TPM Vol. 32, No. 3 2025
ISSN: 1972-6325
https://www.tpmap.org/

Open Access

STUNTING PREVENTION: BIBLIOMETRIC ANALYSIS

OKTARIA SAFITRI[1,2], STANG[3], SHANTI RISKIYANI[4],ABDUL SALAM[5], MARDIANA AHMAD[6], HASNAWATI AMQAM[7], ANTO J. HADI[8], ANWAR MALLONGI[9]*

[1]FACULTY OF PUBLIC HEALTH, HASANUDDIN UNIVERSITY, DOCTORAL PROGRAM STUDENT. MAKASSAR, INDONESIA.
[2]SEKOLAH TINGGI ILMU KESEHATAN ADILA, DEPARTMENT OF MIDWIFERY. LAMPUNG, INDONESIA.
[3]FACULTY OF PUBLIC HEALTH, HASANUDDIN UNIVERSITY, DEPARTMENT OF BIOSTATISTICS HEALTH. MAKASSAR, INDONESIA.
[4]FACULTY OF PUBLIC HEALTH, HASANUDDIN UNIVERSITY, DEPARTMENT OF HEALTH PROMOTION. MAKASSAR, INDONESIA.
[5]FACULTY OF PUBLIC HEALTH, HASANUDDIN UNIVERSITY, DEPARTMENT OF HEALTH NUTRITION. MAKASSAR, INDONESIA.
[6]FACULTY OF MIDWIFERY, HASANUDDIN UNIVERSITY, DEPARTMENT OF MIDWIFERY. MAKASSAR, INDONESIA.
[7]FACULTY OF PUBLIC HEALTH, HASANUDDIN UNIVERSITY, DEPARTMENT OF ENVIRONMENTAL HEALTH. MAKASSAR, INDONESIA.
[8]FACULTY OF HEALTH, AUFA ROYHAN UNIVERSITY, DEPARTMENT OF PUBLIC HEALTH. PADANGSIDIMPUAN, INDONESIA.
[*9]FACULTY OF PUBLIC HEALTH, HASANUDDIN UNIVERSITY, DEPARTMENT OF ENVIRONMENTAL HEALTH. MAKASSAR, INDONESIA.

ABSTRACT

Objective: This study analyzes trends in stunting prevention research through a bibliometric approach to identify developments, international collaborations, and the most effective interventions.

Methods: 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 critria 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.

Conclusion: 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.

INTROADUCTION

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 (Wright et al., 2021). In implementing the 1000 HPK program policies, several agencies used the SOP as a procedure for implementing the program as well as the division of tasks and responsibilities based on the Decree of the Maros Regent (Azis et al., 2023). 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%. (World Health Organization, 2018).

Stunting affects 87 million children in Asia alone, 59 million in Africa, and 6 million in Latin America and the Caribbean. Five sub-regions—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)—have child stunting rates higher than 30%. The government has a role as a director, regulator, and implementer in accelerating the

reduction of stunting in Indonesia, with a target of 14% by 2024. Sensitive interventions are responsible for 70% of the success in reducing stunting, while specific interventions account for 30% (BKKBN, 2021).
Children who suffer from chronic or long-term malnutrition, particularly before the age of two, will grow physically more slowly and become shorter (stunting). If this is not addressed, it will lead to disease, death, stunted growth, impaired mental and cognitive development, and impaired motor development. Stunted children will also have lower IQs, which will result in less than ideal learning outcomes. Decreased fat oxidation capacity is also linked to long-term consequences, increasing the risk of obesity and degenerative illnesses like cardiovascular disease, type 2 diabetes, and hypertension (Kemenkes, 2022).
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 (Keats et al., 2018), Suboptimal parenting patterns, which can cause the prevalence of stunting (Peñalvo et al., 2021). Parental opinions and work are one of the causes of stunting (Rahayuwati et al., 2023). 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(Batool et al., 2023). The Knowledge, role of parents and weight baby new born is factor's significant and knowledge is dominant with stunting incidence to child under five years (Silas et al., 2018). The risk factor of immunization history and incidence of stunting that's it exclusive breastfeeding history, history of infectious diseasesand history of LBW, (miranti, 2020). There was a difference in the skills of the cadres after being given the Android-based DPQ intervention and skills of toddler mothers after being given the Android-based DPQ intervention applied by the cadres (Hasriani, 2023).
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 (Kemenkes RI, 2022)
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 (Kemenkes RI, 2022). 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 (Tnp2K et al., 2020).
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 (Tnp2K et al., 2020). and stunting prevention can be in the form ofcross-sector collaboration, it is expected that the government and stakeholders share a common perception in addressing stunting issues, enabling joint problem-solving (Goi et al., 2025).

LITERATURE REVIEW 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 31

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.

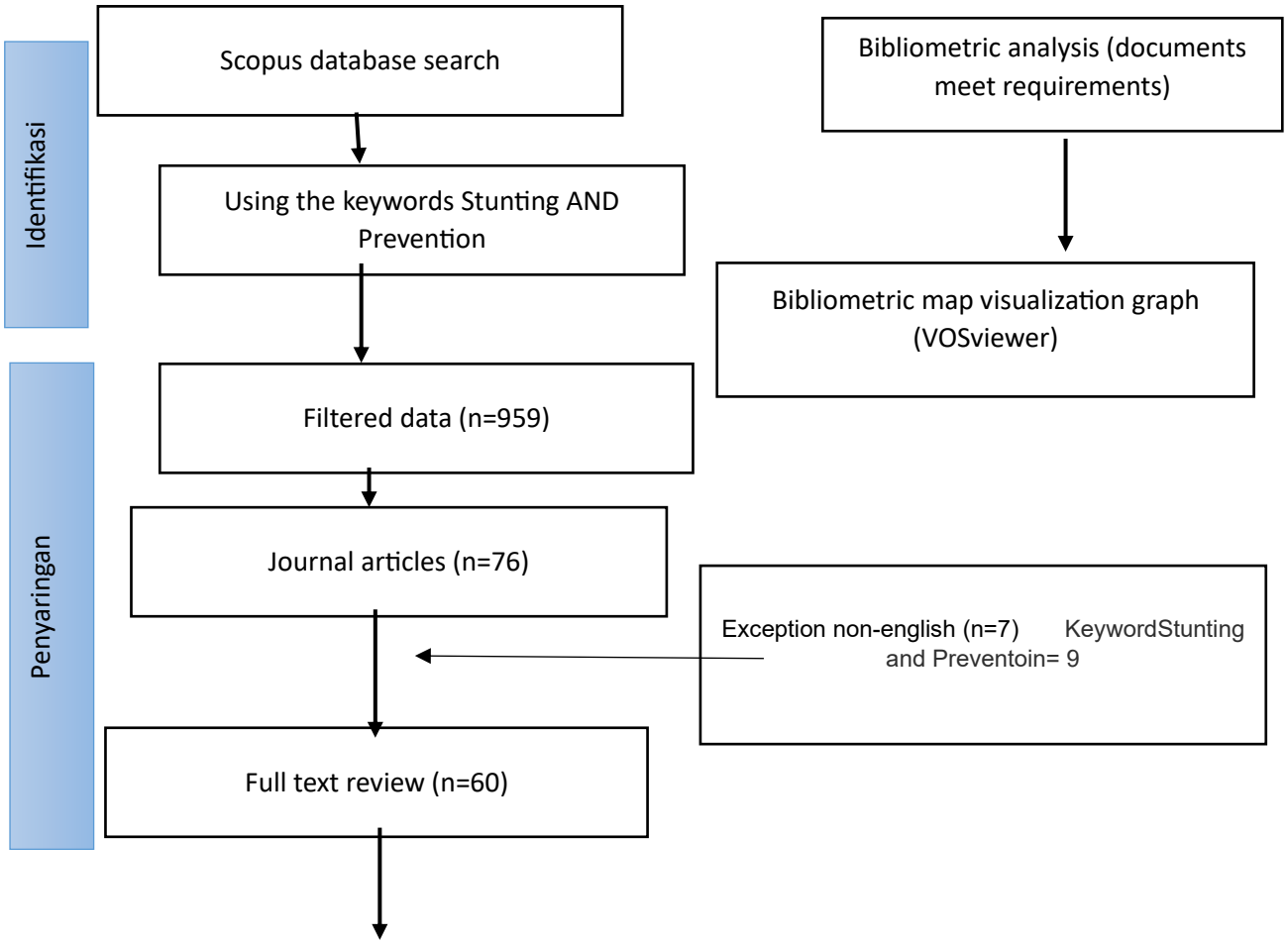
Systematic Review Analysis

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.

Figure 1. Data Processing Flowchart



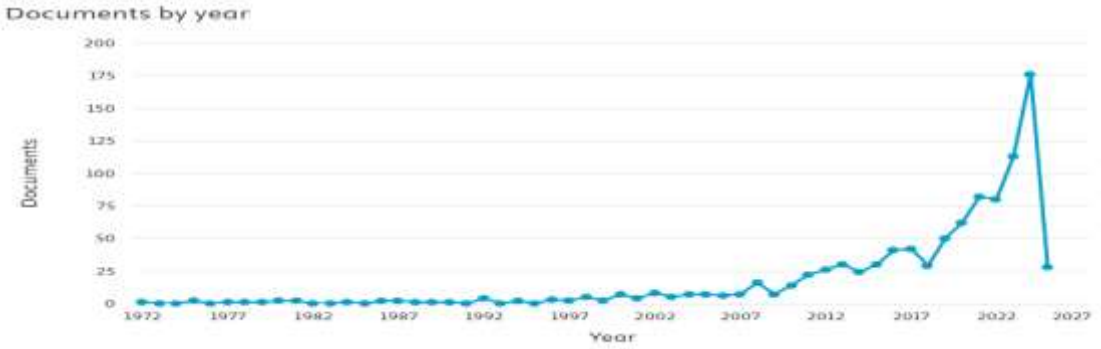
TPM Vol. 32, No. 3 2025
ISSN: 1972-6325
https://www.tpmap.org/

Termasuk

Full text review (n=18) → Literature Review Data collection

In this study, a final sample size of n=18 was chosen because it was the result of a rigorous systematic screening process, designed to ensure that only the most relevant and high-quality documents (English-language journal articles that passed full-text review) were analyzed. In bibliometrics, sample size is not determined by statistical formulas, but by the completeness and relevance of the search. This sample represents the entire population of documents that meet all predetermined inclusion criteria, making it suitable for in-depth and accurate bibliometric map analysis.

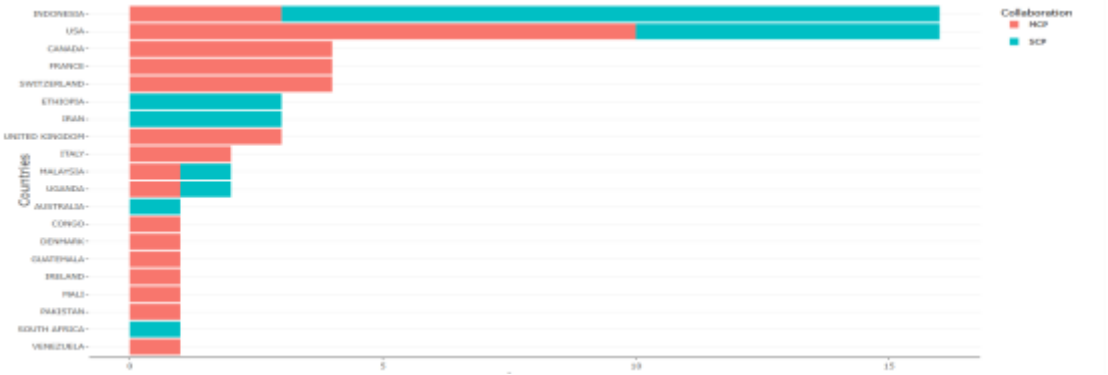
Figure 2 Journal Publications on stunting from 1972-2025



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 3. Related Countries



1. **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.

2. **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.

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

Table 1. 10 influential articles based on citations

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	10.1177/15648265130340S308	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/S1368980014002540	39	3.55	0.86

1. Most Cited Article : Stewart CP et al., 2013 : 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.

2. Hoddinott J et al., 2013 : 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.

3. Articles with High Normalized Citations :

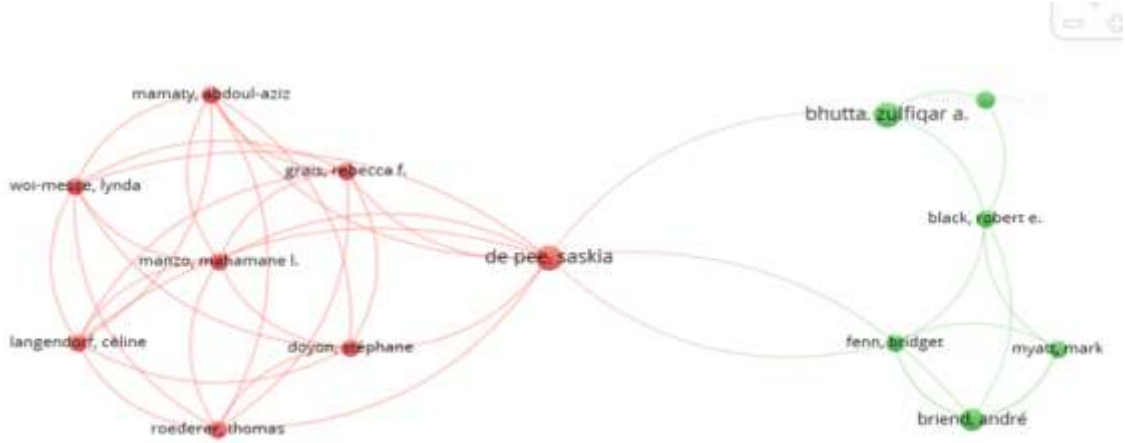
Olney DK et al., 2015 : Although its total citations are not as high as the first two articles, this article has the highest normalized citations (3.74), indicating that this article is very influential in its field. This article may discuss effective nutritional interventions in preventing stunting, which can be an important reference for your article.

Michaelsen KF et al., 2017 : 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.

4. Articles with Low Normalized Citations :

Poh BK et al., 2013 and Kellsch GT et al., 2013 : Both of these 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 4 Co-Authorship By Author



1. 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.

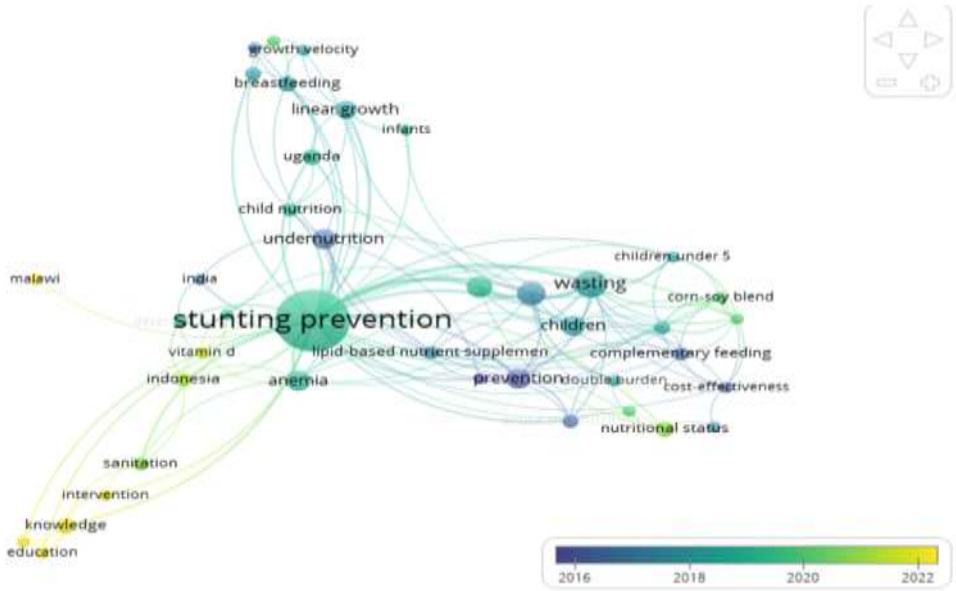
2. Context Collaboration :

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.

3. 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 .

Figure 5 Outher Keyword Co-Occurrence



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.

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 (BKKBN, 2021).

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 (Yulia et al., 2023) 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 2. of 10 Most Influential Articles on Stunting Prevention

Paper (Year)	Country	Sample	Method	Variables	Key Results
Stewart CP (2013)	Malawi	2,400 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). (Stewart et al., 2013)
Hoddinott J (2013)	Guatemala	1,500 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 (2015)	Burkina Faso	1,800 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). (Olney et al., 2016)
Poh BX (2013)	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). (Poh et al., 2013)
GT (2013)	Global (10 countries)	12 RCTs (n=8,000)	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 . (Krebs et al., 2011)
Menon P (2018)	India	3,200 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). (Menon et al., 2018)
Ickes SB (2015)	Uganda	1,000 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 . (Ickes et al., 2017)

Paper (Year)	Country	Sample	Method	Variables	Key Results
Michaelsen KF (2017)	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). (Michaelsen et al., 2017)
Hasan MT (2016)	Bangladesh	5,000 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 ($p<0.05$). (Hasan et al., 2016)
Solomons NW (2015)	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). (Ofori et al., 2022)

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 (2013) and Hoddinott (2013) 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 Kelisch's (2013) 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 (2016) study revealed that poor sanitation increases the risk of stunting by 1.5 times, while Menon's (2018) 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. Solomons' (2015) analysis found that food fortification programs were more successful in urban than rural areas, while Ickes' (2015) 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 (2015) and Hoddinott (2013) 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

Limitations of the Study

This bibliometric analysis has several limitations:

1. It only used the Scopus database, potentially missing relevant studies from other sources.
2. The focus on English-language articles may exclude important local/non-English research.
3. Bibliometrics maps trends but cannot assess the quality or effectiveness of individual studies.
4. There may be a time lag in including the very latest publications.

Future Research Directions To address these gaps, future studies should:

1. Expand to multiple databases and include non-English literature**.**
2. Conduct systematic reviews to evaluate intervention effectiveness.
3. Use qualitative/mixed methods to explore contextual barriers and facilitators.
4. Apply implementation science frameworks to study scaling and sustainability of programs.

CONCLUSIONS

This bibliometric analysis demonstrates consistent growth in stunting prevention research, predominantly concentrating on nutritional, sanitary, and educational strategies. The most successful approaches integrate multimodal solutions—combining dietary supplements, enhanced sanitation infrastructure, and behavioral modifications—which significantly reduce stunting rates, particularly among children under two. A central obstacle remains the contextual adaptation of global interventions, as local socio-cultural and environmental conditions critically influence program efficacy. Despite the urgent need for evidence-based strategies in high-burden nations like Indonesia, international collaborative efforts remain insufficient. Moving forward, effective stunting reduction will depend on technological innovation, community-driven initiatives, and sustainable policy implementation, underscoring the necessity of cross-sectoral collaboration rather than reliance solely on healthcare systems to eradicate stunting.

REFERENCES

1. Azis, A. S. F. W., Darmawansyah, Razak, A., Arifin, A., Syafar, M., & Mallongi, A. (2023). Analysis of Policy Implementation of The First 1000 Days of Life Program in Overcoming Stunting in Maros District. *Pharmacognosy Journal*, *15*(3), 405–410. https://doi.org/10.5530/pj.2023.15.92
2. Batool, M., Saleem, J., Zakar, R., Butt, M. S., Iqbal, S., Haider, S., & Fischer, F. (2023). 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*, *23*(1), 1–7. https://doi.org/10.1186/s12889-023-17135-z
3. BKKBN. (2021). BKKBN Kebijakan Dan Strategi Pecepatan Penurunan Stunting di Indonesi. In *Jakarta*.
4. Capacity, I., Indonesia, I., Under-five, P. I. C., The, E., Of, S., Skilled, H., On, R., & Funds, V. (2020). *Tnp2K Series*. *01*(01).
5. Goi, M., Salmah, A. U., Jafar, N., Ilham, A. A., Stang, S., Safar, M., & Mallongi, A. (2025). Cross-Sector Collaboration in Addressing Stunting in Indonesia. *Pharmacognosy Journal, 16*(6), 1424–1430. https://doi.org/10.5530/pj.2024.16.229
6. Hasan, M. T., Soares Magalhaes, R. J., Williams, G. M., & Mamun, A. A. (2016). 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*, *12*(4), 929–939. https://doi.org/10.1111/mcn.12178
7. Hasriani, Andi Ummu Salmah, Masni, Apik Indarty Moedjiono, Healthy Hidayanty, Wahiduddin, and A. Mallongi. (2023). Analysis of Knowledge and Skills of Cadres in Early Detection of Stunting Toddler Development in Soppeng Regency, Indonesia. *Pharmacognosy Journal, 15*(5), 833-838. https://doi.org/http://dx.doi.org/10.5530/pj.2023.15.159
8. Hoddinott, J., Behrman, J. R., Maluccio, J. A., Melgar, P., Quisumbing, A. R., Ramirez-Zea, M., Stein, A. D., Yount, K. M., & Martorell, R. (2013). Adult consequences of growth failure in early childhood. *American Journal of Clinical Nutrition*, *98*(5), 1170–1178. https://doi.org/10.3945/ajcn.113.064584
9. Ickes, S. B., Baguma, C., Brahe, C. A., Myhre, J. A., Adair, L. S., Bentley, M. E., & Ammerman, A. S. (2017). 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*, *3*(1), 1–10. https://doi.org/10.1186/s40795-017-0140-8
10. Keats, E. C., Macharia, W., Singh, N. S., Akseer, N., Ravishankar, N., Ngugi, A. K., Rizvi, A., Khaemba, E. N., Tole, J., & Bhutta, Z. A. (2018). Accelerating Kenya's progress to 2030: Understanding the determinants of under-five mortality from 1990 to 2015. *BMJ Global Health*, *3*(3), 1–15. https://doi.org/10.1136/bmjgh-2017-000655
11. Kemenkes. (2022). Hasil Survei Status Gizi Indonesia (SSGI) 2022. *Kemenkes*, 1–7.
12. Kemenkes RI. (2022). *Kemenkes RI no HK.01.07/MENKES/1928/2022 Tentang Pedoman Nasional Pelayanan Kedokteran Tata Laksana Stunting*. 1–52.
13. Krebs, N. F., Mazariegos, M., Tshefu, A., Bose, C., Sami, N., Chomba, E., Carlo, W., Goco, N., Kindem, M., Wright, L. L., & Michael Hambidge, K. (2011). Meat consumption is associated with less stunting among toddlers in four diverse low-income settings. *Food and Nutrition Bulletin*, *32*(3), 185–191. https://doi.org/10.1177/156482651103200301
14. Menon, P., Headey, D., Avula, R., & Nguyen, P. H. (2018). Understanding the geographical burden of stunting in India: A regression-decomposition analysis of district-level data from 2015–16. *Maternal and Child Nutrition*, *14*(4), 1–10. https://doi.org/10.1111/mcn.12620
15. Michaelsen, K. F., Grummer-Strawn, L., & Bégin, F. (2017). Emerging issues in complementary feeding: Global aspects. *Maternal and Child Nutrition*, *13*(January), 1–7. https://doi.org/10.1111/mcn.12444
16. Ofori, K. F., Antoniello, S., English, M. M., & Aryee, A. N. A. (2022). Improving nutrition through

biofortification–A systematic review. *Frontiers in Nutrition*, *9*(December), 1–20. https://doi.org/10.3389/fnut.2022.1043655
17. Olney, D. K., Bliznashka, L., Pedehombga, A., Dillon, A., Ruel, M. T., & Heckert, J. (2016). A 2-year integrated agriculture and nutrition program targeted tomothers of young children in Burkina Faso reduces underweight among mothers and increases their empowerment: A cluster-randomized controlled trial. *Journal of Nutrition*, *146*(5), 1109–1117. https://doi.org/10.3945/jn.115.224261
18. Peñalvo, J. L., Sagastume, D., Mertens, E., Uzhova, I., Smith, J., Wu, J. H. Y., Bishop, E., Onopa, J., Shi, P., Micha, R., & Mozaffarian, D. (2021). Effectiveness of workplace wellness programmes for dietary habits, overweight, and cardiometabolic health: a systematic review and meta-analysis. *The Lancet Public Health*, *6*(9), e648–e660. https://doi.org/10.1016/S2468-2667(21)00140-7
19. Poh, B. K., Ng, B. K., Siti Haslinda, M. D., Nik Shanita, S., Wong, J. E., Budin, S. B., Ruzita, A. T., Ng, L. O., Khouw, I., & Norimah, A. K. (2013). 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*, *110*(SUPPL.3). https://doi.org/10.1017/S0007114513002092
20. Rahayuwati, L., Komariah, M., Sari, C. W. M., Yani, D. I., Hermayanti, Y., Setiawan, A., Hastuti, H., Maulana, S., & Kohar, K. (2023). 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*, *16*(August), 2271–2278. https://doi.org/10.2147/JMDH.S417749
21. Silas, L., Rantetampang, A. L., Tingginehe, R., & Mallongi, A. (2018). The Factors Affecting Stunting Child under Five Years in Sub Province Mimika. *International Journal of Science and Healthcare Research*, *3*(2), 99–108. www.ijshr.com
22. Stewart, C. P., Iannotti, L., Dewey, K. G., Michaelsen, K. F., & Onyango, A. W. (2013). Contextualising complementary feeding in a broader framework for stunting prevention. *Maternal and Child Nutrition*, *9*(S2), 27–45. https://doi.org/10.1111/mcn.12088
23. World Health Organization, W. H. O. (2018). *Reducing stunting in children: equity considerations for achieving the Global Nutrition Targets 2025*. https://www.who.int/publications/i/item/9789241513647
24. Wright, B., Hargate, R., Garside, M., Carr, G., Wakefield, T., Swanwick, R., Noon, I., & Simpson, P. (2021). A systematic scoping review of early interventions for parents of deaf infants. *BMC Pediatrics*, *21*(1), 1–13. https://doi.org/10.1186/s12887-021-02893-9

FINANCING: None

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

AUTHORSHIP CONTRIBUTION:
Conceptualization: Oktaria Safitri1, Shanti Riskiyani2, Stang3,Abdul Salam4, Mardiana Ahmad5,Hasnawati Amqam6, Anto7, Anwar Mallongi 8
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