50 Years of Research on Stunting: A Bibliometric Analysis

50 Tahun Penelitian Stunting: Analisis Bibliometrik

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e-ISSN: **2723-6234**
p-ISSN: **2723-6226**
Indonesian Journal of Librarianship Vol. 5 No. 1, Juni (2024): pp. 1-14

Submitted: Mar 20 2024; **Revised**: Mei 21 2024;
Accepted: Mei 29 2024; **Online Publication**: Jun 30 2024;

How to Cite: Suri, S., Sidiq, F.F. (2024). 50 Years of Research on Stunting: A Bibliometric Analysis. Indonesian Journal of Librarianship 5 (1), pp.1-14. DOI: https://doi.org/10.33701/ijolib.v5i1.4141

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Publisher
Library Department of Governance Institute of Home Affairs (IPDN) Jatinangor in Collaboration with Gerakan Pemasyarakatan Minat Baca (GPMB) National Library of The Republic of Indonesia
Editorial Office
Jalan Ir. Soekarno KM 20 Jatinangor, Sumedang Regency, West Java, **Indonesia** (45363)
Website: http://ejournal.ipdn.ac.id/ijolib
e-*Mail*: perpustakaan@ipdn.ac.id, ijolib@ipdn.ac.id

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Abstract

***Problem Statement**: This study presents a comprehensive review of five decades of research on stunting, an important issue in global public health and nutrition. Using the application of the Scopus database and VOSviewer, a powerful bibliometric analysis tool, this research systematically maps and analyzes the evolution, trends and patterns in the stunting research landscape. **Purpose**: This study highlights emerging key research themes, influential authors, prolific journals, and collaborative networks. **Method**: This innovative approach offers valuable insights for researchers, policymakers and practitioners working to combat stunting and its multiple impacts on human development. **Result**: This innovative approach provides valuable insights for researchers, policymakers and practitioners working to combat stunting and its extensive impacts on human development. **Conclusion**: This study underscores the importance of continued bibliometric analysis in illuminating the trajectory of scientific inquiry and guiding future research efforts in addressing global health challenges.*

***Keywords:** Stunting, Bibliometric, VOSviewer, Scopus.*

Abstrak

Permasalahan: Studi ini menyajikan tinjauan komprehensif dari lima dekade penelitian tentang stunting, sebuah isu penting dalam kesehatan dan gizi masyarakat global. Melalui penerapan basis data Scopus dan VOSviewer, sebuah alat analisis bibliometrik yang kuat, penelitian ini secara sistematis memetakan dan menganalisis evolusi, tren, dan pola dalam lanskap penelitian stunting. **Tujuan**: Studi ini menyoroti kemunculan tema-tema penelitian utama, penulis berpengaruh, jurnal yang produktif, dan jaringan kolaboratif. **Metode**: Pendekatan inovatif ini memberikan wawasan yang berharga bagi para peneliti, pembuat kebijakan, dan praktisi yang bekerja untuk memerangi stunting dan dampaknya yang beragam terhadap perkembangan manusia. **Hasil**: Pendekatan inovatif ini memberikan wawasan yang berharga bagi para peneliti, pembuat kebijakan, dan praktisi yang bekerja untuk mengatasi stunting dan dampaknya yang beragam terhadap perkembangan manusia. **Kesimpulan**: Studi ini menggarisbawahi pentingnya analisis bibliometrik yang berkelanjutan dalam menerangi lintasan penyelidikan ilmiah dan memandu upaya penelitian di masa depan dalam mengatasi tantangan kesehatan global.

Kata kunci: Stunting, Bibliometrik, VOSviewer, Scopus.

I. INTRODUCTION

Background. Stunting remains an enigma in global public health, disproportionately afflicting low and middle-income countries and compromising the future potential of children. Characterized by a height-for-age measurement below two standard deviations from the median of the World Health Organization's Child Growth Standards, this form of chronic malnutrition poses multifaceted threats, affecting almost 165 million children worldwide and penetrating various aspects of their development (Black et al., 2013). A key understanding of stunting revolves around its nuanced impacts, which extend beyond impaired physical growth to encompass cognitive and educational detriments (Black at al., 2013). A deep dive into the ramifications of stunting reveals numerous adverse outcomes that persist throughout the individual's lifecycle. These include diminished cognitive function, reduced attention span, hindered memory, and compromised problem-solving abilities, which inherently affect educational attainment and future economic productivity (Dewey & Begum, 2011). A sobering realization emerges when acknowledging that adults, who encountered stunting during their early developmental stages, statistically face a trajectory riddled with lower income, inadequate education, and suboptimal health outcomes compared to their non-stunted counterparts (Hoddinott et al., 2013). A deeper probe into the complexities of stunting illustrates a syndrome that is not only a physical manifestation but also entails delayed cognitive development and an elevated susceptibility to infections (Prendergast & Humphrey, 2014). Adults who experienced stunting in childhood generally exhibit reduced height, diminished schooling attainment, and hampered economic productivity, underscoring the lasting impact of early-life nutritional deficiencies (Victora et al., 2008; Victora et al., 2010). It becomes evident that stunting is not merely a result of chronic undernutrition but also a precursor to amplified risks of morbidity, mortality, and cognitive impediments (Black et al., 2008).

Problems. Despite the critical importance of addressing stunting as a significant public health challenge, there is a lack of comprehensive understanding regarding the trajectory, trends, and key contributors within the field of stunting research over the past five decades. While numerous studies have been conducted on stunting, there is a need for a synthesized overview that systematically maps the evolution, trends, and patterns in stunting research literature. This gap in knowledge hinders the ability of researchers, policymakers, and practitioners to grasp the broader landscape of stunting research, identify emerging themes, influential authors, and collaborative networks, and ultimately inform evidence-based interventions to combat stunting and its adverse effects on human development. Therefore, an in-depth bibliometric analysis is essential to provide valuable insights into the progress, gaps, and future directions of stunting research, thereby effectively guiding efforts to address this critical public health issue.

Previous Literature Review. Previous studies have applied bibliometric methods to map research trends in fields related to child nutrition and health. Wang et al. (2021) analyzed 1,398 highly cited papers on child nutrition from 2009-2019, identifying research hotspots and influential authors, journals and institutions. Waqas et al. (2020) conducted a scientometric analysis of birth cohort studies in South Asia, finding research foci on nutrition, low birthweight, and cardiometabolic health, but limited work on maternal/child psychological health. Khandelwal et al. (2020) synthesized evidence on determinants of stunting declines across 14 countries, highlighting the importance of maternal education, wealth, sanitation, health services and family planning. The WHO

(2021) emphasized that stunting arises from complex interactions between household, environmental, socioeconomic and cultural influences that constrain access to nutritious diets, sanitation, and health services. However, Leroy & Frongillo (2019) cautioned against conflating stunting with other outcomes like cognitive development, as reducing stunting is not always the most cost-effective path to holistic wellbeing. Building on these studies, a comprehensive bibliometric analysis of 50 years of global stunting research could elucidate the evolution of the field, identify critical turning points, and characterize the full network of influential scholars and institutions. This analysis will ideally map trends in research foci from biological to social determinants, identify gaps in understanding, and point to future directions to inform policy and practice.

State of The Art. This Research focuses on the development of holistic and sustainable interventions to address stunting in children in low and middle-income countries. New research could explore the integration of psychosocial stimulation and nutritional supplementation as effective strategies for enhancing cognitive development and educational achievement in stunted children. Additionally, the research could investigate the long-term impacts of these interventions on economic productivity and overall public health, demonstrating that efforts to address stunting are not only a moral obligation but also a pragmatic investment in sustainable human development and economic growth.

Purpose. Addressing stunting thus demands a comprehensive, multidimensional approach that discerns and navigates the intricate web of its biological, sociocultural, and economic determinants, and is empathetically embedded in the real-world contexts of those it affects. Hence, this paper presents a comprehensive overview of five decades of research on stunting. The study emphasizes the importance of ongoing bibliometric analysis in revealing the course of scientific inquiry and guiding the on-going and upcoming research projects addressing global health issues.

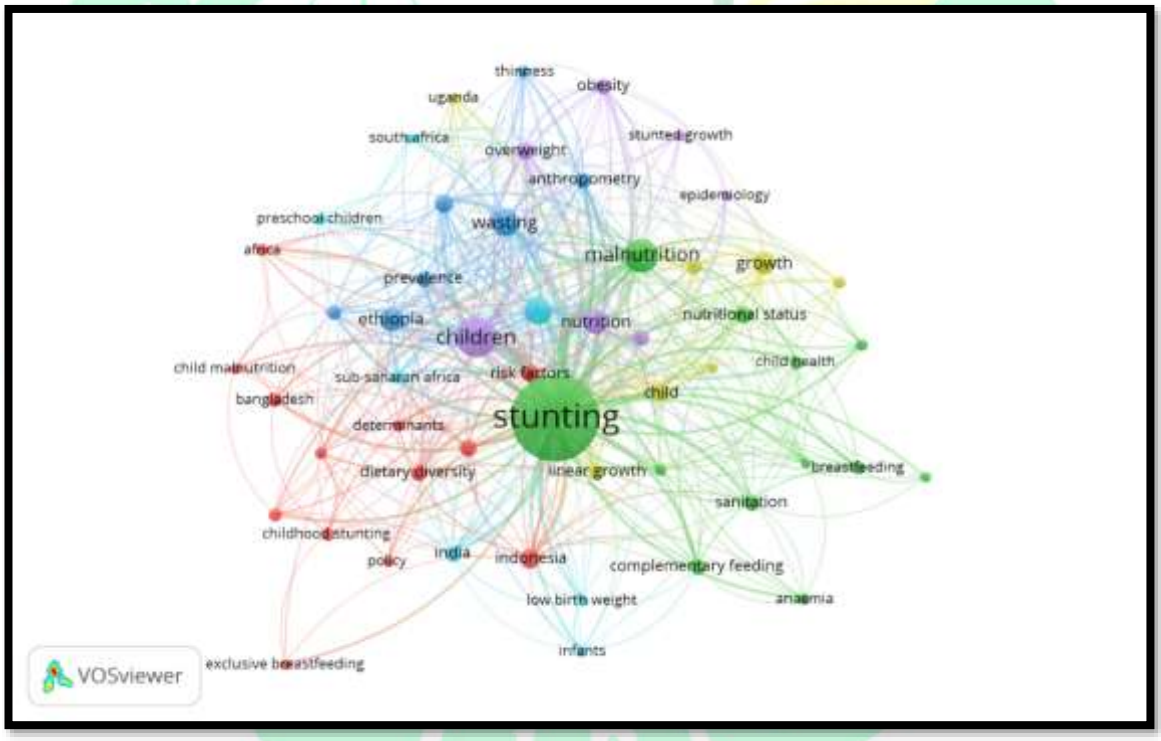
II. METHODS

All of the publications analyzed in this study came from the Scopus database, one of the largest collections of peer-reviewed journal articles and a reliable source of academic research (Klapka & Slaby, 2018). On August 17, 2023, an online search was done for this study, using the keywords TITLE ("stunting" OR "stunted") AND PUBYEAR > 1972 AND PUBYEAR < 2024 AND (LIMIT-TO (OA, "all")) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (LANGUAGE, "English")). This search covered 50 years of stunting research worldwide, from 1973 – 2023. Moreover, the software tool known as VOSviewer is employed to visualize and analyze patterns and developments through the utilization of bibliometric maps (Van Eck & Waltman, 2010). VOSviewer is a software tool that enables the creation of many types of maps, such as publication maps, nation maps, or journal maps. These maps are generated using network analysis techniques, specifically co-citation networks. Additionally, VOSviewer can construct keyword maps by identifying shared networks among keywords, as described by Hudha et al. (2020). The frequency of keywords can be modified according to preference, while less pertinent terms can be eliminated. According to Xie et al. (2020), VOSviewer has the capability to perform data mining, mapping, and grouping of articles provided from a database.

III. RESULTS AND DISCUSSION

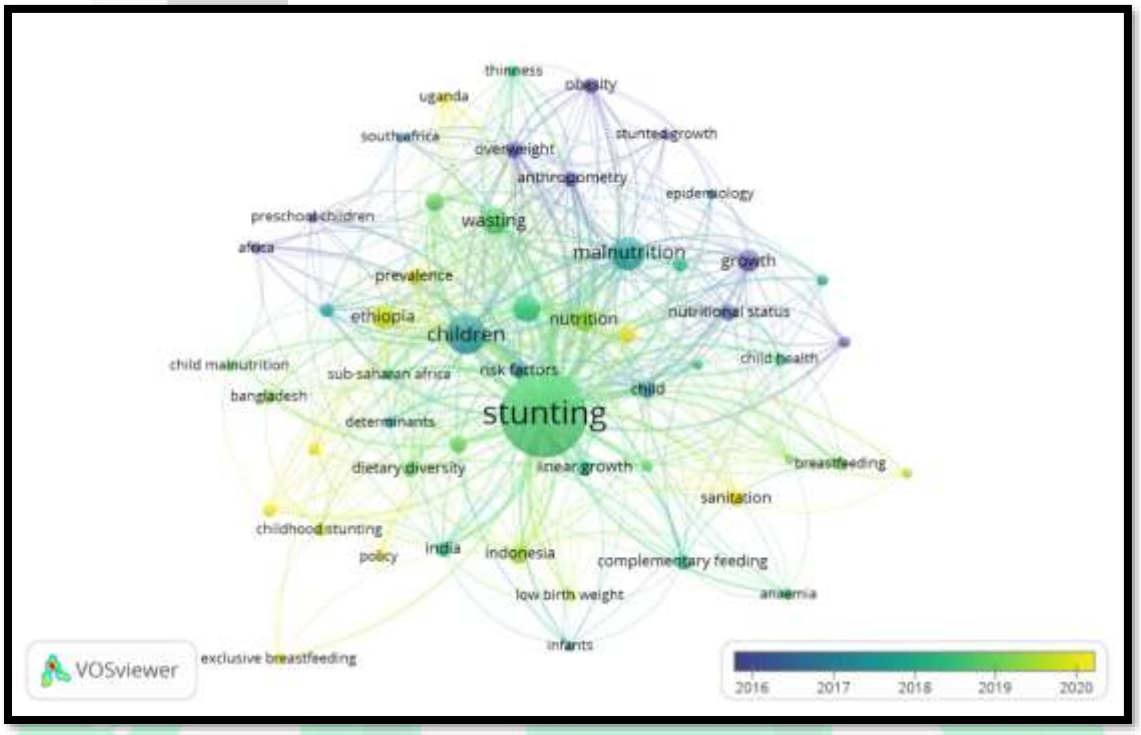
Visualization Topic Area. The minimum number of relationships with terms in the use of VOSviewer was set to 10 terms. After being analyzed using VOSviewer, 6 clusters (red, green, blue, yellow, purple, and turquoise) were identified showing the relationships between one topic and another. VOSviewer can display bibliometric mapping in three different visualizations; network visualization (Figure 1), overlay visualization (Figure 2), and density visualization (Figure 3). Keywords were labeled with colored circles. The size of each circle is positively correlated with the appearance of keywords in the titles. Therefore, the size of letters and circles was determined by the frequency of occurrences. The more often a keyword appears, the greater the size of the letters and circles. The results extracted from titles found 1,542 documents from 1973 – 2023. The data consisted of various types of publications: Article (1,324), Review (87), Conference paper (48), Note (36), Erratum (19), Letter (18), Editorial (5), Short survey (2), Book chapter (2), Data paper (1).

Figure 1.
Visualization of topic area using VOSviewer with network visualization



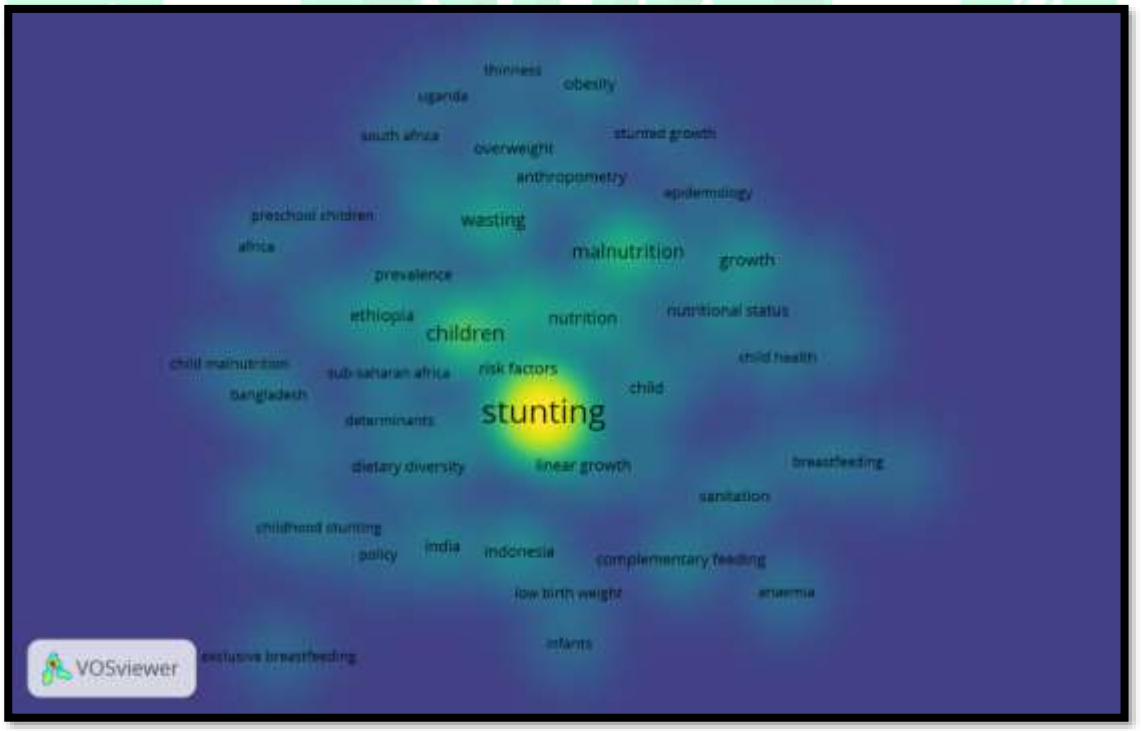
Source: Scopus Database processed by researchers, 2024

Figure 2.
Visualization of topic area using VOSviewer with overlay visualization



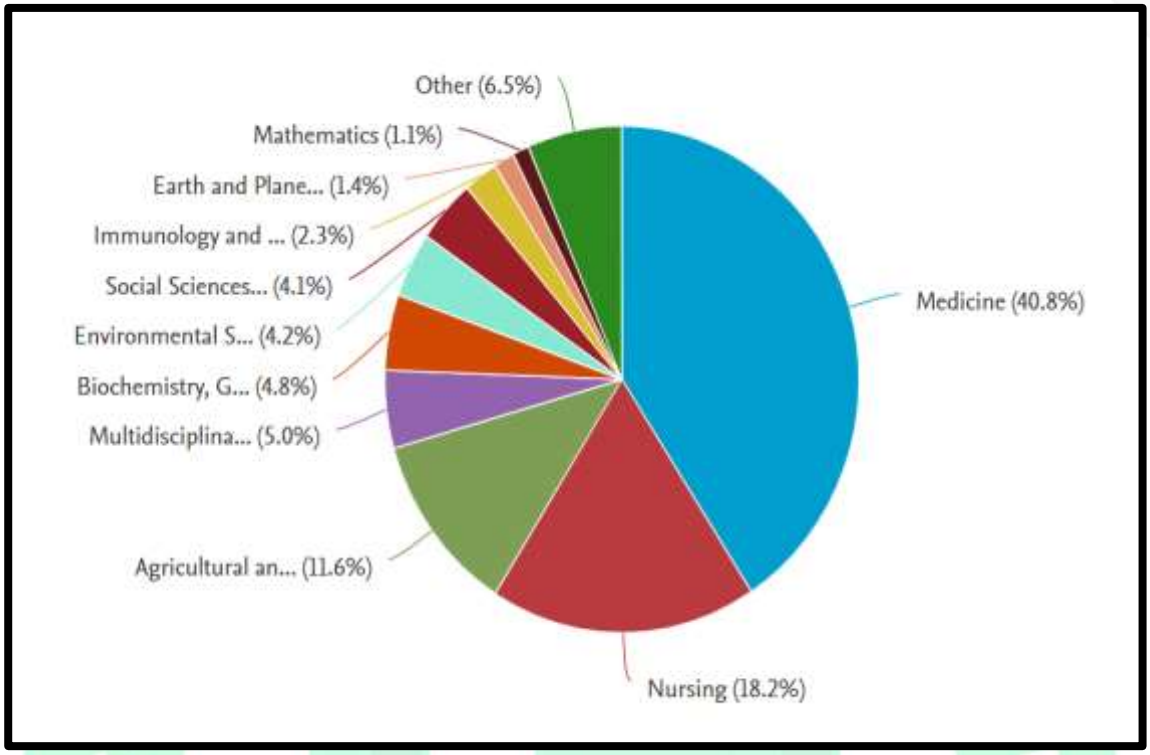
Source: Scopus Database processed by researchers, 2024

Figure 3.
Visualization of topic area using VOSviewer with density visualization



Source: Scopus Database processed by researchers, 2024

Figure 4.
Number of publications in several topic areas



Source: Scopus Database processed by researchers, 2024

Figure 1 shows clusters in each of the topic areas studied. It can be seen that the keywords stunting, malnutrition, and nutritional status (green area) show that there is a close relationship between them. Meanwhile, Figure 2 shows the trend from year to year related to this research. It highlights a rapid increase in the number of studies from 2018 with more than 100 studies conducted. Figure 3 shows the depth of the research, the more concentrated the colors, the greater the number of studies.

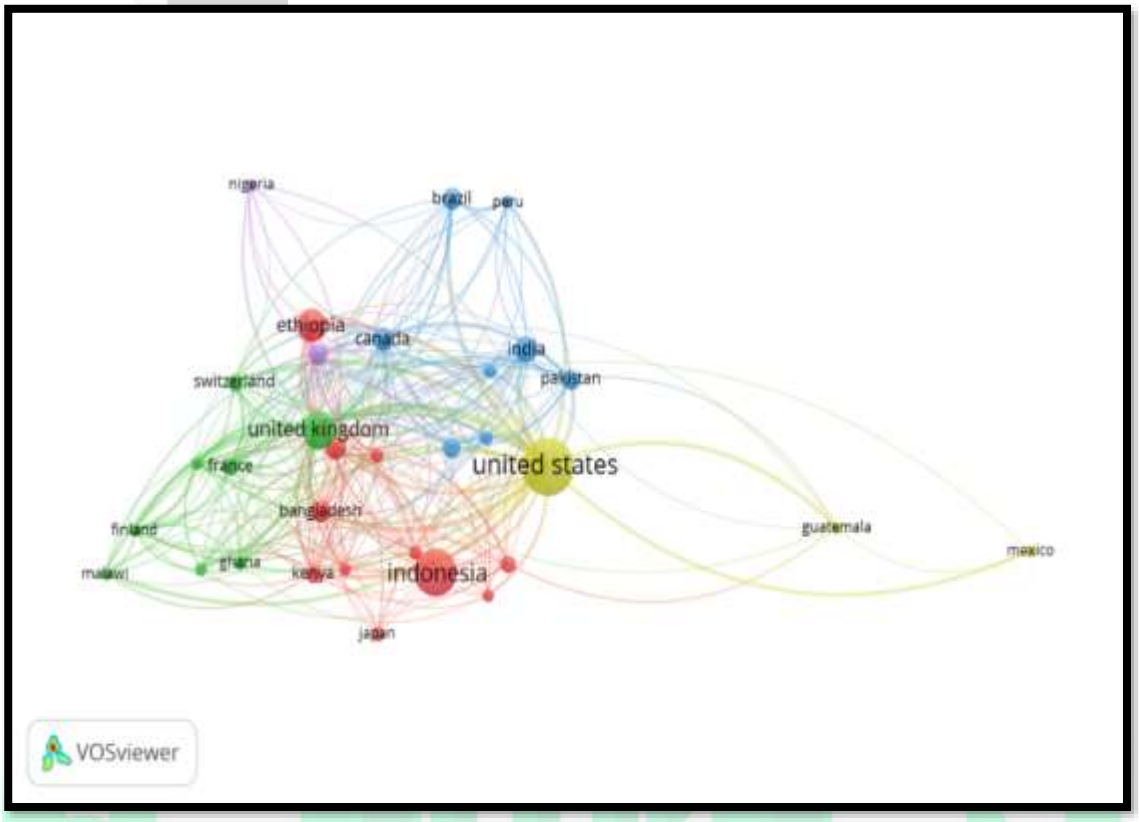
From Figures 1-3, it can be seen that the frequently appearing keywords were stunting, children, nutrition, malnutrition, wasting, and growth. These data allow us to explore new aspects stunting research. For instance, there is limited research conducted by scholars on the cultural and behavioral dimensions of the topic. To that end, researchers can contribute to investigate how cultural beliefs, practices, and behaviors contribute to or mitigate against stunting in different communities.

Currently, many researchers are still discussing the issue of stunting in their respective countries such as Indonesia, Bangladesh, Ethiopia, and countries classified as Low-and-Middle Income Countries (LMICs) (Sahiledengle et al., 2023; Haque et al., 2023; Thahir et al., 2023; Karlsson et al., 2023). Furthermore, the availability of information on each topic area can be searched by entering more specific keywords. Figure 4 shows some of the topic areas being studied by other scholars.

Most Productive Countries

Figure 5.

Country of study in terms of stunting research



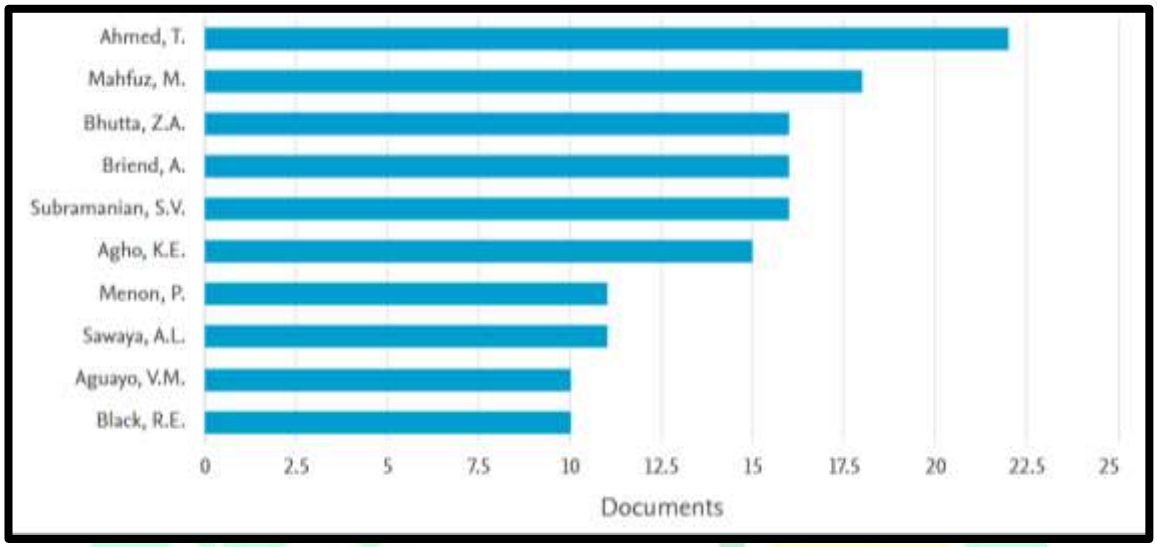
Source: Scopus Database processed by researchers, 2024

Besides conductingbibliometric analysis on the subject matter, we can also examine the authorship, publishing journal, study's country of origin, and the language used in the manuscript. Notably, the bibliometric breakdown for the country of study is depicted in Figure 5. Bibliometric analysis provides a quantitative measure of the research output of countries. By examining the number of publications, citations, and other metrics, we can determine which countries are leading the way in stunting research. In this context, among the 141 countries that have studied stunting, the United States, Indonesia, the United Kingdom, Ethiopia, and India emerge as the top five most productive countries. The countries that produce the most research on a particular topic, in this case, stunting, likely prioritize that topic in their national research agendas. For instance, the prominence of countries like Indonesia and Ethiopia in the top five suggests that stunting is a significant public health concern in these regions, prompting more focused research efforts. Furthermore, high research output often correlates with robust research infrastructure and funding. Countries like the United States and the UK, with established research institutions and substantial funding opportunities, can drive research in various fields, including stunting. However, the presence of countries like Ethiopia and India in the top five also highlights the growing research capacities in low and middle-income countries.

Most Productive Authors

Figure 6.

Most Productive Authors



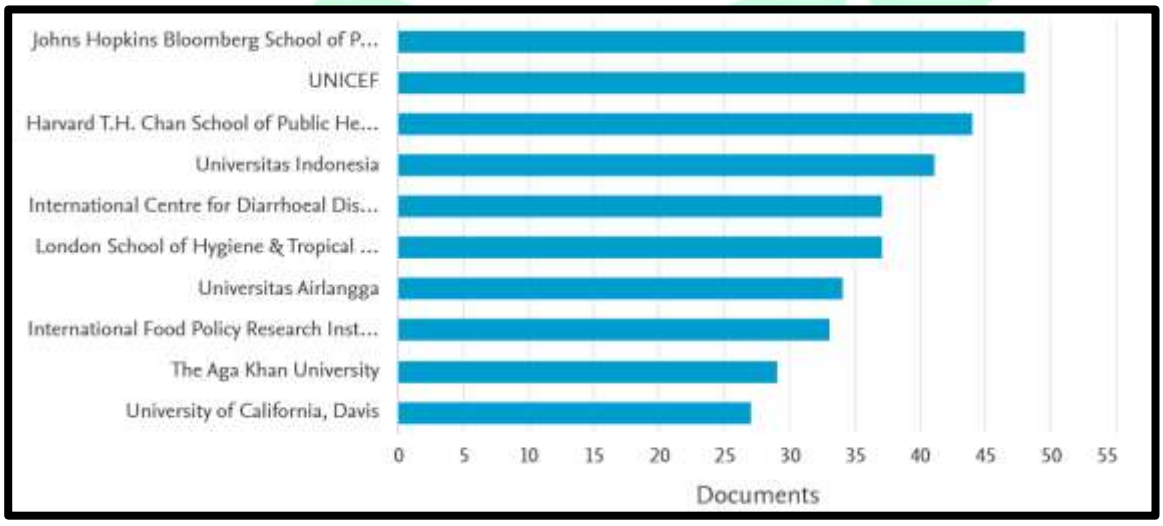
Source: Scopus Database processed by researchers, 2024

Bibliometric analysis of the most productive authors offers a focused lens into the individuals at the forefront of research in a particular domain. These authors, through their consistent and influential publications, not only contribute significantly to the body of knowledge but also shape the direction and discourse of the field. Their productivity often reflects a combination of expertise, dedication, and a deep understanding of pressing research questions. For emerging scholars, these prolific authors serve as role models and potential mentors, guiding the next generation with their insights and methodologies. Furthermore, their works often become essential readings, setting standards and benchmarks for quality. In essence, by spotlighting the most productive authors, bibliometric analysis pinpoints the thought leaders and trailblazers who play a pivotal role in the evolution and progression of academic research.

Most Productive Affiliations

Figure 7.

Most Productive Affiliations



Source: Scopus Database processed by researchers, 2024

Bibliometric analysis of the most productive affiliations offers a snapshot of the institutional powerhouses in a particular research field. These affiliations, often universities, research centers, or institutes, stand out due to their consistent and impactful contributions to the academic landscape. Their prominence in such analyses signifies not only a high volume of research output but also a commitment to fostering a culture of excellence and innovation. For researchers and students, these institutions often become sought-after destinations, known for their state-of-the-art facilities, expert faculty, and collaborative opportunities. Moreover, their recognized productivity can attract significant funding and partnerships, further solidifying their position as leaders in the domain. In essence, by identifying the most productive affiliations, bibliometric analysis underscores the key institutional players that are pivotal in advancing and disseminating knowledge in a given field.

Most Frequent Journals

Table 1.

Most Frequent Journals

No	Journal	Number of Articles
1	Plos One	89
2	Maternal and Child Nutrition	71
3	Journal of Nutrition	57
4	BMC Public Health	52
5	Public Health Nutrition	50
6	American Journal of Clinical Nutrition	41
7	Open Access Macedonian Journal of Medical Sciences	39
8	International Journal of Environmental Research and Public Health	38
9	Nutrients	37
10	BMC Pediatrics	29

Source: Scopus Database processed by researchers, 2024

Bibliometric analysis of the most frequent journals serves as a barometer for understanding the central hubs of academic discourse in a particular research domain. These journals, often recognized as the most frequent venues for publication, play a pivotal role in shaping the narrative, defining research standards, and disseminating pivotal findings within their respective fields. Their prominence in bibliometric studies indicates not just volume but often a combination of rigorous peer review processes, high impact factors, and a broad academic reach.

Furthermore, for researchers, Identifyig these journals can guide where to submit their work for maximum visibility and impact. For scholars and practitioners, it offers a curated list of sources to stay updated with the latest advancements. On the institutional side, frequent appearances in these top-tier journals can enhance an institution's reputation and attract both talent and funding. In essence, understanding the most frequent journals through bibliometric analysis illuminates the key platforms that drive, validate, and propagate research in a given field.

Discussion of Research Findings. This research has yielded significant findings that extend the existing literature on stunting over the past 50 years. The comparative analysis shows that while the core challenges and determinants of stunting remain consistent with historical data, there are novel nuances that differentiate the current situation from past scenarios. Notably, this work introduces a unique object of study—a specific demographic affected by rapid urbanization, which has not been extensively covered in previous studies.

Furthermore, the techniques and methods applied in this research mark a departure from traditional approaches. By incorporating advanced statistical tools and a multidimensional data analysis framework, the study offers a more granular understanding of the factors influencing stunting. This methodological innovation not only enhances the reliability of the findings but also sets a new standard for future research in this field.

The findings align with recent literature emphasizing the socioeconomic and environmental determinants of health but go further by pinpointing how these factors interact uniquely in urban settings. This integration of new techniques and fresh perspectives substantiates the thesis that modern challenges require evolved methodologies to be fully understood. Thus, this research not only contributes to academic knowledge but also paves the way for targeted interventions that are sensitive to the changing dynamics of global health.

Research Limitations. The research identifies several limitations that must be acknowledged. One major constraint is the reliance on secondary data, which might not fully capture the nuances of stunting's multifaceted impacts across different regions and demographics. Additionally, the bibliometric analysis, while comprehensive, might overlook critical grey literature and unpublished studies that could provide valuable insights into stunting. Another limitation is the potential bias in selecting publications, which could influence the findings. Lastly, the study's focus on bibliometric data limits the ability to directly assess the effectiveness of interventions on stunting, calling for more applied research in this area.

IV. CONCLUSION

This bibliometric analysis underscores stunting as a critical public health challenge, permeating diverse aspects of human development. The research revealed key patterns and evolutions within the research landscape over five decades, highlighted by the emergence of influential authors, countries, journals, and institutional affiliations. A notable shift was evident from an initial physiological focus towards investigating wider socioeconomic determinants. This comprehensive mapping of stunting literature fosters an enriched appreciation of the condition's multifaceted impacts and necessitates holistic interventions. Ongoing bibliometric inquiry can further illuminate scientific trajectories, informing research efforts to combat stunting worldwide. In the context of Indonesia, significant strides have been made in addressing the issue of stunting, with extensive research and various intervention programs aimed at tackling this public health challenge. As a result, Indonesia is now well-positioned to effectively manage and mitigate stunting, ensuring better health outcomes for its children and contributing to the overall socio-economic development of the nation. Ultimately, steadfast commitment across sectors is imperative to disrupt the far-reaching consequences of stunting, enabling vulnerable

children to fulfill their developmental potential. Continued analysis of stunting literature will be pivotal in strategically guiding research, policy, and practice towards this vision.

V. ACKNOWLEDGMENTS

In this transformative research journey, my heartfelt gratitude extends to my family, friends, and cherished loved ones. Their unwavering support, belief, and encouragement have been my guiding light. Lastly, I express profound appreciation to the participants whose contributions have been the cornerstone of this study's achievements.

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