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Research Article

Stunting Prevention in Indonesia Between 2018-2023 from Scopus: A Bibliometric Study

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ABSTRACT

Stunting remains a significant concern, particularly in Indonesia. This study aims to assess the development of scientific publications related to stunting prevention in the country. A bibliometric analysis method was utilized to identify research trends concerning stunting prevention in Indonesia. Data were collected from the Scopus database and processed using Biblioshiny software from R-Studio. The results indicate a steady increase in publications on stunting prevention in Indonesia from 2018 to 2023, suggesting a rise in research activity during this period. Future research topics may include the relationship between malnutrition and children in Indonesia, poverty, being small for gestational age, immunization, and attitudes toward health.

Keywords: *Bibliometric, biblioshiny, indonesia, stunting prevention*

INTRODUCTION

Stunting is a condition caused by a lack of nutritional fulfillment in the past, leading to a chronic nutritional problem (Sutarto et al., 2018). According to the World Health Organization (WHO), stunting is a disruption in children's growth caused by inadequate nutrition, repeated infections, and insufficient stimulation (WHO, 2015). Nutritional deficiencies can begin during pregnancy and continue into the early months after birth (Rahayu et al., 2018). The first 1,000 days of life are crucial for preventing stunting in childhood and can have long-term effects on an individual's health and development (Mitra et al., 2022). Children under the age of five who are stunted are often harder to identify, as the differences between them and their age-appropriate peers are less noticeable (Fitriani & Darmawi, 2022).

Stunting in children can be caused by various factors, not just malnutrition. A mother's knowledge and understanding of nutritional needs during pregnancy and throughout her child's growth play a crucial role in preventing stunting (Nirmalasari, 2020). In addition, parenting (Banjarmasin & Asuh, 2021; Bella et al., 2020; Tasnim & Muslimin, 2022), inadequate breastfeeding (Husna et al., 2023; Louis et al., 2022; Pratama & Irwandi, 2021), environmental

hygiene (Mia et al., 2021; Zairinayati & Purnama, 2019), family economic level, and many other factors play a significant role in causing stunting in children (Hidayah et al., 2021; Nirmalasari, 2020; Wahyuni & Fithriyana, 2020).

Stunting affects not only health but also social life. Its impact can be categorized into two parts: the short-term and the long-term. In the short term, the consequences of stunting may include developmental disorders related to the brain, intelligence, physical growth, and metabolism(Ekholuenetale et al., 2020). Meanwhile In the long term, stunting can lead to various potential health issues, disabilities in old age, and reduced productivity due to decreased work capacity (Kementrian Kesehatan RI, 2016).

According to the World Health Organization (WHO), stunting in children is characterized by height and weight measurements that fall below the standard deviations (SD) of the WHO growth curve. This condition is primarily caused by nutritional deficiencies or chronic infections occurring during the first 1,000 days of a child's life (WHO, 2015). The classification of stunting status is based on height for age: children with a height below -3.0 SD are considered severely stunted, those with height between -3 SD and -2 SD are classified as stunted, and children with height at or above -2 SD are considered healthy. In general, stunted children are shorter than their peers of the same age. Other indicators of stunting can include low body weight, children appearing younger or smaller than expected for their age, and delayed bone growth (Kemenkes RI, 2018). Unfortunately, public awareness regarding the importance of monitoring children's height remains low. This lack of awareness can hinder efforts to recognize the symptoms of stunting, as changes in a child's height growth are not always immediately noticeable(Rahayu et al., 2018).

The 2022 Indonesian Nutrition Status Survey by the Ministry of Health indicates that East Nusa Tenggara has the highest stunting prevalence at 35.3%. Overall, there has been a decrease in stunting prevalence domestically to 21.6% from 24.4% in 2021. Although there is a decline domestically, this does not align with global prevalence. According to a 2022 report from the Asian Development Bank (ADB), Indonesia ranks as the seventh country with the highest stunting prevalence in the world, at 31%. This places Indonesia as the second highest in Southeast Asia for stunting, following Timor Leste, which has a prevalence rate of 45.1%.

The urgency to prevent stunting is significant, given that its prevalence in Indonesia remains critically high. Addressing this issue requires collaboration across various sectors. In recent years, numerous studies on stunting prevention efforts in Indonesia have been conducted using different methodologies. However, there is a need for further research in this area, particularly studies utilizing bibliometric analysis, which offers a quantitative approach to identify research patterns and literature trends in a specific field (Demir et al., 2020). Therefore, the author is interested in examining the development of stunting prevention research in Indonesia based on the question "How has research on stunting prevention in Indonesia evolved between 2018 and 2023?".

This article is divided into three sections. First section, it presents the methods used in conducting the research. In the second section, the article presents the results and discussions related to the data analysis. Finally, the third section presents conclusions regarding the contribution of the research that has been conducted on the topic of stunting prevention in Indonesia.

MATERIAL AND METHODS

This study employed bibliometric analysis to map, document research trends, and visualize the results. The Scopus database was utilized to collect data, and Biblioshiny was visualized using R-Studio software.

1. **Topic determination**
   Numerous studies have examined stunting prevention in Indonesia. To understand the evolution of research in this area, the author has chosen to focus on stunting prevention efforts in Indonesia.
2. **Data collecting**
   The data was collected from the Scopus database. The keywords used for the search were "stunting prevention" and "Indonesia." In total, 41 documents were collected. To refine the results, the filtering criteria were set to include only articles, without any additional restrictions. The search query applied was: (TITLE-ABS-KEY ("stunting prevention") AND TITLE-ABS-KEY ("Indonesia")) AND (LIMIT-TO (DOCTYPE, "ar")). From this search, 37 documents were identified, with the earliest publication dated in 2018. The selected documents were then exported in both BibTeX and CSV formats by choosing the "select all information" option..
3. **Data processing**
   The exported data was processed using Biblioshiny software. This software was used for its user-friendly mapping and visualization capabilities..
4. **Data analysis**
   Once the data was visualised, the next step involved analyzing the results to provide a clearer understanding of the findings.
5. **Conclusion**
   The data that has been analysed, then was been concluded to explain the overall results.

RESULTS AND DISCUSSION

RESULTS

Through the search results, a total of 37 articles were found to be analysed with main information below.

Table 1. Main information about collected document

DESCRIPTION	RESULTS
Timespan	2018:2023
Sources (Journals, Books, etc)	27
Documents	37
Annual Growth Rate %	67,03
Document Average Age	2,19
Average citations per doc	1,541
DOCUMENT CONTENTS	
Keywords Plus (ID)	244
Author's Keywords (DE)	105
AUTHORS	
Authors	149
Authors of single-authored docs	2
AUTHORS COLLABORATION	
Single-authored docs	3
Co-Authors per Doc	4,32
International co-authorships %	24,32

Publication and Citation Trend

Table 2 presents Indonesia's annual scientific production on stunting prevention from 2018 to 2023. It shows a significant upward trend in the number of articles published during this period. In 2018 and 2019, only one article was published each year. However, starting in 2020, there was a notable increase, with three articles published. This positive trend continued, as the number of articles more than doubled in 2021, reaching a total of seven articles. In 2022, there was an even more significant jump, with twelve articles published, indicating substantial growth in publication contributions. The trend continues in 2023, with the number of articles increasing to thirteen. This analysis demonstrates that research and publication activity in this field are becoming more intense each year, reflecting the potential for growth and development in specific focus areas during this time.

Table 2. Annual scientific production

Year	Article
2018	1
2019	1
2020	3
2021	7
2022	12
2023	13

Table 3 shows the top five sources that are considered the most relevant in the research or studies that have been conducted. *Open Access Macedonian Journal of Medical Sciences* dominates as the leading source with 4 articles published. Then followed by *Southeast Asian Journal of Tropical Medicine and Public Health* with 3 articles, which shows the significance of this source in contributing to research. Other sources including *Bali Medical Journal*, *Indian Journal Of Public Health Research And Development* and *International Journal of Environmental Research And Public Health* all played an important role with each contributing 2 articles. This analysis demonstrates that researchers are more inclined to refer to specific medical journals, especially the *Open Access Macedonian Journal of Medical Sciences* and *Southeast Asian Journal of Tropical Medicine and Public Health* as primary sources in developing and supporting their research results. Understanding these sources can be an indicator of the sustainability of certain collaborations or selections within the scope of medical research.

Table 3. Top 5 Most relevant source

Journal	Article
Open Access Macedonian Journal of Medical Sciences	4
Southeast Asian Journal of Tropical Medicine and Public Health	3
Bali Medical Journal	2
Indian Journal Of Public Health Research And Development	2
International Journal of Environmental Research And Public Health	2

The distribution of publications related to stunting prevention efforts in Indonesia, as shown in Table 4, requires further examination. The analysis reveals that the top five affiliations contributing to this research are significant. Hasanuddin University and Padjadjaran University lead with nine articles, highlighting their substantial impact on research in this area. Following them, Universitas Airlangga and Universitas Indonesia each contributed six articles, demonstrating their

important role in generating new knowledge. Finally, Andalas University, despite being in fifth place, still made a notable contribution with four articles. This analysis reflects a relatively even distribution of research among several well-known higher education institutions in Indonesia. This diversity of affiliations may reflect collaboration and continuity in cross-disciplinary research or may indicate the particular excellence of each institution in its contributions to science.

Table 4. Most relevant affiliations

Afiliations	Article
Universitas Hasanuddin	9
Universitas Padjadjaran	9
Universitas Airlangga	6
Universitas Indonesia	6
Universitas Andalas	4

Table 5 presents top five most relevant authors in the research that has been conducted. Bih-O Lee and Esti Yunitasari dominate as top authors by contributing 3 articles in each author, indicating the significant contribution of these two authors in the literature discussed. Endang L. Achadi, Besral, and Titih Huriah follow with 2 articles each, demonstrating fairly consistent and sustained contributions in relevant research areas. This analysis illustrates that some authors have had a vital role in the development of a particular literature, and the consistency of contributions from these authors indicates a particular focus or expertise within the scope of their research. Recognition of this author's contribution can guide readers or other researchers to explore their works further to deepen understanding regarding the topic being examined.

Table 5. Most relevant author

Author	Article
Bih-O Lee	3
Esti Yunitasari	3
Endang L. Achadi	2
Besral B	2
Titih Huriah	2

Table 6. Top 3 country scientific's production

Country	Frequency
Indonesia	99
China	4
Kanada	2

The relationship between a country's scientific output and publication affiliations is evident in the number of scientific publications produced. When multiple authors from different affiliations and countries contribute to a single document, each country's publication frequency increases by one. Table 6 highlights Indonesia's top three countries with the highest number of scientific publications related to stunting prevention. Given the focus of the study area, it is not surprising that Indonesia ranks first with a total of 99 publications. China is second with four publications, while Canada holds third with two publications.

Table 7. Average citations

Year	Average citation per article	Average citation per year
2018	0	0

2019	0	0
2020	2	0,4
2021	3,29	0,82
2022	2,25	0,75
2023	0,08	0,04

The data presented in Table 7 reveals that between 2018 and 2019, there were no citations for articles related to stunting prevention in Indonesia. This lack of citations coincided with fewer articles published during that period. However, in 2020, the average number of citations began to emerge, with an average of 0.4 per year and two citations per article. 2021 saw the highest averages, with 3.29 citations per year and 0.82 citations per article. Following 2021, the average number of citations per article and year began declining. This trend contrasts with the increasing rate of publications observed. Further research is necessary to investigate the reasons behind this phenomenon.

Table 8. Top 5 most cited articles

Article	Year	Source	Total citation
Determinants of Stunting Prevention among Mothers with Children Aged 6- 24 Months	2021	Open Access Macedonia Journal of Medical Sciences	13
The Targets for Stunting Prevention Policies in Papua, Indonesia. What Mother's Characteristic Matter?	2022	Nutrients	7
Factors Affecting the Knowledge and Motivation of Health Cares in Stunting Prevention Among Children in Indonesia	2022	Journal of Multidisciplinary Health	6
Determining the Factors that Influences Stunting during Pandemic in Rural Indonesia: A Mixed Method	2022	Children	5
Use of Technology for Monitoring The Development of Nutritional Status 1000 HPK in Stunting Prevention in Indonesia	2021	Gaceta Sanitaria	4

Table 8 presents the top 5 most cited articles. It is known that the article "Determinants of Stunting Prevention among Mothers with Children Aged 6-24 Months" is the most cited article with 13 citations. In second place is the article "The Targets for Stunting Prevention Policies in Papua, Indonesia: What Mothers' Characteristics Matter?" with 7 citations. In third place is the article "Factors Affecting the Knowledge and Motivation of Health Cadres in Stunting Prevention Among Children in Indonesia," with 6 citations. The article "Determining the Factors That Influence Stunting during Pandemic in Rural Indonesia: A Mixed Method" was in fourth place with 5 citations. In last place is the article "Use of Technology for Monitoring The Development of Nutritional Status of 1000 HPK in Stunting Prevention in Indonesia," with 4 citations. This analysis shows that research on preventing stunting in Indonesia, particularly concerning its determinants and relevant policies, has been widely discussed in the scientific literature. These articles are crucial as they contribute valuable knowledge to inform policy development and practices to prevent stunting.

Keywords Trend

Figure 1. Treemap

Keyword trends were analyzed to examine the progression of stunting prevention research in Indonesia. As illustrated in the Treemap shown in Figure 1, the article's various terms or most frequently used keywords are depicted. The size of each rectangle in the Treemap corresponds to the frequency of word occurrences; larger rectangles indicate a higher intensity of keyword usage. These commonly occurring keywords can highlight significant trends in the research topic.

Table 9. Most frequent words

Words	Occurrences
indonesia	21
female	16
child	15
article	13
human	13
stunting	12
infant	11
adult	8
growth disorder	7
major clinical study	7

Table 9 shows the most frequent word related to stunting prevention in Indonesia. From Figure 1 Table 9, the word *Indonesia* dominates with 21 occurrences, primarily focusing on the geographic context or study population. Words such as *female*, *child*, *article*, and *human* indicate a focus on demographic aspects and categorization of research subjects. In contrast, the words *stunting* and *infant* describe the selection of specific health topics, especially related to children's growth. The appearance of the word *adult* indicates that attention is also being paid to the adult population. At the same time, *growth disorders* and *major clinical studies* highlight the focus on growth disorders and significant clinical research. Words like poverty, small for gestational age, immunization, and health attitudes can be topics for further study due to their low occurrence.

This analysis illustrates that the literature considers explicitly the issue of stunting in children, with additional emphasis on general health and clinical aspects. The choice of frequently occurring words reflects this research literature's primary focus and interests. This analysis can also help further understand the main aspects of concern in understanding stunting prevention in Indonesia.

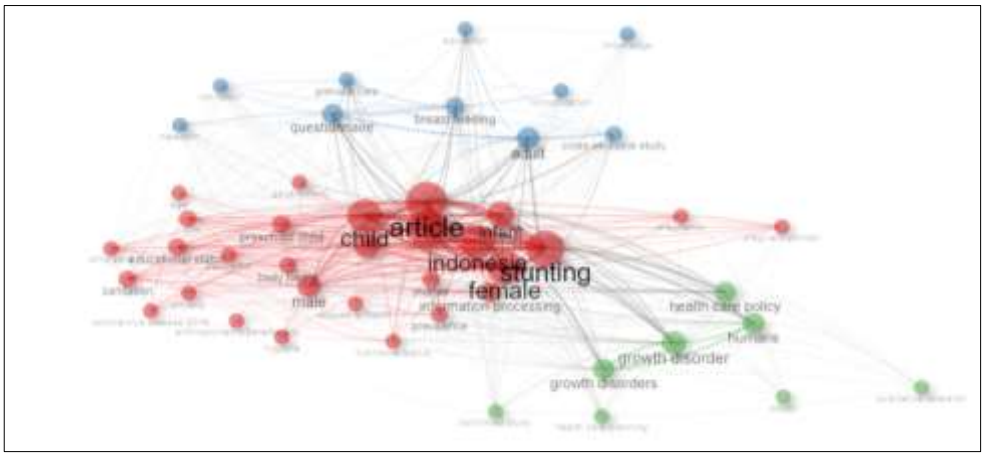

Figure 2. Co-occurence network

In addition, a co-occurrence network can be used to find the relationship between the keywords. Co-occurrence illustrates the network between keywords in a visual format (Zakiyyah et al., 2022). Figure 2 presents the visualisation of the co-occurrence network results. Some keywords have a reasonably extensive network indicated by the circle size on each keyword. It can be seen that terms such as research related to stunting prevention in Indonesia are often associated with the terms pregnant woman, growth disorder, sanitation, educational status, and breastfeeding. Humans, males, and females directly correlate with stunting prevention in Indonesia.

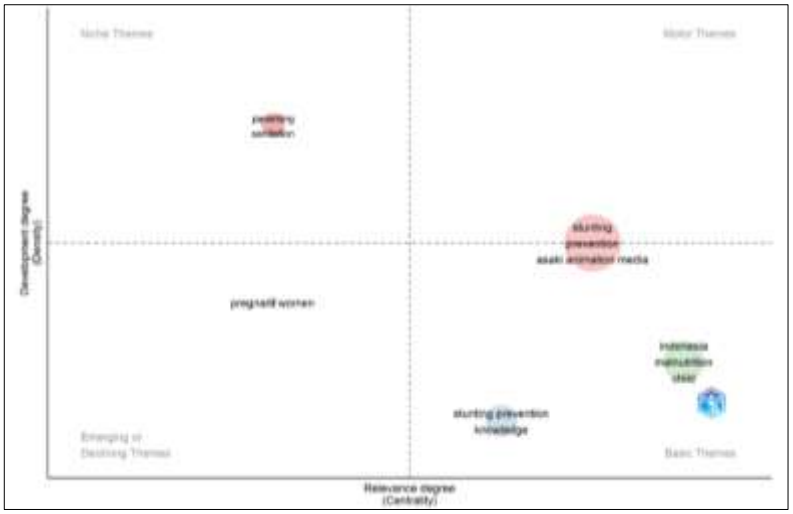

Figure 3. Thematic map

Figure 3 is a thematic map that analyses and divides topics into four quadrants based on density and centrality. Centrality was represented by the horizontal axis, while the vertical axis represented density. Topics in the upper right-hand quadrant need to be studied more deeply as they have high density and centrality. Topics in the upper left quadrant are detailed and have high density but low centrality. On the other hand, topics that are experiencing a downward trend are located in the lower left-hand quadrant. Topics with high centrality but low density are in the lower right quadrant.

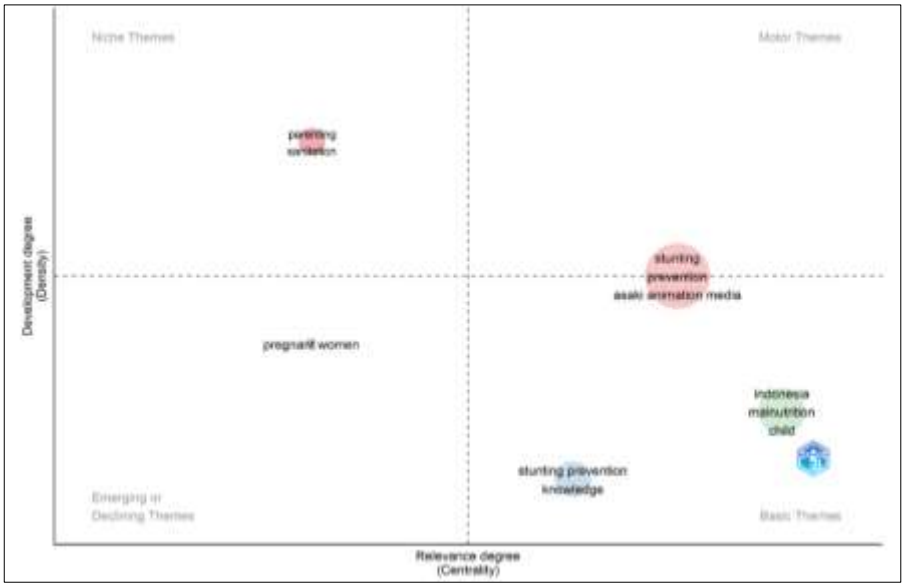

Figure 4. Thematic map

Collaboration Research

Research on stunting prevention in Indonesia spans multiple domains and involves collaboration between various authors and countries. Figure 4 and Table 10 illustrate the trend in these international research partnerships focused on stunting prevention in Indonesia.

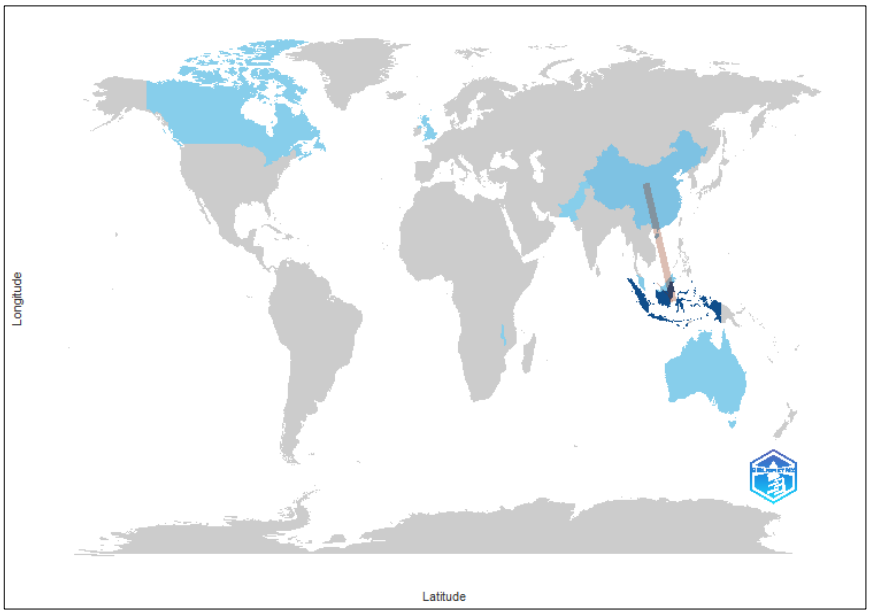

Figure 5. Countries collaboration's world map

In addition, several one-off collaborations exist between Indonesia and various countries, including Canada, Australia, Malawi, Pakistan, and the United Kingdom. This result emphasizes the diversity of international partnerships in research development, highlighting the necessity of a global perspective in understanding health issues and formulating policies. This analysis provides an overview of cross-country collaboration networks in research, which can enrich insights, facilitate knowledge exchange, and improve the quality and impact of research by various scientific teams. Canada with Pakistan and Malaysia with the United Kingdom also conducted research collaborations with one frequency.

Table 10. Countries collaboration

From	To	Frequency
Indonesia	China	4
Indonesia	Malaysia	2
Canada	Pakistan	1
Indonesia	Australia	1
Indonesia	Canada	1
Indonesia	Malawi	1
Indonesia	Pakistan	1
Indonesia	United Kingdom	1
Malaysia	United Kingdom	1

In addition to collaboration between countries, there is also collaboration between authors. Based on Figure 5, it is known that there is a collaboration between authors in research related to stunting prevention in Indonesia. Thus, collaboration networks between authors form a basis for exchanging ideas, discussions, and joint contributions in responding to health issues being tested. This analysis shows that this research's success depends on specific individuals and involves cooperation and collective contributions from several committed researchers. Further understanding of interactions between authors can provide insight into the dynamics of collaboration in developing research literature.

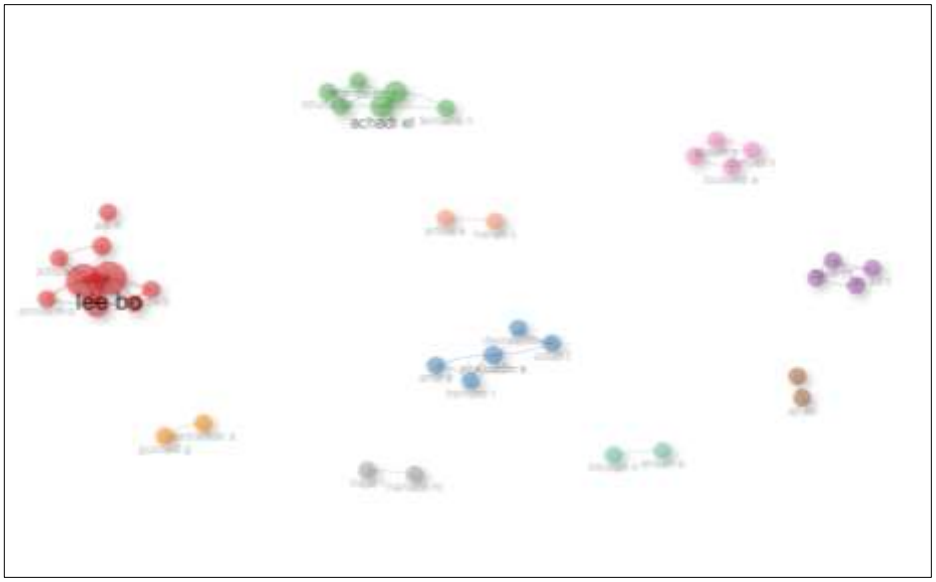

Figure 6. Collaboration network

DISCUSSION

This study answers the research question, "How has research on stunting prevention evolved between 2019 and 2023?" which shows that research on stunting prevention in Indonesia continues to increase. This finding indicates that awareness of stunting prevention in Indonesia is growing in various literatures. The thematic map indicates a connection in the lower right quadrant, highlighting three topics: Indonesia as a geographic factor, malnutrition, and child stunting prevention in Indonesia. Further study related to these three topics has excellent potential and is crucial to research because it has high centrality. At the same time, the density is low, and research has been rare until now.

Citation analysis also broadens insights into the most influential works in the literature related to stunting prevention in Indonesia. On the other hand, there are still gaps in research in

certain aspects that have caused the average citation of literature related to stunting prevention in Indonesia to decline. Therefore, global collaborative efforts are needed to support more inclusive research on stunting prevention in Indonesia and tackle the challenge effectively.

CONCLUSION AND SUGGESTION

This study shows a significant increase in scientific publications related to stunting prevention in Indonesia between 2018 and 2023. The trend indicates a consistent rise in articles published yearly, almost doubling from the previous year. This ongoing increase reflects a growing intensity of research activities over time. A collaborative network was also established to enhance knowledge sharing during the research process. Furthermore, the connection between Indonesia, malnutrition, and children, along with the limited exploration of topics such as poverty, small for gestational age, immunization, and health attitudes, presents opportunities for further study, as these areas remain under-researched.

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CONFLICT OF INTEREST

Author declares has no conflict of interest.

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