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Tren Penelitian Global tentang ASI Eksklusif: Analisis dan Visualisasi Bibliometrik pada Database Scopus (2021-2024)

Global Research Trends on Exclusive Breastfeeding: A Bibliometric Analysis and Visualization Based in the Scopus Database (2021-2024)

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Abstrak

Pemberian Air Susu Ibu (ASI) secara eksklusif selama enam bulan pertama kehidupan merupakan intervensi kesehatan masyarakat yang paling efektif dalam mencegah kematian bayi dan meningkatkan kualitas gizi anak. Namun, praktik ini masih menghadapi berbagai tantangan, baik dari sisi kebijakan, budaya, maupun akses informasi. Penelitian ini bertujuan untuk menganalisis tren, pola kolaborasi, dan fokus topik dalam publikasi ilmiah mengenai ASI eksklusif selama periode 2020–2024. Metode yang digunakan adalah pendekatan kuantitatif-deskriptif dengan metode bibliometrik berbasis data dari database Scopus. Data tersebut kemudian dikumpulkan dan dianalisis menggunakan perangkat lunak VOSviewer untuk mengidentifikasi tren publikasi, tren kutipan, dan kata kunci populer. Berdasarkan analisis dan visualisasi bibliometrik, tren penelitian global mengenai ASI eksklusif menunjukkan penurunan selama periode 2020 hingga 2024, yang menunjukkan puncak aktivitas publikasi pada tahun 2020 dan penurunan pada tahuntahun berikutnya. Melalui analisis menggunakan VOSviewer, diidentifikasi tujuh klaster tematik utama dengan kata kunci dominan seperti *ASI eksklusif, stunting*, dan *kesehatan bayi*. Analisis dan visualisasi dalam penelitian ini menyoroti tema-tema yang telah mapan sekaligus area yang masih kurang tereksplorasi, termasuk faktor pasca persalinan dan indikator antropometri. Temuan ini menegaskan pergeseran fokus dalam penelitian dan memberikan arah untuk studi lanjutan serta pengembangan kebijakan di masa depan.

Kata kunci: ASI Eksklusif, Bibliometrik, Scopus

Abstract

Exclusive breastfeeding during the first six months of life is one of the most effective public health interventions for preventing infant mortality and improving child nutritional status. However, its practice continues to face numerous challenges, including policy constraints, cultural barriers, and limited access to information. This study aims to analyze trends, collaboration patterns, and topical focus in scientific publications on exclusive breastfeeding during the period 2020–2024. The method employed in this study is a quantitative-descriptive approach using bibliometric analysis based on data retrieved from the Scopus database. The collected data were then analyzed using VOSviewer software to identify publication trends, citation patterns, and prevalent keywords. Based on bibliometric analysis and visualization, global research trends on exclusive breastfeeding show a declining pattern during the period from 2020 to 2024, with a peak in publication activity observed in 2020 followed by a decrease in subsequent years. Through analysis using VOSviewer, seven major thematic clusters were identified, featuring dominant keywords such as exclusive breastfeeding, stunting, and infant health. The analysis and visualizations in this study highlight both well-established themes and underexplored areas, including postpartum factors and anthropometric indicators. These findings confirm a shift in research focus and offer direction for future studies and the development of informed policies.

Keywords: Exclusive Breastfeeding, Bibliometric, Scopus

Introduction



Exclusive breastfeeding is the practice of feeding infants only breast milk for the first six months of life, without any additional food or drink, except for medically prescribed medications or vitamins. Wahidmurni (2025) explains that exclusive breastfeeding refers to providing breast milk without supplementary liquids such as formula milk, fruit juice, honey, tea, plain water, or solid foods such as bananas, papayas, milk porridge, biscuits, or rice porridge. The World Health Organization (WHO) and the United **Nations** Children's Fund (UNICEF) consistently recommend exclusive breastfeeding as the most effective nutritional intervention to ensure optimal child growth, development, and survival.

Despite the well-documented benefits of exclusive breastfeeding and widespread campaigns at both global and national levels, the coverage rate remains far below target in many countries, including Indonesia. Globally, only around 40% of newborns at 2021 received exclusive breastfeeding. One of the contributing factors to child undernutrition is the lack of exclusive breastfeeding, with undernutrition accounting for 45% of child deaths and affecting 149 million children under the age of five through stunting (WHO, 2024). According to UNICEF, currently only 38% of mothers practice exclusive breastfeeding, and in Indonesia, the coverage has only reached 55%—well below the national target of 80%. These figures indicate that many infants in Indonesia still do not receive adequate exclusive breastfeeding (Herdhianta 2023).

As a critical public health issue, exclusive breastfeeding has been the subject of multidisciplinary research, encompassing fields such as public health, nutrition, nursing, and anthropology. However, to date, there has been comprehensive study no systematically maps the landscape scientific publications on exclusive breastfeeding at either the global or regional level. In recent years, the number of scientific publications on exclusive breastfeeding has shown a significant decline. For instance, a study on global trends in exclusive breastfeeding conducted by Cai *et al* (2012) utilized data from 1995 to 2010. Therefore, the present study aims to address this gap by conducting a bibliometric analysis.

Bibliometric analysis provides quantitative and visual overview of the dynamics and structure of scientific literature within a specific field of study. By conducting a bibliometric analysis of publications on exclusive breastfeeding, this study not only presents the development of knowledge in the field but also supports researchers. practitioners, and policymakers understanding research directions, knowledge gaps, and potential areas for collaboration. The objective of this study is to identify trends in scientific publications on exclusive breastfeeding over the past few years (2020-2024).

Bibliometric studies have been widely employed to understand research dynamics across various public health fields. A previous study by Ekayanthi and Besral (2024) explored research trends on breastfeeding mothers' self-efficacy from 2000 to 2023, identifying eight main themes and knowledge gaps within the literature. Meanwhile, Tondak et al (2024) highlighted the contribution of the United States to research on the effects of breastfeeding on infant immunity, focusing on journals such as Nutrients and institutions like the University of Western Australia. In the context of exclusive breastfeeding, several studies have been conducted; however, they tend to be limited to specific aspects, such as breastfeeding practices in certain regions or policy evaluations. Comprehensive and structured literature reviews using bibliometric approaches remain scarce. This study aims to address this gap by providing a knowledge map that can serve as a reference for researchers and stakeholders in the future.

Method

This study employs a quantitative-descriptive approach using bibliometric methods to identify publication trends, citation patterns, and popular keywords related to exclusive breastfeeding. This design enables a systematic analysis of the metadata



of scientific publications to reveal patterns and the knowledge structure within the field. The population of this study includes all scientific publications addressing the topic of exclusive breastfeeding at the global level. The sample consists of scientific articles published between 2020 and 2024, retrieved from the Scopus database. This study utilized the Scopus database as the sole data source due to its broad interdisciplinary coverage, indexing standards, rigorous comprehensive citation information. Its robust and export functionalities facilitate efficient data retrieval and analysis, making it a widely accepted source for bibliometric research.

The sampling technique used was total sampling, which involved including all articles that met the inclusion and exclusion criteria within the Scopus database for the specified period. The inclusion criteria were: 1) articles written in English or Indonesian; 2) containing the keyword 'exclusive breastfeeding' in the title, abstract, or keywords; and 3) published between 2020 and 2024. The exclusion criteria were: 1) thematically irrelevant articles; and 2) articles lacking full metadata availability in Scopus. Table 1 outlines the data search strategy utilized in this study.

Table 1. The Search Strategy

Description
Scopus
Total sampling (all articles meeting inclusion and exclusion criteria)
2020-2024
English and Indonesia
4 June 2025
Exclusive breastfeeding

Figure 1 presents the screening and selection process conducted in this study, offering a comprehensive depiction of the

steps involved in filtering and selecting the eligible articles for analysis.

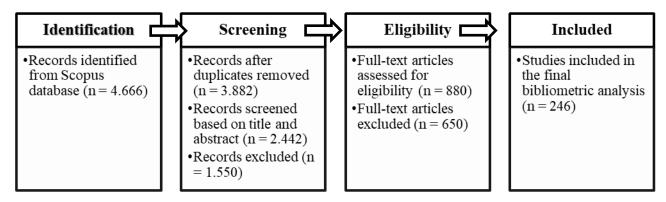


Figure 1 Screening and Selection Process

The data source was the Scopus database, selected for its extensive coverage and international reputation. Data were collected by exporting Scopus metadata, which included article titles, author names, affiliations, keywords, abstracts, publication years, journal names, citations, DOI sources, and author keywords. The data were analyzed and visualized using VOSviewer software in three main formats: network visualization, overlay visualization, and density visualization. Prior to visualization, a series of

preprocessing steps were carried out to ensure the validity and relevance of the bibliometric data.

First, the bibliographic data exported from the Scopus database were imported into VOSviewer. The counting method used was full counting, where each occurrence of a term or author was counted equally, regardless of the number of co-authors or co-occurrences. Then, a co-occurrence analysis of author keywords was conducted to identify



the most relevant terms in the field of exclusive breastfeeding.

To refine the analysis, a minimum threshold for term occurrences was set—only terms that appeared at least 2 times in the dataset were included. From this, VOSviewer generated a list of keywords that met the threshold, and manual verification was performed to exclude irrelevant or overly generic terms. After verification, a total of 215 selected terms were retained for visualization.

The results were then presented through tables, graphs, and network visualizations, which helped illustrate the development and thematic structure of exclusive breastfeeding research over the past five years. These visualizations provided insights into keyword clusters, emerging trends, and the interconnectedness of research themes in this domain.

Findings and Discussion

Publication Trends

From 2020 to 2024, several researchers have published articles related to exclusive breastfeeding. An analysis based on the Table 2. Ten Most Cited Articles Based on Scopus Data

Scopus database found that 776 articles were published in 2020, 889 articles in 2021, 940 articles in 2022, 1.010 articles in 2023, and 1.051 articles in 2024. The keywords used for the search in Scopus search engine were "exclusive breastfeeding" OR "exclusive breastfeeding" OR "exclusive breastfeeding". Following a thorough screening and selection process, 246 articles were deemed eligible and included in this bibliometric analysis.

Citation Trends

Table 2 presents the ten leading authors who have written the most influential articles exclusive breastfeeding Publications from 2022 had the greatest impact in this field. The study by Zeidan et al (2022) published in *Pediatrics* (PEDS), with 587 citations, is among the most cited. This article is highly referenced because it is an official document issued by the American Academy of Pediatrics (AAP). The document provides evidence-based guidelines on the importance and use of breast milk, as well as recommending policies to support breastfeeding.

No.	Document Title	Authors	Year	Citation Total
1	Policy Statement: Breastfeeding and the	(Meek and Noble 2022)	2022	587
	Use of Human Milk			
2	EAACI Guideline: Preventing The	(Halken et al. 2021)	2021	304
	Development of Food Allergy in Infants			
	and Young Children (2020 Update)			
3	A Consensus Approach to the Primary	(Fleischer et al. 2021)	2021	232
	Prevention of Food Allergy Through			
	Nutrition: Guidance from the American			
	Academy of Allergy, Asthma, and			
	Immunology; American College of			
	Allergy, Asthma, and Immunology; and			
	the Canadian Society for Allergy and			
	Clinical Immunology			
4	Factors Affecting Early-Life Intestinal	(Vandenplas et al. 2020)	2020	168
	Microbiota Development			
5	The Need to Study Human Milk as A	(Christian et al. 2021)	2021	148
	Biological System			
6	Postpartum Stress and Infant Outcome: A	(Oyetunji and Chandra 2020)	2020	136
	Review of Current Literature			
7	Rates and Time Trends in the	(Neves et al. 2021)	2021	102
	Consumption of Breastmilk, Formula, and			
	Animal Milk by Children Younger than 2			
	Years From 2000 to 2019: Analysis of			
	113 Countries			
8	Global Prevalence of WHO Infant	(Zong et al. 2021)	2021	100



No.	Document Title	Authors	Year	Citation Total
	Feeding Practices in 57 LMICs in 2010-			
	2018 and Time Trends Since 2000 for 44			
	LMICs			
9	A Meta-Analysis of the Association	(Qiao et al. 2020)	2020	100
	between Breastfeeding and Early			
	Childhood Obesity			
10	Postnatal Depression and its Association	(Dadi, Miller, and Mwanri 2020)	2020	99
	with Adverse Infant Health Outcomes in			
	Low-And Middle-Income Countries: A			
	Systematic Review and Meta-Analysis			

Popular Keywords

A bibliometric analysis was conducted using VOSviewer software to identify the most frequently researched topics and the relationships between terms. When two or more keywords appear together in the same article, they are referred to as "co-keywords."

Co-keywords can be used to determine, discover, and define popular research topics as well as to identify research boundaries. In this study, a co-keywords network map was generated using VOSviewer, setting a minimum occurrence threshold of two for keywords.

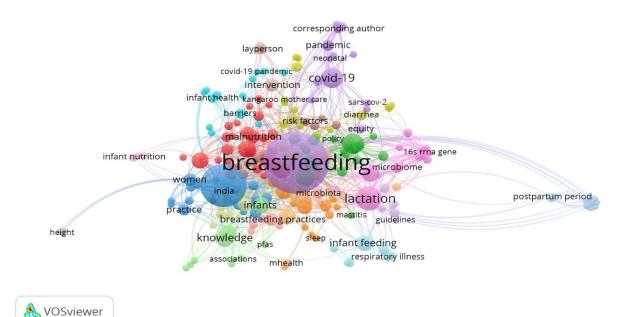


Figure 2 Network Visualization

illustrates the network visualization highest-frequency of the keywords appearing in the publications. The most prominent keywords are stunting, infant, exclusive breastfeeding, complementary feeding, breast feeding, infant health, and infant formula. Nodes (circles) represent keywords, with their size indicating the frequency of occurrence. Connecting lines between nodes indicate cooccurrence within the same article, where

thicker lines represent stronger associations between terms. Based on the automatic clustering performed by VOSviewer software, several main topic clusters were formed. Cluster 1 (red) focuses on *stunting*, Cluster 2 (green) on *infant*, Cluster 3 (blue) on *exclusive breastfeeding*, Cluster 4 (yellow) on *complementary feeding*, Cluster 5 (purple) on *breast feeding*, Cluster 6 (light blue) on *infant health*, and Cluster 7 (orange) on *infant formula*. Table 3 presents



the results of the automatic clustering

generated by VOSviewer.

Table 3. Clustering Results

Cluster	Colour	Links	Total Link Strength
Cluster 1	Red	22	35
Cluster 2	Green	42	73
Cluster 3	Blue	89	175
Cluster 4	Yellow	16	22
Cluster 5	Purple	163	390
Cluster 6	Light Blue	7	11
Cluster 7	Orange	15	22

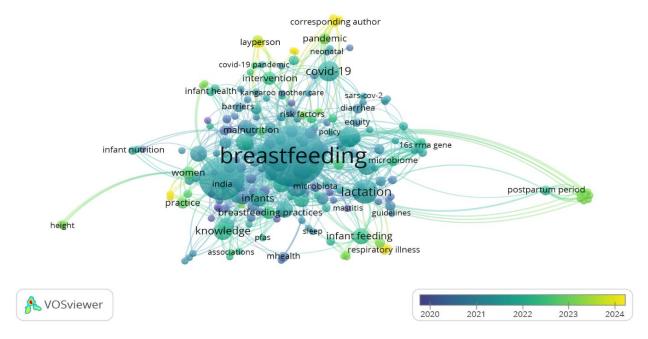


Figure 3 Overlay Visualization

Figure 3 presents the overlay visualization illustrating the temporal dimension of keywords, specifically the average publication year of each term. The colour of the nodes indicates the time period:

dark blue represents terms that were more frequently used in the earlier years (2020), while yellow or orange indicates terms that have become more dominant in recent years (2024).



Figure 4 Density Visualization



Figure 4 displays the results of the density visualization, illustrating the frequency density of keywords. coloured in bright yellow indicate keywords with very high frequency, whereas regions shaded from blue to green represent low to moderate density. These results emphasize the of terms dominance key such breastfeeding, which appears as a central point with high density. Conversely, keywords such as height and postpartum period are located in areas with low density, indicating that these topics remain relatively underexplored in the literature.

From 2020 2024. to exclusive breastfeeding has been a significant subject of research. This study aims to identify publication trends related exclusive to breastfeeding. To facilitate keyword identification in exclusive breastfeeding research, the study employs content analysis using bibliometric software, specifically VOSviewer. This software has proven to be highly effective in extracting data from the Scopus database. The study produces a bibliometric overview that examines scientific articles, researchers, and publications with the highest citation counts. The research focuses on a relevant journal sample, contextualizing findings through cluster analysis, review, authorship, objectives, and key findings.

This study revealed that 2020 marked a peak in exclusive breastfeeding research publications, followed by a notable decline in 2023 and 2024. To better understand the structure and evolution of this research area, a bibliometric analysis was conducted using VOSviewer software, which generated cooccurrence networks and identified major clusters. The most prominent thematic keywords identified in the dataset were infant, exclusive breastfeeding, stunting, complementary feeding, breast feeding, infant health, and infant formula. In the VOSviewer visualizations. nodes represent these keywords, with node size corresponding to frequency of occurrence, and connecting lines representing co-occurrence in the same

article. Thicker lines indicate stronger relationships between terms.

Based on automatic clustering VOSviewer, seven main topic clusters were identified. Cluster 1 (Red) on Stunting. This cluster focuses on the relationship between exclusive breastfeeding and stunting. The frequent co-occurrence of "stunting" with other terms like "malnutrition" underscores the concern with undernutrition outcomes in early childhood. Cluster 2 (Green) on Infant. Keywords in this cluster, such as "newborn" and "child development" suggest studies emphasizing infant vulnerability and overall health during the first 1,000 days. Cluster 3 (Blue) on Exclusive Breastfeeding. As a central term, this cluster reflects core on breastfeeding discussions practices, prevalence, and health outcomes. It connects closely with both policy-oriented and clinical outcome studies. Cluster 4 (Yellow) Complementary Feeding. This cluster highlights the transitional period when infants begin consuming food other than breastmilk, with frequent links to nutrition adequacy and timing of food introduction. Cluster 5 (Purple) on Breast Feeding. Though similar to Cluster 3, this cluster may reflect different terminologies (e.g., "breast feeding" vs. "exclusive breastfeeding") and broader breastfeeding behaviors, barriers, and facilitators. Cluster 6 (Light Blue) on Infant Health. This group includes studies linking breastfeeding to disease prevention, immune function, and general health outcomes. Cluster 7 (Orange) on Infant Formula. This smaller cluster points to literature discussing the use of formula feeding, often in contrast to exclusive breastfeeding, and its implications for health and policy.

visualization Density revealed that "exclusive breastfeeding" and "breast feeding" are central terms high with occurrence and strong connections to other terms. In contrast, terms such as "height" and "postpartum period" appeared in low-density regions, indicating limited research attention. These underrepresented topics may present opportunities for future investigation, particularly in understanding how maternal



postnatal health and anthropometric outcomes intersect with breastfeeding practices.

By mapping the thematic and temporal patterns of exclusive breastfeeding research, this analysis identifies both well-established themes and areas needing further exploration. The dominance of topics like stunting and feeding practices highlights ongoing global concerns, while the sparse attention to maternal postpartum factors and modern feeding challenges suggests the need for expanded research focus. These insights support the aim of this study to highlight underexplored emerging trends and dimensions within the field, as outlined in the introduction.

The limitations of the bibliometric analysis in this study include the potential gaps in understanding, as lead authors may not reference all highly significant citations. Additionally, reliance on the Scopus database may result in the omission of important articles indexed in other databases. Although Scopus is one of the largest databases, there remains a risk of bias due to its incomplete coverage of all international and national journals. Technical limitations of the analysis software, such as VOSviewer, also present challenges. This software is not fully capable of handling synonyms or variations in keyword spelling, which may to imperfect clustering of terms in the visualization maps.

Conclusions and Suggestions

This study successfully mapped the dynamics and research trends on exclusive breastfeeding from 2020 to 2024 based on data from the Scopus database. bibliometric analysis of publications on exclusive breastfeeding over the past five years reveals a peak in research activity in 2020, followed by a notable decline in the most recent years. The keyword occurrence network highlights dominant such stunting, exclusive terms as breastfeeding, complementary feeding, and infant health, indicating that the literature has primarily focused on health outcomes and infant feeding practices.

The automatic clustering performed by VOSviewer identified seven major thematic reflecting diverse clusters. research ranging from nutritional approaches, and child growth to outcomes socialdeterminants and behavioral policy interventions. However, certain topics such as height and the postpartum period were found in low-density areas, suggesting that these areas remain underexplored and opportunities for future research.

In summary, this analysis provides a comprehensive overview of the evolution of exclusive breastfeeding research and identifies existing gaps. Further in-depth and multidisciplinary studies are needed to address contemporary challenges and support global efforts to promote and sustain exclusive breastfeeding practices.

Future research on exclusive breastfeeding should place greater emphasis on topics that remain underexplored, such as the postpartum period, child height as an indicator of nutritional status, and the influence of maternal mental health on breastfeeding outcomes. Addressing these gaps may offer a more holistic understanding of the factors that contribute to successful breastfeeding practices. Further studies are also encouraged to incorporate data from multiple scientific databases, such as PubMed and Web of Science, and to conduct in-depth content analysis of the key publications identified.

Thank you note

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