
Examining Trends and Social Complexity of Clean and Healthy Living Behavior through Bibliometric Analysis

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Abstract

Clean and Healthy Living Behavior (CHLB) provides information, education, and empowerment to encourage individuals, families, groups, and communities to adopt healthier lifestyles and minimize disease risk. Despite its crucial role in health, CHLB implementation in Indonesia is still low, with various studies highlighting inadequate CHLB practices among students and households. We conducted a bibliometric analysis to explore research results and identify trends and social complexity of CHLB. This study reports a bibliometric analysis through a systematic search of academic literature applying the CHLB theme. Bibliographic data were retrieved from the Scopus database on June 18, 2024, and then analyzed using the Bibliometrix R package. The 131 publications focused on journal articles, conference papers, and reviews in English, which were then collected and analyzed based on publication trends, influential articles, country contributions, and theme development. The authors also interpreted and synthesized the results of the bibliometric description of CHLB using Ulrich Beck's risk society theory. Articles on CHLB are published in 11 influential journals, with Indonesian authors contributing the most articles with 447 frequencies, followed by the USA (14 frequencies), China (11 frequencies), and Netherlands (11 frequencies). As part of the CHLB research hotspots, ten research areas and nine motor themes were presented, such as COVID-19, alternative medicine, pandemic, knowledge, diabetes mellitus, attitude and practice, education, empowerment, and environmental health. Using Ulrich Beck's risk society theory, this study also highlights how uncertainty and social complexity affect the implementation of CHLB in Indonesia.

Keywords: CHLB; Social Complexity; Public Health; Risk Society; Bibliometric

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Introduction

Clean and Healthy Living Behavior (CHLB) is a method carried out by providing information, education, and empowerment to individuals, families, groups, and communities to be able to implement a healthy lifestyle by maintaining, preserving, and improving health (Andhika, Lismayanti, and Falah 2019). Therefore, implementing CHLB is important to minimize the risk of being infected with diseases. Moreover, based on a study by Mustar, Susanto, and Bakti (2018), CHLB is the second most significant factor that influences the health of individuals, groups, and communities. Starting with small groups like families and extending to large organizations, the CHLB program is one of the most frequently delivered topics in community health education and counseling activities (Syaukani et al. 2023).

CHLB is one of the preventive efforts to prevent disease occurrence (Mustar et al. 2018). However, there are still many people who have a low level of implementation of CHLB. In a research conducted by Nasiatin et al. (2021) on a population of 1729 fifth-grade students from all elementary schools in Kramatwatu District, Banten, it was found that 54,7% of students implemented CHLB correctly. This can be seen from the lack of measuring body weight and height, poor snacking habits, inadequate school toilet conditions, and the high rate of students' littering habits. In addition, a study by Jayadipraja et al. (2018) of 293 households in Labunia Village, South Wakorumba, found that only 36% practiced CHLB. The study revealed that many people lacked knowledge, which affected their CHLB practices.

Several factors influence the low implementation of CHLB in Indonesia. One is the availability of hygiene and sanitation facilities (Karon et al. 2017; Pertiwi and Nasiatin 2021). In a study by Yuniarti and Raharini (2024), Indonesia was ranked 3rd among countries with poor sanitation in 2017. Based on data from Indonesia Urban Water Sanitation and Hygiene (IUWASH) and the United States Agency for International Development (USAID), Indonesia is the lowest-ranked ASEAN country in terms of providing clean water sources and sanitation facilities. Data from WHO and UNICEF also show that as many as 60% of rural communities in Indonesia have limited access to sanitation facilities (Hasyim et al. 2021). This can be seen from the community's habit of bathing, washing clothes, and excreting in

the river and contaminated clean water sources. The availability of sanitation facilities is one of the driving factors in changing habits to implement CHLB (Pertiwi and Nasiatin 2021).

The influence of geographical conditions on CHLB implementation stems from the lower levels of knowledge and awareness found among people living in hard-to-reach areas (Syamsuni et al. 2022). The difficulty in reaching the area also causes health workers not to be able to provide optimal health services (Ayuningsih, Yusriani, and Idris 2022). Remote areas in Indonesia are particularly hard to reach because the routes to these areas are difficult to pass. Socioeconomic circumstances, such as family income, education level, and access to health facilities, also influence the implementation of CHLB (Sulistyowati 2022). Both low income, which can limit access to sanitation and health facilities, and low education, which can hinder knowledge and awareness of CHLB's importance, pose significant challenges to CHLB implementation (Katmawanti, Nikmatasari, and Nurrochmah 2020). Therefore, various aspects of CHLB need to be supported to achieve proper implementation.

These challenges in implementing CHLB indicate that in the era of a risk society, there are social complexity aspects in implementing CHLB. Encyclopedia Editorial Office (2024) states that social complexity describes social systems' complicated and interconnected nature. It highlights how various elements, such as institutions, individuals, and cultures, interact in unpredictable ways. This complexity means that social phenomena can have emergent properties that cannot be fully understood by studying individual parts separately. So, in the context of public health issues, an interdisciplinary approach is needed to understand the trends of social complexity related to CHLB.

Hermanus et al. (2019) state that healthcare is undergoing multiple transitions in health, demographics, epidemiology, nutrition, and behavior. This has led to a double burden of health challenges: although life expectancy is increasing, problems related to newborns and children remain significant, there is a surge in infectious diseases that were previously under control, and widespread malnutrition is accompanied by new nutritional problems (Hermanus et al. 2019). This phenomenon illustrates sociologically that modern society is now entering an era of a risky society. This era describes the risks due to the consequences

of human actions and decisions, such as industrial accidents, climate change, and various problems related to the health crisis (Beck 1992).

As a sociological theory, Beck (1992) indirectly highlights that risks, such as health crises and health problems, are becoming global in scope. These risks cannot be addressed within national boundaries, and a global perspective must address them effectively. Global health crises, such as pandemics and widespread infectious and non-communicable diseases, pose significant challenges to international health systems, governance, and policy-making. These crises often reveal fundamental problems in global health leadership, resource allocation, and the effectiveness of international cooperation. Strategies are needed to mitigate these crises through CHLB to reduce the impact of the risk of health crises.

Previous studies on CHLB have mainly focused on the habit of implementing CHLB in school students (Kandou and Kandou 2018; Mardiah 2023; Susanto et al. 2016; Syaputri et al. 2023), the correlation between knowledge, attitude, and implementation of CHLB with the incidence of a disease (Amelia 2018; Herdayati and Karniastuti 2021; Kusumo and Prabandari 2021; Zuchalia et al. 2021), the use of digital media as a promotional medium for CHLB (Indrayathi et al. 2022; Nayoan 2017; Suandari and Prianthara 2024) and preventive behaviors and efforts to improve quality of life (Ernawati et al. 2022; Israfil et al. 2024; Sinawang, Kusnanto, and Pratiwi 2020; Tarihoran, Honey, and Slark 2021). Based on previous studies, the authors observed at least three tendencies in the research methods often used by previous researchers. *First*, research focusing on CHLB habits in the school education environment and using digital media as a CHLB promotion instrument generally uses qualitative methods. *Second*, research on the relationship between knowledge, attitudes, and implementation of CHLB generally uses quantitative methods. *Third*, preventive behavior and efforts to improve quality of life use systematic literature review methods. Therefore, in conducting the current study, the authors use bibliometric methods to examine the social complexity and trends of CHLB. Until now, no previous research has been found using this method to study CHLB. In addition, to this day, no research uses the theory of risk society and the concept of social complexity to explore and answer research problems. The author aims to use bibliometric analysis to examine various aspects of

research in the field of CHLB, including topics, sources, influential articles, and countries. The study also addresses the issue of synthesizing the findings from the bibliometric analysis to understand the state of CHLB in the risk society and its social complexities. The article seeks to answer questions about the conditions and trends of CHLB research in relation to the theory of risk society and how those findings can be applied in society. Furthermore, the author mentions that using the Biblioshiny program to analyze CHLB has not been widely discussed in Indonesia, a secondary problem that this research aims to answer.

Based on this reasoning, it is necessary to study the trends and social complexity of CHLB in society. This article seeks to explore the phenomenon of trends and social complexity of CHLB in Indonesian academic literature over the past decade with Ulrich Beck's (1992) theory. After the author presents the results of the bibliometric analysis, this theory is used to synthesize or interpret the CHLB documents (Montazeri et al. 2023). This research does not only focus on the CHLB publication area, assessed in quantity only. However, this article also needs to highlight the quality of the content areas analyzed bibliometrically (Churruca et al. 2019) so that people can understand the importance of CHLB for survival, especially in the era of the risk society. With this article, the researcher seeks to contribute to the sociological aspects of public health, such as public healthy behavior, by conducting bibliometric analysis research on the topic of CHLB in the context of academic publications. Moreover, until now, no research has used bibliometrics to see the trends and social complexity of CHLB in Indonesia. Bibliometrics can help researchers and funding institutions focus more on under-researched topics in public health (Sweileh 2020). In the future, the implications of this research are expected to be useful for policymakers, communities, and self-help groups in determining policies. They can be constructive input for future research on CHLB in general.

Methods

This study reports a bibliometric analysis through a systematic search of academic literature (Churruca et al. 2019) applying the CHLB theme. Bibliometric analysis is a quantitative method for evaluating and analyzing scientific literature, assessing academic productivity, and identifying emerging research areas (Donthu et al. 2021; Moral-Muñoz et al. 2020). The authors gathered information about CHLB from the Scopus database in this study. Publication data from Scopus is considered to have high credibility and reliability, so it can be used to analyze literature data and create a more varied bibliometric map (Amier and Pradana 2022). Compared to other platforms, such as Pubmed and Web of Science, as databases, Scopus offers a comprehensive overview of global interdisciplinary scientific information, covering various fields of science, technology, medicine, social sciences, and arts and humanities (Cruz et al. 2018). Scopus provides opportunities to access literature from different countries and cultural contexts, providing a broader perspective on CHLB research in Indonesia.

On June 18, 2024, authors compiled CHLB data published on the Scopus platform using the keyword "healthy behavior" in the article title, abstract, and keywords. This resulted in at least 6873 CHLB documents published in Scopus. These documents consist of journal articles (5553 documents), reviews (595 documents), conference papers (219 documents), notes (44 documents), editorials (25 documents), books (23 documents), short surveys (13 documents), letters (10 documents), erratum (9 documents), conference reviews (9 documents), and data papers (1 document). In order to make the literature data more relevant to the main objective of this research, which is to examine the trends and social complexities of CHLB in Indonesia. The authors then applied inclusion and exclusion criteria to the previously obtained CHLB Scopus data.

The inclusion criteria consisted of: 1) published in English, 2) data-based (primary or secondary), 3) the study must focus on public health behavior, and 4) the study was published in the years 2013-2024. Based on basic health research data conducted by the Indonesian Ministry of Health in 2013, the national average implementation of CHLB was

only 32.3% of the Indonesian population (Kandou and Kandou 2018). On the contrary, the success indicator of CHLB in the Ministry of Health Strategic Plan (Renstra Kemenkes) 2010-2014 targets 70% of households to have implemented CHLB (Fatmawati et al. 2024). Therefore, the achievement of CHLB in households has not met the target even though it has reached 2018. Furthermore, on March 11, 2020, WHO officially declared the COVID-19 pandemic (Pradipta and Rosemary 2024). Various measures have been conducted, such as examining, treating, and isolating infected patients. However, to prevent further spread of Covid-19 infection, prevention measures are needed, including CHLB. The Indonesian government recommends the implementation of CHLB to the community, such as wearing masks when leaving the house, washing hands and using hand sanitizers after activities, and maintaining distance to prevent and break the chain of COVID-19 transmission (Afrizal and Athallaisya Adinda 2022). 5) Publication in the form of journal articles, conference papers, and reviews, and 6) Studies must be conducted in Indonesia, either exclusively or Indonesia as one of the countries in a cross-national research collaboration.

As for the exclusion criteria used, namely: 1) Documents are in Spanish, Portuguese, French, German, etc. 2) Research documents not directly related to CHLB's research themes, such as biochemistry, and health and computer science. 3) Documents of the type notes, editorial, books, short surveys, letters, etc. To ensure the validity of the data, each author looked for inclusion and exclusion criteria. After obtaining each of these criteria, the author triangulates what criteria need to be included that are relevant to the research topic or removed because they are not by the research topic. If there is a disagreement in perception, the author will ask for expert help to review the criteria that have been made. After this process is complete, the author screens and reviews the data obtained, whether it is by the inclusion or exclusion criteria. From this process, 131 Scopus data documents were used, which means that 131 CHLB documents passed the data validity test by the author.

During the data analysis process of bibliographic data, the authors used Biblioshiny software by Bibliometrix. Biblioshiny by Bibliometrix is a web-based program in the Bibliometrix package developed in the R language that provides extensive techniques for conducting bibliometric and scientometric analysis (Aria and Cuccurullo 2017). In this study,

the authors used Biblioshiny to quantitatively analyze citation, co-authorship, and keyword analysis to evaluate publication trends, citation patterns, and author collaboration by country. Biblioshiny was also used to visualize research trends in various CHLB fields and help authors identify key themes and intellectual structures in CHLB documents. Through Biblioshiny, the results of data analysis were visualized in the form of graphs, matrices, and quadrants. In addition, to see the overall contribution of publications in CHLB, the authors used Bradford's law, which is available in the Biblioshiny program. Bradford's law is a bibliometric principle that states that a few journals, known as "Core Sources," will contain most articles on a given topic (Gourikeremath, Hiremath, and Hadagali 2021). Biblioshiny data results are then selected based on the coverage of CHLB studies in Indonesia that have been obtained from the inclusion and exclusion process that has been carried out.

The study utilized Biblioshiny for descriptive and frequency analysis to provide an overview of 131 documents related to CHLB. The analysis covered elements like publication year range, document type, number of citations, document information, and author information. Additionally, descriptive analysis was conducted to explore publication and citation trends, journal productivity, the most cited documents, document production by country, and research area and theme mapping based on the Author's Keywords. Visualization of results in these studies relies on mapping techniques such as graphical representations, tables, and network diagrams, frequently implemented using software (Aria and Cuccurullo 2017; Donthu et al. 2021; Montazeri et al. 2023). The obtained bibliometric data from Biblioshiny was then analyzed and interpreted through the lens of the risk society theory and the concept of social complexity, considering the scope of CHLB studies in Indonesia and social entities (like community, family, students, children, and costal community). In the process of interpreting and synthesizing the results of the bibliometric analysis, Beck's (1992) theory of risk society is used to see that not only biological threats but the risk of health and medical crises are a localized global phenomenon, covering a vast network of interrelated changes in social life (Jong 2022). On the other hand, the individualization process in overcoming this crisis is to apply CHLB. So, this theory can be used to analyze the content coverage of CHLB publications obtained from bibliometric

analysis. The authors followed an inclusion and exclusion process to gather relevant information for the study.

Results

Bibliometric Data Descriptive Analysis

Based on the CHLB data search results on the Scopus platform, the researcher found 6873 documents that match the keyword "healthy behavior" in CHLB studies. However, because the purpose of this study is to explore the phenomenon of CHLB social trends and complexities in Indonesian academic literature over the past decade, the researcher excluded documents that 1) Documents are in Spanish, Portuguese, French, and German, etc. 2) Research documents not directly related to CHLB's research themes, such as biochemistry, and health and computer science. 3) Documents of the type notes, editorials, books, short surveys, letters, etc. From the results of this exclusion, only 131 CHLB documents were selected for bibliometric analysis.

Table 1. Data Overview on CHLB documents

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2013:2024 (years)
Sources (Journals, Books, etc)	88 (count)
Documents	131 (count)
Annual Growth Rate %	20,81 %
Document Average Age	3,41 (years)
Average citations per doc	2,603 (citations)
References	3634 (count)
DOCUMENT CONTENTS	
Keywords Plus (ID)	641 (count)
Author's Keywords (DE)	394 (count)
AUTHORS	
Authors	471(count)
Authors of single-authored docs	9 (count)
AUTHORS COLLABORATION	
Co-Authors per Doc	4,05 (count)
International co-authorships %	19,08 %
DOCUMENT TYPES	
article	102 (count)
conference paper	23 (count)
review	6 (count)

Source: Biblioshiny analysis, 2024

Table 1 presents a comprehensive general description of the bibliometric data from the analysis of publications covering 2013-2024 in CHLB studies focusing on CHLB in Indonesia. The bibliometric data description is divided into three main sections in the matrix. In the first section, the general information contains the period of CHLB publications in

Indonesia, the source of documents, the total documents published, the annual growth rate of documents during the period 2013-2024, the average document publication per year, the average citation per document, and the number of references contained in all documents. The second section contains document information, such as keyword usage and document type. The last section contains author information, such as keyword usage and author collaboration.

The first part of **Table 1** shows that the data covers the period of CHLB publications from 2013 to 2024, coming from 88 different sources, including journals and books. From these sources, 131 CHLB documents were generated, with an annual growth rate of 20,81%, which means that the field of CHLB studies has grown rapidly over the years. The average document age of 3.41 years indicates the average time since the documents were published. This relatively young average age implies that the field is actively producing new research. The Average citations per document, at 2,603, shows the average number of times other documents cite each document. This metric helps measure the impact and relevance of research within the academic community. Each document has an average of 2,603 citations, with the total number of references being 3634.

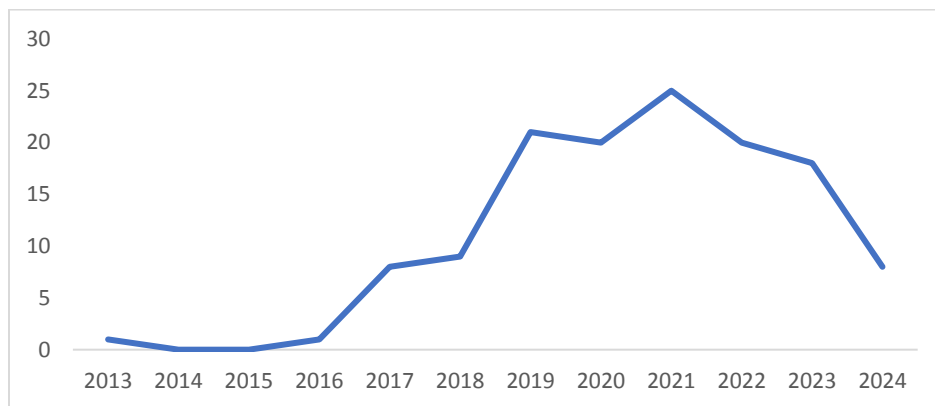
In the second section, Keyword Plus refers to additional keywords automatically generated based on the titles of the cited references. There are 641 Keyword Plus in the document, which helps identify the main topics and themes of the research. Meanwhile, the Author's Keywords are keywords provided by the authors to describe their work's content. There were 394 Author's Keywords in the document, which provided insight into the specific focus areas of the research. Furthermore, in the bibliometric data, CHLB documents are divided into three types: journal articles totaling 102 papers, conference papers totaling 23, and reviews totaling 6. In the third part, 471 authors contributed to these documents, and 9 were the sole authors in the CHLB publication documents. Then, on average, as many as 4,05 researchers have conducted joint research on each document, and 19,08% of the 131 documents involve international co-authors. This bibliometric analysis shows that research in the field of CHLB has high visibility, significant impact, and good productivity in academia.

This suggests that research in this area is highly relevant and contributes substantially to developing science and practice in public health.

Development of Research Interest

As shown in **Figure 1**, our bibliometric analysis indicates a significant increase in CHLB-related publication volume from 2013 to 2024. There is a notable jump from 1 publication in 2013 to 25 in 2021. Overall, **Figure 1** shows a positive and consistent growth trend in the number of publications from year to year, with an annual growth rate of 20,81%. This suggests that this area of research continues to grow and attract more significant interest from the academic community.

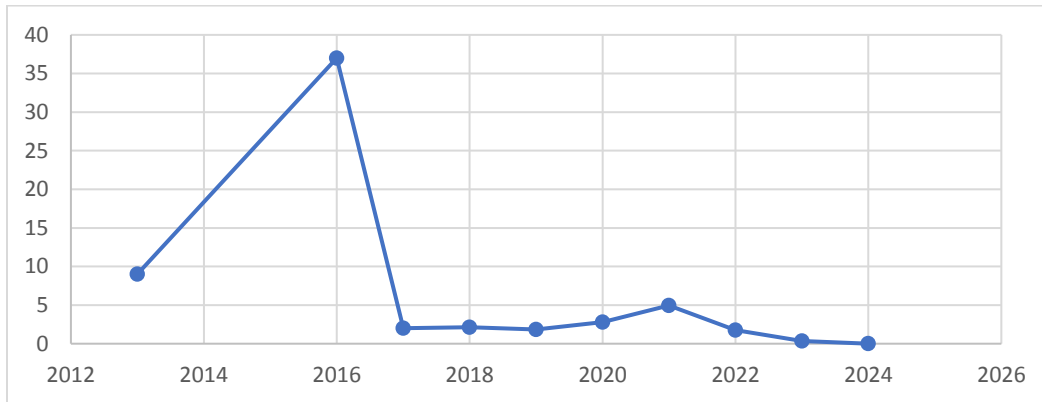
Figure 1. Annual Scientific Production on CHLB Research



Source: Data analysis, 2024

Figure 2 illustrates the average total citations per year, offering a detailed overview of citation trends from 2013 to 2024. It is important to note that the age of the documents can explain the decline in average citation values after 2016. Newer publications typically receive fewer citations than older ones, as it takes time for scientific work to gain recognition. Therefore, the temporal factor should always be considered when analyzing citation trends. Additionally, studies on CHLB often focus on local or specific contexts (Samrah et al. 2021), which may limit their reach to a broader audience.

Figure 2. Average Citation per Year On CHLB

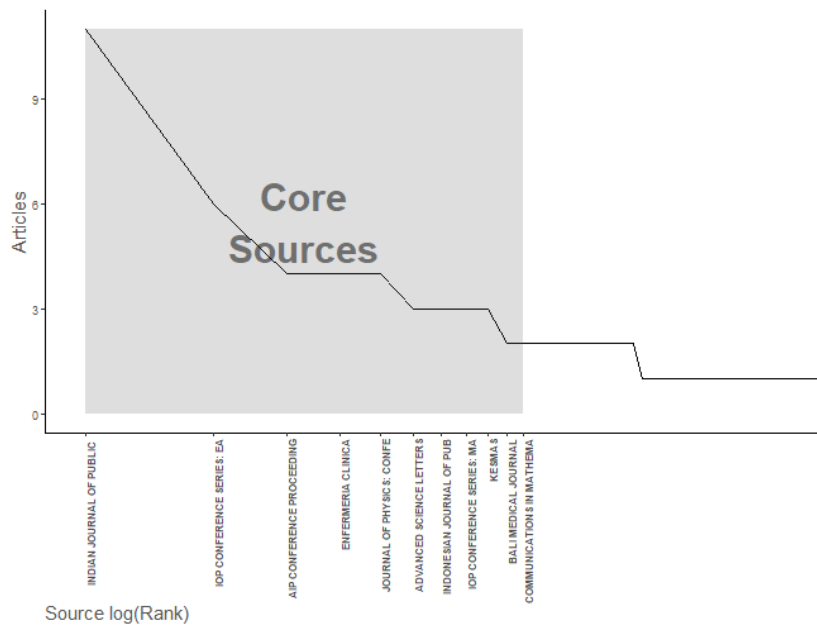


Source: Data analysis, 2024

CHLB Publication Contribution

The contribution of publications in CHLB can be seen from the results of bibliometric analysis using Bradford's law, which states that a small number of sources or journals (core) will cover most of the literature in a field of research.

Figure 3. Journal productivity on CHLB Field



Source: Biblioshiny Analysis, 2024

Using Bradford's Law, which describes the distribution of scientific articles among various journals, authors identified at least 11 core journals that are considered the top choice for researchers to publish their research in CHLB, shown in **Figure 2**. After the publication data was analyzed using Bradford's law through Biblioshiny, authors observed that the Indian Journal of Public Health Research And Development ranks first to emerge as a productive journal in publishing research about CHLB by representing 8,39% of articles in the study period from 2013 to 2024. Then, it was followed by other journals, such as the IOP Conference Series: Earth and Environmental Science (6 publications), AIP Conference Proceedings (4 publications), and Enfermeria Clinica (4 publications). The third journal from the bottom includes Kesmas (3 publications), Bali Medical Journal (2 publications), and Communications In Mathematical Biology And Neuroscience (2 publications), which were also identified as the most fundamental sources of research. This finding indicates that the distribution of articles in various journals can provide insight into the structure of the field.

Most Cited Paper

The results of bibliometric analysis using Biblioshiny showed that there were several articles that had the most citations in the field of CHLB. According to **Table 2**, ranking the top referenced article titles from the time of publication to the making of this study, papers published in 2021 accounted for the majority of citations. Furthermore, the data presented in **Table 2**, shows that some articles in 2021, namely those written by Leman et al. (2021) entitled "Predicting factors on modeling health behavior: A systematic review" occupies the first place with 55 citations. In second place, the article by Azmiardi et al. (2021) entitled "The effect of peer support in diabetes self-management education on glycemic control in patients with type 2 diabetes: A systematic review and meta-Analysis" with 18 citations. The final rank is occupied by the article Sari et al. (2013) entitled "A community intervention for behaviour modification: An experience to control cardiovascular diseases in Yogyakarta, Indonesia" with 9 citations.

Table 2. Highly Cited on CHLB Field

No	Authors	Title	Journal	Citations Count
1	Leman, Claramita, and Rahayu (2021)	Predicting factors on 84orontalo health behavior: A systematic review	American Journal of Health Behavior	55
2	Ginting et al. (2014)	Type D personality is associated with health behaviors and perceived social support in individuals with coronary heart disease	Journal of Health Psychology	37
3	Solikhah, Promthet, and Hurst (2019)	Awareness level about breast cancer risk factors, barriers, attitude and breast cancer screening among Indonesian women	Asian Pacific Journal of Cancer Prevention	27
4	Azmiardi et al. (2021)	The effect of peer support in diabetes self-management education on glycemic control in patients with type 2 diabetes: A systematic review and meta-Analysis	Epidemiology and Health	18
5	Komang et al. (2020)	Determinants of diarrhea among children under two years old in Indonesia	Children and Youth Services Review	16
6	Pamungkas and Chamroonsawasdi (2020)	Family functional-based coaching program on healthy behavior for glycemic control among Indonesian communities: A quasi-experimental study	Oman Medical Journal	9
7	Sari et al. (2013)	A community intervention for behaviour modification:	BMC Public Health	9

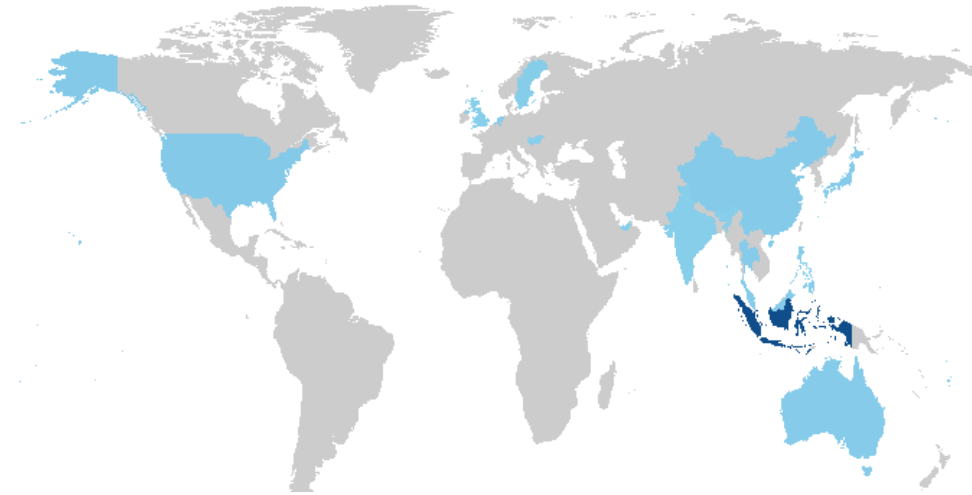
No	Authors	Title	Journal	Citations Count
		An experience to control cardiovascular diseases in Yogyakarta, Indonesia		
8	Rokhmah et al. (2021)	Increase in public interest concerning alternative medicine during the COVID-19 pandemic in Indonesia: a Google Trends study	F1000Research	8
9	Irwan (2018)	Model of hypertension transmission risks to communities in 85orontalo province	Indian Journal of Public Health Research and Development	7
10	Nainggolan et al. (2022)	The relationship of body mass index and midupper arm circumference with anemia in nonpregnant women aged 19-49 years in Indonesia: Analysis of 2018 Basic Health Research data	PloS ONE	6

Source: Data analysis, 2024

Most of these cited articles addressed healthy behaviors and dangerous non-communicable diseases. In other words, these articles have significant quality and impact on publications in the field of CHLB. Not only that, but revealing the most cited articles can help in understanding how knowledge is disseminated and how cooperation between researchers impacts science advancement in the CHLB field.

Publications by Researcher's Country

Figure 4. Country Scientific Production on CHLB



Source: Data analysis, 2024

Regarding the authors who contribute to publications in the field of CHLB, the authors found that researchers from Indonesia had a higher frequency of occurrence than other countries in publishing documents about CHLB, which can be seen in **Figure 4. Table 3** shows the authors' countries that appear most frequently in producing documents about CHLB. Indonesia occupies the first position with 447 appearances. The USA occupies the second position with 14 appearances. The next position is occupied by China and the Netherlands, each with 11 appearances.

Table 3. Frequency Countries Scientific Production

Countries	Freq
Indonesia	447
USA	14
China	11
Netherlands	11
Australia	7
Japan	7
Thailand	7
Malaysia	6
Sweden	4
Philippines	3

Source: Data Analysis, 2024

Research Area and Thematic Map

Bibliometric analysis using Biblioshiny from Bibliometrix shows that the development of publications about CHLB has created a relatively complex and broad diversity of research topic areas in the field. Authors found at least 10 trends in research topics about CHLB, as shown in **Figure 5**. Of the 131 documents in the field, about 10 (16%) publications raise the topic of healthy behavior, an Indonesian topic that accounts for 10 publications (16%). The next topics are followed by COVID-19 (13%), behavior (10%), and health behavior (10%). The Indonesian topic (16%) refers to the application and case studies regarding CHLB in Indonesia. Indonesia still faces various public health problems, such as stunting and infectious and non-communicable diseases (Sari et al., 2024). Kementerian Kesehatan RI (2018) reported that data from Riskesdas (Basic Health Research) showed that many communities still have not implemented CHLB optimally. This can be seen from 38 provinces; only five provinces have met the criteria for CHLB in Indonesia, namely North Sulawesi (76,6%), East Kalimantan (75,3%), Bali (74,2%), Jambi (72,4%), Central Java (71,1%). This attracts other researchers to develop the topic of CHLB in Indonesia.

Figure 5. Research Area CHLB

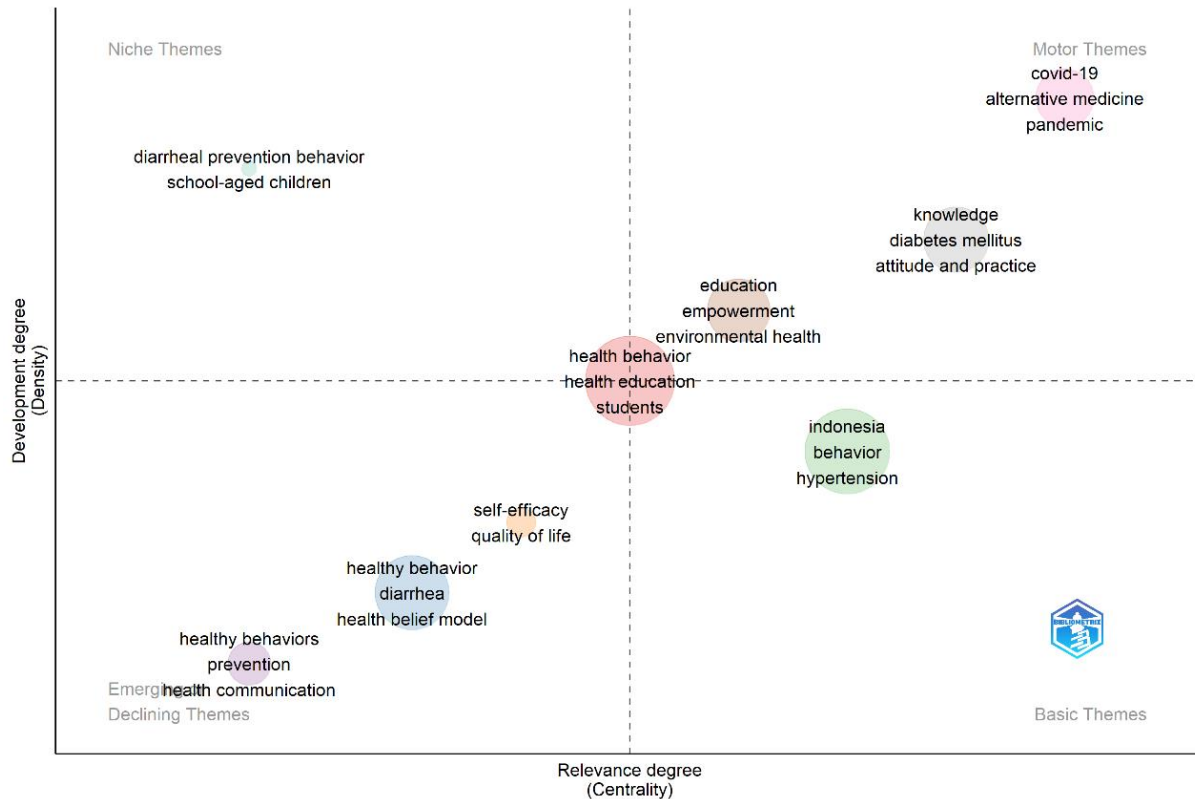
Source: Data analysis, 2024

Based on **Figure 5**, it can also be seen that the distribution of this research topic area has a clear tendency, namely healthy behavior, Indonesia, COVID-19, diabetes mellitus, and education. In other words, the research topic areas about CHLB cover a broad spectrum, including various social aspects (individual and group behavior), educational aspects, and health aspects (infectious or non-communicable diseases). The diversity of research topic areas in this field illustrates the complexity and future challenges to efforts to implement and succeed in CHLB so that it can encourage other researchers to conduct research with various cross-disciplines and perspectives.

Furthermore, to see the themes that are developing about CHLB, Biblioshiny analysis shows that at least 4 clusters divide the themes about CHLB. The authors used Thematic Map from Biblioshiny to map keywords into themes. Thematic map in bibliometric analysis is a method used to understand the structure and evolution of a particular discipline, scientific domain, or research field. This method involves using bibliometric and text search-based analysis methods to analyze bibliographic data of journal articles (Parlina, Ramli, and Murfi 2020).

The thematic map groups themes into four themes: Niche Themes, Motor Themes, Emerging or Declining Themes, and Basic Themes.

Figure 6. Thematic Map on CHLB Field



Source: Data analysis, 2024

The first quadrant is Motor Themes, the core high-maturity theme. In this quadrant, the themes present in the 131 documents on CHLB consist of: 1) Covid-19, alternative medicine, pandemic. 2) Knowledge, diabetes mellitus, attitude, and practice. 3) education, empowerment, environmental health. These highly developed and relevant themes make them pivotal to the field. They drive the research agenda and are often central to academic discourse. The second quadrant is Niche Themes, an isolated theme with high maturity consisting of diarrheal prevention behavior and school-aged children. These themes have a high degree of development but lower relevance, indicating that they are well-researched but may not be central to the core discussions in the field.

The third quadrant is Emerging or Declining Themes and new or disappearing themes. Themes in this quadrant, such as "healthy behaviors," "prevention," "health communication," "healthy behavior," "health belief model," "diarrhea," "self-efficacy," and "quality of life," have both low development and low relevance. These could be either emerging themes that are just starting to gain attention or declining themes that are losing their significance in the current research landscape. The fourth quadrant is Basic Themes, basic themes with low maturity, which may be hot topics for research or trends for future development, consisting of the themes of "Indonesia," "behavior," and "hypertension." These themes have high relevance but lower development, meaning they are crucial to the field but may not yet have extensive research backing them. Not only that, the authors also found the central theme in the map is "health behavior," "health education," and "students," which are positioned near the center, indicating moderate development and relevance. By classifying CHLB research topics, authors can develop a roadmap for future research. This allows us to be more effective in designing programs and interventions to improve the community's clean and healthy living behaviors.

Dealing with Risk Society

Beck (1992) states that a risk society is a condition where society is experiencing uncertainty due to advanced modernity. The era of contemporary modernity is characterized by many risks closely related to economic crises, the spread of pathogens, environmental crises, and even health crises (Beck, 1992). These risks have become an integral part of everyday life, with health issues representing a significant risk to the health of the wider public. Furthermore, uncertainty has also reached the healthcare domain, where Indonesians are now faced with a variety of health problems, such as cardiovascular disease and diabetes (Ginting et al. 2016; Sari et al. 2013), hypertension (Israfil et al. 2024), diabetes mellitus (Siregar et al. 2023), diarrhea (Adria, Wulandari, and Kurniasari 2023), Covid-19 (Wibisono, Isramilda, and Amelia 2020), to HIV AIDS (Asrina et al. 2023). Based on the results of the bibliometric analysis that has been conducted, the researcher interprets that the uncertainty of Indonesia's current public health problems is manifested by the increasing

number of publications on CHLB and the variety of topics and themes raised in discussing CHLB issues.

This study conducted a bibliometric analysis of 131 CHLB-related publications published between 2013 and 2024. The analysis showed a significant increase in the number of publications but a decrease in the number of citations. This finding indicates that although research interest in CHLB is increasing, recognition of its contribution to addressing public health challenges in Indonesia is still not optimal. The early development of CHLB in Indonesia first appeared in 2013.

The authors portrayed that in 2013, there was a serious problem regarding cardiovascular disease, where cardiovascular disease is the highest cause of death in Indonesia. The 2013 and 2018 Basic Health Research (Riskesmas) showed an increasing trend in heart disease, from 0.5% in 2013 to 1.5% in 2018 (Kementrian Kesehatan RI 2018). A study by Sari et al. (2013) initiated the topic of CHLB, which discussed how the community intervened in healthy behaviors to control cardiovascular disease in Jogjakarta. The focus on cardiovascular disease is also presented in other studies (Ginting et al. 2016; Israfil et al. 2023), arguing that cardiovascular disease can occur due to an individual's unhealthy lifestyle.

Therefore, a study by Siregar et al. (2023) stated that diabetes mellitus is a health problem in Indonesia, where its prevalence increases yearly. This condition can negatively affect a person's quality of life and cause significant complications. More than 50% of patients with diabetes mellitus have type 2, which is the most common type of diabetes worldwide. Moreover, diarrhea is also a global health problem that causes morbidity and mortality in all age groups (Adria et al. 2023). Not only these non-communicable diseases but infectious diseases, such as COVID-19 (Wibisono et al., 2020) and HIV AIDS (Asrina et al. 2023), have contributed to adding uncertainty in people's lives. Where the total number of deaths due to COVID-19 in Indonesia in 2022 occupied the second highest position in Asia, reaching 150,000 cases (BBC News 2022), and TB-HIV deaths in Indonesia amounted to 6,500 or 2.4 per 100,000 people (The Conversation 2023). This indicates that as time progresses, the risks due to health problems will continue to exist, forming even newer faces.

They experience uncertainty and face social complexity, which is evident in the challenges of implementing CHLB. Challenges in CHLB include the number and diversity of individuals in a group, their interaction patterns, and the properties that arise from these interactions. Bibliometric analysis shows that CHLB research has been conducted in Indonesia and several other countries, such as Indonesia, the USA, China, the Netherlands, Australia, and Japan. These countries also collaborate with Indonesia. In this case, this finding shows that CHLB studies in Indonesia attract the attention of researchers from other countries to be studied in depth. One indication is that there are differences in the application of CHLB in developing and developed countries. The principle that applies to social strata also applies to countries. Poor countries tend to be more vulnerable to risks compared to rich countries with more resources to overcome them (Ritzer 2012).

WHO recorded that each year, there are approximately 2.2 million people in developing countries, especially children, die from various diseases caused by the lack of adequate safe drinking water and poor sanitation practices (Samrah et al. 2021). In a study conducted by Yuniarti and Raharini (2024) in 2017, according to WHO data, there were 2.2 million people with limited access to safe drinking water and 4.2 million people globally with limited sanitation facilities. Furthermore, low-income countries have poorly implemented handwashing habits using clean water and soap (Smith et al. 2020). This is due to the limited availability of handwashing facilities or a poor understanding of the importance of handwashing habits for people in developing countries. Another poor implementation of CHLB includes smoking habits. In 2008, WHO estimated that around one-third of the world's population smoked, corresponding to 47% of men and 12% of women. While the rate of smoking has been decreasing for several decades in developed countries, tobacco consumption continues to increase in developing countries at an annual rate of about 3.4% (Khattab et al. 2012).

In countries with low and middle income, more women experience breast cancer compared to high-income countries. This is due to inadequate health infrastructure, which prevents people from undergoing routine mammography due to limited facilities. In addition, a relatively low level of knowledge causes many women to be unaware of the risk

factors for breast cancer and not conduct self-examination (Solikhah et al. 2019). Research by Jaya and Andriyana (2021) has shown that information about CHLB is one of the effective methods in efforts to improve public health and prevent several epidemic diseases, such as malaria. A high level of CHLB implementation correlates with a low risk of malaria infection. Therefore, CHLB is one of the main risk factors that must be considered in disease prevention measures.

Apart from that, complex health problems are also experienced by children who are living on the streets. Their inability to access health information has led to a lack of knowledge. This has resulted in a poor understanding of the importance of maintaining personal hygiene. Moreover, negative perceptions arising from the surrounding environment towards themselves make it difficult for them to utilize health facilities (Chairani et al. 2019). Coastal communities are also not exempt from health problems. One example is limited access to health facilities, causing low health status in coastal communities (Dupai et al. 2019). The lack of health education they received led to a low understanding of the importance of implementing CHLB in everyday life. Besides, the surrounding environmental conditions, such as inadequate clean water availability, are causing them difficulties in implementing CHLB. The availability of health facilities also does not ensure the implementation of CHLB in their daily lives, as in a study conducted by Rizal (2018), there are still coastal communities who do not seek medical treatment when they are unwell but instead choose to practice self-health treatment. This stated that in risk societies, individuals also contribute to constructing the risks they create.

Furthermore, behind many publications originating from Indonesia, the authors argue that CHLB itself has a strong relationship with public health conditions. The uncertainty of health problems has created social risks that impact the failure to fulfill the needs of a complete human being. Social risk is a condition or event that can trigger conflict, division, or disharmony in society, thus threatening social stability and welfare (Kusvianti et al. 2023). Moreover, Indonesia is a developing country. The authors have identified this logical relationship for several reasons. *First*, previous studies have shown that developing countries have poor disease prevention due to a lack of resources, inadequate public health

systems, inadequate political commitment, and inadequate infrastructure (Gori et al. 2021; Jamison and Mosley 1991; Juma et al. 2018). *Second*, wide gaps in people's understanding of a healthy and clean environment, ignorance about waste management, and vested interests contribute to Indonesia's failure to create a clean and healthy society (Brotosusilo and Handayani 2020). *Third*, the Community-Based Total Sanitation (CBTS) approach in Indonesia, which uses methods of punishment and social humiliation, is inadequate and reflects colonial public health practices (Engel and Susilo 2014). *Fourth*, Indonesia's high population growth and poverty have led to poor hygiene and sanitation, leading to infectious diseases and stunting in children under five years old (Saleh, Atiyatna, and Sari 2021). *Fifth*, Indonesia's universal health coverage initiative has improved health equity and access to services, but challenges remain in addressing the lower middle class and promoting healthy lifestyles (Agustina et al. 2019).

Risk Anticipation

CHLB is also closely related to the social construction of society (Aulia and Sadewo 2019; Nadhiroh and Sadewo 2023). The prevailing view is that failure to implement CHLB properly will result in illness within the family (Aulia and Sadewo 2019; Nadhiroh and Sadewo 2023). Indeed, health crises, such as non-communicable diseases (in this context, stunting), arise from gaps in social constructs that influence how individuals perceive and respond to an illness (Lestari, Kristiana, and Paramita 2018). This suggests that CHLB programs themselves are not ineffective in addressing health risks, but their effectiveness depends on the social units overseeing their implementation. This also suggests that society has two dimensions as a result of the formation of alternative realities, which gives rise to a dialectical process in which society can both create risks and reduce them. Therefore, researchers see this process as an implication of what Beck (1992) calls individualization. Modern individuals are increasingly detached from traditional bonds, such as social class, religion, and community, which previously defined their identities and roles. The liberation of individuals from the burden of tradition has resulted in an accompanying responsibility,

where individuals must also bear the consequences of their choices, including the risks that may arise.

Based on the findings of the bibliometric analysis of CHLB research themes, themes such as "healthy behaviors," "prevention," "health communication," "healthy behavior," "health belief model," "diarrhea," "self-efficacy," and "quality of life" actually experienced a decline in publication trends. The authors argue that although this theme is relevant to Indonesian society's conditions, health issues that are considered national priorities may change over time. Governments and health agencies may redirect their policies and programs towards new health issues, changing the landscape of supported and published research. This encourages community reflexivity, where, in the face of risk, they re-regulate themselves to cope with health risks.

The modernization trajectory often brings unforeseen consequences that can undermine its basic principles. These additional effects give rise to continuous uncertainty, which necessitates societal adaptation (Wimmer and Quandt 2007). So, what to do if risks cannot be eliminated? Although advanced modernization generates risks, it also generates reflexivity that allows it to question itself and the risks it generates (Ritzer, 2012). In other words, the evolving process of modernization cannot be separated from the emergence of various risks. However, along with this progress, there is also an awareness of the importance of evaluating existing risks, thus enabling mitigation and prevention efforts.

Bibliometric analysis showed that to improve the knowledge, attitudes, and behaviors of CHLB, an extension and empowerment approach was used. Efforts to increase the implementation of CHLB have been explored through various methods. Nayoan (2017) utilized a 12-week SMS campaign to provide information on children's health, oral hygiene, sanitation, and nutrition. Hasni and Fajri (2018) emphasized the need for engaging media, such as picture books, videos, and brochures, to promote CHLB among children. Jafar et al. (2020) highlighted the effectiveness of self-determination theory (SDT) by using modules, calendars, and physical activity posters to improve knowledge, attitudes, and behaviors. The use of technology and the Internet to disseminate health information was supported by studies from Bajari, Wahyudin, and Erlandia (2019) and Suandari and Prianthara (2024),

which showed that exposure to the Internet can enhance public knowledge and behavior regarding health protocols, especially during the Covid-19 pandemic. Agustina and Ramdhani (2023) found that internet-based self-management programs can increase confidence in practicing exercise among overweight women. Rizal (2018) suggests that the community often resorts to self-treatment before seeking medical care. Dupai et al. (2019) stressed the importance of community empowerment through socialization, education, training, cross-sectoral cooperation, and continuous supervision to support successful CHLB implementation. Kusmawan et al. (2021) found that knowledge and experience significantly influence the implementation of CHLB, including mask-wearing habits. During the COVID-19 pandemic, communities enhanced their health and immunity using alternative medicines like ginger and turmeric, as Rokhmah et al. (2021) noted.

The social complexity and lack of proper facilities in some neighborhoods highlight the challenges of implementing CHLB. To promote CHLB, policymakers should prioritize sanitation facilities and integrate hygiene education across sectors, including schools. Furthermore, some factors that affect the success of CHLB implementation in the community include the low level of community knowledge, inappropriate socialization methods, the use of terms that are difficult to understand, and the use of less attractive media (Hasni and Fajri 2018). Therefore, government and non-governmental organizations can use various attractive media, such as digital campaigns that massively mobilize CHLB actions. Therefore, broad collaboration is needed to encourage community members to implement CHLB programs. This includes utilizing technological advances, religion, and sociocultural support factors (Herlina et al. 2023) so that individuals from different social classes and backgrounds can quickly learn about CHLB and immediately apply it in their daily lives. In addition, issues related to CHLB should also be massively popularized through various media because, in an at-risk society, the media has an important role in making the risk visible and influencing people's perceptions (Wimmer and Quandt 2007).

The limitation of this study is that the bibliometric analysis design and interpretation of the research results are limited to the context of CHLB in Indonesia and not to the global aspects of CHLB, so the social complexity of CHLB in Indonesia will not necessarily be the

same social complexity in other countries. Thus, different results may be obtained if other studies include global trends regarding CHLB, so the generalization of the study results to the global context needs to be considered carefully. In addition, this study only used 131 documents that were only journal articles, conference papers, and reviews that have a focus on CHLB in the country of Indonesia due to applying inclusion and exclusion criteria that are likely to change the results of the study according to the inclusion and exclusion criteria of other researchers.

Conclusion

This study uses bibliometric methods to analyze the trends and social complexity of CHLB research in Indonesia. Research on CHLB in Indonesia was conducted from 2013 to 2024 on the Scopus platform, and 131 documents were found. The trend in the number of CHLB publications continues to increase due to CHLB attracting attention. However, interest in CHLB continues to decline from 2013 to 2024 because CHLB research is only related to the local context, and audience reach may be limited. The Indian Journal of Public Health Research And Development is a journal that has significantly contributed to the publication and dissemination of studies. The influential article "Predicting factors on modeling health behavior: A systematic review" is an influential article in CHLB. Regarding publication distribution by country, Indonesia, the USA, China, the Netherlands, Australia, and Japan have contributed to the CHLB study.

Indonesian society is faced with various health problems, such as cardiovascular disease, hypertension, diabetes mellitus, diarrhea, Covid-19, and HIV/AIDS. This uncertainty is reflected in the variety of topics and themes raised in CHLB research, such as behavior, hypertension, diarrheal prevention behavior, and school-aged children. This has become a sign that in the era of a risk society, people face uncertainty due to health crises. This crisis can prevent people from fulfilling their health needs. In this era of uncertainty, challenges in implementing CHLB include the number and diversity of individuals in a group, their interaction patterns, and the characteristics that arise from these interactions. However,

behind the uncertainty that creates social risks in CHLB, reflexivity emerges as a form of effort to anticipate the dangers of the health crisis due to the lack of application of CHLB through counseling and empowerment to the community.

Finally, future research should conduct further bibliometric analysis with a global focus on CHLB. In addition, future research can also use other databases, such as Web of Science, Pubmed, or Dimensions database. Not only using Biblioshiny from Bibliometrix, but future researchers are also expected to use or collaborate with more than one software to visualize the results of bibliometric data analysis, such as Citespace, Vosviewer, or Bibexcel.

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