Depression Postpartum: Bibliometric Analysis

Siti Rafika Putri

Universitas Negeri Semarang, Central Java, Indonesia

Corresponding author: sitirafikaputri06@gmail.com

Abstract: The prevalence of postpartum depression continues to increase annually. Approximately 13%-18% of mothers worldwide who experience postpartum depression exhibit severe depressive symptoms and seek treatment. Untreated postpartum depression significantly increases the risk of developing depression beyond the postpartum period, making these individuals six times more likely to suffer from depression later in life. This study aims to identify and analyze academic literature on postpartum depression and to explore emerging research trends, leading authors, co-authorship networks, institutions, countries, and journals. Methods: Scopus was utilized to collect relevant articles on postpartum depression published from January 1925 to September 27, 2024. All titles were screened to ensure they met inclusion criteria, with the primary requirement that the titles be in English. All bibliographic information was extracted and used for descriptive analysis. Bibliometrics and VOSviewer were used to compile and visualize annual publication totals, journals, authors, countries, institutions, collaboration networks, keywords, and references. In total, 13,383 articles met the inclusion criteria. The number of publications annually indicated an increasing trend, although there was a decrease in the last two years, 2023 and 2024. The journals with the most publications were the Journal of Affective Disorders, Archives of Women's Mental Health, and BMC Pregnancy and Childbirth. The most productive countries were the United States, the United Kingdom, and Canada. The most prolific institutions included the University of Toronto, the University of North Carolina at Chapel Hill, and the University of Melbourne. The most productive researchers were Wisner, K.L., Meltzer-Brody, S., and Dennis, C.L. Conclusions: This study summarizes recent advances in postpartum depression research and highlights emerging trends, sources, leading institutions, and hot topics through bibliometric analysis and network visualization. Although this study has unveiled new knowledge in healthcare, it will provide valuable insights relevant to future research directions and clinical practice.

Keywords: Postpartum Depression, Maternal Health, Bibliometric Analysis

INTRODUCTION

Postpartum depression is a type of depression associated with stress in postpartum women. Depending on the severity, depression can be categorized into mild, moderate, and, in the most severe cases, psychosis, where the mother may experience suicidal thoughts (Kurniawati, 2019). Postpartum depression affects approximately 14% of new mothers and is characterized by mood disturbances that can begin as early as four weeks after delivery and may last up to one year postpartum. The signs and symptoms include depressive thoughts and emotions, anxiety, and despair, which can interfere with a mother's ability to perform her new role during the crucial first year of caring for her baby (Dlamini, L.P.; Amelia, V.L.; Shongwe, M.C.; Chang, P.-C.; Chung,

2023). The incidence of postpartum depression has been on the rise year after year (Wan Mohamed Radzi, C.W.J.B., Salarzadeh Jenatabadi, H. Samsudin, 2021). The internationally recognized prevalence of PPD is between 10–15% (Shorey, S., Chee, C. Y. I., Ng, E. D., Chan, Y. H., Tam, W. W. S., and Chong & S, 2018) and varies from 3.5% to 63.3% in Asian countries (Shorey, S., Chee, C. Y. I., Ng, E. D., Chan, Y. H., Tam, W. W. S., and Chong & S, 2018). Factors contributing to the occurrence of postpartum depression include biological/physical, obstetric, sociodemographic, lifestyle, and psychological factors (Chen J, Cross WM, Plummer V, Lam L, 2019).

The consequences of postpartum depression are twofold. The first loss affects the women themselves, where postpartum depression can lead to self-harm and even suicide, with recurrences potentially occurring in the second or fifth year, complicating recovery. The second loss impacts the child; the mother-child relationship is disrupted by the mother's depression, leading her to harm or even kill her baby. This disruption can affect the child's intellectual, emotional, and personality development and increase the risk of violence as the child grows into adolescence. If postpartum depression is not adequately addressed, it becomes a burden not only for the mother but also for the husband, children, family, and the community at large (Bodnar-Deren, S., Klipstein, K., Fersh, M., Shemesh, E., and Howell, 2016).

Among postpartum women worldwide, 30%-50% are clinically diagnosed with postpartum depression, yet only 14%-16% receive treatment for their symptoms (Constance, G. & Roger, 2019). Several factors contribute to the low management rate of postpartum depression, including mothers' hesitance to acknowledge signs of postpartum depression due to a lack of knowledge about psychological changes during the postpartum period, and their reluctance to discuss symptoms with healthcare providers due to social stigma. This lack of knowledge leads mothers to consider signs of insomnia and anxiety as normal during the postpartum period. Additionally, medical professionals, midwives, and nurses often overlook these symptoms or fail to conduct early depression screenings (Güdücü, N.; Özcan, 2023).

Reducing the incidence of postpartum depression is included in the Sustainable Development Goals (SDGs), specifically under target 3.4 which aims by 2030 to reduce by one-third premature mortality from non-communicable diseases through prevention and treatment, and to promote mental health and well-being. Currently, addressing postpartum depression is not yet a priority in treatment, despite extensive research by many experts on its causative factors and management.

To focus on future research and identify postpartum depression, it is crucial to explore patterns and trends within the literature. Researchers use bibliometric analysis to gain a comprehensive view of this emerging field. They utilize quantitative evaluation metrics of scholarly literature to understand the breadth of research (Andy Wai Kan Yeung, Eliana B. Souto, Alessandra Durazzo, Massimo Lucarini, Ettore Novellino et al., 2020). Bibliometric studies provide information on publications such as authors, journals, countries, institutions, and collaboration networks to offer an overarching perspective of a field (Müller, A. M., Maher, C. A., Vandelanotte, C., Hingle, M., Middelweerd, A., Lopez, M. L., ... & Wark, 2018). Bibliometric analysis is a statistical analytical approach that yields valuable insights by exploring trends in specific topics, identifying who and where active researchers are propelling studies, determining which journals and organizations contribute most to research in a particular field, the types of research conducted, and the tools used in these fields. Bibliometric analysis is beneficial as it allows researchers to better understand this area and provides insights for the future. Researchers used bibliometric analysis to conduct a systematic review of postpartum depression research from 1925 to 2024, thus providing an overview of current trends, topics, and bibliometric characteristics in postpartum depression literature. The findings of this study offer crucial information and directions for future research on postpartum depression literature.

METHOD

This study followed a standard bibliometric approach (Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., Lim, 2021). The process involved the following steps: (1) defining search criteria, keywords, and period; (2) selecting the Scopus database; (3) refining and finalizing research criteria; (4) exporting full results; (5) analyzing the information and discussing the results (Ruiz-Real, J.L., Uribe-Toril, J., Valenciano, J.D.P., Gazquez-Abad, 2018).

2.1. Search Strategy

The researchers conducted a search for relevant articles in Scopus, considered one of the most comprehensive international databases for scholarly literature. Scopus includes over 13,383 research journals, offering a variety of bibliometric indicators (e.g., titles, institutions, countries/regions, years of publication, categories, and keywords) and covers diverse aspects. The keywords used to find relevant topics were "depression" or "postpartum" or "psychology" and "maternal" or "anxiety." The search was limited to the years 1920 to 2024. Subsequently,

researchers validated our search strategy by manually reviewing all retrieved article titles. Relevant articles were selected, and all extracted articles were saved in TXT format.

2.2. Publication Screening

In this study, all articles concerning postpartum depression were included for screening. Articles for bibliometric analysis were restricted to those that (1) were published in English, (2) focused on postpartum depression as an outcome, and (3) involved research in the realm of maternal postpartum. Articles published in peer-reviewed journals as research papers, conference proceedings, and reviews were included, but publications such as letters, editorials, and book chapters were excluded. The screening of postpartum depression has evolved since 1978, following the development of screening tools like the Beck Depression Inventory by Beck (1976) and the Edinburgh Postnatal Depression Scale by Cox et al. (1987). Articles were screened according to pre-established criteria. Publications included in the visualization analysis must mention postpartum depression as a primary, secondary, or covariate outcome and report relevant findings and methods. Publications included in the bibliometric data must have postpartum depression as their main focus. Publications were excluded from both analyses if they reported (1) separation anxiety, (2) other mental health issues (e.g., stress, other psychiatric disorders) without anxiety, or (4) were based on animal research.

2.3. Bibliometric Analysis

Bibliometric analysis, first proposed by Mulchenko, is a quantitative evaluation of scientific research used to measure and analyze current research trends in a specific area to obtain measurable and reproducible information relevant to policy management. Bibliometric analysis can provide a broad overview of a knowledge domain and identify research questions researchers may wish to address, serving as a method developed by the authors to achieve their objectives. Visualizing the entire field of postpartum depression will help readers gain a global perspective on patterns and trends in postpartum depression research (Tahmina Nasrin Poly, 2023). Bibliometric information about the number of publications, publication years, authors, journals, and countries was cleaned and computed in Excel. Additionally, a data extraction survey was conducted on the abstracts of all relevant publications. A data extraction form was first used to determine whether postpartum depression was the main focus of the publication or not. The growth rate of postpartum depression publications in Scopus data from 1946 to 2024 resulted in 17,121 publications

This research will produce trends in publications by year, top countries, leading journals, top research institutions, top authors, and impact rankings of each country, journal, institution, and author based on the number of publications.

2.4. Visualization Mapping

VOSviewer is used to visualize the network of relationships among publications, including the bibliometric networks of co-authorship, co-occurrence, and co-citation, as well as the occurrence between keywords. Publications not related to postpartum depression in the title/abstract screening phase were removed from the dataset used for analysis. Analysis and visualization were performed for co-authorship, keyword co-occurrence, citations, bibliographic coupling, and co-citation. Additionally, keyword co-occurrence was conducted based on text data using title and abstract data. The size of connections or relationships indicates frequency, with larger connections representing a higher number of identified items, and lines between two connections indicating the relationship between items. Connections with the same color belong to clusters or groupings of similar items. The strength of a link is defined as the number of links an item has with other items (van Eck, N.J., Waltman, 2017).

RESULTS

3.1. Publication Outcomes

An electronic database search yielded 13,383 articles. The distribution of articles by year is as follows:

Table 1. The distribution of articles by year between 2014 and 2024

Year	Articles, n	Annual Growth, n
2014	471	-2
2015	533	62
2016	592	59
2017	567	-25
2018	646	79
2019	751	105
2020	845	94
2021	1129	284
2022	1187	58
2023	1174	-13
2024	1002	-172

Table 1 shows that the publication of articles on postpartum depression fluctuated over time. Overall, these articles were published in 159 international peer-reviewed journals. As indicated in Table 2, the Journal of Affective Disorders published the most articles, with 576 articles, followed by Archives of Women's Mental Health with 524 articles, and BMC Pregnancy and Childbirth with 339 articles.

Table 2 Top 10 journals that published articles on depression postpartum

Rank	Journal	Country	Article, n	Ranked based on citation	Citation count
1	Journal of Affective Disorders	Netherlands	576	12	311
2	Archives Of Woman S Metal Health	Austria	524	15	209
3	BMC Pregnancy and Childbirth	United Kingdom	339	54	209
4	Maternal and Child Health Journal		189	130	330
5	Plos One	San Fransisco	174	18	171
6	Journal of Reproductive and Infant Psychology	United Kingdom	159	29	330
7	International Journal of Environmental Research and Public Health	Switzerland	142	88	665
8	Midwifery	Belanda	136	3	663
9	JOGNN Journal of Obstetric Gynecologic and Neonatal Nursing	North America	131	8	43
10	Journal of Women S Health	American	131	577	12

Table 3 shows the top 10 countries that have published research on postpartum depression, with the United States leading with 4,793 publications, followed by the United Kingdom with 1,289 publications, and Canada with 1,044 articles.

Table 3. Top 10 countries that published articles on depression postpartum

Rank	Country	Articles
1	United States	4793
2	United Kingdom	1289
3	Canada	1044
4	Australia	949
5	China	854
6	Germany	414
7	Japan	409
8	Sweden	367
9	Italy	343
10	Netherlands	336

Table 4 shows the 10 most productive institutions in postpartum depression research. The University of Toronto leads with 273 articles, followed by The University of North Carolina at Chapel Hill with 249 articles, and the University of Melbourne with 229 articles.

Table 4. Top 10 institutions that published papers on depression postpartum

Rank	Affiliations	Country	Articles
1	University of Toronto	Canada	273
2	The University of North Carolina at Chapel Hill	United States	249
3	University of Melbourne	Australia	229
4	King's College London	United Kingdom	225
5	Harvard Medical School	United States	211
6	UNC School of Medicine	United States	167
7	Karolinska Institut	Sweden	163
8	The University of British Columbia	Canda	150
9	University of Michigan, Ann Arbor	United States	147
10	University of Pittsburgh	United States	145

VOSViewer was used to analyze co-authorship and to present a broad overview of the extensive institutional network in postpartum depression research. The relationships between institutions with the number of co-authored articles were examined. The analysis of institutional publications included a total of 236 institutions, each publishing at least 41 articles resulting in 20 clusters. These clusters are presented in Figure 1.

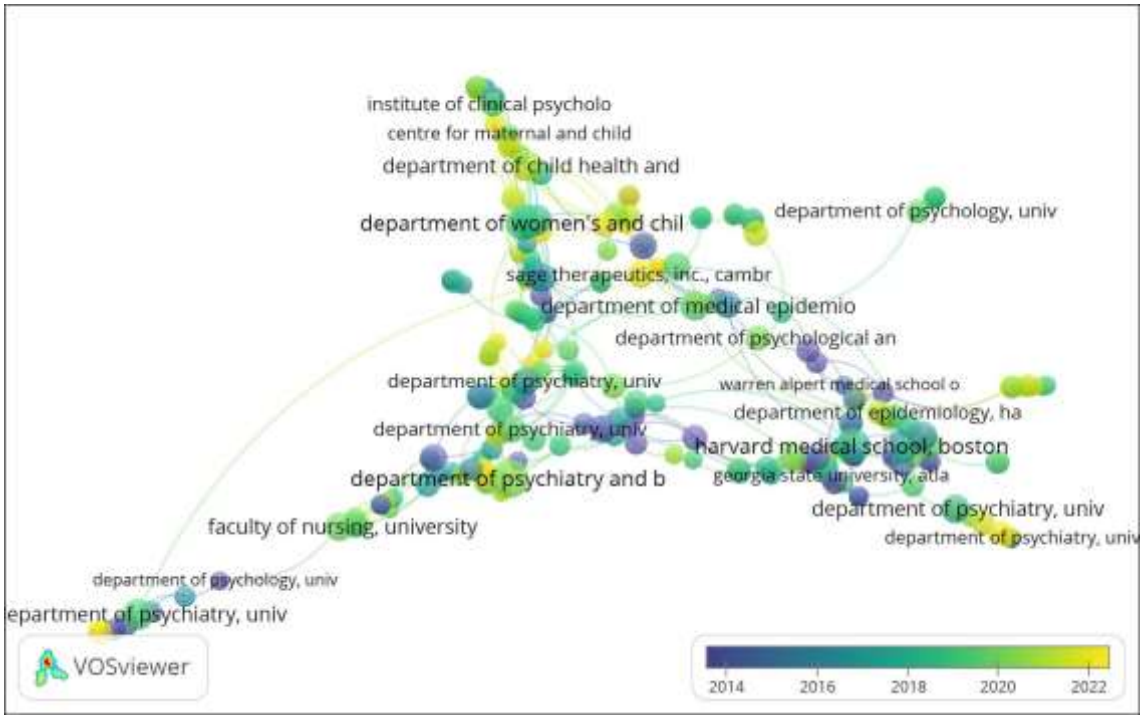

Figure 1. The co-authorship network of institutes that contributed to Depression Postpartum.

13,328 articles on postpartum depression were authored by 162 writers. Table 5 shows the 10 most productive authors in the field of postpartum depression research, with Wisner, K. L. leading with 91 articles, followed by Meltzer-Brody, S with 87 articles, and Dennis, C. L. with 83 articles.

Table 5 Top 10 authors that published papers on depression postpartum

Rank	Authors	Articles, n	Citations, n	h-index[a]
1	Wisner, K. L	91	11784	70
2	Meltzer-Brody, S	87	8832	53
3	Dennis, CL	83	13198	71
4	Skalkidou, A.	63	4138	43
5	Milgrom, J	61	7521	54
6	Beck, C. T	57	13467	49
7	O'Hara M. W	54	11769	57
8	Ayers, S.	48	6061	53
9	Murray, L	46	11282	68
10	Eberhard-Gran M	44	4258	46

The co-authorship analysis showed that the highest set of related authors consists of 772 authors across 34 clusters (Figure 2).

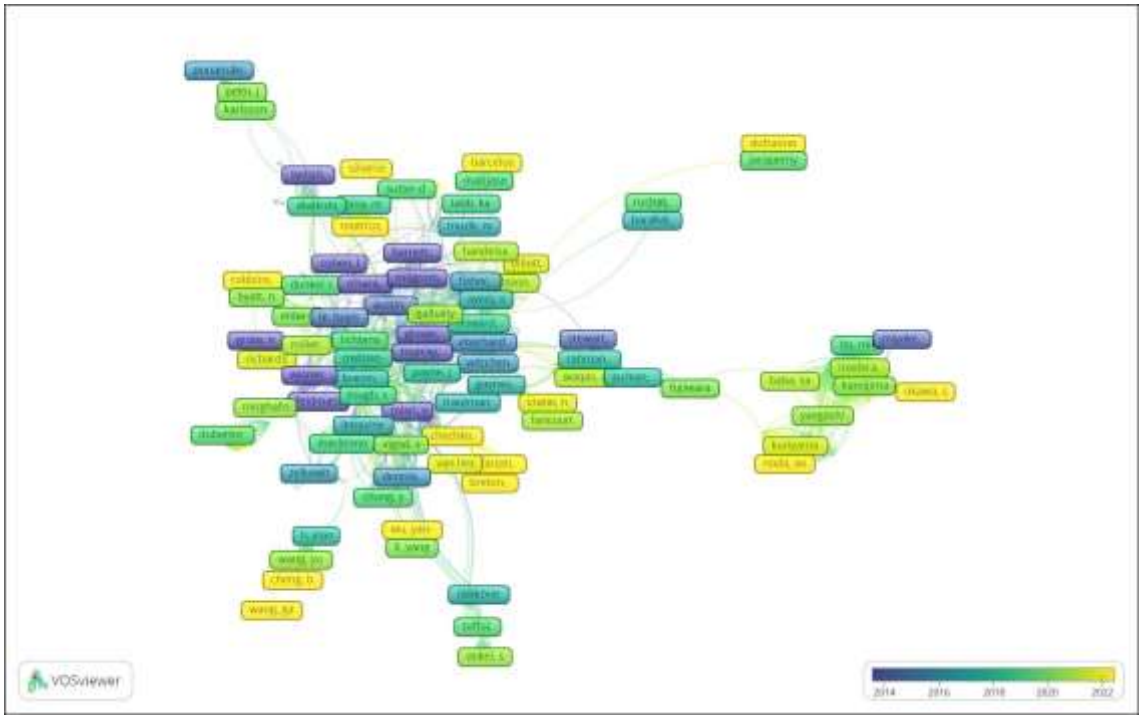

Figure 2 The co-authorship network of authors who contributed to Depression Postpartum

3.2. Co-occurrence Analysis of Top 100 Keywords

A total of 159 keywords were utilized across 13,383 articles. Table 6 presents the top 20 keywords used in the articles retrieved. Notably, clinical keywords such as Female, Human, Article, Humans, Adult, Pregnancy, and Postpartum Depression appear at the top of the list. The best research on postpartum depression was identified through a co-occurrence analysis of the top 100 keywords.

Table 6 Top 20 author keywords for depression postpartum

Rank	Author Keyword	N
1	Female	11.236
2	Human	11.193
3	Article	9.402
4	Humans	9.174
5	Adult	8.543
6	Pregnancy	7.286
7	Depression, Pospartum	6.020
8	Depression	5.671
9	Postnatal Depression	4.683
10	Major Clinical Study	4.621
11	Puerperium	4.563
12	Controlled Study	4.336
13	Psychology	3.470
14	Puerperal Depression	3.367
15	Postpartum Period	3.052
16	Postpartum Depression	3.045

17	Priority Journal	2.877
18	Risk Factors	2.803
19	Mothers	2.739
20	Mother	2.735

3.3. Reference Co-citation Analysis

Researchers further explored the knowledge base for postpartum depression research. The top 10 most cited articles are presented in Table 7. The publication receiving the most citations is by Crowther, C.A., et al., titled "Effect of Treatment of Gestational Diabetes Mellitus on Pregnancy Outcomes," published in the New England Journal of Medicine in 2005, receiving a total of 2,670 citations to date.

Table 7 Top 10 highly cited articles in Depression Postpartum

Rank	Author	Title	Journal	Citations, n
1	Crowther, C.A., et.al	Effect of Treatment of Gestational Diabetes Melitus on Pregnancy	New England Journal of Medicine	2670
2	O'Hara, M.W., et.al	Rates and Risk of Postpartum Depression – a Meta-analysis	International Review of Psychiatry	2548
3	Alexander, E.K., et.al	2017 Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease during Pregnancy and the Postpartum	Thyroid	1736
4	Beck, C.T., et. al	Predictors of Postpartum Depression: An Update	Nursing Research	1472
5	Robertson, E., et.al	Antenatal Risk Factors for Postpartum Depression: A Synthesis of Recent Literature	General Hospital Psychiatry	1461
6	Siu, A.L., et.al	Screening depression in adults: US Preventive Services Task Force Recommendation Statement	JAMA	1129
7	Evans, J., et.al	Cohort Study of Depressed Mood During Pregnancy and After Childbirth	British Medical Journal	1072
8	Murray, L., et.al	The Impact of Postnatal Depression and Associated Adversity on Early Mother-Infant Interactions and Later Infant Outcome	Child Development	1030
9	Heron, J., et al	The Course of Anxiety and Depression Through Pregnancy and the Postpartum in a Community Sample	Journal of Affective Disorders	920

10	Vesgaz-Lopez, O., et.al	Psychiatric disorders in pregnant and postpartum women in the United States	Archives of General Psychiatry	794

Subsequently, top-cited articles were selected and presented in a network visualization map using VOSViewer of co-cited references in postpartum depression research. Figure 3 shows the 100 main references distinguished by various colors.

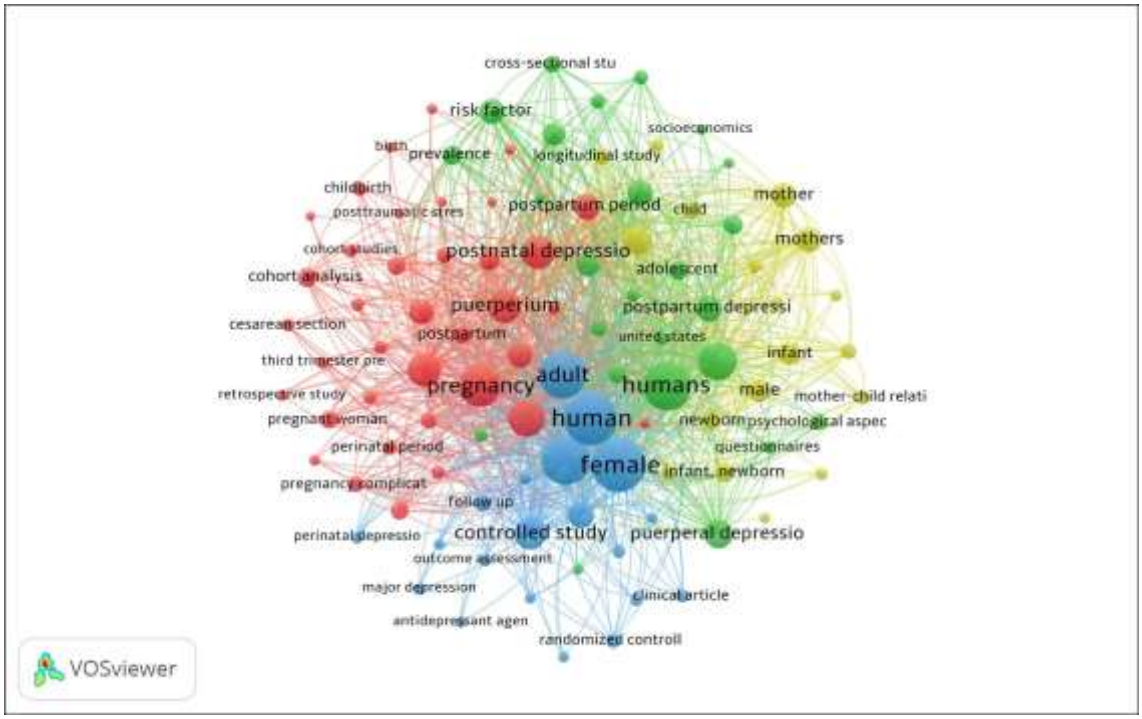

Figure 3 The co-occurrence network of the top 100 keywords in Depression Postpartum

DISCUSSION

This study aimed to assess emerging research in the field related to postpartum depression. The high level of interest among researchers, as indicated by the number of publications, suggests that this research area will continue to expand. This study not only identified research trends but also examined the productivity of research, productive researchers, regions, institutions, and collaboration networks. An exponential growth was observed in postpartum depression research, reaching 13,383 articles. If this trend continues, it is expected that the number of publications on postpartum depression will increase even further, advancing findings in evidence-based postpartum depression. Research output trends also reflect a wealth of evidence-based knowledge, including the latest risk factors, screening detection, early diagnosis, and preventive measures to address postpartum depression issues.

The top five journals publishing research on postpartum depression are linked with several other conditions that can influence postpartum depression. Publications on postpartum depression are widely distributed across various health fields. The top subject areas are found to be medical, psychology, nursing, neuroscience, and social science.

Although research related to postpartum depression has significantly increased in high-income countries, the outputs from middle-income and low-income countries remain sparse. This discrepancy is because developing countries invest more heavily in their health sectors, which transforms their research outcomes and economies (Mahajan, Abhishek; Vaidya, Tanvi; Gupta, Anurag; Rane, Swapnil; Gupta, 2019). Indonesia ranks 37th in contributing to the publication of 73 articles since 2006.

Research has shown that pregnant women with unstable personalities are more susceptible to postpartum depression. The personalities of pregnant women can be categorized based on types such as introvert-unstable, extrovert-unstable, extrovert-stable, and introvert-stable (López-Muñoz, F., 2019). Psychoanalysts believe that women during and after pregnancy undergo psychological changes that lead to psychological conflicts. Due to a lack of understanding of the childbirth process, excessive worries about childbirth pain, and the tension of labor, postpartum women are emotionally fragile. Mood changes become more apparent one week after childbirth. Excessive anxiety and depression in mothers can lead to a range of physiological symptoms and pathological reactions, becoming contributing factors to postpartum depression.

This bibliometric analysis identified a range of articles exploring various therapies for postpartum depression, making research on postpartum depression interventions a new and intriguing research topic. Psychotherapy serves as the first line of treatment for postpartum depression and can make patients feel supported, respected, understood, and confident. It enhances self-control and the ability to communicate effectively with others, stimulates patients' intrinsic motivation to address their issues and has a significant impact on postpartum depression.

Other researchers have studied preventive intervention research for postpartum depression using techniques including Cognitive Behavioral Therapy (CBT), Interpersonal Psychotherapy (IPT), Behavioral Activation (BA), and Mindfulness-Based Cognitive Therapy (MBCT) (Stewart, D. E., and Vigod, 2019). There is also Virtual Reality (VR) therapy, which is beneficial in managing patients' emotional issues. For instance, distracting features of VR can divert patients' attention from real-world situations, and the creation of a sense of presence allows patients to "experience" scenarios designed like cognitive behavioral therapy (Falconer, C. J.,

2016). A review of bibliometric articles related to depression reveals that researchers are increasingly paying attention to psychological research over time, such as the comorbidity of pain and depression. However, there are still few bibliometric studies on women's mental disorders (Wang, X. Q., n.d.,2019)

The strength of the current bibliometric analysis has provided a comprehensive overview of research on postpartum depression. Researchers have also reviewed previous bibliometric findings to gain knowledge on search strategies and develop the screening process. Researchers are confident that this bibliometric review has encompassed all articles related to postpartum depression. Additionally, information has been provided about countries, institutions, and authors who are highly productive in postpartum depression research. However, several limitations need to be addressed. First, this study included only articles, although, on Scopus, articles are the most common form of research output. Second, the study included articles from a single database, Scopus, which, while comprehensive and offering a variety of publication metrics suitable for bibliometric analysis, limits the scope. Future researchers are encouraged to use other databases such as WoS and PubMed to explore more potential articles.

CONCLUSION

Postpartum depression has garnered significant attention from researchers and practitioners. A bibliometric study was conducted to explore the status and global trends of postpartum depression research. Despite the extensive publication of literature reviews, narrative reviews, and meta-analyses, this study utilized bibliometric analysis from the inception of postpartum depression research, examining 13,383 articles through a quantitative mapping approach. Countries, institutions, authors, and research developments have been identified. Although research on postpartum depression in high-income countries has advanced, it remains limited in low and middle-income countries. Future research is expected to address potential challenges such as methodological implications, and evidence-based clinical applications of postpartum depression, especially in low and middle-income countries.

Conflict of Interest

The author(s) declare that they have no conflict of interest.

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