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Trends, Topics, and Visualization Analysis of Global Scientific Production on Maternal Mortality from Postpartum Hemorrhage: A 5-year Bibliometric Analysis

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Abstract:

BACKGROUND: Maternal death generates a great impact on public health, and it is recognized that its main cause is postpartum hemorrhage (PPH). Therefore, the objective was to analyze the bibliometric profile of the world scientific production on maternal mortality due to PPH.

MATERIALS AND METHODS: Bibliometric study that included original articles indexed in Scopus, identified by means of a search strategy that included MESH terms and logical operators. Bibliometric indicators were estimated with the SciVal tool, and the VOSwiever program was used for co-occurrence networks by key terms and co-authorship by country.

RESULTS: There has been an increase in the number of publications in the past 5 years. Regarding co-occurrence, the most frequent terms were "postpartum hemorrhage" and "maternal mortality." The United States and the United Kingdom are positioned as those with the highest density of publications; in addition, Australia evidences collaboration with Canada and South Korea. Publications with national collaboration were more frequent (36%). BMC Pregnancy and Childbirth is the most productive journal, although BJOG: An International Journal of Obstetrics and Gynecology has a higher normalized impact. The authors with the highest scientific output belong to an institution in the Netherlands. Vrije Universiteit Amsterdam and Leiden University are the most productive.

CONCLUSION: Scientific activity on maternal mortality due to PPH is increasing and its main means of dissemination are high-impact journals. National collaboration was more frequent, with the active participation of authors and institutions from the Netherlands and the United States.

Keywords:

Bibliometric analysis, maternal mortality, postpartum hemorrhage

Introduction

Postpartum hemorrhage (PPH) is the blood loss of at least 500 mL after euthyroid delivery or 1000 mL after cesarean delivery, within the first 24 h after delivery.[1] About 80% of this type of hemorrhage is due to uterine atony,[2] and other frequent causes are injuries in the vaginal tract, placental retention or pathologies, and coagulopathies.[3]

This obstetric complication has a considerable impact on maternal health; in fact, it is recognized as one of the main causes of morbidity and mortality in the world, affecting approximately 10% of all deliveries.[4-6] It is estimated globally that almost a quarter of maternal deaths are

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associated with PPH,[7] with a significant number of cases occurring in developing countries.[8]

Timely recognition of blood loss and risk factors by health-care providers is important for the prevention of this complication and timely identification for interdisciplinary care to prevent the loss of the woman's life.[6,9] This is a matter of research and of interest to all health teams; in this regard, it is known that its prediction is necessary for a timely approach. Several studies have reviewed the literature and concluded that there are still no reliable PPH prognostic tools and that those that do exist still require external validation for their application in clinical settings.[10,11]

Bibliometrics comprises the analysis of scientific publications and their metadata, as well as the description of the relationships between studies; its use allows the evaluation of the impact of studies, the visibility of articles, authors and institutions, the type of collaboration in a given field of knowledge, as well as future trends and research horizons.[12] Although it is a useful tool for research teams, it is necessary to consider its limitations when using it and especially when making decisions.[13,14]

Given its relevance for maternal and perinatal health and the need to continue exploring and promoting new areas of reflection, this study aims to analyze the bibliometric profile of the worldwide scientific production indexed in Scopus on maternal mortality due to PPH.

Materials and Methods

Descriptive study developed based on the bibliometric methodology to explore the Scopus database and analyze its publications related to maternal mortality due to PPH.

For the search of articles, the first step was the creation of a search strategy that included Boolean operators and MESH thesaurus terms; in addition, field delimitations (title, abstract, and keywords) and years (2018–2022) were generated; considering these characteristics, the strategy was as follows: TITLE-ABS-KEY (("Postpartum Hemorrhage" OR "Hemorrhage Postpartum" OR "Immediate Postpartum Hemorrhage" OR "Hemorrhage Immediate Postpartum" OR "Postpartum Hemorrhage Immediate" OR "Delayed Postpartum Hemorrhage" OR "Hemorrhage Delayed Postpartum") AND ("Maternal Mortality" OR "Mortality Maternal" OR "Maternal Mortalities" OR "Mortalities Maternal")) AND PUBYEAR >2017 AND PUBYEAR <2023.

As of August 1, 2023, the result of the search was 968 articles. We considered including original publications indexed in Scopus, in any language and dealing with the subject of the study; while we considered excluding review articles (156), note (29), editorial (29), letter (19), book chapter (7), short survey (6), conference paper (6), erratum (1), and those that could not be exported with the SciVal tool (2), so the sample was composed of 713 original articles [Figure 1].

Data processing for the estimation of bibliometric indicators was carried out with the SciVal tool, which is interoperable with Scopus. The bibliometric indicators considered were number of publications and citations, mean number of citations per publication, country, number of authors and affiliation, Field-Weighted Citation Impact (FWCI), Source-Normalized Impact per Paper, SCImago Journal Rank, and quartile. In addition, figures on co-authorship and co-occurrence networks of indexed words were imported using the VOSviewer version 1.6.19 program (Centre for Science and Technology Studies, Leiden University, The Netherlands).

For the development of the bibliometric study, review by a research ethics committee was not necessary since records from secondary sources were analyzed.

Results

The co-occurrence network shows eight clusters, of which the blue and light blue clusters present the terms with the highest frequency of occurrences, such as "postpartum hemorrhage" and "maternal mortality," respectively. In addition, the terms "maternal health" in

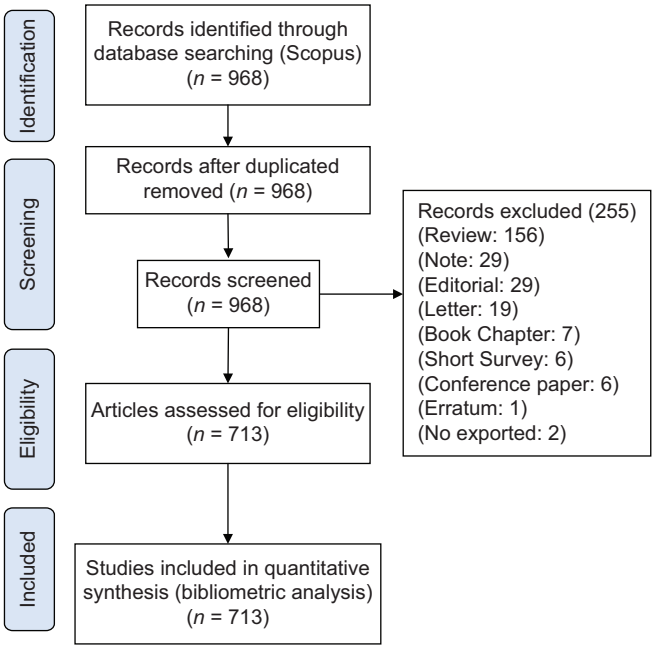


Figure 1: Flow chart

the purple cluster and "maternal near miss" in the red cluster stand out [Figure 2].

The visualization of co-authorship by country highlights the participation of the United States and the United Kingdom, which are also positioned as those with the highest density of publications in the brown and purple clusters, respectively. On the other hand, Australia leads the green cluster and shows strong collaborative relationships with Canada and South Korea [Figure 3].

Publications with national collaboration were more frequent (36%), although those with international collaboration were more cited and also had 72% more expected citations than the global average. The mean number of citations per publication was higher for single-authored articles. Regarding the trend in scientific production, an increase in the past 5 years is evident, with a higher percentage in journals positioned in the Q1 (37.9%) and Q2 (30.2%) quartiles [Table 1].

The highest percentage of journals positioned in the top ten belong to the Q1 quartile; of this group, the journal BMC Pregnancy and Childbirth is the one in the first place and has a CiteScore of 4.6, although the journals BJOG: An International Journal of Obstetrics and Gynecology (10.4) and American Journal of Obstetrics and Gynecology (14.3) have a better indicator and a higher normalized impact per article [Table 2].

Among the authors with the highest output, the top three belong to an institution in the Netherlands. Van den Akker Thomas leads the ranking with 19 publications and 27% more citations than expected considering the world average. However, Burke Thomas F. (FWCI: 4.86)

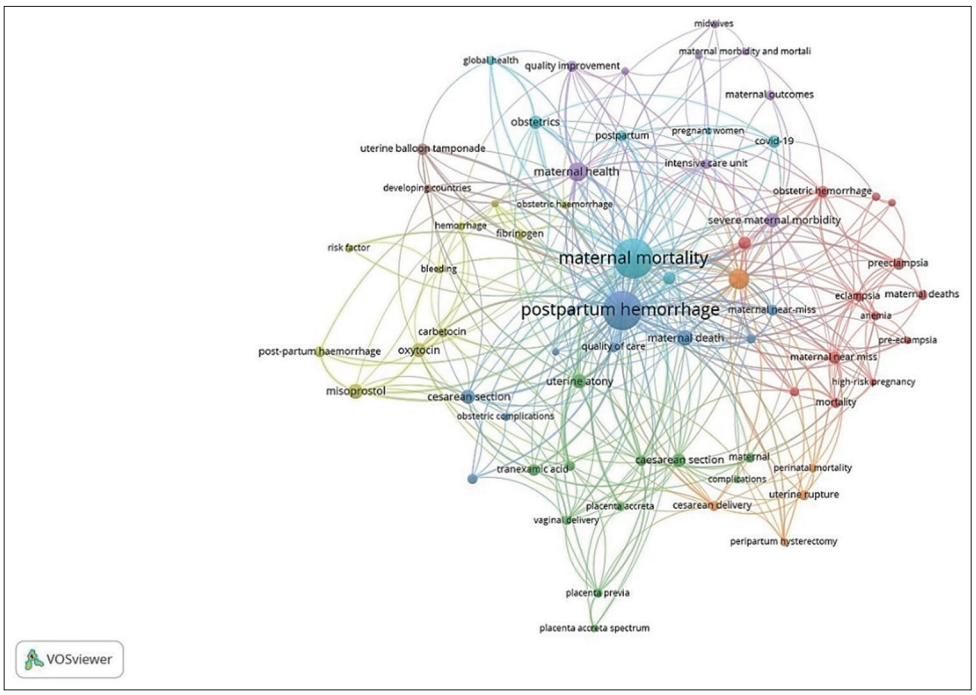


Figure 2: Co-occurrence by indexed word

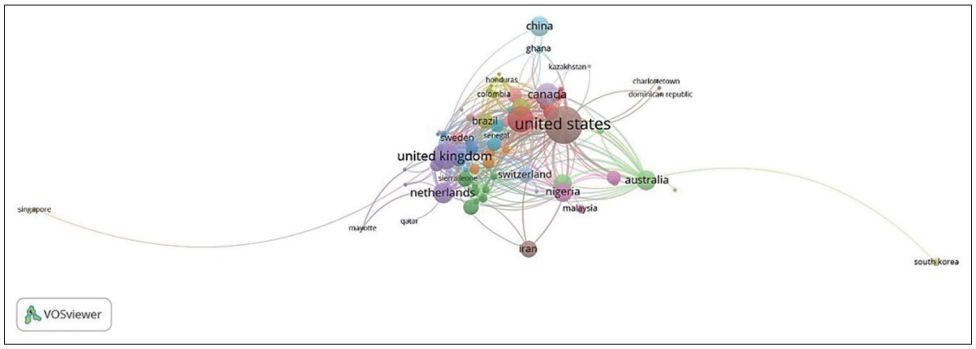


Figure 3: Co-authorship by country

Table 1: Trend and type of collaboration in scientific production

Type collaboration	Scholarly output, *n* (%)		Citations	Citations per publication	FWCI
International collaboration	214 (30.0)		2551	11.9	1.72
Only national collaboration	257 (36.0)		1628	6.3	1.16
Only institutional collaboration	213 (29.9)		1994	9.4	1.02
Single authorship	28 (3.9)		567	20.2	0.99
Cite score quartile	**2018**	**2019**	**2020**	**2021**	**2022**
Q1 (top 25%)	45	49	42	67	54
Q2 (top 26%–50%)	23	38	57	42	45
Q3 (top 51%–75%)	24	24	20	31	28
Q4 (top 76%–100%)	15	18	18	20	18
Total	107	129	137	160	145

FWCI: Field-weighted citation impact

Table 2: Top ten Scopus journals with the highest scientific production

Scopus source	Publications	Citations per publication	SNIP	CiteScore 2022	Quartile
BMC Pregnancy and Childbirth	53	7.3	1.52	4.6	Q1
International Journal of Gynecology and Obstetrics	32	11.7	1.42	5.7	Q1
PLoS ONE	29	6.5	1.25	6	Q1
Journal of Maternal–Fetal and Neonatal Medicine	21	4	1.21	3.9	Q2
Journal of SAFOG	13	0.2	0.24	0.3	Q4
BJOG: An International Journal of Obstetrics and Gynecology	12	22.3	2.57	10.4	Q1
European Journal of Obstetrics, Gynecology, and Reproductive Biology	12	4.2	1.15	4	Q2
Journal of Obstetrics and Gynecology	12	3.9	0.77	1.8	Q3
Acta Obstetricia et Gynecologica Scandinavica	12	11.4	1.72	7.3	Q1
American Journal of Obstetrics and Gynecology	12	48.3	3.37	14.3	Q1

SNIP: Source-Normalized Impact per Paper, SJR: SCImago Journal Rank

Table 3: Top ten authors with highest scientific production

Author	Filiation	Scholarly output	Citations	Citations per publication	FWCI
van den Akker, Thomas	Vrije Universiteit Amsterdam Athena Instituut, Netherlands	19	233	12.3	1.27
van Roosmalen, Jos J.M.	Vrije Universiteit Amsterdam, Netherlands	14	157	11.2	0.9
Bloemenkamp, Kitty W.M.	University Medical Center Utrecht, Netherlands	9	92	10.2	1.03
Zwart, Joost J.	Deventer Hospitals, Deventer, Netherlands	8	91	11.4	0.98
Friedman, Alexander Michael	Columbia University Irving Medical Center, United States	8	160	20	2.72
Tharaux-Deneux, Catherine	Inserm, France	8	49	6.1	0.92
van der Bom, Johanna Gerarda	Leids Universitair Medisch Centrum, Netherlands	8	104	13	1.3
D'Alton, Mary E.G.	Columbia University Irving Medical Center, United States	8	176	22	2.77
Burke, Thomas F.	Massachusetts General Hospital, United States	8	137	17.1	4.86
Miller, Suellen P.	UCSF School of Medicine, United States	7	127	18.1	4.35

FWCI: Field-weighted citation impact

and Miller, Suellen P. (4.35), authors belonging to US institutions, have a higher weighted impact. In addition, the participation of the French author Tharaux-Deneux, Catherine stands out [Table 3].

The Vrije Universiteit Amsterdam of the Netherlands and Leiden University are at the top of the ranking, with 22 and 21 publications each, respectively. Those with the highest citation index per publication were the World Health Organization (19.9) and Columbia University (21.4), the latter also having the highest citation weighted impact (FWCI: 5.79) with Johns Hopkins University (FWCI: 5.55). The institution with the most authors involved in this thematic field was Harvard University [Table 4].

Discussion

Scientific research on mortality has been of interest worldwide; in fact, its production has presented a

Table 4: Top 10 institutions with the highest scientific production

Institution	Country	Scholarly output	Citations per publication	FWCI	Authors
Vrije Universiteit Amsterdam		22	11.7	1.2	12
Leiden University		21	12.1	1.25	21
Harvard University		19	14.3	2.99	45
University of Toronto		18	17.2	1.88	29
Institut national de la santé et de la recherche médicale		16	10.4	1.55	32
Columbia University		16	21.4	5.79	28
World Health Organization		15	19.9	1.98	13
University of California at San Francisco		15	14.1	2.92	19
University of Oxford		14	11.8	1.22	10
Johns Hopkins University		14	60	5.55	26

FWCI: Field-weighted citation impact

positive trend, mainly due to preventive research linked to public health.[15] Continuing this orientation of scientific activity, this study that explored publications on the main cause of maternal mortality also showed that productivity increased over the years, which demonstrates the interest and willingness of research teams to solve this serious public health problem that impacts all levels of society.

In this study, the United States, the Netherlands, Canada, and the United Kingdom stand out in the concentration and co-authorship of publications; in this regard, it should be noted that this is linked to what was reported in a previous study, in which the United States is the main country interested in the dissemination of research related to maternal health.[16]

The terms most used in the scientific literature published and analyzed were "maternal mortality" and "postpartum hemorrhage," clearly evidencing the theme of the bibliometric exploration, and a more interesting term for the prevention of maternal mortality was also highlighted, such as "maternal near miss," which has been increasing its number of publications every year, especially in Latin American countries.[17]

In accordance with the analysis, future studies should strengthen the development of policies, as well as promote the financing of research and health programs that contribute to the prevention of maternal death from PPH. In addition, it is necessary to improve the quality and availability of data to allow a better analysis of the real situation of maternal mortality and its causes.[18] The

co-occurrence network shows a relevant cluster (green) that is oriented to the causes of uterine hemorrhage and that in turn represents a field of research that would require a preventive approach and interdisciplinary management.

The relevance of the topic for maternal health and public health corresponds to the scientific space where research on this study is disseminated; in fact, BMC Pregnancy and Childbirth is a journal with a high-impact factor and positioned in the first quartile, which leads the scientific production. In this journal, two articles with the highest citation were those by Mohammed *et al*.[19] and Sageer *et al*.,[20] which conclude that PPH is the leading cause of maternal death followed by preeclampsia.

Institutional and international collaboration represents a pending gap to be narrowed in the development of studies in this field, so it is necessary to establish active networks of research teams that favor a greater scope and quality of the studies, as well as the establishment of lines of research with the participation not only of physicians specializing in gynecology and obstetrics but also of midwives and nurses, to generate an approach from different perspectives that achieve a real solution to the problem or at least get closer to it.

These limitations were considered for this study: the articles included were only from one database (Scopus), so it is necessary to expand to other search engines to better characterize the scientific activity; in addition, the indicators were estimated from the available metadata, in which there may have been errors at the time of indexing. It should also be considered that the bibliometric parameters could have been affected by the nonexclusion of self-citations or duplicity in the names.

Conclusions

The scientific activity on maternal mortality due to PPH is mainly characterized by articles published in high-impact journals, with a favorable trend in the number of publications per year, by an especially national and international collaboration and by an active and significant participation of authors and institutions from the Netherlands and the United States.

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Conflicts of interest
There are no conflicts of interest.

References

1. McLintock C. Prevention and treatment of postpartum hemorrhage: Focus on hematological aspects of management. Hematology Am Soc Hematol Educ Program 2020;2020:542-6.
2. Miller HE, Ansari JR. Uterine atony. Curr Opin Obstet Gynecol 2022;34:82-9.
3. Feduniw S, Warzecha D, Szymusik I, Wielgos M. Epidemiology, prevention and management of early postpartum hemorrhage – A systematic review. Ginekol Pol 2020;91:38-44.
4. Omotayo MO, Abioye AI, Kuyebi M, Eke AC. Prenatal anemia and postpartum hemorrhage risk: A systematic review and meta-analysis. J Obstet Gynaecol Res 2021;47:2565-76.
5. Higgins N, Patel SK, Toledo P. Postpartum hemorrhage revisited: New challenges and solutions. Curr Opin Anaesthesiol 2019;32:278-84.
6. Andrikopoulou M, D'Alton ME. Postpartum hemorrhage: Early identification challenges. Semin Perinatol 2019;43:11-7.
7. Jones AJ, Federspiel JJ, Eke AC. Preventing postpartum hemorrhage with combined therapy rather than oxytocin alone. Am J Obstet Gynecol MFM 2023;5:100731.
8. O'Brien KL, Shainker SA, Lockhart EL. Transfusion management of obstetric hemorrhage. Transfus Med Rev 2018;32:249-55.
9. Watkins EJ, Stem K. Postpartum hemorrhage. JAAPA 2020;33:29-33.
10. Neary C, Naheed S, McLernon DJ, Black M. Predicting risk of postpartum haemorrhage: A systematic review. BJOG 2021;128:46-53.
11. Carr BL, Jahangirifar M, Nicholson AE, Li W, Mol BW, Licqurish S. Predicting postpartum haemorrhage: A systematic review of prognostic models. Aust N Z J Obstet Gynaecol 2022;62:813-25.
12. Ninkov A, Frank JR, Maggio LA. Bibliometrics: Methods for studying academic publishing. Perspect Med Educ 2022;11:173-6.
13. Belter CW. Bibliometric indicators: Opportunities and limits. J Med Libr Assoc 2015;103:219-21.
14. Szomszor M, Adams J, Fry R, Gebert C, Pendlebury DA, Potter RW, *et al*. Interpreting bibliometric data. Front Res Metr Anal 2020;5:628703.
15. de Groot CJ, van Leeuwen T, Mol BW, Waltman L. A longitudinal analysis of publications on maternal mortality. Paediatr Perinat Epidemiol 2015;29:481-9.
16. Xie Y, Lang D, Lin S, Chen F, Sang X, Gu P, *et al*. Mapping maternal health in the new media environment: A scientometric analysis. Int J Environ Res Public Health 2021;18:13095.
17. Hernández-Vásquez A, Bendezu-Quispe G, Comandé D, Gonzales-Carillo O. Worldwide original research production on maternal near-miss: A 10-year bibliometric study. Rev Bras Ginecol Obstet 2020;42:614-20.
18. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, *et al*. Global causes of maternal death: A WHO systematic analysis. Lancet Glob Health 2014;2:e323-33.
19. Mohammed MM, El Gelany S, Eladwy AR, Ali EI, Gadelrab MT, Ibrahim EM, *et al*. A ten year analysis of maternal deaths in a tertiary hospital using the three delays model. BMC Pregnancy Childbirth 2020;20:585.
20. Sageer R, Kongnyuy E, Adebimpe WO, Omosehin O, Ogunsola EA, Sanni B. Causes and contributory factors of maternal mortality: Evidence from maternal and perinatal death surveillance and response in Ogun state, Southwest Nigeria. BMC Pregnancy Childbirth 2019;19:63.