BIBLIOMETRIC ANALYSIS

Global research trends in partograph: A bibliometric analysis

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ABSTRACT

Objective: The present study aims to clarify the emerging patterns in partograph utilization, its development, and its impact on clinical practice.

Materials and Methods: A bibliometric analysis was conducted using Scopus as the primary database. Articles were retrieved using the keywords "Partograph" or "Partogram" and analyzed using two strategies: performance analysis (Scopus "analyze" function) and network analysis (VOSviewer and NVivo).

Results: Five hundred and thirteen articles published between 1965 and 2025 were analyzed. Performance analysis revealed that the most cited studies focused on labor management, labor progression, and maternal and neonatal health outcomes. The leading publishing countries included Ethiopia, the United States, the United Kingdom, India, and South Africa. Network analysis identified strong connections between partograph research and healthcare quality, personnel delivery, and facilities. Research trends evolved from early studies on spontaneous delivery, dystocia, and maternal mortality to more recent investigations into partograph utilization as a healthcare service quality improvement tool. Pearson correlation analysis showed strong associations between partograph use and birth outcomes (0.81), mortality (0.78), and healthcare workers' perspectives (0.76).

Conclusion: Research on partograph utilization continues to expand, focusing on labor monitoring and its impact on maternal and neonatal outcomes. Recently, studies have shifted toward labor-management quality, healthcare service improvement, and patient safety. However, certain areas remain underexplored, presenting opportunities for further research.

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Highlights:

1. This study highlights growing global attention on the Partograph as a part of labor monitoring.
2. Partograph use remains inconsistent and affects clinical decision-making and management of labor.
3. Future studies should focus on digital monitoring and policy effectiveness in intrapartum care as a part of enhancing maternal and neonatal outcomes.

INTRODUCTION

Facility-based birth has been the main focus of global efforts to lower maternal mortality over 20 years, with the coverage rising from 50% in 2000 to 77% in 2020.[1] Maternal mortality is still high despite these advancements, especially in low- to lower-middle-income countries, where 94% of maternal deaths occur.[2] Although prompt measures are necessary for labor complications and postpartum hemorrhage, poor mother and newborn outcomes are nevertheless a result of care delays. A low-cost labor monitoring tool, Partograph, has been widely promoted for the early detection of labor complications.[3]

Existing studies highlight low completion rates and poor interpretation of partographs, often due to a lack of training and the perception that it is merely a documentation formality rather than a clinical decision-making tool.[4,5] In settings with high workloads and workforce shortages, partograph documentation is frequently neglected, leading to inadequate emergency obstetric care.[6] Asphyxia continues to be an avoidable contributor to neonatal mortality, and poor partograph adherence limits its potential to aid early fetal distress detection and timely interventions.[7] These challenges highlight a persistent gap between policy recommendations and real-world implementation.

Research has predominantly focused on the partograph's clinical benefits, yet studies remain fragmented and lack a comprehensive overview of its adoption, implementation barriers, and evolving role in labor management.[8,9] Moreover, no study has systematically mapped global research trends on partograph utilization to identify knowledge gaps and future research directions.

This study addresses a gap in the literature by conducting a bibliometric analysis of partograph-related research. No comprehensive bibliometric study has mapped the evolution of partograph research or identified thematic trends and underexplored areas in obstetric care. The findings aim to provide a foundation for future research and policy recommendations to optimize partograph utilization as an effective labor monitoring tool in reducing maternal and neonatal morbidity and mortality.

MATERIALS AND METHODS

Source information

This study used an electronic online database, Scopus (https://www.scopus.com/). Scopus is the most comprehensive abstract and references database, which has been carefully chosen and has more information about peer-reviewed literature. The online search was performed on 25 March 2025. The data gathered during the same period to prevent bias caused an increase in the number of published journals in the database. The search results were then analyzed using bibliometric analysis that combines two procedures: (1) performance analysis as the main technique and (2) network analysis as an enrichment technique.

Search strategy

The keywords are selected to filter the information, so a search within the Scopus database can be conducted. The keywords used were "Partograph" or "Partogram". Side functions in the Scopus menu bar allow the researcher to refine the obtained data by publication year, subject area, document type, geographical distribution, or even language used. This study does not set time limitations to capture research trends from the beginning of the first article related to keywords, which was published in 1965.[10]

The search strategy is shown in Figure 1. The search query employed to obtain the necessary data was: (title-abs-key(partograph) or title-abs-key(partogram)) and (limit-to(subjarea, "medi") or limit-to(subjarea, "nurs") or limit-to(subjarea, "mult") or limit-to(subjarea, "bioc") or limit-to(subjarea, "comp") or limit-to(subjarea, "engi") or limit-to(subjarea, "soci") or limit-to(subjarea, "heal") or limit-to(subjarea, "agri") or limit-to(subjarea, "busi")) and (limit-to(doctype, "ar")) and (limit-to(pubstage, "final")) and (limit-to(srctype, "j")) and (limit-to(language, "English")).

Bibliometric indicators, analytics, and mapping

Performance analysis was done by applying the "analyze" feature in the Scopus menu section to present the various research constituents. Performance analysis using Scopus search results was analyzed descriptively. This article presents a performance analysis consisting of publication and citation numbers per year, number of contributing authors, most cited articles, and most active countries. Publication of the article represents productivity. Citation is a metric that quantifies the influence or impact of an area of study.[11]

All data from the Scopus Search query will then be exported in *.ris format to be processed for the network analysis. Network analysis was done using two strategies: (1) network visualization generated using VOSviewer and (2) qualitative interpretation using the NVivo software. Vosviewer analysis visualizes the most dominant keywords and the correlation between one

topic and another. The advantage of using VOSviewer analysis was that the researcher could adjust the study's desired or less relevant keywords. The NVivo software facilitated the qualitative interpretation of the prior study's indicators, variables, and keywords. The minimum occurrence of keywords was kept under 10 to maintain relevance. Finally, bibliometric research does not involve humans or animals as subjects. Consequently, this study did not require ethical approval as it was based on publicly available data from Scopus-indexed publications and did not involve human subjects or identifiable personal data.

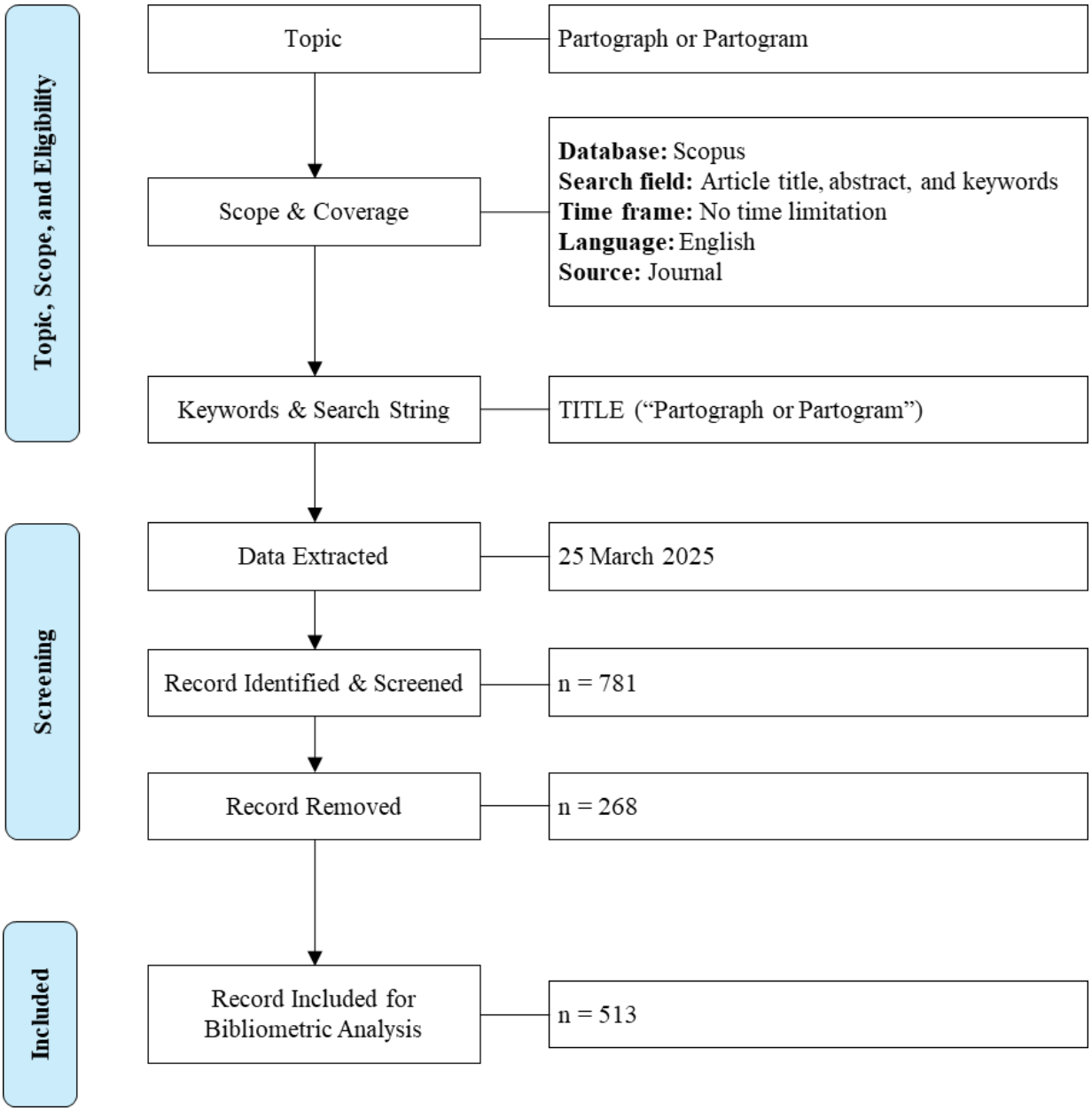

Figure 1. Flow diagram of search strategy

RESULTS AND DISCUSSION

Performance analysis is conducted based on journals, articles, authors, institutions, and countries. Performance analysis represents the usage of "Partograph" or "Partogram" in the title, abstract, and keywords. First, performance analysis was carried out to show the research trend related to "Partograph" or "Partogram" since the first article published in 1965, as shown in Figure 2. From 1965 until the online search was performed, 513 articles were retrieved. The first article was titled "Introduction, use, and results of a new Partogram".[10] The trend shows a gradual increase in publications, with a significant surge in recent decades and substantial growth between 2010 and 2021. This suggests increasing global recognition of the importance of the partograph in obstetric care.

The number of citations of the articles was then analyzed to reflect the impact and influence of the "Partograph" or "Partogram" written in the scientific community's title, abstract, and keywords.[11,12] Table 1 displays the top 10 most frequently cited articles in the partograph study.[13–22] The highest-cited article was "Contemporary Patterns of Spontaneous Labour with Normal Neonatal Outcomes," published in Obstetrics and Gynaecology and received 605 citations.[13] The three most cited articles primarily focus on spontaneous labor patterns, partograph in labor management, and birth attendant skills, which are critical aspects of intrapartum care.[13–15]

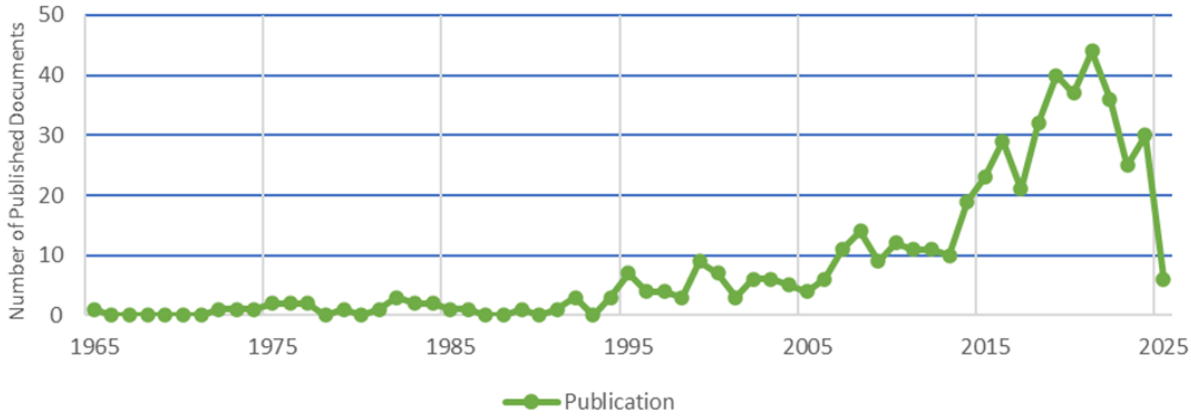

Figure 2. Annual growth of publication activity

Table 1. Top 10 cited articles

No.	Article title	Author	Year	Journal	Number of citations
1.	Contemporary patterns of spontaneous labor with normal neonatal outcomes	Zhang J, et al.	2010	Obstetrics and Gynecology	605
2.	World Health Organization partograph in management of labour	WHO	1994	The lancet	249
3.	Are skilled birth attendants really skilled? A measurement method, some disturbing results and a potential way forward	Harvey S A, et al	2007	Bulletin of the world health organization	170
4.	Association between anaemia during pregnancy and blood loss at and after delivery among with vaginal births in Pemba Islam, Zanzibar, Tanzania	Kavle J A, et al	2008	Journal of Health, Population and Nutrition	126
5.	Partograms and Nomograms of cervical dilataion in management of primigravid labour	Studd J, et al	1973	British Medical Journal	108
6.	Progress in childbirth care in brazil: preliminary results of two evaluation studies	Leal M D C, et al	2019	Cadernos de saude publica	83
7.	Use and abuse of oxytocin for augmentation of labor	Selin L, et al	2009	Acta Obstetricia et Gynecologica Scandinavica	75
8.	Predictive value of cervimetric labour patterns in primigravida	Cardozo, L D, et al	1982	BJOG: An International Journal of Obstetrics & Gynecology	70
9.	Duration of second stage of labor and instrumental delivery as risk factors for severe perineal lacerations: population-based study	Simic M, et al	2017	BMC Pregnancy and Childbirth	69
10.	The sonopartogram: a novel method for recording progress of labor by ultrasound	Hassan W A, et al	2014	Ultrasound in Obstetrics and Gynecology	67

To highlight the research productivity of the article publications globally, the data were visualized using Microsoft Excel 365. As shown in Figure 3, the darker shades represent higher publication output, indicating a strong academic focus on this topic. National contributions to scientific research are the key indicators of research engagement, maternal health research initiatives, and healthcare prioritization.[23] The most published were from Ethiopia, the United States, the United Kingdom, India, and South Africa.

Network analysis was conducted using VOSviewer and NVivo to visually analyze dominance and interconnections between keywords. VOSviewer provides three visualization modes: network, overlay, and density, where the node and label size reflect keyword significance. From 513 Scopus-indexed articles from 1965 to 2025, 2.337 keywords were extracted. Then the extracted keywords were filtered, and 72 met the criteria after filtering for a minimum occurrence of 10 keywords.

The VOSviewer network analysis (Figure 4) identified five distinct research clusters, each represented by colors, highlighting key themes in partograph-related studies. The most dominant keyword, "Partograph," was strongly associated with "healthcare quality, healthcare personnel, delivery, and healthcare facility." The peripheral positioning suggests underexplored research areas in this study. This analysis provides insight into major themes, research gaps, and future directions.[24,25]

Table 2 and Figure 4 show that Cluster 1 (Red, 31.9%) focused on the relationship between partograph utilization, healthcare protocols, and medical decision-making, particularly in diagnosing dystocia and guiding hospital referrals. A lack of understanding of the normal labor curve among healthcare personnel has resulted in sub-optimal decision-making, limiting the effectiveness of maternal health protocols during labor. This gap contributes to missed opportunities for life-saving interventions, unnecessary cesarean sections, and adverse maternal and neonatal outcomes, including neonatal asphyxia and post-partum hemorrhage.[3,26,27]

Cluster 2 (Green, 23.6%) emphasized structural challenges in emphasized structural challenges in partograph utilization, linking underuse to deficiencies in clinical practice monitoring, utilization review, and the need for in-service training. The findings suggest that inadequate institutional support and insufficient training programs hinder effective implementation of the partograph in maternal healthcare management.[6,8,9]

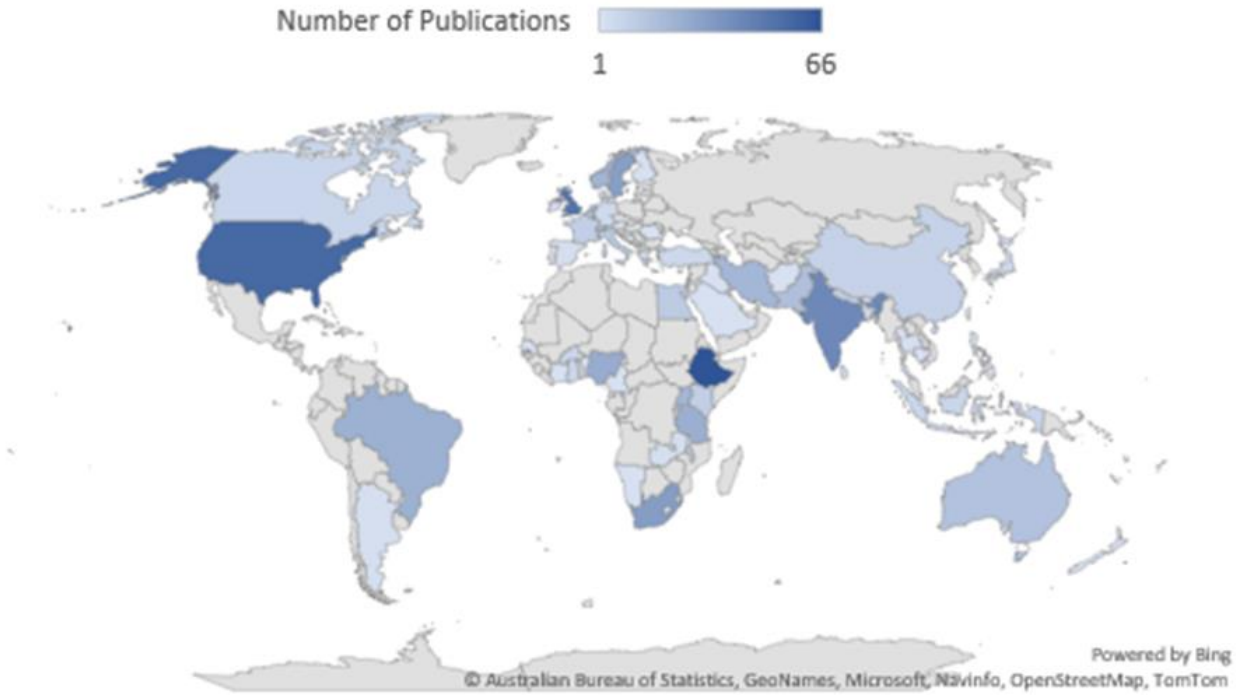

Figure 3. Geographical distribution of publications

Table 2. Cluster analysis

Cluster	Keyword Items	Total	Percentage	Theme	Article Title,	Author, and (Years)	Study Findings
Cluster 1	Asphyxia neonatorum, Cesarean section, Clinical protocol, Dystocia, Emergency surgery, fetus weight, forceps delivery, information processing, instrumental delivery, labor curve, labor onset, malpresentation, maternal morbidity, medical decision making, medical record, newborn hypoxia, partogram, postpartum hemorrhage, prolonged labor, time factors, treatment indication, trial of labor, vacuum extraction.	23 items	31.9%	Clinical Decision-Making and Maternal Health Outcomes	Disclosing suboptimal indications for emergency cesarean sections due to fetal distress and prolonged labor: a multicenter cross-sectional study at 12 public hospitals in Nepal	Helena L, et al (2020)	This study identifies that an 18% CS rate was linked to suboptimal CS indications due to inadequate fetal heart rate during labor monitoring and poor partograph use.[27]
Cluster 2	Attitude to health, clinical competence, decision support technique, diagnostic techniques, obstetrical and gynecological, fetal monitoring, health care personnel, health care utilization, health knowledge, attitude, practice, in-service training, in-service training, obstetric procedure, organizational and management, partograph, physiologic monitoring, uterine activity monitoring utilization, utilization review.	17 items	23.61%	Clinical Competence and Structural Issues	Level of partograph utilization and its associated factors among obstetric caregivers at public health facilities in East Gojam Zone, Northwest Ethiopia.	Zelellw and Tegegne, (2018)	This study evaluated the utilization of the Partograph and the factors associated with obstetrics caregivers. The study indicated that healthcare personnel possessed substantial knowledge, yet their application was limited. On-the-job training has the potential to enhance health outcomes substantially.[6]
Cluster 3	Cause of death, cervical dilatation, delivery, documentation, health care facility, health services accessibility, maternal mortality, medical audit, obstetrical surgery, patient referral, perinatal mortality, referral, and consultation.	12 items	16.67%	Medical Documentation and Referral System	Quality of Comprehensive Emergency Obstetric Care Through the Lens of Clinical Documentation on Admission to Labour Ward.	Kosgei RJ, et al. (2016)	This study determined the comprehensive emergency obstetric quality care level through clinical documentation indicators. This study found that completion of partograph parameters varied: cervical dilatation (73%), contractions (72%), fetal heart rate (71%), maternal blood pressure (67%), fetal head descent (65%), maternal pulse rate (59%), Liquor (48%), degree of moulding (36%), maternal temperature (42%), maternal respiratory rate (31%). The variation of partograph completion limits partograph effectiveness and affects labor management decisions. Poor record-keeping could compromise the continuity of care and timely interventions during labor.[28]
Cluster 4	Clinical assessment tool, health care planning, healthcare quality, intrapartum care, labor pain, newborn care, patient safety, protocol compliance, quality improvement, scoring system, skilled birth attendant, total quality management.	12 items	16.67%	Healthcare Planning and Quality Management	Effect of partograph use on outcomes for women in spontaneous labour at term and their babies.	Lavender T, Cuthbert A, and Smyth R (2018)	This study determined the efficacy and safety of partograph utilization on pregnancy outcomes. The study found that routine partograph use as a standard labor management tool remains uncertain. A comparison of action line placement shows that the three-hour action line group is linked to a higher cesarean rate compared to the four-hour action line (RR 1.7, 95% CI 1.07-2.70). This early identification increases the intervention rate without clear benefits on maternal and neonatal outcomes. A partograph with an alert line only resulted in a lower cesarean section than one with an alert and action line (RR 0.68, 95% CI 0.50-0.93). This resulted from reduced mandatory interventions and an emphasis on

							clinical judgment regarding labor progression.[29]
Cluster 5	Clinical evaluation, clinical practice, health personnel attitude, labor management, medical documentation, outcome assessment, patient monitoring, perception	8 items	11.11%	Healthcare Personnel Attitudes and Practices	A cross-sectional study of partograph utilization as a decision-making tool for referral of abnormal labour in primary health care facilities of Bangladesh	Khan, et al, (2018)	The study assessed how health workers practice on a partograph. The study found that Interview data showed that health workers interpret referral indications poorly from partographs. Supporting health workers in primary health centers in interpreting and decision-making related to partograph is needed to improve maternal care quality and prevent poor neonatal outcomes.[5]

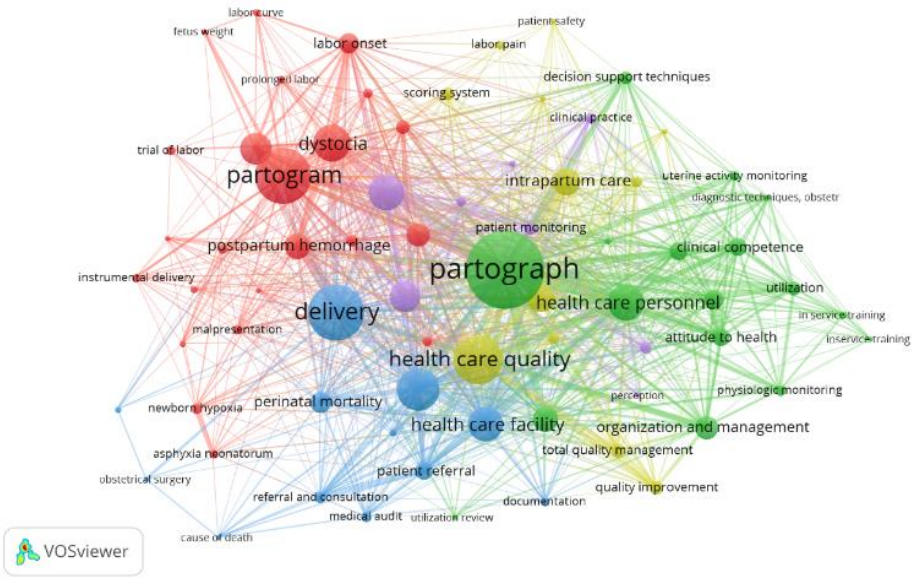

Figure 4. Network visualization

Cluster 3 (Blue, 16.7%) explored the role of the partograph in medical documentation, particularly in determining causes of death during audits and improving communication in referral coordination. Its underutilization exposed inefficiencies in healthcare communication and bureaucratic delays, which could negatively impact maternal and neonatal outcomes. Strengthening referral systems and ensuring partograph use as a standardized documentation tool may improve coordination between healthcare facilities.[28,30]

Cluster 4 (Yellow, 16.7%) examined partograph use in intrapartum healthcare planning, highlighting its role in improving care quality. The effectiveness of intrapartum care is a key indicator of total quality management in healthcare facilities. Recent maternal health paradigms emphasize positive birth experiences, making high-quality intrapartum care essential in shaping women's perceptions of childbirth. Integrating clinical excellence with patient-centered approaches enhances maternal health outcomes and aligns with efforts to improve overall service quality.[29]

Cluster 5 (Purple, 11.1%) analyzed healthcare personnel's perceptions of patient monitoring, medical documentation, and clinical practice related to partograph use. The findings suggest that many providers view the partograph as a routine formality rather than a critical decision-support tool, leading to gaps in clinical practice and ineffective labor monitoring. Many studies focus on how partograph is viewed from a clinical perspective rather than as a basis for policy enforcement or the digitalization of labor monitoring. Addressing this issue requires a shift in clinical training and policy enforcement to ensure the partograph is fully utilized to improve maternal and neonatal health outcomes.[5]

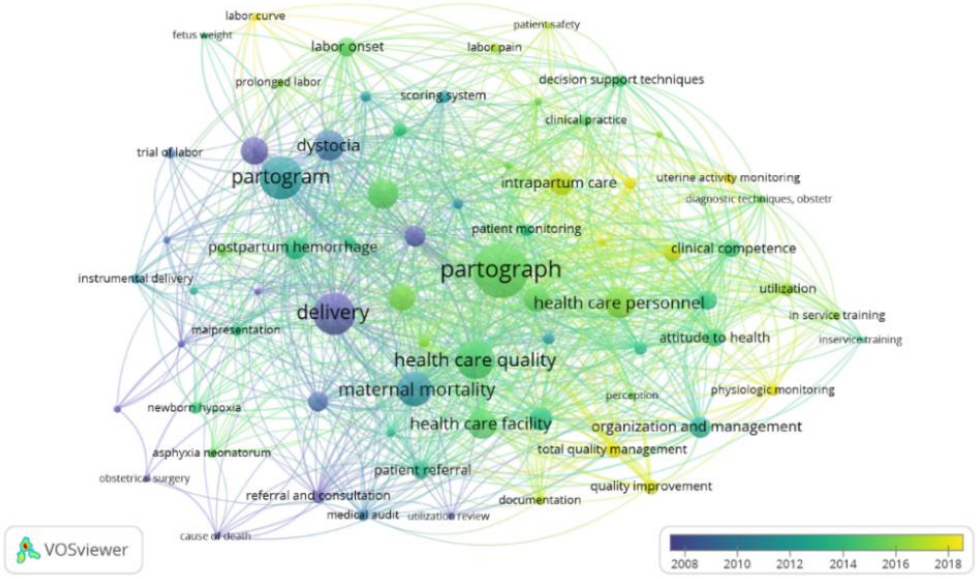

Figure 5. Overlay visualization

The cluster analysis offers important clinical insights into the practical use of the partograph. By identifying key thematic groupings, such as clinical decision-making, structural issues, referral system, healthcare planning and quality management, and healthcare personnel practices. This analysis highlights which aspects of partograph utilization are well-studied and which remain underexplored. Additionally, cluster focusing on clinical competence and training reinforces the need for capacity building among healthcare personnel in using the partograph effectively. The peripheral clusters reveal opportunities for future research in areas such as digital monitoring, quality assurance, and patient-centered care, which can strengthen the integration of the partograph into routine obstetric services. The cluster analysis provides actionable evidence for clinicians, health managers, and policy makers to improve maternal care systems and ensure timely, lifesaving interventions during labor.

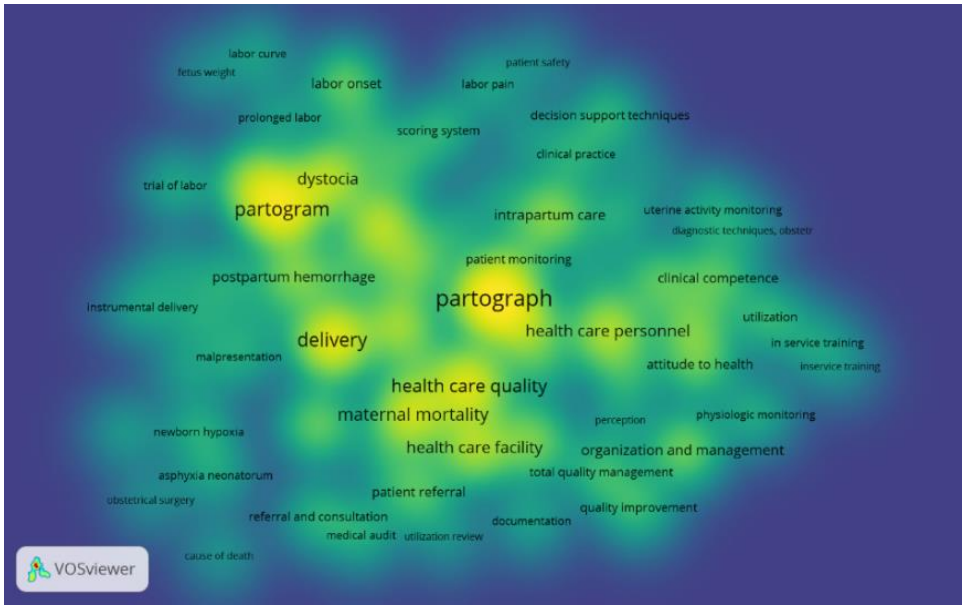

Figure 6. Density visualization

The overlay visualization (Figure 5) classifies the research shift from labor management to maternal mortality and healthcare access, then evolving to service quality. Meanwhile, the density visualization (Figure 6) provides an overview of the research landscape, highlighting key focus areas. The red and yellow regions represent higher keyword density and significance, while blue areas indicate less-explored topics. Figure 6 shows that no subject has been extensively developed and remains underexplored, suggesting ongoing gaps in maternal healthcare studies. Keywords such as "partograph, partogram, healthcare quality, delivery, and maternal mortality" have the highest density as research themes.

The trending topic of the keyword presented in Table 3 resulted from NVivo analysis. It shows the authors' size of frequency words. Since the first article was published in 1965, health (n=16.488), care (n=12.099), labor (n=10.127), pregnancy (n=7.472), and delivery (n=5.654) are the most trending terms used in the articles. Furthermore, the researchers found that partograph research trends were highly used as part of healthcare during labor,[30,31] as a basis to maintain clinical quality,[8,28] prevent mortality for both mother and fetus,[7,32] and as a part of childbirth management.[5]

The relation trend in Table 4 resulted from NVivo, which showed the Pearson Correlation Coefficient to reflect the correlation value between words. A strong correlation was found between Partograph with mortality, neonatal, perinatal mortality, and monitoring. Besides that, "Partogram" keywords strongly correlate with healthcare workers' perspectives. "Partogram" keywords found are quite strong with monitoring, rural health facilities, health facilities, and primary healthcare facilities.[6,33]

The bibliometric analysis holds practical relevance for clinicians, health managers, and policymakers by identifying critical gaps in the implementation, documentation, and training related to the routine clinical practice of the partograph. Addressing these gaps is essential to strengthen intrapartum care and reduce preventable maternal and neonatal complications. The bibliometrics analysis demonstrates how partograph research has been evolving from a basic labor monitoring tool to broader themes like maternal safety, health worker competency, and health system quality improvement.[8,27]

The partograph is a real-time monitoring tool that facilitates timely and evidence-based clinical decisions during labor. The deficiencies in implementation, training, and documentation contribute to inaccuracies in clinical decision making and delays in referrals.[9,31] The proper use of partograph is vital in low-resource settings, where the third phase delay is often caused by insufficient labor assessment and late referral, as it remains a major barrier to quality care.[34] The partograph supports early identification of complications such as prolonged labor, enabling prompt referral and management to reduce further morbidity risk, such as a low 5th APGAR Score, especially in primary care and rural health facilities.[35] The strong correlation between partograph and neonatal mortality further underscores its potential role in reducing preventable deaths when properly utilized.[36]

Table 3. Trending topic of the keyword

Word	Length	Count	Word	Length	Count
Health	6	16.488	Clinical	8	3.372
Care	4	12.099	Quality	7	3.273
Labor	5	10.127	Birth	5	3.241
Pregnancy	9	7.472	Mortality	9	3.122
Delivery	8	5.654	Hospital	8	3.027
Obstetric	9	5.630	Section	7	2.977
Maternal	8	5.596	Cesarean	8	2.898
Labour	6	4.132	Childbirth	10	2.478
Newborn	7	3.799	Management	10	2.345
Partograph	10	3.602	Outcome	7	2.232

Table 4. Relation of partograph or partogram keywords

Code A	Code B	Pearson Correlation Coefficient
Partograph	Birth	0.807609
	Mortality	0.78269
	Neonatal	0.777066
	Perinatal Mortality	0.769482
	Monitoring	0.751678
Partogram	Health Care Workers Perspectives	0.761183
	Monitoring	0.478388
	Rural health facilities	0.451084
	Health facilities	0.445508
	Primary health care facilities	0.441794

While this study provides a comprehensive, longitudinal overview of the global partograph literature, it is limited by its reliance on the Scopus database. It does not include a critical appraisal of individual articles. Furthermore, although network mapping identifies associations among keywords, it does not reflect the context-specific barriers or the real-world complexity of implementing the partograph in everyday practice. Future studies should bridge this gap by exploring qualitative insights from healthcare providers and evaluating digital tools that integrate partograph function into maternal care pathways.

CONCLUSION

The emerging trends in Partograph or Partogram remain developing. Despite its recognized potential, the partograph continues to be underutilized, posing a critical barrier to improving maternal and child health outcomes. This study found an underutilized partograph deeply rooted in structural challenges within maternal healthcare systems, including inadequate clinical monitoring, lack of utilization review, and insufficient in-service training. Underutilized partograph reflects poor communication and bureaucratic inefficiencies in the referral process. A persistent gap between clinical protocols and real clinical practice persisted in health-care personnel's perception that the partograph was just a procedural formality rather than a vital decision-support tool. Despite the underexplored and under-developed ongoing partograph research, the paradigm of maternal healthcare has shifted, emphasizing positive birth experiences and integrating clinical excellence with patient-centered care. Future research should prioritize integrating partograph utilization with digital monitoring technologies and embedding it into health systems as a strategic component of quality intrapartum care.

DISCLOSURES

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Conflict of interest

The authors declared no conflict of interest with respect to the material presented in this study.

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Author contribution

Study conceptualization by Alfun Dhiya An and Maria Ulfa, format analysis by Asri Nur Maulidya and Maria Ulfa, methodology by Maria Ulfa, writing original draft by Asri Nur Maulidya, and review and editing by Alfun Dhiya An.

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