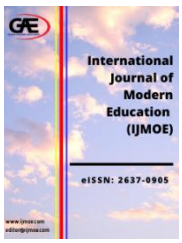
International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 28 (December 2025) PP. 874-889
DOI: 10.35631/IJMOE.728060



INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

GLOBAL ACADEMIC EXCELLENCE

GLOBAL RESEARCH TREND ON KNOWLEDGE AND ATTITUDE TOWARDS INFERTILITY

Caroline Satu Jelemie[1], Baidi Baddiri[2*], Sharinah Abd Kassim[3], Rosnah Majin[4], Siti Fatimah Sa'at[5]

[1] Department of Nursing, Universiti Malaysia Sabah, Malaysia
Email: caroline.satu@ums.edu.my
[2] Department of Nursing, Universiti Malaysia Sabah, Malaysia
Email: baidibaddiri@ums.edu.my
[3] Department of Nursing, Universiti Malaysia Sabah, Malaysia
Email: sharinah.abdkassim@ums.edu.my
[4] Department of Nursing, Universiti Malaysia Sabah, Malaysia
Email: rosnahmajin@ums.edu.my
[5] Kulliyyah of Nursing, International Islamic University Malaysia, Malaysia
Email: sitifateemah@iium.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 22.10.2025
Revised date: 11.11.2025
Accepted date: 01.12.2025
Published date: 17.12.2025

To cite this document:

Jelemie, C. S., Baddiri B., Abd Kassim, S., Majin, R., & Sa'at, S. F. (2025). Global Research Trend on Knowledge and Attitude Towards Infertility. *International Journal of Modern Education, 7* (28), 874-889.

DOI: 10.35631/IJMOE.728060

Abstract:

Infertility is increasingly recognized as a global public health concern, not only for its biomedical implications but also for its psychological, social, and cultural dimensions. Understanding the knowledge and attitudes towards infertility is crucial for informing policies, reducing stigma, and enhancing patient-centered care. Despite its importance, research in this area has been scattered, necessitating a comprehensive bibliometric analysis to map trends, collaborations, and thematic developments. The present study addresses this gap by systematically examining global research output on knowledge and attitudes towards infertility. Data were collected using the Scopus database through an advanced search strategy with the keywords "knowledge," "attitude," and "infertility," yielding a total of 1,035 articles. The data were then refined and harmonized using OpenRefine to ensure consistency and accuracy. Statistical and graphical analyses were conducted using the Scopus analyzer, while VOSviewer software was employed to generate network visualizations of co-authorship, co-citation, and keyword co-occurrence patterns. The findings revealed a steady increase in publication output over the past five decades, with a sharp rise after 2010, indicating growing academic attention to the subject. The United States, the United Kingdom, and Australia emerged as the leading contributors, while collaborative networks highlighted increasing involvement from developing countries such as India, Nigeria, and Iran. Keyword co-occurrence analysis identified seven major clusters, reflecting thematic emphases on assisted reproductive technologies, patient

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awareness, fertility preservation, psychosocial dimensions, and cultural perceptions. These results contribute to the body of knowledge by mapping the intellectual structure and global research dynamics of infertility studies. In conclusion, the study underscores the multidimensional nature of infertility research and highlights the need for strengthened interdisciplinary and international collaborations to address this complex health issue.

Keywords:

Knowledge, Attitude, Infertility

Introduction

Infertility is a significant concern affecting millions of couples worldwide, with profound emotional, social, and medical implications. Despite its prevalence, there remains a considerable lack of knowledge and awareness about infertility, leading to misconceptions and stigmatization. Understanding the knowledge and attitudes towards infertility is crucial for developing effective educational programs and interventions to support affected individuals and couples. This paper aims to explore the existing knowledge and attitudes towards infertility among different populations, highlighting the gaps and misconceptions that persist.

Research indicates that knowledge about infertility varies significantly across different demographic groups. A study conducted among infertile couples in Mosul city revealed that 58% of the participants had moderate knowledge about infertility, while 42% had inadequate knowledge. Despite this, a majority (60.9%) exhibited a positive attitude towards infertility, with only a small fraction (2.9%) holding negative views (Hashim et al., 2024). This suggests that while knowledge may be lacking, attitudes towards infertility can still be positive, potentially influenced by personal experiences and societal norms.

Men's knowledge and attitudes towards infertility have been less studied compared to women. A study in Mashhad City, Iran, found that men had insufficient health literacy regarding infertility, with no significant relationships between their knowledge and factors such as age, education, or income. Interestingly, attitudes towards surrogacy and the possibility of separation due to infertility varied with age, indicating that younger men might have different perspectives compared to older men. This highlights the need for targeted educational interventions to improve men's understanding of infertility and its implications (Saifi et al., 2021)

Among college students in Iran, gender differences in knowledge and attitudes towards infertility were evident. Female students demonstrated higher awareness of biological and lifestyle factors affecting fertility compared to their male counterparts. However, both groups showed significant gaps in knowledge about critical aspects such as the most fertile period in a woman's menstrual cycle and the impact of lifestyle factors like smoking and alcohol consumption on fertility (Alaee et al., 2019). These findings underscore the importance of incorporating comprehensive reproductive health education into academic curricula to address these knowledge gaps.

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A scoping review of literature on knowledge, attitudes, and practices towards infertility revealed several themes, including the lack of knowledge and awareness, gender-based treatment responsibilities, and the social consequences of infertility. The review found that both men and women consulting healthcare facilities had numerous misunderstandings about infertility. Despite this, most exhibited a positive attitude towards infertility as a disease and were willing to adopt necessary lifestyle changes to improve fertility (Mabitsela et al., 2025). This suggests that while misconceptions persist, there is a willingness to learn and adapt, which can be leveraged through educational programs.

Further studies have shown that knowledge about infertility is often influenced by personal experiences and societal beliefs. For instance, infertile women tend to have higher knowledge about infertility compared to fertile women, likely due to their interactions with healthcare providers during treatment. However, both groups exhibited limited understanding of the fertile period and various causes of infertility, indicating that knowledge is not solely dependent on formal education but also on personal experiences (Sharma et al., 2023). This highlights the need for broader public health initiatives to improve general awareness about infertility.

In addition to knowledge, attitudes towards infertility are shaped by cultural and social factors. In Morocco, a study found that both male and female participants had low levels of knowledge about infertility, with significant differences in attitudes towards treatment failure. Men were more likely to propose polygamy as a solution, while women were less inclined towards this option (El Adlani et al., 2021). Such cultural attitudes can influence the acceptance and uptake of infertility treatments, emphasizing the need for culturally sensitive educational interventions.

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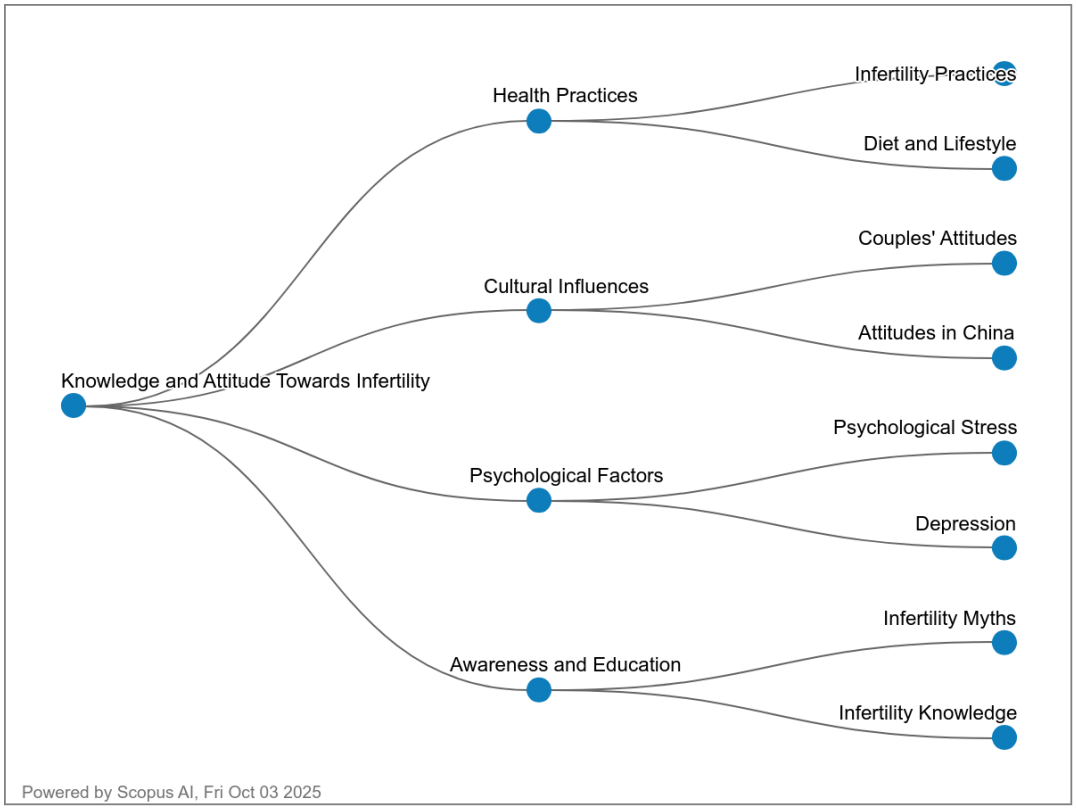

Figure 1. The Concept Map of Knowledge and Attitude Towards Infertility

The concept map Figure 1 highlights the multifaceted global research trends on knowledge and attitudes towards infertility. Four major domains emerge: health practices, cultural influences, psychological factors, and awareness and education. Under health practices, studies emphasize the impact of infertility-related practices and lifestyle factors such as diet. Cultural influences shape couples' perceptions and regional attitudes, exemplified by specific insights from China. Psychological factors, including stress and depression, are strongly associated with infertility, underlining the emotional burden couples face. At the same time, awareness and education play a vital role in shaping public understanding, addressing myths, and improving knowledge about infertility. Collectively, these interconnected themes reveal that infertility is not only a biomedical condition but also a complex psychosocial and cultural issue. Research underscores the necessity of integrating medical interventions with culturally sensitive education, psychological support, and lifestyle guidance to holistically address infertility challenges. This comprehensive approach is essential for improving outcomes, reducing stigma, and fostering supportive environments for affected couples worldwide.

Overall, the literature indicates that while there is a general awareness of infertility, significant gaps in knowledge and misconceptions persist across different populations. Attitudes towards infertility are generally positive, but they are influenced by cultural, social, and personal factors. Addressing these gaps through targeted educational programs and public health initiatives is essential to improving understanding and support for individuals and couples dealing with infertility.

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Research Question

The research question, together with the purpose, expected outcomes, and target audience, guides how data are found, collected, and presented. In this paper, the aim is to answer several key questions:

RQ1: What are the research trends in these studies according to the year of publication?
RQ2: What are the top 10 most cited articles?
RQ3: Where are the top 10 countries based on the number of publications?
RQ4: What are the popular keywords related to the study?
RQ5: What is co-authorship by countries' collaboration?

Methodology

Bibliometric analysis extends far beyond the mere collection of publication counts; it systematically gathers, organizes, and evaluates bibliographic data to uncover meaningful trends within scientific research (Alves et al., 2021; Assyakur & Rosa, 2022; Verbeek et al., 2002). While descriptive indicators such as publishing outlets, annual output, and prolific authors provide initial insights (Wu & Wu, 2017), advanced methodologies—including document co-citation analysis—offer a deeper understanding of intellectual structures within the field. Conducting a rigorous literature review, therefore, demands a deliberate and iterative process: selecting precise keywords, executing comprehensive searches, and applying critical analysis to refine results. This structured approach ensures the development of a reliable and comprehensive bibliography that captures the evolution of the discipline (Fahimnia et al., 2015).In the present study, emphasis was placed on high-impact publications, as these works often serve as cornerstones shaping theoretical and conceptual frameworks. To uphold methodological rigor, SCOPUS was selected as the primary database, given its extensive coverage and robust indexing standards (Al-Khoury et al., 2022; Di Stefano et al., 2010; Khiste & Paithankar, 2017). Furthermore, to preserve academic quality, only peer-reviewed journal articles were included, while non-refereed sources such as books and lecture notes were intentionally excluded (Gu et al., 2019). The dataset comprised publications from 2020 through December 2023, systematically retrieved via Elsevier's Scopus platform for subsequent analysis.

Data Search Strategy

For this study, data collection was conducted using the Scopus database, recognized for its comprehensive coverage of peer-reviewed academic literature. An advanced search strategy was employed to ensure accuracy and relevance of the retrieved publications. (Table 1. search string). Specifically, the search query applied was: *TITLE-ABS-KEY (knowledge AND attitude AND infertility) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))*, which restricted the search to articles containing the specified keywords within the title, abstract, or author keywords. This approach was selected to capture a focused body of literature that directly addressed knowledge and attitudes in relation to infertility. To enhance rigor, defined inclusion and exclusion criteria were applied during the screening process. (Table 2, selection criterion). Only journal articles published in English were included, as these ensured peer-reviewed quality and accessibility, while publications such as conference proceedings, books, book chapters, and review papers were excluded to maintain methodological consistency and avoid duplication. Furthermore, the subject area was restricted to studies explicitly addressing knowledge and attitudes toward infertility, ensuring thematic alignment with the research objectives. Following the application of these criteria, the final

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dataset comprised 1,035 articles. This systematic and structured search strategy provided a robust foundation for subsequent bibliometric analysis, ensuring that the dataset was both comprehensive and representative of scholarly discourse on knowledge and attitudes towards infertility.

Table 1
The Search String.

Scopus	TITLE-ABS-KEY (knowledge AND attitude AND infertility) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))
	Assess date 03October 2025

Table 2
The Selection Criterion Is Searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Literature type	Journal (Article)	Conference, Book, Review

Data Analysis

VOSviewer is a widely recognized and user-friendly bibliometric software developed by Nees Jan van Eck and Ludo Waltman at Leiden University, the Netherlands (van Eck & Waltman, 2010a, 2017). Extensively employed in the visualization and analysis of scientific literature, it is particularly effective in producing intuitive network visualizations, clustering related items, and generating density maps. The software's versatility supports the exploration of co-authorship, co-citation, and keyword co-occurrence networks, thereby offering researchers a comprehensive perspective on evolving research landscapes. Its interactive interface, combined with continuous updates, ensures dynamic and efficient navigation of large datasets. Moreover, VOSviewer's capacity to compute bibliometric metrics, customize visualizations, and integrate with multiple data sources underscores its value as an indispensable tool for scholars engaged in complex research domains.

A distinctive strength of VOSviewer lies in its ability to transform intricate bibliometric datasets into visually interpretable maps and charts. By emphasizing network visualization, the software enables efficient analysis of keyword co-occurrence patterns and related-item clustering, benefiting both novice and experienced users alike. Its ongoing development maintains its position at the forefront of bibliometric analysis, offering rich insights through metric computation and flexible visualization options. The adaptability of VOSviewer to diverse bibliometric data—ranging from co-authorship to citation networks—further enhances its role as a powerful platform for scholarly inquiry.

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In this study, datasets including publication year, title, author names, journals, citations, and keywords (retrieved in PlainText format) were collected from the Scopus database covering the period 1971 to Jun 2025. These datasets were analyzed using VOSviewer version 1.6.19, with VOS clustering and mapping techniques applied to generate knowledge maps. Serving as an alternative to the traditional Multidimensional Scaling (MDS) approach, VOSviewer situates items in a low-dimensional space where distances accurately reflect relatedness (van Eck & Waltman, 2010b). While it shares conceptual similarities with MDS (Appio et al., 2014), VOSviewer diverges by adopting a more robust normalization method for co-occurrence frequencies, utilizing association strength (ASij) as a superior measure of similarity (Van Eck & Waltman, 2007)

$$AS_{ij} = \frac{C_{ij}}{w_i w_j}$$

which is "proportional to the ratio between on the one hand the observed number of co-occurrences of i and j and on the other hand the expected number of co-occurrences of i and j under the assumption that co-occurrences of i and j are statistically independent" (Van Eck & Waltman, 2007).

Findings and Discussion

RQ1.What Are the Research Trends on* Knowledge and Attitude Towards Infertility *According to The Year of Publication?

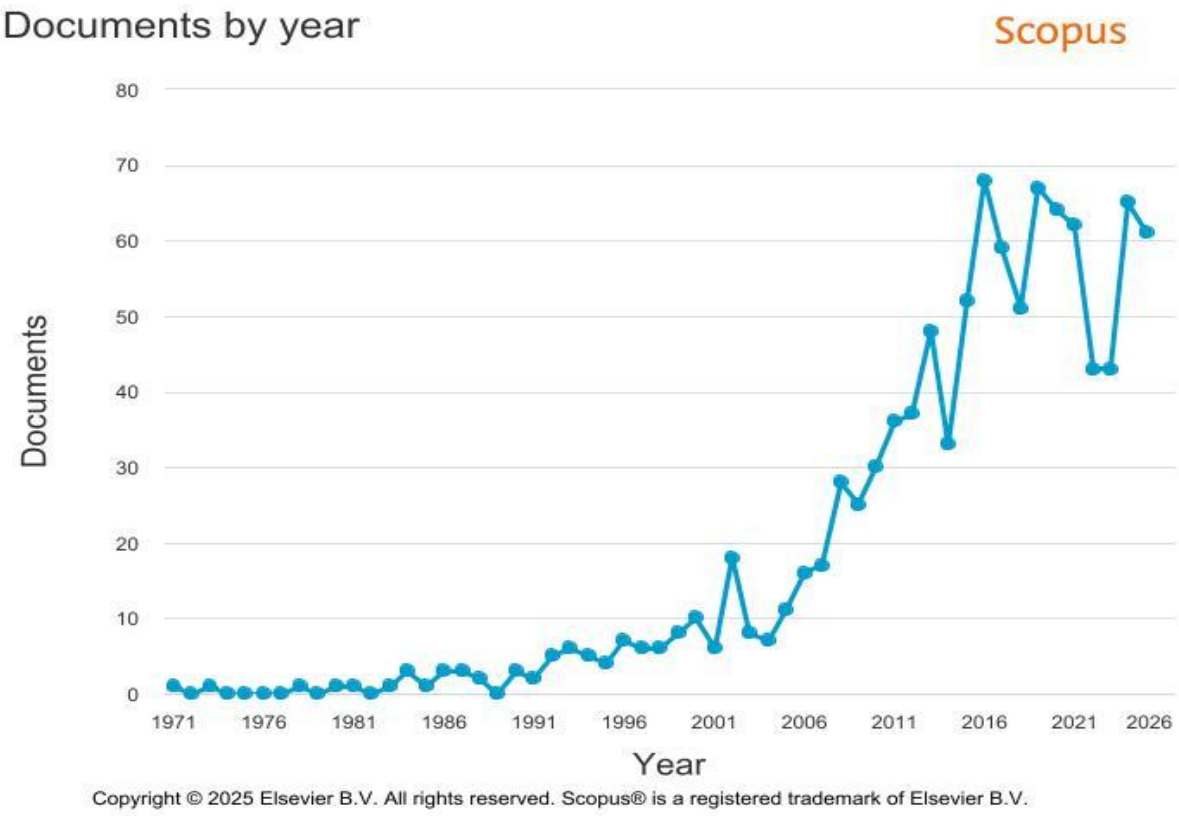

Figure 2: Research Trends on Knowledge and Attitude Towards Infertility According to The Year of Publication

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The publication trend on knowledge and attitude towards infertility from 1971 to 2025 reveals an evolution from sporadic scholarly contributions to a pronounced surge in recent decades. (Figure 1, research trends according to the year of publication). During the 1970s through the 1990s, the number of publications was relatively low and fragmented, reflecting the limited recognition of infertility as a global health priority at that time. Much of the early research was confined to clinical and biomedical perspectives, with little emphasis on social or psychological dimensions such as knowledge, perception, and attitudes. From the early 2000s, however, there was a gradual rise in publications, coinciding with the global expansion of assisted reproductive technologies (ART), such as IVF and ICSI, and the emergence of infertility as a key component of reproductive health policy. The steady upward trajectory became particularly pronounced after 2010, aligning with broader international attention to reproductive rights and the WHO's increasing advocacy in classifying infertility as a disease, thereby encouraging more systematic scientific inquiry.

The sharp growth between 2015 and 2024 underscores a paradigm shift in infertility research. Several factors contribute to this trend: increasing infertility prevalence worldwide due to lifestyle, environmental, and demographic changes; heightened public awareness and reduced stigma, enabling more open discussion; and interdisciplinary approaches that incorporate sociology, psychology, and cultural studies alongside medical science. Moreover, advances in bibliometric tools and greater accessibility of global databases, such as Scopus, have allowed researchers to map knowledge structures and collaborations more effectively, thus boosting scholarly output. The apparent decline in 2025 is likely an artifact of incomplete indexing, as not all current-year publications are yet recorded. Taken together, the data reflect how infertility has transitioned from a narrowly defined biomedical issue to a multidimensional research field that bridges health, culture, and society, highlighting its growing importance in global scholarship

RQ2.What Are the Top 10 Most Cited Articles?

Table 3: Most Cited Articles

Authors	Year	Source Title	Cited by
Karafillakis et al. (2019)	2019	Human Vaccines and Immunotherapeutics	249
Benedict et al. (2016)	2016	Journal of Adolescent and Young Adult Oncology	203
.Ochako et al., (2015)	2015	BMC Public Health	250
Hodes-Wertz et al. (2013)	2013	Fertility and Sterility	234
Bunting et al. (2013)	2013	Human Reproduction	212
Quinn et al., (2009)	2009	Journal of Clinical Oncology	375
Quinn et al., (2007)	2007	Journal of Cancer Survivorship	216
Zebrack et al. (2004)	2004	Psycho-Oncology	318
Schover et al., 2002)	2002	Journal of Clinical Oncology	481

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Authors	Year	Source Title	Cited by
(Schover et al., 2002b)	2002	Journal of Clinical Oncology	321

The analysis of the most highly cited articles shows that research at the intersection of infertility, cancer survivorship, and reproductive decision-making dominates scholarly influence in this field. (refer to Table 3, which is the most cited articles). Several of the top-cited studies, including Benedict et al. (2016), Quinn et al. (2009; 2007), Zebrack et al. (2004), and Schover et al. (2002a; 2002b), focus on fertility preservation and reproductive concerns among cancer patients and survivors. This indicates that the overlap between oncology and fertility has been a critical driver of high-impact research, likely because it addresses urgent clinical dilemmas with significant psychosocial implications for young patients. Articles by Hodes-Wertz et al. (2013) and Bunting et al. (2013) extend this discourse by exploring fertility knowledge, decision-making, and women's attitudes toward reproductive technologies, reflecting a growing scholarly emphasis on patient-centered perspectives. Collectively, these works are highly cited because they align with pressing global health concerns, combine clinical and psychosocial dimensions, and often inform guidelines or policy recommendations in fertility care.

The inclusion of studies such as Karafillakis et al. (2019) on HPV vaccine hesitancy and Ochako et al. (2015) on contraceptive uptake barriers underscores the broader reproductive health context in which infertility research is embedded. These articles highlight the role of public health attitudes, trust, and cultural determinants in shaping reproductive behaviors, suggesting that knowledge and attitudes extend beyond infertility to encompass preventive health and contraception. The prominence of these articles can be attributed to their policy relevance, cross-disciplinary appeal, and methodological rigor, including systematic reviews and qualitative studies that capture complex social dynamics. Ultimately, the citation patterns reflect the global research community's recognition of infertility as not only a medical condition but also a psychosocial and cultural issue, where patient awareness, health communication, and provider practices play decisive roles in shaping outcomes.

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RQ3.Where Are the Top 10 Countries Based on The Number of Publications?

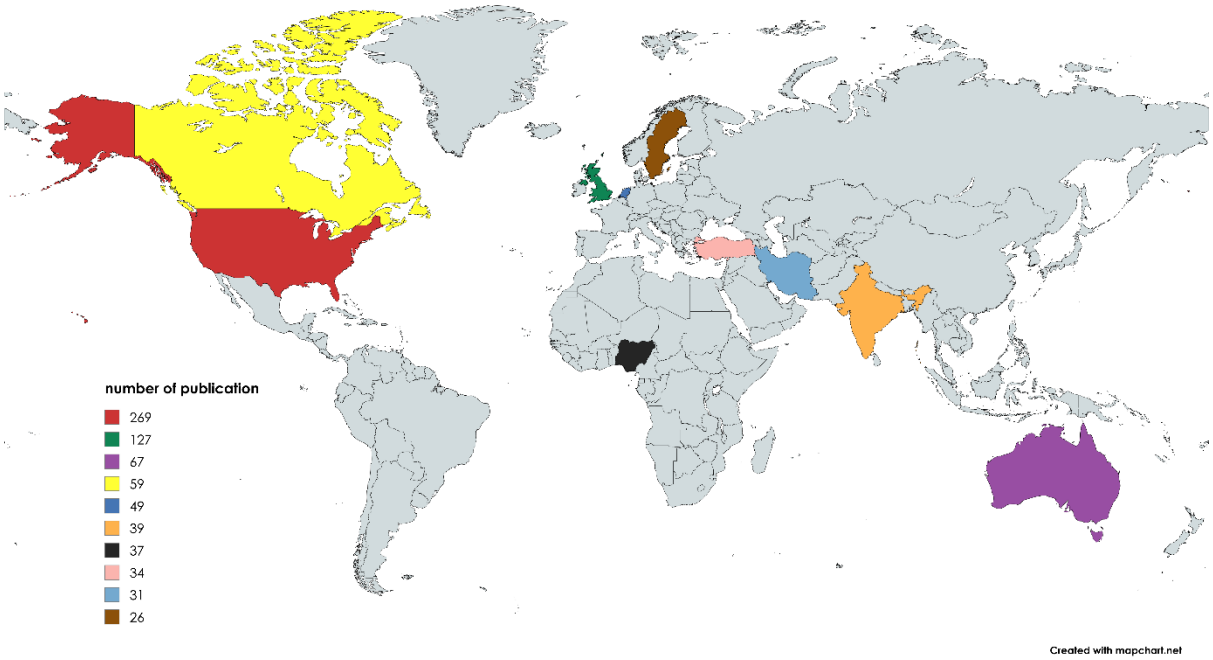

Figure 3: Top 10 Countries Based on Number of Publications

Figure 3 The country-wise distribution of publications on knowledge and attitude towards infertility indicates that research activity is concentrated in high-income, English-speaking nations, led by the United States (269), the United Kingdom (127), Australia (67), and Canada (59). These countries dominate partly due to their well-established academic infrastructures, greater funding for reproductive health research, and advanced clinical practices in assisted reproductive technologies (ART). The Netherlands (49) and Sweden (26) also contribute significantly, reflecting strong European engagement with reproductive medicine and social science research. The prominence of these countries highlights the role of robust healthcare systems, accessible research funding, and international collaborations in advancing infertility studies, particularly on psychosocial and attitudinal dimensions that complement biomedical inquiry.

In contrast, contributions from emerging economies such as India (39), Nigeria (37), Turkey (34), and Iran (31) reflect a growing recognition of infertility as a pressing public health issue in low- and middle-income contexts. Factors such as high infertility prevalence, cultural and social implications of childlessness, and increasing access to ART services have motivated scholars in these regions to explore both medical and societal perspectives. However, comparatively lower outputs may be explained by limited research funding, infrastructural constraints, and fewer opportunities for international collaboration. The distribution underscores global disparities in research capacity yet also reveals the gradual diversification of scholarly contributions beyond Western nations. This trend suggests that infertility is increasingly recognized as not only a medical condition but also a socio-cultural challenge requiring global, multidisciplinary engagement.

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RQ4: What Are the Popular Keywords Related to The Study?

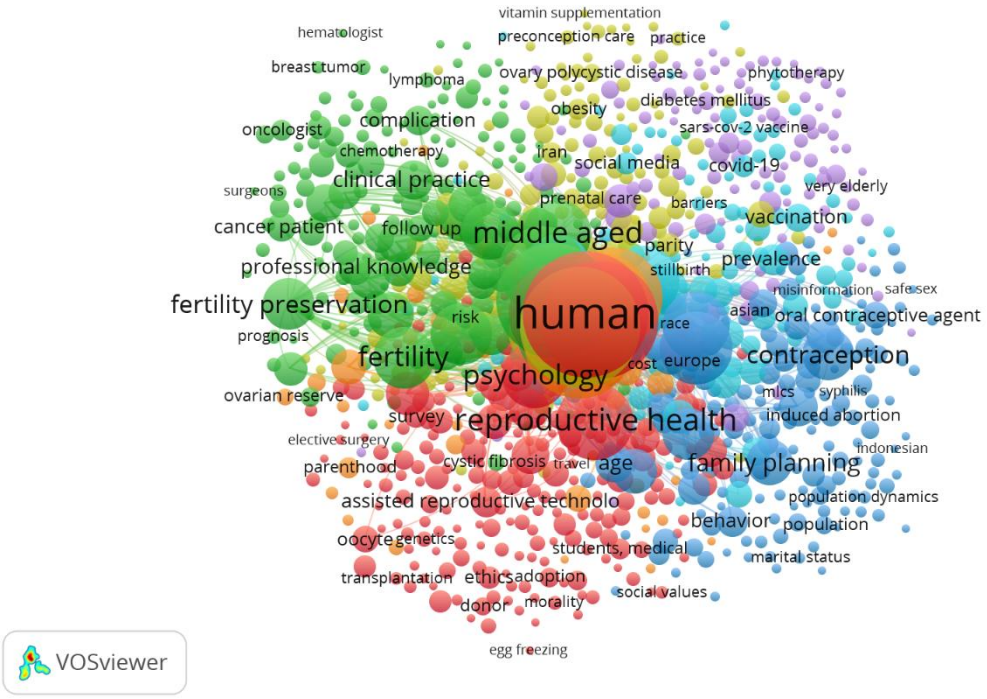

Figure 4 Popular Keywords Related to The Study

Co-occurrence analysis of author keywords is a bibliometric approach that identifies how often specific terms appear together within the same body of literature, thereby revealing conceptual linkages and thematic structures in a research field. Using VOSviewer, this method visualizes the intellectual landscape by mapping the frequency and strength of associations among keywords. In this study, the analysis was conducted with the full counting method, applying a minimum threshold of five occurrences. Out of a total of 4,295 author keywords, 978 met the inclusion criteria. To enhance the robustness of the results, a minimum cluster size of five was also set, which allowed related keywords to be grouped into distinct thematic clusters. Based on these parameters, the software generated seven clusters, each representing a major sub-theme in the literature on knowledge and attitudes towards infertility. This systematic filtering ensured that the analysis focused on meaningful and recurrent patterns, reducing noise from rarely used or peripheral terms.

The findings provide valuable contributions to the body of knowledge by mapping how infertility research is evolving across medical, psychological, and socio-cultural domains. The seven clusters highlight the multidimensional nature of infertility, capturing themes such as assisted reproductive technologies, fertility preservation, patient awareness, cultural perceptions, and psychosocial impacts. These clusters not only confirm established areas of focus but also reveal underexplored domains, guiding future research directions. By illustrating how key concepts interconnect, the analysis helps scholars and practitioners understand the dominant narratives shaping infertility research and identify gaps where further studies are needed. Ultimately, the visualization underscores the complexity of infertility as a research

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topic, reinforcing the importance of integrating biomedical, psychosocial, and cultural perspectives to advance both academic inquiry and practical interventions.

RQ5: What Is Co-Authorship by Countries' Collaboration?

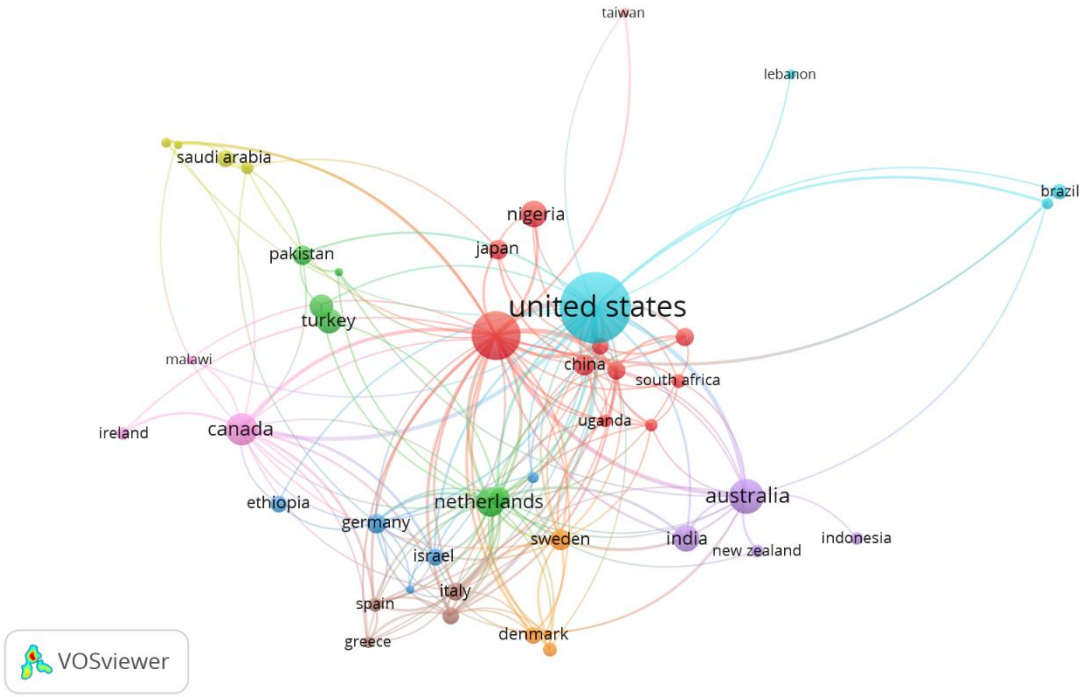

Figure 5: Co-Authorship by Countries' Collaboration

Co-authorship analysis by country in VOSviewer is a bibliometric approach that examines collaborative relationships between nations based on shared publications. The method highlights how often authors from different countries co-publish articles, thereby visualizing global research partnerships and identifying influential players within a field. Using the full counting method, each co-authored publication contributes equally to the collaboration strength, ensuring that all partnerships are recognized regardless of publication volume. In this study, a minimum threshold of five co-authored documents was applied, reducing the dataset from 96 to 45 countries that met the inclusion criteria. To further refine the visualization, a minimum cluster size of five was set, resulting in the generation of seven clusters, each representing a network of countries with stronger research linkages. These parameters ensured the map captured meaningful patterns of collaboration while excluding peripheral or less frequent connections.

The resulting visualization provides critical insights into the international dimension of infertility research, particularly regarding knowledge and attitudes. The seven clusters highlight distinct regional collaborations, reflecting how research is shaped not only by scientific interest but also by geopolitical, cultural, and resource-based factors. For example, high-income countries tend to form strong hubs of collaboration, driving knowledge production and disseminating best practices, while emerging economies increasingly appear as contributors through regional or cross-continental partnerships. This co-authorship analysis underscores the importance of international collaboration in addressing infertility, as it

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enhances knowledge exchange, diversifies perspectives, and strengthens methodological rigor across contexts. Ultimately, these findings enrich the body of knowledge by demonstrating that infertility is a global concern requiring shared expertise, cross-cultural sensitivity, and joint research efforts to develop comprehensive and inclusive solutions.

Conclusion

The purpose of this study was to examine global publication trends, thematic structures, and collaboration patterns in research on knowledge and attitudes towards infertility. Guided by key research questions, the analysis sought to determine publication growth over time, identify the most influential works, map leading countries, highlight recurring keywords, and explore international co-authorship networks. The results show that research on this topic has grown steadily since the 1970s, with a marked increase after 2010, reflecting the rising recognition of infertility as both a medical and socio-cultural challenge. High-income countries such as the United States, United Kingdom, and Australia produced the largest share of publications, while emerging economies, including India, Nigeria, Turkey, and Iran, demonstrated growing engagement. The analysis of co-occurrence keywords generated seven clusters, indicating major research themes in assisted reproductive technologies, fertility preservation, psychosocial impacts, cultural perspectives, and patient awareness. Co-authorship mapping further revealed seven clusters of collaboration, reflecting both established partnerships among advanced economies and emerging networks across developing regions.

This study contributes to the field by offering a comprehensive overview of how infertility research has evolved over five decades, situating it within broader reproductive health scholarship and showing how it has expanded beyond clinical outcomes to include psychological, social, and cultural aspects. The findings emphasize the importance of interdisciplinary approaches and highlight the value of international collaboration in addressing infertility more effectively. In practice, these insights can guide policymakers and healthcare professionals in developing culturally sensitive educational programs, promoting awareness, and improving access to reproductive health services. Limitations of this study include the reliance on a single database and the restriction to English-language journal articles, which may have excluded relevant perspectives from other regions. Future research could incorporate multiple databases, extend linguistic coverage, and focus on emerging topics such as digital health interventions and policy responses to infertility. In conclusion, this bibliometric analysis underscores the significance of mapping global research activity to better understand existing knowledge structures, identify gaps, and guide future scholarship. The study reaffirms the role of bibliometric methods as essential tools for capturing the intellectual landscape of infertility research and advancing informed, collaborative, and inclusive solutions to this pressing public health issue.

Acknowledgment

The authors would like to express their sincere gratitude to TS Dr. Wan Azani for his valuable guidance, constructive feedback, and continuous support throughout the course of this work. Appreciation is also extended to the Iman Excellence Centre for providing the necessary resources and facilities that contributed to the successful completion of this study.

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