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Recent Developments in Reproductive Health Research: A Bibliometric Analysis

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ABSTRACT

In recent decades, reproductive health research has expanded significantly with growth in the number of scientific publications. This trend indicates an increased interest in understanding critical aspects affecting fertility, pregnancy problems, reproductive technologies, and their impact on women's and men's reproductive health. Bibliometric analysis is a powerful tool to understand changes in research trends, collaboration between researchers, and the impact of publications in the reproductive health domain. This study aims to analyze recent developments in reproductive health research through a bibliometric approach. The research method utilizes bibliometric analysis of leading journal databases to identify research trends, collaboration, and impact in the reproductive health domain. The results showed a significant increase in the number of publications related to reproductive health over the last few decades. Key findings include a research focus on risk factors such as diet, environment and lifestyle that affect fertility and the impact of new medical technologies on fertility treatments. In addition, cross-disciplinary collaboration is an important trend, combining fields such as medical science, psychology and social science to better understand the dynamics of reproductive health. In conclusion, this bibliometric analysis confirms the need for a holistic approach in reproductive health research. Cross-disciplinary collaboration is key to expanding understanding of the factors that influence reproductive health and to developing more effective prevention and intervention strategies. This study provides a foundation for future research planning in an effort to improve global reproductive health.

Keywords: *Analysis, Bibliometric, Reproductive Health*

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INTRODUCTION

Reproductive health is one of the crucial aspects of human welfare that continues to receive serious attention in the scientific realm (Park et al., 2022, pp. 1980–2019). The study of aspects of human reproductive health has become the center of widespread concern not only for scientists, but also for the global community as a whole (Banchi et al., 2022). This phenomenon is not surprising, considering the complexity and broad impact of reproductive health on the sustainability of human life and society. Research related to reproductive health has undergone significant development over time (Caserta et al., 2011). From changes in fertility patterns, to the growth of reproductive technologies, to increased awareness of environmental factors that affect reproductive health (Blanc, 2001), each of these aspects becomes an integral part of ever-evolving scientific exploration (Glasier et al., 2006). Today, we are in an era where developments in reproductive health research are expanding not only quantitatively but also qualitatively, opening the door to new discoveries that are changing paradigms and approaches in the treatment and understanding of reproductive health.

Reproductive health involves a range of aspects related to the human reproductive system (Dixon-Mueller, 1993). Reproductive health includes several things, namely 1. Fertility and female reproductive health. Female fertility is a key element in reproductive health (Fathalla, 1992). Various factors such as hormonal balance, good ovarian function and uterine health affect fertility. Hormonal disorders, lifestyle, and chronic diseases can affect a woman's fertility. 2. Male reproductive health. Men also play an important role in reproductive health (Toppari et al., 1996). Factors such as sperm quality, hormonal disorders and health issues affecting the male reproductive system can affect fertility and reproductive health (Fathalla et al., 2006). 3. Pregnancy and childbirth. Reproductive health during pregnancy and labor requires special attention (Dudgeon & Inhorn, 2004). Prenatal check-ups, care during pregnancy, and management of complications that may occur during labor are crucial to ensure the health of both mother and newborn (Thorne-Lyman & Fawzi, 2012). 4. Prevention of sexually transmitted diseases (STDs) (W. Sweileh & Mansour, 2020). STDs are an important issue in reproductive health. Education, prevention, and treatment of STDs are key in maintaining reproductive health (Corrêa, 1997). The importance of condom use, vaccination, and proper testing and treatment is crucial in preventing the spread of this disease. 5. Other reproductive health issues. Various reproductive disorders such as endometriosis, erectile dysfunction, infertility, and hormonal disorders require in-depth understanding and appropriate treatment. Understanding the causative factors, prevention, and effective therapies are important in overcoming these reproductive health problems. 6. Psychosocial aspects of reproductive health. In addition to physical aspects, reproductive health also involves

psychosocial aspects. Psychological support, appropriate information, and understanding of the psychological aspects involved in reproductive health issues are key to holistic care. The importance of education, access to quality reproductive health services, regular check-ups, and comprehensive treatment are important elements in maintaining reproductive health (Bearinger et al., 2007). The continued emergence of medical technology innovations, evolving research, and changes in public health approaches will continue to enrich our understanding of reproductive health, bringing positive impacts to society as a whole.

Bibliometric analysis is a scientific method used to measure, analyze, and explore the information contained in scientific publications and literature (Deng et al., 2022). This approach involves utilizing bibliographic data, such as the number of publications, citations, and collaborations between researchers, to explore patterns, trends, and impacts of scientific work. As an analytical tool, bibliometrics has become an integral part of the world of research and science. It allows researchers to see the scientific evolution of various fields, identify important contributions, and evaluate the impact of scientific publications on the development of science. The use of bibliometric analysis is widespread in various disciplines, such as social sciences, medicine, natural sciences, engineering, and humanities (Ilagan-Vega et al., 2022). Its main purpose is not only to understand the development of research in a field, but also to provide insights into research directions and trends, as well as to bridge collaboration between researchers. In the context of recent developments, bibliometric analysis has become a very useful tool in dealing with the information explosion in the digital age. With its ability to filter information, identify the most influential works, and understand patterns of collaboration between researchers, bibliometric analysis makes an important contribution to decision-making in research, policy development, and overall scientific development.

Bibliometric analysis, as a research method that explores and analyzes bibliographic data, has become an important tool in understanding the dynamics of scientific development (Trivedi et al., 2023). Through bibliometric analysis, we can reveal trends, collaboration patterns between researchers, and the impact of publications in the field of reproductive health (Arnull et al., 2023). A deeper understanding of the evolution and direction of these scientific developments can provide valuable insights for formulating policies, determining research directions, and designing more effective intervention strategies in the field of reproductive health. This approach is becoming increasingly important given the new challenges that are emerging in the context of global reproductive health. Changes in lifestyle, environmental factors, access to reproductive health services, and socio-cultural issues are some of the factors that continue to evolve and affect human reproductive health. Therefore, a thorough bibliometric analysis of recent developments in reproductive health research is not only important to see the history but also to provide a better understanding of the direction that needs to be taken in the future to address these challenges.

Bibliometric analysis has its roots in the development of bibliography and scientific measurement. Its history began in the 17th century with efforts to record information about scientific works. However, more formalized methods began to emerge in the early 20th century. In 1927, Alfred Lotka, a statistician, developed "Lotka's Law" which deals with the law of division of scientific productivity in a particular field (El Ansari et al., 2023). This was one of the early contributions to measuring scientific productivity in a field of study. In 1948, Derek J. de Solla Price, a social scientist, developed the concept of the "law of halving", which describes the growth of scientific literature and the distribution of citations within it. Price also introduced the concept of "factor of increase", which is the ratio between the number of articles published in a particular field of study over time. Then, in 1969, Eugene Garfield introduced the "Science Citation Index (SCI)", one of the first databases to record citations in scientific literature. This paved the way for the development of modern bibliometric analysis method (W. M. Sweileh et al., 2018). In the following years, the development of information technology brought about a revolution in bibliometric analysis (W. M. Sweileh, 2020). The use of computers and easy access to digital databases allows researchers to conduct bibliometric analysis more efficiently and in-depth (Zhang et al., 2016). It also enabled the use of more advanced statistical techniques to explore more complex patterns in bibliographic data. Since then, bibliometric analysis has continued to grow rapidly, being used in various fields of study to understand research trends, the impact of scholarly publications, and patterns of collaboration between researchers (Ivanitskaya et al., 2021, pp. 1973–2019). As technology advances, these methods continue to evolve, allowing for a deeper understanding of scientific dynamics in a variety of disciplines.

The use of bibliometric analysis has a number of benefits. The first is identifying research trends. Bibliometric analysis allows researchers to identify research trends within a field of study (W. M. Sweileh, 2018). By analyzing the number of publications, frequently used keywords, and the evolving focus of research, researchers can understand the direction and development of scholarship. The second is measuring the impact of publications. Bibliometric analysis allows measuring the impact of a scientific work (Dai et al., 2020). Through the number of citations received by a publication, it can be measured how much the work influences and is used by other researchers in the same field. Third, evaluate the quality of research. This method helps in evaluating the quality of research by looking at the frequency of citations, the reputation of the journal where the publication is published, and the collaboration between researchers that occurs in scientific work. Fourth, identifying researcher collaborations and networks. Bibliometric analysis can help reveal collaboration patterns between researchers (Sugimoto et al., 2019). This is important in understanding the network of cooperation within and between scientific disciplines, opening the door for interdisciplinary research cooperation and development. Fifth, future research planning. By understanding emerging research trends and foci, bibliometric analysis helps in planning future research (Falagas et al., 2013).

Researchers can identify untapped areas, the need for further research, and the potential for scientific breakthroughs. Sixth, decision-making basis. Bibliometric analysis provides a strong foundation for decision-making in the development of scientific policies, allocation of research funds, and scientific development strategies in various research and academic institutions (W. M. Sweileh, 2018). As such, bibliometric analysis not only provides insight into scientific developments, but is also a valuable tool for researchers (Brandt et al., 2019), policy makers, and academic institutions in making more informed and effective decisions.

There are several previous research opinions. The first research according to (Zahraa & Yuadi, (2022), with the research title Mapping Publications on Sexual Education Using VOSviewer. The results of his research state that sex education publications from 2019 to 2021 stored in Scopus have increased significantly. The author who wrote the most sex education publications from 2019 to 2021 stored in Scopus was Bennett D.A. with 19 publications. The country that has the most sex education publications from 2019 to 2021 stored in Scopus is the United States with 700 publications. The second research according to Putri, (2022), with the research title Bibliometric Analysis of the Influence of Social Media News on Teenage Behavior in Society. The results of his research state that the Bibliometric technique in the process uses a set of articles or journals as a reference for research sources. The articles or journals are obtained through Google Scholar as the main channel in finding reference sources for analysis. Then the results of the analysis are visualized and explained in detail through theoretical dialogue and the results of bibliometric analysis. The third research according to Noeraida, (2020), with the research title Performance Measurement of Accredited Scientific Journals at Batan (Bibliometric Analysis). The results of his research state that the metric analysis of journals shows that the scientific impact measured by the number of cited articles is in the high category. The most productive and most cited journal is J. Material Science Indonesia, but the journal that has the highest citation ratio is Urania, which is 1.44. The collaboration visualization shows the collaboration between authors obtained from eight accredited journals.

RESEARCH METHODOLOGY

The research method using bibliometric analysis of leading journal databases has been a very useful tool in understanding research trends, collaborations, and their impact in the reproductive health domain (Yadava et al., 2019). This approach allows researchers to systematically explore and analyze the information contained in large collections of published scientific articles, enabling a deeper understanding of the evolution of knowledge in these fields. The bibliometric process involves the use of quantitative metrics to evaluate various aspects of scientific publications, such as citation frequency, patterns of collaboration between researchers, subject distribution, and publication trends. The first step in bibliometric analysis is to collect data from

reputable journal databases related to reproductive health. For example, PubMed, Scopus, or Web of Science are often used as important data sources. After collecting the data, the next step is to analyze it using various statistical techniques and relevant algorithms. This can include identifying the most commonly occurring keywords in publications, collaboration networks between researchers, research trends over time, or even citation analysis to assess the relative impact of a work on the scientific literature.

In the reproductive health domain, bibliometric analysis can provide deep insights into the development of research, the main focus in this field, as well as the direction taken by researchers (Mitra et al., 2021). For example, it can identify up-and-coming research topics such as reproductive technology, adolescent reproductive health, or ethical issues in reproduction. In addition, bibliometric analysis can also illustrate patterns of collaboration between researchers, both locally and globally. This can help in understanding the strong network of cooperation between institutions or countries in terms of reproductive health research, which in turn can lead to more effective cooperation in the future. The impact of bibliometric analysis in reproductive health is not only limited to academic understanding, but can also have practical implications (Ding et al., 2022). The information gained from this analysis can help policy makers, research institutions, and health practitioners to identify priority areas, support more effective policy development, and plan more successful collaboration strategies. Overall, this approach using bibliometric methods provides a solid framework for understanding the evolution of knowledge in reproductive health, enabling stakeholders to make more informed and relevant decisions in their efforts to improve public reproductive health.

One important aspect of bibliometric analysis is the assessment of the impact of scientific publications. This is often measured using a citation index, which measures how often a scientific work is cited by other scientific works. In the context of reproductive health, frequently cited works may indicate a significant contribution to the understanding and development of the field. In addition, bibliometric analysis also allows the identification of gaps in research. This can assist in directing research resources to areas that are under-tapped or poorly understood, helping to increase the diversity of knowledge in reproductive health. Over the past few years, technologies and methodologies in bibliometric analysis have evolved rapidly, allowing for more sophisticated approaches and more in-depth analysis. The use of techniques such as co-citation analysis, bibliographic coupling, or cluster analysis can provide a more complex understanding of inter-article relationships and more subtle trends in reproductive health research.

RESULT AND DISCUSSION

Reproductive health is a good physical, mental and social condition in all aspects related to the reproductive system. It includes bodily conditions that enable individuals to reproduce normally, while maintaining good health during the entire

reproductive life cycle, from adolescence to adulthood and old age. More than just inequity in access to sexual and reproductive health services, reproductive health also involves understanding, awareness, and behaviors that support well-being in the context of reproduction. This includes an understanding of sexual health, appropriate access to contraceptive information and services, quality maternal care, and prevention and treatment of sexually transmitted diseases. Reproductive health does not only focus on physical health, but also involves mental, emotional and social aspects that affect a healthy reproductive balance.

Reproductive health encompasses important aspects of individual well-being, ranging from physical functioning to psychosocial aspects. It involves not only the ability to reproduce physically but also overall well-being in the context of reproduction. Important aspects of reproductive health are firstly fertility and fertility. Reproductive health highlights aspects of fertility, including the diagnosis and treatment of fertility problems in both men and women. It includes an understanding of the factors that affect fertility and the solutions available. Second is sexual health. This aspect involves understanding and managing the risks of sexually transmitted diseases (STDs) as well as sexual health and safe behaviors. Third maternal care. Focuses on maternal health during pregnancy, labor, and postpartum. This includes maternal health monitoring, prenatal care, safe delivery, and postpartum care. Fourth, adolescent reproductive health. Providing adolescents with appropriate knowledge and access to information about sexuality, including sexual education, contraception, and prevention of unplanned teenage pregnancy. Fifth birth control and contraception. Includes appropriate access to and information on various contraceptive methods and education on family planning. Sixth reproductive disease monitoring and prevention. This includes prevention and treatment of sexually transmitted diseases, such as HIV/AIDS, syphilis, gonorrhea, and others. Finally, male reproductive health. Focuses on aspects of male reproductive health, including fertility treatments and sexual health.

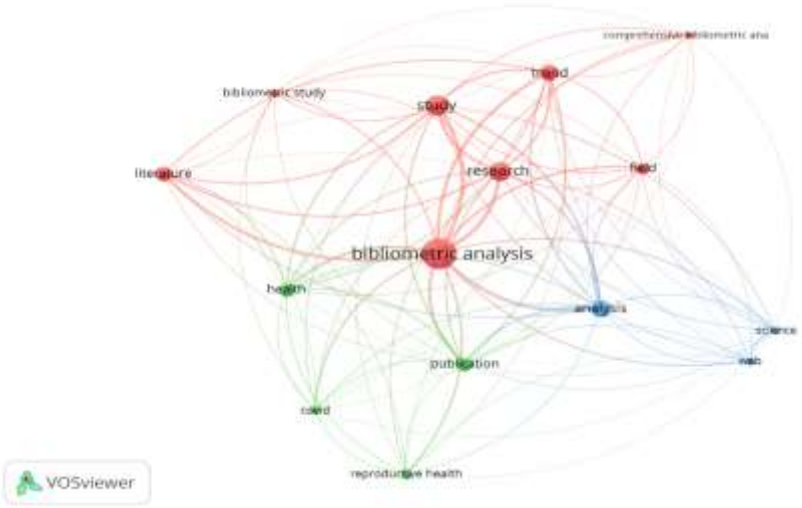
Reproductive health is very important because it is first for the well-being of individuals and families. Good reproductive health helps individuals and families to achieve optimal balance in their lives. Secondly population control. Consciously regulating births helps control population growth and allows for better planning in various aspects of life. Third prevention of diseases and complications. Attention to reproductive health helps in preventing the spread of sexually transmitted diseases and reducing complications associated with pregnancy, childbirth, and the reproductive process. Fourth education and awareness Having a good knowledge of reproductive health allows individuals to make informed decisions regarding their own bodies, reducing the risk of complications or unwanted conditions. Fifth influence on global development. Good reproductive health is also an important element of sustainable global development as it has a direct impact on health.

Table 1: Verivy selected terms

NO	Term	Occurrences	Relevances
1	Bibliometrik anlisis	198	2,94

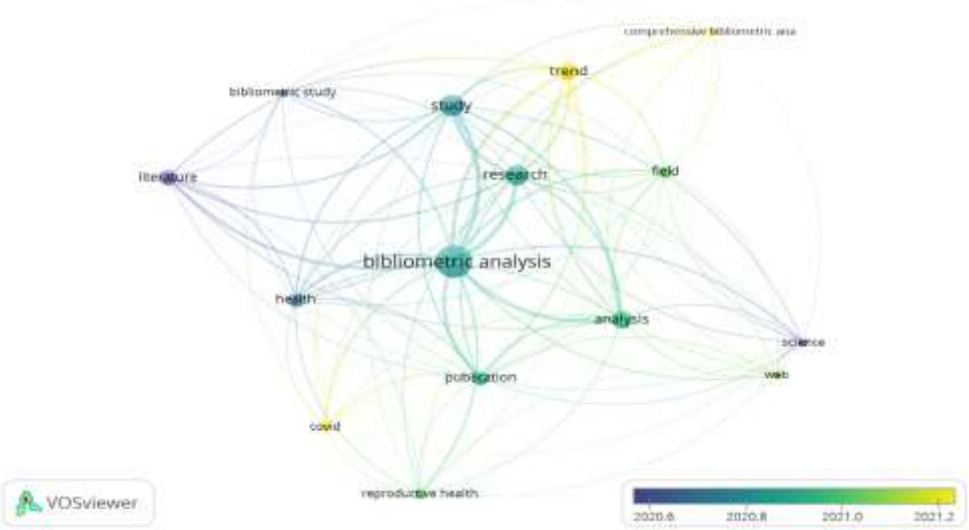
2	Science	14	2,16
3	Web	13	2,12
4	Reproductive helath	19	1,15
5	Literature	42	0,93
6	Field	28	0,86
7	Research	79	0,74
8	Bibliometric study	13	0,70
9	Study	84	0,69
10	Covid	17	0,54
11	Health	40	0,51
12	Publication	40	0,50
13	Analysis	63	0,49
14	Ternd	55	0,39
14	Comprehensive biblimetric anlysis	10	0,27

Figure 1: Reproductive Health Network Visualization, Bibliometric Analysis



In Figure 1 above is a network visualization image of reproductive health obtained from conducting bibliometric analysis. The analysis was obtained from the analysis of journals in google scoolar.denagn the number of papers is 200. The publication is taken from publish or operate, then click the google scoolar section and the publication is taken from 2018-2022. Here researchers take keywords namely reproductive health, bibliometric analysis. This bibliometric analysis was obtained with the help of VOS viewer.

Figure 2: Overlay Visualization of Reproductive Health, Bibliometric Analysis.



In Figure 2 above is an overlay image of reproductive health visualization, which is obtained from conducting bibliometric analysis on VOS viewer. In the picture it can be understood that from the scientific journals that have been recorded bibliometric analysis is dominantly used. Because in the picture above there is a larger blue circle in the bibliometric analysis section. All existing components have a relationship between one another. This overlay section is related to the year of publication or the year of publication. The brighter it is the more recent the publication. This means that there is a tendency for terms to change from year to year.

Figure 3: Density Visualization Reproductive Health, Bibliometric Analysis.

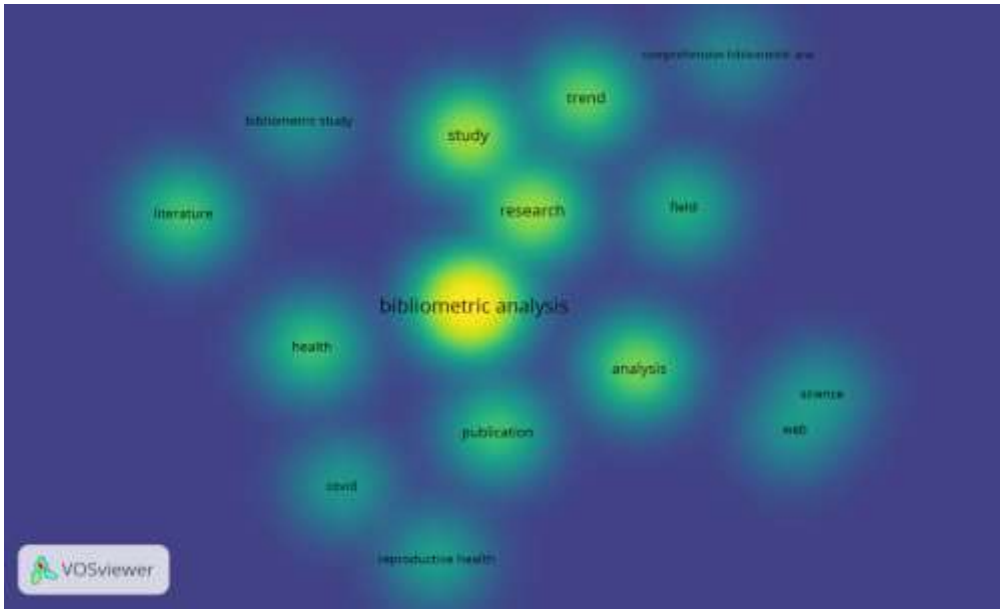


Figure 3 above is an image of density visualization.nDensity Visualization is also known as density visualization. The first is the density of clusters or groups of data.

VOS Viewer uses algorithms to group entities based on bibliometric relationships such as co-citation or keyword similarity. Density visualization highlights the density of entities in these groups, showing how many connected entities are in a cluster or group. Both color and size represent density. Color and size can be used to represent the level of density. Larger and darker dots or nodes usually indicate higher density, highlighting denser clusters or stronger relationships between those entities. The third identifies strong relationships or communities in the data. Density visualization helps in identifying closely related clusters or communities among entities in bibliometric data. This allows users to understand groups of entities that have strong relationships between them, which may be specific areas of study or closely related topics. Fourth, interpretation and analysis. Through density visualization, users can analyze and explore patterns and relationships among entities in bibliometric data.

Users can identify highly interconnected groups, study trends, and develop a better understanding of the network structure of the bibliometric data. The density visualization in VOS Viewer helps users to interpret and analyze the relationships between entities in the bibliometric network, highlighting more closely related clusters or groups in the data.

Some common problems that often occur in reproductive health are infertility. Infertility can be caused by various factors such as hormonal disorders, problems with the reproductive organs, lifestyle, or genetic factors. Diagnosis involves reproductive health screening, fertility testing, and may require medical treatment or interventions such as assisted reproductive technology (TRA) or lifestyle changes. The second problem is sexually transmitted infections (STIs). STIs include gonorrhea, syphilis, HIV/AIDS, and others. Prevention of STIs involves condom use, vaccination if available, and safe sex. Treatment involves antibiotics or antiviral therapy prescribed based on the type of STI diagnosed. The third problem is reproductive cancer. Cancers of the reproductive organs such as breast cancer, prostate cancer, cervical cancer, and others require early detection through routine examinations and screening. Treatment may involve surgery, chemotherapy, radiotherapy, or targeted therapy. Fourth, menstrual disorders. Problems such as irregular menstrual cycles, severe pain, or abnormal bleeding can be caused by diet, stress, or other reproductive health issues. Treatment may involve diet, medication, or hormonal therapy. The fifth problem is endometriosis. Endometriosis occurs when tissue that normally grows inside the uterus starts growing outside the uterus. This can cause pelvic pain, menstrual disturbances, and difficulty conceiving. Treatment involves painkillers, hormone therapy, or surgery. Sixth problem is sexual dysfunction. Disorders such as erectile dysfunction, orgasmic dysfunction, or impaired sexual drive can affect quality of life and relationships. Treatment involves counseling, sexual therapy, or medical treatment according to the cause. Seventh, hormonal disorders. Hormonal imbalances such as polycystic ovary syndrome (PCOS) or thyroid disorders can affect fertility and body balance. Treatment involves hormonal regulation, medication, or lifestyle changes. Lastly anatomical problems. For example, varicocele in men or structural problems with the reproductive

organs can affect fertility. Treatment may involve surgery or medical intervention according to the specific condition.

Some common ways to overcome these problems are firstly lifestyle changes. Consume a nutritious and balanced diet, high in fiber, low in saturated fat, and adequate in vitamins and minerals. Regular physical activity helps maintain ideal body weight and supports reproductive health. Stop smoking and drinking excessive alcohol can interfere with reproductive health. Both medical care and medication. Consult reproductive health problems with a doctor or specialist for proper diagnosis. Hormonal therapy, antibiotics, pain medication, or surgical intervention may be prescribed according to the diagnosed condition. Thirdly Assisted Reproductive Technology (TRA). A method where eggs and sperm are combined outside the body and then implanted back into the uterus. Follow-up scans and treatments include procedures to remove endometriosis tissue or varicocele repair. Fourth, psychological counseling and support. Especially for sexual dysfunction or psychological issues that affect reproductive health. Support from the community or support groups. Joining a group with similar experiences can provide much-needed emotional support. Fifth, early detection and prevention. Routine check-ups are done when regular reproductive health check-ups for early detection of certain diseases or conditions. Vaccination and STI prevention.

Protect yourself from sexually transmitted infections by getting vaccinated if available and using protection during sexual intercourse. Each reproductive health issue requires unique treatment and can involve a variety of approaches. It is important to consult a medical professional for advice that is appropriate for your condition. Understanding the importance of early detection and proper treatment can help better manage reproductive health issues.

CONCLUSION

Based on the results and discussion above, it can be concluded that this bibliometric analysis can provide valuable insights into future directions in reproductive health research, including pressing themes, methodological developments, and research focuses that are important to pay attention to in an effort to improve the overall understanding and care of reproductive health. Along with the increase in the number of publications, there has also been a growth in collaboration among researchers in the field of reproductive health. Collaboration networks between researchers are becoming more complex and widespread, indicating more intensive cooperation in addressing reproductive health challenges. In addition to trends, bibliometric analysis also allows the identification of the most influential publications in the field of reproductive health. These publications, often characterized by a high number of citations, provide important insights into significant contributions to our understanding of reproductive health. The bibliometric analysis was obtained from the analysis of journals in google scoolar.with the number of papers is 200. The publication is taken from publish or operate, then click the google scoolar section and the publication is taken from 2018-2022. Here

researchers take keywords namely reproductive health, bibliometric analysis. This bibliometric analysis was obtained with the help of VOS viewer.

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