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REVIEW ARTICLE

Breastfeeding Practices and Immunity Outcomes among Infants: A Bibliometric Analysis 2012-2022

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ABSTRACT

This study aimed to understand the significant relationships between human milk and a newborn's developing immune system over the decade as well as their history, research hotspots, frequency of publications, contextual associations between multiple publications related to the topic, and current trends. The electronic database Dimension™ AI was searched using the keywords "breastfeeding", "immunity" and "infants" to include manuscripts published between 2012 and 2022. Bibliometric analysis was performed using VOSviewer 1.6.14. Network maps were created to analyze collaborations among distinct authors and countries, and recognize top institutions. The study covered 334 papers that meet the inclusion criteria. According to the network visualization, the United States has made a substantial contribution to the study of breastfeeding's effects on newborn immunity, as evidenced by the country's highest number of publications 74 (22.1%). The analysis of journals revealed the research in this area is heavily focused on Nutrient Journal, with maximum publications 104 (31.1%). On analyzing the contribution of institutes, the University of Western Australia showed a maximum publication 16 (4.7%). This bibliometric analysis highlights the United States as a leading contributor to research on breastfeeding's impact on infant immunity, with a significant focus on Nutrients journal and key institutional input from the University of Western Australia.

Keywords: Bibliometrics, Breastfeeding, Immunity, Infants.

INTRODUCTION

Immunity is the body's first line of protection against allergies, germs, and viruses that are present in the environment. The infant's immune system, which is sometimes mislabeled as "immature," is only ignorant of its brand-new extra-uterine surroundings.[1] The newborn's immune system has minimal anti-oxidant and anti-inflammatory activity in the respiratory and gastrointestinal tracts, delayed T-cell response, and decreased immunoglobulin secretion, particularly of immunoglobulin A.[2-4] Human milk has been shown to support the infant's developing immune system, perhaps due to human milk bio-actives like milk microbiota, antibodies, immunoglobulins, cytokines, and hormones.[5]

Human milk most commonly referred to as breast milk is a biological fluid generated by mammals' mothers' breasts to nourish and protect their young from infection until their immune systems have fully developed. In light of this, the World Health Organization (WHO) recommends breastfeeding exclusively during the first six months of a child's life, then continuing with appropriate supplemental foods for another two years or as long as the mother and child both prefer.[6] At the global level, approximately 41% of infants are breastfed exclusively for the first six months of their lives, and just 45% continue till two years of age.[7] Previous study revealed that between 2010 to 2018, the global prevalence of early initiation of breastfeeding was 51.9%, of which 45.7% are exclusively breastfed for 0-6 months, in low-or middle-income countries.[8] However, India had shown significant progress in exclusive breastfeeding from 55% in the National Family Health Survey (NFHS)-4 to 64% in NFHS-5.[9] Breast milk consists of important elements like colostrum, lactoferrins, immunoglobulins (Igs), human milk oligosaccharides, microbiota, and many others. It also provides protective factors that contribute to the infant's immature immune system, encouraging tolerogenic responses.[10] Thus, it strengthens the immune system of infants which enables them to

combat infectious diseases, decreases the risk of diarrhea, lower respiratory infections, and acute otitis media, and achieves optimum cognitive development.[11]
In contemporary times, the culture of mixed milk feeding is often observed. However, this will be harmful to both the infant's and the mother's health.[12] Formula-fed infants face greater risks of infectious diseases in the first year of life. This is so because mothers' milk provides innate immunity against these infections. Data also suggests that women who do not breastfeed have higher chances of diabetes mellitus type-2, obesity, metabolic disorders, cardio cardiovascular disorders, and at times cancers.[13]
Furthermore, breastfeeding has long-term, positive implications from local to national and to global communities, in terms of both health and economic sectors.[7] Therefore, recognizing the importance of breastfeeding, the World Health Assembly has set a global target to foster exclusive breastfeeding for infants under 6 months of age to at least 50% by 2025.[8,14]
As an emerging new technique to analyze and generate evidence, bibliometric analysis has enabled us to understand key research areas in terms of publications, citations, and other academic outputs quantitatively. When it was looked through the lens of evidence synthesis, it can be observed that such analysis helps in understanding shifting patterns in a particular research field in general and the emergence of new subtopics in particular, identify important contributions and high citation researchers, countries and institutions with most contributions in the particular fields, unravelling important collaboration networks between researchers and how the source of funding flows. Such important evidence also enables policymakers to make informed decision making.[15,16]
The current work is designed to understand the global trends in breastfeeding practice and its immunity outcomes on infants. It provides a review of the existing literature on the impact of breastfeeding on immunity outcomes in infants given the significance of breastfeeding and immunity outcomes as well as the dearth of research that synthesizes the extant literature about maternal and child health. To do this, a bibliometric study was conducted on documents published from 2012 to 2022, focusing on the role of breastfeeding in enhancing infant immunity. Since bibliometrics is a collection of quantitative tools that can handle huge datasets related to the literature and also a potent method to disclose the scientific literature on a particular issue within a certain timeframe. It can discover themes and the theoretical underpinnings of scholarly fields where breastfeeding practices have been reported to have an impact on immunity, laying the groundwork for further research. It is still difficult to understand the connection between the innate immune system and human milk, as well as how they change separately and together over time. The crucial interactions between human breast milk and the developing innate immune system of the infant will be the main topic of this review.

METHODS

Data Sources and Search Strategies: Bibliometric analysis of breastfeeding and immunity-related studies among infants between 2012 and 2022 was carried out to ascertain and describe their body of literature. Published books, articles, chapters, and research papers were searched using topic search (full text and title/abstract) on the Dimension™ Database. The following keywords were applied to retrieve all relevant studies. (("Breast Feeding" OR "Breastfed, Exclusive") AND ("Infant" OR "Infant, Newborn")) AND ("Immunity" OR "Immune Response" OR "Immune Process") (("Breast Feeding" OR "Breastfed, Exclusive") AND ("Infant" OR "Infant, Newborn")) AND ("Immunity" OR "Immune Response") NOT ("Food, Formulated") NOT ("Feeding, Complementary"). Only original articles were considered and all those articles which were found to be non-relevant were filtered during the screening process from the study.
Eligibility Criteria: Original research articles published between 2012 and 2022, written in English, and examining the impact of breastfeeding on infant immunity were included. Book chapters, magazine articles, review articles, news articles, and original research articles that did not meet the inclusion criteria were excluded from the study.
Data Collection: The information utilized in this study was sourced from the Dimension™ AI database, encompassing a comprehensive array of data elements. The dataset comprised details from various dimensions, such as published journals, countries, authors and co-authors, cited references, organizations, documents, sources, titles, abstracts, and sets of citations. To facilitate systematic analysis, the gathered data was consolidated and organized using Microsoft Excel version 2016, formatted into a .csv file for further examination and interpretation. The data was screened following the Preferred Reporting Items for Systematic and Meta-analyses (PRISMA) guidelines as shown in Figure 1.[17] This meticulous approach to data extraction and management ensures the robustness and reliability of the information underpinning our research.

Bibliometric Analysis: The meticulously screened dataset was subsequently imported into VOS viewer version 1.6.18 for thorough analysis, presentation, and visualization of bibliometric networks. VOS viewer stands out as a powerful software tool, underpinned by the Java programming language, specifically designed for the comprehensive examination, exploration, and visual representation of bibliometric networks. Its advanced capabilities empower researchers to gain valuable insights into the intricate connections and patterns within the dataset, contributing to a nuanced understanding of the research landscape under scrutiny. This strategic utilization of a VOS viewer enhances the interpretative depth and clarity of the findings derived from the dataset.[18,19]

RESULTS

This result focuses on 6 aspects, namely; sources of published articles, the contribution of authors and co-authors, documentation network, field contribution of countries and institutions, titles, abstract, and co-citation reference networking.

Contributions of Countries in Publications: Figure 2a shows the top 10 countries with the maximum number of publications. The United States ranked first with maximum (n=74, Cluster= 1) number of publications, followed by Australia (n=38, Cluster=2), the United Kingdom (n=19, cluster=3), Netherlands (n=18, cluster=4), and Canada (n=15, Cluster=5) between the year 2012 to 2022. In this Network Visualization, total strength linkages (Figure 2b), were found to be 45555, of which the United States has more prominent link strength (n=17522), than Australia (n=8722), United Kingdom (n=7477), Canada (n=4910) and Switzerland (n=4736).

Contribution of Different Organizations to Publications: The findings of Figure 3a shows that the University of Western Australia ranked first in number of publications with 16 records (cluster=2, links= 45) followed by Utrecht University (cluster=2, links= 45), University of California-Davis (cluster=1, links= 45), Nestle (cluster=2, links= 44) are found 3 to have 7 records. In Figure 3b, the total link strength identified was 25989. Figure 3c indicates John Hopkins University has a maximum citation frequency (n=3855).

Contribution of Different Journals to Publications: Figure 4a indicates that most of the relevant papers were published in the following top 15 journals. Among all these journals, Nutrients Journal (IF=6.706) had the maximum publications with 30.92%, followed by Frontiers in Immunology (IF=7.561) with 11.34%, Plos One (IF=3.24) with 8.25%, International Breastfeeding Journal (IF= 3.46) with 6.19%. In Figure 4b, Network visualization showed a total of 123 links and a total link strength of 3856. Figure 4c, revealed that Nutrients Journal has the highest citation frequency (875) and total link strength 34.

Contribution of Different Authors to Publications: Figure 5a shows the contribution of the most active authors in the field. The total link strength is 7143 among the authors forming clusters (n=4). Figure 5b points out the most cited authors in this field of research. Fernandez (2012) shows the highest citation of 543 and 5 linkage strength. This was followed by Smilowitz (2014) with a citation of 277 and a linkage strength of 4.

Trends in Publications per year during 2012-2022: Figure 6 shows a "zig-zag pattern" of publications per year. The highest peak was attained in the year 2020 (n=51) followed by the year 2013 (n=50) and the lowest peak was observed in 2022 (n=10) followed by 2018 (n=13). In 2020, there was a sharp rise in publications, and after that a sharp decline was observed.

Thematic Clusters of Keyword Co-Occurrence: Figure 7 illustrates thematic clusters or areas of focus in research on breastfeeding and immunity, as identified through keyword co-occurrence analysis. Key topics include lactation benefits (such as malnutrition and allergy prevention), the role of human milk (with elements like microbiota and immunoglobulins), and long-term immunity outcomes (including reduced chronic disease risks). Each cluster highlights the interconnected aspects of breastfeeding in supporting infant immunity and overall health.

Most Cited Articles and their Contribution: Figure 8 shows that "Victora (2016)" has made a significant impact by demonstrating exclusive breastfeeding's role in improving child health outcomes and long-term immunity, influencing global health policies. Another important study, "Ballard (2013)," provided valuable insights into the immunological components of human milk, such as antibodies and oligosaccharides, essential for infant immune development. Together, these influential articles shape our understanding of breastfeeding's importance in enhancing infant health and guide future research.

DISCUSSION

Previous studies in this area have revealed that its long-term immunity and antibodies impact infant health, analysis done from the perspective of the mother's health, and quality of breastfeeding, gut microbiome-based, however, this analysis focuses on those areas

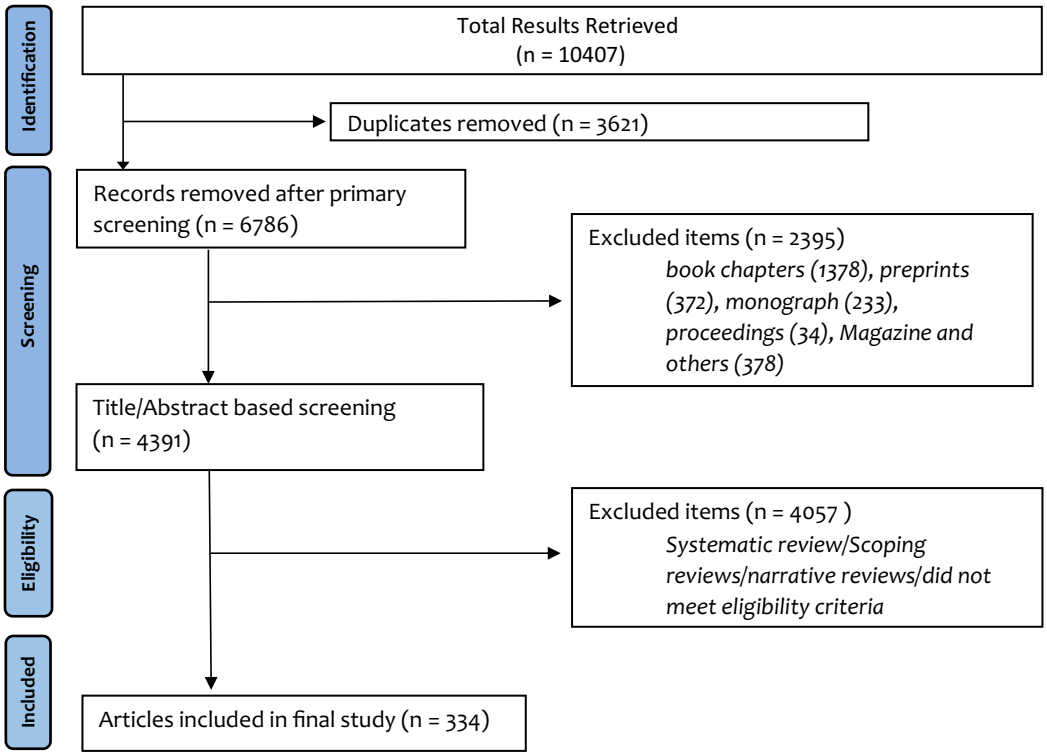

Figure 1: The flow diagram of study selection process based on PRISMA guideline

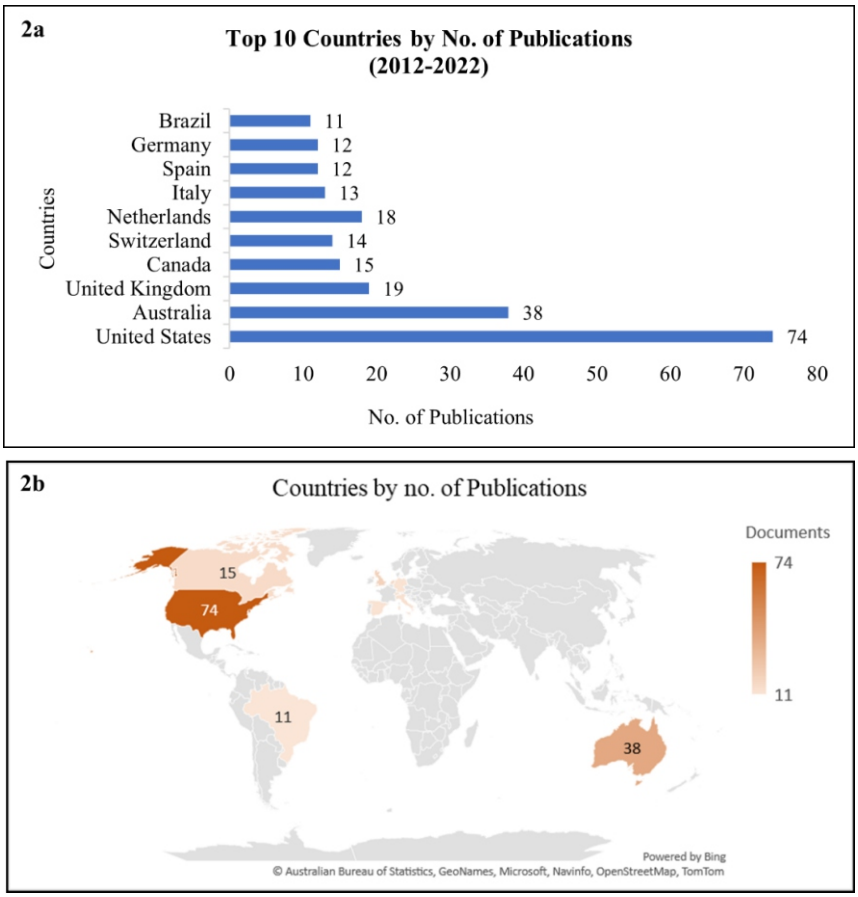

Figure 2: Distribution of countries engaged in research study of breast feeding and immunity outcomes 2a: Graph presenting top 10 countries engaged in this field of research 2b: Network of countries visualized in VOS viewer

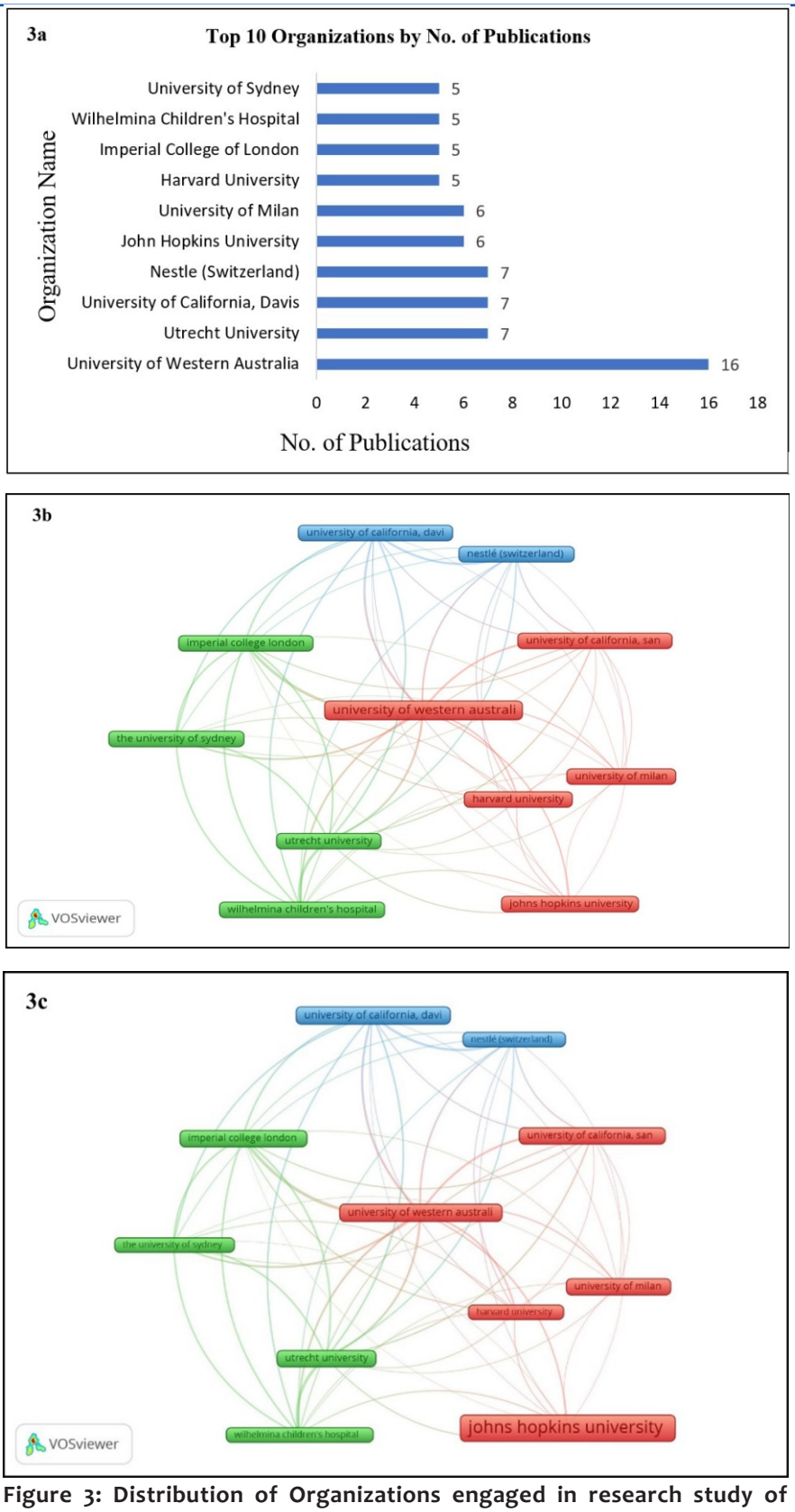

Figure 3: Distribution of Organizations engaged in research study of breastfeeding and immunity outcomes 3a: Graph representing the Top 10 Organizations engaged in this field of research 3b: Network of Organization visualized in VOS viewer (The size of the circle represents the number of the study published by that Organization) 3c: Network visualization of citation analysis of organizations using VOS viewer

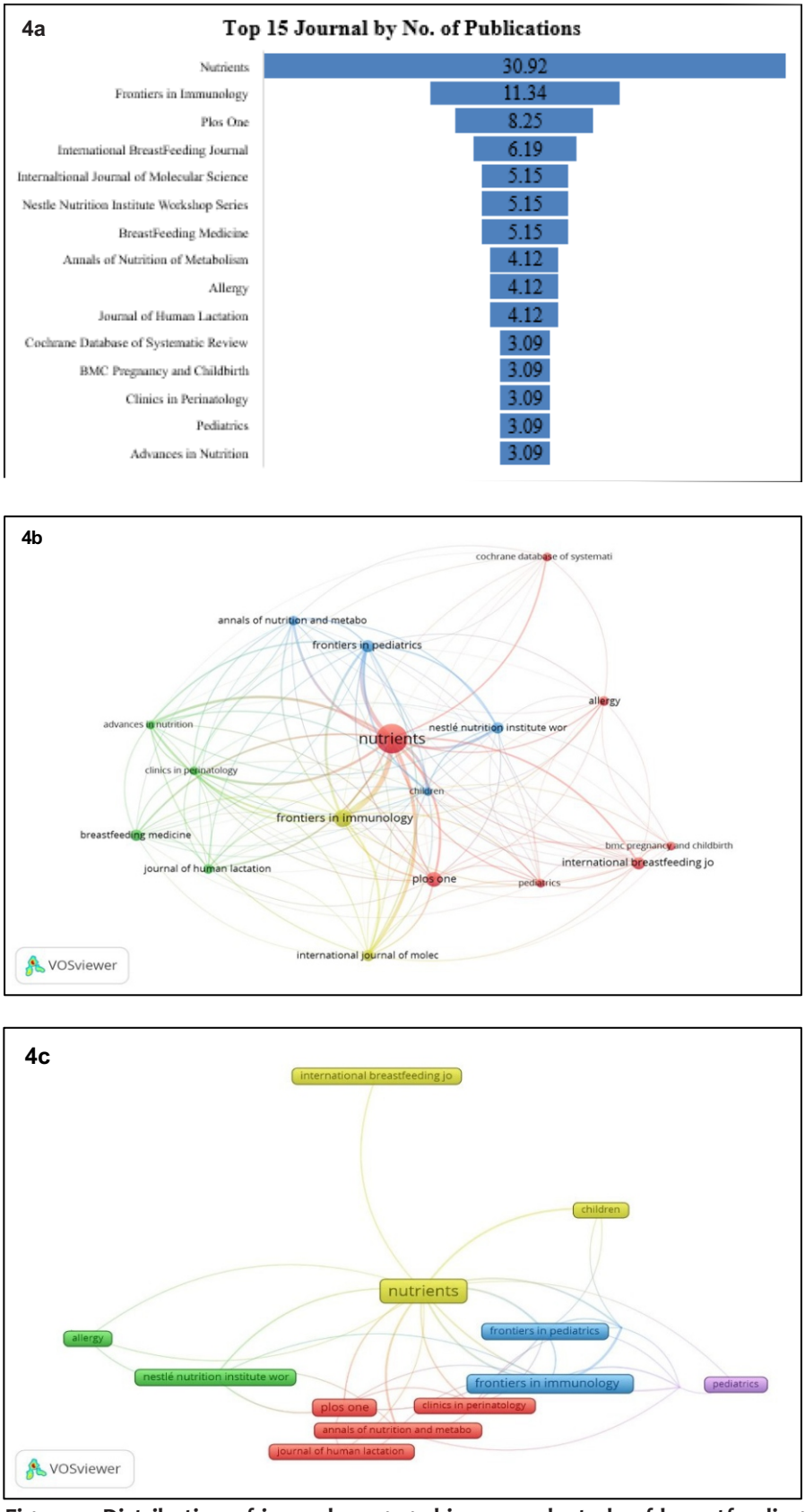

Figure 4: Distribution of journals engaged in research study of breastfeeding and immunity outcomes 4a: Graph representing the Top 15 Journals by publication 4b: Network of Institutions visualized in VOS viewer (Size of the circle represents the number of studies published by that journal) 4c: Network visualization of journal citation frequencies analysis.

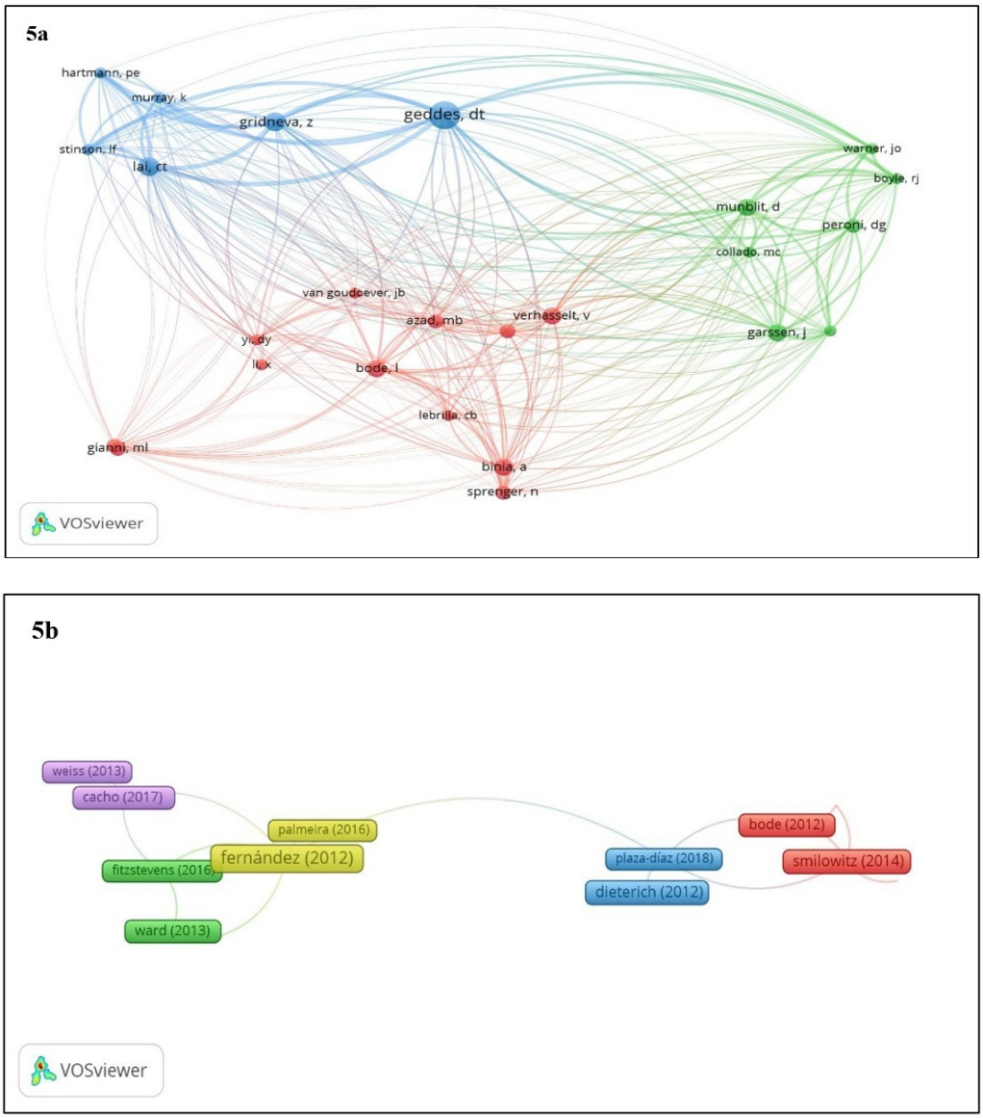

Figure 5: Distribution of Authors engaged in research study of breastfeeding and immunity outcomes 5a: Network of authors visualized in VOS viewer (Size of circle represents the number of studies published by that author) 5b: Network visualization of author citation frequencies analysis and linkages between them.

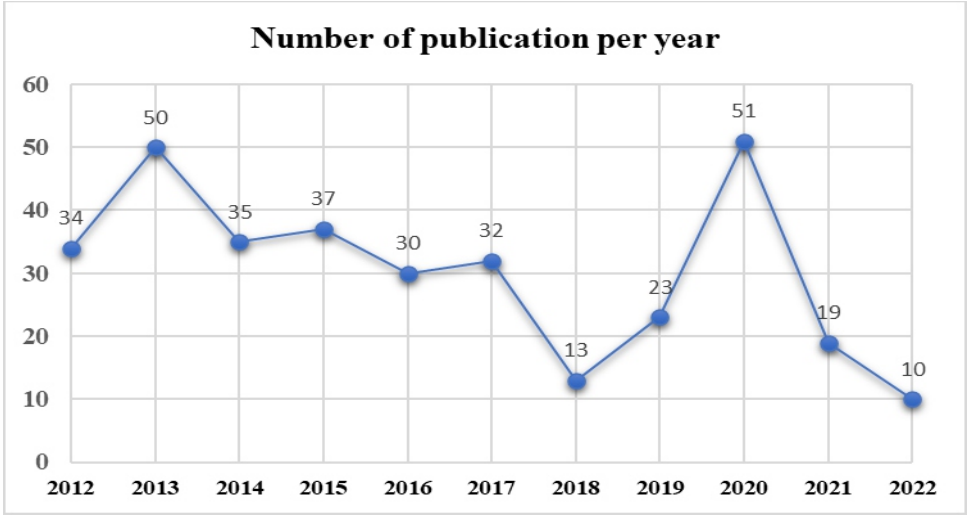

Figure 6: Publication in each year between 2012-2022

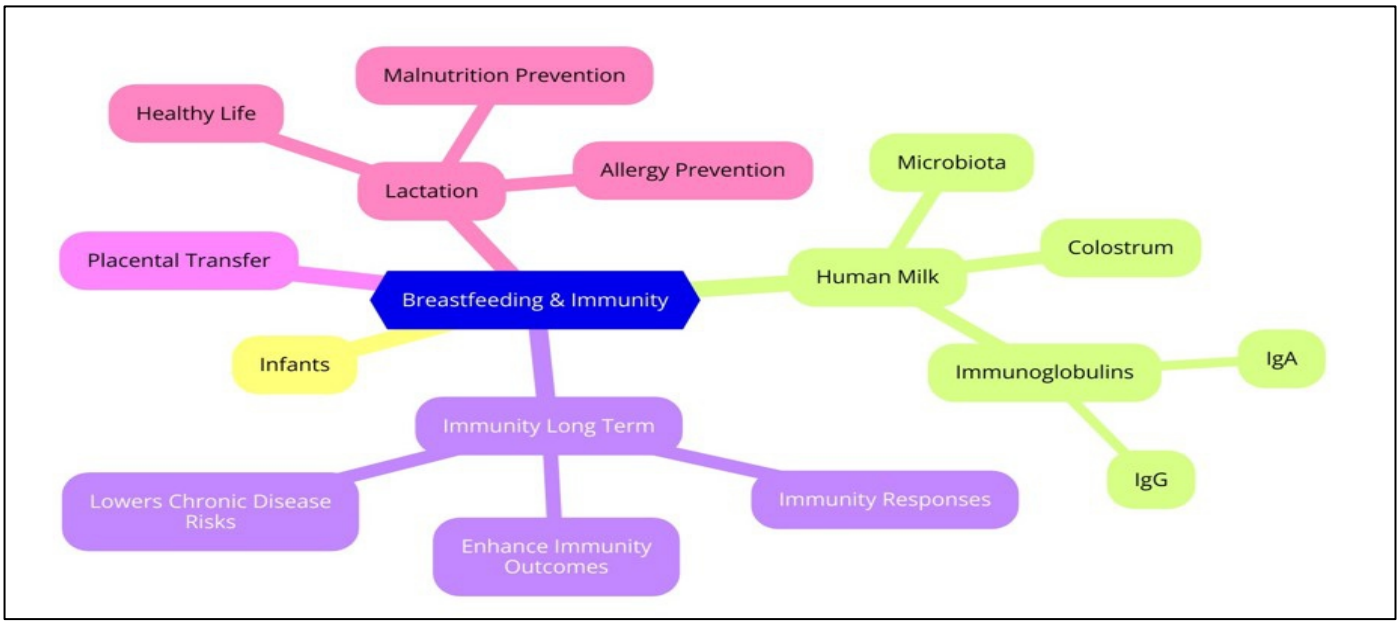

Figure 7: Thematic clusters of keyword co-occurrence

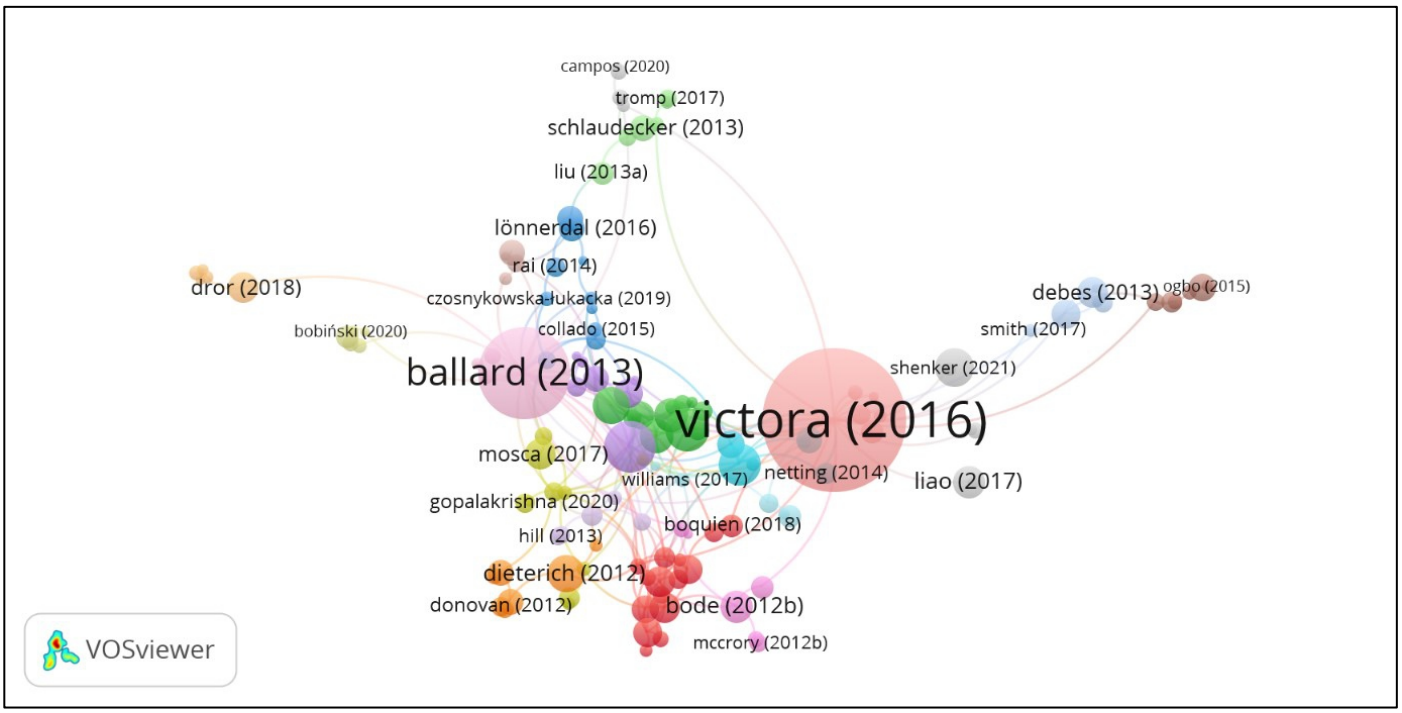

Figure 8: Most cited articles

which comprehensively components focusing on exclusive breastfeeding and then its impact studies on infant and child health.[20-22]

The current study showed a gradual increase in the number of publications from 2012 to 2014 which can be attributed to the increased global burden of infant mortality being 8.8 million since 1990. Alone in 2012, a report from Global Health Observatory showed that seventy three percent of under-five deaths occurred in the first year of life.[23] More than sixty percent of these deaths can alone be avoided with low-cost interventions like exclusive breastfeeding and improved nutrition.[24] Thus, the focus of research would have been increased towards improving infant immunity in that period. However, since 2015 a gradual drop was observed in several publications with improved infant mortality rate from 65 deaths per 1,000 live births to 29 deaths per 1,000 live births.[25] Furthermore, the graph attains its highest peak in 2021 focusing on the impact of breastfeeding on infant immunity during the coronavirus disease (COVID-19) pandemic.[26]

The United States has a definite edge in the research area of breastfeeding and immunity impact on infants as reflected by its largest number of publications. It invests significant resources in scientific research and clinical trials. This implies that gross domestic product plays a crucial role in determining the number of publications by any country.[27] Also, the United States supports various interventions to reduce disparities in breastfeeding rates and provides evidence-based maternal-child healthcare such as celebrating state achievements in breastfeeding practices, calling for community participation to identify gaps, and involving various partners in this drive.[28] United States has various indicators like state early care and education licensing for the regulation of child care standards to encourage breastfeeding and by providing comfortable accommodations for mothers to feed their infants on-site.[29] Dominance of selected country or institution in research areas especially maternal, child health, and new born care emphasize a biased output based on their country parameters. This makes it more difficult when it comes to research gaps between developed and developing countries. For instance, the United States showed the prevalence of exclusive breastfeeding to be twenty four percent, however, initiation prevalence was found to be eighty three percent. As a developed nation, funding research cannot be challenging as in the case of low-or middle-income countries such as malnutrition, infectious diseases, etc.[30,31]

Journal contribution and citation analysis have shown that the field research in breastfeeding and immunity outcomes is highly concentrated towards Nutrient Journal with maximum citation frequency. Other popular journals like Frontiers in Immunology, Plos One, and International Breastfeeding Journal, have also shown significant citation frequency. However, in organization analysis, the University of Western Australia was among the first in the top 10 by the number of publications. This University, through its LactaResearch Group, aims to support effective lactation through the translation of research into practice. It has various forums like LactaMap, and LactaPedia, and provides the largest research platform to improve breastfeeding outcomes.[32]

From the title and abstract analysis, the latest hotspot appears to be centered around COVID-19. The majority of articles focused on the production of SARS-COV antibodies in breast milk and its impact on the immunity of infants.[33] The present study summarises that there has been a gradual shift observed from general immunity concerns towards more disease-specific immunity response and outcome in infants during breastfeeding. One of the study analysis showed that breastfeeding is considered to be the baby's first vaccine and an important source of essential nutrition.[34] It acts as the building block for an infant's immune system, promotes cognitive development, and shapes immune responses for later stages of life.[35]

The studies till now have led to much-informed decision-making across countries where WHO, United Nations Children's Fund (UNICEF) with other regional and national organizations have led to the implementation of various policies to overcome the practice gap in the community to improve immunity outcomes in infants.[36] For instance, Infant and Young Child Feeding (IYCF) operational guidelines helped to implement the first 1000 days plan in many countries, especially growing trends indicating its significance in conflict-prone or humanitarian crises region.[37,38] Researches that focus on sociocultural barriers has also focused on trends and analysis providing important evidence for improvement in breastfeeding rates with baby-friendly places based on the WHO Baby-Friendly Hospital Initiative (BFHI). International health organizations' objectives are furthered by the growth of research in areas like human milk microbiome, the relationship between breastfeeding and vaccinations, and removing barriers in low-or middle-income countries. Nonetheless, additional studies that are context-specific and regionally focused are required, especially in low-resource settings, to fully align with the global health disparity reduction and breastfeeding rate improvement goals.[39,40]

The study includes its comprehensive examination of research trends over a significant period and its systematic bibliometric approach, which identifies key contributors. By focusing on the link between breastfeeding and infant immunity, it highlights critical insights often overlooked in the literature. The findings underscore the importance of breastfeeding for improving global health outcomes, making the study relevant across various disciplines.

The limitation lies in the only usage of Dimension™ Database for this bibliometric study. As the Network Visualization Analysis was only performed through VOS viewer software, Keyword network analysis was not undertaken. Only publications in English were considered, thus there might have been important non-English publications that could not be taken into consideration from databases and analysis. For future studies, the scope of data retrieval can be broadened by accessing wider databases such as the Web of Science, Scopus, Cochrane, or Google Scholar. Additionally,

alternative software tools like Bibliotex, Citespace, or Bibliometrix can be employed for analysis, offering diverse perspectives and methodologies. Expanding the temporal horizon to consider datasets spanning 20, 30, or 50 years has the potential to enhance the richness of our study results, providing a more comprehensive view of the evolution and trends within the research domain. This strategic approach to data collection and analysis opens avenues for deeper exploration and a more robust understanding of the subject matter in future research endeavors.

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REFERENCES

1. Gervassi AL, Horton H. Is infant immunity actively suppressed or immature? Virology (Auckl) 2014:1-9. doi:10.4137/vrt.s12248
2. Medzhitov R, Janeway C Jr. Innate immunity. N Engl J Med 2000; 343:338–44. doi:10.1056/nejm200008033430506
3. Newburg DS, Walker WA. Protection of the neonate by the innate immune system of developing gut and of human milk. Pediatr Res 2007; 61:2-8. doi:10.1203/01.pdr.0000250274.68571.18
4. Yu JC, Khodadadi H, Malik A, Davidson B, Salles E da SL, Bhatia J, et al. Innate immunity of neonates and infants. Front Immunol 2018; 9:1759. doi:10.3389/fimmu.2018.01759
5. Duijts L, Jaddoe VW, Hofman A, Moll HA. Prolonged and exclusive breastfeeding reduces the risk of infectious diseases in infancy. Pediatrics 2010; 126:e18–25. doi:10.1542/peds.2008-3256
6. World Health Organization. International Breastfeeding Key facts. 2022. Available from https://www.who.int/features/factfiles/breastfeeding/facts/en/
7. English Publisher. World Health Day 2021: Together we can reach a fairer and healthier world. World Health Organization - Regional Office for the Eastern Mediterranean.2022. Available from https://www.emro.who.int/media/news/world-health-day-2021-together-we-can-reach-a-fairer-and-healthier-world.html
8. Zong X, Wu H, Zhao M, Magnussen CG, Xi B. Global prevalence of WHO infant feeding practices in 57 LMICs in 2010–2018 and time trends since 2000 for 44 LMICs. ClinicalMedicine 2021; 37:100971. doi:10.1016/j.eclinm.2021.100971
9. International Institute for Population Science (IIPS) and ICF. National Family Health Survey (NFHS-4), 2015-16: India 2017. Available from https://dhsprogram.com/pubs/pdf/fr339/fr339.pdfhttps://dhsprogram.com/pubs/pdf/fr339/fr339.pdf
10. Vieira-Borba V, Sharif K, Shoenfeld Y. Breastfeeding and autoimmunity: Programing health from the beginning. Am J Reprod Immunol 2018; 79:e12778. doi:10. 1111/aji.12778
11. Jain N. The early life education of the immune system: Moms, microbes and (missed) opportunities. Gut Microbes 2020; 12:1824564. doi:10.1080/19490976.2020.1824564
12. Monge-Montero C, van der Merwe LF, Papadimitropoulou K, Agostoni C, Vitaglione P. Mixed milk feeding: a systematic review and meta-analysis of its prevalence and drivers. Nutr Rev 2020; 78:914–27. doi:10.1093/nutrit/nuaa016
13. Stuebe A. The risks of not breastfeeding for mothers and infants. Rev Obstet Gynecol 2009; 2:222–31.
14. Gupta A, Dadhich JP, Rundall P, Bidla N. Interpreting the World Health Assembly Targets on Exclusive Breastfeeding by 2025: What is expected of each country? World Nutr 2019; 10:152-5. doi:10.26596/wn.2019104152-155
15. Ninkov A, Frank JR, Maggio LA. Bibliometrics: Methods for studying academic publishing. Perspect Med Educ 2022; 11:173–6. doi:10.1007/s40037-021-00695-4
16. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. J Bus Res 2021; 133:285–96. doi:10.1016/j.jbusres.2021.04.070
17. Page MJ, Mckenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow C. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews BMJ. Br Med J 2021;372. doi:10.1136/bmj.n71
18. VOSviewer Visualizing scientific landscapes. VOSviewer 2022. Available from https://www.vosviewer.com/
19. Bukar UA, Sayeed MS, Razak SFA, Yogarayan S, Amodu OA, Mahmood RAR. A method for analyzing text using VOSviewer. MethodsX 2023; 11:102339. doi:10.1016/j.mex.2023.102339
20. Patel S, Rao V, Kim D. Global trends and research frontiers in breastfeeding and vaccination studies: A bibliometric study. Vaccine 2018; 36:1346–55. doi:10.1016/j.vaccine.2018.01.012
21. Smith C, Jones A, Brown H. Bibliometric insights into the research on breastfeeding and maternal health. Matern Child Health J 2022; 26:875-82. doi:10.1007/s10995-022-03215-7
22. Bertran P, Dominguez M, Uauy GJ. Lactation, breast feeding, and the immune system: A bibliometric review. J Hum Lact 2020; 36:319–28. doi:10.1177/0890334420905704
23. World Health Organization. Infant mortality 2014. Archve Org 2022. Available from https://web.archive.org/web/20140324141053/http:/www.who.int/gho/child_health/mortality/neonatal_infant_text/en/
24. World Health Organization. Millennium Development Goal 4: Child mortality. Archive Org2022. Available from https://web.archive.org/web/20110314194542/http:/www.who.int/pmnch/media/press_materials/fs/f

s_mdg4_childmortality/en/
25. World Bank. Mortality rate, infant (per 1,000 live births). World Bank Open Data 2023. Available fromhttps://data.worldbank.org/indicator/sp.dyn.imrt.in
26. Perez-Bermejo M, Peris-Ochando B, MurilloLlorente MT. COVID-19: Relationship and impact on breastfeeding-A systematic review. J Nutr 2021;13:2972. doi:10.3390/nu13092972
27. Ni Z, Wang S, Li Y, Zhou L, Zhai D, Xia D, et al. Mapping trends and hotspots regarding gut microbiota and host immune response: A bibliometric analysis of global research (2011-2021). Front Microbiol 2022; 13. doi:10.3389/fmicb.2022.932197
28. Centers for Disease Control and Prevention. Breastfeeding report card United States 2020 overview; 2023. Available from https://www.cdc.gov/breastfeeding/pdf/2020-breastfeeding-report-card-h.pdf
29. Centers for Disease Control and Prevention. Breastfeeding report card 2022. Available from https://www.cdc.gov/breastfeeding/pdf/2022-Breastfeeding-Report-Card-H.pdf
30. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, et al. Breastfeeding and maternal and infant health outcomes in developed countries. Evid Rep Technol Assess 2007; 153:1–86.
31. Dakhil ZA, Cader FA, Banerjee A. Challenges in clinical research in low and middle income countries: early career cardiologists' perspective. Glob Heart 2024; 19:13. doi: 0.5334/gh.1293
32. University of Western Australia. LactaResearch Group 2023; Available from https://www.uwa.edu.au/Research/LactaResearch-group
33. Vassilopoulou E, Feketea G, Koumbi L, Mesiari C, Berghea EC, Konstantinou GN. Breastfeeding and COVID-19: From nutrition to immunity. Front Immunol 2021; 12. doi:10.3389/fimmu.2021.661806
34. Dawod B, Marshall JS, Azad MB. Breastfeeding and the developmental origins of mucosal immunity: how human milk shapes the innate and adaptive mucosal immune systems. Curr Opin Gastroenterol 2021; 37:547–56. doi:10.1097/mog.0000000000000778
35. Global Breastfeeding Collective 2022;Available From https://www.globalbreastfeedingcollective.org/
36. Porciello J, Ivanina M, Islam M, Einarson S, Hirsh H. Accelerating evidence-informed decision-making for the Sustainable Development Goals using machine learning. Nat Mach Intell 2020; 2:559–65. doi:10.1038/s42256-020-00235-5
37. Avula R, Oddo VM, Kadiyala S, Menon P. Scaling-up interventions to improve infant and young child feeding in India: What will it take? Matern Child Nutr 2017; 13. doi:10.1111/mcn.12414
38. Khandelwal S, Kondal D, Chakravarti AR, Dutta S, Banerjee B, Chaudhry M, et al. Infant young child feeding practices in an Indian maternal–child birth cohort in Belagavi, Karnataka. Int J Environ Res Public Health 2022; 19:5088. doi:10.3390/ijerph19095088
39. Souza JP, Day LT, Rezende-Gomes AC, Zhang J, Mori R, Baguiya A, et al. A global analysis of the determinants of maternal health and transitions in maternal ortality. Lancet Glob Health 2024; 12:e306-16. doi:10.1016/S2214-109X(23)00468-0
40. Barnish MS, Tan SY, Robinson S, Taeihagh A, Melendez-Torres GJ. A realist synthesis to develop an explanatory model of how policy instruments impact child and maternal health outcomes. Soc Sci Med 2023; 339:116402. doi:10.1016/j.socscimed.2023.116402