

# RESEARCH TRENDS OF OPEN ACCESS PUBLICATIONS IN LIBRARY AND INFORMATION SCIENCE DURING COVID-19 PANDEMIC: A BIBLIOMETRIC ANALYSIS

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## Abstract

Covid-19 has altered the way of life of human civilization. The new paradigm demanded novel solutions to cope with this shift, as a response to which the scientific community developed and disseminated knowledge. The open access movement catalyzed the hurdle-free access to this knowledge. Though there has been sufficient research on understanding the trends of open access knowledge dissemination in domains of science and medicine, the areas of social science and humanities remained unexplored. This study explores the patterns of scholarly work disseminated as publications, citations, and collaborations from the library and information sciences field. Bibliometric analysis is a tool that facilitates an understanding of the patterns existing within this domain. The publications from leading journals in the LIS domain were collected from the Scopus database and analyzed to decipher the patterns and trends in publications during the Covid-19 pandemic. The results inform researchers about the extent of productive collaboration, prolific authors, and corresponding trends in this domain during the pandemic period.

**Keywords:** Covid-19, Bibliometric analysis, library science, publication trends during covid-19, co-author analysis, citation analysis.

## INTRODUCTION

The last two decades have witnessed ubiquitous digital data sharing over the internet across various devices leading to free and rapid access to information (Woszczynski & Whitman, 2016). Such free dissemination has allowed the dissemination of knowledge and academic researchers to build on current research practices in their domain, which was once inaccessible (Parker, 2013). A social movement that promotes access to knowledge resources without the hindrance of subscription fees or access charges is called "open access" (Swan, 2012). OA is " free, immediate, permanent

online access to the full text of research articles for anyone, worldwide."(Bawack,2018)

The actual value of OA was experienced during the Covid-19 pandemic that forced movement restrictions to workplaces, leading to the work-from-home model. This model restricted access to institutional repositories that were once available at the workplace of academic researchers. Further, the novelty of the pandemic has pressed medical science to rapidly and collaboratively develop healthcare solutions (Alemnah et al.,2020). OA was one of the platforms that facilitated the dissemination of high-quality research across nations to support teams developing these solutions. For

example, 'Nature' set up an "Open Peer Review Platform" (Johansson & Sadari, 2020), and publishers like Elsevier facilitated open access for Covid-19-related research through high-profile journals like Cell and The Lancet, which are a part of its publications. Similar is the case with Wiley, Springer Nature, and The New England Journal of Medicine (Tavernier, 2020). On the one hand, as the publishers geared up to facilitate research via platforms, on the other hand, the pandemic also influenced the publications in OA journals. In a study by Malekpour et al. (2021), it was found that there exists a correlation between pandemic incidences and the publication count, especially in the fields of medicine and science.

In response to the need of the hour, knowledge dissemination was higher in medicine than in other disciplines (Haghani et al., 2020). However, the impact of the pandemic on OA in other domains of social science and humanities was also sensed. However, empirical research to provide evidence for the impact is far from sufficient.

This study aims to fill this gap by conducting a bibliometric analysis of the leading open access journals in the library science domain from 2018 to 2022. The findings from this research could provide readers with an understanding of how shocks like the pandemic influence research in library science. The research questions that guide the study are

RQ1: How has the pandemic impacted the publications in leading journals in library science?

RQ2: What is the trend of citations during this period?

RQ3: Who are the leading authors influencing this domain during the period?

RQ4: Which are the leading countries contributing to the research in this field?

RQ5: Which countries are involved in research collaborations during this period?

The paper is organized as follows: The following section discusses the methodology and tools, followed by an evaluation and

discussion of the results. Finally, we conclude with the limitations and possible directions for future research.

## METHODOLOGY

Bibliometrics is a quantitative method of analyzing bibliographic data (Broadus, 1987). Studies in the past have used bibliometrics to explore publications of countries (Merigó et al., 2016), specific themes (Deng et al., 2020), author networks (Cisneros et al., 2018), and institutions (Mas-Tur et al., 2021). The analysis comprises various measurements of linkages. For this study, we focus on trend analysis of publications (to answer RQ1), trend analysis of citations (to answer RQ2), citation analysis, including h-index (to answer RQ3), country analysis based on total publications (to answer RQ4), and co-citation analysis between countries (to answer RQ5).

## DATA RETRIEVAL

The data was collected from the Scopus database in two phases. The first phase aimed at collecting the leading journals in the library science domain, which yielded 317 journals. This result was further subjected to the following inclusion criteria. (Numbers in the parentheses indicate the output) open-access only (n=45), first quartile only (n=9). Fig 1 indicates the process adopted for phase 1

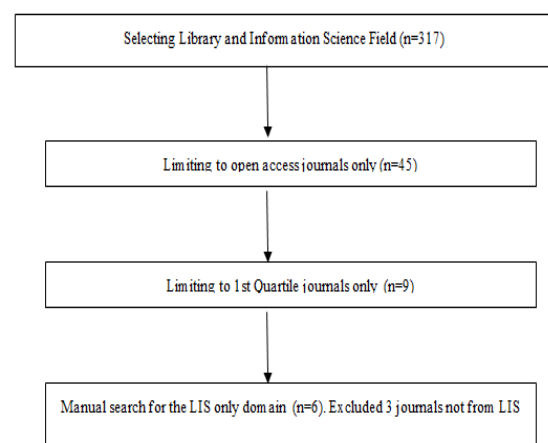


Fig 1: Search strategy -Phase 1

The second phase feeds from the first phase. Using the output from the first research phase,

we conducted individual document searches using the Scopus database. The inclusion criteria included the following - "all open access", the year "2018- 2022", Language "English", Source type "journal", and document type "article". The final results are presented in Table 1

Table 1: Journal search results

Journal Name	Total Publications (TP)
College and Research Libraries	197
Journal of Cheminformatics	290
Journal of Information Literacy	72
Journal of Open Research Software	118
Journal of the Medical Library Association: JMLA	20
Publications	194
<b>Grand Total</b>	<b>891</b>

### ANALYSIS AND RESULTS

To analyze the retrieved data, two tools were employed - Microsoft Excel to analyze trends (analysis for RQ1 & RQ2) and Visualization of Similarities (VoS) viewer (analysis for RQ's 3,4 & 5). VoS viewer as a tool assists in developing bibliometric maps (Mas-Tur,2021).

#### Publication and Citation Trends

The publication details for the selected journals from 2018 to 2022 are presented in Table 2. The graphical representation (as in Fig2) allows easier understanding. The pandemic infected the world to a more significant extent from early 2020. The graph (Fig3) depicts the trend of the pandemic from January 2020 to February 2022.

Table 2: Publication trends

Journal Name	2018	2019	2020	2021	2022	Grand Total
College and Research Libraries	47	49	51	50	0	197
Journal of Cheminformatics	63	70	62	93	2	290
Journal of Information Literacy	18	21	10	23	0	72
Journal of Open Research Software	28	33	29	28	0	118
Journal of the Medical Library Association: JMLA	2	6	9	3	0	20
Publications	40	57	48	48	1	194
Grand Total	198	236	209	245	3	891

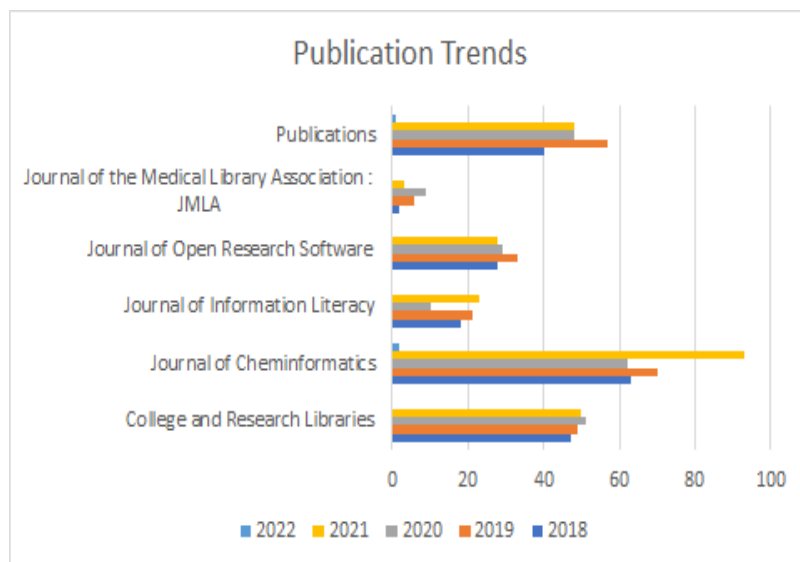
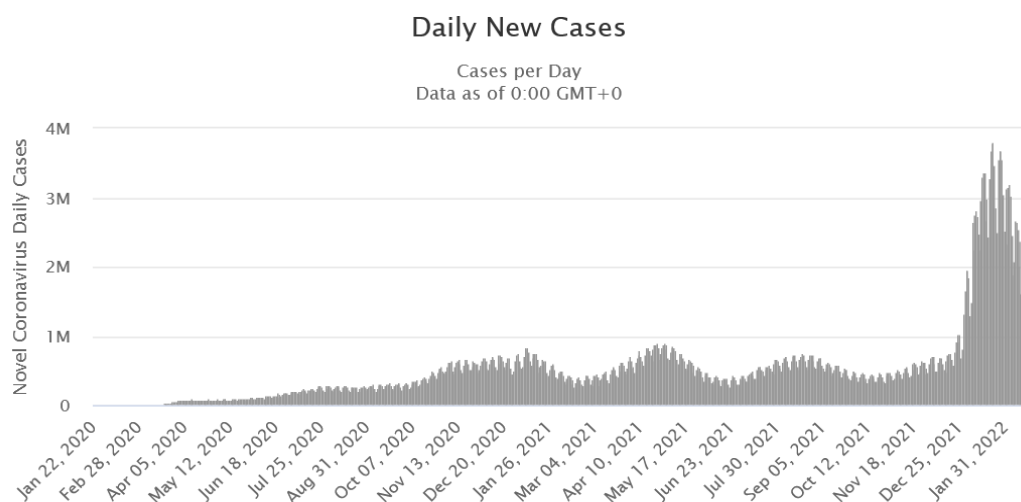


Fig2: Publication trends



Source: Worldometer

Fig3: Covid-19 trend

From fig3, it is seen that the number of cases globally peaked during December 2020, May 2021, September 2021, and January 2022. A comparison of the global pandemic trends with the publication trends during 2020-22 indicates that the advent of the pandemic forced nations to impose lockdowns during 2021, resulting in the culture of working from home. A study by Nature reported that submission to Elsevier's journals increased by 58% during February 2020 and May 2020 as compared to the same period during 2019 (Else, 2020)

However, it is seen that except for the Journal of Information Literacy and Journal of Cheminformatics, the publications in the other journals have not experienced this drastic growth as seen in other fields of medicine and science.

It is further reported that the researchers could publish a more significant number of papers as the time was spent more on writing than on non-writing tasks like 'conducting science' (Else, 2020). The trends from 2021 to 2022 cannot be detected as the period is too short (February 2022).

The citation trends based on citations from the selected journals are presented in Fig4. The trends indicate that the citations for all the journals have been decreasing.

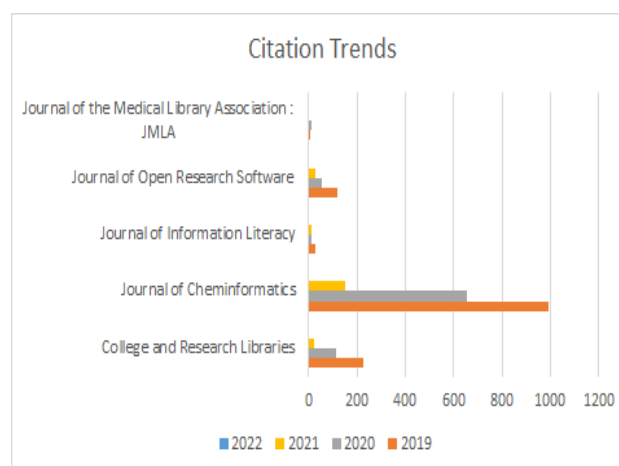


Fig4: Citation trends

#### Prolific Authors

Table 3 presents the leading five authors during the stated period. It can be noted that most of the leading authors are from Europe. Ola Engkvist from Sweden has twelve publications, followed by Steinbeck and Zielesny from Germany.

However, in Table 4, the leading authors by citations are led by China, where three out of the five authors are from China. Lin Zhang leads this group of authors with 310 citations, followed by Ola Engkvist from Sweden with 302 citations. It can also be inferred that Chinese authors have significantly impacted publications during this period.

Table 3: Prolific authors by publications

Author	Total Publications	Country
Ola Engkvist	12	Sweden
Christoph Steinbeck.	9	Germany
Achim Zielesny	9	Germany
Andreas Bender	8	UK

Table 4: Leading authors by citations

Author	Total Publications	Total citations	h-index	Country
Lin Zhang	5	310	55	China
Ola Engkvist	12	302	34	Sweden
Jean-Louis Reymond	8	283	62	Switzerland
Hongming Chen	8	266	23	China
Dong-ShengCao	4	224	36	China

Country-Wise Analysis

Table 5 shows that USA, Germany, and UK are the top three countries concerning the number of publications, followed by Spain and China. Further, it is observed that, though the USA is leading for the volume of publications, no authors from the USA appear in the top list of authors (see Tables 3 and 4).

Table 5: County-wise publications

Country	Total Publication	Total Citations
United States	329	1677

Germany	105	738
United Kingdom	102	491
Spain	57	313
China	47	741

International Collaborations

The results from Table 6 indicate the number of collaborations a country has with other countries, as indicated by the total link strength. It can be seen that the USA, UK, and Germany occupy the top three positions concerning the number of collaborations. However, the presence of the Netherlands and Spain in the fourth and fifth positions is unique, indicating more extensive connections between authors from other countries compared to several nations across the globe. This indicates the extent of international collaboration concerning research in this domain undertaken by the Netherlands and Spain. The global collaborations are shown in Fig5. The collaborations between Spain (Fig6) and the Netherlands (Fig7) show the strength (thickness of the links) and the number of connections the respective countries (Spain and Netherlands) have with other countries. For instance, Spain collaborates with Brazil, India, Denmark, Mexico, Norway, Portugal, and South Africa.

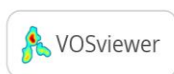
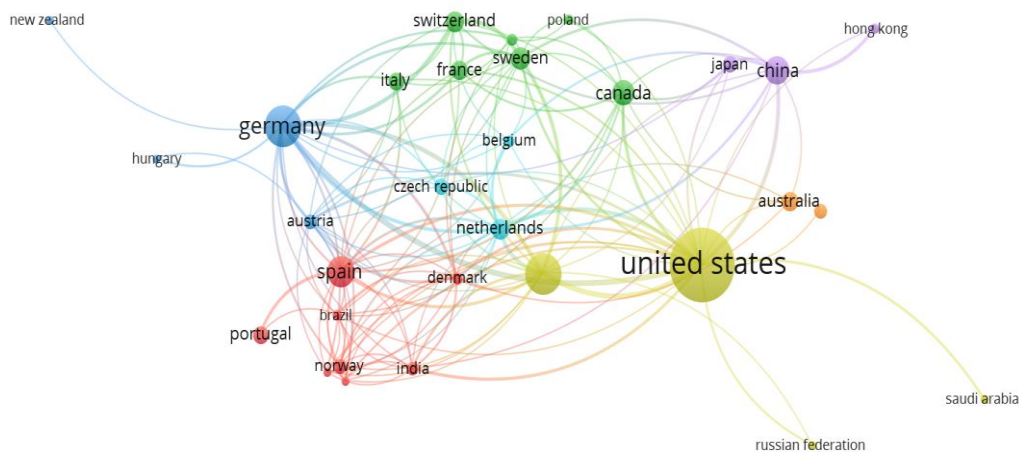


Fig 5: Global international collaborations

Table 6: International collaboration

Country	Publications	Citations	Total Link Strength
United States	329	1677	97
Germany	102	738	74
United Kingdom	102	491	63
Netherlands	28	201	49
Spain	57	313	45

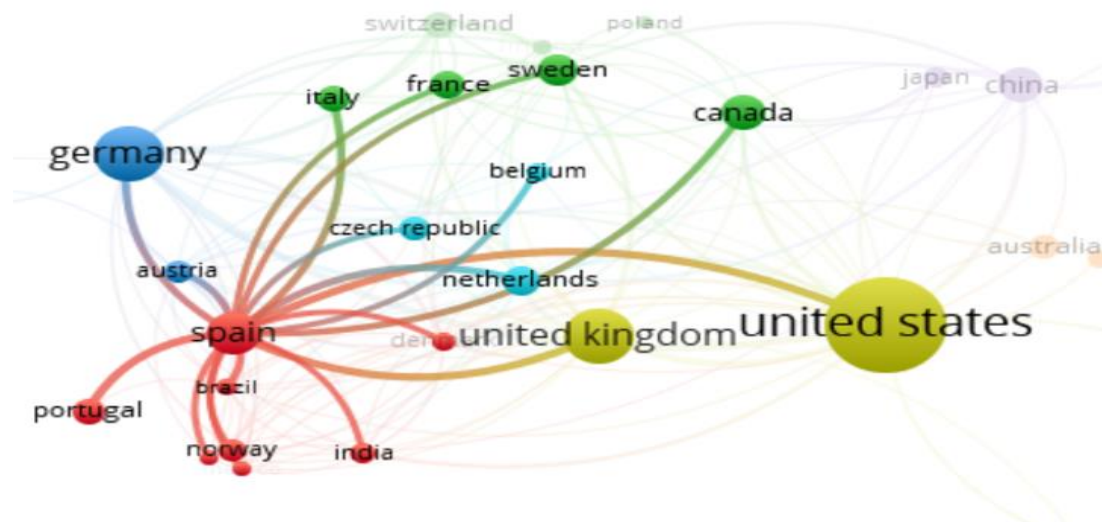


Fig 6: Spain's international collaborations

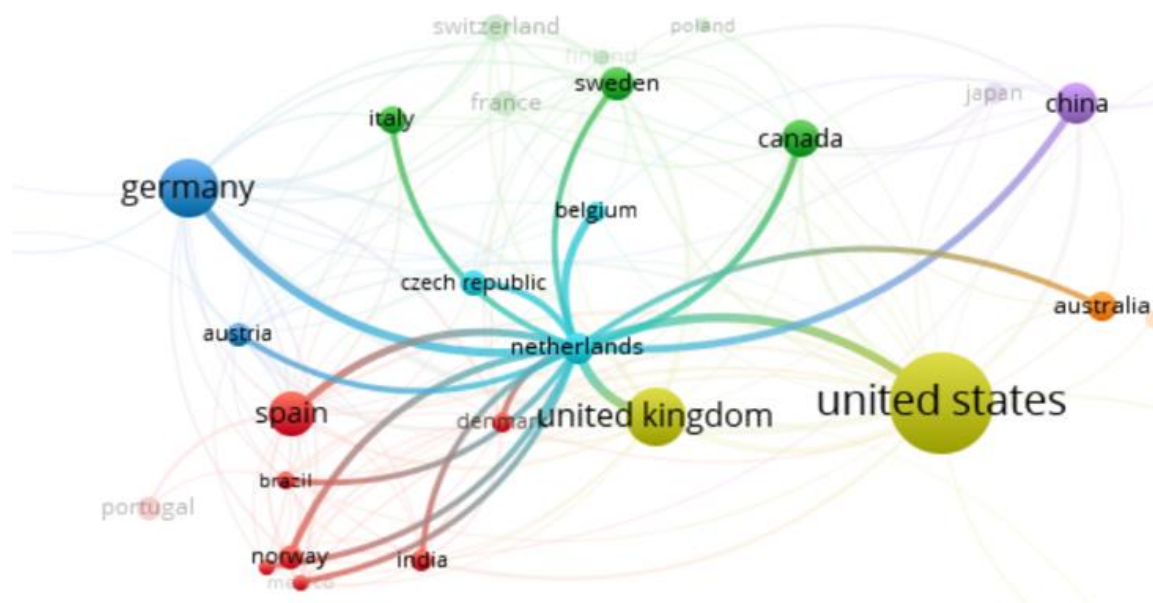


Fig7: Netherland's international collaborations

## DISCUSSION

The study aimed at answering five research questions. The results found that the Covid-19 pandemic influenced the trends of publications in the library and information science domain.

A significant impact was seen in two journals - Journal of Cheminformatics and Journal of Information Literacy. Cheminformatics is a multi-disciplinary field formed at the juncture of chemistry, computer science, and

information science. Cheminformatics is instrumental in decreasing the time for drug development; hence we find a rise in publications during the Covid-19 pandemic. (Martinez-Mayorga, 2020). The Journal of Information Literacy focuses on educating readers and helping develop skills in accessing, sharing, interpreting, and sharing information. According to the information literacy group, "information literacy is the ability to think critically and make balanced judgments about any information we find and use. It empowers citizens to reach and express informed views and engage fully with society." (ILG, 2018). It focuses on higher education, online education, healthcare education, etc. These fields have seen a meteoric rise during the pandemic, resulting in a rise in publications.

The second research question focused on evaluating the citation trends. The results indicate that the citation across the journals has decreased during this study. The reason could be that the domains of medicine, pharmacology, and higher education have dedicated journals in their respective domains, which would attract citations.

The third research question aims to identify the prolific authors from this domain. The output from the VoS viewer helped identify the leading authors. It was seen that Ola Engkvist from Sweden is the leading author with 12 published articles. When citations were taken as the parameter, Lin Zhang from China had 310 citations with the second-highest h-index of 55. The h-index is a measure to evaluate the impact of an author's academic performance.

The fourth research question was intended to evaluate the leading countries concerning scholarly output in this domain. The USA, Germany, and the UK are the leading three nations with 329, 105, and 102 publications, respectively. Though the USA has not featured in the leading author's segment, the overall volume of publications produced as a nation is the highest. This could indicate the large number of researchers from this domain working in universities in the USA.

The last research question pertains to the Nature of international collaborations. The results indicate that USA, Germany, and UK are the leading countries developing collaborations with other nations. However, it is interesting to note that Netherlands and Spain feature in the fourth and fifth positions, respectively.

## CONCLUSION

The Covid-19 pandemic has influenced all walks of human life. It has affected the business world, education, and healthcare, to name a few. During the pandemic, the need of the hour was to solve all these myriad problems—designing solutions for these issues required rapid and affordable dissemination of knowledge globally. The OA movement was a crucial driver to this end. The knowledge dissemination from domains of medical sciences, pharmaceuticals, and education saw a rapid rise during this period. However, research in library science lacked a study on analyzing the impact of covid on this field. This study filled in the gap by analyzing the trends in scholarly work from this domain. The output could inform researchers which countries are encouraging OA in the domain, which countries are collaborating, who are the leading authors, and from which countries they belong. This vital information could help researchers from the field and other domains to target the good nations, the right authors, and the appropriate journals to ensure the required penetration of their scholarly work. Though this paper has aimed to achieve these goals, there were a few limitations. The study was restricted only to first quartile journals. It used only a few tools for author analysis - citation and publications. Further studies could be produced interesting results using advanced bibliometric tools like author co-citation and bibliographic coupling analysis.

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