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REVIEW ARTICLE

Mapping of Bibliometric Studies in Healthcare: Evidence from South Asian Countries

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ABSTRACT

Introduction	The current bibliometric study is designed to analyse the bibliometric studies in healthcare specific to South Asian countries.
Methods	Bibliometric and thematic analysis was performed on 85 screened documents and author keywords respectively from Scopus. The current study covered the timespan from 2013 to 2023.
Results	Results are classified into three broad themes i.e., bibliometric, healthcare, and technological mapping. These three themes are grouped with the relevant sub-themes. Findings reveal the publication output trend, prominent authors, subject areas, journals, and affiliated institutions. Important and conspicuous words (author keywords) are visualized in bibliometric maps showing the noticeable themes for future research directions such as machine learning, blockchain, deep learning, and scientometrics in the area of healthcare.
Conclusions	This study guides the researchers who are involved in conducting bibliometric studies specifically in healthcare. It serves as a compilation of published bibliometric studies through which different uncovered and underexplored aspects of healthcare research have emerged.
Keywords	Healthcare services; Bibliometrics; Thematic analysis

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INTRODUCTION

It is imperative that we examine these contributions to the body of knowledge that any scientific discipline develops over time in order to fully appreciate and comprehend the current state of knowledge and discipline, which is carried on by the theoretical and empirical work of scholars.[1] Bibliometric analysis is among the instruments that might be utilized for this aim.

A quantitative method known as "bibliometric analysis" can be used to find and examine data about keywords that are used and searched in the literature, their correlations, the quantity of articles published in a specific period, and their citations.[2,3] 'Bibliometrics' was first used by Pritchard,[4] to refer to the use of statistical and mathematical methods to various types of communication materials. One type of these materials is bibliographic content, that can be subjected to a quantitative analytical technique called bibliometric analysis.[5] In terms of its citations, keyword and concept mapping, graphic structuring of scientific research, and its evolution in various literary spheres, it aids in explaining the entirety of knowledge available in each field.[6] According to Odriozola-fernández & Berbegal-mirabent,[7] this literature is not only one that bibliometric analysis is delving into, but it also aids in highlighting the specifics of writers, organizations, and journals that are directing their works toward a particular area or field. In the end, this aids in the formulation of new research policies that can support the advancement of newcomers and scholars.

Like other services, healthcare involves a wide range of intricate tasks. Patients, who are consumers of healthcare services, look to healthcare professionals including doctors, nurses, and support workers to deliver the intended outcomes. The healthcare industry has received a lot of attention lately due to its significance, impact on national economies and populations, ability to reduce health inequities, and ability to give policymakers useful data and information.[8] The industry is now more competitive as a result of the public and private healthcare systems, which has compelled healthcare organizations to improve their quality and address their shortcomings.[9]

Nobody can envision living in a nation without access to healthcare.[10] It is one of the most important industries for a nation since it influences all other spheres and national values, including commerce, politics, society, the economy, and morality.[11] In addition to its significance, the healthcare has become the epicenter of the researchers around the world specially after the pandemic. Due to its complex nature, healthcare has been analyzed and studied in plenty of bibliometric studies (e.g., Guo et al;[12] Rejeb et al;[13] Jimma;[14] Churruca et al;[15] Sikandar et al;[16] Jalali et al;[17] de Las Heras-Rosas et al;[18] Filser et al;[19] Ali et al[20]). However, to the best of our knowledge, there is hardly any study available that has analyzed the bibliometric studies altogether in healthcare and in relation to South Asian Countries. Therefore, the current study intends to fill this gap by achieving the research objectives; to identify the output trend, most productive authors, institutions, subject areas and journals of bibliometric studies in healthcare, and to unfold the insights in bibliometric & thematic mapping of bibliometric studies in healthcare.

METHODS

Scopus database is used to extract the records from 2013 to 2023. Records included in the analysis are limited to South Asian countries and other filters shown in Figure 1. These records are bibliometric studies that have been conducted in healthcare context only. After careful screening of abstract, 85 studies have been added for the final analysis. To view the records on Scopus, Search string is given in Appendix-I. Bibliometric and thematic mapping have been performed on final records and author keywords respectively by using different freely available software such as VOSviewer (Ref), MindManager, Gitmind and Xmind.

RESULTS

Thematic analysis of keywords results in seven broad themes containing various sub-themes mentioning various aspects of quality, outcomes/DVs, theories/models, contexts (services & countries), methodologies, technologies, and services marketing. Analysis is based on the number of occurrences of author keywords (281) and the occurrence was set at the threshold of ≥ 05. Main data of the screened records is listed in Table 1.

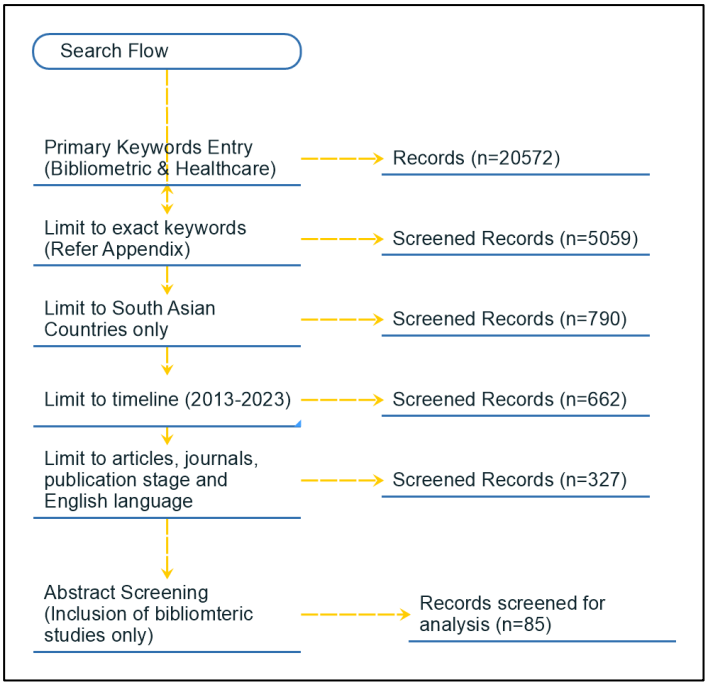

Figure 1 Search Flowchart

Table 1 Main Dataset Information

Description	Results
Main Information About Data	
Timespan	2013:2023
Sources (Journals, Books, etc)	72
Documents	85
Annual Growth Rate %	25.47
Document Average Age	2.88
Average citations per doc	9.976
References	4251
Document Contents	
Keywords Plus (ID)	558
Author's Keywords (DE)	281
Authors	
Authors	393
Authors of single-authored docs	5
Authors Collaboration	
Single-authored docs	6
Co-Authors per Doc	4.92
International co-authorships %	51.76
Document Types	
article	85

Output Trend

Overall publication of bibliometric studies in healthcare is sloping upward (Figure 2). It shows that trend is increasing by increasing rate after the year 2019 showing the impact of pandemic where healthcare remains the focus of the research. Trend show that it will likely increase further.

The Prominent Authors

Based on the number of publications and minimum threshold of publishing 2 documents, list shows the top 11 prominent authors who have contributed much to publishing bibliometric studies in healthcare. Abbas, A.F., Ali, J. and Kotecha, K. have produced the greater number of publications (n=3) each. Other prominent authors are shown in Figure 3.

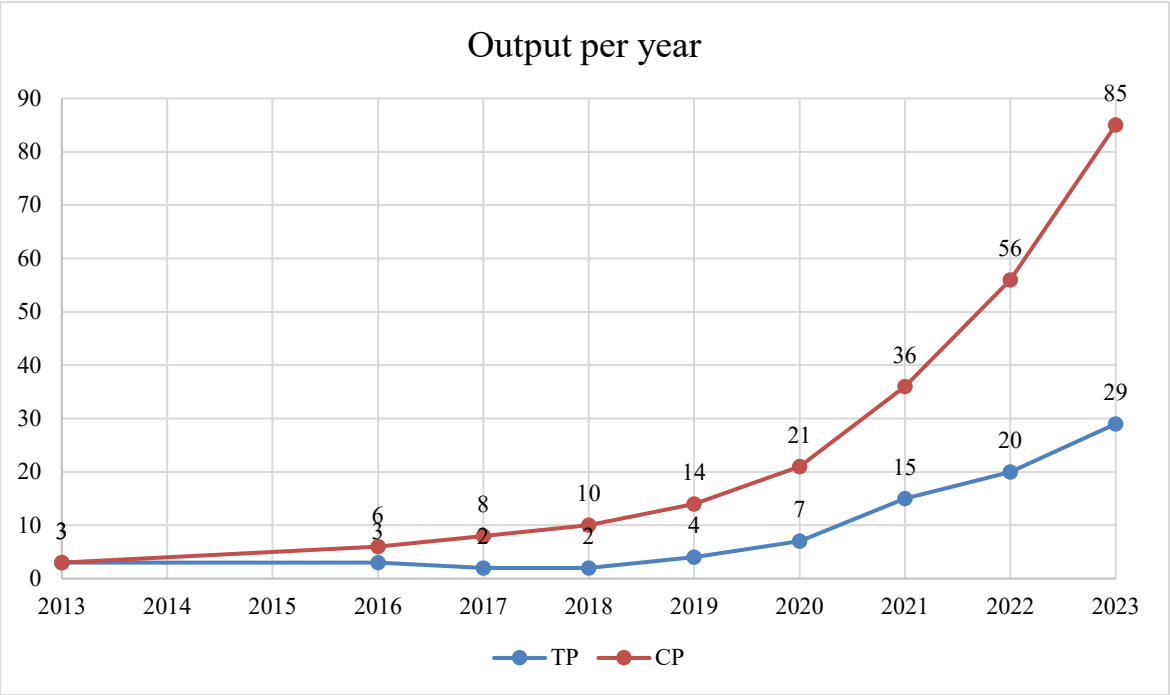

Figure 2 Publication Output

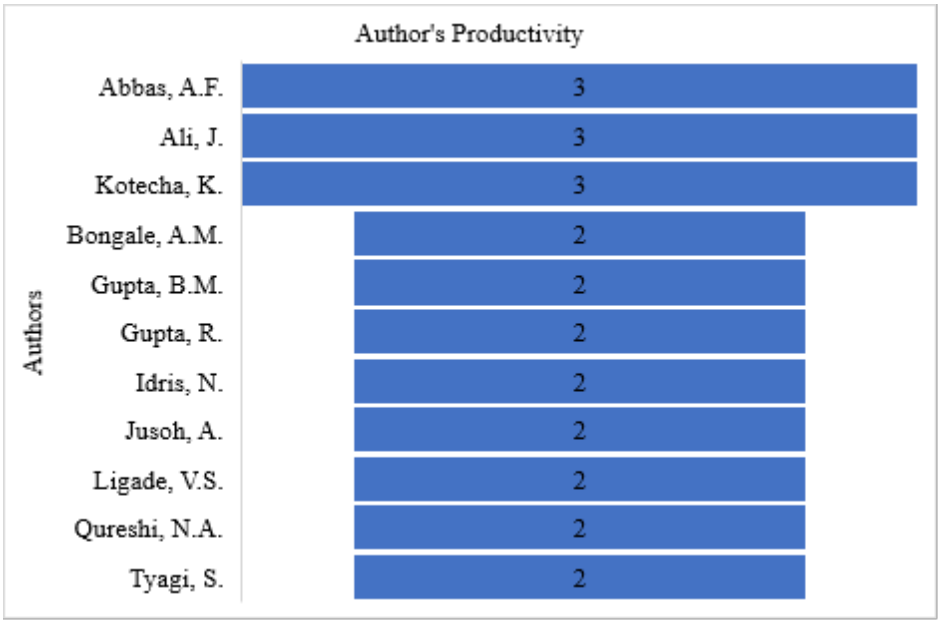

Figure 3 Authors's Productivity

The Top Journals

Results show top 7 journals in which papers have been published (Figure 4). Library Philosophy and Practice is the leading journal in producing the most documents (n=08) of bibliometric studies in healthcare. It is followed by International Journal of Environmental Research and Public Health, International Journal of Online and Biomedical Engineering, Journal of Hospital Librarianship, Journal of Young Pharmacists, PLOS One and Science and Technology Libraries at minimum threshold of 02.

The Major Subject Areas

Most of the publications are reported in Medicines with 25% of overall output. It is followed by social sciences (19%), computer science (9%), arts and humanities (7%), engineering (7%) and others illustrated in (Figure 5). A smaller number of publications is reported in healthcare related subject areas such as nursing (2%), health professions (2%) and pharmacy (4%).

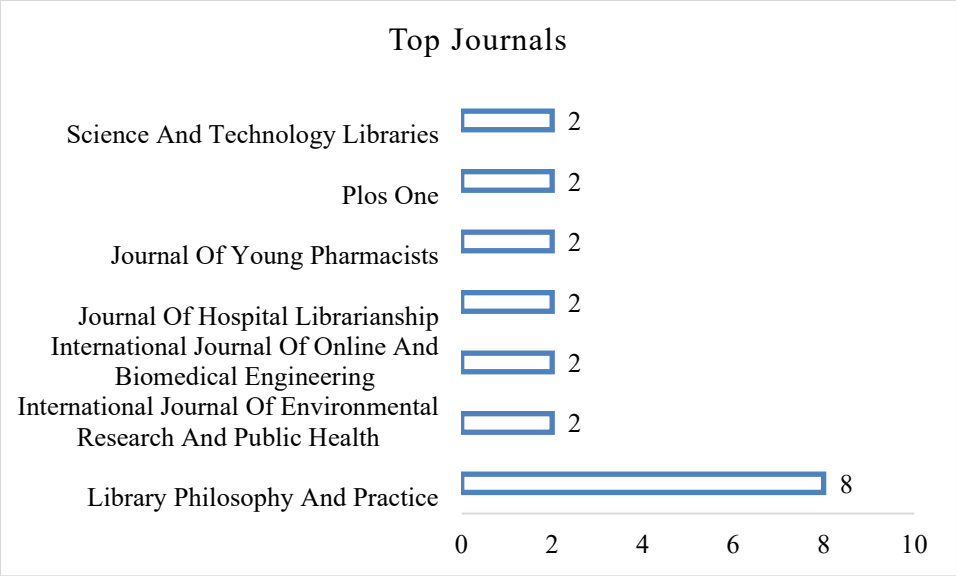

Figure 4 Top Journals

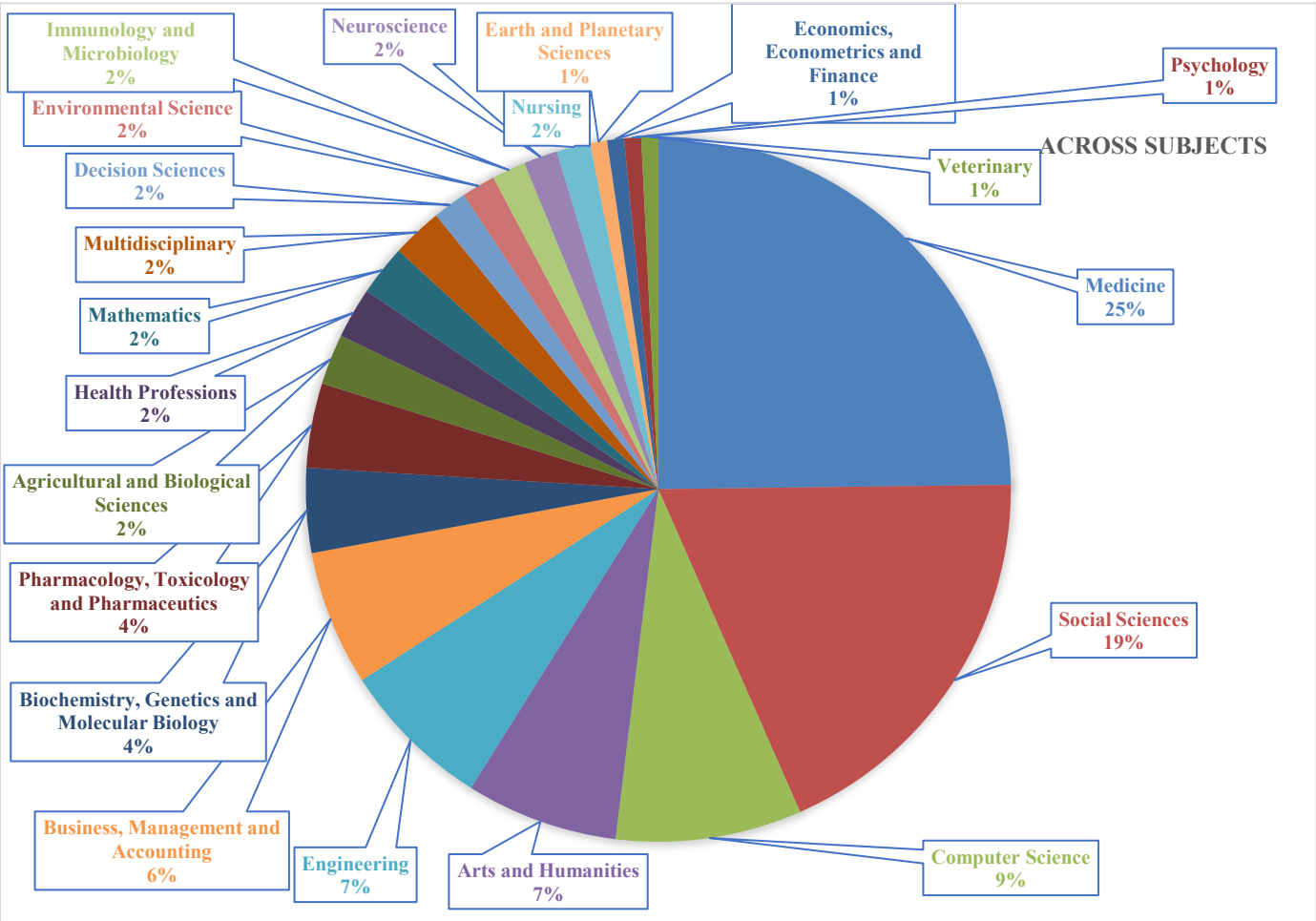

Figure 5 Publications Contributions in Subject Areas

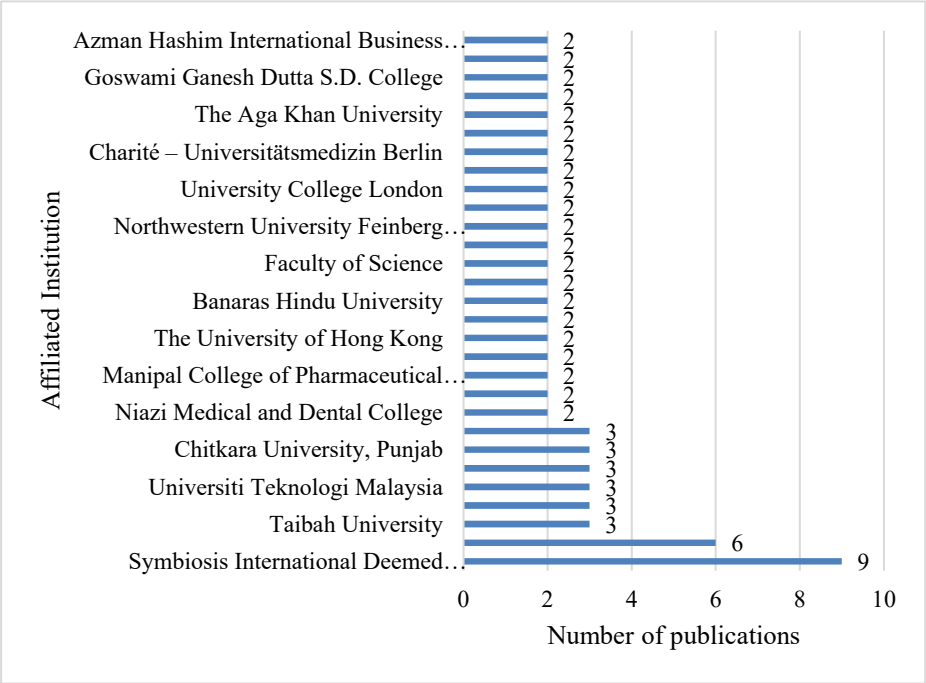

Figure 6 Top Affiliated Institutions

The Most Prolific Affiliated Institutions

Nine affiliations reported in the results are from Symbiosis International Deemed University, thus leading all other institutions. It is followed by Symbiosis Institute of Technology with six affiliations, Taibah University (03), Manipal Academy of Higher Education (03), Universiti Teknologi Malaysia (03), Imam Abdulrahman Bin Faisal University (03), Chitkara University, Punjab (03) Sukkur IBA University (03) and others mentioned in Figure 6.

Thematic Mapping

Three major themes have been identified i.e., bibliometric, healthcare and technological aspects in the current study. These themes are mapped by associating different sub-themes and their relevant elements based on obtained author keywords.

Theme-I: Bibliometric Thematic Mapping

This theme is divided in four sub parts i.e., bibliometric analysis techniques used, visualization applied, statistical method opted, databases utilized, and software used. Various bibliometric analysis techniques have been identified in author keywords that have been utilized in the studies for example, scientometric analysis, citation analysis, co-occurrence analysis, bibliographic coupling, co-authorship, collaboration networks, and others shown in Figure 7. Second part contains the aspects of visualization that have been identified and these are thematic and scientific mapping. Third part comprises of statistical method used and that would be used besides the bibliometric analysis e.g., simulation. Fourth part of bibliometric theme includes the databases utilized for the data and these are Scopus and Web of Science only that have been utilized to analyse the data of bibliometric studies in healthcare. Finally, fifth part constitutes the names of software used for data analysis and these are VOSviewer, R studio, and biblioshiny.

Theme-II: Healthcare Thematic Mapping

Healthcare is one of the major themes of the current study. It is broken down into six sub-themes based on the obtained author keywords, these sub-themes are healthcare service, disease classification, health & wellbeing, specialities, drugs & pharma and covid-19. Healthcare service majorly contains the items that are associated to healthcare service organization in terms of delivery and service providers e, g., corporate medical institutions, bio-medical waste, digital healthcare and others mentioned in Figure 8 These items reflect that bibliometric studies in healthcare have been incorporated with these elements in their analysis. Similarly other sub-themes have been grouped with the relevant items (author keywords). If it is disease so it shows that disease has already been analysed with respect to its bibliometric data in the literature.

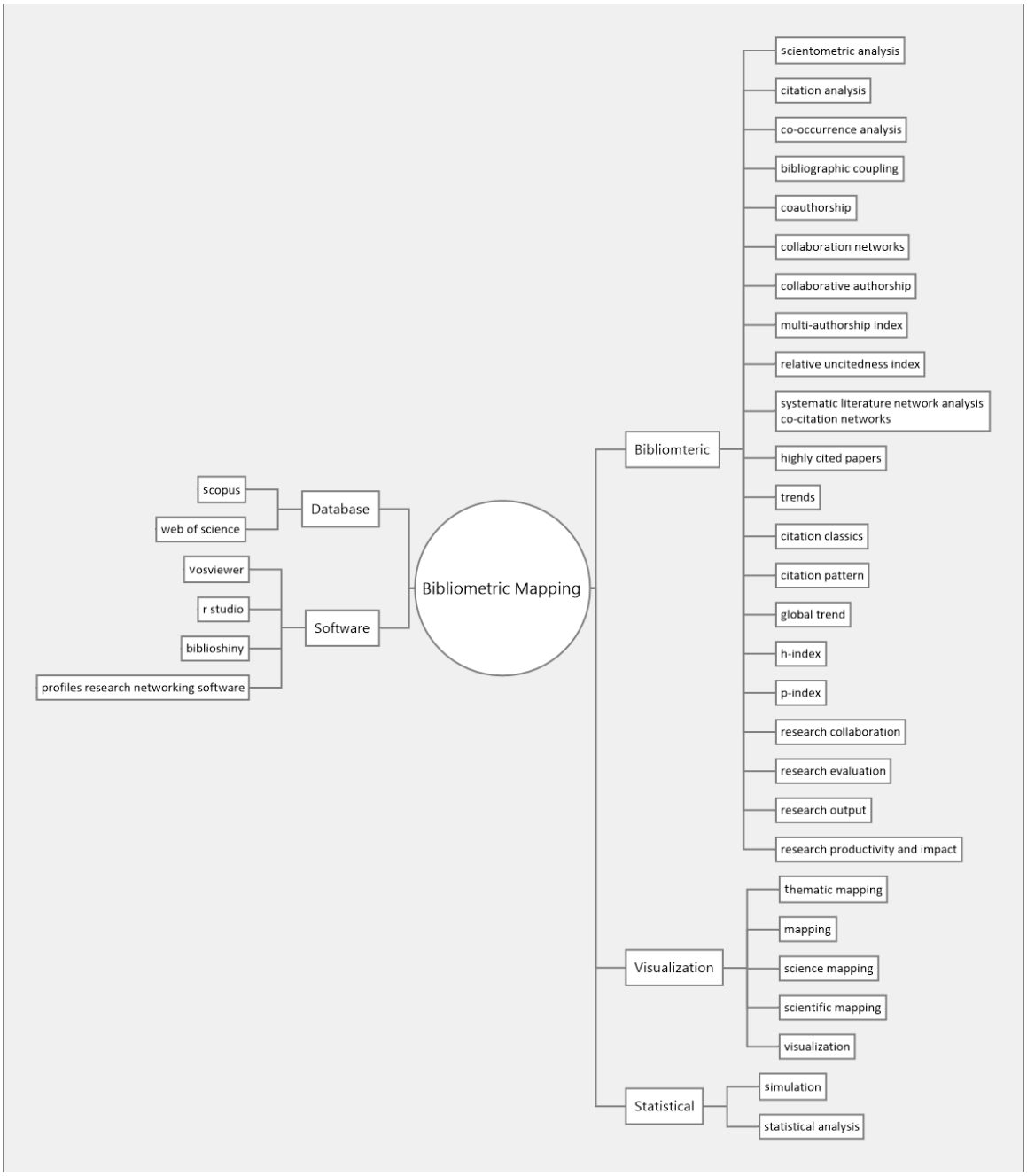

Figure 7 Bibliometric Theme Mapping

Theme-III: Technology Thematic Mapping

Results of author keywords led this theme to evolve as more keywords seemed to associate with it (Figure 9). We divided this theme in certain number of portions such as AI & machine learning, Blockchain & IoT, Cloud Computing & Big Data, Disruptive innovation, ICT and Others. It shows that bibliometric studies of healthcare contained the specific scopes within their technological additions.

First portion includes the subthemes of AI & machine learning that contains associated other elements such as deep learning, natural language processing, distributed machine learning, and optimization techniques. Next portion contains the aspects of blockchain and IoTs that too contains relevant subthemes such as smart contracts, medical IoTs, wearables, smart phones, decentralized applications, IoT security and personal protective equipment. Sub-theme of cloud computing & big data contains other elements as well such as data mining, predictive analytics, cloud and cloud storage. Among disruptive technologies, results revealed technologies i.e., femtosecond laser technology, bioinformatics and electrochemical biosensor. Internet technologies, mobile technologies, safety climate, privacy-preserving, prototype, data privacy and security are grouped in ICT portion based on their relevance.

Figure 8 Healthcare Theme Mapping

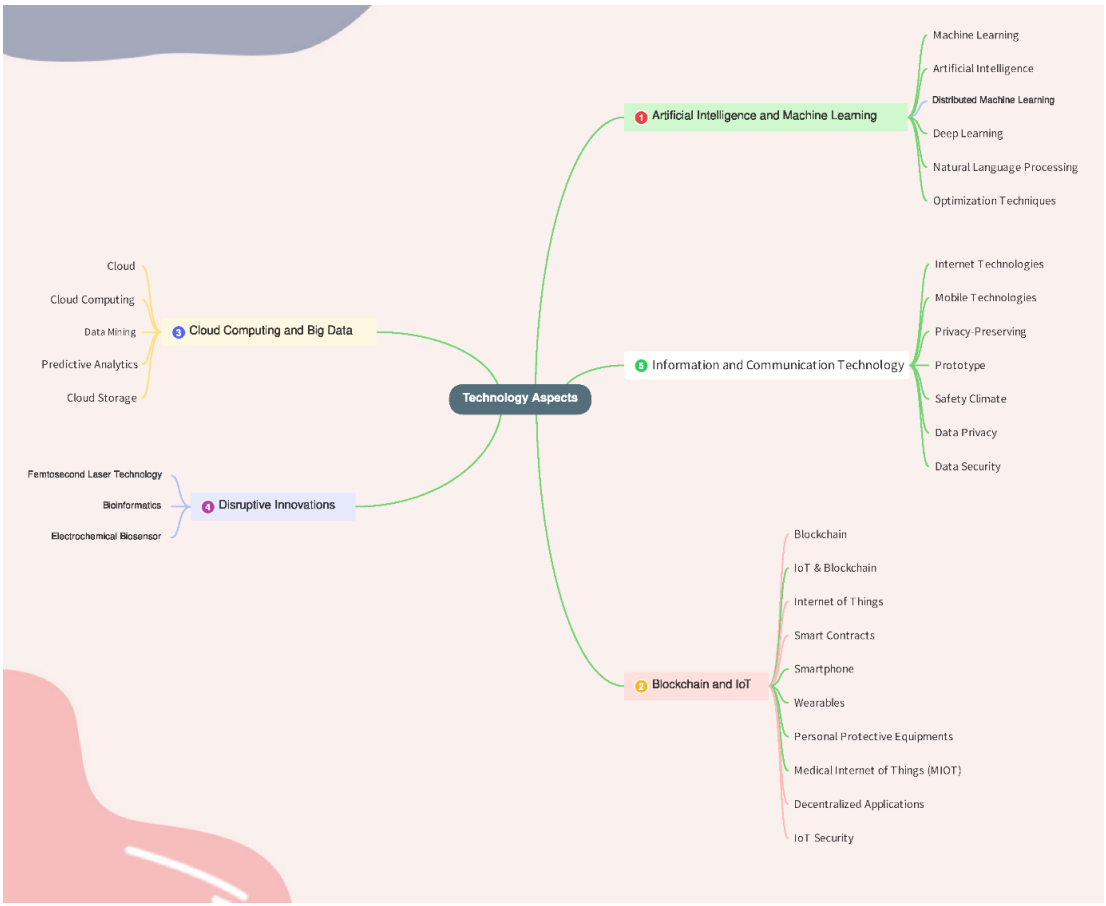

Figure 9 Technology Theme Mapping

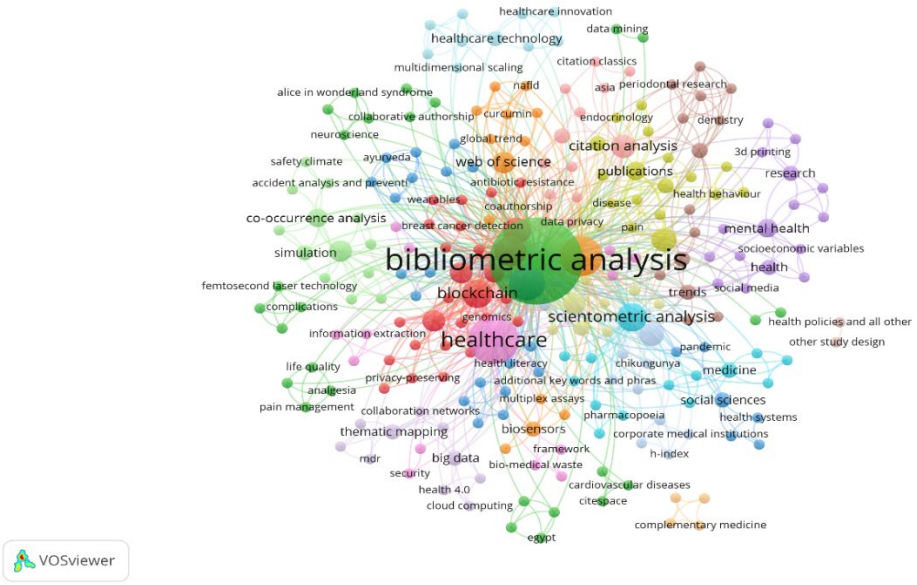

Figure 10 Keyword co-occurrence: Network Visualization

Bibliometric Maps

To analyse the records further, VOSviewer and R studio have been used to visualize the patterns, trends & association, and generate the maps.

Co-occurrence Author Keywords

Co-occurrence of items (author keywords) refers to the association of one keyword with other that have been used together in a study. It shows the prominence of items that have been co-occurred in the literature. Screenshot of network visualization of author keywords' co-occurrence is illustrated in Figure 10in which most of the prominent keywords are found to be the bibliometric analysis, healthcare, blockchain, scientometric analysis and others with the size of their circle respectively. Overlay visualization shows the timeline of themes with the different colours. Figure 11 shows that items highlighted with yellow colour are the author keywords that have been studied and used in recent bibliometric studies in healthcare e.g., data mining, nafld, curcumin, ayurveda and others.

Classification of Themes (Author Keywords)

One of the analytical tests in biblioshiny software is thematic mapping of items in which items are classified on the dimensions of density and centrality (Figure 12). Moreover, they are categorized accordingly in emerging or declining, basic, motor and niche themes. The result of this test reveals the web of science and citation as emerging or declining themes, bibliometrics, healthcare, vosviewer and others as basic themes, mental health and scinetometric analysis as motor themes and covid-19, literature review & others as niche themes.

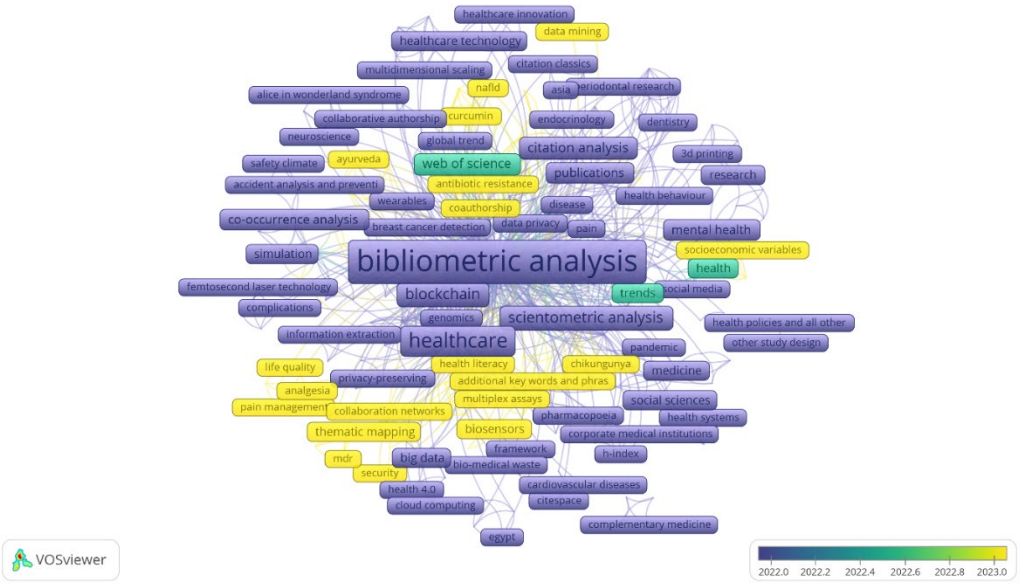

Figure 11 Keyword co-occurrence: Overlay Visualization

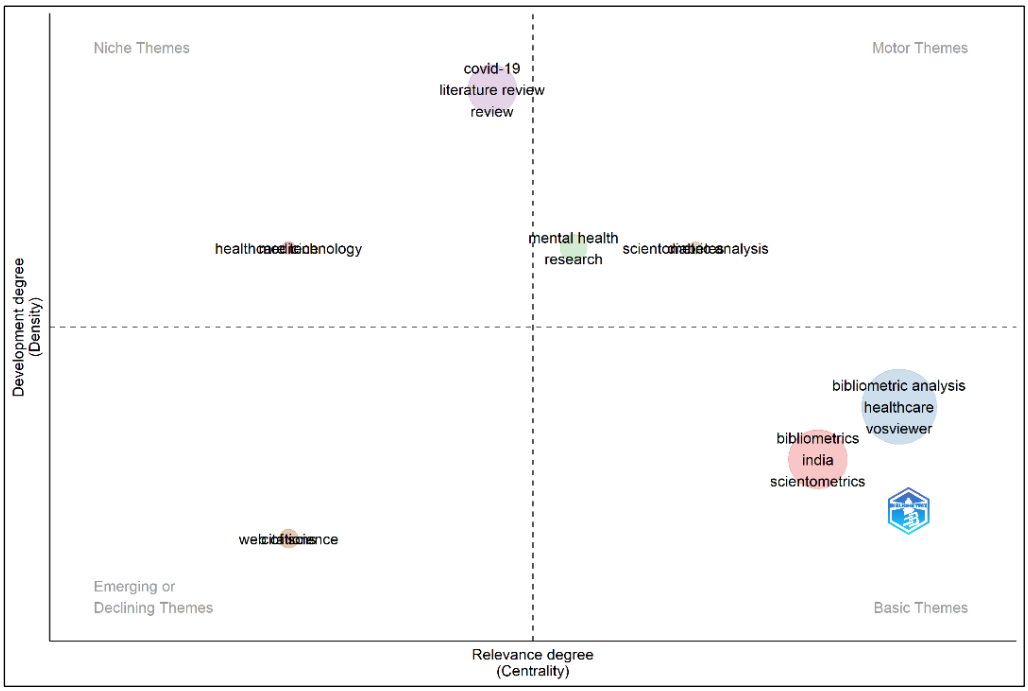

Figure 12 Classification of themes

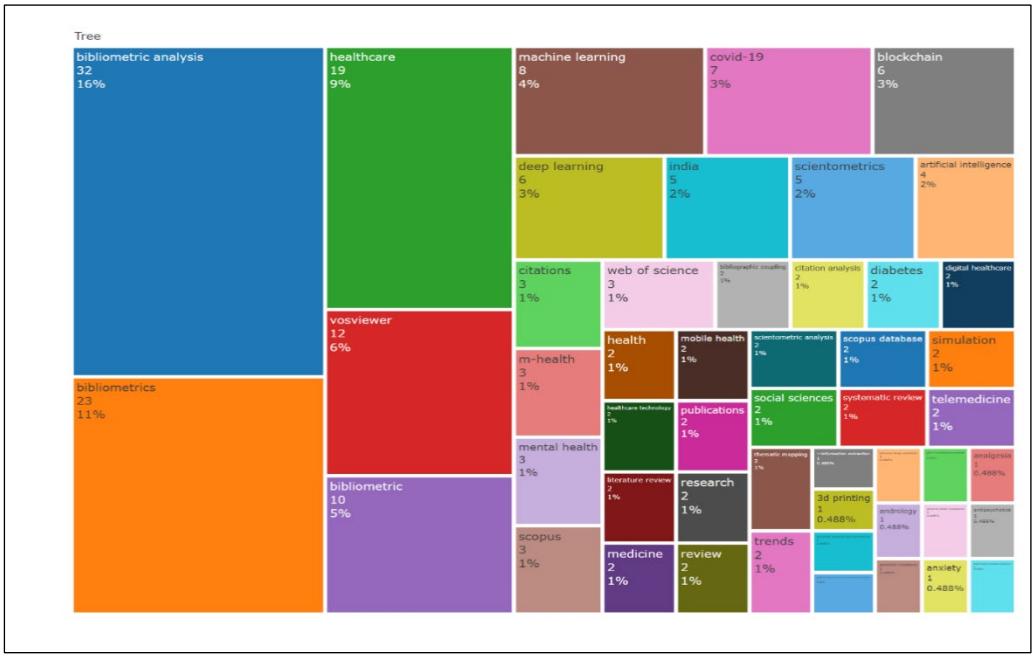

Figure 13 Treemap

Figure 14 Worldcloud

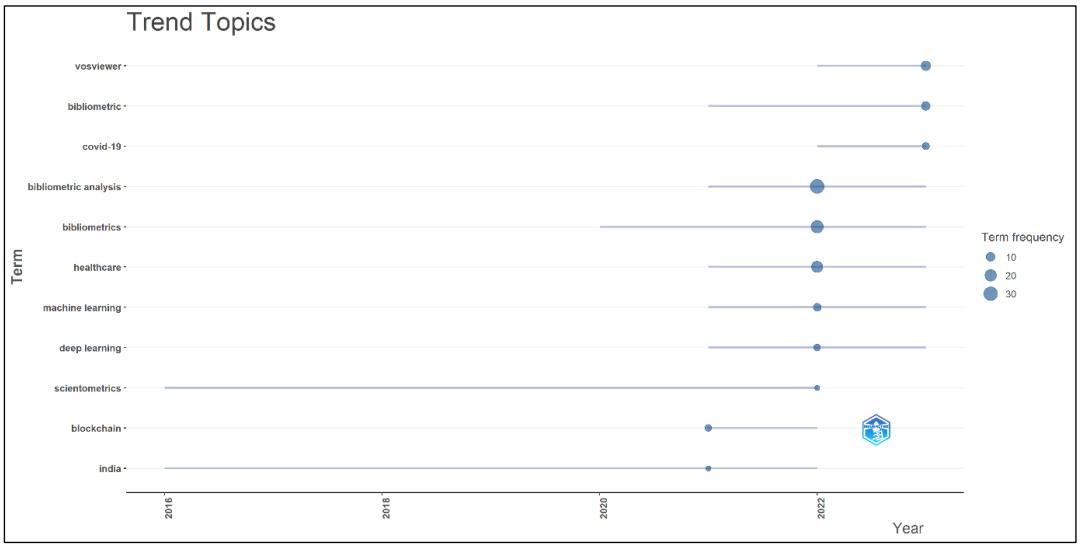

Figure 15 Trending Topics

Treemap, Wordcloud and Trend Topics (Author Keywords)

Treemap (Figure 13) shows the quantitative value of items respective to its weight. Result of treemap shows that basic themes obviously prominently get more value e.g., bibliometric & healthcare, however, machine learning (4%), covid-19 (3%), blockchain (3%) and deep learning (3%) are valuable themes as well in the bibliometric studies of healthcare. Wordcloud (Figure 14) visualize the importance of items (author keywords) as per the frequency of items and shows the prominence with the size and color of the items. Result of treemap shows that besides bibliometric and healthcare items, machine learning, deep learning, vosviewer, blockchain, covid-19 and scientometrics are also important. Finally, trend topic (Figure 15) visualizes the items as per their importance in trends that whether items are still active throughout the years. Results show that bibliometric studies in healthcare with addition to covid-19, machine learning, deep learning, blockchain, are scientometrics still active and worth considering in the studies emerge from south Asian countries.

Insights for Future Research Directions

Thematic and bibliometric analysis in the current study has revealed some insights that can be viable options for future research directions. The number of publications of bibliometric studies in healthcare has increasing trend showing the increasing interests of researchers specifically in South Asian countries reflecting the bibliometric studies are still important and significant to consider in future. Most of the publications have been executed in medicines, social sciences and computer science, if other aspects of healthcare are taken as specific area of study it will be a useful bibliometric study in body of knowledge

such as nursing, health professions, veterinary and pharmacy.

Researchers are suggested to incorporate new techniques of analysis in their bibliometric studies as most of the techniques have already been covered as in bibliometric mapping. Different healthcare settings pertaining to service providers and healthcare organizations have been covered in the studies, therefore, there is need to include novel healthcare settings. Similarly, some aspects of diseases, drugs, covid-19, specialties or expertise and health related elements have already been studied, therefore, unique aspects of diseases, drugs, specialties or expertise and health related elements should be incorporated in future bibliometric studies. However, it is suggested to add trending themes in the studies of healthcare such as machine learning, AI, blockchain, deep learning, scientometrics, and IoTs as value addition to the studies.

LIMITATIONS

This study presents the overall picture of bibliometric studies in healthcare by uusing specific combination of keywords, that has the possibility to limit the resulting outcomes or records. Different combination with different similar can be used instead. Results are based on only Scopus records and from South Asian Countries, other databases or geographical contexts can also be used instead such as WoS, MedLine, & Dimensions, and ASEAN, MidEast, Europe and so on respectively.

CONCLUSION

Bibliometric and thematic analysis of bibliometric studies in healthcare reveal the top authors, journals, institutions, subject areas, and emerging themes that can pave the ways for future research directions. Analysis was performed on author keywords that were further operationalized in creating major and sub-themes in thematic mapping under three major themes such as bibliometric, healthcare and technology aspects. Bibliometric analysis was also performed on author keywords and maps were created by using different techniques such as co-occurrence analysis in network and overlay visualization, treemap, wordmap and topictrend to show the prominent and emerging themes in the bibliometric studies of healthcare.

Conflict of Interest
No.

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