Scientometrics (2022) 127:4547–4568
https://doi.org/10.1007/s11192-022-04447-x

Mapping the research landscape of Covid-19 from social sciences perspective: a bibliometric analysis

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Received: 9 August 2021 / Accepted: 20 June 2022 / Published online: 6 July 2022

Abstract
COVID-19 has emerged as a widely researched topic and the academia has taken interest in the effects of COVID-19 in various sectors of human life and society. Most of the bibliometric research addresses scientific contributions in medicine, health, and virology related topics, with very little emphasis on social sciences. Therefore, to address this gap, a bibliometric analysis of research related to COVID-19 in the subject area of social sciences was performed on selected publications from January 2020 to mid-2021. A total of 9289 articles were analysed to identify major emerging themes of Covid-19 and social sciences and how research collaborations between countries have helped in communicating critical issues to academia. The empirical results indicate the dominance of psychology and business economics subjects in the social sciences sphere, with the emerging themes as psychosocial problems among people, economics, the outbreak of SARS, and discussions on the quality of life in terms of surroundings and environment. The study also suggests that more collaborations between social scientists working in different nations is required to explore the less focussed themes addressing the local challenges of poor nations.

Keywords Covid-19 · Social sciences research · Bibliometrics · Coronavirus · Developed nations · Developing nations

Introduction

COVID-19 was declared as a global pandemic on 11 March, 2020 by the World Health Organization (WHO) when alarming levels of infection and deaths caused by the Coronavirus were witnessed in countries throughout the world (WHO 2020). The alarm so raised, was with the intention that countries could take a whole-of-government and whole-of-society approach to control the transmission of this never-before witnessed pandemic caused

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by a Coronavirus along with minimizing the social and economic impacts (WHO 2020). This was immediately followed by a situation where countries, irrespective of their economic stature, started facing health crises. The emergency measures such as countrywide complete lockdowns within a few days or hours taken by the governments caused severe disruption in human life and society. Where the direct impact on health till 10 June, 2021 has been in the form of 174,061,995 confirmed cases and 3,758,560 deaths (WHO, 2021), the associated impacts in other fields of human life and society, across the world, too displays a depressive situation (Shaukat et al., 2020). This calls for a need to study the multidimensional impacts on human life and society (Viedma-del-jesús & Juan, 2021), so as to create a database for the future knowledge source (Aristovnik et al., 2020; Mohadab et al., 2020; Shaukat et al., 2020) to deal with any such pan-world crisis.

Academia has taken interest in the effects of COVID 19 in various sectors of human life and society, which are bound to get covered in the field of social sciences research. As social sciences research concerns itself with demography, social statistics, development studies, environmental planning, economics, management, education, social anthropology, law, politics, social policy and social work, and the role of science and technology on society and culture (Kaase et al., 2002), therefore, the impact of COVID 19 on the pre-mentioned sectors have been studied and worldwide research has pin-pointedly covered the specific fields of concerns. However, in order to understand the themes, content, quantity, and trend of social sciences research impacted by the COVID 19 pandemic, it is necessary to perform a bibliometric analysis. This will bring forth the significant contributing authors, their collaboration, and journals in different countries under a framework (Mohadab et al., 2020; Viedma-del-jesús & Juan, 2021). Bibliometric analytical software has been used for critical appraisals through quantitative and qualitative analysis. This analytical technique was utilized to examine contemporary themes and discover future research topics in the academic and their proportion and distribution over time (Aristovnik et al., 2020; Hamidah et al., 2020; Liu et al., 2020; Wang & Tian, 2021), mutual interaction among subjects (Herrera-viedma et al., 2020; Liu et al., 2020), change in impact and fields over time (Gong et al., 2020), analysis of co-occurrence and citation behaviour (Aristovnik et al., 2020; Dehghanbanadaki et al., 2020; Humboldt-dachroeden et al., 2020; Liu et al., 2020; Shaukat et al., 2020) publication of different themes of research by different countries (Aristovnik et al., 2020; Gong et al., 2020), collaboration patterns (Dehghanbanadaki et al., 2020; Farooq et al., 2021), affiliation of the authors (Viedma-del-jesús & Juan, 2021; Zyoud, 2020), evaluating the research strength of countries and institutions (Gong et al., 2020; Nowakowska et al., 2020; Shaukat et al., 2020; Wang & Tian, 2021), document type (Aristovnik et al., 2020; Mohadab et al., 2020; Nowakowska et al., 2020; Zyoud, 2020), along with database creation related to COVID 19 associated research from the widely revered databases (Santana et al., 2020).

Since the emergence of the SARS-CoV-2 virus, the academic domain has witnessed an accelerated growth of Covid-19 research across the science and social sciences landscape (Aristovnik et al., 2020). Most of the bibliometric research addresses scientific contributions in medicine, health, and virology related topics. The topics covering clinical, epidemiological, and basic sciences have overshadowed the social sciences discipline, hence this study primarily deals with the topics covering social sciences research like sociology, social work, political science, economics, business, psychology, and other disciplines that are included in the social sciences domain.

Bibliometric analysis of research literature on the effects of COVID 19 on research in the domain of social sciences has been sparsely covered, where certain works are associated with performance of analysis over the collected dataset of top journals, highly cited

articles, keywords, authors and research stream in social sciences (Shaukat et al., 2020) and bibliometric analysis over science and social sciences research subject areas with subject-area classification, showing the result that the research in the subject-area of social sciences is less (Aristovnik et al., 2020). Thus, addressing the gap in research field of bibliometric analysis regarding the effects of COVID 19 pandemic on the contribution of research in social sciences domain with an undetermined spatial distribution, through the perspective of how the nature of research has varied among the different class of nations on the basis of their level of COVID transmission, economic progress and human development, this study looks into answering the following questions:

(a) Which domain of social sciences have been majorly discussed in COVID 19 related research from 2020 to mid-2021?
(b) How do the themes of social sciences related publications differ worldwide?
(c) How has the collaboration among authors between developed and developing countries helped the propagation of COVID 19 research in different countries?

In this paper, the following sections discuss the content in detail, i.e., Sect. "Datasets and methods" discuss the databases used and describes the methodology for data analyses; Sect. "Findings" presents the results; discussion on the procured results has been done in Sect. "Discussion"; which is followed by a conclusion in Sect. "Conclusion".

Datasets and methods

Datasets

Numerous studies focus exclusively on Covid-19 research, especially in the health sciences and life sciences, and therefore, a huge volume of research has been published in different journals within a year and a half. The rush among scientists to provide effective solutions to the deadly disease problems might inadvertently result in erroneous or inaccurate content and consequently stimulate publications in predatory journals (Soltani & Patini, 2020; Yeo-Teh & Tang, 2021). Therefore, a search strategy was designed to retrieve social sciences related papers from literature repositories systematically. There are numerous repositories of databases of peer-reviewed literature and digital libraries, such as Scopus, Web of Science (WoS), ProQuest, IEEE, PubMed, and web-based search engines like Google Scholar. Among them, Scopus and Web of Science (WoS) are the most popular subsets of the prominent academic search engines that provide relevant peer-reviewed publications, covering different topics across all domains (Martín-Martín et al. 2018). In this study, the literature was accessed from Scopus and WoS. To search Covid-19 related manuscripts from these databases, keyword screening was conducted. After examining articles, and news reports, more comprehensive search expressions regarding the topic were derived. In the search query, a broad range of terms like “2019-nCoV” OR “COVID-19” OR “Coronavirus Disease 2019” OR “Novel Coronavirus Pneumonia” OR “2019 novel coronavirus” OR “SARS-CoV-2” OR “2019 Novel Coronavirus Diseases” were applied. The keyword search consisted of titles, abstracts, and keywords. Further, the timeline of the search period was restricted between 1st January 2020 and 30th May 2021. From the query, it was observed that 111,456 and 10,745 documents were published in WoS and Scopus respectively. However, in this study, the focus was on the publications within the framework of

social sciences. Therefore, in the second round of screening, the literature belonging to social sciences research areas was conducted. In WoS, the options selected were: health policy services, psychology multidisciplinary, economics, environmental science, green sustainable science technology, environmental studies, management, educational research, social sciences biomedical, sociology, ethics, hospitality leisure sport tourism, social work, psychology social, political science, social sciences interdisciplinary, social issues, and psychology. Similarly, the options selected in Scopus were: environmental science, social sciences, energy, business management and accounting, arts, and humanities, economics, econometrics, and finance. The categories of social sciences as classified by WOS and Scopus are different, therefore, the number of criteria on which the articles have been classified are different. The number of papers was scaled down to 8791 and 754 from WoS and Scopus, respectively. Subsequently, duplicate papers and topics that are not related to Covid-19 topics were removed. Finally, 9289 articles were exported for bibliometric analysis.

Method

A machine learning bibliometric methodology was applied to examine the issues explored in the social sciences domain of Covid-19 researches. The technique involves simplifying complex input of literature data and deriving relationships between variables to predict outcomes without being explicitly programmed. Machine learning in bibliometric analysis comprises pattern recognition, classification and hotspot and principal component identification, factor analysis, correspondence analysis, and ascertaining interrelationships between subjects through correlation and regression analysis. After the comprehensive stratification of the articles, the analyses were performed to explore the research trends on Covid-19 impacted social sciences research. The methods also helped us to visualize the cluster of documents vocalizing common themes and promote intra-country and inter-country research collaborations. These exemplified the challenges faced by different communities during the pandemic. In this study, several bibliometric indicators and mapping techniques were used to achieve the objectives using VOS Viewer, Citespace, and R studio Bibliometrix package. The method followed can be visualized in Fig. 1. The literature

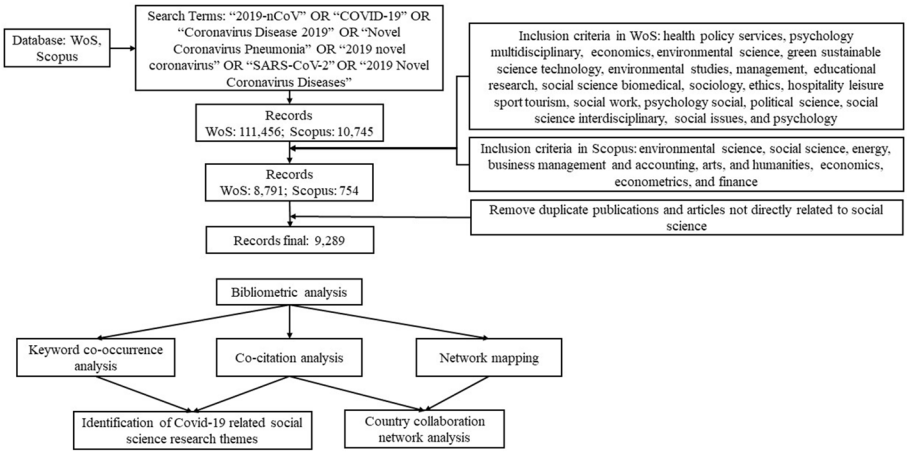

Fig. 1 Method applied for bibliometric analysis

was extracted, and information associated with the total number of articles, their types, their sources, author information, countries and affiliations, citations, and reference related statistics were recorded. In essence, the number of publications and citations information were utilized to determine the most influential country and institutions, even more visualizing the institutional and geographic leadership of the research in thematic illustrations. The citation analysis measures the overall impact of the authors and publications. Articles with high citations indicate the high impact of a particular author or publication. Furthermore, the h-index is an author-level metric that attempts to measure both the productivity and citation impact of the publications of a scientist or scholar. The index is based on the set of the scientist's most cited papers and the number of citations that they have received in other publications.

Frequency-based textual data analysis was conducted to create textual networks and identify sub-themes and decipher the recent trends in social sciences research attending to the pandemic. Keyword co-occurrence analysis has been performed after extracting clusters from CiteSpace software and validating the pattern in Bibliometrix package of R studio using Co-occurrence network tool and Thematic Map tool. Keyword co-occurrence analysis was performed to map the existing knowledge structure of the research field. The keyword co-occurrence network was created using Louvain clustering algorithm with top 50 frequently used keywords. The Louvain algorithm is an agglomerative hierarchical clustering approach that utilizes the modularity measure. Equation 1 shows the calculation of the modularity measure, where n_c is the number of clusters, lc is the number of intra-cluster edges, d_c is the sum of degrees of all nodes in c and m is the number of edges in the graph,

$$Q = \sum_{c=1}^{n_c} \left[\frac{l_c}{m} - \left(\frac{d_c}{2m} \right)^2 \right] \tag{1}$$

The nodes, also known as a cluster, are labelled by using their respective keywords. The larger the node or cluster, the more frequently the keyword is used, while the thicker the edge, the higher the frequency of the connected keywords. The length of the edge represents the distance between the keywords in a sentence. Using this approach, the key themes were identified. Finally, from the co-author's affiliation, a research collaboration map was prepared to understand the links between countries that have contributed the most in social sciences research during the pandemic. The network analysis tool from VOS viewer and Collaboration World Map from Bibliometrix package was useful in interpreting and visualizing research collaboration and intrinsic networks among authors, countries and institutions. Here, the Bibliometrix tool uses networkPlot() tool from VOSviewer software to plot a network and collaboration graph and conceptualStructure() function from R software to sketch out the conceptual structure map of a scientific field using Multiple Correspondence Analysis and Cluster Analysis.

Findings

Global research scenario

The social sciences themed publications obtained from WoS and Scopus highlight that a total of 9289 articles were written by 28,193 different authors and published in 985 journals. Among them, 7340 were journal articles, 1730 were early access articles, while 475

were review articles. Overall, 286,862 documents were cited, the average citations per document were 3.45, and authors per document were 3.21. The Covid-19 research was published across 985 journals, among which 25 journals have published more than 50 articles in the selected time span. Sustainability and Frontiers in Psychology have been actively publishing novel works related to both development and challenges faced by people and different communities in managing their mental health, social lifestyle, engagement, and participation in different economic sectors, contributing to the global demand and supply chain, mobility, to encourage social, economic and environmental sustainability. The next list of the peer-reviewed journals publishing most of the studies revolve around health care and risk management policies, linking the impact of Covid-19 on personality development and behavioural measures. However, numerous journals exhibited a myriad of Covid-19 related publications and the impact of the pandemic on holistic development of nature, cities and societies, public economics, online education and communication, tourism, food technology, social work, and policy modelling.

During the bibliographic study, the list of references was also procured while analysing the data. The details of the cited manuscripts from the reference lists were enlisted. The journals when ranked based on the number of the manuscripts cited in the articles, it was observed that most of the journals belonged to the medical, advanced science, and physical and mental health related journals. The Lancet journal was ranked the highest cited journal from the reference list, having cited by 3295 scientific papers, followed by International Journal of Environmental Research and Public Health, Sustainability, Plos One, Journal of Personality and Social Psychology, The New England Journal of Medicine, and Frontier in Psychology (Table 1). The journals focus on cutting-edge research, inclusive and novel contributions across science, medicine, engineering, and other social science disciplines. Although most of the authors have published their works in social sciences specific journals like World Development, Gender Work and Organization, Qualitative Social Work, Social science and Medicine, and Sustainable Cities and Societies, the research theme is based on the impact of the pandemic on mental health, psychosocial problems, risk perception, occupation, work stress, social distancing measures, tourism, and air pollution. The journals of Sustainability, Frontiers in Psychology, Personality and Individual Differences, and Journal of Community Health are the conventional journals with the highest H-index value and are integral to exceptional publications in the social sciences domain.

Interdisciplinary research plays a key role in addressing many of the world's contemporary challenges, the recent being the global health crisis originated from the outbreak of the deadly SARS virus. WoS and Scopus categorized the articles based on the subject area, and according to their classification, it was observed that psychology and business economics occupied the topmost researched domain covering 20% of the total articles, respectively. It was followed by health care sciences services and educational research and ecology and environmental sciences. In addition, social sciences, technology related to it, public environment and occupation health, biomedical social sciences, government law, social work, and sociology occupied an important position in Covid-19 research areas. The other important domains of research include medical ethics, psychiatry, development studies, international relations, women studies, public administration, family studies, communication, geography, and urban studies. Figure 2 depicts the distribution of subject areas researched extensively in the social sciences domain. Although scholarly articles in psychology and business economics have been extensively published in the past year, the other fields of environmental sciences, health care services, educational research, health-related policy and services, development studies, social work, and sociology have contributed to a similar extent. The psychology domain can be further categorized into 26 sub-categories, where

Table 1 List of significant journals in the Covid-19 related social sciences research domain

Most contributing journals				Most journals cited in references	
Source titles	TR	TC	H-index	Source titles	RC
Sustainability	703	1707	17	LANCET	3295
Frontiers in Psychology	647	1754	17	International Journal of Environmental Research and Public Health	2259
Healthcare	193	417	9	Sustainability	2244
Journal of Chemical Education	178	267	6	PLoS ONE	2028
Risk Management and Healthcare Policy	138	185	7	Journal of Personality and Social Psychology	1850
Personality and Individual Differences	122	528	14	New England Journal of Medicine	1813
World Development	97	363	9	Frontiers in Psychology	1681
Gender Work and Organization	86	359	9	JAMA: The Journal of the American Medical Association	1664
Current Psychology	78	92	5	Journal of Chemical Education	1577
International Journal of Hospitality Management	69	317	10	Tourism Management	1437
Qualitative Social Work	66	35	2	Psychiatry Research	1369
Journal of Community Health	64	462	11	SCIENCE AAAS	1352
Journal of Bioethical Inquiry	63	64	4	Science of the Total Environment	1310
Social Science Medicine	62	320	11	Personality and Individual Differences	1140
Current Issues in Tourism	59	229	9	NATURE	1139
International Social Work	58	63	4	Social Science & Medicine	1090
Sustainable Cities and Society	58	385	10	International Journal of Hospitality Management	1085
European Societies	55	149	5	BMJ-British Medical Journal	1044
Health Communication	55	76	4	New York Times	1040
Journal of Medical Ethics	55	318	11	Journal Of Cleaner Production	1021

TR Total records, *TC* total citations, *RC* references cited; *Source* Author's computations from data retrieved from WoS and Scopus database

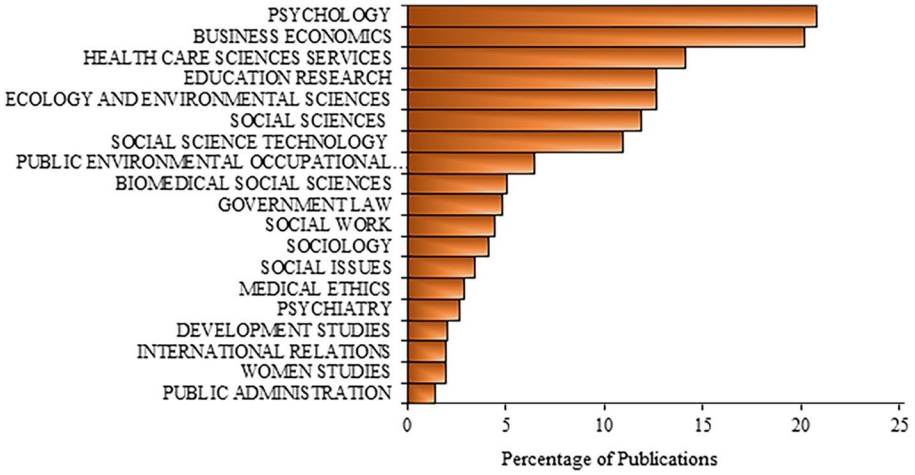

Fig. 2 Distribution of subject areas researched extensively on Covid-19 in social sciences domain

905 articles have been published in the multidisciplinary aspect of the subject, followed by social issues aspects, and clinical biomedical aspects. Here, studies related to the psychology of health care workers during the pandemic and the impact of massive work pressure and innumerable deaths have been studied (Belmin et al., 2020; Busch et al., 2021; Crittenden et al., 2021; Peng et al., 2021). Apart from that, studies related to combating depressive symptoms and suicidal thoughts (Carvalho et al., 2021; Knowles et al., 2021), pandemic anxiety (Robinson et al., 2021), and loneliness (Landmann & Rohmann, 2021) in different age groups and personalities have been studied. Another significant research arena that was extensively studied was business management and international relations of trade and commerce, and the impact of Covid-19 on pandemic driven recession (Liu et al., 2020). More than 15% of the articles described different aspects of economics, business and management themed research, giving an account of financial immunity (Zaremba et al., 2021), emerging stock markets (Liu et al., 2020; Pandey & Kumari, 2021; Salisu et al., 2020), recession (Banks et al., 2020) and monetary policies related to it (Amromin et al., 2020). The tourism industry is greatly affected and, thus, the research category of tourism studies has gained immense importance (4%) in academia (Hailu et al., 2021).

Journals about health care and the health care policies revolved around research areas focusing on health care system response to Covid-19 (Kendzerska et al., 2021), the public's trust in the health care system (Pak et al., 2021), the role of social media in portraying the system (Xu & Sattar, 2020), and occupational health safety of health professionals (Hailu et al., 2021). The implications of the pandemic in the environment domain are multifaceted, ranging from geo-environmental determinants responsible for the acceleration of Covid-19 diffusion spatially (Bontempi et al., 2020), the lethality of air pollution (Barua & Nath, 2021), and anthropogenic heat (Noda et al., 2021; Pal et al., 2021) amidst the global crisis. Work and food consumption patterns and wastes related to this have also received significant attention during the pandemic (Amicarelli et al., 2021). Around 18% of the publications cover the environmental domain of academia, where significant contributions can be noted from its sub-branches like Green and Sustainable Technology, Urban Studies, Geography, Energy and Fuels, Forestry, and Law. Moreover, studies on online education (Bhagat et al., 2021; Yoon & Leem, 2021), digital anxiety (Khanna & Carper, 2021), and

social distancing (Zhai et al., 2021) are in the spotlight of Covid-19 research. Therefore, the others social sciences research domains that are extensively contributing to the Covid-19 research and currently rising in the academic front are Social work, Rehabilitation, Educational research, Nursing, Women studies, and International relations.

Classification of potential research themes in Covid-19 associated social sciences research

The keyword co-occurrence analysis in this study produces strategy maps to elucidate the research trends and future direction of Covid-19 research in the social sciences domain. The keyword analysis links the relationship between multiple keywords that appear collectively in the articles. Prior to this, the frequency of the most repeatedly used keywords were extracted and the usage of the terms in 2020 till mid-2021 was inspected. The most frequently used keyword was impact, followed by health, stress, model, and risk. Figure 3 shows the rising trend in the usage of these words in social sciences research and the rate at which the usage has increased in the last six months than throughout 2020. Additionally, a keyword co-occurrence network was created using the Louvain clustering algorithm with the top 50 frequently used keywords. The keyword co-occurrence network map displayed in Fig. 4 suggests the presence of four clusters. One of the clusters highlighted by the red colour focuses strongly on psychosocial problems among citizens and health workers in different stages of Covid-19 and the impact of the pandemic on the increasing cases of depression, insomnia, anxiety, somatization, and obsessive compulsion symptoms. The next distinguished cluster, embroidered in blue colour, relates to business models and decision making in different economic sectors, the degree to which the pandemic has created long-term disruptions, and uncertainty in the economic system and the global demand and supply chains. The third group, represented in green colour, solely focuses on the origin of the Covid-19 disease and its outbreak in different countries, resulting in a global health emergency. The final cluster, depicted in purple colour, in linked with health care, quality of life in terms of surroundings, and the environment. The keyword clustering and the network links underline the nature of research emphasized in Covid-19 related social sciences research. More studies have been conducted on psychosocial problems and business

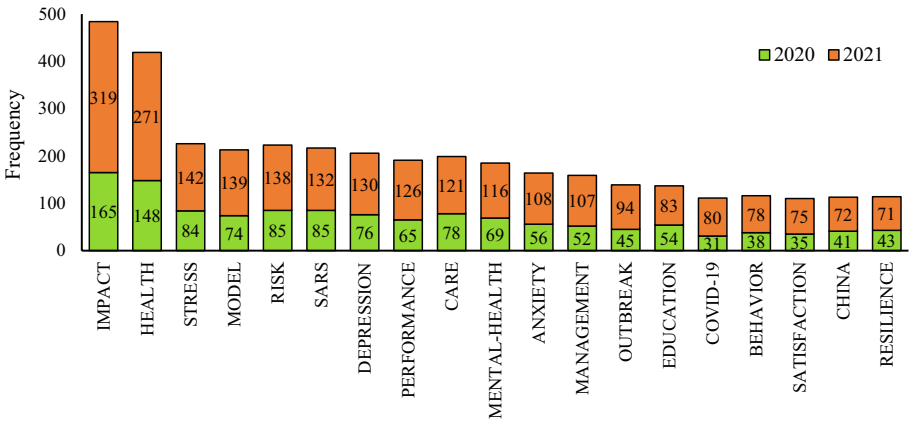

Fig. 3 Frequently used keywords in 2020 and 2021

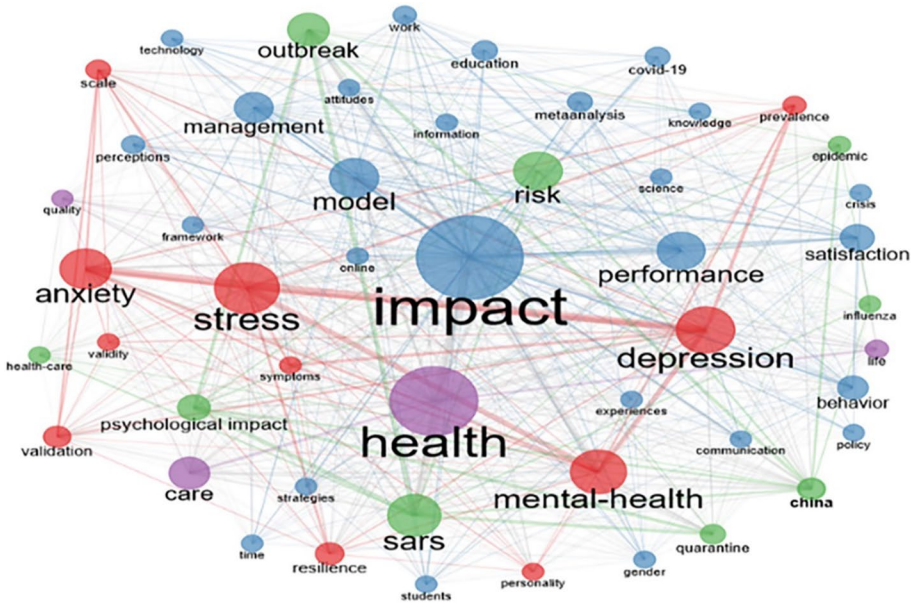

Fig. 4 Network diagram of the keyword analysis

economics in this time span. Alternatively, the research trends that are on the rise engage in social and environmental well-being research.

The keyword co-occurrence analysis was followed by degree centrality and dependence measurement analysis. Degree centrality measures the importance of a node by calculating the number of other nodes that are connected to it. The greater the values, the more is the importance of that node in the network. Similarly, the network density of the keywords was calculated to estimate which clusters have a higher in-group correlation. The mentioned indicators were plotted against each other to comprehend the behaviour of the clusters and determine the emerging research themes in the social sciences domain. Figure 5 explains the comparison diagram between the four themes derived from the keyword co-occurrence analysis. Quadrant I include the two clusters dealing with psychosocial problems and business economics and modelling. These are the most upcoming research trends in Covid-19 related social sciences research. They have the highest centrality and density values and therefore, possess the scope to develop in the near future and become one of the dominant research topics in this field. On the other hand, the next two prominent groups, indicating research on SARS outbreak and quality of life experiences have occupied the fourth quadrant. These clusters have lower centrality and density values and suggest an emerging or declining field.

Geographic distribution of research and country collaborations

This section throws light upon the geographic distribution of research articles according to the author's institution and countries. Table 2 presents the list of most relevant countries and institutions based on the total number of articles published by them, respectively. The table also highlights the countries which have received the maximum

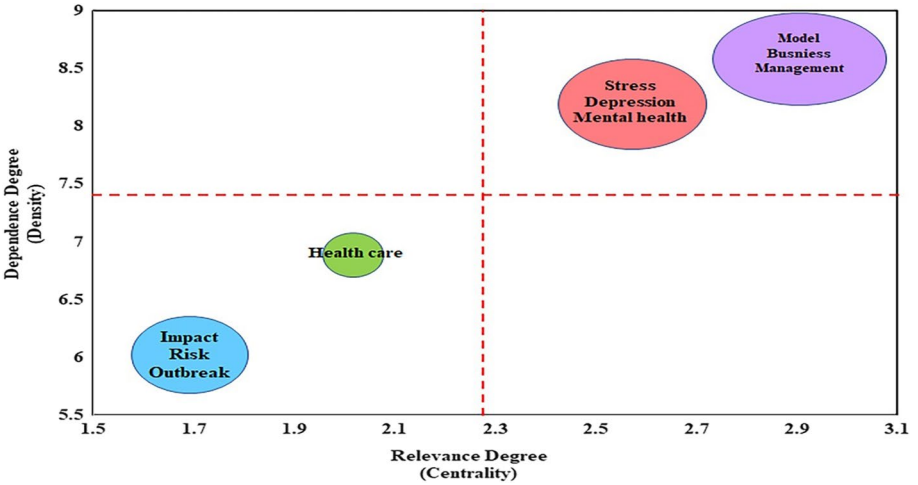

Fig. 5 Comparison between density and centrality of the dominant keyword clusters

Table 2 Most contributing countries and institutions in Covid-19 themed social sciences research

Most contributing countries			Most cited countries			Most contributing institutions		
Countries	TR	PTR	Countries	TC	AAC	Organizations	TR	PTR
USA	2883	32.80	USA	7847	3.34	University of Oxford	105	1.19
England	1105	12.57	England	3664	4.60	University of Toronto	96	1.09
China	923	10.50	China	2999	3.64	University of Melbourne	87	0.99
Australia	627	7.13	Canada	2007	5.04	Harvard Med School	70	0.80
Canada	572	6.51	Italy	1578	3.87	Columbia University	67	0.76
Italy	563	6.40	Australia	1553	3.73	University of British Columbia	67	0.76
Spain	430	4.89	Spain	1055	3.24	University College London	62	0.71
Germany	401	4.56	Germany	916	3.72	University of Cambridge	61	0.69
India	231	2.63	Norway	559	9.98	Monash University	60	0.68
Netherlands	229	2.61	India	542	3.19	University of Sydney	57	0.65
France	199	2.26	Turkey	451	3.55	Stanford University	56	0.64
South Korea	196	2.23	Poland	373	3.49	University of Michigan	56	0.64
Turkey	177	2.01	Sweden	327	4.96	University of Penn	55	0.63
Brazil	159	1.81	Israel	319	2.66	Kings College London	54	0.61
South Africa	150	1.71	Denmark	318	6.24	Arizona State University	49	0.56

TR Total record, *PTR* percentage of total records, *TC* total citations, *AAC* average articles cited. *Source* Author's computations from data retrieved from WoS and Scopus database

number of citations. In an attempt to map the research collaborations between different countries, this section also provides an insight into the willingness to cooperate among authors of different institutions and countries to explore more scientific research questions and expand the horizon of research.

Through the bibliographic analysis, it was observed that 16% (N = 1524) of the documents were single-authored while the rest of the publications indicated multiple co-authors. At the country level, the USA occupied the prime position in publishing the maximum number of scientific publications, almost double the number of papers published by England and China. These countries were successively followed by Australia, Canada, Italy, Spain, Germany and India. North American, European countries, and Australia have performed relatively better than South American and Asian countries, whilst African countries have the least to contribute in Covid-19 related social sciences research. A similar pattern was noticed in the rankings of the countries with the highest cited research papers on Covid-19. The USA grabs the lion's share with the maximum number of research papers cited in most publications, followed by England and China occupying the second and third positions, respectively. However, on average, publications from Norway, Egypt, Denmark, Sweden, and Canada have performed better than the USA, England, China, Germany, and India. The former list of countries has published a greater number of papers and thus, rank better than other European and Asian countries. The countries that have published a lesser number of articles in comparison to the former list have been cited equally or more to receive a higher grade in average articles cited.

Research collaborations are harbingers of the cross-pollination of ideas. The USA has surpassed most of the countries not only in terms of the number of publications and citations but also in terms of collaborative research. Authors from the USA have collaborated with other authors from 102 countries, and England, Canada, China, and Australia were major collaborators with the country. The overall partnership among USA, England, China, and Australia surpasses research collaborations between any other countries on Covid-19 social sciences research. Researchers from other countries that have collaborated with these four countries, as seen in Fig. 6, include Canada, Italy, Spain, India, Germany, South Korea, South Africa, Brazil, and Peru.

Covid-19 research has been extensively carried out in different parts of the world, covering all the spectrums of scientific and social sciences related research themes, and thus research collaborations between elite universities are inevitable. The institutions that have published the majority of the publications reside in the USA. Nevertheless, authors affiliated with the University of Oxford from England have contributed the most to the covid-19

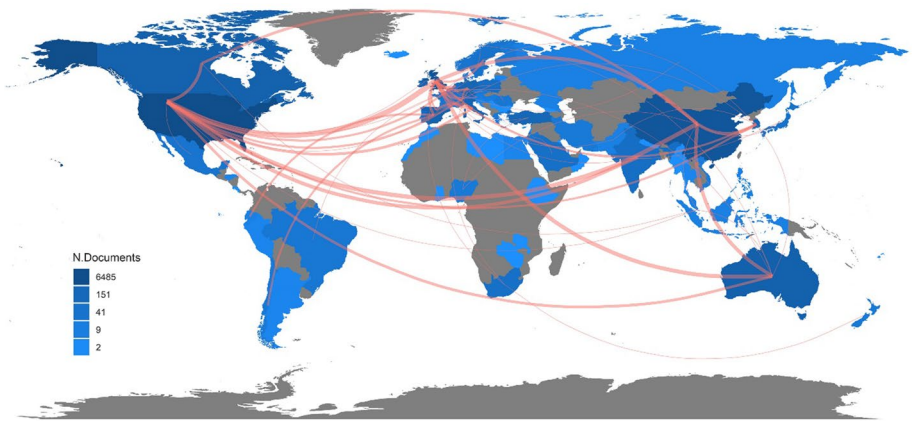

Fig. 6 Total COVID-19-social sciences related articles of countries 2019–2020 along with the research collaborations

related social sciences research (N = 105), followed by the University of Toronto (N = 96) and University of Melbourne (N = 87). The top three universities with the highest number of publications belong to England, Canada, and Australia, with researchers from Harvard Medical School from USA occupying the fourth position with the higher number of research publications. Table 2 lists the order of countries and institutions based on the total number of papers published, cited, and the institutions with the maximum contribution to the social sciences research domain during the pandemic. Noteworthy contributions in this arena were also imparted by Columbia University, University of British Columbia, University of Cambridge, Monash University, University of Sydney, and Stanford University. The most productive institutions to contribute the most in the Covid-19 social sciences research is distributed in England, USA, and Australia.

Discussion

Even though the social scientists across the globe have worked on the need for research over myriads of aspects affected by COVID-19 pandemic, but methodological suitability with respect to constraints created by the restrictions imposed in this crisis has brought up some changed understandings of the social worlds because of inequalities in level of focus on different issues (Otto & Hsaase, 2022). Nonetheless, the importance of research and the role of institutions in promoting the same during the pandemic does not dwindle, for their nature of activeness is highly responsible for variation in creation and maintenance of human development in a sustainable manner amongst countries (Abad-Segura & Gonzalez-Zamar, 2021).

Contexts in emerging research themes on Covid-19 in the social sciences academia

Since the emergence of the SARS-CoV-2 virus, along with health crisis and the emergency measures such as countrywide complete lockdowns taken by the governments caused severe disruption in human life and society. Thus, the academic domain has witnessed an accelerated growth of COVID-19 research across the social sciences landscape (Aristovnik et al., 2020).

A wide range of issues has been discussed in the social sciences research arena about the impact of the pandemic on people, communities, and their surroundings, which were mostly associated with the—psychosocial problems, business economics, disease outbreak, and quality of life and environment. An interrelation gets highlighted among the hotspots in the studies belonging to these four domains.

The domain of psychological problems in social sciences research mostly investigated the negative psychological impact and inequalities in the provision of services, the focal study groups to which can be segmented based on socio-cultural and economic conditions (Meléndez et al., 2020; Yeasmin et al., 2020). The highlights in the domain of disease outbreak contextualised the effect of disease transmission leading to stringent restriction measures imposed by the authorities. Its adverse effects on the mental health of people by distress, fear, anxiety (Fitzpatrick et al., 2020; Serafini et al., 2020), and their health and quality of life have been studied. The studies have put light on the emotional sufferings of people from all socioeconomic status and age groups, whether- old, adolescents, teenagers, and children. To which probable solutions have been attempted by the researchers to address issues like health-related crises. The shattered economy during COVID-19 has

spiked the interest of the researchers to take interest in dip in the GDP (Jena et al., 2021; Maliszewska et al., 2020). But of all other pockets of economic crises, business economic domain has been predominantly investigated to learn about the economical rumblings through fall in industrial output and service sector causing huge employment crisis and poverty in the lives of workers. The academia has also taken keen interest on the environment trying to restore itself because of the reduced human footprint during the period of COVID-19. The studies have found that the lockdown effects due to COVID-19 have reduced the levels of pollution, i.e., air, water, and noise, and improved the quality of the same and also the landscape, whereby creating a positive effect on the environment (Basu et al., 2021; Chakraborty & Maity, 2020; Razzaq et al., 2020; Somani et al., 2020; Zambrano-monserrate et al., 2020).

In the persisting condition of the pandemic throughout the world, research in these four domains is very relevant. All these works aimed for an improved quality of life and well-being of mankind and the environment. But there lies the scope to delve more intrinsically into the various lesser marked issues of society's support givers and systems. In that way, social sciences researchers can holistically focus on the adaptation of human society to these challenges and support the communities through the provision of knowledge, support and motivation.

A regional approach to Covid-19 issues in social sciences research landscape

The publications about COVID 19 within the ambit of social sciences, the countries, namely—USA, England, China, Australia, Canada, Italy, Spain, Germany, India, and Netherlands, are dominating the field of research in this sector. When compared with the total number of active Covid-19 cases, USA, India, England, and Italy are among the top 10 countries with more than 4 million confirmed coronavirus cases by July 2021, followed by Spain, Germany, Netherlands and Canada. China, however, has a significantly lower number of Covid cases, amounting to 1 lakh by July 2021 (WHO, 2021). The significant themes discussed upon by the major research paper contributing countries are varying (Fig. 7). The basic themes tend to be revolving within the four basic domains, as pre-mentioned. If the research landscape is regionalized, a deep observation helps us to follow that the level of COVID affected population and the development of a nation has an impact on the concentration of themes- the countries are working upon.

Themes discussed by the developed nations

Keeping the common themes aside, the authors in developed nations with high COVID cases, like, USA, England, Italy, Spain, Germany, Netherlands, and Canada, are mainly illuminating a particular aspect of the impact of COVID-19. The academia in these countries has emphasized on changing society, illness, and deaths of cultural and socio-economically disadvantaged groups, at large. The psychological atmosphere has been covered by studies on mental health and anxiety, loneliness and distress, and negative self-perceptions. The socio-behavioural feature was put forward by studies on inequalities in key domains of life and well-being, well-being in families, health risk behaviours, public risk perception, People's perception on preventative public health behaviours, prosocial emotional process, and behavioural therapy via telehealth. The works on economic attributes mostly dealt with family firms, food supply chains, workers and workplaces, and teleworking. The resource sector has been looked into by studies over patterns of energy demand and sustainable

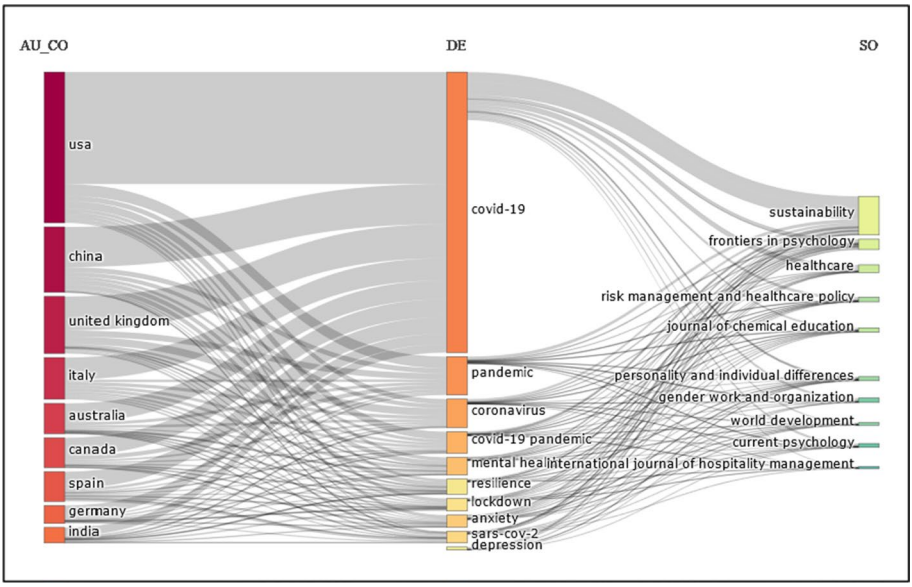

Fig. 7 Themes discussed by major contributing countries through major publishing outlets

energy transitions. The other hotspots in the research themes of these countries are digital inequalities along with (mis)information on social media. The research on government policies and individual differences to follow the governmental restrictions are there. Interestingly, the conspiracy worldviews regarding the disease have also been given due consideration in the research scope. At a broader aspect, all these issues have been dealt with at all levels-local, national, and world scale.

While the developed nation, like Australia, with low COVID cases, is sharing the research themes as of other developed nations but largely focused on the economy by studying the development of the country's stock price affected by the nationwide lockdown. Social behaviour has also been studied by judging the trust, and attitude towards government and well-being which has been disrupted due to the pandemic.

Themes discussed by the developing nations

Been largely recovered from the highly transmitting coronavirus disease and improving life conditions have distinguished the noticeable theme of research done in developing countries like China. It is mainly concentrated on the national scenario of socio-economic aspects responsible for the transmission of COVID-19 in local communities. Their research also focuses on the building up of their stock market sector. But, in a developing country like India, where the affected population from coronavirus disease is high, the studies are highly concentrating on some basic aspects like national conditions for maintenance of social distancing because of COVID-19. The research atmosphere is composed of studies on the factors and facilities of human development like higher education and health measures. The economic sphere has focused on the financial market, the performance of industries, and trade interconnectedness. The studies are so themed, that they help in forecasting and planning for national emergencies of this kind.

The observable pattern in the international scale publication is that the basic research areas in social sciences have quite vigorously dealt with the major issues of concern for all the countries in common. While the themes of inequalities and perceptions of national residents over various life activities along with other subjective parameters are getting focussed for the developed nations' concerned study aspect, the developing countries are mainly studying on the objective parameters, with less focus on micro-scale studies. The probability of a decline in research related to SARS outbreak is negotiable if the Covid-19 cases wane in the highly affected countries and the capability to mutate into deadly variants diminishes. However, quality of life experiences revolving around lifestyle change, working conditions, and environmental quality is in the embryonic stage and has the potential to enlighten the research community on the challenges faced by individuals, groups, and communities during the pandemic.

Dissemination of research knowledge between developed and developing countries

In the period of a pandemic due to COVID 19, the authors from different countries have been working upon the sufferings and impacts associated with the pandemic in all walks of life within the field of social sciences. The nature of the living standards and conditions of the people in the countries are dependent on the level of human development and economic growth within the nations. Thus, the impacts of COVID 19 on the same are researched over a myriad of themes. Thus, all the developed, developing, and least developed countries, have been creating a knowledge base over the sufferings from the present pandemic on the overall livability of the people based on their human development, presenting a vivid picture of the nature of the research work among the nations of the world throughout.

The nature of collaboration among the authors dealing with the themes of social sciences in COVID-19 research presents a view through a similar lens of the nature of publication by the different countries worldwide. The top 10 countries associated with the production of scientific works done on the themes are the same as that of the collaboration present among the authors, i.e., USA, England, China, Australia, Canada, Italy, Germany, Spain, India, and Netherlands. But, in terms of their human development, it is noticeable that these are the countries that are among the very high human development index holders along with being the developed nations of the world. The exception with China- having a high human development index, and India- having a medium human development index, which are among the developing nations. The authors from these two countries have been majorly showing collaborating tendencies with the authors from the developed nations, having a very high human development index. The collaborations between different income group as defined by the World Bank is displayed in Fig. 8a. A similar diagram representing the research cooperation between the top 10 countries with the most contribution to the Covid-19 social sciences research is also illustrated in Fig. 8b.

As has been reported by the United Nations, that the impact of COVID-19 on the least developing countries in the world would be gruesome in the social and economic sectors, more than the health situation (UNCTAD, 2020). This is so because, along with their economic situation, the human development of these nations is not too pleasant. Therefore, there was a necessity for the developed nations of the world who are highly active in the publication of papers on the social aspect of COVID-19 to collaborate with the least developing countries. This would have resulted in a boost to these nations to explore the areas of their concern better in a more adept form. As observed,

(a) Income Groups	High income	Upper middle income	Lower middle income	Low income
High income				
Upper middle income				
Lower middle income				
Low income				

(b) Countries	USA	ENGLAND	CHINA	AUSTRALIA	CANADA	ITALY	SPAIN	GERMANY	INDIA	NETHERLANDS
USA										
ENGLAND										
CHINA										
AUSTRALIA										
CANADA										
ITALY										
SPAIN										
GERMANY										
INDIA										
NETHERLANDS										

Fig. 8 Distribution of research collaborations **a** regions wise (based on income group) and **b** among top-most productive 10 countries; Green represents more than 200 collaboration, light green represents author collaboration between 100 and 200 authors, yellow represents author collaboration between 50 and 100 authors, and orange represents author collaboration between 0 and 50 authors

only Bangladesh and Ethiopia have collaborated with the major nations. Keeping aside the degree of collaboration, the research sector dealing with this field is poor in these countries, thus, reflecting the same in the collaboration among authors too.Within the picture, where the domination in publication and collaboration among authors is majorly among the developed nations of the world and the least developed countries are lagging, the developing nations are markedly present in the research work. The highly collaborating nations are working well with the developing countries with very high human development index, mostly-France, Chile, Argentina, Turkey, South Korea, Saudi Arabia, United Arab Emirates, Malaysia, Singapore, while India is collaborating with Greece and Turkey. The countries with high human development index like Brazil, Mexico, Columbia, Vietnam, Egypt, Indonesia, Jordan, South Africa, Philippines, and medium human development index like India, Pakistan, Kenya are also highly collaborated with nations. Nigeria is the only country with a low human development index but is a preferred country to collaborate with.

It is observed that the research ties are closely knit between the developed countries, with China and India being the only developing countries with better research ties. As COVID-19 has humongous effects on a multitude scale over the least developed and the developing nations with medium and low human development index, therefore, a resourceful body of knowledge can be gathered from the studies in those countries, while the collaboration of the authors from developed nations, having very high and high human development index, with the other nations, would give them the impetus for creating a means to counter the vulnerabilities through academic support from worldwide. Overseas research collaboration between developed and developing countries ensures leadership and directions from different institutions to build capacity and explore unconventional and ambitious research projects. The lesser number of research collaborations between the world's research elites and the poorest nations indicates the failure to address the local challenges faced by the least developed countries during the pandemic and missing out on research funds to conduct significant research works revolving around the social aspects of the impact of COVID-19 on people and communities and the workforce sector.

Need for research collaboration between countries

When the world is facing the out-turn of the COVID-19 outbreak contemporaneously, the issues experienced by the human community lays to be similar. The level of socio-economic development of the countries has determined the nature of response to the destruction created by the pandemic in human lives, property and society. The spatial variation in nature and degree of research on varying themes has presented that an introspection from the eyes of the researchers promotes policy makers to develop policies as per the importance highlighted from their studies and vice-versa. A research collaboration among the economically distinct nations would help to view the effects of pan-global epidemic on human lives and society under different lights with equal focus, which would bring up solutions towards betterment of humanity and lead to human development at an international level. Henceforth, the knowledge so created through this study can be discussed more frequently in academia by future researchers to work more cooperatively and enable evidence-based policy-making easier from research-outcomes for the policy makers of the governments in case of future threat to the human society at world-wide scale.

Conclusion

A new wave of research has emerged to document and map the impact of Covid-19 on global health—physically and mentally, and the social and economic disruption created by the pandemic. Most of the bibliographic studies encompass a plethora of research themes, concentrating on clinical or epidemiological aspects of Covid-19, overlooking the socio-economic disaster in the first phase of the pandemic. This study addresses the multidimensional nature of calamity through the lens of social sciences research. The literature discussing public health crisis from social, anthropological, economical, and environmental perspectives was detected, availed, and analysed using bibliographic techniques to decipher the topics discussed significantly in the social sciences domain, the spatial distribution of such studies, and how authors from different institutions have engaged with each other globally to spread the knowledge of consequences of Covid-19 on all aspects of human society, ranging from employment, business, industries, travel, and various services. Citation analysis, keyword co-occurrence analysis, and spatial network maps were strategically utilised to elucidate the potential themes characterizing Covid-19 research in the social sciences domain and the outcome of international collaborations between different countries amidst global emergencies.

The study summarizes that the current research topics envisage Covid-19 related discussions on mental health, psychosocial problems, unemployment, economic crisis, social distancing measures, tourism, and air pollution. The key themes were summed up as psychosocial problems among people, business economics and models, the outbreak of SARS, and discussions on the quality of life in terms of surroundings and the environment. Following the country-level assessment, the USA has performed the best with the highest number of publications and maximum international collaboration. England, China, Australia, and Canada have also performed equally in terms of publications, citations and have addresses the key themes significantly in their studies. The academic sphere demands a necessity for the developed countries who are documenting and publication papers actively on social sciences related publications addressing the impact of COVID-19 on different communities and sectors to collaborate with the least developing nations of the world to

encourage these nations to explore the areas of their concern in the best possible manner. Nevertheless, the social, economic, and environmental aspects of Covid-19 were discussed in this study, and it should be discussed more frequently in academia to enable evidence-based policy-making easier for future researchers.

Declarations

Conflict of interest None.

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