Scientific Production on Social Networks during the COVID 19 Pandemic

Dennis Arias-Chávez
Universidad Continental, Arequipa, Perú.
E-mail: darias@continental.edu.pe; https://orcid.org/0000-0003-1500-8366

Roger Wilfredo Asencios Espejo
Universidad Nacional de Educación Enrique Guzmán y Valle, Lima, Perú.
E-mail: rasencios@une.edu.pe; https://orcid.org/0000-0003-1801-2758

Richard Cervantes Juro
Universidad César Vallejo, Lima, Perú.
E-mail: perurichard1@gmail.com; https://orcid.org/0000-0003-4486-3353

Jessica Camayo Tovar
Universidad Nacional Mayor De San Marcos, Lima, Perú.
E-mail: jesica.camayo@gmail.com; https://orcid.org/0000-0002-2206-860X

José Elias Plasencia Latour
Universidad Católica Los Ángeles De Chimbote, Chimbote, Perú.
E-mail: jplasencial@uladech.edu.pe; https://orcid.org/0000-0002-5656-5276

Received September 08, 2021; Accepted December 08, 2021
ISSN: 1735-188X
DOI: 10.14704/WEB/V19I1/WEB19144

Abstract

This research seeks to characterize the global scientific production on social networks during the Covid-19 pandemic between the months of January 2020 to September 2021. A bibliometric study was carried out in five databases (Scopus, Web of Science, Google Academic, Microsoft Academic and Crossref). Bibliometric indicators were analyzed in a universe of 7889 articles obtained through Publish or Perish v. 7.19 and the same analytical software of the chosen databases. The results indicate that the article with the most citations is "Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland". The author with the most scientific production on the subject of social networks is J. Wu. Regarding the journal with the largest number of articles on the subject, IEE Access stands out, a peer-reviewed open access scientific journal published by the Institute of Electrical and Electronic Engineers. While the United States stands as the country with the highest production of articles on social networks. It is concluded that scientific production was mainly directed to the study of the behavior of

social networks during the pandemic. This increase generates an attractive phenomenon for researchers, who wish to evaluate and document totally new events for society. Stands as the country with the highest production of articles on social networks. It is concluded that scientific production was mainly directed to the study of the behavior of social networks during the pandemic. This increase generates an attractive phenomenon for researchers, who wish to evaluate and document totally new events for society. Stands as the country with the highest production of articles on social networks. It is concluded that scientific production was mainly directed to the study of the behavior of social networks during the pandemic. This increase generates an attractive phenomenon for researchers, who wish to evaluate and document totally new events for society.

Keywords

Bibliometrics, Scientific Production, Social Networks, COVID-19.

Introduction

Technology has allowed societies to grow and develop. Thanks to it, people can share information of all kinds in a short time, as well as establish a way of coexistence different from the traditional one, since virtuality prevails in this. This new ecosystem generates tools that the internet makes available to people to create and modify all kinds of content in a collaborative way. Social networks are virtual platforms that allow users to interact regardless of the time or space in which they are. Its use is not only restricted to transmitting information between communities of people but also between companies and organizations that seek in this medium the way to get their message more quickly and effectively. In recent years, social media has been used as platforms to organize political movements and social protests. Whatever the use that is given to social networks, it is important to know that all content transmitted through this medium is no longer private to become public content. Therefore, it is important to know and evaluate the information that is shared as well as what is uploaded to it.

For Khanday et al. (2021), social media has closed the communication gap by providing a large number of functions to transfer data from one user to another. As online social media has developed, sharing information has become a simple process that allows for immediate dialogue. The risk of sharing false or inaccurate information that leads to confusion has also become an imminent threat. The internet is the fastest medium through which this information travels, generating fear and even panic in those who read and share it. People use these media for various purposes such as brand ads, marketing, education, business (Babcock et al., 2019), as well as to search for health-related information that

helps them find answers that allow them to adopt behaviors and make intelligent decisions.

In early 2020, the outbreak of a disease caused by coronavirus (COVID-19) changed the lives of people around the world. COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new human pathogen that virologists believe arose from bats and eventually jumped to humans through an intermediate host. (Zu et al., 2020). The clinical manifestations range from mild or no symptoms to more serious diseases that can lead to lung failure and even death. (Cascella et al., 2021). "The absence of treatments and prevention measures generated an effort on the part of many countries in the development of different strategies to combat the virus, among which therapeutic approaches and preventive measures such as antiviral drugs and vaccines stand out" (Herrera-Peco et al., 2021).

With the advent of the pandemic, people turn to social media more than usual due to the ease of communicating with loved ones during confinement, as well as reliance on online news sources to search for health information for them and your loved ones. With social networks, the infodémic risk is amplified as information travels much faster and farther. However, for Abbas et al. (2021). This increase in the use of social networks had as one of its causes the appearance of the global health crisis, since it led people to seek gratifying and useful answers in these media in order to obtain emotional, informational and support of pairs. Social media, then, provides platforms that facilitate efficient communication, interactions, and connections between professionals in front-line practice, professional networks, education, and training with limitations identified as technical knowledge, professionalism, and protection risks of data (Chan & Leung, 2018).

The coronavirus disease 2019 (COVID-19) pandemic has spread across the world with a growing number of people infected. Naturally, the demand for information is high and people have been forced to share news about the pandemic and their experiences. Social media has played a central role during the ongoing pandemic and the wave of content related to COVID-19 has been referred to as an infodemic. (Gabarron et al., 2021).

In the current virtual context, social network applications have become means of communication to keep informed about the situation that is being lived. Although the virus is a reality, there are many groups that still distrust its origin, effects and consequences. This distrust is directed in particular towards vaccines, which they consider little or not at all legitimate and that behind them is the pharmaceutical industry that seeks to obtain great advantages from their production and sale. Over time, studies on its role in the current state of public health have been focused from various perspectives, for

example, the role of public institutions in the dissemination of information through Twitter and the need to create communication plans and public health surveillance programs to combat false news or manipulated messages transmitted by third parties (Herrera-Peco et al., 2021); also studies on the causes of the appearance of misinformation related to coronavirus disease, in order to promote actions that help reduce the spread of false or misleading information about the disease (COVID-19) on social networks during the first phase of the pandemic (Gabarron et al., 2021); the interaction of users on Twitter in the face of the pandemic emergency as well as citizen participation in this social network through the use of hashtag as social identity marks (Vela et al., 2021; Carrasco-Polaino et al., 2021); phenomena such as emotional contagion in social networks and digital communication processes, social networks and online processes on topics such as vaccines, treatments or containment measures to avoid contagion (Pasquel-López & Valerio-Ureña, 2021; Barredo et al., 2020) among others.

This panorama shows us that social networks have become spaces for dialogue about the pandemic and the convenience of the measures taken by governments and international institutions such as the WHO to control the advance of the disease. Within this framework, a descriptive bibliometric study of scientific production on social networks was carried out during the COVID-19 pandemic, analyzing documents based on bibliometric indicators. The results are expected to aid the development of future research. Although the study covers a limited period, the analysis of the information offers quantitative results and reveals regularities and behaviors of the subject, which makes it a starting point for subsequent analysis.

Materials and Methods

The documents that served as sources for the bibliometric analysis come from the Scopus, Web of Science, Google Academic, Microsoft Academic and Crossref databases. The cut-off date of the search was from January 2020 to September 2021. To calculate the bibliometric indicators, the Publish or Perish v. Software was used. 7.19. For the searches, the terms TI = (social network) were used in the title, abstract and keywords fields, in addition to the publication dates of the articles. The results were reviewed individually, forming a final universe of 7889 results that are related to the subject of the study.

Statistic Analysis

The data extracted from the analysis were exported to a database generated by Microsoft Corp.'s MS Excel programs. After this process, they were analyzed using the Vos Viewer software. The results obtained are presented in tables and figures.

Ethical Aspects

The present work had as unit of analysis scientific articles of public access (bibliographic material), which does not imply any contact with human subjects.

Results

Table 1 shows the results of the analysis of the bibliometric indices obtained from the 7889 articles. An average of 5125 citations was obtained, 2929 citations per year, 7 citations per article and 2269 citations per author. The publications on average have an h index of 23.00, a g index of 37 and an e index of 24. Finally, the AW index was 64 and the AWCR was 4584.

Table 1 Bibliometric indicators of scientific production on social networks during the COVID-19 pandemic

Source	Scopus	Microsoft Academic	Academic google	Crossref	Web of Science
Articles	200	1000	999	997	4693
Quotes	3996	6418	7208	713	7292
Years	1	1	1	1	1
Appointments per year	3996	6418	7208	713	7292
Citations per article	19.98	6.42	7.22	0.72	1.87
Citations by author	3996	1979.78	2756.69	342.13	
Articles by author	200	325.11	369.64	508.56	
Authors by article	1	4.3	3.39	1.99	
h index	25	24	31	eleven	26
index g	40	44	51	13	
hc index	72	64	76	28	
hi index	25	5.43	10.22	4.32	
normal h-index	25	13	19	7	
AWCR	3996	6418	7208	713	
AW index	63.21	80.11	84.9	26.7	
AWCRpA	3996	1979.78	2756.69	342.13	
index e	26.06	31.27	33.6	6.48	
Hm index	25	16.79	22.9	7.9	
Citations per author per year	3996	1979.78	2756.69	342.13	
hI_Annual	25	13	19	7	
Amplitude h	32.6	24.2	29	22.9	
Amplitude g	41.4	30.9	36.3	25.7	
he has	25	24	31	eleven	

Note. Study data.

The research of Timon Elmer, Kieran Mepham and Christoph Stadtfeld is noteworthy. The article is titled “Students in Lockdown: Comparisons of students' social media and mental health before and during the COVID-19 crisis in Switzerland”, which aimed to investigate the social media and mental health of students before and during the COVID pandemic. -19 in April 2020, using longitudinal data collected since 2018. This article received 167 citations in the Scopus database and 153 in Web of Science since its publication on July 23, 2020 in the journal PLOS ONE.

Also noteworthy is the article "COVID-19 and the 5G conspiracy theory: social network analysis of Twitter data" by the authors Wasim Ahmed, Josep Vidal-Alaball, Joseph Downing and Francesc Lopez Seguí. This article was published in the "Journal of Medical Internet Research" on May 6, 2020, and aimed to develop an understanding of the drivers of the 5G COVID-19 conspiracy theory and strategies to deal with such misinformation. This post features 317 citations in Google Scholar, 290 in Microsoft Academic, 160 in Scopus, and 129 in Web of Science.

Finally, the article by Per Block, Marion Hoffman, Isabel J. Raabe, Jennifer Beam Dowd, Charles Rahal, Ridhi Kashyap and Melinda C. Mills stands out, entitled “Social network-based distancing strategies to flatten the covid-19 curve in a post-lockdown world”, whose objective was to evaluate the effectiveness of three distancing strategies designed to keep the curve flat and aid compliance in a post-lockdown world. The article has 136 citations in Scopus, 131 in Web of Science, 274 in Google Academic and 272 in Microsoft Academic. The article was published in the journal "Nature Human Behavior" on June 4, 2020.

The scientific production described shows the behavior of the scientific production on COVID-19, which is varied. These results are relevant above all because all types of articles published by journals were included, which makes the present study encompass broad and complete results. However, this approach must be taken with care since, for further analysis, each type of scientific document must be independently analyzed in order to determine its contribution. Similarly, it is highlighted that the metrics performed may vary in the short term since, as can be seen, the scientific production on COVID-19 is increasing. In view of the demand to publish research on the disease, many journals have implemented the modality called "advance publication" which has been speeding up the rapid dissemination of results.

Table 2 shows the results of authors, journals and countries with the highest number of publications on social networks, as well as the types of publications. The results prioritize the two most important databases: Scopus and Web of Science.

Table 2 Scientific production on social networks by authors, journals, countries and type of publication

	Web of Science		Scopus	
Authors	Wu, J.	40	Wu, J.	2. 3
	Zhang, Y.	24	Wu, W	22
	Wang, Y.	2. 3	Kumar, S	eleven
	Li, Y	19	Chen, G	10
	Wu, W	19	Fu, L.	10
Journals	IEEE Access	119	Lecture notes in Computer Science	153
	Sustainability	73	IEEE Access	118
	International journal of environment	58	Advances In Intelligent Systems And Computing	97
	Plos one	53	Ceur Workshop Proceedings	62
	Information science	41	Communications In Computer And Information Science	62
Countries	USA	1204	China	1434
	China	1157	USA	1326
	England	362	India	453
	Spain	328	United Kingdom	443
	Australia	210	Spain	361
Post types	Articles	4254	Articles	4415
	Early access	504	Conference paper	1362
	Review	150	Review	188
	Meeting abstracts	144	Book chapter	122
	Editorial materials	58	Erratum	35

Regarding the authors with the greatest scientific production on the subject of social networks, J. Wu stands out, affiliated with the Central South University, School of Computer Science and Engineering of China, with 40 publications in Web of Science and 23 in Scopus. Regarding the journals with the largest number of articles on the subject, IEE Access stands out, a peer-reviewed open access scientific journal published by the Institute of Electrical and Electronic Engineers. This magazine features 119 posts on social media on the Web of Science and 118 on Scopus. Regarding the production on social networks by countries, the US stands out with 1204 in Web of Science and China with 1434 in Scopus. Finally, regarding the type of publications, scientific articles predominate, these being 4254 in Web of Science and 4415 in Scopus. This result shows the importance of the publication of original results for the scientific community, since, according to Postigo-Zumarán et al. (2021), "these documents allow us to know the assessment and contribution of validated knowledge to explain and respond to scientific problems".

Regarding the network analysis of the titles and abstracts of the Scopus database, the creation of 4 clusters, 575 items, 52149 links and a total link strength of 127143 is observed. The red cluster 1 that is born from participant has 322 Items, cluster 2 green with user, 176 items, cluster 3 with feature and 76 items, and cluster 4 with baseline and only 1 item (see figure 1).

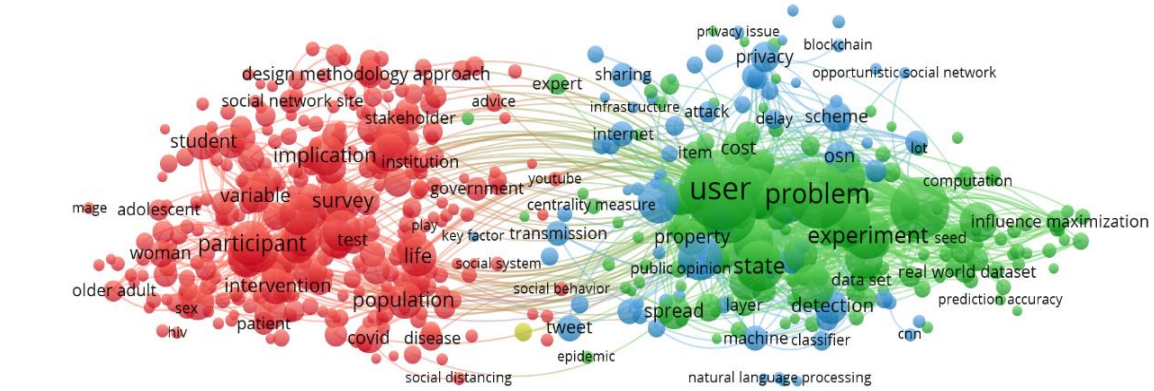

Figure 1 Analysis of the network visualization in Scopus

Analyzing the network of titles and abstracts of the Web of Science database, the creation of 3 clusters, 302 items, 20368 links and a total link strength of 54772 is observed. Cluster 1 red, which is born from relationship presents 168 items, cluster 2 green with paper and 133 items and cluster 3 blue with customer and 1 item (see figure 2).

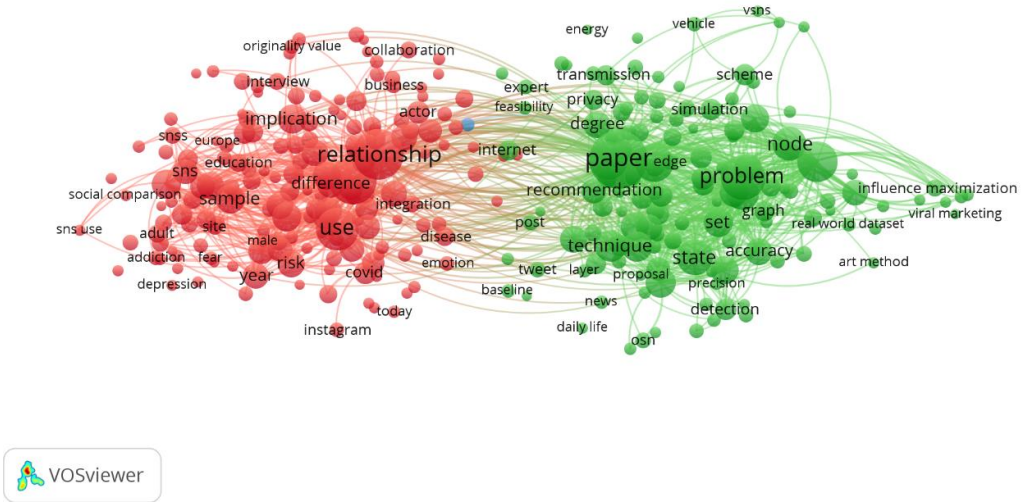

Figure 2 Analysis of network visualization in Web of Science

Discussion

Social networks are currently the means by which people seek to inform themselves in real time of different world events. The current pandemic has only accentuated the role of social networks since millions of messages with health content are transmitted through their channels. More than a third of the world's population uses social networks, and this number increases in countries with advanced economies and in some developing ones (Goodyear et al., 2021). The contents that are transmitted via Facebook, YouTube or Instagram are diverse, from unproven treatments to combat COVID-19, to diets and lifestyles that are in tune with the state of confinement imposed by governments. And while many serious institutions share scientific information, many other pages seek to create chaos by spreading false news that, unfortunately, usually go viral in a matter of seconds.

Digital communication, in recent decades, has evidenced significant transformations in the mediations of daily life and the habits of access, reception, consumption, and appropriation of audiences. Whatever the process, the construction of a new media ecosystem is observed, in which technology becomes invisible, even with significant relevance. (Barredo et al., 2020).

Currently, a large number of scientific articles are disseminated through social networks, although they are not always of good quality. The need to know the scope of COVID-19 has accelerated the publication and dissemination of scientific documents. Similarly, many of the findings (which may only be preliminary) have served as the basis for the drafting of prevention policies by the countries. This accelerated growth means that what is known one day, changes for the next, which is why there is a need to closely follow the studies whose results are of good quality and without any excess of doubt.

This research sought to characterize the global scientific production on social networks during the Covid-19 pandemic, in the Scopus, Web of Science, Google Academic, Microsoft Academic and Crossref databases between the months of January 2020 to September of the year. 2021.

In this line, Su et al. (2020) conducted similar research using bibliometric analysis to identify the current state of the academic literature regarding social network analysis (ARS). To do this, they evaluated authors, countries, type of document, analysis of keywords and subject areas during the period 1999-2018. Now, this research was based only on the years 2020 and part of the year 2021, years in which the Covid-19 pandemic

developed, observing a significant increase in world scientific production on the subject in recent months.

Vinader-Segura et al. (2020) worked with a population of 734 documents from 2010 to 2019 using the Dialnet database, ending with a sample of 185 units of analysis in 15 academic journals analyzed. For its part, Delcea et al. (2015). The worked with the Web of Science search engine, obtaining 64,742 results, of which he selected 12687 papers that contained the phrase social network in the title. Both studies consider significant ranges, hence the number of articles found and selected. The present study shows a considerable number of results even though it only considered two years. Likewise, the search covered five databases, which is a relevant factor when determining the world production on the phenomenon. The results indicate that the issue of social networks has taken a particular role in this context of pandemic.

Regarding the most cited authors and articles published in the analyzed databases, the study by Elmer, Timon; Mepham, Kieran; Stadtfeld, Christoph, entitled "Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland", which has received 167 citations in Scopus and 153 in Web of Science since its publication on July 23, 2020 in PLOS ONE.

Regarding the journals that publish studies on social networks, "IEE Access" stands out, with 119 publications in Web of Science and 118 in Scopus. Rezvanian et al. (2019) corroborates this result after conducting a bibliometric analysis on social networks and learning systems, in which they evaluated 1,768 articles indexed in Web of Science (WoS) until November 2018. However, in the research of García González et al. (2017). The most prominent journals were "Procedia Social and Behavioral Sciences" by Springer publishing house and "The Internet and Higher Education" by ScienceDirect publishing house with 3 publications each, accounting for 18.18% of the total, followed by "Computers & Education", "Communication Education", "Computers in Human Behavior" and "Learning, Media and Technology", with 2 publications each, generating 24.24% of the total. While in the study of Su et al. (2020), highlight the magazines "Scientometrics", "Plos One" and "Social Networks". Finally, Lopes et al. (2017), point to "Computers and Education" from Elsevier publishing house as the most relevant journal by number of publications (22) and impact factor. It should be noted that, as in the current research, there is a multidisciplinary nature in the journals reviewed with the largest number of publications on social networks.

In relation to the countries with the highest number of publications on social networks, García González et al. (2017) indicates that the United States is the country with the highest scientific production on this topic. This result coincides with what was found in the present study, where The US ranks first, followed by China, the UK, and Spain. Su et al. (2020). They corroborate in their study that the United States, the United Kingdom and China are the countries with high productivity conducting research on social networks.

With regard to the types of publications, original scientific articles predominate. This result coincides with that found by Zyoud et al. (2018) in his bibliometric study on global trends in research related to social networks in psychology. The authors determined that the most common type of document was original research articles (873; 91.03%).

Regarding the network analysis of titles and abstracts, the Vos Viewer tool was used, as suggested Furstenau et al. (2021). In the present investigation, relevant terms were obtained in both databases, being these in the Scopus database, 4 clusters, 575 items, 52149 links and a total link strength of 127143. In the Web of Science database, notes the creation of 3 clusters, 302 items, 20368 links and a total link strength of 54772. In the study of Gan & Wang (2014), the most used author keywords that appeared in the articles were "social networks", "social network", "Internet", "communication", "Web 2.0", "blog", "Twitter", "Facebook" and " virtual community ".

The advancement of the disease around the world has generated concern for people since they represent a strong threat to global public health. Therefore, the actions to control its progress have been multiple. Controlling the virus not only involves implementing containment measures, but also through rigorous monitoring of the scientific literature to be published in scientific journals. This control allows to have first-hand results on processes, measures and possible cures for the disease that may well be adopted by the countries.

For this, companies such as Facebook have established agreements with organizations such as the World Health Organization and various health authorities to ensure the quality of the content related to the pandemic, disseminated on their platform. These agreements seek to reduce the impact of false or biased news (although the latter is not entirely false, it can generate confusion and rumors). Communication plays an important role in high-impact social problems, such as the spread of COVID-19 infections.

A person exposed to a large amount of information through social networks must fully develop his capacity for discernment that leads him to make decisions based on evidence.

The use of communication on social networks in health contingency situations can be summarized as: sharing and disseminating important information (disease outbreaks, diagnosis, treatment and follow-up protocols), learning from approaches from other countries, increasing awareness, stay connected with others, as well as receive and offer social support to acquaintances and support socio-psychological states. (Pasquel-López & Valerio-Ureña, 2021).

Scientific production on the subject has been growing and expanding exponentially from different fronts, although all of them are aimed at finding solutions that slow the progression of the disease. In this sense, important publishers such as Elsevier, Taylor and Francis and Springer have given open access to their articles related to COVID-19 in order to promote and increase studies that generate new knowledge and solutions to the problem. Bibliometric studies allow an account of the rate of scientific production as well as its characteristics. They also allow establishing trends and regularities given the multidisciplinary nature of the COVID-19 research front and the multitude of data sources existing to date. Therefore, a characterization of production is urgently needed to help researchers understand and visualize the phenomenon (Torres-Salinas, 2020).

To date, the amount of bibliometric studies on the scientific production on COVID-19 has increased considerably, despite having limitations compared to studies that use statistical methods to generalize results. Therefore, and coinciding with O´brien et al. (2021), it is important to highlight that the rapid evolution of the COVID-19 pandemic, statistical variations and the accelerated production of new research results represent a limitation of the present investigation.

It is concluded that this is an original and original bibliometric analysis worldwide that measures the scientific production referring to social networks in times of the Covid-19 pandemic, showing that the production was mainly directed to the study of the behavior of social networks during the pandemic.

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