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Trends, characteristics, and impact of global scientific production on mental health of health workers in the context of coronavirus disease 2019 (COVID-19)

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Abstract:

BACKGROUND: Healthcare workers are under significant constant stress as a result of the coronavirus disease 2019 (COVID-19) pandemic. The aim of this study, therefore, was to analyze bibliometrically the impact, trend, and characteristics of scientific production related to the mental health of health professionals during the COVID-19 pandemic.

MATERIALS AND METHODS: A bibliometric analysis of the scientific production on the mental health of health professionals and COVID-19 in Scopus from December 2019 to December 2021 was performed. An advanced search was designed using Boolean operators in Scopus and applied in April 2022. The metadata was entered into Microsoft Excel for the elaboration of the tables, SciVal to obtain the bibliometric indicators, and VosViewer to plot collaborative networks.

RESULTS: A total of 1393 manuscripts, 1007 of which met the eligibility criteria, were found on the mental health of health workers and COVID-19.The country with the highest academic production was the United States and Harvard University with 27 manuscripts as the most productive institution. The scientific journal with the highest scientific production was the *International Journal of Environmental Research and Public Health* with 138 manuscripts and 1580 citations, and the author with the most citations per publication was Carnnasi Claudia with 69.8.

CONCLUSION: The countries with the highest economic income occupy the first places in scientific production on the mental health of health workers during the COVID-19 pandemic, with the United States as the leader. There is a gap in the scientific knowledge on the mental health of healthcare workers during the COVID-19 pandemic in middle- and low-income countries.

Keywords:

Bibliometric analysis, coronavirus disease 2019, health workers, mental health

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic has had an impact on society like no other preexisting pandemic, both because of its rapid spread and mortality[1] and because of the consequences of the containment measures. This health crisis, combined with other social, political, economic crises, and natural disasters occurring at the same time, caused drastic modification of lifestyle and huge affect on mental health of people in all spheres of society.[2-4] Health workers, one of the most impacted groups, with the sudden work overload, the high risk of contagion, the high mortality of patients and colleagues, the uncertain management of COVID-19, family

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isolation among others have been severely affected by the pandemic since its onset in December 2019.,[5] It has been evidenced that the pandemic has had a significant impact on the healthcare system.

A higher incidence of pathologies such as posttraumatic stress disorder,[5-7] generalized anxiety and depression[8-10] has been evidenced in healthcare workers during the pandemic. In epidemics previous to COVID-19, it was observed that the mental health of health professionals suffered from medium and long-term consequences. One study found that after a pandemic, a higher number of negative feelings and a lower happiness index were manifested in healthcare workers than in the general population. In addition, a higher incidence of posttraumatic stress disorder, depression, drug use, and alcohol dependence in this population was observed in the long term.[11]

This impact on the social spheres has managed to disrupt the psychological axes of the population in general. Therefore, anxiety about the possible effects of the COVID-19 pandemic on mental well-being has been manifested in a considerable amount of scientific production on these issues worldwide.[12] Due to their vital participation in the current health crisis, health professionals form the group studied with greatest acuity.

Bibliometric studies enable the study of scientific production, and allow us to reveal publication trends by country, region, institution, authors, topics, among others; and observe the density of publications according to the country or institution of creation. Likewise, the main function of such research is the supervision of research activity, as well as the description and analysis of bibliometric variables.[13,14] Thus, by exploring the scientific performance in this field, we can identify the regions with the lowest production to encourage research in them.

Consequently, the aim of this study was to perform a bibliometric analysis of the scientific production on the mental health of health workers during the COVID-19 pandemic.

Materials and Methods

In this descriptive study, unit of analysis was each scientific publication appearing in the Scopus database. All manuscripts on the mental health of health personnel and COVID-19 published between December 2019 and December 2021 were selected, so sample calculation was not necessary. Variables were measured using Scopus (SciVal). The search was applied in April 2022. Ethical approval was not applicable in this research, as the study did not involve any direct participation of human subjects.

The keywords "mental health," "healthworkers" and "COVID-19" with their respective MeSH terms were used to extract the manuscripts using the Boolean operators "OR," "AND" "W/" and "LIMIT TO." The search fields for title, abstract, and keywords were used to increase bibliometric indicators. The following formula was applied in Scopus: TITLE-ABS-KEY (2019*cov OR ncov OR (((cov) W/2 (19 OR 2019 OR 2)) AND NOT ("Coefficient* ofvariation" OR "Torsion" OR cov * o*)) OR (covid W/2 (19 OR 2019 OR 2)) OR covid19 OR (covid AND NOT tocovid) OR ((coronavirus OR "Corona virus" OR cov) W/2 (disease OR infection) W/2 (2019 OR 19 OR 2)) OR ((sars OR "Severe acute respiratorysyndrome" OR sras) W/2 (cov OR coronavirus OR "Corona virus" OR covid) W/2 ("2" OR 2019 OR 19)) OR "SARS-CoV2" OR sarscov2 OR "SRAS-CoV2" OR "Severe acute respiratorysyndrome COV2" OR ((((novel OR wuhan OR china OR pandemi OR outbreak OR "new human" OR crisis OR "new cases" OR "normalcy") W/2 (coronaviru * OR "corona viru*" OR covid)) OR ("new corona*" AND NOT (coronar*)))) OR "Corona pandemic" OR (wuhan W/2 pneumonia) OR "Corona crisis" OR "Corona outbreak" OR "20I 501Y. V1" OR "20J501Y. V3" OR "CAL.20C" OR "20H501Y. V2" OR "mRNA 1273 vaccine" OR "Covishield" OR "AZD1222" OR "Ad26. COV2. S" OR "JNJ 78436735" OR "Ad26COVS" OR "BNT162 vaccine" OR "BNT162-01" OR "BNT162b1" OR "BNT162a1" OR "BNT162b2" OR "BNT162c2") AND TITLE-ABS ("mental health" OR "mental disorder" OR "psycologicaldistress" OR "wellbeing" OR "depression" OR "anxiety" OR "burnout" OR "psiqui*" OR "psyco*" OR "stress" OR "post traumatic stress" OR "suicide") AND AUTHKEY ("mental health" OR "mental disorder" OR "psycologicaldistress" OR "wellbeing" OR "anxiety" OR "burnout" OR "psiqui*" OR "psyco*" OR "post traumatic stress" OR "suicide") AND TITLE-ABS-KEY ("healthworkers" OR "nurs*" OR "physician*" OR "caregiver*") AND (LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019)).

The selection criteria were as follows: manuscripts in Scopus-indexed journals, manuscripts in any language, and manuscripts of any methodological design. Microsoft Excel was used to collect descriptive data. Means and percentages of categorical and numerical variables were expressed in tables and graphs. Scopus search tools were used for bibliometric measurements. Between December 2019 and December 2021, 1393 manuscripts were downloaded and refined through metadata analysis. Publications

included article-type manuscripts (1204), letters (13), reviews (140), editorials (10), notes (9), errors (1), short surveys (2), book chapter (3), conferences (10), and retractions (1). The metadata found in SciVal was downloaded in comma-separated value format and registered in Microsoft Excel, where it was analyzed by Institution, Author, Scopus Journal, CiteScore, quartile, and collaboration using tables.

The information was processed by SciVal of Scopus using the sections of generalities, comparative evaluation, collaboration, and trends, and were analyzed for countries, institutions, authors, publications, thematic fields, and journals. In addition, collaborative networks of scientific production were performed using VosViewer. Finally, Microsoft Excel was used to calculate frequencies and percentages. The bibliometric indicators that were analyzed with SciVal were the H index, to determine the impact of the published manuscripts of an institution, author, or country; the Source-Normalized Paper (SNIP) to determine the impact of a manuscript or journal in its subject field, the CiteScore to evaluate scientific journals according to the ratio of citations per manuscript per year for the past 4 years between the number of manuscripts published in the past 4 years; the Field-Weighted Citation Impact (FWCI) to measure the impact of citations obtained per manuscript compared to expected citations; the SCimago Journal Rank (SJR) to measure the quality of scientific journals indexed in Scopus; the Scholarly Output to determine the number of manuscripts published per author, institution or journal; and the Citation per publication to determine the average number of citations of manuscripts, journals, authors, or institutions.

Results

The search strategy found 1393 publications in Scopus on the mental health of healthcare workers during the COVID-19 pandemic. The SciVal analysis, after eliminating duplicates and null values, found 1007 manuscripts. It was observed that the country that led academic production was the United States with 281 manuscripts, followed by the United Kingdom with 145, China with 141, Italy with 119, and Spain with 79.

The journal with the most publications was the *International Journal of Environmental Research and Public Health,* with 138 publications and 1580 citations involving 960 authors. Its SNIP was 35% higher than average, although its SJR was not the highest of the top 10 journals. The journal in the top 10 with the highest SJR was the *Journal of Psychiatric Research.* Although the *Journal of Psychiatry Research* has only 9 publications and has the fewest authors in the top 10, it has 1436 citations and thus ranked second in the top 10 according to this variable [Table 1].

The institution with the highest academic output, with 27 manuscripts, was Harvard University. Wuhan University manuscripts had the greatest impact with 700 citations in its 13 published articles with 53.8 as the average number of citations per article. The university with the highest number of authors was Huazhon University of Science and Technology, with 71 authors, followed by the University of Toronto and King's College London [Table 2].

The author with the most citations was Carnassi Claudia, with 4 manuscripts, 69.8 citations per publication, an FWCI 9.0 times more than the overall average. She also has the highest H-index of the Top 10 with 38 points, followed by Magnavita Nicola with 207 articles, and also an FWCI of 13.2 times more than the global average [Table 3].

The highest percentage of manuscripts was published in 2021 with 74.7% of the global academic production, and most of the publications concentrated in Q2 journals with 41.3% of the global production. It was observed that

Table 1: Top 10 journals with the highest scholarly output on mental health of health workers and coronavirus disease 2019

Number°	Scopus magazine	Citations per publication	Citations	Scholarly output	Authors	SNIP	CiteScore 2020	SJR
1	International Journal of Environmental Research and Public Health	11.4	1580	138	960	1.3	3.4	0.7
2	Frontiers in Psychiatry	13.6	695	51	417	1.2	3.5	1.3
3	BMJ Open	6.7	234	35	291	1.3	3.7	1.1
4	Frontiers in Public Health	4.3	65	15	100	1.2	2.7	0.9
5	Journal of Affective Disorders	36.3	436	12	108	1.7	6.3	1.8
6	Psychiatria Danubina	8	96	12	80	0.5	1.6	0.3
7	Healthcare (Switzerland)	7.5	83	11	91	-	-	-
8	Psychiatry Research	159.6	1436	9	47	1.2	5	1.2
9	BMC Psychiatry	12.9	103	8	51	1.7	4.7	1.4
10	Journal of Psychiatric Research	15	120	8	74	1.5	6.7	1.8

SNIP=Source-normalized impact per paper, CiteScore=Rate of citations, SJR=SCimago Journal Rank

Table 2: Top 11 institutions with the highest scholarly output in scopus on mental health of health workers and coronavirus disease 2019

Number°	Institution	Country	Citations by publication	Citations	Scholarly output	Authors
1	Harvard University	USA	11.7	316	27	55
2	University of Toronto	Canada	5.6	124	22	70
3	King's College London	UK	9.1	163	18	67
4	Huazhong University of Science and Technology	China	36.9	590	16	71
5	Institutnational de la santé et de la recherche médicale	France	27.8	445	16	35
6	University College London	UK	13.6	218	16	45
7	University of British Columbia	Canada	4	56	14	39
8	Wuhan University	China	53.8	700	13	60
9	University of Melbourne	Australia	6.3	75	12	36
10	University of Calgary	Canada	6.4	77	12	44
11	New York University	USA	19.6	235	12	18

Table 3: Top 10 authors with the highest schorlarly output on mental health of health workers and coronavirus disease 2019

Number°	Names	Citations by publication	Citations	Scholarly output	Field-weighted citation impact	H index
1	Vitale, Elsa	5	25	5	2.4	7
2	Mea, Rocco	5	25	5	2.4	3
3	Galatola, Vito	5	25	5	2.4	3
4	Magńavita, Nicola	41.4	207	5	13.2	33
5	Franza, Francesco	7.8	31	4	1.6	4
6	Carmassi, Claudia	69.8	279	4	9.0	38
7	Caruso, Rosario	0.5	2	4	0.4	12
8	Chung, Seockhoon	7.5	30	4	3.3	23
9	Morawa, Eva	7.8	31	4	4.9	11
10	Willis, Karen	4	16	4	2.1	22

Table 4: Scientific production on mental health of health workers and coronavirus disease 2019 by quartile of the journal

CiteScore	2020 *N* (%)	2021 *N* (%)	Global *N* (%)
Q1[a]	83 (32.5)	193 (25.7)	276 (27.4)
Q2[b]	85 (33.3)	331 (44.0)	416 (41.3)
Q3[c]	54 (21.2)	149 (19.8)	203 (20.2)
Q4[d]	33 (12.9)	79 (10.5)	112 (11.1)
Total	255 (25.3)	752 (74.7)	1007 (100.0)

[a]Top 25%, [b]Top 26% – 50%, [c]Top 51% – 75%, [d]Top 76% – 100%.
CiteScore=Rate of citations

the academic production in 2021 was 255 manuscripts as against 752 manuscripts in 2022 [Table 4].

The manuscripts had mostly national collaboration, 48.3% of which also had the highest production (505 publications) and the highest number of citations (6400). The manuscripts that received international collaboration had the highest impact, 5.0 times more than the global average [Table 5].

It was found that the United States, the United Kingdom, and China were the most productive countries, with an average of 282, 145, and 141 manuscripts, respectively [Table 6].

Discussion

The COVID-19 pandemic has led to an exponential development of research never seen before owing to the seriousness of its impact on society.[15,16] Multiple mental health problems have been triggered in the entire population, and is more acute in health personnel because of the large number of stressors they faced.[17,18] The aim of this study was to study the scientific production of mental health in health professionals during the COVID-19 pandemic using bibliometric analysis and collaborative network visualization.

The impact of COVID-19 on population mental health is a topic already studied bibliometrically. The first bibliometric study in Scopus conducted with data collected in July 2020 and found 277 articles.[4] By June 2021, a similar study conducted on the Web of Science platform had found 5449 publications[19] while another in PubMed in the same period found 85 articles.[12] In Latin America, data from May 2020 were analyzed in Scielo and found 261 manuscripts.[16] Around August 2020, a comparison done on research on mental health in response to COVID-19, Ebola and H1N1 found that COVID-19 had more academic production than the

Table 5: Collaboration between institutions, regions, and countries of manuscripts on mental health of health workers and coronavirus disease 2019

Metrics	Collaboration percentage	Academic production	Citations	Citations per publication	Field-weighted citation impact
International collaboration	24.3	254	4398	17.3	5.0
Only national collaboration	48.3	505	6400	12.7	4.0
Only institutional collaboration	24.2	253	2485	9.8	2.9
Single authorship (no collaboration)	3.2	33	193	5.8	2.1

Table 6: Top 10 most productive countries with the highest scholarly output on mental health of health workers and coronavirus disease 2019

Country/region	Scholarly output	Views count	Field-weighted citation impact	Citation count
United States	282	12833	5.4	6983
United Kingdom	145	8480	6.64	4488
China	141	7734	7.09	5084
Italy	119	6382	4.55	2980
Turkey	82	2385	3.87	922
Spain	78	8029	6.57	2000
Canada	76	3049	3.73	1082
Australia	59	2959	4.91	992
Iran	49	2358	4.44	819
Brazil	48	2067	3.31	594

other epidemics. However, no bibliometric studies relating to the mental health of health professionals was found in Scopus. This is the first bibliometric study on this topic.

It was found that the journal with more publications and more citations was the *International Journal of Environmental Research and Public Health*, the journal with more impact index normalized by journal was BMC Psychiatry (BioMed Central) for publications on the mental health of health professionals during COVID-19. These results are consistent with articles that evaluated mental health output and COVID-19 globally. The study by Gul *et al*. found in mid-2020 that the *Journal of Environmental Research and Public Health* had the first place in scholarly output,[4] though the study by Akintunde *et al*. put this journal in second place after Psychiatry Research. By mid-2021, in Women Scientist Scheme,[19] like Chen *et al*. found Psychiatry research in the first place of publications and in first place in citations, and *Lancet and Lancet Psychiatry* in second place.[20] The country with the most academic production in our study has the highest academic production in the world.

The country with the highest academic output in our study was the United States, followed by the United Kingdom and China. In relation to mental health and COVID-19 in the general population, the United States, China, the United Kingdom, and Italy led in scientific production.[19-21] It is interesting to note that in the COVID-19, EBOLA, and AH1N1 pandemics, the United States and the United Kingdom led research in mental health.[21] Likewise, like the studies described above, the greatest academic production was in medicine.

The author with the most citations was Chang Bernard P., and Magnavita Nicola had the highest number of publications. The author with the highest citation index weighted by field was Bruera, who obtained 104 citations from his two published manuscripts, and the author with the highest H-index was Kessler Ronald. In contrast to our study, a bibliometric analysis in Web of Science on the mental health of the general population and COVID found that the author with the most publications was Zhang L. with 29 manuscripts and 1745 citations,[19] but another study found Griffiths MD in first place for publications with 16 articles.[20]

Regarding the output of institutions, the most productive in our study was Harvard University; as was found globally from 2020 to 2021 by Akintunde, followed by King's College London.[19] Gul *et al*., and Chen *et al*., found that Huazhong University of Science and Technology led in academic output during 2020.[4,20] The institution with the most citations was Wuhan University, a different result from the Chen *et al's* study, and those of Akintude and Gul who found that the most cited universities were Wuhan University, Harvard University and Huazhong University of Science and Technology, respectively.[4,19,20]

This growing interest in research on the mental health of healthcare professionals observed in this study may be due to the public's demands on healthcare workers during the pandemic, as well as the high mortality observed in this population with the death of at least

180, 000 healthcare worker reported by May 2021, and a mortality rate of 37.3 deaths per 100 infected.[22]

Conclusion

High-resource countries with the United States in the forefront, lead in health worker mental health research. No middle-income or low-income country was found within the top 10 of scientific production for any variable, revealing a knowledge gap in these regions. Since the working conditions of health personnel in the middle-income and especially low-income countries are rather unfavorable, the problems they face require further study. We recommend reinforcing the study and publication of manuscripts on this topic in countries with greater challenges for their health personnel.

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Conflicts of interest
There are no conflicts of interest.

References

1. Louie S, Shi Y, Allman-Farinelli M. The effects of the COVID-19 pandemic on food security in Australia: A scoping review. Nutr Diet 2022;79:28-47.
2. Lidz V. Afterword: A functional analysis of the crisis in American society, 2020. Am Sociol 2021;52:214-42.
3. Watson P. Stress, PTSD, and COVID-19: The utility of disaster mental health interventions during the COVID-19 pandemic. Curr Treat Options Psychiatry 2022;9:14-40.
4. Gul S, Rehman SU, Ashiq M, Khattak A. Mapping the scientific literature on COVID-19 and mental health. Psychiatr Danub 2020;32:463-71.
5. Noorbala AA, Bagheri Yazdi SA, Faghihzadeh S, Kamali K, Faghihzadeh E, Hajebi A, *et al*. A survey on mental health status of adult population aged 15 and above in the province of Kerman, Iran. Arch Iran Med 2017;20 11 Suppl 1:S55-8.
6. Balsamo M, Carlucci L. Italians on the age of COVID-19: The self-reported depressive symptoms through web-based survey. Front Psychol 2020;11:569276.
7. Azoulay E, Cariou A, Bruneel F, Demoule A, Kouatchet A, Reuter D, *et al.* Symptoms of anxiety, depression, and peritraumatic dissociation in critical care clinicians managing patients with COVID-19. A cross-sectional study. Am J Respir Crit Care Med 2020;202:1388-98.
8. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. Psychiatry Res 2020;288:112936.
9. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, *et al.* Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. Psychother Psychosom 2020;89:242-50.
10. Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, *et al.* Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. J Nurs Manag 2020;28:1002-9.
11. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, *et al*. The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. Lancet 2020;395:912-20.
12. Caballero-Apaza LM, Vidal-Espinoza R, Curaca-Arroyo S, Gomez-Campos R, Callata-Gallegos Z, Fuentes-López J, *et al.* Bibliometric study of scientific productivity on the impacts on mental health in times of pandemic. Medicina (Kaunas) 2021;58:24.
13. Mayta-Tovalino F, Pacheco-Mendoza J, Diaz-Soriano A, Perez-Vargas F, Munive-Degregori A, Luza S. Bibliometric study of the national scientific production of all peruvian schools of dentistry in scopus. Int J Dent 2021;2021:5510209.
14. Mayta-Tovalino F. Bibliometric analyses of global scholarly output in dentistry related to COVID-19. J Int Soc Prev Community Dent 2022;12:100-8.
15. Liu N, Chee ML, Niu C, Pek PP, Siddiqui FJ, Ansah JP, *et al.* Coronavirus disease 2019 (COVID-19): An evidence map of medical literature. BMC Med Res Methodol 2020;20:177.
16. Gallegos M, Cervigni M, Consoli AJ, Caycho-Rodríguez T, Polanco FA, Martino P, *et al*. COVID-19 in Latin America: A bibliometric analysis of scientific publications in health. Electron J Gen Med 2020;17:1-7.
17. Yellowlees P. Impact of COVID-19 on mental health care practitioners. Psychiatr Clin North Am 2022;45:109-21.
18. Desta AA, Woldearegay TW, Gebremeskel E, Alemayehu M, Getachew T, Gebregzabiher G, *et al.* Impacts of COVID-19 on essential health services in Tigray, Northern Ethiopia: A pre-post study. PLoS One 2021;16:e0256330.
19. Akintunde TY, Musa TH, Musa HH, Musa IH, Chen S, Ibrahim E, *et al.* Bibliometric analysis of global scientific literature on effects of COVID-19 pandemic on mental health. Asian J Psychiatr 2021;63:102753.
20. Chen Y, Zhang X, Chen S, Zhang Y, Wang Y, Lu Q, *et al.* Bibliometric analysis of mental health during the COVID-19 pandemic. Asian J Psychiatr 2021;65:102846.
21. Maalouf FT, Mdawar B, Meho LI, Akl EA. Mental health research in response to the COVID-19, Ebola, and H1N1 outbreaks: A comparative bibliometric analysis. J Psychiatr Res 2021;132:198-206.
22. Bandyopadhyay S, Baticulon RE, Kadhum M, Alser M, Ojuka DK, Badereddin Y, *et al.* Infection and mortality of healthcare workers worldwide from COVID-19: A systematic review. BMJ Glob Health 2020;5:e003097.