

Bibliometric Analysis of COVID-19-related Publications in Nursing by Philippine-based Authors

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ABSTRACT

Objective. To describe the trend and landscape of Coronavirus Disease (COVID-19)-related publications in nursing authored by at least one Philippine-based author.

Methods. This study is a bibliometric analysis of documents retrieved from Scopus using the search terms “COVID-19” and “nurs*” in the article title, abstract, and keywords. The documents were limited to those published in English, affiliated with Philippine-based authors, and those published from 2020 to 2023. We used the ‘analyze report’ function in Scopus to analyze the data including the number of publications, types, sources, authors, and affiliations. We used VOSViewer for the co-authorship analysis of countries and co-occurrence analysis of author keywords.

Results. A total of 136 documents were found. Majority of these documents were classified as original articles (83%). There was a rapid increase in COVID-19 publications in nursing authored by at least one Philippine-based researcher published from 2020 to 2021 and plateaued from 2022-2023. Co-authorship analysis showed that Philippine-based authors have written documents with authors from 111 countries most notably from Saudi Arabia, the United States, Indonesia, and Australia. Most documents were published in the *Belitung Nursing Journal*. Authors from the University of Santo Tomas had the most publications. The most cited articles focused on psychosocial impacts, resilience, workplace stress, and online education. Author keywords commonly used in the documents were *COVID-19*, *nursing*, and *nursing students*, covering topics such as pandemic impacts, workplace impacts, nurse well-being, psychosocial impacts, and nursing education. Keywords have evolved through the pandemic period with a recent focus on stress and professional values.

Conclusion. Philippine-based authors actively contributed in understanding the impact of COVID-19 on nurses and nursing education. Their scientific productivity was driven partly by their collaboration with foreign-based researchers. To sustain this trend in productivity and collaboration, policies, programs, and strategies are needed to promote, support, and foster research collaboration among local and international nursing researchers and institutions.

Keywords: *bibliometrics, COVID-19, nursing, Philippines*



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INTRODUCTION

The Coronavirus Disease (COVID-19) pandemic is an extraordinary experience with a global impact that shaped the history of infectious diseases.¹ Originally starting as a case of “pneumonia of unknown etiology” in December 2019, the uncertainty surrounding COVID-19’s cause, transmission, prevention, and management heightened anxiety that called for system-wide responses across countries and segments of society.^{2,3} In the frontline of the COVID-19 response were healthcare workers whose roles were pivotal in the prevention, control, and management of the infection and in the care of individuals diagnosed with COVID-19 infection.

Nurses, comprising majority of healthcare workers worldwide, were positioned to influence the response trajectory to the pandemic.⁴ However, the pandemic's magnitude and the extent of its impact had adverse repercussions on nurses' well-being. Evidence showed that nurses suffered from burnout, moral distress, compassion fatigue, and even trauma, which impacted their ability to respond to the pandemic.⁵⁻⁸ Similarly, these situations were observed among nurses in the Philippines and even aggravated by nurses' shortage as a result of out-migration due to poor working environments and salaries.⁹ The pandemic also affected nursing education as it limited opportunities for nursing students to gain clinical experience in hospitals and other healthcare settings. This affected students' ability to develop their clinical competencies and decision-making skills. The transition to a virtual platform also posed challenges to both nursing students and educators as they needed to adjust to the new instructional platform, with some contended with issues related to connectivity, digital literacy, economic uncertainty, and concern about infection.¹⁰⁻¹²

While the pandemic brought significant burden and uncertainty, it also became a catalyst for governments, organizations, academic disciplines, and the industry to innovate.¹³⁻¹⁵ Examples of these innovations were the quick turnaround in the development of the COVID-19 vaccine, multilateral agreements among governments and the industry to accelerate research and development, and the use of virtual strategies that ensured healthcare and educational institutions continued to provide service.¹³⁻¹⁵ Growth and expansion in the science and practice of nursing were also observed including developments in clinical nursing education and the roles of advanced practice nurses.^{16,17}

In order to be informed and make visible the extent of knowledge production in the intersection of nursing and COVID-19, it is crucial to investigate documents published in this topic during the pandemic period. These papers represent the cumulative scientific knowledge generated at that crucial period in our history which may inform policy, education, and research trajectories into the future as we prepare in responding to the next pandemic. To aid this investigation, a bibliometric analysis can be done.¹⁸ A bibliometric analysis is a type of review that examines the overview of the phenomenon of interest and unlike a meta-analyses or systematic literature reviews, it typically involves the examination of a large dataset with a broader focus.¹⁸ This type of analysis can offer broad ideas that can inform future directions in policy, education, and research.¹⁸

Several bibliometric analyses of COVID-19 publications in nursing had been published previously. Most notable of these were by Cicek Korkmaz et al. and Zhang et al. where they mapped the state of COVID-19 publications in nursing globally.^{19,20} While they focused on the worldwide state of COVID-19-related nursing publications, they did their bibliometric analysis at the height of the pandemic and only included in their analysis articles published until 2021 for

Cicek Korkmaz et al. and until 2022 for Zhang et al.^{19,20} It is beneficial to examine the document corpus published during the entirety of the pandemic period, as this may allow us to examine the nuances and evolution of topics investigated in these papers as the pandemic progressed. In our current paper, we focused on COVID-19-related publications in nursing that were authored by at least one researcher affiliated with a Philippine-based institution. This allowed us to examine the setting-specific context and nuances that may explain the findings and enabled us to derive specific insights on the future directions of knowledge production in nursing in the Philippines post-pandemic.

Given the above contexts, this paper aims to describe the trend and landscape of COVID-19-related publications in nursing authored by at least one Philippine-based author. The analysis is guided by the following questions:

1. What is the distribution of COVID-19-related publications in nursing published during the pandemic?
2. What are the types and sources of these publications?
3. What are the citation patterns of these articles?
4. What are the commonly studied topics in these articles based on the author keywords used?

MATERIALS AND METHODS

Study Design

In conducting the bibliometric analysis, we followed the guidelines outlined by Donthu and colleagues.¹⁸ We chose a bibliometric analysis over other review methods such as a scoping or systematic review because we aimed to provide a broad overview of knowledge production about COVID-19 and nursing by Philippine-based authors. This entailed analyzing the various research constituents including the authors and institutions that contributed to knowledge production, and the topics examined in publications.¹⁸ We defined a publication as related to nursing if it reported data emanating from a nursing research or discussed a topic about nurses or nursing. Nursing research is defined as a scientific inquiry that provides the basis for the profession of nursing that encompasses clinical research, health systems and outcomes, and nursing education.²¹

Data Collection

We searched the Scopus database for relevant articles on 6 March 2024. The choice of the electronic database is a key decision in conducting bibliometric analysis because each database has varied journal coverage.¹⁸ While it is possible to use data from a search of multiple databases, this necessitates merging of metadata which is challenging as each database has its own bibliometric formatting.¹⁸ Given this context, Donthu and colleagues recommended using only one electronic database to prevent errors in merging search results from multiple databases.¹⁸ Furthermore, the software we used for analysis (i.e., VOSViewer) can only currently support analysis from a single database.²² In our case, we

chose Scopus because it is regarded as one of the most comprehensive bibliographic databases available globally.²³

To search for relevant articles, we used the search terms “COVID-19” and “nurs*” in the article title, abstract, and keywords. Since we are only interested in publications authored by an individual affiliated with a Philippine-based institution, we included the term “Philippines” as a search limiter in the country affiliation field in the Scopus search engine. This step allowed us to retrieve articles that were authored by at least one individual affiliated with a Philippine-based institution. We also limited our search to articles in English and those published from January 1, 2020 to December 31, 2023. The upper date limit was chosen because it was the year when the Philippine government officially lifted the state of national emergency due to the COVID-19 pandemic.²⁴ Except for erratum, we retrieved and analyzed all types of articles published within the search period.

With assistance from a health science librarian, the first author performed the Scopus database search. A total of 136 articles were retrieved. To facilitate the analysis, we exported the bibliographic data, citation information, and author keywords of these articles in a comma-separated values (CSV) file. As recommended by Donthu and colleagues, we checked the document corpus to ensure the number of retrieved articles and to check for missing, erroneous, and duplicate data.¹⁸ We further checked the titles and abstracts of these retrieved articles if they satisfied the definition of nursing-related publications we used in this study. Since there are no identified erroneous or duplicate data and all 136 articles satisfied the definition of nursing-related publications, we included all the articles in the analysis. Three authors performed the data check by going through the CSV file version of the document corpus.

Data Analysis

For the data analysis, we employed both performance analysis and science mapping.¹⁸ Performance analysis is a descriptive analysis of the retrieved publications.¹⁸ For this study, we used the ‘analyze report’ function in Scopus to descriptively analyzed the number of publications per year, the types and sources of publications, who the authors are, and the countries or territories of author affiliations. We did not distinguish between primary and co-authors. We generated tables and figures using Microsoft Excel.

The science mapping, on the other hand, involved analyzing the structural connections among retrieved publications.¹⁸ We used VOSViewer (version 1.6.19) to create network maps of relationships among authors’ countries (i.e., co-authorship analysis based on country) as indicated in the retrieved publications.²⁵ This was done to examine the interaction and collaboration among authors (both Philippine-based and their foreign-based co-authors) who published COVID-19 publications in nursing. Co-occurrence analysis of author keywords was also done to examine the content of

the retrieved articles. This allowed us to examine the topics explored in these publications. In both co-authorship and co-occurrence analysis, we used the links and link strength metrics which were computed automatically through the VOSViewer to describe the interaction among authors based on their country of affiliation (for co-authorship analysis) and keywords used in publications (for co-occurrence analysis). Network maps for both co-authorship and co-occurrence analyses were also created by generating network and overlay visualizations through the VOSViewer.

RESULTS

Publication Output

We retrieved 136 articles from the Scopus database search. Figure 1 shows the trend in publications within the COVID-19 pandemic from 2020 to 2023 while Figure 2 illustrates the distribution of the types of publications retrieved. There was a significant increase in COVID-19 publications in nursing from 2020 (n=10) to 2021 (n=42) while a slight decrease was observed from 2022 (n=46) to 2023 (n=36). Most publications were classified as original articles (n=113, 83%).

Publication by Countries

Researchers from 111 countries co-published with Philippine-based authors to produce COVID-19-related publications in nursing. Aside from Philippine-based authors, the publications retrieved were co-authored by individuals affiliated with institutions based in various countries including Saudi Arabia, United States, Indonesia, and Australia. Table 1 summarizes the 25 countries where authors of the articles analyzed were affiliated while Figure 3 shows a mapping of the co-authorship analysis.

The countries in Table 1 were ranked based on the number of documents and limited to countries with at least five documents in the corpus. The number of links indicate the number of countries a specific country has co-authorships with. As expected, the Philippines has the most links with other countries (n=24), while the following countries have 23 links each: Australia, Bangladesh, Canada, China, Egypt, Hong Kong SAR, India, Japan, Malaysia, Pakistan, Singapore, South Korea, Taiwan, Thailand, United States, United Kingdom, and Vietnam. The link strength, on the other hand, indicates the total number of co-authored publications that Philippine-based researchers have with authors from other countries. As seen in Table 1, Philippine-based authors have co-authored 23 publications with researchers based in Saudi Arabia, 18 publications with authors based in the United States, and 14 publications with those based in Indonesia. As can be seen in both Table 1 and Figure 3, Oman is linked with only one country, the Philippines. Nevertheless, Philippine- and Oman-based researchers have co-authored 11 publications in total.

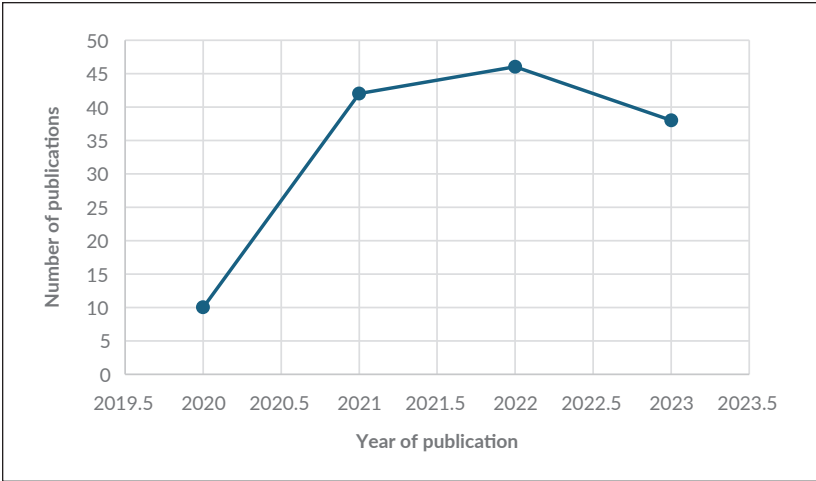


Figure 1. Trend in COVID-19-related publications in nursing with at least one Philippine-based author published from 2020 to 2023.

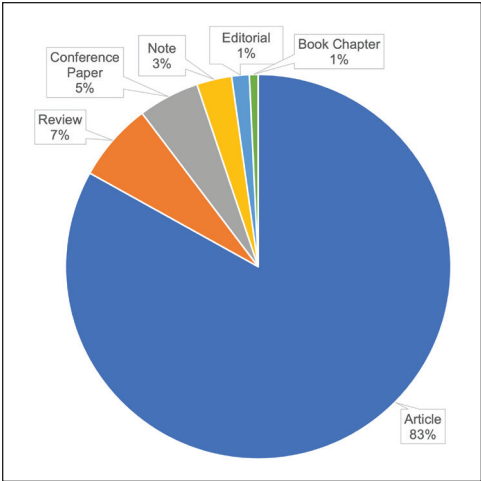


Figure 2. Distribution of type of COVID-19-related publications in nursing with at least one Philippine-based author published from 2020 to 2023.

Table 1. Countries that Contributed to COVID-19-related Publications in Nursing with at least one Philippine-based Author Published from 2020-2023

Rank	Country	Documents	Citations	Average Citations	Number of Links ^a	Link Strength with the Philippines ^b
1	Philippines	136	2613	19.21	24	-
2	Saudi Arabia	23	230	10.00	20	23
3	United Sates	18	667	37.06	23	18
4	Indonesia	14	71	5.07	22	14
5	Australia	13	351	27.00	23	13
6.5	China	11	258	23.45	23	11
6.5	Japan	11	87	7.91	23	11
6.5	Oman	11	1324	120.36	1	11
6.5	Thailand	11	171	15.55	23	11
10	United Kingdom	9	641	71.22	23	9
11.5	Canada	8	552	69.00	23	8
11.5	Hong Kong	8	189	23.63	23	8
11.5	Kazakhstan	8	63	7.88	22	8
11.5	Taiwan	8	142	17.75	23	8
15	Vietnam	7	63	9.00	23	7
16.5	Bangladesh	6	416	69.33	23	6
16.5	Germany	6	146	24.33	22	6
16.5	India	6	144	24.00	23	6
16.5	Italy	6	522	87.00	22	6
16.5	Malaysia	6	67	11.17	23	6
16.5	Pakistan	6	425	70.83	23	6
16.5	Singapore	6	162	27.00	23	6
23.5	Egypt	5	419	83.80	23	5
23.5	Netherlands	5	137	27.40	22	5
23.5	South Korea	5	133	26.60	23	5

^a refers to the number of countries a specific country has co-authorship relationships with.

^b refers to the number of co-authored publications Philippine-based researchers have with foreign-based researchers.

Publications by Journal

Eighty journals indexed in Scopus have published at least one COVID-19-related publication in nursing authored by at least one Philippine-based researcher. The leading journals (Table 2), ranked according to the number of documents, are Belitung Nursing Journal (n= 9), Journal of Nursing Management (n= 5), Acta Medica Philippina (n= 5), and the Philippine Journal of Nursing (n= 5). Among these journals, the International Journal of Mental Health Nursing has the highest Impact Factor (5.6) while the Journal of Nursing

Management has the most citations (1,053 citations) (Table 2). Three journals, i.e., Acta Medica Philippina, the Philippine Journal of Nursing, and the Philippine Journal of Internal Medicine, are based and published in the Philippines. Majority of these journals (n=8) follow an open access publishing model.

Publications by Institutions

Table 3 shows the leading institutions that produced COVID-19-related publications in nursing with at least one

Table 2. Leading Journals that Published COVID-19-related Publications in Nursing with at least one Philippine-based Author, 2020 to 2023

Rank	Journal Name	Country where Journal is based ^a	Impact Factor (2022)	Cite Score (2022)	No. of Documents	Citations	Average Citations	Publishing Model
1	Belitung Nursing Journal	Indonesia	1.4	1.4	9	62	6.89	Open access
2	Journal of Nursing Management	United Kingdom	5.5	6.8	5	1053	210.60	Hybrid/Open access ^b
2	Acta Medica Philippina	Philippines	none	0.3	5	4	0.80	Open access
2	Philippine Journal of Nursing	Philippines	none	0.3	5	0	0.00	Open access
3	Malaysian Journal of Nursing	Malaysia	none	none	4	0	0.00	Open access
3	International Journal of Mental Health Nursing	United Kingdom	5.6	6.5	4	43	10.75	Hybrid
3	Journal of Advanced Nursing	United Kingdom	3.8	5.3	4	59	14.75	Hybrid
3	Nurse Education Today	United Kingdom	3.9	5.5	4	36	9.00	Hybrid
4	Healthcare Switzerland	Switzerland	none	2.7	3	7	2.33	Open access
4	Philippine Journal of Internal Medicine	Philippines	none	none	3	0	0.00	Open access
4	Nurse Education in Practice	United Kingdom	3.2	4.9	3	54	18.00	Hybrid
4	Public Health Nursing	United Kingdom	2.1	2.8	3	48	16.00	Hybrid
4	Nursing Forum	United Kingdom	2.4	3.3	3	27	9.00	Hybrid/Open access ^b

^a Data from Scimago Journal and Country Rank

^b These journals transitioned to be open access starting January 2023

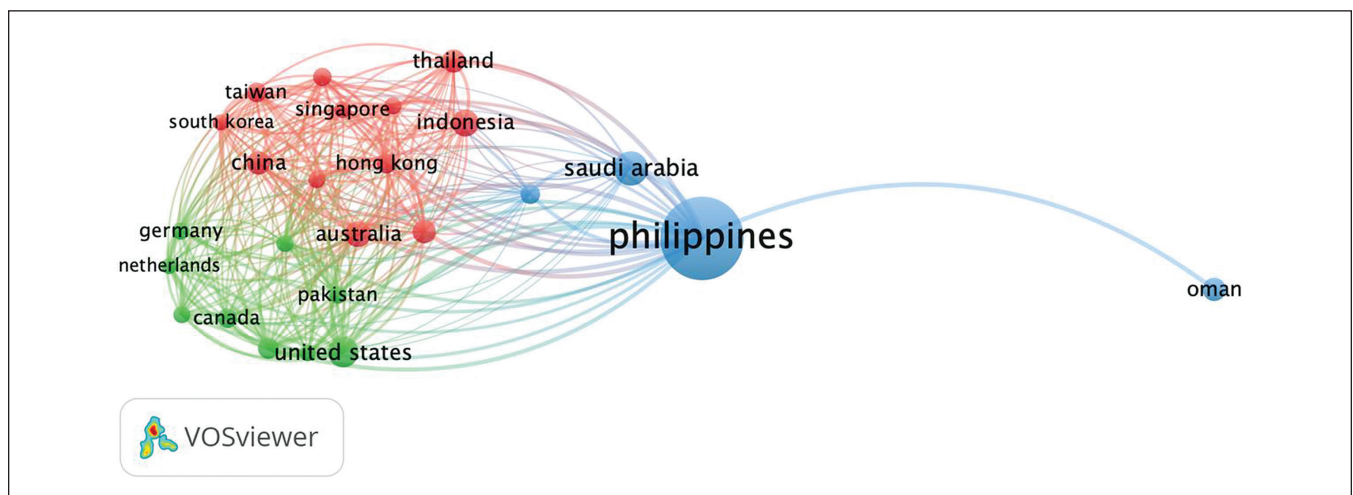


Figure 3. Mapping of international collaboration of countries that produced COVID-19-related publications in nursing with at least one author based in the Philippines. The size of the circle is directly proportional to the number of documents contributed by the country. The thickness of the line corresponds to the strength of connection between countries.

Philippine-based author. The University of Santo Tomas has the most publications (n=25), followed by the University of the Philippines Manila (n=20), University of Ha'il (n=18), Visayas State University (n=12), and the Sultan Qaboos University (n=11). Seven of these institutions are based in the Philippines while three are based overseas specifically in Saudi Arabia (University of Ha'il), Oman (Sultan Qaboos University), and Kazakhstan (Nazarbayev University). Publications from Sultan Qaboos University have the most citations with 1,324 followed by Visayas State University with 1,267.

Publications by Author

The most productive authors are presented in Table 4. Ranked based on the number of publications, these include Berdida, D. J. E (University of Santo Tomas, Philippines), Grande, R.A.N (University of Ha'il, Saudi Arabia), Labrague, L.J. (Sultan Qaboos University, Oman) with 21, 14, 12 publications, respectively. Among the productive authors, the most cited is Labrague, L.J. (Sultan Qaboos University, Oman), followed by De Los Santos, J.A.A. (University of

the Visayas, Philippines), and Berdida, D.J.E (University of Santo Tomas, Philippines) with 1,329; 1,260; and 168 citations, respectively.

Top Cited Publications

Table 5 shows the 10 most cited COVID-19-related publications in nursing with at least one Philippine-based author published from 2020 to 2023. Three of these documents were in the Journal of Nursing Management. Majority (n=7) of these top cited publications were classified as original articles, while three were review articles. Varied topics were discussed in these top cited publications. Six publications examined the psychosocial impact of COVID-19 among nurses and student nurses.²⁶⁻³¹ Some of the concepts examined were organizational support, resilience, job stress, and compassion fatigue.^{26-28,30} The other articles examined infection and mortality from COVID-19 among healthcare workers, care for people with Alzheimer's Disease amidst the pandemic, barriers and facilitators of online medical and nursing education during the pandemic, and quality of nursing care during the pandemic.³²⁻³⁵

Table 3. Institutions that Published COVID-19-related Publications in Nursing with at least One Philippine-based Author, 2020 to 2023

Rank	Institution	Country/Territory	Records	Citations	Average Citations
1	University of Santo Tomas, Manila	Philippines	25	184	7.36
2	University of the Philippines Manila ^a	Philippines	20	869	43.45
3	University of Ha'il	Saudi Arabia	18	205	11.39
4	Visayas State University	Philippines	12	1267	105.58
5	Sultan Qaboos University	Oman	11	1324	120.36
6	De La Salle University	Philippines	9	19	2.11
7	West Visayas State University	Philippines	8	102	12.75
8	Mindanao State University	Philippines	7	131	18.71
9	Saint Louis University	Philippines	6	26	4.33
10	Nazarbayev University	Kazakhstan	6	50	8.30

^a including publications from the Philippine General Hospital

Table 4. Leading Authors of COVID-19-related Publications in Nursing with at least One Philippine-based Co-author, 2020-2023

Rank	Author	Institutional Affiliation	Records	Citations	Average Citations
1	Berdida, D.J.E	University of Santo Tomas, Manila (Philippines)	21	168	8.00
2	Grande, R.A.N	University of Ha'il (Saudi Arabia)	14	150	10.71
3	Labrague, L.J.	Sultan Qaboos University (Oman)	12	1329	110.75
4	De los Santos, J.A.A	Visayas State University (Philippines)	10	1260	126.00
5	Oducado, R.M.F	West Visayas State University (Philippines)	7	102	14.57
5	Cruz, J.P.	Saint Louis University, Baguio (Philippines)	5	36	7.20
6	Acob, J.R.U.	Visayas State University (Philippines)	4	12	3.00
6	Alquwez, N.	Shaqra University (Saudi Arabia)	4	25	6.25
6	Sadang, J.M.	Mindanao State University (Philippines)	4	126	31.50
6	Soriano, G.P.	San Beda University (Philippines)	4	68	17.00

Table 5. Top Cited COVID-19-related Publications in Nursing with at least One Philippine-based Author Published from 2020 to 2023

Rank by TC	TC	Author/s	Article Title	Year of Publication	Journal Name	Document Type
1	559	Labrague L.J. & De los Santos J.A.A.	COVID-19 anxiety among front-line nurses: predictive role of organizational support, personal resilience and social support	2020	Journal of Nursing Management	Article
2	415	Labrague L.J. & De los Santos J.A.A.	Fear of COVID-19, psychological distress, work satisfaction and turnover intention among frontline nurses	2021	Journal of Nursing Management	Article
3	379	Bandyopadhyay S., Baticulon R.E., Kadhum M., Alser M., et al.	Infection and mortality of healthcare workers worldwide from COVID-19: a systematic review	2020	BMJ Global Health	Review
4	109	Mok V.C.T., Pendlebury S., Wong A. et. al.	Tackling challenges in care of Alzheimer's disease and other dementias amid the COVID-19 pandemic, now and in the future	2020	Alzheimer's and Dementia	Review
5	91	Koontalay A., Suksatan W., Prabsangob K. & Sadang J.M.	Healthcare workers' burdens during the COVID-19 pandemic: a qualitative systematic review	2021	Journal of Multidisciplinary Healthcare	Review
6	86	De los Santos J.A.A. & Labrague L.J.	The impact of fear of COVID-19 on job stress, and turnover intentions of frontline nurses in the community: a cross-sectional study in the Philippines	2021	Traumatology	Article
7	84	Li W., Gillies R., He M., Wu C., Liu S., et al.	Barriers and facilitators to online medical and nursing education during the COVID-19 pandemic: perspectives from international students from low- and middle-income countries and their teaching staff	2021	Human Resources for Health	Article
8	58	Labrague L.J. & De los Santos J.A.A.	Resilience as a mediator between compassion fatigue, nurses' work outcomes, and quality of care during the COVID-19 pandemic	2021	Applied Nursing Research	Article
9	45	Labrague L.J., De los Santos J.A.A. & Fronda D.C.	Factors associated with missed nursing care and nurse-assessed quality of care during the COVID-19 pandemic	2022	Journal of Nursing Management	Article
10	41	Labrague L.J.	Resilience as a mediator in the relationship between stress-associated with the COVID-19 pandemic, life satisfaction, and psychological well-being in student nurses: a cross-sectional study	2021	Nurse Education in Practice	Article

TC – total citations

Table 6. Top Author Keywords Used in COVID-19-related Publications in Nursing with at least One Philippine-based author, 2020 to 2023

Rank	Keyword	Number of Documents the Keyword Occurred
1	COVID-19	62
2	Nursing	28
3	Philippines	15
4	COVID-19 pandemic	12
5	Nursing students	12
6	Nurses	11
7	Anxiety	10
8	Resilience	10
9	Mental health	9
10	Pandemic	8

Keyword Visualization

Table 6 shows the most common author keywords used in the document corpus. The most common author keywords used are COVID-19 (n=62), nursing (n=28), Philippines (n=15), COVID-19 pandemic (n=12), and nursing students (n=12).

We further analyzed the author keywords by examining the relationships between and among them. Created through VOSViewer, Figure 4 shows the network visualization of author keywords used in the document corpus. We limited the analysis to keywords that have occurred at least three times in the document corpus. Five topic 'hotspots' or categories can be derived from the resulting network visualization. The first topic 'hotspot' (color yellow) is about COVID-19 pandemic. This includes keywords such as *COVID-19*, *nursing education*, *online learning*, and *pandemic*. The second 'hotspot' (color purple) pertain to the pandemic's impact to workplace. This category includes keywords such as *workplace*, *nurses*, *professional values*, and *technology*. The third 'hotspot' (color green) relates to the pandemic's impact to nurses. This includes keywords such as *nursing*, *coping*, *health personnel*, *fear*,

compassion fatigue, and *turnover intention*. The fourth ‘hotspot’ (color red) pertains to the pandemic’s psychosocial impact. Keywords under this category include *mental health*, *resilience*, *stress*, *social support*, *anxiety*, *depression*, and *quality of life*. Finally, the fifth ‘hotspot’ (color blue) is about the pandemic’s impact to nursing education. Keywords under this category include *students*, *nursing students*, *knowledge*, and *attitude*.

We also examined the pattern by which the author keywords used in publications changed through the COVID-19 pandemic from 2020 to 2023. Figure 5 illustrates the overlay visualization of keywords based on the average year of publication of documents that included them. The keywords *fear*, *online learning*, and *attitude* have been used in documents published in 2020. The keywords *COVID-19*, *nursing*, *anxiety*, *social support*, *nursing students*, and *nursing education* were used by documents published around 2021. The keywords *mental health*, *older adults*, and *workplace* were published around 2022. In more recent publications from 2022 to 2023, the more common keywords used were *nurses*, *stress*, and *professional values*.

DISCUSSION

In this study, we described the trends and landscape of COVID-19-related publications in nursing with at least

one Philippine-based author over the course of the entire pandemic from 2020 to 2023. Through this paper, we were able to map how Philippine-based authors have responded to the pandemic through their contributions in knowledge production in the intersection of nursing and COVID-19.

Our findings show that the number of COVID-19 publications in nursing which was authored by at least one researcher based in the Philippines had rapidly peaked from 2020 to 2021. This pattern in publication records was expected and consistent with those reported in other bibliometric analyses that examined COVID-19-related publications from a global perspective as well as the publication patterns around the time of other international emergencies such as SARS and Ebola.^{19,20,36,37} It seems that through their publications, researchers have rapidly responded to the pandemic in an effort to understand the disease including its source and transmission, its prevention and treatment, and its impact on the health of individuals and communities.³⁷

Researchers have found ways to be productive despite the threat of COVID-19 to safety and health. The sudden and the large-scale quarantine that persisted for several months and the shift to work-from-home arrangement could mean more time and opportunity for some researchers to conduct research and write papers for publication.³⁸ Innovative methods of collecting primary data were also used such

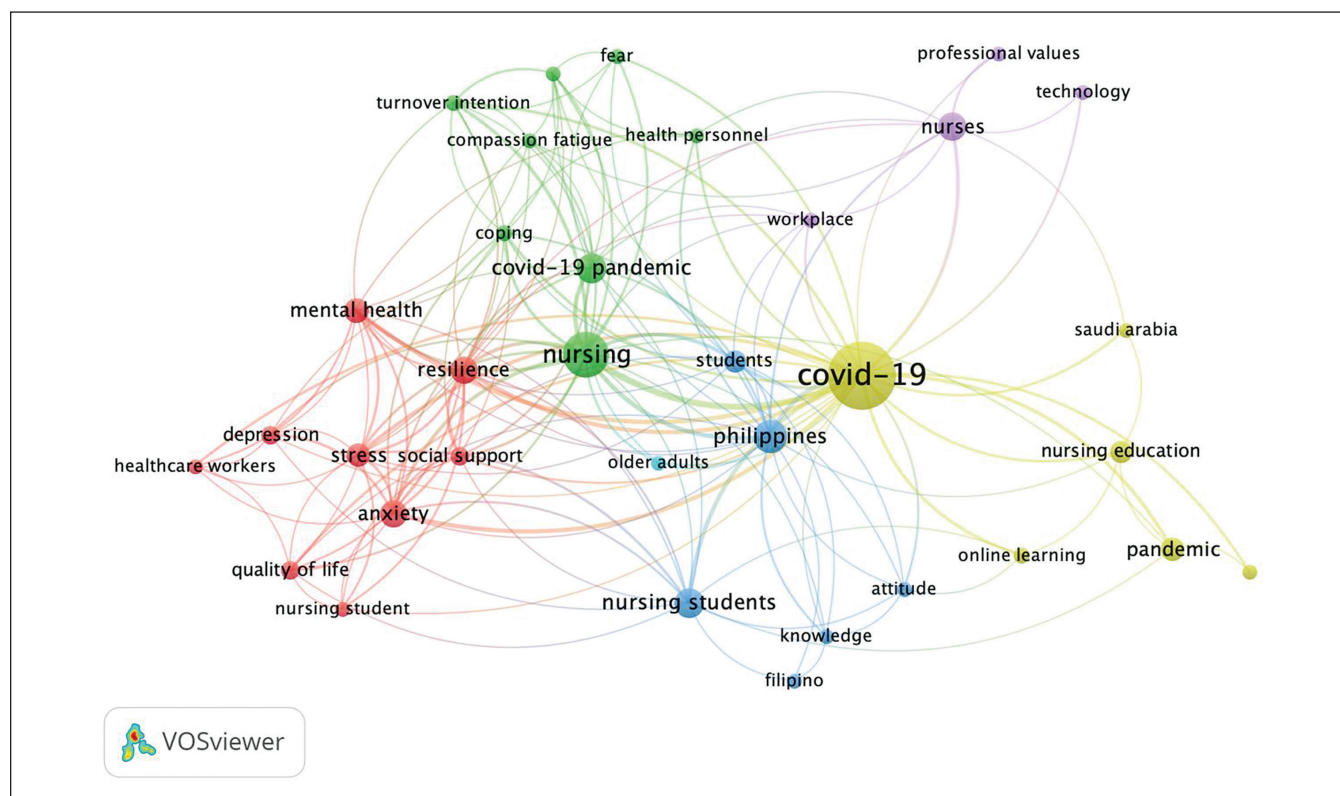


Figure 4. Network visualization of author keywords used in COVID-19-related publications in nursing with at least one Philippine-based author published between 2020 to 2023. The size of the circle is directly proportional to the number of documents containing the keyword. The thickness of the line corresponds to the strength of connections between keywords.



The co-authorship analysis of countries provides information on the extent of collaboration among authors in producing COVID-19 publications in nursing. Our findings show that Philippine-based authors actively collaborated with their foreign-based counterparts in producing scientific knowledge about COVID-19 and nursing. This evidence of global collaboration is especially important in international emergencies such as during the COVID-19 pandemic. This led to the accumulation of evidence that was used to improve the praxis of nursing, including training and education which may redound to improved patient care and more responsive educational approaches.^{19,44} Existing and future collaborative research activities should be encouraged as this not only results in the researcher's individual professional development but can also enrich nursing science through relevant scholarly discussions and the exchange of resources and expertise.⁴⁴ It has to be acknowledged, however, that certain structural challenges may hinder nursing researchers from participating in collaborative research. These challenges may include perennial nursing workforce issues, limited recognition of the value of research to the continuous advancement of nursing science, and limited opportunities to participate in collaborative research activities.⁴⁵ Thus, it is important to

advocate for adequate support for nurses to participate and lead research activities as nursing-sensitive research can enhance both patient care and the over-all response to future public health emergencies.⁴⁵

The findings about the journals that have published the most articles provide insight into the journal preferences of authors. Publishing in refereed high-quality journals is a standard in disseminating research findings and thus choosing the right journal is an important step in the dissemination process.⁴⁶ Interestingly, three of the journals listed in Table 2 are Philippine-based journals. The *Acta Medica Philippina*, founded in 1939, is considered as The National Health Science Journal in the Philippines.⁴⁷ It publishes original articles in medical or human health-related fields.⁴⁷ The *Philippine Journal of Nursing* is the official journal of the Philippine Nurses Association and it serves as a venue to publish scientific articles on nursing science and education.⁴⁸ The *Philippine Journal of Internal Medicine*, on the other hand, is the official journal of the Philippine College of Physicians.⁴⁹ These three journals are indexed in Scopus, and recently, *Acta Medica Philippina* was included in PubMed Central. While none of these Philippine-based journals are currently indexed in Web of Science, it is worth noting that their national reputation, their inclusion in other indexing databases, and their open-access publishing model are important characteristics that may have influenced authors' decisions to publish with them.⁴⁶ However, none of the articles that were published in the *Philippine Journal of Nursing* and the *Philippine Journal of Internal Medicine* have been cited as of the writing of this paper. This finding needs further analysis to determine possible reasons these articles are not cited.

The findings on the institutions and authors that have published the most provide information about their productivity. Consistent with previous research, majority of these institutions are universities.³⁶ All authors that have published the most are also affiliated with universities. These findings point to the crucial role of universities and academics in rapidly responding to public health emergencies such as COVID-19 to help decision-makers and other stakeholders mitigate the impact of such events.³⁶ For example, we found in this study that many authors were affiliated with universities who have investigated how the curriculum can be more adaptive given emerging knowledge about the pandemic. However, it is alarming to learn about reports of cases of duplicate publications which may have impacted the productivity of some authors included in Table 4.⁵⁰ Duplicate publications refer to articles that report on the same data as that of a previously published manuscript.⁵¹ Publishing duplicate articles, together with plagiarism and authorship issues, is unethical and considered scientific misconduct, which can erode other researchers' and the public's trust in the scientific process.⁵² While authors committing unethical publication practices need to be reprimanded, these issues need to be seen from a broader perspective such as that of

the pressure to publish.⁵³ A holistic approach is needed to tackle the problem of unethical publication practices and should involve all partners including journal publishers, editors, university administrators, research institutions, and the researchers themselves.⁵³

Our analysis of the author keywords used in publications provides information on the common topics that were examined in these papers. Based on the author keywords, we can infer that the most dominant topics were about the impact of COVID-19 on the nursing workforce, and nursing education and training. This is anticipated given the overwhelming number of studies that have pointed to the deleterious impact of the pandemic on nurses' well-being and welfare.⁵⁻⁹ Nursing workforce shortage, incommensurate salaries, and poor working environments are also some of the persisting issues that have compounded adverse outcomes among Filipino nurses during the pandemic.⁵⁴ Several government policies on deployment ban and cap were also imposed to control the out-migration of nurses.⁵⁵ While these policies have short-term benefits ensuring workforce availability, many stakeholders claim that these solutions do not address the root causes of migration.⁵⁵ As mentioned, many publications included in our analysis provide evidence of the effects of the pandemic on Filipino nurses and may be used to derive lessons that can inform national policies in rationalizing the number of nurses and in improving their work conditions.

As seen in the author keywords analysis, nursing education and training is another area where many of the publications have focused on. The shift to virtual learning approaches during the pandemic was inevitable with all planned clinical exposure halted.^{56,57} Nursing educators and students alike experienced the impact of the pandemic, and some have suffered adverse effects such as anxiety and depression.¹⁰⁻¹² Many students in clinical placements have expressed concern about the interruption of their studies and its impact on their future, while many have also brought issues about the quality of nursing graduates whose education were impacted by the pandemic.⁵⁶ While the shift to an online learning platform was seen to be acceptable, Shorey et al. reported that many nursing students in Southeast Asia felt that their education was compromised.¹¹ Nevertheless, the adoption of innovative educational approaches and emerging technology for use in nursing education that was hastened by the COVID-19 pandemic has to be examined and considered as the new standard in a post-pandemic world.⁵⁸ As mentioned, many of the articles included in our analysis tackle various issues relevant to nursing education and as such can be used to inform policies related to the preparation of resilient and responsive nursing curriculum and approaches.

The author keyword analysis also provides insights into possible research directions at least in the short-term. The longer-term effects of the pandemic as well as the current post-pandemic situation of the nursing workforce may need to be examined.⁵⁹ This includes analyzing the transition

and needs of newly graduated nurses into the workforce.⁵⁹ Evidence also needs to be generated whether the changes adopted during the pandemic in terms of staffing model, care delivery, and nursing education can be retained or modified to suit current situations.⁵⁹ The idea is to build upon lessons during the pandemic and retain those that may be proven to be beneficial on the long term.

Implications of the Findings

Several implications can be drawn from the findings of the study. Policies and programs should be in place to a) facilitate stronger collaboration in nursing research between local and international nursing scholars and institutions, and b) strengthen individual and institutional capacity in ensuring ethical conduct of research including publication ethics. These strategies can promote and sustain the development of nursing knowledge responsive to the present and future nursing needs, including a pandemic-ready healthcare system.

Majority of the authors of identified publications were affiliated to academic institutions. This finding suggests the need to strengthen partnerships between academic and practice-setting institutions to conduct context-specific and meaningful nursing research reflecting the realities of nursing practice and education. This could lead to the publications of nursing research that are more acceptable, beneficial, and grounded in the practice of nursing and healthcare.

Nursing education will not be the same compared to the pre-pandemic landscape. The use of technology and virtual simulations have become instrumental in the continued education of pre-service nurses amidst the pandemic and should become part of teaching-learning strategies even post-pandemic. Many articles published about the impact of the pandemic in nursing education can guide educators and policy makers alike in ensuring more transformative curriculum that can readily respond to future health emergencies.

Limitations of the Study

The results of this bibliometric analysis need to be considered in light of the following limitations. First, using a single electronic database in the search is an important limitation. Although Scopus is a comprehensive electronic database²³, we acknowledge that there are articles that may have inadvertently excluded because of the use of a single database. Second, we only used two search terms: COVID-19 and nurs*. We acknowledge that this decision may have inadvertently excluded other relevant articles as there were other terms to refer to COVID-19 prior to this term being adapted to refer to this condition. Third, VOSViewer does not currently support non-English articles and as such we limited our search to articles published in English.²² We acknowledge that this decision may have excluded relevant articles written in other languages. Despite these limitations, this study still provided valuable insights into the trends in COVID-19-related publications in nursing that is authored by at least one Philippine-based researcher.

CONCLUSION

This bibliometric analysis showed that Philippine-based authors responded to the pandemic by generating knowledge through publications about the impact of COVID-19 on healthcare and nursing. Despite the limitations imposed by the pandemic, an upward trend in publications in nursing was observed. Most publications focused on assessing nurses' psychosocial well-being and the continued delivery of nursing education amidst the pandemic. In this study, we have seen evidence of active global collaboration between and among authors in producing such knowledge. This partnership is essential to produce broader knowledge beneficial to the advancement of nursing praxis locally and internationally. This study highlights the need for programs, policies, and strategies to promote ethical conduct of research including publication ethics, and support and foster research collaboration between local and international nursing researchers and institutions to sustain the generation of valuable and responsive health and nursing-related studies.

Recommendation

For future research, it is recommended that a scoping review be done on the studies done by Philippine-based researchers on COVID-19 and nursing. This would provide a more in-depth and nuanced examination of the content and topics investigated in these studies.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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