



Research article

Scientometric evaluation of trends and global characteristics of published research on occupational public health

Frank Mayta-Tovalino^{a,*}, Josmel Pacheco-Mendoza^b, Daniel Alvitez-Temoche^c, Juan Alvítez^d, John Barja-Ore^e, Arnaldo Munive-Degregori^f, Maria Eugenia Guerrero^g^a CHANGE Research Working Group, Universidad Científica del Sur, Lima, Peru^b Unidad de Investigación en Bibliometría, Universidad San Ignacio de Loyola, Lima, Peru^c Postgraduate Department, Faculty of Dentistry, Universidad Nacional Federico Villarreal, Lima, Peru^d Academic Department, Faculty of Medicine, Universidad Nacional Federico Villarreal, Lima, Peru^e Direction of Research, Universidad Privada del Norte, Lima, Peru^f Faculty of Systems and Computer Engineering, Universidad Nacional Mayor de San Marcos, Lima, Peru^g Academic Medical-Surgical Department, Universidad Nacional Mayor de San Marcos, Lima, Peru

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ABSTRACT

The objective of this scientometric study was to assess the global trends and characteristics of published occupational health research from 2016 to 2020. The SciVal tool (Elsevier) was used to perform the corresponding bibliometric analyses such as the Field-Weighted Citation Impact (FWCI), Source Normalized Impact per Paper (SNIP), CiteScore, and SCImago Journal Rank (SJR). Most of the manuscripts (46.5%) had national collaboration, with an average of 6.1 citations per paper. However, only 71 manuscripts (5.4%) presented single authorship (without collaboration). It was found that 486 manuscripts related to occupational health were published in Q2 journals (top 26–50%). Scientific publications on occupational health have increased remarkably worldwide, especially in Europe, and have mainly been published in Q1 and Q2 journals with a total of 292 and 289 scientific manuscripts in 2019 and 2020, respectively.

1. Introduction

Work is an essential activity to which humans dedicate an important part of their lives. Therefore, a work environment must guarantee safety and allow a good state of health to be maintained. Occupational health is a discipline that seeks to ensure that labor practices promote and maintain the physical, mental, and social well-being of workers [1, 2, 3, 4].

The International Labor Organization (ILO) reported that more than one million deaths occur each year due to occupational accidents or illnesses, in addition to other non-fatal injuries [2]. These figures indicate that there is a significant global demand for the enhancement of occupational health and safety. Studies also indicate that economic losses due to worker absenteeism represent around 4% of production, which is estimated at billions of American dollars lost until 2020 [3]. Therefore, it is also important for the industry to find solutions to this complicated worker reality [5, 6, 7, 8].

Globally, research on the scientific production on occupational health through bibliometric studies provides concise and relevant information

for those responsible for implementing health policies and identifies the most important contributors to the scientific literature on the subject in relation to the country of origin, affiliations of the authors, the existing collaborative groups, the most used publication medium, and the trends of the topics investigated [4, 9, 10, 11, 12, 13]. Nonetheless, the type, period and number of related studies indicate that occupational health research has yet to increase. The factors for this low productivity remain unknown; for example, in South America, there are many scientific articles on occupational health published in local journals that are not indexed. This is probably consolidated by lack of knowledge of publication criteria, and lack of economic resources, among other factors [14].

Scientometric studies on occupational health are necessary to identify trends and characteristics of publications in this field. They also allow establishing solutions for the future as they can be identified through different bibliometric indicators [5].

Therefore, the aim of the present scientometric study was to evaluate the trends and global characteristics of published research on occupational health.

* Corresponding author.

E-mail address: fmaytat@cientifica.edu.pe (F. Mayta-Tovalino).

2. Methods

2.1. Study design

A retrospective scientometric study was conducted. The unit of analysis consisted of publications on occupational health during the period from 2016 to 2020. It was decided to evaluate this five-year period since at the date of execution of this study these data were only available in SciVal. The evaluation focused on data such as year of publication, affiliation, country, authors, citations, H-index, and journal type. The following research question was formulated: P: Scientific publications; I: Occupational public health; C: None; and O: Scientometrics profile, trends, and global characteristics.

Selection Criteria

Inclusion criteria

- Articles published in Scopus from 2016 to 2020.
- Articles published in any language.
- Articles whose metadata were complete in Scopus.

Exclusion criteria

- Articles published in other databases.
- Articles published outside the evaluation period.
- Articles that cannot be exported to SciVal.

2.2. Search strategy

Data extraction was performed by a bibliometric specialist (FMT). Prior to performing the search strategy, the MeSH (PubMed) and Emtree terms (Embase) were analyzed to identify the main keywords related to the term 'occupational health'. It was decided to work with Scopus because it is one of the most extensive and prestigious databases worldwide. In addition, articles published in other databases, such as Medline and PubMed, are usually already included in Scopus. In addition, both Scopus and SciVal are supported by Elsevier, and thus, there was no conflict to directly export each of the metadata extracted with the search strategy. Subsequently, on August 26, 2021, 1833 documents were identified in the Scopus database, which is one of the main comprehensive databases for health sciences. Of these, 1831 were published in journals, one in the Trade Journal, and one in a book series.

The following formula was used: TITLE ("occupational health" OR "industrial hygiene" OR "industrial health" OR "occupational safety" OR "employee health" OR "occupational exposure" OR "occupational hazard" OR "job accommodation" OR "occupational carcinogenesis" OR "personnel radiation monitoring" OR "preemployment medical examination" OR "quality of working life" OR "sheltered employment" OR "laboral health") AND (LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015)) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (EXACTKEYWORD, "Occupational Exposure") OR LIMIT-TO (EXACTKEYWORD, "Occupational Health")) AND (LIMIT-TO (SUBJAREA, "MEDI") OR LIMIT-TO (SUBJAREA, "ENVI")).

2.3. Data collection and indicators

The data collection technique was developed based on the Scopus IDs of the institutions evaluated during the period 2016–2020. Once the csv file was obtained, it was exported to the SciVal tool (Elsevier) to perform the corresponding bibliometric analyses. This evaluation focused on the number of articles, countries, authors, and institutions. Additionally, bibliometric indicators such as Field Weighted Citation Impact (FWCI), Source Normalized Impact per Paper (SNIP), CiteScore and SCImago Journal Rank (SJR) were used. Finally, images and techniques were used to visualize the scientific production on occupational health worldwide

through the co-occurrence of countries, authors, and keywords. For this, VOSviewer software was used, and bibliometric maps were created.

2.4. Statistical analysis

All descriptive and bibliometric analyses were conducted using SciVal, a digital system that evaluates different indicators. An analysis of collaboration, authors, citations, institutions, trend topics and type of journal was completed. Finally, the frequencies and percentages of the mentioned indicators are shown in descriptive tables.

3. Results

3.1. Co-occurrence by key words

Six major clusters were identified, of which the red cluster was mainly represented by the key word 'occupational health' and the blue cluster by 'occupational exposure'. The purple and green clusters were represented by the keywords 'risk assessment' and 'adverse event', respectively. In addition, a small yellow cluster was identified, which represented economic sciences, cancer, and epidemiology as keywords more closely related to the main clusters (red, green, and blue) (Figure 1).

3.2. Co-citation by cited source

There were seven clusters in which occupational and environmental medicine (yellow cluster) were interrelated with four clusters and 1092 citations. The American Journal of Industrial Medicine (green cluster) was interrelated with two clusters and 720 citations. Safety Science (red cluster) was only related to one cluster and 355 citations (Figure 2). The purple and orange clusters were also identified, corresponding to the journals Safety Science and J Occup Environ Med, which were less strongly interrelated in the co-citation with the other clusters.

3.3. Global academic output on occupational health by CiteScore Quartile (Q)

It was found that during the years 2016–2020 manuscripts related to occupational health were mainly published in Q2 journals (top 26–50%), with 486 articles, and in Q1 journals (top 25%), with 405 articles, with both quartiles having the highest impact. However, 156 manuscripts were published in Q4 journals (top 76–100%). Finally, 2019 and 2020 were the most productive years, with 292 and 289 manuscripts, respectively (Table 1).

3.4. Top 10 universities with the highest academic production on occupational health

The most productive universities were the Utrecht University, Université de Versailles Saint-Quentin-en-Yvelines and Université Paris-Saclay, with 30, 29 and 29 scientific publications on occupational health, respectively. However, Monash University and Pompeu Fabra University had the highest average of citations per publication, with 10.3 and 11.3, respectively. Finally, the Pompeu Fabra University had the highest FWCI (1.72), suggesting that it had 72% more citations than expected (Table 2).

3.5. Top 10 most productive authors on occupational health

The most productive author was Roel C.H. Vermeulen, with 18 manuscripts, followed by Hans Kromhout with 17 articles, and Koji Mori with 16 manuscripts. This productivity is related to the h-index of the leading authors, who had an average h-index of 66 and 59, respectively, while the third author had an h-index of 9 (Table 3).

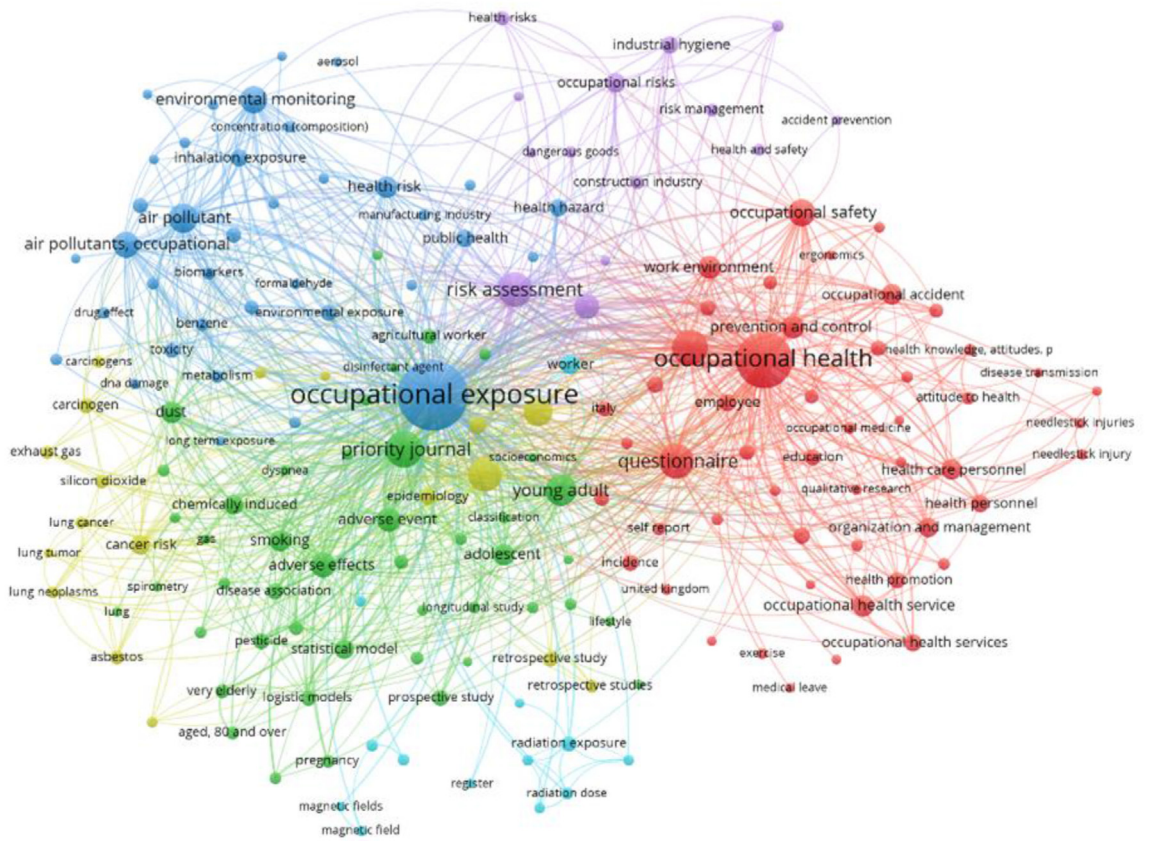


Figure 1. Co-occurrence by key words.

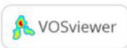
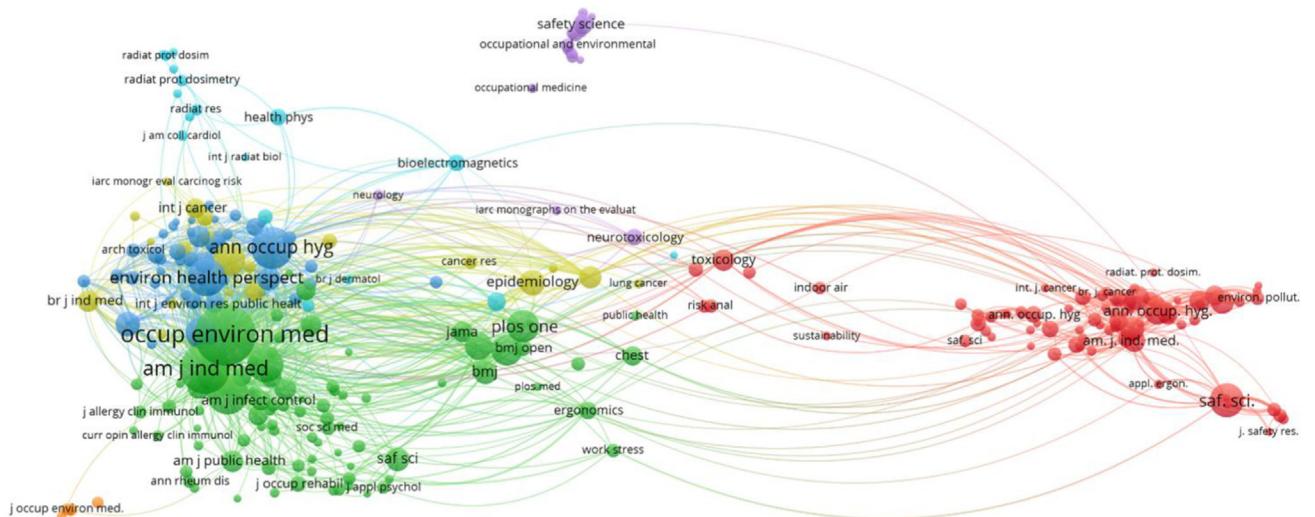


Figure 2. Co-citation by cited source.

Table 1. Global academic output in occupational health by CiteScore quartile journal.

CiteScore quartile	2016	2017	2018	2019	2020	Total
Q1	73	85	84	82	81	405
Q2	73	67	95	129	122	486
Q3	58	54	46	45	42	245
Q4	27	21	28	36	44	156
Total	231	227	253	292	289	1292

4. Discussion

In the present study, we evaluated the trends and global characteristics of 1883 meta-data units in scientific publications on occupational health published worldwide in Scopus. At present, occupational health is an obscure area of medicine. Our bibliometric results show that scientific production on occupational health in the period 2016–2020 has undergone a steady increase, with 2019 and 2020 being the most prolific years. Regarding trends, the results show that the most researched topics were ‘Occupational Exposure, Job Title, Wood Dust’, ‘Needlestick Injuries, Blood-Borne Pathogens, Universal Precautions’ and ‘Safety Climate, Construction Workers, and Health Management’, while in a recent study the topics of concern were occupational exposure to psychosocial risks such as stress, dissatisfaction, or burnout [5].

The future perspective of the present study is that based on the results found the most productive authors and institutions in occupational medicine research can be identified. This is very important because there are many occupational hazards such as occupational accidents, contamination with chemical agents, genotoxicity, and psychosomatic diseases, which must be timely identified by occupational health. In relation to the clinical relevance of this research, collaborative networks can be established to carry out team research. In addition, the results facilitate decision making by knowing the bibliometric characteristics of the scientific production on occupational medicine and occupational health worldwide.

Additionally, similar to what has been reported in other recent bibliometric studies, we found that the most important journals in terms of the contribution of published articles were the International Journal of Environmental Research and Public Health, Occupational and Environmental Medicine, Journal of Occupational and Environmental Medicine, Safety Science, and Journal of Occupational and Environmental Hygiene [2, 3, 4].

Analysis of the data revealed that the countries with the highest production are the United States, followed by France and China. Similarly, in a recent study, the highest production was described in the United States, followed by the United Kingdom, Australia, and Canada [2], while another study revealed that it was the United States, United Kingdom, China, Canada, and Australia [4]. In a study on the occupational health of health workers, the most prolific countries were the same

Table 2. Top 10 universities with the highest academic production in occupational health in Scopus.











Institution	Country/Region	Scholarly Output	Citations	Citations per Publication	Field-Weighted Citation Impact
Utrecht University	 Netherlands	30	361	12.0	1.55
Université de Versailles Saint-Quentin-en-Yvelines	 France	29	226	7.8	1.23
Université Paris-Saclay	 France	29	226	7.8	1.23
Monash University	 Australia	27	277	10.3	1.29
Universite Claude Bernard Lyon 1	 France	25	137	5.5	0.77
University of Montreal	 Canada	25	171	6.8	1.14
University of Toronto	 Canada	22	177	8.0	1.17
University of Occupational and Environmental Health, Japan	 Japan	21	20	1.0	0.09
Pompeu Fabra University	 Spain	20	226	11.3	1.72
University of Illinois at Chicago	 United States	19	115	6.1	0.98

Table 3. Top 10 most productive authors in occupational health in Scopus.

Name	Scholarly Output	Most recent publication	Citations	Citations per Publication	Field-Weighted Citation Impact	h-index
Vermeulen, Roel C.H.	18	2020	261	14.5	1.68	66
Kromhout, Hans	17	2020	183	10.8	1.62	59
Mori, Koji	16	2020	15	0.9	0.11	9
Stücker, Isabelle	14	2019	70	5.0	0.58	39
Benke, G.	12	2020	89	7.4	0.91	29
Luce, Danièle	12	2019	67	5.6	0.66	32
Siemiatycki, Jack A.	12	2019	81	6.8	0.85	44
Schüz, Joachim	11	2020	108	9.8	1.26	56
Lavoué, Jérôme	11	2020	92	8.4	1.42	18
Menvielle, Gwenn	10	2019	50	5.0	0.57	33

as those mentioned above [6], while in a similar study, Brazil, and South Africa predominated [15].

The institutions with the highest production were the Utrecht University, Université de Versailles Saint-Quentin-en-Yvelines and Université Paris-Saclay, while in a similar study covering the period 1995–2018, the institutions with the highest production were the Centers for Disease Control and Prevention of the United States of America, the University Kebangsaan Malaysia and the Delft University of Technology of the Netherlands, with five publications each [4].

On the other hand, the most productive authors were Vermeulen with 18 manuscripts, followed by Kromhout with 17 articles and Mori with 16 manuscripts. In a similar bibliometric study on occupational health of health science workers, the noteworthy authors were A. Yassi with 17 articles, followed by H. Alamgir and J.M. Spiegel with nine articles each. Thus, this type of study provides a panoramic view of scientific publications in each field of knowledge [16, 17, 18, 19, 20, 21, 22, 23, 24].

One of the main limitations of the present study is that the results obtained should be taken with caution because the elaboration of the search strategy could be perfectible, thus broadening the scope of the results found. In addition, a probable bias in the scope of the results must also be recognized, since only one database was used, and no gray literature in which relevant information on occupational medicine may be found was considered.

Nevertheless, the primary strengths of our study are that we used the largest number of MESH terms from PubMed and Emtree from Embase to obtain more representative results in the search strategy, which were analyzed with the Boolean operators 'AND' and 'OR'. In addition, a considerable number of samples were analyzed. Finally, the results have significant implications for understanding the characteristics of scientific publications on occupational health. Therefore, our results contribute to bibliometric visualizations by providing a better understanding of the research conducted worldwide in the field of occupational health.

5. Conclusions

Finally, the global scientific production on occupational health increased during the period 2016 to 2020, especially in Europe. Similarly, during this period, scientific publications on occupational health were mainly published in high impact Q1 and Q2 journals. This study revealed a relationship between all the scientific production in occupational health and the different bibliometric indicators worldwide. The present research provides a comprehensive analysis of indicators of production, collaboration, and impact of scientific productivity in occupational health.

Declarations

Author contribution statement

Frank Mayta-Tovalino, Daniel Alvitex-Temoche, Juan Alvitex, Jasmel Pacheco-Mendoza: Conceived and designed the research; Performed the research; analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

John Barja-Ore, Maria Eugenia Guerrero, Arnaldo Munive-Degregori: Performed the research; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data included in article/supp. material/referenced in article.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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