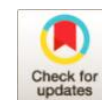




Highly-cited papers in public, environmental and occupational health from a bibliometric perspective (2014-2023)



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ABSTRACT

As highly-cited papers are important items in exploring main productive and influential scientific entities as well as hot topics in different scientific fields, this bibliometric research aimed at evaluating and visualizing the highly-cited papers in public, environmental and occupational health during the recent decade (years 2014-2023). Web of Science (WoS) was searched for extracting the bibliographic and bibliometric data of highly-cited papers on public, environmental and occupational health. Excel 2016 and VOSviewer 1.6.19.0 were used for data analysis and network visualization. Bibliometric indicators such as most productive authors, affiliations and countries, most-frequent keyword and highly-considered and hot topics were explored. 3,027 papers were identified as highly-cited papers. A considerable increase can be seen in 2020 as to the publication year. The first to third ranks in publishing sources belonged to Morbidity and Mortality Weekly Report (MMWR) with 316 papers, International Journal of Epidemiology with 126 papers and International Journal of Environmental Research and Public Health with 118 papers, respectively. The first-ranked productive country was USA with 1,754 papers, followed by the UK with 525 papers and China with 324 papers. The top-ranked occurred keywords were COVID-19 with 438 occurrences, Health (306) and Risk (238), respectively. Four main subject clusters appeared: public health, mental health and common diseases, epidemiology, and health inequalities. Analyzing the bibliometric indicators of the highly-cited papers in the studied scientific health areas in this study identified some gaps in contribution to the highly-cited papers in the areas. Researchers in the fields can use the findings for further research and more collaboration for making their works more visible.

Keywords: Bibliometrics, Environmental health, Highly-cited papers, Public health, Occupational health.

Introduction

Scientific research is one of the requirements of continuous development (1) that is mainly manifested in scientific journals. High-quality and most-influential papers are papers that are frequently cited in other papers and can be conceived as “highly-cited papers” (2). Highly-cited papers have been heavily considered in the academic setting as research items indicating the high prestige of their authors, related affiliations and contributing countries (3).

Bibliometrics is a scientific approach that measures the quality and quantity of scientific entities by applying

different evaluative indicators (4). As a main modern bibliometric technique, the scientific visualization with mapping scientific networks reflects the knowledge flow in the scientific community and shows the development of scientific disciplines and communicative procedures (5, 6).

As medical fields deal with problems occurred in the health system, bibliometric analyses and visualization in these fields are important, including among others, public, environmental and occupational health areas. Bibliometric analyses for evaluating scientific research in these areas are needed for some reasons.

identifying health-related problems and challenges (7, 13), measuring the share of each country in the scientific research, and discovering the possible gaps in scientific collaboration in the areas (8, 9). However, no research analyzed the bibliometric performance of highly-cited papers in these areas, except two that considered the highly-cited papers published in some related journal between 1919-1960 (2) and between 1961-1974 (10). This research aimed at bibliometrically evaluating and visualizing the highly-cited papers in public, environmental and occupational health during the recent decade (the time span of 2014-2023).

Material and Methods

Data sources and search approach

Web of Science (WoS) was searched on 29 December 2024 for extracting the bibliographic and bibliometric data of highly-cited papers on public, environmental and occupational health areas during 2014-2023. The search strategy included searching for highly-cited papers in the category field of environmental, public and occupational health between 2014-2023 as the search query as follows: ((WC= (Public, Environmental & Occupational Health)) AND PY=(2014-2023)) AND DT=(Article) Refined by: Highly Cited Papers

Data extraction

Data were extracted as TXT and Excel formats. Possible inconsistencies and variations in affiliation and author names and author-assigned keywords were identified and modified. Excel 2016 and VOSviewer 1.6.19.0 were used for data analysis and network visualization.

Data analysis

The publication dates and citation count as well as highly-productive and highly-cited sources were extracted from the Excel file. Social networks and keyword co-occurrences were illustrated by applying VOSviewer for CVS files.

Findings

Research performance by publication years
3,027 papers were identified as highly-cited papers in the areas of public, environmental and occupational health published between 2014-2023. Table 1 shows the number of publications and their citation counts of the papers based on their publication year. A considerable increase can be seen in 2020 comparing previous years. The highest citation count belonged to year 2020.

Highly-productive sources

Table 2 shows the highly-productive journals publishing highly-cited papers. The top 20 publishing journals published 1,811 papers (60% of all highly-cited papers). The first to third ranks belonged to Morbidity and Mortality Weekly Report (MMWR) with 316 papers, International Journal of Epidemiology with 126 papers and International Journal of Environmental Research and Public Health with 118 papers, respectively.

Table 1. Paper numbers and citation count by publication years of highly-cited papers

Publication Year	Paper number	Citation count	Mean citations per paper
2014	251	89580	356.89
2015	241	79619	330.37
2016	230	71415	310.50
2017	269	68029	252.90
2018	224	54657	244.00
2019	264	48192	182.55
2020	472	117643	249.24
2021	468	54415	116.27
2022	440	19886	45.20
2023	168	2197	13.08
Total	3027	605633	200.08

Table 2. Highly-productive journals in publishing highly-cited papers

Rank	Source title	Paper number	Citation count	Mean citations per paper
1	MMWR (MORBIDITY and MORTALITY WEEKLY REPORT)	316	77141	244.12
2	INTERNATIONAL JOURNAL OF EPIDEMIOLOGY	126	34601	274.61
3	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	118	24519	207.79
4	BMC PUBLIC HEALTH	116	16268	140.24
5	SOCIAL SCIENCE & MEDICINE	115	15659	136.17
6	LANCET GLOBAL HEALTH	104	38770	372.79
7	ENVIRONMENTAL RESEARCH	101	10928	108.20
8	AMERICAN JOURNAL OF PUBLIC HEALTH	93	18353	197.34
9	LANCET PUBLIC HEALTH	87	15619	179.53
10	FRONTIERS IN PUBLIC HEALTH	86	8244	95.86
11	AMERICAN JOURNAL OF PREVENTIVE MEDICINE	85	15649	184.11
12	JOURNAL OF CLINICAL EPIDEMIOLOGY	77	19524	253.56
13	AMERICAN JOURNAL OF EPIDEMIOLOGY	58	10890	187.76
14	ACCIDENT ANALYSIS AND PREVENTION	56	6747	120.48
15	EUROPEAN JOURNAL OF EPIDEMIOLOGY	55	14836	269.75
16	TOBACCO CONTROL	51	9128	178.98
17	STATISTICS IN MEDICINE	48	13175	274.48
18	BMJ GLOBAL HEALTH	43	5062	117.72
19	LANCET PLANETARY HEALTH	40	6706	167.65
20	INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY	36	7364	204.56

Table 3. Authors with ten or more highly-cited papers

Rank	Author	Paper number	Citation count	Mean citations per paper
1	Brian A. King	20	7110	355.6
2	Ahmed Jamal	18	6923	384.61
	Lauri E. Markowitz	18	5350	297.22
3	H. Keipp Talbot	16	2263	141.44
4	Grace M. Lee	14	2264	161.71
	Rebecca L. Morgan	14	1603	114.5
5	Karen A. Cullen	13	4085	314.23
	James A. Singleton	13	2034	156.46
6	Adi, V Gundlapalli	12	2206	183.83
	Tegan K. Boehmer	12	1993	166.08
	Megan Wallace	12	1936	161.33
	Sara E. Oliver	12	1885	157.08
7	Christopher M. Jones	11	2623	238.45
	Lisa A. Grohskopf	11	2369	215.36
	Beth P. Bell	11	1605	145.91
8	Karen R. Broder	10	2154	215.4
	Alicia M. Fry	10	2131	213.1
	David Yankey	10	2076	207.6
	Jean Y. Ko	10	1752	175.2

Highly-productive authors

Table 3 shows authors publishing ≥ 10 papers. The first to the third ranks belonged to Brian A. King with 20 papers, Ahmed Jamal and Lauri E. Markowitz each with 18 papers, and H. Keipp Talbot with 16 papers, respectively. The two first-mentioned authors had the highest mean citation rates per paper (Ahmed Jamal with 385 and Brian A. King with 356).

Table 4. Highly-productive affiliations publishing highly-cited papers

Rank	Affiliation (abbreviated) name	Paper number	Citation counts	Mean citations per paper
1	CDC	315	85744	272.2032
2	Harvard Univ	88	21798	247.7045
	Univ Washington	88	20085	228.2386
3	UCL	84	14133	168.25
4	Johns Hopkins Univ	82	24132	294.2927
5	Univ Calif San Francisco	78	15999	205.1154
6	Emory Univ	77	18121	235.3377
7	Ctr Dis Control & Prevent	75	19510	260.1333
8	London Sch Hyg & Trop Med	74	18792	253.9459

9	Stanford Univ	71	14413	203
10	Univ N Carolina	70	16445	234.9286
11	Univ Michigan	69	10860	157.3913
12	Univ Oxford	68	17414	256.0882
13	Harvard Med Sch	66	9390	142.2727
14	Columbia Univ	65	13690	210.6154
15	Johns Hopkins Bloomberg Sch Publ Hlth	62	12102	195.1935
16	WHO	59	16324	276.678
	Harvard Th Chan Sch Publ Hlth	59	10363	175.6441
17	Vanderbilt Univ	54	11925	220.8333
18	Univ Toronto	52	14374	276.4231

Highly-productive countries

Table 5 shows the top 20 highly-productive countries in publishing highly-cited papers. The first-ranked country was USA with 1,754 papers, followed by the UK with 525 papers and China with 324 papers. The UK and Netherlands had the highest mean rates of citation per paper.

Table 5. Highly-productive countries in publishing highly-cited papers

Rank	Country	Paper number	Citation count	Mean citations per paper
1	USA	1754	369489	210.66
2	UK	525	117731	224.25
3	China	324	50776	156.72
4	Canada	275	53492	194.52
5	Australia	240	44779	186.58
6	Netherlands	169	37740	223.31
7	Germany	156	26110	167.37
8	Switzerland	136	29266	215.19
	Italy	136	22091	162.43
9	France	134	23757	177.29
10	Spain	110	18550	168.64
11	Brazil	97	19554	201.59
12	Sweden	92	15512	168.61
13	India	86	13054	151.79
14	Denmark	78	14358	184.08
15	Scotland	76	15908	209.32
16	South Africa	73	14942	204.68
17	Norway	66	14036	212.67
18	Belgium	62	11237	181.24
19	Japan	60	8597	143.28

Highly-frequent keywords

As Table 6 shows, the top-ranked occurred keyword was COVID-19 with 438 occurrences, followed by Health (306) and Risk (238). Keywords Disease with 287, Impact with 221 and Risk with 218 were included in papers with the highest mean citation per paper, respectively.

Table 6. Highly-frequent keywords occurred in highly-cited papers

Rank	Keyword	Frequency	Mean citation rate
1	COVID-19	438	126.863
2	health	306	191.3725
3	risk	238	218.2017
4	mental health	202	167.0968
5	impact	196	220.898
6	mortality	195	192.8667
7	United-States	191	190.1675
8	prevalence	175	193.1886
9	depression	139	197.554
10	epidemiology	118	206.2458
11	association	116	175.0086
12	care	113	173.1947
13	stress	106	217.6038
14	adults	99	190.0808
15	disease	97	287.1546
	children	97	188.3918
16	public health	94	148.3085
17	obesity	91	177.4333
	SARS-COV-2	90	111.9444

Collaboration networks of contributing affiliations

Figure 1 depicts the collaboration network of 49 contributing affiliations publishing at least 30 highly-cited papers. The first cluster (in red) as an international collaborating cluster included 19 affiliations (from the USA, the UK, Canada, Australia, Sweden, Scotland and China). The second cluster (in green) with 18 collaborating affiliations and the third cluster (in blue) with 12 collaborating affiliations as nationally-collaborating ones included affiliations with the origin of the USA.

Collaboration network of contributing countries

Figure 2 depicts the collaboration network of 61 contributing countries with publishing at least 10 highly-cited papers. Four clusters were formed. The first cluster (in red) consisted of 25 countries, with China, Brazil, India and South Africa as pioneering countries. The second cluster (in green) included 20 European

countries, with Netherlands, Germany, Sweden, Italy and France as main countries. The third cluster (in blue) demonstrated the collaboration among 10 countries from Oceania and Eastern Asia. The fourth cluster (in yellow) included six countries, with the USA, the UK and Canada as major ones.

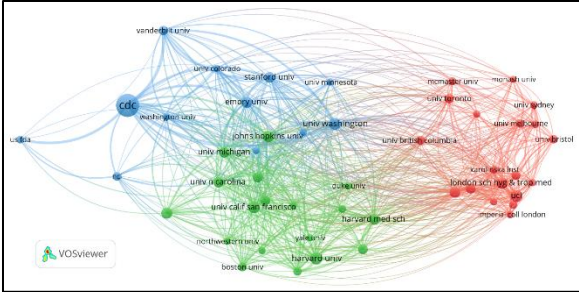


Figure 1. Collaborative network of contributing affiliations with publishing at least 30 highly-cited

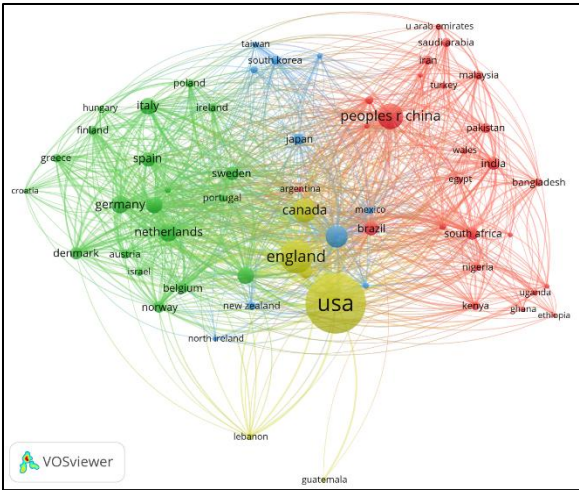


Figure 2. Collaborative network of contributing countries with publishing at least 10 highly-cited papers

Keyword co-occurrence network

59 keywords with at least 40 occurrences were included in the keyword co-occurrence network. As Figure 3 depicts, three clusters appeared. Covering 24 keywords, the first cluster (in red) dealt with “public health”, with topics such as mortality, risk factors, disease prevalence, prevention, obesity, health-related issues, cardiovascular diseases and physical activities related to children, adolescents and adults. The second cluster (in green) with 15 keywords related to “mental health and common diseases”, including among others COVID-19, depression, anxiety, stress and outbreak of common diseases. The third cluster (in blue) with 15 keywords considered “epidemiology” with topics such as risk factors, impact and health outcomes in different races and ages, with modelling and evaluation at hand. Highlighting “health inequalities”, the fourth cluster (in yellow) considered topics such as health disparities and health discriminations among different races and gender groups, especially women.

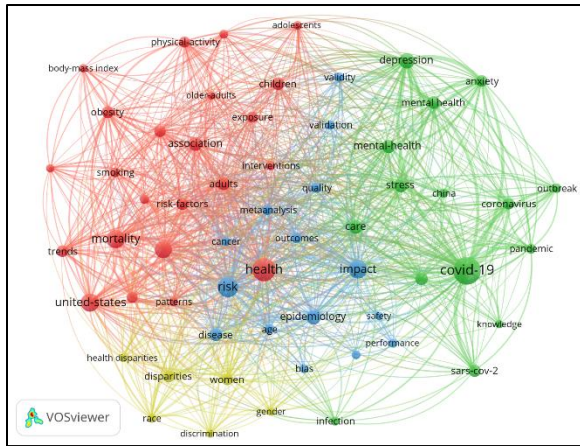


Figure 3. Keyword co-occurrence network of highly-cited papers

Based on the time-based keyword co-occurrence network (Figure 4), some research trends can be detected:

1. Increasing awareness on the risk factors and prevention of diseases such as cancer and cardiovascular diseases resulted in the priority of the related topics.
2. Heavily considering mental health and crises affecting it such as COVID-19 in recent years.
3. Highlighting the issues on epidemiology and the validity, quality and reliability of papers on the topic.
4. Regarding health discriminations badly affecting some groups and races.
5. Different effects of viruses and health crises on social and individual systems worldwide.

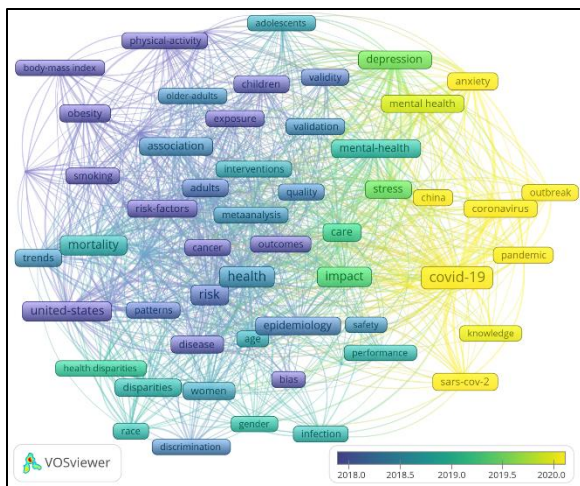


Figure 4. Time snapshot keyword co-occurrence network

Discussion

In this study, the highly-cited papers in the public, environmental and occupational health published during

2014-2023 were analyzed with a bibliometric approach. No stable annual growth rate can be seen in the number of highly-cited papers of studied areas in the studied years. However, the mean rate of citations per paper has shown that the older papers normally received more citations as receiving the citation is a time-related indicator (11).

Top journals publishing the highly-cited papers in the studied areas are of famous and prestigious journals that are active in an international level (including among others, Morbidity and Mortality Weekly Report (MMWR), International Journal of Epidemiology and International Journal of Environmental Research and Public Health).

Top contributing organizations were mainly from the USA and European countries. As well, the USA and European countries were more active in producing the highly-cited papers and the share of Asian and African countries were low in this regard. The encouraging approaches need to be made for making more international contribution. Highly-frequent keywords were related to health-related problems dominated in the world (such as COVID-19, risk-factors, disease prevention and mental disorders) and these keywords were ones that were and are highly-considered in health-related items.

Within the collaboration network, three main collaborating clusters are nation-wide with American organizations and international with the contribution of organizations mainly from European countries. This is the case when considering the clusters of collaborating countries. Many affiliations and countries were absent in these clusters, reflecting the low share of many worldwide research organizations in contribution to the highly-cited papers.

Mining valuable knowledge from visualization networks helps us to save time for understanding the content and direction of the literature on the fields quickly (11). As the network of highly-frequent keywords showed, main topics included issues related to public health, mental health and common diseases, epidemiology and health inequalities among different social groups.

Time-based analysis or overlay mapping of highly-occurred keywords highlighted old and newly-emerged topics (13). Due to the outbreak of COVID-19 pandemic in recent years, the problems that related to this major pandemic have been highly considered recently in the highly-cited papers. In addition, some topics have been considered as topics of interests in all of these years, such as risk factors, diseases and epidemiology.

Conclusion

In conclusion, analyzing the bibliometric indicators of the highly-cited papers in the studied scientific health areas in this study identified some gaps in contribution to the areas.

As well, the topics of interest are main subjects that have been highly considered and researchers can conduct further studies on the hot topics and newly-emerged ones. Decision-makers can find helpful information on most influential and productive entities in the fields, too.

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