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ABSTRACT

The new SARS-CoV-2 COVID-19 has spread quickly around the globe since it was first reported in Wuhan city of China, in December 2019 subsequent to being contracted from a zoonotic source. The main focus of this bibliometric survey is to recognize the few studies which have upheld the epidemiological hypothesis that the effect of climatic factors is playing a crucial role in the spreading of COVID-19. The analysis is done on the basis of 412 documents such as journals, articles, editorials, short surveys and some review papers. The United States contributes to the maximum number of publications followed by the United Kingdom and India. The bibliometric survey is conducted by using Research gate, Google scholar, Scopus and many other tools such as Gephi, sciencescape etc. The survey includes the geographical regional analysis, network analysis, analysis by the type of publications, region, languages the documents are written in and the universities, institutes, authors contributing to the area of research. This bibliometric survey revealed that the maximum publications of "climatic factors affecting the spread of COVID-19 are from journals, articles etc, affiliated with Medicine followed by Environmental sciences. The documents are analyzed over the time period of 2020 to 2021.

Keyword: COVID-19, Bibliometric survey, Environmental sciences, Climate change

1. INTRODUCTION

In December 2019, the fast spread of coronavirus pandemic caused by the severe acute respiratory syndrome (SARS)-CoV-2 pathogen was started in Wuhan, Hubei Province, China (World Health Organization 2020). It turned into a cut off wellbeing and financial issue, while the world has no immunization to battle this infection. After a month on 30th January 2020, it was officially declared a Public Health Emergency by the WHO. Later on, it was declared as a Global pandemic in March, 2020.

With the spread of coronavirus on a global scale over many seasons, the environment and climate became crucial factors to be taken under observation in transmission. As a result of studies done in California and Italy, it is evident that their air pollutants are correlated with an increased number of COVID-19 cases. There is limited however an increasing number of literature on COVID-19 and weather conditions. Till date there are only a limited number of peer-reviewed publications with enough focus on "effect of climatic factors on spread of COVID-19".

2. DATA COLLECTION

The most of the publications are from journals, articles, editorials, short surveys and review papers. Now there are two types of access to these publications: first is open access and the other one is paid access. There are many platforms from where these publications can be accessed some of them are Scopus, Google scholar, ScienceDirect, ResearchGate etc. Here we have used Scopus and Research gate. Scopus is a huge database with citations and abstracts from peer reviewed journal literature, books, conferences and patent records. It has tools which help in tracking, visualizing and analyzing search results. We have used Scopus with some suitable keywords.

Master Keyword	"Coronavirus"
Primary Keywords Using (OR)	"Climate", "COVID-19"

Table 1: Planned search tactics

2.1 Key Findings

The database of scopus is used for this research paper. The initial search using the keyword search tactic resulted in 412 publications and these publications are from 10 different languages. Both Published and unpublished publications are taken into consideration.

There are publications of different types like journals, articles, reviews etc. All data related to the types of publications is shown in the table below:

Sr. No.	Language	No. of Publications
1	English	395
2	Chinese	4
3	French	4
4	Spanish	4

5	Portugese	3
6	German	2
7	Greek	1
8	Italian	1
9	Russian	1
10	Swedish	1
	Total	412

Table 2: Documents language trends

There are publications of different types like journals, articles, reviews etc. All data related to the types of publications is shown in the table below:

Sr. No.	Publication Type	Number of Publications
1	Article	256
2	Review	54
3	Notes	39
4	Letter	33
5	Editorial	24
6	Short Survey	6

Table 3: Publication types

2.2 Preliminary data Features

As we know the Coronavirus came in 2019-2020, so the publications retrieved are from 2020 and 2021. As a result 396 publications in 2020 have been published and 16 for 2021, have been retrieved from scopus database. Both Published and unpublished documents have been considered for the analysis.

Year	Publications count
2020	396

2021	16

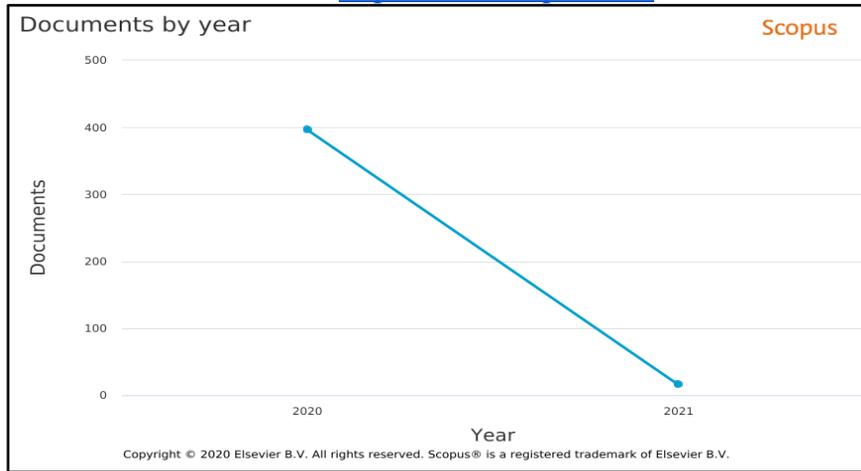*Table 4: publications per year*
Source:

Figure 1: documents by year
Source: http://www.scopus.com

3. BIBLIOMETRIC ANALYSIS

In a bibliometric analysis of effect of climatic factor on spread of COVID-19, the analysis is done in two ways:

- Analysis of topographical provinces, network visualization and citation survey etc.
- Demography about the keyword, affiliation, author, subject areas and country/territory.

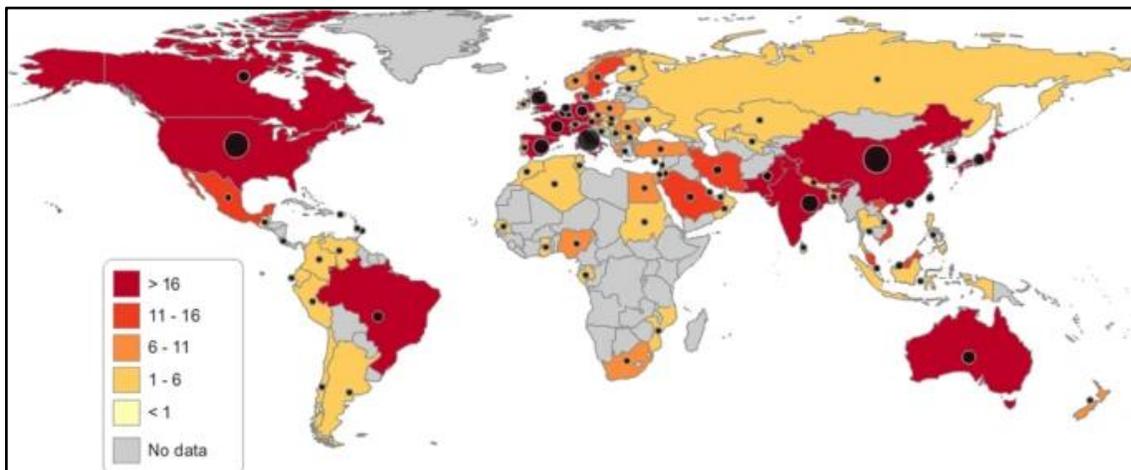## 3.1 Topographical provincial analysis

Figure 2: Geographical regions as per documents

Country-level production on Coronavirus linked to ecological fields; global view of the research output of nations. The colour intensity represents the amount of publications. The quantity of black circles indicates the productivity of every country (i.e., the larger circle, the upper contribution of the country in terms of number of published documents)
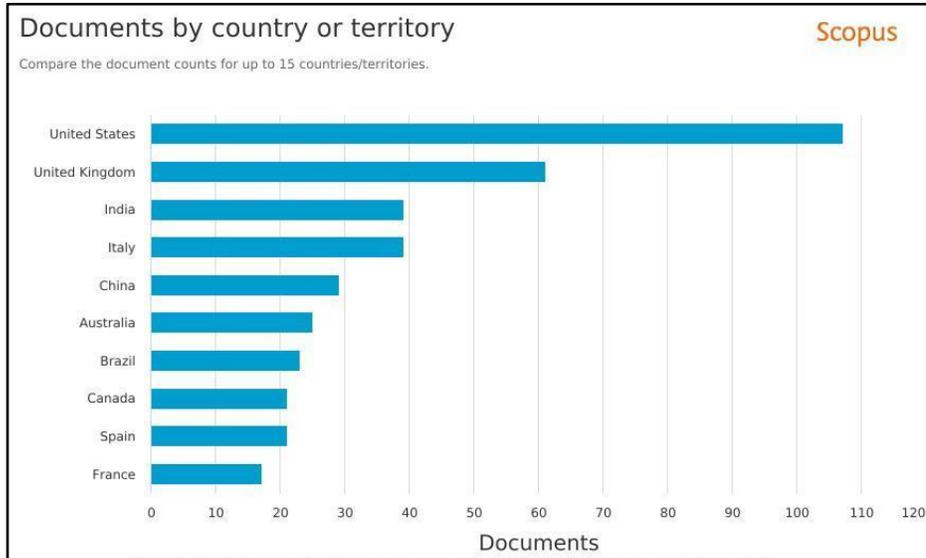

Figure 3: documents by country
Source: http://www.scopus.com (accessed on 10th december)

3.2 Keyword insights

The right use of keywords will help to target notable research areas. It gives a general perspective on what the researcher needs to look for. The top 15 keywords used by the Scopus database for COVID-19 are shown in the table below. It is evident from the table that COVID-19 is mostly related to Climate change and also some significant factors of climate like temperature and humidity. Air Pollution is also a keyword to look for because its mention is closely related to that of environmental temperature.

Keywords	Number of publications
Humans	298
Coronavirus	243
Climate change	162

Humidity	63
Public	61
Temperature	60
Environmental temperature	55
Air pollution	47
Mortality	30
Respiratory disease	30
Health care	29
Risk factor	24
Female	21
Male	17
Pollution	13

Table 5: keywords Source: http://www.scopus.com (accessed on 10th december)
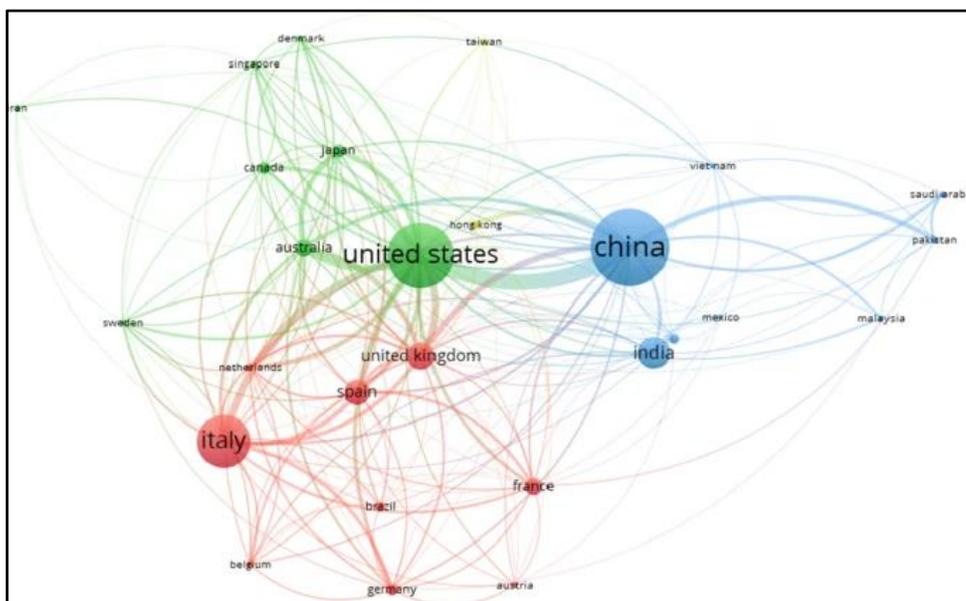
3.3 Analysis of Network

Figure 4: network visualization

Figure 4 shows network visualization map of country collaboration. The breadth of the connection among any two nations is a marker of the strength of coordinated effort among both nations. At least 9 reports for each nation were set as an edge, and 24 nations met the edge. The quantity of the circle around the item is a sign of the commitment of the item (i.e., the bigger the circle, more is the commitment of the nation). The items with the same color demonstrate that these are related with one another (inside a similar group).
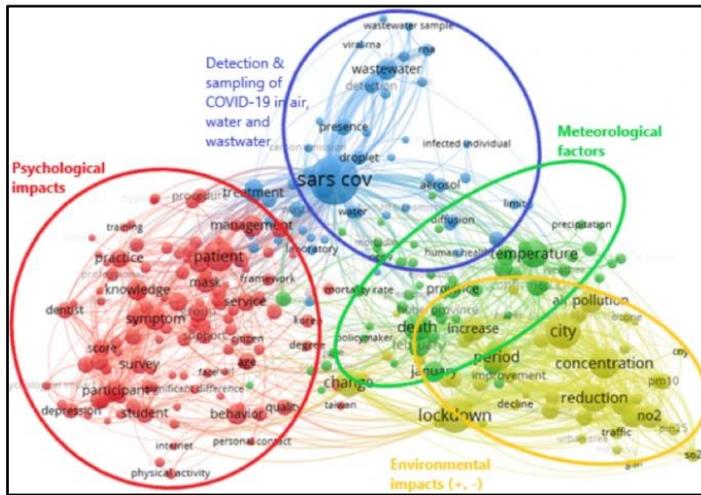

Figure 5: Analysis of co-occurrence of terms

Organization representation map - least count of events of a term was initialized to 10, Of the 12,060 terms, 446 terms that have met the predetermined edge.
Documents on COVID-19 in all areas of science were 34,501. These documents are dispersed as follows:

Sr. no.	Type	Count	%age
1	Articles	16,815	50.8
2	Letter	7576	20.6
3	Review	3975	10.6
3	Note	3140	8.3
4	Editorial	2663	7.7
5	Short Survey	343	1.0

6	Erratum	255	0.7
7	Conference	177	0.5
8	Data paper	58	0.1
9	Book Chapter	8	0.02

3.4 Subject areas

Pie chart below describes subject area segregation for withdrawn climate effect on COVID-19papers. It is intelligible from the chart that the highest number of research is achieved in Medicine and Environmental Sciences. It is also perceived that a low count of research has been achieved in the field of Pharmaceutics and Business Management. Other subject areas which is 16.3% comprises many subjects having less than 2% documents per subject.
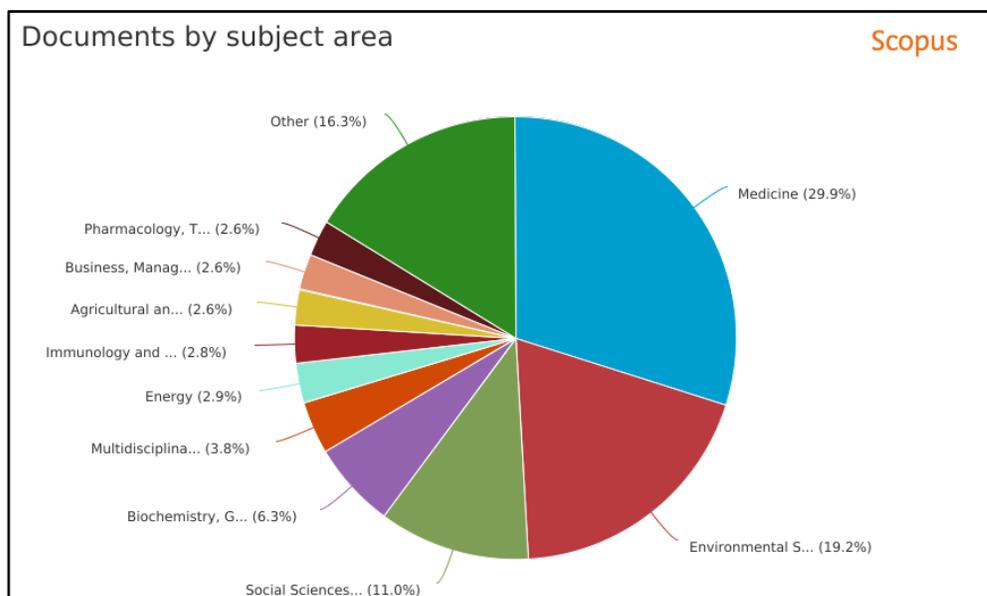

Figure 6: documents by subject area
Source: http://www.scopus.com (accessed on 10th december)

3.4 Affiliation measurements

Graph below stipulates the top ten bestowed organizational affiliations. Maximum number of affiliations is from the Monash University, Australia and the Consiglio Nazionale delle Ricerche (National Research Council), Italy. These both universities have 9 affiliations each followed by John Hopkins University, United States which have 8 Affiliated documents.
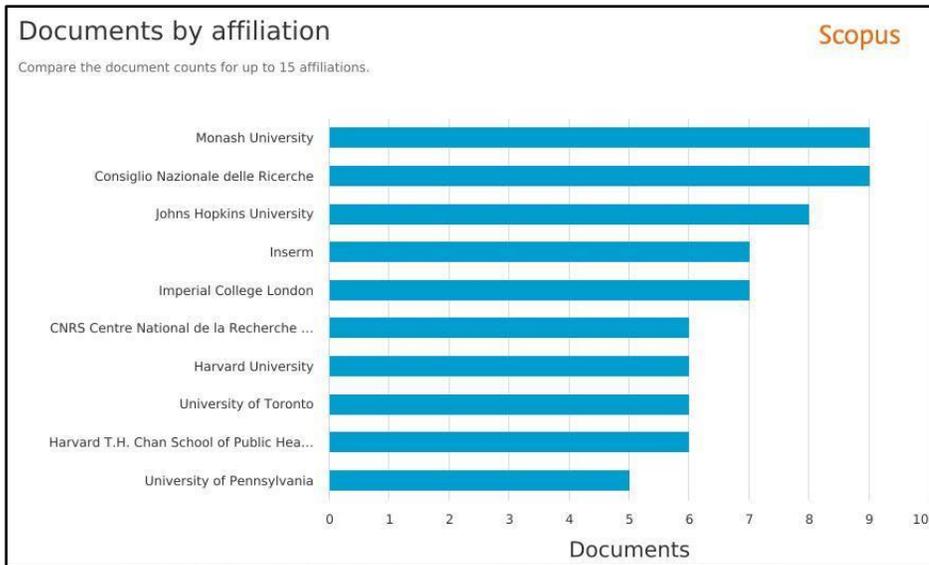
Figure 7: documents by affiliation
Source: http://www.scopus.com (accessed on 10th december)

3.6 Author contribution measurements

Figure below depicts the top 10 authors who have given their contribution in the area of studying the effect of climate change on COVID-19. As it is evident from the given graph that Shultz, J.M. has a maximum number of documents which is 4 followed by many other authors.
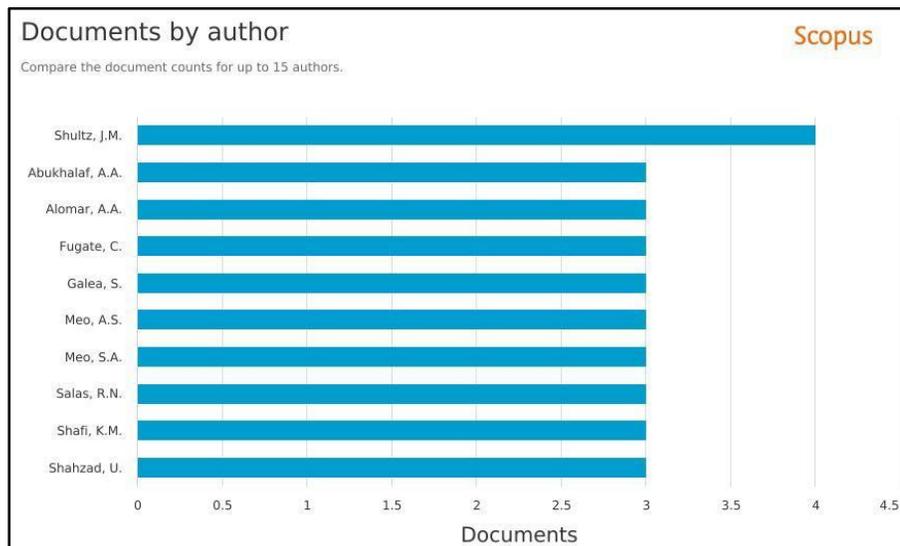

Figure 8: documents by author
Source: http://www.scopus.com (accessed on 10th december)

3.7 Scrutinized Citations

Table 6 below depicts the citations received through these documents that are drawn out in the area of effect of climate change on COVID-19. Total sum of citations of 412 documents is 2600 till date.

Year	2020	>2020	Total
No. of Citations	2446	154	2600

Table 6: Yearwise Citations
Source: http://scopus.com (accessed on 10th december)

List of first 10 publication titles obtained from the scopus with maximum citations acquired till date is shown in the table 7. As a result we can see that the publication with title "Unstable Gas Clouds and Respiratory Pathogen Discharge: Potential Ramifications for Controlling Transmission of coronavirus." have received the maximum number of citations in this research area.

Name of publication	2020	>2020	Total
Unstable Gas Clouds and Respiratory Pathogen Discharge: Potential Ramifications for Controlling Transmission of coronavirus.	227	9	236
Pandemics, tourism and global change: a continuous assessment of coronavirus	181	10	191
Association among weather and coronavirus pandemic in Jakarta, Indonesia	118	7	125
Association among climate factors and Coronavirus pandemic in New York city.	83	5	88
Examination of effective aerology parameters on COVID-19 upsurge in Iran	65	5	70
Temperature remarkably changes COVID-19 transference in (sub)tropical region of Brazil	62	4	66

Influence of weather and climate on COVID-19 surge in Turkey	50	2	52
Consequences of temperature on the dynamics of the COVID-19 outbreak in China	40	6	46
Temperature, Humidity, and Latitude examination to Evaluate developing Spread and Seasonal pattern of Coronavirus Disease 2019 (COVID-19)	36	3	39
Verify that prime temperatures and transitional ratio might benefit the spread of coronavirus in tropical climates: A study for the prime affected Brazilian cities.	37	1	38

4. RESEARCH RAMIFICATIONS OF STUDY

CoronaVirus disease is an extensive infectious disease that has affected millions of people over the world. Many researchers are working on many contributing factors like climate to prevent the spread of COVID-19. By analyzing the effect of meteorological climate parameters and its effect on COVID-19, preventive actions and majors can implemented to avoid further pandemic.

The main keywords used in bibliometric analysis are of climate change affecting the spread of COVID-19 are climate, correlation, coronavirus, disease, pandemic and analysis. This implies that there is a lot more to work on for finding the real impact of climate on COVID-19. This will surely help in preventing the more spread of coronavirus.

China and India are the world rising economies, and their exploration system is developing at a brisk pace. With the steadily expanding interest for dealing with information which is consistently refreshed, Indian experts can examine this zone which has been unnoticed previously.

5. CIRCUMSCRIBING THE RECENT STUDY

The current investigation has a couple of constraints. The literature explored is taken from journals which are marked in Scopus while grey literature and documents in non-marked journals have not been scrutinized. The search query was used to focus on climatic changes and health of humans. The precision and extent of human health

and environmental changes are expansive and composite. In this manner, it is hard to guarantee a full consideration of writing on the two points. The subsequent drawback was the strategy used for tallying records quantities for every country. Scopus makes all investigations dependent on the quantity of various combining in the reports. Accordingly, with a few creators having a similar nation connection was checked once for that nation. Notwithstanding, a record with two creators having two diverse nation affiliations were tallied once for every nation. This has expanded the examination yield of specific nations with more noteworthy international research collaboration regardless of whether the creators from that nation were not the primary or comparing creators.

6. CONCLUSION

The aim of the bibliometric study is to study related research documents and to bring out useful information in that particular research field. This study will help in finding the gaps in the literature and will be helpful to map the gap. Here in this study, the bibliometric survey on effects of climate change on COVID -19, several central participants, many research topics, and research gaps are identified. The recent study emphasizes on the significance of environmental swap on the study of disease transmission and geography of infectious diseases. The present study demonstrated deficient IRC which is mostly required during these times. An examination of interesting issues in the area and the advanced patterns of exploration on coronavirus in ecological sources is carried out dependent on content examination and grouping of terms occurrences. Generous exploration exercises on COVID-19 comparable to creating immunizations have just started broadly. Analysis of promising ecological interest on Coronavirus will be an interesting study.

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