



## A Bibliometric Analysis of Covid-19 Research using VOSviewer

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### ABSTRACT

The new Coronavirus (namely Covid-19) discovered in 2019 in Wuhan has sickened more than three million people in worldwide. Because Covid-19 is spreading so fast and killing so many people, it has encouraged researchers to conduct research and publish it in various mass media, including journals. This study aims to analyze the scope of Covid-19 research using a bibliometric review. To obtain information about Covid-19 studies, the Scopus database was used. Topic areas with titles, keywords, and abstract criteria in Covid-19 studies were used as a reference for extracting search results. Search result extraction was done using VOSviewer. After that, the results of bibliometric mapping were analyzed further. A total of 3,513 articles were found in the Scopus database accessed on April 25, 2020. There was a significant increase in the number of publications on Covid-19 from 2019 to 2020. Among all countries, China contributed the most publications. Meanwhile, the keywords coronavirus, pandemic, and impact turned out to be the area's most widely discussed. Through VOSViewer we analyzed how many articles have been published about Covid-19 and its relationships to a topic area. This review certainly can provide a reference point for further research related to the Covid-19 outbreak.

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## 1. INTRODUCTION

The disease caused by the new coronavirus or Covid-19 is now a pandemic that is troubling people around the world (Meng *et al.*, 2020). The rapid spread of the coronavirus and its extraordinary killing power has created an unsettling situation for governments, communities, scientists, educators, economists, and especially medical officers (Lima *et al.*, 2020). The pandemic due to coronavirus is extremely concerning and several countries in the world have implemented a lockdown system for its people to prevent the spread of coronavirus which is even worse. As a result, a lockdown system like this has adversely affected various aspects of human life such as social life (Ali & Alharbi, 2020; Koon, 2020), economy (Laing, 2020; Nicola *et al.*, 2020), health (Li, *et al.*, 2020), emotional (Kang *et al.*, 2020; Yang & Ma, 2020), and it has even affected the world of education (Araújo *et al.*, 2020). Various efforts have been made by all parties, including research, to deal with the Covid-19 outbreak. For this reason, a comprehensive study is needed so that it can be used to help other researchers plan the steps in handling Covid-19 outbreaks.

The purpose of this study is to investigate the development of research related to the Covid-19 outbreak in terms of the distribution of bibliometric maps and research/publication trends on the Scopus database using VOSViewer software. Bibliometric is effective for giving dataset that can be used for policy makers, researchers, and other stakeholders for improving quality of research (Nandiyanto *et al.*, 2020). The bibliometric map distribution displayed consists of the type of publication, the topic area being studied, the country of origin of the researcher, the journal in which the publication was published, and the language used.

## 2. METHOD

All articles analyzed in this study were taken from the Scopus database, where Scopus is one of the most comprehensive peer-reviewed journal databases in the world and it can provide good scientific academic information (Klapka & Slaby, 2018). The study was conducted by searching online on April 25, 2020, with the keywords "Covid-19" according to the criteria "titles, keywords and abstract (topic area)". There is no period used in this sampling, considering the topic of Covid-19 is something new.

Sample articles were downloaded in \*.ris format and then processed using HistCite 12.3 software to make it easier in analyzing data. Furthermore, VOSviewer is used to visualize and analyze trends in the form of bibliometric maps (van Eck & Waltman, 2010). VOSviewer can make publication maps, country maps, or journal maps based on networks (co-citation) or build keyword maps based on shared networks (Hudha *et al.*, 2020). The frequency of keywords can be adjusted as desired and less relevant keywords can be removed. VOSviewer software can also be used to do data mining, mapping, and grouping articles that were taken from a database source (Xie *et al.*, 2020).

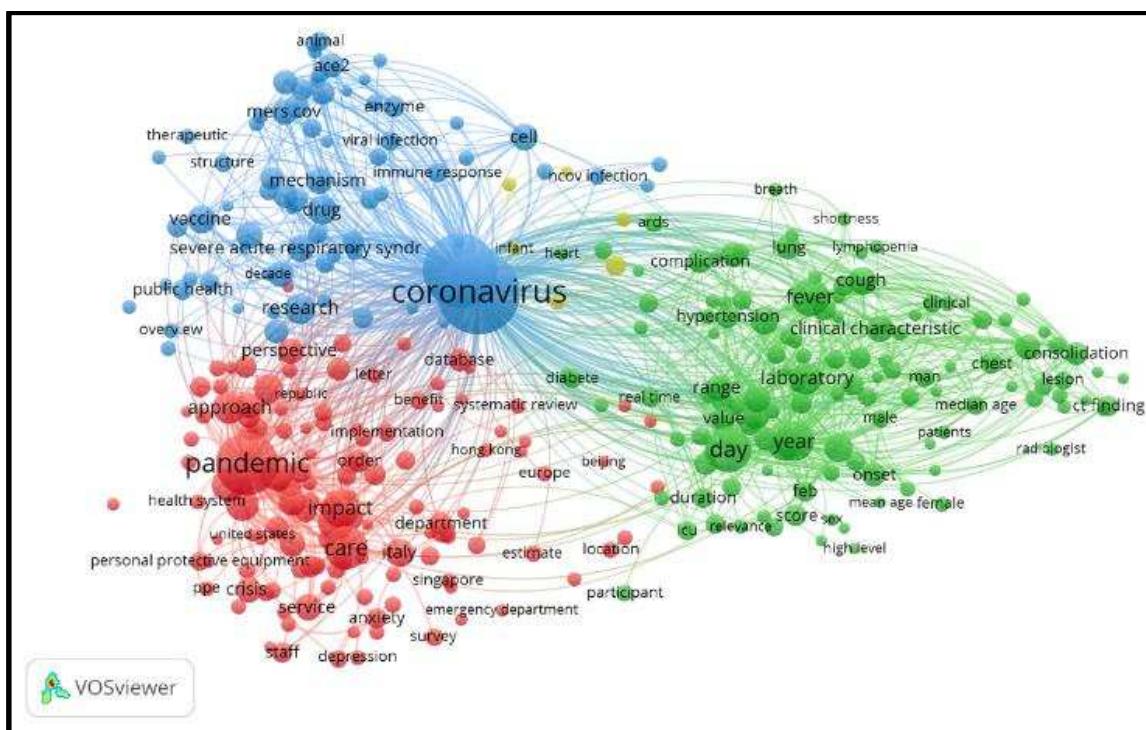
## 3. RESULTS AND DISCUSSION

### 3.1. Visualization topic area using VOSviewer

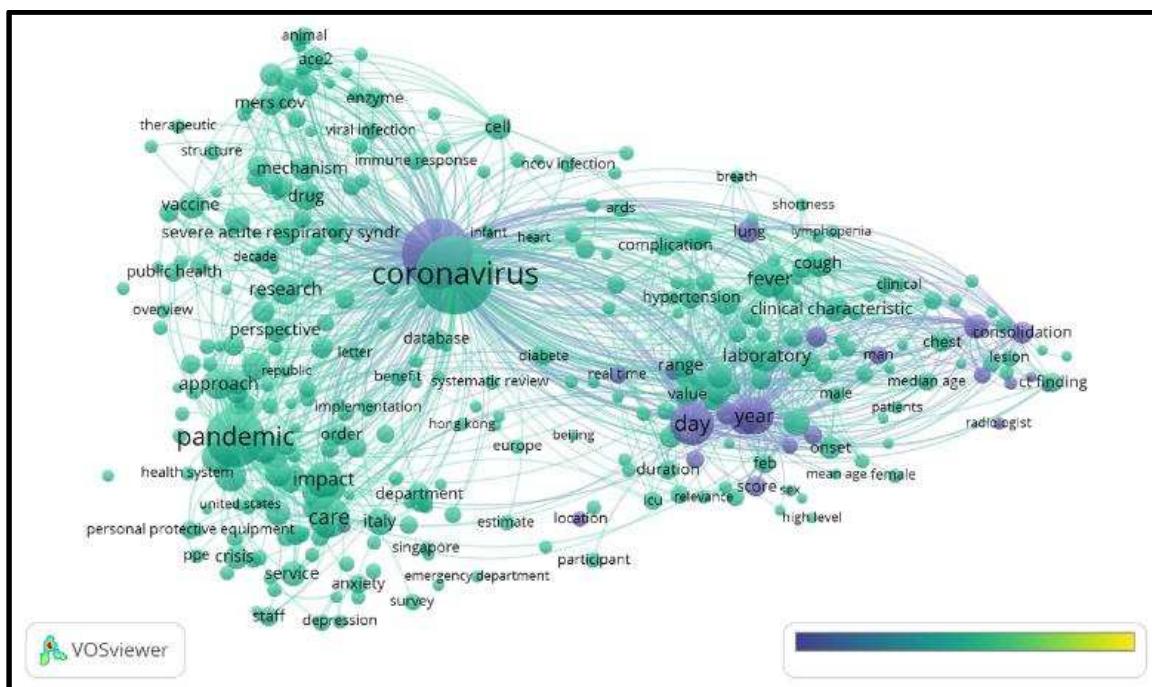
The minimum number of relationships with terms in the use of VOSviewer was set to 10 terms. After being analyzed using VosViewer, there were 4 clusters (red, green, blue, and yellow), which showed the relationship between one topic and another. VOSviewer can display bibliometric mapping in three different visualizations; network visualization (**Figure 1**), overlay visualization (**Figure 2**), and density visualization (**Figure 3**). Keywords were labeled with colored circles. The size of the circle is posi-

tively correlated with the appearance of keywords in the titles and abstracts. Therefore, the size of letters and circles was de-

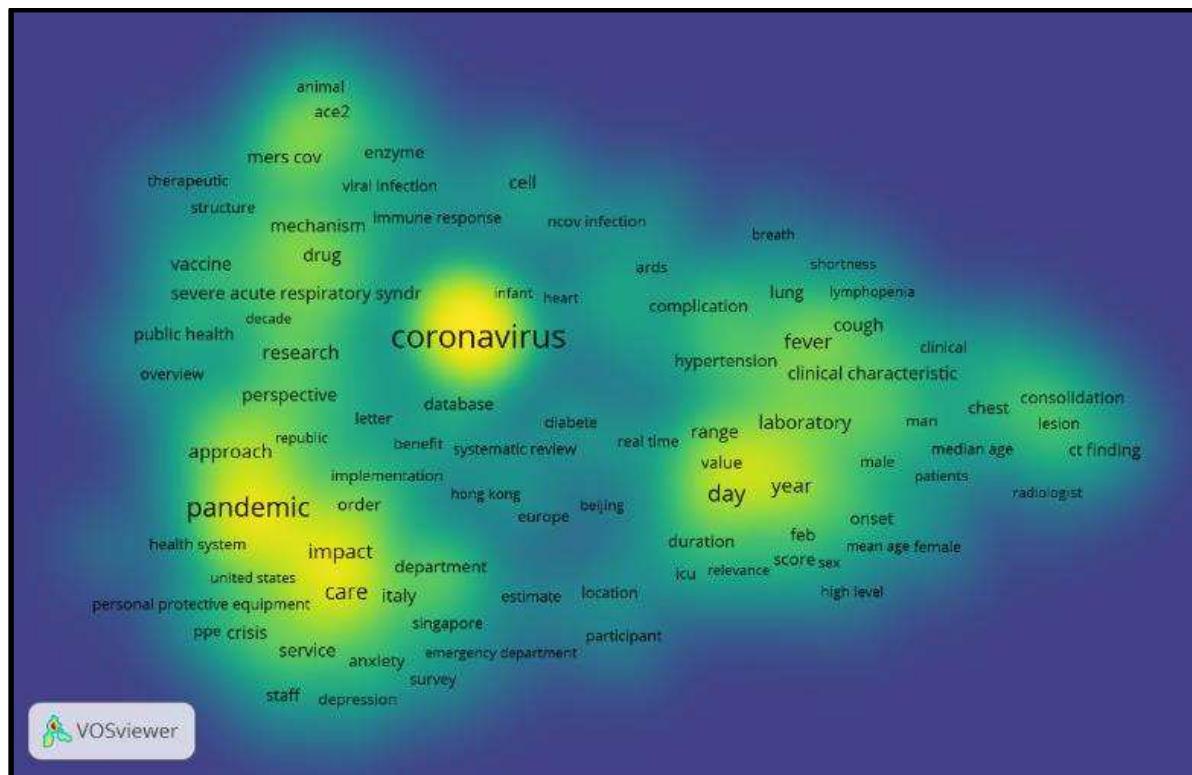
termined by the frequency of occurrences. The more often a keyword appears, the greater the size of the letters and circles.



**Figure 1.** Visualization topic area using VOSviewer using network visualization



**Figure 2.** Visualization topic area using VOSviewer using overlay visualization



**Figure 3.** Visualization topic area using VOSviewer using density visualization

The results extracted from titles, keywords, and abstracts found 3,513 documents consisting of 3,511 documents in 2020 and 2 documents in 2019. Data consisted of various types of publications: Article (1,794), Letter (595), Editorial (428), Note (315), Review (307), Short Survey (42), Erratum (26), Data Paper (4), and Conference Paper (2).

**Figure 1** shows clusters in each of the topic areas studied. It can be seen that the keywords pandemic, impact, and care are in the same cluster (red area). This shows that there is a close relationship between them. Meanwhile, **Figure 2** shows the trend from year to year related to this research. It is worth noting that this coronavirus outbreak occurred at the end of 2019, so there were only 2 studies in 2019 and the number increased rapidly in 2020. Meanwhile, **Figure 3** shows the depth of research, replying that the more concentrated the colors that appear and the research increases in number.

From **Figures 1-3**, it can be seen that the keywords that often appeared were coronavirus, pandemic, impact, care, day, and year. From these data, we can search the novelty coronavirus research. For example, research related to the learning process during the Covid-19 outbreak is still little done by other researchers. To that end, researchers can contribute to tackling the Covid outbreak by conducting studies on the use of technology for learning. Furthermore, the availability of information on each topic area can be searched by entering more specific keywords. For example, learning Covid-19 or technology in Covid-19 or others. **Figure 4** shows some of the topic areas being studied by other researchers.

The analysis to be carried out in the topic of the use of technology in learning can also be viewed from the number of studies being carried out by other researchers. From Figure 2 it appears that both learning and technology show relatively small numbers

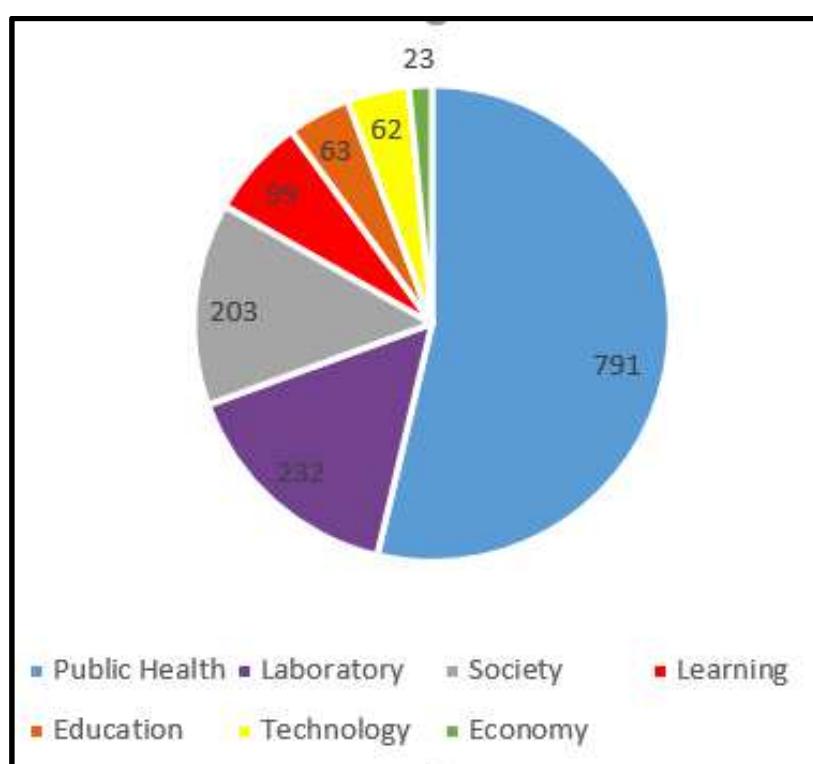
compared to public health and laboratory (both of these topic areas appear in Figure 1). For this reason, we can provide support in handling the Covid-19 outbreak through the use of technology in learning. Other researchers have shown that utilizing technology can bridge the learning vacuum for students during the Covid-19 outbreak ([Almarzooq et al., 2020](#); [Chick et al., 2020](#)).

### 3.2. Visualization of country of study

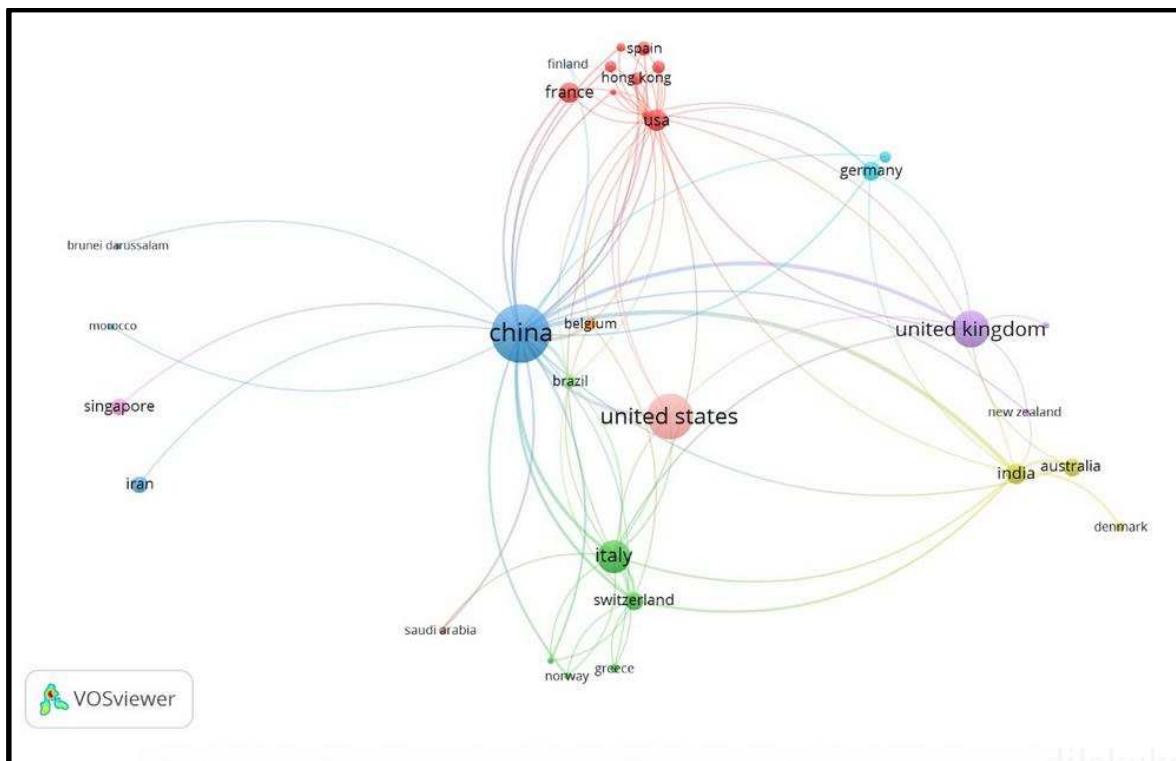
In addition to bibliometric analysis in the topic area, we can analyze the author, journal, country of study, and the language used in writing. Specifically, for the country of study, bibliometric analysis is shown in [Figure 5](#).

If we search for the term country in Covid-19 in the Scopus database, 229 data will appear. However, if analyzed further, in fact, there are only 95 countries that have conducted such a study. This is due to the

large number of institutions that wrote down affiliations followed by the name of their country so that Scopus reads it as a new country. For example Taiwan; Research Center for Artificial, People's Republic of China, and so on. Although 95 countries are conducting Covid-19 studies, for the simplicity of VOSViewer visualization, we limit them to the top 20 countries with the highest studies. It can be seen that China is the country that has conducted the most studies, followed by the United States and the United Kingdom. [Figure 3](#) also shows that China is a referral center for Covid-19 studies, where all countries conducting Covid-19 studies have a network with China. In other words, these countries refer to articles written by authors from China. This is understandable because the beginning of the new coronavirus outbreak occurred from Wuhan-China.



**Figure 4.** Number of publications in several topic areas



**Figure 5.** Country of study in terms of Covid-19

#### 4. CONCLUSION

The current Covid-19 epidemic is spreading rapidly. As proof, we have shown many rapidly growing research related to Covid-19. This research drew upon data from various scientific disciplines and their relationships with one another. Although there is no systematic evidence on the subject, this article attempts to configure and visualize the sharing of literature systematically and analyze it through a bibliometric approach. This bibliometric approach was used to identify key themes in each study or scope of knowledge or research that has been done so far and is

useful for determining novelty in conducting further research.

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#### 6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirm that the data and the paper are free of plagiarism.

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