A CiteSpace-based Bibliometric Review of Public Health Governance System with the Belt and Road Initiative

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Abstract: With the support of CiteSpace, this paper adopts bibliometric analysis to sort out macro concepts of the literature on public health under the Belt and Road Initiative and public health governance. Visual knowledge graphs are drawn in terms of keywords, authors, institutions, funding sources, and more. By extracting keywords for co-occurrence analysis, this paper delivers the summary graph on research fronts and the timespan graph of keywords. It presents the structure of research developments from the perspectives of time and theme to analyze the hot topics and trends of studies related to public health under the BRI and public health governance. In conclusion, the role of the BRI and the establishment of the public health governance system have not yet become trending topics and much-discussed issues in the field of public health. In addition, relevant studies mainly focus on theoretical conception, thus leaving considerable potential for further exploration in terms of law implementation.

Keywords: public health under the Belt and Road Initiative; knowledge graph analysis; CiteSpace

1. Introduction

Public health and security have been a trending topic of global concern. In the early 21st century, global health governance was caught up in the unexpected strike of SARS, and the world was alarmingly aware of its devastation[1]. The BRI is not only an international public product, but also an inclusive platform for cooperation and development. Therefore, this paper uses the CiteSpace software to analyze the literature on public health governance under the BRI in CNKI and WOS databases, draws visual knowledge graphs in terms of keyword co-occurrence, clustering analysis, and timespan analysis, and illustrates major research focuses related to public health governance under the BRI.

2. Data Sources and Study Methods

This paper selected target literature in the CNKI database from the following two aspects: a) the subjects and keywords for searching were set as "public health under the BRI"; b) the publication time was set to start in 2013. It is found the relevant literature regarding the rudiment of public health under the BRI was initially proposed in May 2016, and the latest literature was published in March 2024, during which time a total of 256 articles of relevant themes have been published. The paper proceeded likewise in the WOS database, searching for target literature with English keywords. Given the sum of English literature themed with public health under the BRI is not representative enough for analysis, the paper searched with the keyword "public health governance" and found 5214 relevant articles dating from 2013 to 2022. All the articles were imported into CiteSpace to establish a literature processing project with public health under the BRI and public health governance as its themes and generate visual knowledge graphs in such terms as keyword co-occurrence and clustering analysis.

3. Analysis of Study Results

3.1 Chinese literature data

3.1.1 The collaboration network of authors

The sum of articles published in a journal can reveal the academic status of the author in the field to some extent, and the collaboration network of authors can reflect the major author groups of relevant research and their cooperative relationships. This paper applies CiteSpace to perform a visualized analysis of the collected data and the results are demonstrated the Knowledge Graph of (Chinese) Authors and Their Collaboration Network. The font and node size represent the number of articles published by the authors, the lines in between show their cooperative relationships, and the thickness of the lines refers to their collaboration intensity. Analyzing the number of articles published by the authors in the relevant field and the

connections between them helps uncover productive authors and influential ones.

3.1.2 The network of research institutions

The collaboration network of research institutions showcases the spatial distribution of the facilities in the relevant research field. To uncover the institutions that promote research development, this paper exploits the collaboration network analysis function of CiteSpace to map the network of the research institutions in the relevant field. The network directly demonstrates the cooperation between the institutions, which provides a scientific method to evaluate their influences in the academic circle. With the selection of "Institution" in the Node Types tab, CiteSpace produces a visualized analysis of the collected data, a distribution network of research institutions. The node size represents the sum of the articles published in journals by the institutions. The lines in between suggest their collaboration intensity, and the lines' varied colors refer to cooperative relationships in different periods.

3.1.3 Co-occurrence of keywords

One of the significant methods of co-word analysis is to extract bibliographic information such as keywords and abstracts of citations, statistically produce plain knowledge graphs, and explore the hot spots in a research field in a certain period through the analysis of high-frequency keywords. This paper extracted author-related keywords with pre-set threshold values and found 223 high-frequency keywords and 562 lines. The knowledge graph of the co-occurrence of hot-spot keywords in the literature is depicted. The size of nodes and Chinese characters represent the frequency of occurrence of keywords. The lines' varied colors refer to connections established in different periods. The thickness and density of the lines represent the co-occurrence intensity of the keywords. It's not hard to see that"一带一路" ("BRI") makes the largest node, followed by "人类卫生健康共同体" and "人类命运共同体" ("a health community for humanity" and "a community with a shared future for mankind"). According to the time span collected by Cite Space, "一带一路", "公共卫生", "非传统安全", and "卫生合作" ("BRI", "public health", "non-traditional security", and "health cooperation") are proposed earlier, while the keywords including "东盟", "全球公共卫生治理", "健康丝路之路", "国际话语权", and "中国方案" ("ASEAN", "global public health governance", "the Silk Road of Health", "international discourse power" and "Chinese initiatives") are likely to become new areas for research in the future.

3.1.4 The clustering analysis of keywords

Hot topics for research represent the focuses of scholars in a specific academic field, thus making a reflection of the much-discussed issues in a certain period. As an important part of academic articles, keywords are a crystallization of the articles' essence, often used to study the hot-spot issues in a certain field. In this regard, the paper applies CiteSpace and LLR (Log-likelihood Ratio) algorithm to conduct a clustering analysis of keyword co-occurrence to produce a direct reflection of the hot topics for research.The number of nodes is 223, the sum of the lines is 257, and the network density reaches 0.0104. The Modularity Q is related to the density of the nodes, the larger the Q, the greater the clustering effect, which can be used for scientific clustering analysis. The Weighted Mean Silhouette S can be used to measure the homogeneity of the clustering groups, the larger the S, the greater the homogeneity of the network, which indicates that the clustering group is highly credible. Q comes at 0.7032, meaning the network structure has a good clustering effect, and that S reaches 0.9142, representing high homogeneity and well-organized classification of different clustering groups. The figure demonstrates ten clustering groups, with "一带一路", "全球治理" and "人类卫生健康共同体" ranking atop. The largest clustering group is "一带一路", which appeared mostly in 2020, including 28 keywords such as "一带一路", "中国—东盟" (China-ASEAN), "留学生" (international students) and "全球卫生治理".

3.1.5 Timeline

The academic trends analysis is applied to depict the evolution and nature of a certain research field through the consecutive citation of the clustering group of a fixed pack of literature with co-citation clustering groups and citations as the analytic basis. As one of the main views of CiteSpace, the timeline knowledge graph with the clustering groups of literature keywords allows researchers to explore the evolution and academic trends of the clustering group of research topics and provides valuable knowledge of the relationships between the hot-spot topics. The largest clustering group of relevant literature is "一带一路", including 28 keywords, most of which came up in 2020. The keywords rang from "China-ASEAN" in the first place to "全球治理", "流行病学" (epidemiology), "中国之治" (Chinese initiatives), and "传染病控制" (epidemic control). This clustering group is centered around the research evolution of the BRI. According to the computer-generated clustering group report, it shows what relates to the clustering keywords in this clustering group is Boao Forum for Asia Annual Conference 2021: Join Hands to Promote High Quality Belt and Road Cooperation by Xiao Wei (2021); its connections with such clustering groups as "infectious diseases" and "the BRI participants" suggest multiple themes co-occurrence to some extent. In 2016, the concept of public health under the BRI started to come up in the research topics. The year of 2018 witnessed a surging increase in the studies of global governance, public health, a community with

a shared future for mankind, and public health cooperation, which produced systematic explanations for international issues including public health emergencies and corresponding international cooperation.

3.2 English literature data

3.2.1 The collaboration network of authors

There are 1572 nodes and 1688 lines in total, and the overall network density is 0.0014. The most apparent collaboration network of authors is composed of Sharon Friel, Rob Ralston, Ashley Schram, Jeff Collin, and other authors, the most populated group of co-authors. According to the sum of articles published by the authors, the publication per author is relatively high, with eleven authors who have published more than ten articles. According to the cooperation degree of authors, that of the main authors is relatively high. Through the analysis of Figure 6, it is obvious that a dense and mature collaboration network has been formed in groups in the relevant field. Generally, there exists a clear connection between the productive authors and the collaboration density and intensity, and the main collaboration network is relatively concentrated. Among the top three authors, Sharon Friel, who initially studied cases in the Australian trade sector, focuses on trade and food security governance[2,3] and proposes that more attention should be given to the strategic ideas of industrial and public health organizations in formulating agendas for public health and trade policies, which has significant effects on how the governments promote the public health agendas[4]. Rob Ralston studies the implementation of the WHO Framework Convention on Tobacco Control in countries such as Ethiopia and Uganda[5,6]. Ashley Schram studies tobacco control in trans-Pacific regions[7]. The top three authors form an in-depth cooperative relationship.

3.2.2 The network of research institutions

The collaboration network of research institutions showcases the spatial distribution of the facilities in the relevant research field. To uncover the institutions that promote research development, this paper applies the collaboration network analysis function of CiteSpace to map the network of the research institutions in the relevant field, which directly demonstrates the cooperation between the institutions, and provides a scientific method to evaluate their influences in the academic circle. The node size represents the sum of the articles published in journals by the institutions. The lines in between suggest their collaboration intensity, and the lines' varied colors refer to cooperative relationships in different periods.

3.2.3 Co-occurrence of keywords

One of the significant methods of co-word analysis is to extract bibliographic information such as keywords and abstracts of citations, statistically produce plain knowledge graphs, and explore the hot spots in a research field in a certain period through the analysis of high-frequency keywords. This paper extracted author-related keywords with pre-set threshold values and found 570 high-frequency keywords and 1908 lines.The size of nodes and Chinese characters represent the frequency of occurrence of keywords. The lines' varied colors refer to connections established in different periods. The thickness and density of the lines represent the co-occurrence intensity of the keywords. It's not hard to see that"public health" makes the largest node, followed by "governance" and "health". According to the timespan collected by CiteSpace, "governance", "public health", "health policy", "health system", and "global health" come up earlier, while the keywords including "tobacco industry", "pandemics", "middle-income country", "machine learning", and "environmental pollution" are likely to become new areas for research in the future.

3.2.4 The clustering analysis of keywords

Hot topics for research represent the focuses of scholars in a specific academic field, thus making a reflection of the much-discussed issues in a certain period. As an important part of academic articles, keywords are a crystallization of the articles' essence, often used to study the hot-spot issues in a certain field. In this regard, the paper applies CiteSpace and LSI (Latent Semantic Indexing) algorithm to conduct a clustering analysis of keyword co-occurrence to produce a direct reflection of the hot topics for research. The knowledge graph of the clustering analysis of keywords is shown in Figure 9, with the colored blocks representing different clustering groups, clustering keywords inside. The number of nodes is 570, the sum of the lines is 1908, and the network density reaches 0.0118. The Modularity Q is related to the density of the nodes, the larger the Q, the greater the clustering effect, which can be used for scientific clustering analysis. The Weighted Mean Silhouette S can be used to measure the homogeneity of the clustering groups, the larger the S, the greater the homogeneity of the network, which indicates that the clustering group is highly credible. It's not hard to see in Figure 9 that Q comes at 0.4283, meaning the network structure has a good clustering effect, and that S reaches 0.7145, representing high homogeneity and well-organized classification of different clustering groups. The figure demonstrates ten clustering groups, with "public health", "climate change", and "governance" ranking atop. The first five clustering groups came up from 2015 to 2017. The largest clustering group is "public health", which appeared mostly in 2015, including 70 keywords such as "health care", "service delivery", "health financing", and "Asia-Pacific".

3.2.5 Timeline

The academic trends analysis is applied to depict the evolution and nature of a certain research field through the consecutive citation of the clustering group of a fixed pack of literature with co-citation clustering groups and citations as the analytic basis. As one of the main views of CiteSpace, the timeline knowledge graph with the clustering groups of literature keywords allows researchers to explore the evolution and academic trends of the clustering group of research topics and provides valuable knowledge of the relationships between the hot-spot topics.the largest clustering group of relevant literature is "public health", including 70 keywords, most of which came up in 2018. The keywords rang from "China innovation model" proposed in 2015 to "indicators efficiency", "public health policy", and "construction health insurance". This clustering group is centered around the research evolution of public health.

4. Conclusion

The review of the current studies of scholars at home and abroad on the BRI and the establishment of a public health governance system reveal the main features of research cooperations, research priorities, and developments of research focuses of the scholars. Above all, Chinese researchers have formed relatively tight cooperation in studying public health governance under the BRI as evidenced by their dense collaboration network, while Western scholars pay more attention to public health governance with less research results in public health governance under the BRI. Judging from the research focuses, such major nodes as public health security and medical quarantine appeared in early studies, and the research vision was mainly concentrated in the relevant fields at home. According to the research focuses of scholars abroad, such major nodes as health policy, health system, and global health appeared in early studies with an international vision in place. Through the analysis of the overall data, the integrated study of public health and the BRI seems inadequate in the studies abroad with few noticeable in terms of the clustering groups of keywords and keyword co-occurrence.

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