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Bibliometric analysis of quality studies in healthcare during the pandemic

Pandemi döneminde sağlık hizmetlerindeki kalite çalışmalarının bibliyometrik analizi

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ABSTRACT

Introduction and Objective: COVID-19 has significantly affected healthcare processes along with quality studies in healthcare services. This research aims to reveal the bibliometric profile of quality studies in healthcare during COVID-19. **Materials and Methods:** The data were obtained from the Web of Science (WoS) core collection (n=470). The search criteria were used to access quality studies conducted in healthcare during the pandemic. Bibliometric analysis was made with the SciMAT program. **Results**: During COVID-19, quality studies in healthcare focused on mental health subjects. "Quality of life" (n=82) and "mental health" (n=80) were the most frequent keywords. The themes of "insomnia," "depression," and "physical activity, which also affect the quality of life, were among the most frequent subjects. **Conclusion**: During the pandemic period, research focused on subjects of quality of life rather than managerial quality research. Although health outcomes for patients and healthcare professionals are a priority in pandemics, managerial quality issues must be addressed from a broader perspective.

ÖZ

Giriş ve Amaç: COVİD-19 sağlık hizmet süreçlerini kalite çalışmaları ile önemli bir ölçüde etkilemiştir. Bu araştırma, COVİD-19 döneminde kaliteye yönelik çalışmaların bibliyometrik profilini ortaya çıkarmayı amaçlamaktadır. **Gereç ve Yöntem**: Veriler Web of Science (WoS) çekirdek koleksiyonundan elde edilmiştir (n=470). Pandemi döneminde sağlık hizmetleri alanında yapılan kalite çalışmalarına ulaşmak için takip eden arama kriteri kullanılmıştır. Bibliyometrik analizi SciMAT programı ile yapılmıştır. **Bulgular**: COVİD-19 döneminde sağlık hizmetleri alanındaki kalite çalışmaları özellikle yaşam kalitesi kavramı üzerinde odaklanmıştır. Yaşam kalitesi (n=82) ve akıl sağlığı (n=80) en sık kullanılan anahtar kelimelerdendir. Yaşam kalitesini etkileyen "uykusuzluk," "depresyon," ve "fiziksel aktivite" temaları da en sık tartışılan konular arasındadır. **Sonuç**: Pandemi döneminde araştırmalar yönetsel kalite araştırmalarından ziyade yaşam kalitesi konularına odaklanmıştır. Pandemilerde hastalar ve sağlık çalışanları için sağlık sonuçları öncelik olsa da, yönetsel kalite konuları da araştırmacılar tarafından geniş bir perspektiften ele alınmalıdır.

INTRODUCTION

Technological advances, increasing success rates in healthcare applications, and increasing patient expectations force health systems to change in many areas, from health services to financing, access to healthcare, and quality improvement processes. The necessity of providing the highest quality care service to patients as soon as possible is gaining more importance (Shaw et al., 2010).

Health service delivery requires a multidimensional and multidisciplinary understanding. Each patient can be evaluated as a project with its unique characteristics. These two basic features make providing healthcare services and meeting patient expectations much more complicated than in other areas. Additionally, another important challenge is the difficulty in measuring health outcomes (Tengilimoğlu et al., 2021). At this point, quality management is an important tool in minimizing unpredictability in health service delivery.

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Quality studies, an integral part of health systems in many countries, play an important role in healthcare management. Studies in this area range from quality improvement of patient care to preventing infections, ensuring patient and employee safety, managing risks, continuity of care, effective organizational processes, and resources management etc. Their results contribute to the field (Kavak et al., 2020).

Additionally, quality applications were noted as an important tool for preparing planned and effective healthcare management for extraordinary situations such as COVID-19 (Akyüz et al., 2021). Extraordinary situations such as pandemics affect all management processes worldwide, especially in healthcare systems.

On January 13, 2020, the Coronavirus Disease (COVID-19) was identified in Wuhan Province, China. The disease is characterized by respiratory problems, fever, cough, and shortness of breath (TR Ministry of Health, 2020). World Health Organization (WHO) announced that COVID-19 was deemed a pandemic on March 11, 2020 (News, 2020). Globally, as of May 31, 2023, 767,364,883 cases were confirmed, and 6,938,353 deaths were reported to WHO (World Health Organization) (World Health Organization, 2020a). In Turkey, as of December 2022, the total case number was 17,141,400, and 101,763 of them lost their lives (TR Ministry of Health, 2020).

Comprehensive control measures have been taken worldwide for the disease since the first days when COVID-19 cases were identified. WHO has provided extensive guidance to countries, healthcare institutions, and professionals to minimize the spread of the disease. Health managers and healthcare professionals have made great efforts to reduce the number of cases and prevent deaths in line with international control measures and the decisions of national authorities (World Health Organization, 2020b). Considering the sociological (Clair et al., 2021b; Farboodi et al., 2021), psychological (da Silva Neto et al., 2021; Mukhtar, 2020; Uzunhasanoğlu & Şen, 2021), and economic (Barrett et al., 2021; Nicola et al., 2020) effects of the pandemic on both employees and society, it affected the dynamics in healthcare. As expected, the pandemic created a significant workload on healthcare systems (de Oliveira Souza, 2020; Doleman et al., 2023). Even developed healthcare systems such as Europe and the United States of America (USA) were significantly affected by the pandemic for many reasons, such as excessive patient load, long queues, and lack of healthcare personnel (Rathnayake et al., 2021). These characteristics of the pandemic might also affect healthcare quality management processes, which is the starting point of this study. This research aims to reveal the bibliometric profile of quality studies in medicine during the COVID-19 pandemic.

MATERIALS AND METHODS

This section includes methodological information about the research's data collection, analysis, and interpretation process.

Study type

This study is a bibliometric study that includes scientific mapping and performance analysis findings. The research findings cover the 2-year pandemic period. Bibliometric analysis is a type of methodology that allows quantitative interpretation of big data, such as academic outputs. In particular, by using data such as keywords, abstracts and authors of scientific articles, many findings such as author productivity, subject training, relations between authors and subjects, and the evolution of the relevant subject over time can be obtained by academics. Bibliometric analysis can reveal findings in two different areas: science mapping and performance areas. Performance analyses reveal the productivity of authors and countries with different findings. The science mapping technique reveals the evolution of topics in the literature over time and the relationships between topics.

Data Collection

The data in the study were retrieved from the Web of Science (WoS) database. The search criteria to filter the purposed publications from the database are (Covid* OR cov-19 OR cox19 OR coronavirus)(Title)AND quality AND(health*OR health care OR hospital OR medical) (Title)and 2021 or 2020(Publication Years). After the search, 470 publications were found. The data was downloaded as "plain text" and uploaded to the SciMAT software for analysis. (https://www.webofscience.com/wos/woscc/summary/f945f932-244f-4c5e-9484-7db335e7aa59-3d68926f/relevance/1).

Data Categorization and Analysis

Based on these 470 publications, 1362 keywords were determined by singular/plural form. The analyses were carried out with data allocated for 2020 and 2021. There were 90 publications in 2020 and 380 in 2021. The SciMAT software configuration in the analysis was "[Unit of analysis: Words (authorRole=true, sourceRole=true, addedRole=true); Kind of network: Co-occurrence; Normalization measure: Equivalence index; Cluster algorithm: Centers simples, Max cluster size: 6, Min cluster size: 1; Evolution measure: Inclusion index; Overlapping measure: Inclusion index]". Based on this specification, analysis findings were presented with strategic diagrams, thematic networks, overlap maps, and thematic development map visuals.

Data Interpretation

The theme sizes change based on the publication number. The publications number, the total citations number, and h-index values are used to evaluate the theme quality. The placement of the themes in the strategic diagrams is based on centrality and dencity. Themes with stronger external relations - more centralities are placed on the right side of the diagram, whereas the themes with stronger internal relations -more intense are placed on the upper side. Based on these features, themes can be placed in four different areas: high centrality and dencity themes (motor) are in the upper right area, low centrality and density themes (emerging or disappearing) are in the lower left area, high centrality and low-dencity themes (basic and transformational) are in the lower right area, and low centrality and density themes (advanced and isolated) are in the upper left area. In thematic networks, the relationships between the themes in the visual are revealed, and the line thickness is shaped based on the relationship strength. The overlap map visualizes the quantitative change of publication keywords during the analysis periods. In the thematic development map, the horizontal relationships of the themes between the periods are presented. The line thickness is correlated with the relationship strength. Solid lines show the shared keywords with the same theme names, while dashed lines show that mutual words are shared with the themes (Akyüz, 2021; Cobo et al., 2011; Cobo et al., 2012; Cobo et al., 2015; Martínez et al., 2015; Murgado-Armenteros et al., 2015; Orhan, 2018).

RESULTS

This section presents general, 2020, and 2021 year and thematic relationship findings.

General Findings

The publications distribution by country is seen in Figure 1. Examining the graph, the USA was in first place with 94 publications, followed by China with 58 and England with 51. Türkiye ranked 9th with 18 publications.

The total number of citations was 4822, and the mean of citations per publication was 10.26. The total number of citations decreased to 4594, with self-citations excluded. The publications' h-index value was 32. The top 3 most cited publications were produced by Zhang et al. (2020), Garrigues et al. (2020) and Xiao et al. (2020) (Table 1).

The most productive authors in the field were Armstrong M (n=4), Cheung T (n=4), Do TV (n=4), Nguyen HC (n=4), Nguyen TTP (n=4) and Xiang YT. (n=4) (Table 2).

The most frequent keywords were "Covid-19" (n=238), followed by "quality of life" (n=82) and "mental health" (n=80) (Table 3).

Table 1. Top 3 Most Cited Publications

Rank	Title	Authors	Year	Total Citations
1	"Impact of the COVID-19 Pandemic on Mental Health and Quality of Life among Local Residents in Liaoning Province, China: A Cross-Sectional Study"	"Zhang, Yingfei; Ma, Zheng Feei"	2020	465
2	"Post-discharge persistent symptoms and health-related quality of life after hospitalization for COVID-19"	"Garrigues, Eve; et al."	2020	300
3	"The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China"	"Xiao, Han; et al."	2020	239

Table 2. Top 10 Most Prolific Writers

Rank	Name	Documents Number
1	Armstrong M	4
2	Cheung T.	4
3	Do TV	4
4	Nguyen HC	4
5	Nguyen TTP	4
6	Xiang Y.T.	4
7	Budimir S	3
8	Chen YQ	3
9	Dao HK	3
10	Devine J	3

Table 3. Top 20 Keywords Most Used in The Research

No.	Keywords	Number of Uses
1	Covid-19	238
2	Quality-Of-Life	82
3	Mental-Health	80
4	Depression	67
5	Anxiety	57
6	Stress	48
7	Health-Related-Quality-Of-Life	44
8	Impact	34
9	Coronavirus	33
10	Pandemic	32
11	Sleep-Quality	30
12	Outbreak	27
13	Physical-Activity	23
14	Insomnia	20
15	China	19
16	Psychological-Impact	18
17	Prevalence	17
18	Sars Cov-2	16
19	Nurses	16
20	Reliability	16

The Year 2020

As a result of the analysis, seven themes emerged in the strategic diagram for 2020 (Figure 2). One of these themes was a motor theme ("healthcare workers"), and 3 were an isolated and advanced theme ("pollution," "insomnia," "health effect"). Three were a basic and transformational theme ("physical activity," "mental health," "coronavirus").

The findings of the themes of 2020 are given in Table 4. The theme with the most publications (n=8) in 2020 was "physical activity." While the total number of citations for this theme was 465, the h-index value was 8. In 2020, the theme with the highest citation (n = 545) was "insomnia," with 7 publications and 7 h-index.

When the thematic networks were examined, "physical activity" theme was related to "exercise," "sedentary

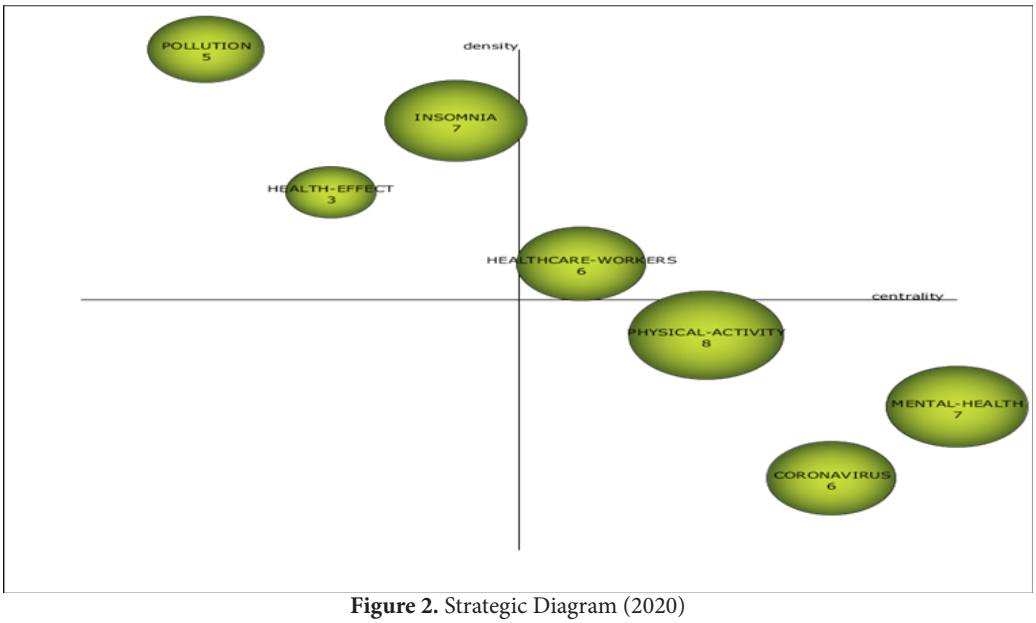

Figure 2. Strategic Diagram (2020)

Table 4. Findings on Themes (2020)

Name	No. of documents	No. of citations	h-Index	Centrality	Density
Pollution	5	79	4	2.67	64.44
Insomnia	7	545	7	22.86	44.59
Physical-Activity	8	465	8	26.64	21.88
Healthcare-Workers	6	228	6	24.14	38.41
Mental-Health	7	190	6	34.53	10.84
Coronavirus	6	291	5	30.32	10
Health-Effect	3	38	2	2.67	44.44

behavior," "quality of life," "patterns," and "reliability". "Insomnia" theme was related to "depression," "psychometric properties," "association," "anxiety," and "sleep quality." Additionally, "mental health" theme was related to "coronavirus outbreak," "PHQ 9," "disturbances," "stress" and "workers."

The Year 2021

As a result of the analysis, 28 themes emerged in the strategic diagram in 2021, 8 of which were motor themes ("China," "satisfaction," "digital healthy diet literacy," "depression," "pandemic," "outbreak," "nurses," "children"), 7 of which were isolated and advanced theme ("quality improvement," "mortality," "visits," "public health," "disparities," "staff," "college students"), 7 of which were basic and transformational themes ("physical activity," "insomnia," "validation," "health-related quality of life," "validity," "coronavirus," "population") and 6 of which were emerging or disappearing themes ("services," "outcomes," "hospitals," "experience," "risk factors," and "care") (Figure 3).

The findings of themes in 2021 are given in Table 5. The theme with the most publications (n=63) in 2021 was "depression." While the total citation number of this theme was 520, the h-index value was 9. The second theme with the highest number of publications (n=43) in 2021 was "pandemic," with a total citation number of 415 and an h-index value of 8.

Figure 3. Strategic Diagram (2021)

Table 5. Findings Related to Themes (2021)

Name	No. of documents	No. of citations	h-Index	Centrality	Density
Depression	63	520	9	79.97	25.4
Satisfaction	8	15	2	16.26	36.3
Nurses	8	72	2	24.15	10.06
China	4	4	1	8.85	93.7
Outbreak	24	153	6	36.48	10.1
Physical-Activity	9	47	3	17.8	9.26
Children	10	73	4	10.46	11.53
Pandemic	43	415	8	47.55	12.46
Health-Related-Quality-Of-Life	18	56	5	30.82	5.47
Validation	8	29	3	12.24	6.43
Coronavirus	11	79	3	20.59	4.4
Quality-Improvement	4	12	2	0	89.33
Mortality	6	83	3	4.81	32.69
Insomnia	10	29	3	27.1	6.64
Public-Health	3	15	3	0.51	28.7
Visits	2	4	2	1.8	30.56
College-Students	3	19	2	4.12	17.78
Hospitals	4	2	1	2.16	7.62
Outcomes	3	3	1	4.16	7.9
Experience	3	2	1	4.52	7.22
Digital-Healthy-Diet-Literacy	2	15	2	12.45	33.33
Disparities	2	38	1	0	22.22
Staff	2	0	0	0.75	20
Services	2	12	2	2.18	8
Risk-Factors	2	0	0	4.39	6.67
Resort	2	15	2	2.11	6.25
Validity	2	9	1	6.96	5
Population	2	5	1	6.9	2.02

When the thematic network 5 were examined, "pandemic" theme was related to the "general population," "WEB," "quality of life," "mental health," and "adults" themes. "Outbreak" theme was related to "Wuhan," "working," "healthcare workers," "impact" and "epidemic" themes.

Overlap Map and Thematic Relationship

The keyword number in the publications in 2020 was 309, and 149 (48%) keywords in 2020 continue to be used in 2021. The number of keywords in 2021 increased to 1137, with 988 new keywords (Figure 4).

In the thematic development map, relationships between "pollution" and "mortality" and between "insomnia" and "depression" themes were determined. "Healthcare workers" theme was observed to have a strong relationship with "satisfaction" and "validity" themes. Additionally, there were strong relationships between "physical activity" and "risk factors" and between "mental health" and "services" themes.

In short, looking at the findings, the effects of the pandemic period can also be seen in academic studies. In 2020, healthcare workers, who were especially important

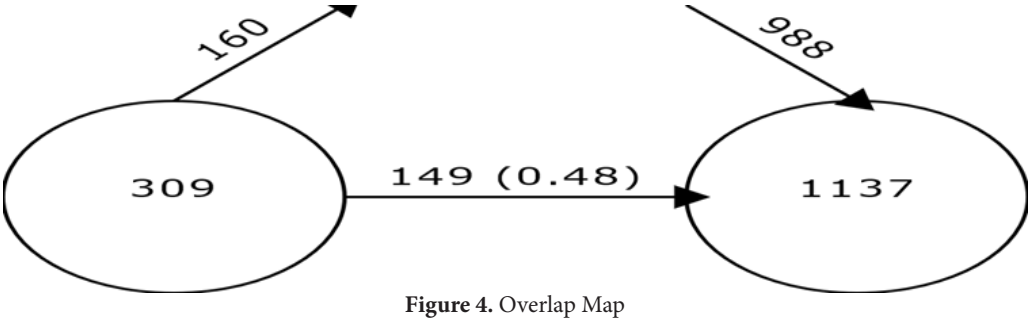

Figure 4. Overlap Map

actors of the pandemic, and the lack of physical activity resulting from isolation were mainly questioned. In 2021, the number of studies increased. In particular, depression and related problems, which have an impact on the quality of life of the pandemic, were discussed. As can be seen from the findings, other dimensions of quality remained in the background. This is an expected result, considering the pandemic conditions.

DISCUSSION

Quality in health services has six dimensions: patient safety, effectiveness, patient-centeredness, timeliness, efficiency, and fairness. It is not always easy to achieve the results expected and desired by patients in these dimensions of healthcare quality. In addition, measuring and evaluating healthcare outcomes is another quality management challenge in health services. Within the quality framework in healthcare services, effective quality management positively affects patient health outcomes, safety, treatment effectiveness, and efficiency. However, extraordinary situations such as pandemics significantly affect the functioning of the healthcare systems.

Despite all developments in the health workforce, intellectual capital, technology, and infrastructure in healthcare, humanity was caught unprepared for the COVID-19 pandemic. Many countries, including developed health systems, faced extraordinary workloads, chaos and psychosocial problems during the pandemic. These problems affected all normal management processes in healthcare systems. In particular, it caused us to leave our pursuit of quality in the background and focus on the most basic clinical tasks. The results of this study partially reveal this situation. When the studies on quality in healthcare during the pandemic are examined, the concept of healthcare workers comes to the fore in 2020. It was determined that the high patient load, the contamination risk and the fear of transmitting the disease to family members during the pandemic negatively affected healthcare professionals (Sheraton et al., 2020; Shreffler et al., 2020). In addition, the lack of physical activity resulting from social isolation during the pandemic was another important theme. It was reported that decreased physical activity due to social isolation during the pandemic (Park et al., 2022) caused health and psychological problems (Caputo & Reichert, 2020; Lesser & Nienhuis, 2020; Woods et al., 2020). The concept of mental health, which is considered to be another consequence of social isolation and pandemic conditions, was also widely researched. In 2020, the literature also saw the quality of life as an important theme.

In 2021, the number of research on the subject increased significantly. The concept of mental health in 2020 was discussed more in the literature as depression and related concepts in 2021. Another essential concept was the pandemic. Under this concept, quality of life attracted attention. As can be seen, during the pandemic period, studies on quality of life came to the fore rather than institutional or process-based quality studies. It is considered that this results from the severe effects of the pandemic on people's health, social, and economic lives. Studies indicated that social isolation during the pandemic negatively affected people's well-being (Chakraborty & Maity, 2020; Hamilton & Gross, 2021) and mental health (Aymerich et al., 2022; Clair et al., 2021a; Murayama et al., 2021; Pietromonaco & Overall, 2022; Sayin Kasar & Karaman, 2021) and caused negative behaviours such as substance use (Chacon et al., 2021; Holt-Lunstad, 2021). In addition, the negative effects of social isolation on the quality of life during the pandemic were determined (Aldhahi et al., 2021; Panayiotou et al., 2021; Sayin Kasar & Karaman, 2021). The psychological negative effects of social isolation were also identified in the literature (Aymerich et al., 2022; Murayama et al., 2021; Pietromonaco & Overall, 2022; Sayin Kasar & Karaman, 2021). Consistent with the study findings, concepts affecting the quality of life during the pandemic come to the fore in the literature.

CONCLUSION

During the pandemic period, all social systems were significantly affected and changed. All health systems' functioning and dynamics, especially developed ones, have been significantly challenged and changed. During this period, normal health processes were inadequate. Managing quality processes, which are important measures of health service output, became difficult.

Research results show that the pandemic's social, psychological, and economic effects on people also affected academic interests. Based on the research findings, it was determined that mental health and related themes during the pandemic were frequently discussed. In addition, academics widely discussed the quality of life and mental problems affecting it. However, studies on clinical quality or the quality of service provided were rarely discussed during the pandemic.

The concept of quality in the literature includes care, service, technical, clinical, etc. It is a concept handled with a multidimensional perspective. Although health outcomes for patients and healthcare professionals were a priority during the pandemic, researchers, practitioners, and managers should address the quality issue from a wider perspective. It is evaluated that this perspective can provide a significant advantage in being prepared and effectively managing healthcare for extraordinary events such as pandemics.

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