

## Occupational Safety and Health Mapping During Pandemic Highlight for The Vast Realm of Practices

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### ABSTRACT

The COVID-19 pandemic has brought changes and awareness about safety and health workplace. Numbers of studies showed that organizations need to adopt new habits at the workplace to minimize the virus spread and infection. Occupational Safety and Health (OSH) studies are now returning to attention .to provide mitigations, guidance, introduce new habits, decision-making data, and predict future risks due to pandemics. This study map global occupational safety and health research using Bibliometric Visualization with VOS Viewer 1.6.15 software. The keywords Occupational Safety and Health yielded 1489 publications, with 224 keywords were mapped. Humans and control were the top two keywords as the center of the network. Furthermore, a mapped keyword dominated by standards and guidelines issues was clustered into five: psychological issues, infection control, safety management in healthcare, OSH standards, and the standard of treatment. The map presented a broader range of responsibility of OSH practices during the pandemic. It is implied that the vast realm of OSH practice should maintain for future study and implementation.

**Keywords:** bibliometric analysis, covid-19, occupational safety and health, pandemic, workplaces

### Introduction

The COVID-19 pandemic that has hit the world since 2020 had a significant impact on various aspects of life. The world's attention refers to how to suppress the spread and recover the infected and emergency rescue in various fields, such as the economy and education. The world of work, in particular, has felt the impact of the pandemic. The organization made various adaptation efforts to various regulations related to mitigation during the pandemic, such as adjusting working hours, changing work patterns, reducing employees, vaccination rules, and health protocols to maintain production stability.

Employees are an essential part of the organization that needs special attention in mitigating the adverse effects of the pandemic. Studies on occupational safety and health (OSH) need to be the primary concern of the government and organizations to ensure the quality of life and well-being. It includes change management, decision making, regulation in favor of public safety (Shoss, 2021), mitigation for prevention, and protection from adverse impacts. Mitigation is also needed to carry out control related to a healthy and comfortable work environment to ensure workers' physical and psychological health (World Health Organization and International Labour Organization, 2021)

A survey conducted on 122 companies shows that activities related to OSH have increased during the pandemic. The main concern is changing meeting patterns, installing disinfectants in rooms, recommending working from anywhere, shortening working hours, and regularly monitoring employee health. Another concern is the impact of using masks which leads to security issues, anxiety about infection, and stress that arises from working remotely. An interesting discussion then was the



broader influence of the pandemic on organizational activities and the limited OSH study to answer all the challenges that exist today (Fukuda et al., 2022)

One of the fundamental changes in adjusting work patterns during the pandemic is the emergence of working from anywhere, flexible working hours, and working from home. However, several types of work could not adjust due to the work characteristics. According to research, this phenomenon needs to be studied more deeply, related to the consequences, feelings of isolation, and job loss (Shoss, 2021). Research on OSH has also been carried out to answer the challenges of the current pandemic and predict future crises (Shoss, 2021). This study intend to present a map from the systematic overview of global OSH research through Bibliometric analysis. The approach provides zoom out picture and empirically capture the relationship between multiple themes (Lee et al., 2014).

## Method

The study created an OSH map using bibliometric visualization mapping VOS Viewer 1.6.15 software developed by van Eck and Waltman (van Eck & Waltman, 2014). We apply the keywords "occupational safety and health" on the title and abstract using WHO databases on global literature on coronavirus disease. The publication period was from the first article published in databases (2020) until January 2022. We run the application with the rules of a minimum of ten occurrences in keywords and full counting method.

## Results

The search yielded 1489 publications with 3463 keywords and filtered to 224 keywords. The highest two keywords were humans with 1151 occurrences and control with 633 occurrences. Visual representation in Figure 1 showed five clusters with different highlighted keywords and colors, namely humans (red), control (yellow), covid-19 (blue), occupational exposure/prevention (green), and beta coronavirus (purple).

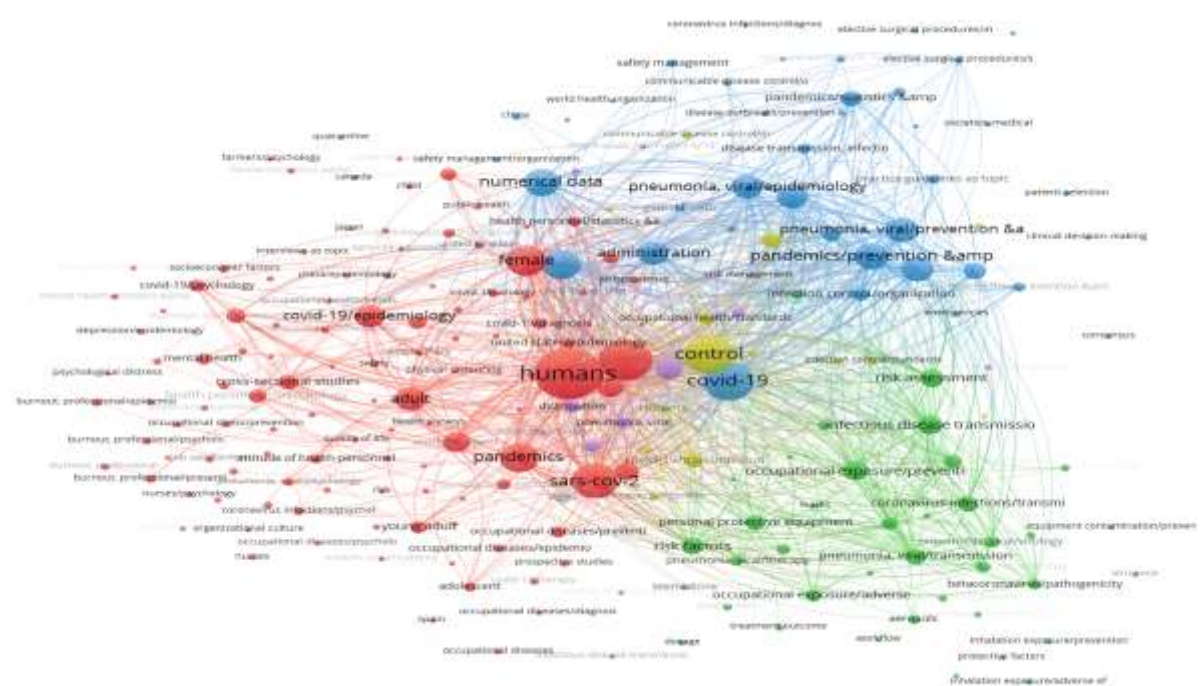


Fig.1 Network Visualization Output

Five cluster titles represent keywords inside the network (Table 1). A keyword may arise in several clusters because of its linkage with many keywords in another network, such as personal protective equipment appearing in three clusters at once and safety management appearing in two clusters.

**Table.1 Cluster and Keywords**

Cluster	Keywords
General psychological issues	Humans, adaptation, anxiety, attitude of health personnel, burnout, depression, employment, job satisfaction, leadership, mental health, model organizational, occupational health, occupational stress, psychological distress, quality of life, resilience, workload, sick leave.
Infection control	Aerosol, covid-19 testing, dosage, equipment contamination, equipment design, infection control, infectious disease transmission, masks, occupational exposure, personal protective equipment, respiratory protective, risk assessment, risk factor, time factors, virulence, workflow.
Safety management in healthcare	Clinical decision making, clinical laboratory technique, cross infection, delivery of health care organization, outcome assessment, disease outbreak, disease transmission, elective surgical procedure, patient safety, patient selection, personal protective equipment, safety management, practice guideline, standards, medical society.
Occupational safety and health standard	Guidelines, infection control, masks standard, n95 respirators, occupational health standard, personal protective equipment, respiratory protective, return to work, workplace standards, safety management.
Treatment standard	Isolation, infection, personal protective equipment, quarantine, risk management, telemedicine.

## Discussion

Bibliometric mapping in occupational safety and health during the pandemic generated five clusters: psychological issues, infection control, safety management in healthcare, occupational safety and health standards, and treatment standards. The result showed that four of five clusters had a similar theme about safety and health standard during covid-19 ranging from prevention to treatment.

As the most prominent cluster based on co-occurrence and link strength between keywords, psychological issues have three sub-cluster, namely mental health issues, organization variables, and personal variables that link each other. Sub-cluster mental health showed that the main keywords are mental health problems in the workplace: anxiety, depression, stress, and psychological distress. This problem tends to show a higher risk in healthcare workers (Zheng et al., 2021) especially in the front-line worker (Jaconia et al., 2022; Magnavita et al., 2022). Mental health problems are frequently found in the worker who experienced burnout in their workplace (Pniak et al., 2021; Zare et al., 2021) and have a significant relationship with some of the organization variables as causes, namely higher workload (Nikeghbal et al., 2021) and lower level of job satisfaction (Jensen et al., 2010). Furthermore, the prolonged problem affected the quality of life (Nikeghbal et al., 2021) and well-being (Jaconia et al., 2022) as personal variables. Related to the problem, some research highlights the significant roles of resilience as a barrier to disorder (Bana, 2020), while another proposes a resilience-promoting intervention (Albott et al., 2020; O'Donnell et al., 2021; Pollock et al., 2020).

The second prominent cluster is infection control which covered issues about organization action to deal with the spread of viruses. Organizations find the infection control object were aerosol

(Fink et al., 2020), equipment contamination (Nogueira, 2020), transmission To deal with the object of control, organizations need to consider several aspects, including risk assessment (Khunti et al., 2021), risk factor (Nguyen et al., 2020), time factors (Zhang, 2021) and virulence (Yuan et al., 2020). Salient action that emerges from this problem is by modifying equipment design (Jayan et al., 2020), equipping workers with personal protective equipment (Fried et al., 2021) such as respiratory protective or masks as well as modify workflow in work practice (Judson et al., 2020). The research found that infection control impacts infection transmission reduction and impacts workers' mental health (Smith et al., 2021). However, to ensure the effectiveness of infection control and prevention programs, organizations should constantly monitor by activating reminders and strengthening administrative control to measure progress (Wailagala et al., 2021).

The third cluster focused on safety management in healthcare as the most hazardous workplace during pandemics and was proved by increased risk infection of covid in healthcare workers (Nguyen et al., 2020). Research put their critical consideration on protecting healthcare workers and patients (Shaw et al., 2020) from minimizing virus transmission (Plantes et al., 2021), especially during the outbreak period (Ahmad & Osei, 2021; Organization, 2020). They created and modified some procedures and guidelines, including clinical decision making (Johnson et al., 2021), clinical laboratory technique (Wang et al., 2020), practice guideline and standard (Prajapati, 2021; Sheth et al., 2020) and PPE standard (Sud, 2020) to protect the healthcare worker from cross-infection (Alhumaid et al., 2021) as well as ensuring patients were provided with the best quality of care (Ahmad & Osei, 2021).

The fourth cluster emerges occupational safety and health standards applied in the organization to minimize cross-infection. Unlike the third cluster, keywords appeared to be more general for the various business areas. Most organizations implement government safety standards to protect their worker, such as using PPE (standard masks), promoting hygiene, and social distancing (Gravina et al., 2020). However, the instructions alone are ineffective and need further intervention, such as behavioral strategies (Gravina et al., 2020). Another research suggests that occupational safety and health standards during a pandemic should be implemented by increasing responsibility and involvement among stakeholders (Dufour et al., 2020). The safety standard issues might be the most relevant during the return to work situation since the probability of the workplace as the hub of disease transmission (Gravina et al., 2020). Research suggests some safety standards and actions to be implemented, such as implementing biological cycle management (Jahangiri et al., 2020), mitigating the risk of workplace transmission (Fragala et al., 2021; Plantes et al., 2021), understanding the susceptibility of workplace (Leso et al., 2021) and anticipating the impact of COVID-19 on health benefits and costs (Fragala et al., 2021).

The smallest cluster refers to the standard of treatment theme during infection of the viruses. Quarantine and PPE usage were the first safety precautions in the early pandemic (Singh et al., 2020), either for prevention or as part of treatment. Unfortunately, these cause another problem, whereas quarantine impacts workers' psychosocial aspects (Fawaz & Samaha, 2020; Gómez-Durán et al., 2020), and PPE increases the risk of skin problems, especially in healthcare workers (Long et al., 2020). For infected workers, almost organizations recommend isolation treatment to reduce transmission (Grout & Leggat, 2021; Mandic-Rajcevic et al., 2020). Moreover, as a part of healthcare provision during the pandemic, telemedicine showed an exponential increase and was applied to a broader range of medical services (Waqas et al., 2020).

## Conclusion

Bibliometric mapping on occupational safety and health depicts the concern still emphasizing standards and policies to reduce transmission of viruses. However, mental health problems acquire significant attention indicated by the cluster's size. During the pandemic, occupational safety and health area were placed as the primary concern in the workplace, and it extended the realm. It is

essential to use this moment of awareness and work toward future practice to ensure a safe and healthy workplace and will impact public health. Future work may be beneficial to investigate OSH practice progress during and after the pandemic.

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