

Exploring Employees' Adherence to Occupational Safety during a Pandemic: A qualitative study

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Abstract

Infectious disease pandemic, as in the previous coronavirus (COVID-19) has significantly affected the industries in various aspects, including economic loss and work productivity. Although various measures were taken, industries in Malaysia are still lacking in occupational safety and health (OSH) preparedness for future pandemic. Hence, this study aims to investigate perceptions towards OSH compliance. Focus group discussions were conducted among employees to provide insights and opinions on the topic. The identified themes included preparedness plans for infectious diseases, implementation and compliance with SOPs at the workplace, barriers and facilitators to OSH SOPs, and improper recordings.

Keywords: Worker's perception; COVID-19; Occupation; Safety

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1.0 Introduction

Emerging infectious diseases are increasing globally in incidence and geographic locations. These infectious diseases ranged from foodborne, vector-borne, and airborne, and account for at least 15% of all human pathogens. In contrast to other types of diseases, infectious diseases are unpredictable with have the potential to cause a global threat (Hao et al. 2022). Recently, the world was struck with the worst pandemic in decades, the Coronavirus disease 2019 (COVID-19). This virus is an airborne infectious disease that is spread through physical contact and air droplets from an infected person to another individual within proximity (WHO, 2020). Major outbreaks have occurred in workplaces such as hospitals, manufacturing, and prisons, with thousands of workers affected, including in Malaysia (Shah et al., 2020). They were hospitalised and quarantined globally (Tognotti et al., 2013). This disease carries a high morbidity and mortality rate, which has become a significant health burden to every nation (Rajpal et al., 2020). The pandemic created anxiety and fear, leading to the loss of productivity among workers (Loreto et al., 2022). To combat the pandemic, the World Health Organization (WHO) has issued guidelines for prevention and control measures to curb its spread (Güner et al., 2020). Since no effective treatment for COVID-19 is available, (Spicer & Jalkanen, 2021) strict adherence to infection control guidelines and policies as well as procedures was suggested as an effective method to prevent and control the global spread of this fatal disease.

In Malaysia, the OSHA 2022 (Amended) states that any workplace with more than 40 occupants needs to establish an Occupational Safety and Health (OSH) committee. The committee is responsible for maintaining all workers' safety, health, and welfare, which includes any pandemic or outbreak that occurs within the industry or organization. The employees' main roles of prevention during an infectious disease event include ensuring compliance with the regulations and standard operating procedures put forward by the organization.

2.0 Literature Review

The recent COVID-19 pandemic has increased the alarm of workplace safety, fear of infection, and anxiety among employees, affecting productivity and mental health (Eguchi et al., 2021). Perception of safety was linked to the level of awareness and understanding of SOPs implementation (Chan et al., 2022). Hence, understanding these perceptions is essential in designing effective OSH strategies to improve the safety and well-being of workers.

The pandemic has also altered the workplace dynamics with companies adjusting and adapting to the new norm (Ancillo et al., 2023). Work rotations, remote work or hybrid settings, and reduction of workforce numbers were some of the steps employers took to minimize the disease transmission (Wontorczyk & Rożnowski, 2022). These changes in work settings have affected productivity and the work culture of employees (Wontorczyk & Rożnowski, 2022). Moreover, mental health issues were evident among workers, causing

stress, anxiety and burnout (WHO, 2020). The pandemic highlighted gaps in developing guidelines that address workers' physical and mental health concerns.

Preparedness for an infectious disease outbreak is crucial in reducing workplace disruptions and ensuring employee safety. The pandemic revealed the gaps in workplace preparedness, especially in industries with high human interaction (Nyberg et al., 2022). In Malaysia, essential service sectors such as healthcare complied with OSH's SOPs (Mohamad et al., 2022). However, in other industries such as academic institutions, staff and students lacked awareness (Filho et al., 2021). In addition, contributing factors including work rotation, staff movement in and out of the campus, and limited resources have led to non-compliance with SOPs (Shafii et al., 2022).

Although extensive research was conducted on industry preparedness during a pandemic, there are limited advances in understanding its impact on smaller industries with limited resources. This study aims to investigate perceptions toward Occupational Safety and Health (OSH) compliance in Malaysian industries during the COVID-19 pandemic among the employees. This qualitative study also explores the barriers and facilitators of workers' adherence to OSH guidelines, laws, and improper record keeping for airborne and droplet infectious diseases. In addition, the study aims to identify the impact of infectious disease management at the workplace (via airborne and droplets) on occupational safety and health aspects (legislation, enforcement, and implementation) and socioeconomic and psychosocial aspects in the industry.

3.0 Methodology

This is a qualitative study involving selected companies in Selangor. Company selection was based on the size of the company, registration with the Department of Occupational Safety and Health (DOSH) and reports of outbreaks during the COVID-19 pandemic. The focus group were randomly selected among employees ranging from white collars to blue collars. Focus group discussions of five to seven employees from each company were carried out across Klang Valley, Malaysia. These focus group discussions were conducted to provide perceptions and opinions on topics in the selected themes.

3.1 Data Collection

In-depth interviews (IDIs) were conducted using a topic-based protocol exploring participants' experiences and their perspectives on their perception towards adherence to OSH procedures during the COVID-19 pandemic. The key themes were shown and reported in sub-sections 4.2, 4.3, and 4.4. The interview probing technique was applied during a face-to-face interview session by a trained researcher in OSH and a qualitative research approach. The interviews were conducted in Malay after getting their informed written consent, for 30-50 minutes for each session. Participants were identified with personalised identification alphabets to ensure anonymity. The researchers recorded and wrote the sessions. The audio files were transcribed verbatim in the Malay language. Confidentiality was ensured throughout the interview process, and transcription of the audio

files was conducted by the research team with the researchers only having access to the data.

3.2 Statistical Analysis

Thematic analysis was conducted using NVIVO software. The selected participants' quote was highlighted, and a suitable coding was assigned deductively and inductively. Data validity was ensured through triangulation of participants' quotes and reflective notes. The study procedures were documented to allow reproducibility. The transcriptions were checked regularly with the audio files to reduce errors.

3.3 Ethical Approval

This study was approved by Research Ethics Committee (REC), Universiti Teknologi MARA.

4.0 Findings

4.1 Sociodemographic of Respondents

Four study locations (Company A, B, C, D) have been identified because they were classified as essential services during the pandemic. Two focus group discussions (FGD) were carried out among 10 to 14 respondents who were workers. Table 1 shows the demographic background of the respondents in both FGDs.

Table 1: Sociodemographic of respondents (N=24)

Initial	Age	Job Position	Location
A. H. R.	28	Security Executive, Operation Maintenance Department	Company A
A. H. A.	32	Executive – System Support	Company A
A. H. S.	39	Administration Executive	Company A
E. N.	-	Corporate Health & Safety Executive	Company A
M. A. F.	25	Corporate Health & Safety Executive	Company A
M. A.	-	Senior Librarian	Company B
M. N. A.	-	Sports Officer in the Sports Unit	Company B
N. H.	-	Building Facilities Operation Division	Company B
N. P.	-	Senior Assistant Engineer	Company B
R. A. G.	-	Senior Nurse	Company B
A. S.	40	Manager - HSE Communications	Company C
A. H. M. Z.	34	HSE Senior Executive	Company C
A. F.	37	Staff Engineer (Industrial Hygiene), HSE	Company C
A.	-	Principle of Industrial Hygiene, HSE Group	Company C
M. A. A. R.	-	Crisis and Incident Management	Company C

H. M.	31	Executive Industrial Hygiene Group, HSSE Corporate	Company C
K. A.	27	Executive Strategic Research, Corporate Strategy	Company C
A. U. A. D.	27	Procurement Executive	Company D
I. Z. K.	34	Executive, Finance department	Company D
N. M. H.	30	Formulation Executive, department product development	Company D
N. A.	27	Executive, Regulatory Affairs	Company D
N. A. M. I.	—	Warehouse distribution department	Company D
R. O.	—	—	Company D
Z. K.	29	Executive, Engineering	Company D

4.2 Theme 1: Preparedness Plans for Infectious Disease at the Workplace

The respondents were aware of the guidelines and the responsible parties. There were recommendations to update the existing guideline from the experience of managing COVID-19, regarding other authorities and international bodies, and customise it to the needs of the companies accordingly. Furthermore, workers were actively involved in developing the guidelines, especially on the technical guidelines. The workers also acknowledged that the pandemic preparedness response team has successfully developed the ventilation and sanitisation guide on time.

"Pandemic preparedness response team, the secretariat that was formed at the time of the pandemic, started to compile all that we have learned for the past two years, as to update the guideline and also serve as references for the future, in case if there is another pandemic or something else. I know the team has come out with a ventilation and sanitisation guide we have never had before. All of these were prepared in a short time. So, the pandemic has been addressed well." (A. S., Company C).

"We update our emergency response or incident action plan for communicable disease. That's the angle that the property has to manage this disease..." (A. H. M. Z., Company C).

"We also give input in developing that guidelines and directives, especially on the technical guidelines. Just like mentioned earlier, staff are prepared before entering the office. Regarding ventilation, people are inquisitive about the quality of indoor air. We must refer to whatever we have, especially the available international references. Still, we must customize them based on the company's requirements, according to our nature of business and professions." (A., Company C).

Another respondent expressed his opinions on developing a standardized health attachment for fitness to work during and post-COVID.

"... another is the health attachment/assessment for fitness to work. So, these are all the standards I mentioned to ensure preparedness for the current disease, during and post. So, it's all covered." (M. A. A. R., Company C).

Company C).

Major companies have a well-prepared plan, however, a respondent from the academic

institution mentioned a lack of preparedness to control the spread of COVID-19 in the early phase of the pandemic.

"There is no preparation for controlling the spread of infectious diseases." (M. A., Company B).

The workers also mentioned the lack of awareness about the spread of diseases in the workplace.

"In my opinion, there seems to be no awareness regarding infection diseases in our workplace." (M. N. A., Company B).

Furthermore, there was a lack of experience controlling the spread of COVID-19 among the students.

"In the Student Affairs Division, we didn't have any experience dealing with a pandemic." (M. N. A., Company B).

After introducing the SOP and enforcement, the respondents had a clearer picture of the situation and what needs to be done.

"Due to COVID, we started to have SOP, it has been tightened and all." (N. A., Company B).

4.3 Theme 2: Implementation and Compliance to Standard Operating Procedures (SOPs) at Workplace

A respondent mentioned that the issue of non-compliance with SOP is due to the human factor. The social interaction that took place at the recreational places, for example, is where humans may forget or become less vigilant.

"Non-compliance with human interactions is one of the barriers to compliance with SOP, causing humans to lapse toward the usual social interactions such as touching and hugging each other, not wearing masks, and talking closely...in the tourist sites, etc. Sometimes people forget or couldn't care less. They are so excited to meet up with friends they fail to practice social distancing." (AHMZ, Company C).

Another major issue the respondent narrated was the difficulty in maintaining social distancing when the company relies on external vendors to enter the premises. In another situation, a logistics warehouse requires a lot of manpower to operate. As a result, more personnel are needed to enforce the law for a more extended period.

"We are facing work difficulty in terms of having vendors be on the premises sometime to conduct site visits or on-site work." (A. U. A. D., Company D).

"From the logistics context, the warehouse division experienced difficulty fulfilling the high demand that caused the company to require more manpower resources. The challenge is to meet all the requirements, e.g., physical distancing, which means we need to have more hours and more people to supervise and enforce." (I. Z. K., Company D).

In the academic institution, when the SOP allowed recreational activities, workers experienced a negative impact on their working process, i.e., the rotation system for the workers on duty.

"After the circular was issued allowing for recreational activities and to use the sports facilities, I had a problem at that point. I will have a problem implementing a rotational

system if all the students are allowed to enter the facilities in large quantities.” (M. N. A., Company B).

The number of students is large at Company B's Puncak Alam campus. Due to this, workers had trouble executing the rotation system.

“If the rotation system were put in place, I would not be able to handle all of them and then this would create more problems.” (M. N. A., Company B).

The rotation system for the workers creates problems with the use of the sports facilities because the rotation system limits the number of staff on site to monitor the transfer of the sports equipment.

“In Puncak Alam campus, we appointed the Station to do the control in terms of observation and items released. However, we do not have enough resources to implement the rotation system.” (M. N. A., Company B).

Sports involve physical contact, which cannot be conducted online. It will not be easy to execute control measures for physical contact activities.

“If we allow students to do physical activities, there is nothing much that I can do to control them, etc. Anyway, sports are not something that can be done online.” (M. N. A., Company B).

In addition, there is anxiety about enforcing the SOP on students as the SOP rules in Phase 4 are now more relaxed. Students may gather and be at risk of disease transmission from staff living outside campus and interacting with students inside the campus. Furthermore, large numbers of students' in and out movements can lead to a higher transmission rate.

“What worries us is that maybe due to the NRP phase transition, we are currently in Phase 2, which is 60%; in Phase 3, maybe 80%; and afterward, we move to Phase 4, which is 100%. We are concerned that social gatherings will be more intense after they have been forced to be apart for so long.” (M. A., Company B).

“Students located inside the campus are safe, but some staff from outside may come into the campus and contact our internal students. Students will be exposed to large numbers of people who come and go, and infectivity will become high.” (M. A., Company B).

4.4 Theme 3: Barriers and Facilitators of Workers' Adherence to OSH Guideline, Law, Improper Record Keeping for Airborne Droplet Infectious Diseases

Company A did not express any barriers to the implementation of SOP. However, Y. R. from Company B mentioned some obstacles encountered by the parents of the students and students themselves at the beginning of the SOP implementation to quarantine students. The parents claimed there was a forceful quarantine of students on the campus. It may happen due to a lack of awareness of the SOP to prevent and control the spread of COVID-19. However, remedial action was taken. Information was given to parents to create an awareness among them.

“Initially, there were complaints from the public and parents; however, soon, the

parents began to understand, and students accepted the lockdown measure, as well as others" (Y. R., Company B).

Organisations acknowledged that mental health issues are among the impacts of the pandemic. Facilitating factors were conducted as a response to the issue; making programmers and online webinars, engaging a third party to provide a health line (hospital beds for those infected with COVID), visiting the families of workers affected by COVID and giving assistance when needed.

"The company recognised mental well-being issues by making programmes and conducting online webinars. They engaged the third-party employee and assistant programme provider by providing health line and assist... we've engaged the third-party employee and assistant programme provider. We have some demands for hospitality as well due to COVID. The company goes that extra mile to meet the families and render any assistance that can help." (A. S., Company C).

"We kept monitoring their performance and so far, in terms of mental health issues, no distress symptoms have been detected yet. However, if any cases affect one's mental state, the task force team or HR will be informed immediately." (R. O., Company D).

Some workers refused to be vaccinated because of media influence by the anti-vaccine group.

"We do have some of the employees that are reluctant to get vaccinated for various reasons, they will say according to a study in Google or somewhere else." (R. O., Company D).

The compliance of the SOP for each company differs from one company to another. There is an issue regarding the lack of trust shown by employees towards COVID-19 self-testing at home. The respondent voiced out about a scenario of her friend who had to do a saliva test while being observed before entering the work premise. Hence, safety culture should be strengthened among the supervisors and workers so that they can remind each other of the SOP of the company and incorporate trust towards the workers.

"We do our saliva test. However, only vaccination status is asked before entering the office, not the saliva test, and we keep reminding each other among the superiors. However, for her GLC company's procedure, she must perform the saliva test right before the appointed employer personnel. This is to avoid manipulation of the test result by some employees, there is an employer-employee trust issue. Something needs to be done to improve or enhance the situation in terms of safety culture and trust, like the first question, we want to curb the preparedness of the current disease. So, if we cannot trust our employee, how do we curtail this disease?" (M. A. A. R., Company C).

4.5 Theme 4: Impact of Infectious Disease Management at the Workplace via Airborne and Droplets

Respondents who were infected with COVID not only suffered psychologically but had difficulty in breathing, which affected their communication. During the ordeal, respondents received moral support from their colleagues. Another reason that may cause a respondent

to feel down is when the spouse loses their job, or the company can no longer afford to pay the salary.

"This new variant affects not only our mental health, but also affects our lives..our functions such as breathing and speech. This new variant, as far as we know, attacks our lungs. Regardless of what happened, we continue giving moral support to our dear friends. Maybe due to the bad economy, spouses were either dismissed from work by their companies or the companies cannot afford to pay their salaries. This can be one of the reasons employees go through mental breakdown." (I. Z. K, Company D).

The other impact observed by the respondent was the grieving of the colleague due to loss of family members caused by the pandemic. Being infected early may affect job performance, but later it will subside. The affected person will then be able to perform his or her work like usual.

"...some of our co-workers experienced the loss of close family members. Being positive COVID might affect the job performance in the early stage of grieving, but it subsided and their job performance returned to normal." (R. O., Company D).

Psychological impact, such as feeling down and bereavement towards the loss of a family member due to COVID, was also seen among the workers of the Puncak Alam campus at Company B. However, they were identified through observation and names were given to the counsellor for intervention.

"In terms of mental challenges, if anyone, e.g. workers or students, seems to have a mental breakdown, we try to help them by providing their name to the counselling officer located in Puncak Alam... as some are experiencing loss of family members." (R. A. G., Company B).

In addition, there was an alleged case of a suicidal attempt, but not at the Puncak Alam campus mentioned by the workers. The workers expressed their hope for support, such as physical and mental health services, and said that the administrator takes these measures seriously.

"I would prefer health, physical, and mental support to be provided among employees and for this matter to be emphasised and seriously considered." (M. A., Company B).

There is a mechanism in place at Company D where the managerial department monitors the job performance. If any worker is identified as feeling depressed, the company will report it to the task force or human resources for action to be taken.

"We kept monitoring their performance and so far, in terms of mental health issues, no distress symptoms have been detected yet. However, if there is any of those cases, the task force team or HR will be informed immediately." (R. O., Company D).

The impact of COVID-19 on the working arrangements can be seen when an employee becomes absent from work due to COVID-19 infection. Company A expressed exemplary commitment and support from employees to work together when there was a lack of employees due to the quarantine procedure.

"Although we perform quarantine against the relevant workers, they still perform in their

work. Our staff show good commitment.” (R. A. J., Company A).

Financial constraint was another impact highlighted by the workers. Increased budget allocation for the prevention and control measures, such as sanitisation, will result in budget cuts for other matters by the administrator. Preparedness to cover the cost of sanitising the building will be a burden when the workers do not follow the SOP.

“In preparing the cost obligation, we must properly manage the budget, where management will dedicate more funds to certain areas, and some will be spent less. For instance, a sanitisation programme, etc. Perhaps other matters will be cut down by management.” (M. A., Company B)

Another respondent mentioned that the need to provide a laptop for the workers creates a financial burden to the company.

“As laptop usage has become compulsory, this may be a financial constraint to the company.” (A. U. A.D., Company D).

However, there are facilitating factors from the viewpoint of the respondents. There are suggestions from the workers regarding the workfrom home policy to be continued after the pandemic. Working from home saves the company money on electricity and utilities expenditure.

“Even though the pandemic is over, the idea of working from home is efficient and applicable and can be implemented for certain departments, of course.” (R. A. G., Company B).

“The company can reduce the operating costs, such as on electricity, utilities cost.” (R. A. G., Company A).

Furthermore, courses that use infographics related to the pandemic are suggested to create an awareness about COVID.

“It is highly advisable to have courses... conduct educational programmes related to the pandemic, as not everyone is aware of COVID cases.” (R. A. G., Company A).

“I prefer infographics. Then video, as many people like to look/watch them. Attractive and informative.” (N. P., Company B).

Workers stressed the weakness in the MySejahtera application. The MySejahtera app needs improvement i.e. by adding a reminder function to check out into the application.

“Some of MySejahtera features are a bit confusing. Sometimes I only went to a store, forgetting to check out after I left.” (A. H. S., Company A).

“Yeah, I also feel the same because sometimes, there is no checkout reminder. So, after two or three days, only then I check out (MySejahtera).” (E. N., Company A).

Finance systems are being upgraded from manual to automated systems that can facilitate business operations during the pandemic.

“From time to time, we upgrade our system and are always aware of the financial terms. For example, for payment, we have been upgrading from manual to an automated system.” (I. Z. K., Company D).

5.0 Discussion

This study explores industrial workers' preparedness and adherence to the OSH guideline in facing the COVID-19 pandemic. In the first theme, most workers agreed that the pandemic response team has developed a good ventilation and sanitization guide. In contrast, workers from Company C, an academic institution, had different opinions. They mentioned a lack of preparedness to control the spread of COVID-19 in the early phase of the pandemic, and a lack of experience in handling students to control the virus transmission. Previous study in China and Hong Kong reported that social distancing intervention and school closures have successfully prevented deaths due to COVID-19 (Viner et al., 2020).

The second theme was the implementation and compliance with standard operating procedures (SOPs) at the workplace. The workers reported non-compliance of SOP during social gatherings among staff due to habits such as touching and hugging each other. A similar finding is also observed in a logistics warehouse, which requires a large number of workers to operate; hence, more enforcement officers are needed to ensure SOP compliance, resulting in longer operating times and higher costs. This situation has led to lower productivity of the workers. In an academic institution, the rotation system practiced on the workers' duty has caused a limitation regarding the number of staff able to monitor students' compliance with the SOPs. Additionally, the students' behaviour among themselves during social interaction may lead to faster transmission of the disease due to the long period of Movement Control Order (MCO). A respondent from Company B also perceived that high cases of COVID-19 among students may also be caused by the movement of staff residing off-campus.

The third theme explained the barriers and facilitators of workers' adherence to OSH guidelines and laws and the improper record keeping of airborne and droplet infectious diseases. The limitation came from the parents of the students on-campus, who claimed that the quarantine was unnecessary due to their lack of awareness of the disease. They were also mental health issues among the respondents, which led to the development of mental health programs online to increase engagement and understanding regarding this. The World Health Organization (WHO) reported 25% of anxiety and depression prevalence globally in 2022 due to loneliness, fear of infection, suffering or death of oneself and family members. The report stated that young people and women were severely impacted compared to men (WHO, 2022).

The last theme investigated the impact of infectious disease management at the workplace via airborne and droplets. This study reported respiratory problems among infected workers, psychological impacts due to loss of family members, a suicidal attempt, and financial constraints among employers for work-from-home arrangements. On the positive note, the COVID-19 pandemic has also saved some companies' expenditure on electricity and utilities.

The findings of this study can inform long-term OSH policy by highlighting the need for comprehensive preparedness plans, especially in sectors with high interpersonal interaction like education and logistics. Policies should mandate clear SOPs for ventilation, sanitization, and social distancing, with enforcement mechanisms tailored to specific

workplace environments to ensure compliance without severely disrupting operations. The challenges faced by academic institutions and warehouses show that sector-specific adaptations are essential. For example, improved monitoring systems in schools and more efficient compliance strategies in high-density workplaces.

Additionally, the mental health impact uncovered across all sectors suggests that future OSH policies must integrate psychological support and resilience training as core components, not just physical health protections. The study also emphasizes the need for better data recording and communication with stakeholders, such as students and parents, to prevent misinformation and resistance. Overall, applying these insights can help build more resilient, responsive, and holistic OSH systems that are prepared for future public health crises across various industries.

6.0 Conclusion

Good preparedness is seen among the major companies. Work rotation, a large number of students, and rapid movement of students were some of the barriers to enforcing SOP in an academic institution. Prioritising budget to manage the pandemic may compromise financial allocations for other essential matters also emerged. Psychological impact was another challenge for the organisations. The respondents voiced the need for support, health services, and mental health awareness. Facilitating factors were a monitoring system of workers affected psychologically by the pandemic, working from home, an automated online system for business operation and moral support from the managerial sector and colleagues during the pandemic. In addition, respondents recommended improvement in compliance with and enforcement of vaccination, COVID-19 self-testing, and the MySejahtera application.

This study has several limitations that should be acknowledged, including that the insights may be too general based on individual understanding of the SOPs. Additionally, the one-time assessment of the psychological impacts was too short, thus may not provide the long-term effects of the pandemic on OSH compliance.

Based on the results, it is recommended to increase the awareness of the workers on the SOPs by conducting training. In addition, counselling services, health programs and hybrid work settings would help the workers to cope with the psychological impact of the pandemic. Lastly, a longitudinal study to determine the long-term effects of COVID-19 on workplace safety and mental health is recommended for future research. Policymakers, employers, and OSH committees must collaborate to develop comprehensive frameworks that enhance workplace safety during pandemics and other infectious disease outbreaks.

Article Contribution to Related Field of Study

This paper contributes to the occupational safety and health field, providing a detailed understanding from workers' perspectives on OSH compliance in Malaysia during the COVID-19 pandemic. The study highlighted the workplace preparedness, the effectiveness

of standard operating procedures (SOPs) and the challenges of adhering to safety measures. Identifying the gaps in awareness among the academic sector helps to improve better healthcare services and increase mental health awareness to ensure workplace safety. These findings are crucial to refine OSH policies and to develop better frameworks for future public health emergencies.

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