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THE ASSOCIATION BETWEEN WORKPLACE READINESS AND INDIVIDUAL CONTROL MEASURES WITH INFECTIOUS DISEASE OUTCOME

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Abstract:

Workplace practices and individual control measures in occupational safety and health may play a role in infectious disease outcomes. Understanding these factors helps mitigate risks and improve on the disease outcomes. This study aims to identify factors related to infectious disease outcome with regards to occupational health and safety workplace practices and workers individual control measures. This study employed a cross-sectional design involving 13 states and 3 federal territories in Malaysia. A self-administered locally tool was distributed online to 373 workers. The questionnaire consisted of three domains: the sociodemographic section, workplace readiness, and individual control factors. Most of the workers were Malaysian (98.1%), blue-collar workers (75.6%), male (59.8%), and married (70.5%). Most workers perceived adequate workplace policies, although ventilation was less agreed upon. Multivariable regression analysis showed higher disease outcome in workplaces with reactive measures as compared to proactive strategies like early disease screening upon suspected cases. In addition, workers who understood their employer's health-related responsibilities, had lung-related conditions like asthma, or had received training on proper PPE usage were less

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likely to have infectious diseases. Understanding the employer responsibilities, good workplace policies, and PPE training are good strategies for infectious disease prevention.

Keywords:

Disease Profile, Infectious Diseases, Industry Size, Workplace Conditions, Workplace Readiness

Introduction

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by the virus SARS-CoV-2. Its outbreak that had started in 2019 had led to the quick spread worldwide and resulted in global pandemic. Fortunately, implementation of preventive measures including vaccination along with quarantine, social distancing, vaccination, hygiene, and travel-related control measures had assisted in reducing the impact and bring the pandemic under control. World Health Organization (WHO) had announced that the virus is no longer a public health emergency of international concern (PHEIC) as of May 5, 2023.

However, the COVID-19 pandemic has profoundly affected our workers, and industries and economy worldwide (Yang et al., 2023). This can be applied in other infectious diseases like influenza (Marson et al., 2023). Therefore, it is essential to retrospect the lessons that can be learned from these pandemics to improve the readiness of the industries for future references.

Employee health outcomes are significantly influenced by workplace conditions, particularly in relation to infectious diseases (Acke et al., 2022). The occupational features and the setting of the industry, such as its control measures may contribute to the transmission of infectious diseases among employees (Aw & Blair, 2010). Over the years, researchers have explored how workplace conditions and organizational capacity may influence disease susceptibility and response preparedness, which are common in industries where workers interact closely with one another and share the same work areas (Husain, 2023).

It is common in larger companies to have more established health regulations and access to more effective assistance, compared to smaller industries due to a lack of resources (Takacs et al., 2022). At a personal level, workers' awareness, behaviour, and compliance with the regulations in taking control measures are important in occupational health intervention (Guerin & Sleet, 2020). These factors help to provide informative insights into the development of effective workplace health policies.

Given the size and diversity of Malaysia's working industries, it is crucial to investigate the potential effects of this aspect on occupational health outcomes (Thong, 2023). The exact connection between workplace circumstances, and individual control measures, in this changing scenario remains unclear, despite previous research addressing general occupational safety.

By determining the variables that influence infectious disease outcomes and the specific preventive actions taken by employees and employers to combat future infectious diseases, this study aims to close this gap. By doing so, this study aims to provide evidence-based recommendations that can enhance workplace preparedness and inform policy decisions at various industry levels.

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Literature Review

The Impact of Workplace Conditions on Disease Profiles

Physical and Environmental Factors

The ventilation systems, hygiene, density, and spatial arrangement can influence the risk of disease transmission (Memarzadeh, 2013). Poor air ventilation and hygiene levels can speed up the transmission of airborne and contact-based diseases (Qian & Cheng, 2018). According to earlier research, clusters of respiratory and gastrointestinal diseases were more common in workplaces with poor environmental conditions (Acke et al., 2022).

Management and Organizational Practices

Besides physical factors, organisational readiness plays a vital role in workplace disease prevention. Husain (2023) emphasises the importance of leadership involvement in establishing infection control strategies, including routine disinfection, policy enforcement, and effective health communication. Workplaces with efficient management have better health precautions because infectious disease is detected and managed early (Hansen et al., 2018).

Support and Readiness for the Workplace

Resources, training, and policy enforcement by the management are essential to provide a safe working environment (ILO, 2023). These preparation aids the workers in informing them of the health risks and help them to take preventive actions. When companies take proactive measures to educate their employees on safety protocols, it helps nurture their readiness and preparedness across all levels of employees within the company (Hamid, 2022).

Methodology

This study was a cross-sectional study conducted in all 13 states and three federal territories in Malaysia from August 2021 to December 2021. An online tool, accessible via the Google platform, was distributed to the company's Human Resource Department throughout Malaysia. A letter was emailed using a letterhead from the Department of Occupational Safety and Health (DOSH) headquarters to 7,502 companies registered with the Department of Occupational Safety and Health (DOSH).

Before the e-mail was sent, the list of companies was assessed using the inclusion and exclusion criteria. Inclusion criteria for companies are based on the definition of small and mid-size enterprise (SME) and industries, in operation in Malaysia for at least 1 year, has Registrar of Companies (ROC) number, have a minimum of 5 staff, can be classified into seven sectors which are manufacturing, services, construction, wholesale and trade, utilities, government facilities and planting and farming and is located in all states in Malaysia. Companies with fewer than 5 workers and without a Registrar of Companies (ROC) number have been excluded.

The staff members who participated in this study were also selected based on the inclusion and exclusion criteria. The inclusion criteria for the staff were male and female, aged 18 years or older, with at least one year of work experience in the current company, able to read, understand, and speak both Malay and English languages (written and verbal), and willing to participate in this study. Exclusion criteria for the staff were part-time workers, industrial trainees, and project consultants.

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Companies were given 1 month to respond and received a few reminder emails before the end of the month. A total of 1,000 companies were randomly called by our research assistants for the project to increase participation. Companies that had agreed were required to fill out two forms. One form was provided to the Human Resource key personnel, and another set of form were self-administered individual questionnaires. The tool was filled out by five persons in the organization, by random selection, which the company are required to distribute to 30% of white-collar and 70% of blue-collar staff.

Measures

The individual self-administered tool comprises three domains, which are a) sociodemographic section, b) workplace readiness, and c) disease profile and individual control factors.

Sociodemographic Section

The sociodemographic characteristics employed consist of demographic characteristics, work-related characteristics, industry-related characteristics, and smoking characteristics.

Workplace Readiness

The workplace readiness questionnaires comprised of 12 domains which are management support; 6 items, organisational measures; 13 items, indoor air quality (case study); 4 items, policy on infectious diseases; 15 items, human resources and Occupational Safety and Health (OSH) related specialties; 7 items, post-rehab programme; 5 items, creating awareness; 8 items, risk communications (engineering control); 16 items, risk communications (administrative control); 8 items, cleaning and disinfection; 7 items, hand hygiene; 6 items and business communication; 4 items.

Disease Profile and Infectious Control Factors

The disease profile and individual control factors comprise 3 domains, which are knowledge, practice and culture of Occupational Safety and Health (OSH); 12 items, comorbidities; 13 items, personal protective equipment (PPE) compliance; 14 items.

The respondents were asked to give their answers to both workplace readiness individual control factors questionnaire, to “Yes”, “No”, “Maybe”, then the “Yes” answers were considered as the positive response while “No” and “Maybe” were categorised as non-positive responses.

Infectious Disease Outcome

The respondents were also asked on their previous infectious disease history within the past 2 years. This infectious disease may either be COVID-19, influenza and dengue fever. The respondents reported as having previous history within 2 years as ‘Yes’ or ‘No’.

The questionnaire used in this project has been validated and showed good CVI among 30 respondents in a manufacturing company in Malaysia [14].

Statistical Analysis

Data was analysed using IBM SPSS version 24. A descriptive analysis was performed to determine the characteristics of all the variables studied, including the status of psychological well-being and depression, anxiety and stress. The results are displayed in an aggregate manner using numbers, percentages, tables and charts.

International Journal of Entrepreneurship and Management Practices
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Inferential statistical analysis includes a chi-square test and multiple logistic regression. A value of P< 0.05 will be considered statistically significant with alpha = 0.05, and 95% CI was used to determine level of significant.

Results

Description of Worker's Profile

Table 1 shows the profile of workers in the study. A total of 373 workers predominantly Malays' blue-collar workers, male and married and mostly based in West Malaysia in manufacturing sector. The majority had 0-5 years of working experience, worked 8 hours or less in a day and in only single shift. Most were non-smokers and among the smokers, a small portion had multiple quit attempts previously.

Table 1: Sociodemographic Characteristics of Respondents

Sociodemographic Characteristics	N (%)
Age	
18 – 23 years old	17 (4.56)
24 – 43 years old	260 (69.71)
44 – 63 years old	94 (25.20)
64 and above	2 (0.54)
Workers' Group	
Blue Collar (Employee)	282 (75.60)
White Collar (Employer)	91 (24.40)
Gender	
Male	223 (59.79)
Female	150 (40.21)
Marital Status	
Single	105 (28.15)
Married	263 (70.51)
Divorced	5 (1.34)
Citizenship	
Malaysian	366 (98.12)
Non-Malaysian	7 (1.88)
Ethnicity	
Malay	253 (67.83)
Chinese	60 (16.09)
Indian	32 (8.58)
Bumiputera Sarawak	10 (2.68)
Bumiputera Sabah	8 (2.14)
Others	10 (2.68)
Education Level	
Certificate	114 (30.56)
Diploma/Matriculation	85 (22.79)
Degree	150 (40.21)
Master and higher	21 (5.63)
PhD	0.00
Others	3 (0.80)

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Types of Industry	
Industry Sizes	
Small and Mid-size Enterprise (SME)	214 (57.37)
Large Industry	159 (42.63)
Industry Sector	
Manufacturing	274 (73.46)
Services	17 (4.56)
Construction	75 (20.11)
Wholesale and Trade	1 (0.27)
Utilities	6 (1.61)
Government Facilities	0.00
Planting and Farming	0.00
State	
West Malaysia	355 (95.17)
East Malaysia	18 (4.83)
Years of Work Experience	
0 – 5 Years	151 (40.48)
6 – 15 Years	126 (33.78)
16 – 35 Years	94 (25.20)
More than 35 Years	2 (0.54)
Shift Work	
Yes	25 (6.70)
No	348 (93.3)
Total of Hours Working	
Less than 9 hours	312 (83.65)
9 -15 hours	58 (15.55)
More than 15 hours	3 (0.80)
Smoker Status	
Yes	68 (18.23)
No	271 (72.65)
Already Quit	34 (9.12)
Age Started Smoking	
14 – 20 years old	49 (13.14)
21 – 34 years old	21 (5.63)
More than 34 years old	0
Not Applicable	303 (81.23)
Total of Cigarettes Smoked	
Less than 5	17 (4.56)
5 - 15	46 (12.33)
More than 15	5 (1.34)
Not Applicable	305 (81.77)
Category Age Started Smoking	
14 – 20 years old	48 (12.89)
21 – 34 years old	20 (5.36)
Not Applicable	305 (81.80)
Attempt to Quit Smoking	
Yes	54 (14.47)

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No	319 (85.52)
Number of Attempts to Quit Smoking	
1 – 5 times	44 (11.80)
6 – 10 times	6 (1.61)
More than 10 times	4 (1.07)
Not Applicable	319 (85.52)

Workplace Readiness

There were high positive responses on workplace readiness for infection control as shown in Table 2. Most workers agreed that there were evidence-based policies, management support and safety measures in place. Many agreed on proper communication, temperature screening, and accessible hand hygiene stations.

Workers also agreed on that their organisation's health and safety measures were implemented to limit the risk of infection in office spaces and at workstations. Nonetheless, only half of the workers agreed on the usage of fans to improve overall ventilation.

Table 2: Workplace Readiness on Infectious Diseases

Items	**Number of Positive Responses (N)**	**%**
Management Support		
The organisation sets policies in relation to infectious diseases at the workplace.	345	92.49
Infection control and prevention policies and procedures are available in writing and is current, based on evidence-based guidelines, regulations or standards.	349	93.57
Infection prevention policies and procedures are reassessed at least annually or according to state government, federal government or taking into account the requirements by the industry involved and updated, if required.	325	87.13
At least an employee either on a full-time or part-time basis is trained in managing the infectious disease prevention and control programme at workplace.	330	88.47
The organisation has an early detection and management system in place towards people who can potentially infect workers at initial points of encounter.	339	90.88
The organisation has a competency-based training programme that provides general guide on Occupational Safety and Health (OSH) e.g. Safety and Health Officer, OSH Coordinator	321	86.06
Organisational Measures		
The organisation has an exposure control plan that is tailored to the specific requirements of the	350	93.83

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organisation (e.g., provide a plan to address related hazards caused by work processes at workplace).		
Employees who are expected to have contact with substances that have the potential to cause infectious disease transmission are trained according to Occupational Safety and Health (OSH) standard guide when employed and follow-up at least once a year.	303	81.23
Following the exposure event, there are assessment, follow-up and preventive treatment (prophylaxis) at no cost to employees by the employers and supervised by a healthcare professional.	312	83.65
The organisation tracks the worker's infection exposure and evaluates the data; and the organisation identifies corrective action plans to reduce incidence of infection.	344	92.23
The organisation follows government recommendations to provide immunisation to the employees, including offering Hepatitis B and influenza vaccination shots.	268	71.85
All employees receive baseline tuberculosis (TB) (Chest X-Ray) screening prior to placement; based on the risk assessment at the organisational level.	189	50.67
The organisation has a respiratory protection programme that details the required worksite-specific procedures and the specific elements needed for the respirators.	328	87.94
The organisation has taken measures to reduce physical contact between workers.	359	96.25
Health and safety measures are implemented to limit the risk of infection in office spaces and at workstations.	361	96.78
Pedestrian flow is organised to limit the risk of infection.	289	77.48
The organisation has conducted periodic cleaning or other hygiene measures in common areas.	357	95.71
All measures have been taken to limit the risk of infection related to meal breaks, shared kitchens/pantries or common rooms.	349	93.57
Suitable containers for the collection of materials (waste) used for individual and collective hygiene needs are provided.	325	87.13
Indoor Air Quality		

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The organisation has consulted with mechanical ventilation and air conditioning (MVAC) engineer to ensure adequate ventilation, where needed.	208	55.76
Fans are arranged to minimise airflow from worker to worker, if applicable.	223	59.79
Personal cooling fans need to be removed from the organisation by the employee, if applicable.	132	35.39
Employer has taken steps to prevent heat hazards if fans are removed.	194	52.01
Policy on Infectious Disease		
The coronavirus disease 2019 (COVID-19) coordinators at the workplace have been identified.	357	95.71
Plans have been developed to continue essential functions when absenteeism of worker is high.	340	91.15
Mechanism for monitoring and tracking absenteeism is in place.	338	90.62
Mechanism for tracking when employees can return to work is in place.	339	90.88
Standard operating procedures for cleaning and disinfection have been modified as needed to prevent infectious diseases.	356	95.44
The infectious diseases policy has been consistently communicated to employees.	353	94.64
Coordination with occupational safety, health or medical professionals is implemented.	319	85.52
The organisation has an active on-site occupational safety and health services.	335	89.81
Collaboration with local and/or state public health authorities and other stakeholders is present.	312	83.65
The organisation has consulted with local and/or state public health authorities.	307	82.31
Pre-shift employee health screening has been implemented (e.g., measurement of body temperature).	357	95.71
Visitors (including delivery workers)/customers health screening has been considered or implemented.	356	95.44
Policies are in place for managing workers with potential exposure to infectious disease.	347	93.03
Policies for managing employees with symptoms are in place.	356	95.44
Policies are in place for managing employees with confirmed or suspected infectious diseases, or obtain positive test result.	357	95.71
Human Resources and Occupational Safety and Health (OSH)		

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The employees get the latest information on the measures to be taken in preventing infectious diseases.	358	95.98
The organisation has related specialties in ensuring that the needs of any high-risk groups are covered in the prevention of infectious diseases.	277	74.26
The Human Resources Department give the instructions to the employees on how to inform about a health concern.	335	89.81
The organisation has related specialties of OSH in managing the employees immediately after they have reported a concern.	314	84.18
The organisation has related specialties of OSH in how to move the staff off-site or at home safely.	285	76.41
The organisation has related specialties of OSH in identifying those who may have had prolonged or close contact with infected employee members.	309	82.84
The organisation has related specialties of OSH in how to cooperate with the public health authorities.	314	84.18
Post-Rehab Programme		
The employee education programme is in place to prevent the spread of infectious disease and to identify the symptoms.	334	89.54
The employee education programme covers signs and symptoms of infectious diseases.	331	88.74
The employee education programme covers the risks for workplace exposures.	334	89.54
The employee education programme covers the practice of avoiding touching the mouth, nose and eyes.	331	88.74
The employee education programme covers hand hygiene.	345	92.49
Creating Awareness		
The organisation display health signage at workplace.	353	94.64
Employees understand the health signages.	353	94.64
The health signages are placed at appropriate locations.	350	93.83
Organisation displays signages that encourages employee to stay at home when sick.	294	78.82
Organisation displays signage that encourages cough and sneeze etiquette at common room and strategic work stations.	301	80.70

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Organisation display signages that encourages proper hand hygiene practices.	341	91.42
Organisation displays signage that encourages physical distancing among the employees.	352	94.37
Education, training, and communication are provided in languages and understanding levels appropriate to the workforce.	346	92.76
Risky Communications (Engineering Control)		
Workers able to maintain physical distancing of at 1 meter.	351	94.10
There are visual cues to maintain physical distancing (e.g., floor marking and signage).	348	93.30
Workstation alignment allow for employee/visitor/customer/client to be separated (for at least 1 meter) apart.	354	94.91
Employees/visitors/customers face each other at distance less than 1 meter apart.	268	71.85
Physical barriers, such as partitions (e.g., stainless steel, plexiglass and plastic strip curtains) are used to separate employees/visitors/customers/clients.	246	65.95
Organisation conducts disinfection to physical barriers to prevent infectious disease transmission.	341	91.42
The number of tables in lunch or break areas been reduced and placed at a distance to prevent transmission.	312	83.65
Other building spaces (e.g., conference rooms) in use to accommodate excess capacity when there is an infectious disease outbreak.	247	66.22
The number of employees/visitors/clients in a space at one time being limited during an infectious disease outbreak.	348	93.30
Are clock in/out stations touch-free?	274	73.46
Handwashing and/or hand sanitiser stations placed in multiple locations.	366	98.12
Handwashing and/or hand sanitiser stations are touch-free.	250	67.02
Handwashing and/or hand sanitiser stations are easily accessible.	366	98.12
All stations are functioning and stocked with adequate supplies (e.g., sanitiser, soap and single use paper towels).	345	92.49
There a mechanism to report supplies are running low.	323	86.60
Additional time is allotted to accommodate more frequent and thorough handwashing for each shift, during the shift and/or between shifts.	243	65.15

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Risky Communications (Administrative Controls)		
Health screening has completed prior to entry into the organisation.	347	93.03
Have health screeners been appropriately trained.	319	85.52
Personal protective equipment (PPE) are provided for the health screeners.	323	86.60
Screening done to every person (including visitors/customers/clients and employees) at all entry points of the building.	350	93.83
All unhealthy symptoms covered when the health screening is conducted.	331	88.74
Body temperatures are being checked during health screening.	362	97.05
Physical distancing between individuals awaiting screening being maintained during the process.	351	94.10
Confidentiality maintained as required by the Ministry of Health (MOH).	338	90.62
Cleaning and Disinfection		
The cleaning and disinfection agents in line with authorities' recommendations.	354	94.91
Cleaning and disinfection is conducted frequently.	354	94.91
High priority is given to the cleaning of targeted surfaces and done more frequently including at common areas, frequently touched surfaces and physical barriers.	351	94.10
Shared equipment and materials being cleaned and disinfected between use by each employee.	330	88.47
There are cleaning and disinfecting procedures conducted between visitors/clients.	318	85.25
Cleaning and disinfection will be intensified after a person with suspected or confirmed infectious disease had been in the organisation.	358	95.98
Protections in place to protect employees who perform cleaning and disinfection tasks from chemical hazards posed by disinfectants.	352	94.40
Hand Hygiene		
The employees are educated regarding appropriate indications for hand hygiene upon hire, prior to provision of care.	325	87.13
The employees are educated regarding appropriate indications for hand hygiene annually.	301	80.70
The employees understand and be able to demonstrate hand hygiene at the end of each training.	303	81.23

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The organisation routinely audits (monitors and documents) adherence to hand hygiene.	252	67.56
The organisation provides feedback from audits regarding the employee's hand hygiene performance.	227	60.86
Hand hygiene policies promote preferential use of alcohol-based hand rub (ABHR), as well as soap and water.	320	85.79
Business Communication		
The organisation has an emergency communications plan.	348	93.30
The organisation reacts quickly to a change of emergency before the employees arrive at the workplace.	334	89.55
Communication about workplace health procedures is done in a way that the employee can understand.	363	97.32
The employees feel free to voice their concerns or make suggestions about workplace health.	345	92.49

Individual Control Measures

Table 3 reflects high awareness of infectious disease reporting and precautionary measures at work, reflecting strong OSH culture. Nearly all agreed that face coverings were mandatory for visitors and PPE was replaced by their companies when soiled. Regarding health status. 15.01% had high blood pressure, 20.91% reported muscle or bone pain and 12.87% had high blood pressure.

Table 3: Individual Control Measures of The Workers

Items	**Number of Positive Responses (N)**	**%**
Knowledge, Practice and Occupational Safety and Health (OSH) Culture		
The organisation creates an atmosphere of trust that encourages employees to report errors, near-misses and biological hazards.	349	93.57
Periodic communication between employees and the organisation about infectious disease issues is in place.	340	91.15
There is an active and effective workers occupational safety and health committee.	347	93.03
The organisation has worked out all the jobs/tasks in the areas that have health risks.	353	94.64
The organisation always creates awareness of any health issues.	355	95.17
The infectious disease cases are investigated quickly in order to improve workplace health.	354	94.91
The employees are clear about their rights and responsibilities in relation to workplace health.	356	95.44

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The employees are clear about their employers' rights and responsibilities in relation to workplace health.	358	95.98
If the employees became aware of the infectious disease case/outbreak at the workplace, they know to whom (at their workplace) they should report it to.	363	97.32
The employees have the knowledge to assist in responding to any health concern at the organisation.	347	93.03
The employees know what are the precautionary measures they should take while doing their job.	362	97.05
The information gained through the reporting of any infectious diseases can be used for the organisation's learning and systemic reform.	352	94.37
Comorbidities		
High blood sugar/ diabetes mellitus.	24	6.43
High blood pressure.	48	12.87
High cholesterol level.	56	15.01
Heart related pain.	11	2.95
Lung-related pain such as asthma.	19	5.09
Muscle and bone related pain such as knee joint pain and back pain.	78	20.91
Skin-related pain such as eczema.	26	6.97
Digestive-related pain such as stomach ulcers.	21	5.63
Blood related pain.	6	1.61
Pain related to the thyroid gland.	10	2.68
Kidney related pain.	5	1.34
Pain related to mental disorders.	4	1.07
Cancer.	5	1.34
Risk Behaviour (Personal Protective Equipment)		
Reusable Personal Protective Equipment (PPE) stored in a clean location at the facility (not taken home) when not in use.	312	83.65
The employees who use Personal Protective Equipment (PPE), receive training on the proper selection and use of PPE upon hire.	329	88.20
The employees who use PPE, receive training on the proper selection and use of PPE annually.	313	83.91
The employees who use PPE, receive training on the proper selection and use of PPE when new equipment or protocols are introduced.	327	87.67
The employees are required to demonstrate proper use in the selection and use of PPE, during each training.	315	84.45

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

The following personal protective equipment (PPE) are required for usual job duties: gloves, respirator, face mask, gown/coveralls/apron and face shield).	330	88.48
There are PPE that can be used more than once (re-used).	287	76.94
Are personal protective equipment (PPE) provided by the organisation?	349	93.57
Face coverings are compulsory for visitors/customers/clients	361	96.78
PPE are being replaced when they are soiled or contaminated.	347	93.03
Cloth face coverings are washed daily.	252	67.56
Organisation has a mechanism for reporting PPE when supplies are low.	325	87.13
Workers are instructed to launder cloth face coverings routinely.	243	65.15
There is a designated area for donning and doffing cloth face coverings or personal protective equipment (PPE).	214	57.37

Relationship between Workplace Readiness and Infectious Disease Outcome

A multivariable logistic regression was analyzed on worker's infectious disease history. linking to workplace readiness (Table 4). Workers were significantly more likely to report previous disease history if their organization had early disease detection systems, active OSH services, adjustable cleaning SOPs or implemented hand hygiene signage. In contrast, proactive strategies, such as baseline TB screening, health checks before entry, collaboration with public health authorities, immediate response to concerns, and frequent disinfection were linked to lower odds of infectious disease history, thus indicating effective prevention. Some measures showed high or low adjusted odds ratio, highlighting the good association workplace readiness and infectious disease outcome.

Table 4: Relationship Between Workplace Readiness and Infectious Diseases

Items	p-value	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)
Management Support				
The organisation sets policies in relation to infectious diseases at the workplace.	0.68	0.82 (0.32 – 2.09)	0.39	2.65 (0.29 – 24.32)
Infection control and prevention policies and procedures are available in writing and is current, based on evidence-based guidelines, regulations or standards.	0.97	1.02 (0.39 – 2.65)	0.21	0.04 (0.00 – 6.37)

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

Infection prevention policies and procedures are reassessed at least annually or according to state government, federal government or taking into account the requirements by the industry involved and updated, if required.	0.44	1.30 (0.67 – 2.55)	0.94	1.08 (0.12 – 9.44)
At least an employee either on a full-time or part-time basis is trained in managing the infectious disease prevention and control programme in the workplace.	0.88	1.06 (0.51 – 2.19)	0.25	0.23 (0.02 – 2.78)
The organisation has an early detection and management system in place towards people who can potentially infect workers at initial points of encounter.	0.14	1.77 (0.84 – 3.73)	0.03	20.66 (1.43 – 298.18)
The organisation has a competency-based training programme that provides general guide on Occupational Safety and Health (OSH) e.g. Safety and Health Officer, OSH Coordinator.	0.08	1.77 (0.93 – 3.31)	0.16	3.21 (0.63 – 16.45)
Organisational Measures				
The organisation has an exposure control plan that is tailored to the specific requirements of the organisation (e.g., provide a plan to address related hazards caused by work processes at workplace).	0.74	0.84 (0.30 – 2.33)	0.72	0.38 (0.02 – 64.81)
Employees who are expected to have contact with substances that have the potential to cause infectious disease transmission are trained according to Occupational Safety and Health (OSH) standard guide when employed and follow-up at least once a year.	0.01	2.12 (1.22 – 3.70)	0.31	2.38 (0.45 – 12.64)
Following the exposure event, there are assessment, follow-up and preventive treatment (prophylaxis) at no cost to employees by the	0.03	1.95 (1.09 – 3.51)	0.08	7.00 (0.81 – 60.53)

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

employers and supervised by a healthcare professional.				
The organisation tracks the worker's infection exposure and evaluates the data; and the organisation identifies corrective action plans to reduce incidence of infection.	0.704	1.18 (0.50 – 2.76)	0.95	0.87 (0.01 – 75.05)
The organisation follows government recommendations to provide immunisation to the employees, including offering Hepatitis B and influenza vaccination shots.	0.77	1.081 (0.64 – 1.82)	0.49	0.63 (0.17 – 2.30)
All employees receive baseline tuberculosis (TB) (Chest X-Ray) screening prior to placement; based on the risk assessment at the organisational level.	0.57	0.87 (0.54 – 1.40)	0.01	0.19 (0.06 – 0.64)
The organisation has a respiratory protection programme that details the required worksite-specific procedures and the specific elements needed for the respirators.	0.14	0.53 (0.23 – 1.22)	0.82	0.77 (0.08 – 7.18)
The organisation has taken measures to reduce physical contact between workers.	0.16	0.23 (0.03 – 1.76)	0.19	0.00 (0.00 – 18.58)
Health and safety measures are implemented to limit the risk of infection in office spaces and at workstations.	0.52	0.60 (0.13 – 2.80)	0.13	0.01 (0.00 – 5.18)
Pedestrian flow is organised to limit the risk of infection.	0.22	1.40 (0.82 – 2.41)	0.02	5.71 (1.33 – 24.6)
The organisation has conducted periodic cleaning or other hygiene measures in common areas.	0.53	1.41 (0.48 – 4.17)	0.06	58.03 (0.83 – 4067.97)
All measures have been taken to limit the risk of infection related to meal breaks, shared kitchens/pantries or common rooms.	0.07	0.23 (0.06 – 1.14)	0.52	3.32 (0.09 – 129.58)
Suitable containers for the collection of materials (waste) used for	0.01	2.26 (1.20 – 4.27)	0.19	3.42 (0.56 – 21.05)

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

individual and collective hygiene needs are provided.				
Indoor Air Quality				
The organisation has consulted with mechanical ventilation and air conditioning (MVAC) engineer to ensure adequate ventilation, where needed.	0.75	1.08 (0.67 – 1.73)	0.46	0.65 (0.20 – 2.07)
Fans are arranged to minimise airflow from worker to worker, if applicable.	0.63	0.89 (0.55 – 1.44)	0.17	0.42 (0.12 – 1.45)
Personal cooling fans need to be removed from the organisation by the employee, if applicable.	0.10	1.54 (0.92 – 2.57)	0.63	0.74 (0.22 – 2.48)
Employer has taken steps to prevent heat hazards if fans are removed.	0.06	1.58 (0.98 – 2.53)	0.04	3.81 (1.05 – 13.80)
Policy on Infectious Disease				
The coronavirus disease 2019 (COVID-19) coordinators at the workplace have been identified.	0.98	1.02 (0.32 – 3.24)	0.48	0.21 (0.00 – 16.63)
Plans have been developed to continue essential functions when absenteeism of worker is high.	0.72	1.16 (0.52 – 2.60)	0.01	0.00 (0.00 – 0.22)
Mechanism for monitoring and tracking absenteeism is in place.	0.88	1.06 (0.48 – 2.36)	0.98	0.95 (0.03 – 26.84)
Mechanism for tracking when employees can return to work is in place.	0.28	1.52 (0.71 – 3.26)	0.14	0.08 (0.00 – 2.24)
Standard operating procedures for cleaning and disinfection have been modified as needed to prevent infectious diseases.	0.11	2.23 (0.82 – 6.04)	0.00	N/A
The infectious diseases policy has been consistently communicated to employees.	0.97	1.02 (0.36 – 2.89)	0.589	0.32 (0.01 – 18.78)
Coordination with occupational safety, health or medical professionals is implemented.	0.01	2.22 (1.21 – 4.08)	0.00	50.81 (3.87 – 666.44)

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

The organisation has an active on-site occupational safety and health services.	0.00	2.81 (1.41 – 5.59)	0.01	92.99 (2.46 – 3514.12)
Collaboration with local and/or state public health authorities and other stakeholders is present.	0.20	1.48 (0.81 – 2.70)	0.03	0.08 (0.01 – 0.83)
The organisation has consulted with local and/or state public health authorities.	0.07	1.69 (0.95 – 3.02)	0.32	0.38 (0.06 – 2.54)
Pre-shift employee health screening has been implemented (e.g., measurement of body temperature).	0.98	1.03 (0.32 – 3.24)	0.93	1.16 (0.04 – 34.28)
Visitors (including delivery workers)/customers health screening has been considered or implemented.	0.64	1.29 (0.44 – 3.76)	0.12	0.02 (0.00 – 2.79)
Policies are in place for managing workers with potential exposure to infectious disease.	0.10	2.02 (0.88 – 4.62)	0.15	193.25 (0.15 – 251415.76)
Policies for managing employees with symptoms are in place.	0.64	1.29 (0.44 – 3.76)	0.12	0.00 (0.00 – 5.24)
Policies are in place for managing employees with confirmed or suspected infectious diseases, or obtained positive test result.	0.98	1.02 (0.32 – 3.24)	0.68	8.38 (0.00 – 207381.76)
Human Resources and Occupational Safety and Health (OSH) Expertise				
The employees get the latest information on the measures to be taken in preventing infectious diseases.	0.85	1.12 (0.35 – 3.59)	0.73	0.24 (0.00 – 818.06)
The organisation has related specialties in ensuring that the needs of any high-risk groups are covered in the prevention of infectious diseases.	0.05	1.69 (1.01 – 2.82)	0.39	1.75 (0.49 – 6.24)
The Human Resources Department give the instructions to the employees on how to inform about a health concern.	0.88	0.94 (0.43 – 2.07)	0.783	1.396 (0.129 – 15.092)
The organisation has related specialties of OSH in managing the employees immediately after they have reported a concern.	0.63	1.17 (0.62 – 2.19)	0.02	0.02 (0.00 – 0.56)

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

The organisation has related specialties of OSH in how to move the staff off-site or at home safely.	0.04	1.732 (1.02 – 2.93)	0.56	1.65 (0.30 – 8.94)
The organisation has related specialties of OSH in identifying those who may have had prolonged or close contact with infected employee members.	0.48	1.24 (0.68– 2.27)	0.52	0.46 (0.04 – 4.93)
The organisation has related specialties of OSH in how to cooperate with the public health authorities.	0.15	1.57 (0.86 – 2.87)	0.81	1.30 (0.15 – 11.50)
Post-Rehab Programme				
The employee education programme is in place to prevent the spread of infectious disease and to identify the symptoms.	0.19	1.61 (0.79 – 3.29)	0.27	0.09 (0.00 – 6.68)
The employee education programme covers signs and symptoms of infectious diseases.	0.53	1.26 (0.61 – 2.57)	0.09	12.78 (0.67 – 244.59
The employee education programme covers the risks for workplace exposures.	0.19	1.61 (0.79 – 3.29)	0.10	28.27 (0.53 – 1489.66)
The employee education programme covers the practice of avoiding touching the mouth, nose and eyes.	0.32	1.43 (0.71 – 2.88)	0.15	0.17 (0.02 – 1.87)
The employee education programme covers hand hygiene.	0.62	1.24 (0.53 – 2.93)	0.49	0.34 (0.02 – 7.69)
Creating Awareness				
The organisation display health signages at workplace.	0.57	1.33 (0.50 – 3.57)	0.97	1.18 (0.00 – 10431.62)
Employees understand the health signages.	0.57	1.33 (0.50 – 3.57)	0.24	122.71 (0.04 – 373146.34)
The health signages are placed at appropriate locations.	0.51	1.36 (0.54 – 3.43)	0.10	0.00 (0.00 – 3.44)
Organisation displays signages that encourage employee to stay at home when sick.	0.46	1.24 (0.71 – 2.16)	0.78	0.74 (0.09 – 5.91)
Organisation displays signages that encourage cough and sneeze etiquette at common room and strategic work stations.	0.11	1.58 (0.90 – 2.77)	0.10	0.12 (0.01 – 1.44)
Organisation displays signages that encourage proper hand hygiene practices.	0.01	2.62 (1.25 – 5.51)	0.01	266.89 (5.316 – 13399.68)
Organisation displays signages that encourage physical distancing among the employees.	0.93	0.95 (0.34 – 2.67)	0.22	0.04 (0.00 – 3.22)

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

Education, training, and communication are provided in languages and understanding levels appropriate to the workforce.	0.54	1.31 (0.56 – 3.11)	0.15	17.39 (0.37 – 823.30)
Risky Communication (Engineering Control)				
Workers able to maintain physical distancing of at 1 meter.	0.83	0.89 (0.32 – 2.49)	0.13	0.02 (0.00 – 3.22)
There are visual cues to maintain physical distancing (e.g., floor markings and signages).	0.38	1.48 (0.62 – 3.55)	0.60	2.23 (0.11 – 45.18)
Workstation alignment allows for employee/visitor/customer/client to be separated (for at least 1 meter) apart.	0.86	1.10 (0.38 – 3.13)	0.55	0.31(0.01 – 14.39)
Employees/visitors/customers face each other at distance less than 1 meter apart.	0.58	1.16 (0.69 – 1.94)	0.17	0.40 (0.11 – 1.47)
Physical barriers, such as partitions (e.g., stainless steel, plexiglass and plastic strip curtains) are used to separate employees/visitors/customers/clients.	0.00	2.06 (1.27 – 3.34)	0.45	1.57 (0.49 – 5.01)
Organisation conducts disinfection to physical barriers to prevent infectious disease transmission.	0.37	1.44 (0.65 – 3.16)	0.76	0.72 (0.09 – 5.97)
The number of tables in lunch or break areas been reduced and placed at a distance to prevent transmission.	0.73	0.89 (0.47 – 1.71)	0.20	0.41 (0.10 – 1.62)
Other building spaces (e.g., conference rooms) in use to accommodate excess capacity when there is an infectious disease outbreak.	0.01	1.84 (1.14 – 3.01)	0.16	2.42 (0.71 – 8.27)
The number of employees/visitors/clients in a space at one time being limited during an infectious disease outbreak.	0.18	1.78 (0.78 – 4.22)	0.21	6.16 (0.37 – 103.73)
Are clock in/out stations touch-free?	0.33	1.29 (0.77 – 2.18)	0.23	0.47 (0.13 – 1.63)
Handwashing and/or hand sanitiser stations are placed in multiple locations.	0.53	0.50 (0.06 – 4.24)	0.56	N/A
Handwashing and/or hand sanitiser stations are touch-free.	0.35	1.27 (0.77 – 2.07)	0.19	0.40 (0.10 – 1.59)
Handwashing and/or hand sanitiser stations are easily accessible.	1.00	0.00	1.00	0.00
All stations are functioning and stocked with adequate supplies (e.g.,	0.62	1.24 (0.53 – 2.93)	0.37	0.14 (0.00 – 10.73)

International Journal of Entrepreneurship and Management Practices
IJEMP
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Volume 8 Issue 32 (December 2025) PP. 338-366
DOI: 10.35631/IJEMP.832023

sanitiser, soap and single-use paper towels).				
There is a mechanism to report supplies are running low.	0.02	2.10 (1.12 – 3.93)	0.00	21.54 (3.77 – 123.12)
Risky Communication (Administration Control)				
Health screening has completed prior to entry into the organisation.	0.51	0.71 (0.26 – 1.94)	0.01	0.00 (0.00 – 0.04)
Have health screeners been appropriately trained.	0.36	1.35 (0.71 – 2.55)	0.56	0.47 (0.04– 6.07)
Personal protective equipment (PPE) are provided for the health screeners.	0.05	1.89 (1.01 – 3.57)	0.04	11.07 (1.17 – 104.70)
Screening done to every person (including visitors/customers/clients and employees) at all entry points of the building.	0.10	2.07 (0.86 – 4.95)	0.30	4.92 (0.25 – 97.93)
All unhealthy symptoms are covered when the health screening is conducted.	0.01	2.61 (1.34 – 5.06)	0.05	30.98 (0.98 – 981.96)
Body temperatures are being checked during health screening.	0.37	1.78 (0.51 – 6.22)	0.02	0.00 (0.00 – 0.19
Physical distancing between individuals awaiting screening being maintained during the process.	0.02	2.73 (1.14 – 6.56)	0.01	N/A
Confidentiality is maintained as required by the Ministry of Health (MOH).	0.03	2.22 (1.08 – 4.58)	0.82	0.72 (0.04 – 12.53)
Cleaning and Disinfection				
The cleaning and disinfection agents are in line with authorities' recommendations.	0.21	1.85 (0.70 – 4.84)	0.14	184.38 (0.19 – 175830.57)
Cleaning and disinfection are conducted frequently.	0.36	0.56 (0.16 – 1.96)	0.00	0.00 (0.00 – 0.00)
High priority is given to the cleaning of targeted surfaces and done more frequently including at common areas, frequently touched surfaces and physical barriers.	0.83	0.89 (0.32 – 2.49)	0.69	0.21 (0.00 – 400.63)
Shared equipment and materials being cleaned and disinfected between use by each employee.	0.10	1.76 (0.89 – 3.46)	1.00	1.00 (0.09 – 11.19)
There are cleaning and disinfecting procedures conducted between visitors/clients.	0.25	1.449 (0.774 – 2.715)	0.98	1.03 (0.17 – 6.26)
Cleaning and disinfection will be intensified after a person with suspected or confirmed infectious disease had been in the organisation.	0.85	1.12 (0.35 – 3.59)	0.06	28.23 (0.83 – 964.59)

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Protections in place to protect employees who perform cleaning and disinfection tasks from chemical hazards posed by disinfectants.	0.35	1.57 (0.61 – 4.02)	0.38	0.08 (0.00 – 20.16)
Hand Hygiene				
The employees are educated regarding appropriate indications for hand hygiene upon hire, prior to provision of care.	0.03	2.04 (1.07 – 3.856)	0.63	1.76 (0.18 – 16.88)
The employees are educated regarding appropriate indications for hand hygiene annually.	0.00	3.21 (1.87 – 5.54)	0.12	5.39 (0.65 – 44.72)
The employees understand and be able to demonstrate hand hygiene at the end of each training.	0.00	2.299 (1.321 – 4.001)	0.70	1.43 (0.24 – 8.46)
The organisation routinely audits (monitors and documents) adherence to hand hygiene.	0.02	1.79 (1.10 – 2.91)	0.08	0.16 (0.02 – 1.27)
The organisation provides feedback from audits regarding the employee's hand hygiene performance.	0.03	1.71 (1.06 – 2.75)	0.77	0.76 (0.13 – 4.83)
Hand hygiene policies promote preferential use of alcohol-based hand rub (ABHR), as well as soap and water.	0.51	1.25 (0.65 – 2.39)	0.53	1.74 (0.31 – 9.65)
Business Communication				
The organisation has an emergency communications plan.	0.02	2.59 (1.13 – 5.93)	0.52	0.30 (0.01 – 11.16)
The organisation reacts quickly to a change of emergency before the employees arrive at the workplace.	0.19	1.61 (0.79 – 3.29)	0.31	0.22 (0.01 – 4.03)
Communication about workplace health procedures is done in a way that the employee can understand.	0.26	2.08 (0.58 – 7.55)	0.09	67.94 (0.20 – 577627477.57)
The employees feel free to voice their concerns or make suggestions about workplace health.	0.02	2.48 (1.13 – 5.47)	0.01	0.19 (3.15 – 1466.44)

Relationship between Individual Control Measures and Infectious Disease Outcome

Table 5 shows that workers in organizations with regular communications on infectious disease were significantly associated with history of infectious disease, suggesting a possible reactive implementation. In contrast, workers who understood their employer's health-related responsibilities, had lung related conditions like asthma or had received training on proper PPE usage were less likely to have infectious disease. This points to awareness and preventive practices by the organizations were strong protective values related to infectious disease.

International Journal of Entrepreneurship and Management Practices
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Table 5: Relationship Between Workplace Readiness and Infectious Diseases.

Items	p-Value	Crude OR (95% CI)	p-Value	Adjusted OR (95% CI)
The organisation creates an atmosphere of trust that encourages employees to report errors, near-misses and biological hazards.	0.31	1.58 (0.65 – 3.82)	0.27	0.41 (0.08 – 2.03)
Periodic communication between employees and the organisation about infectious disease issues is in place.	0.01	2.85 (1.37 – 5.91)	0.01	4.68 (1.41 – 15.56)
There is an active and effective workers occupational safety and health committee.	0.46	1.39 (0.58 – 3.32)	0.69	1.40 (0.27 – 7.13)
The organisation has worked out all the jobs/tasks in the areas that have health risks.	0.57	1.33 (0.50 – 3.57)	0.32	0.33 (0.04 – 2.89)
The organisation always creates awareness of any health issues.	0.16	2.02 (0.76 – 5.38)	0.09	7.88 (0.71 – 87.60)
The infectious disease cases are investigated quickly in order to improve workplace health.	0.86	1.10 (0.38 – 3.13)	0.87	0.83 (0.10 – 7.29)
The employees are clear about their rights and responsibilities in relation to workplace health.	0.11	2.23 (0.82 – 6.04)	0.31	3.18 (0.35 – 29.14)
The employees are clear about their employers' rights and responsibilities in relation to workplace health.	0.67	0.76 (0.22 – 2.74)	0.02	0.01 (0.00 – 0.43)
If the employees became aware of the infectious disease case/outbreak at the workplace, they know to whom (at their workplace) they should report it to.	0.26	2.08 (0.58 – 7.55)	0.18	6.39 (0.42 – 96.98)
The employees have the knowledge to assist in responding to any health concern at the organisation.	0.46	1.39 (0.58 – 3.32)	0.50	1.62 (0.34 – 6.67)
The employees know what are the precautionary measures they should take while doing their job.	0.37	1.78 (0.51 – 6.22)	0.63	1.74 (0.18 – 16.60)
The information gained through the reporting of any infectious diseases can be used for the organisation's learning and systemic reform.	0.35	1.57 (0.61 – 4.02)	0.578	1.63 (0.29 – 9.14)
Comorbidities				

International Journal of Entrepreneurship and Management Practices
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High blood sugar/ diabetes mellitus.	0.97	0.98 (0.378 – 2.55)	0.63	1.38 (0.37 – 5.09)
High blood pressure.	0.763	1.12 (0.54 – 2.29)	0.38	1.53 (0.59 – 4.03)
High cholesterol level.	0.69	0.88 (0.46 – 1.67)	0.12	0.52 (0.28 – 1.18)
Heart-related pain.	0.84	0.87 (0.23 – 3.35)	0.66	1.69 (0.17 – 17.38)
Lung-related pain such as asthma.	0.02	0.34 (0.13 – 0.87)	0.01	0.22 (0.07 – 0.71)
Muscle- and bone-related pain such as knee joint pain and back pain.	0.82	0.94 (0.53 – 1.66)	0.73	1.14 (0.53 – 2.45)
Skin-related pain such as eczema.	0.26	1.87 (0.63 – 5.57)	0.22	2.64 (0.56 – 12.45)
Digestive-related pain such as stomach ulcers.	0.15	0.51 (0.20 – 1.27)	0.25	0.47 (0.13 – 1.71)
Blood-related pain.	0.04	0.16 (0.03 – 0.88)	1.00	0.00
Pain related to the thyroid gland.	0.69	0.76 (0.19 – 2.99)	1.00	N/A
Kidney-related pain.	0.43	0.49 (0.08 – 2.95)	1.000	N/A
Pain related to mental disorders.	0.26	0.32 (0.05 – 2.32)	1.000	N/A
Cancer.	0.09	0.21 (0.04 – 1.29)	1.00	0.00
Risk Behaviour (Personal Protective Equipment Compliance)				
Reusable Personal Protective Equipment (PPE) is stored in a clean location at the facility (not taken home) when not in use.	0.19	0.63 (0.31 – 1.26)	0.06	0.36 (0.12 – 1.04)
The employees who use Personal Protective Equipment (PPE), receive training on the proper selection and use of PPE upon hire.	0.76	0.89 (0.43– 1.87)	0.12	0.21 (0.0 – 1.46)

International Journal of Entrepreneurship and Management Practices
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The employees who use PPE, receive training on the proper selection and use of PPE annually.	0.70	1.13 (0.61 – 2.13)	0.39	1.80 (0.47 – 6.82)
The employees who use PPE, receive training on the proper selection and use of PPE when new equipment or protocols are introduced.	0.55	1.24 (0.62 – 2.47)	0.07	6.38 (0.89 – 45.87)
The employees are required to demonstrate proper use in the selection and use of PPE, during each training.	0.67	0.86 (0.44 – 1.68)	0.04	0.22 (0.05 – 0.90)
The following personal protective equipment (PPE) are required for usual job duties: gloves, respirator, face mask, gown/coveralls/apron and face shield).	0.88	1.06 (0.51 – 2.19)	0.11	2.47 (0.81 – 7.51)
There are PPE that can be used more than once (re-used).	0.23	0.70 (0.39 – 1.26)	0.27	0.65 (0.31 – 1.39)
Are personal protective equipment (PPE) provided by the organisation?	0.65	0.79 (0.29 – 2.19)	0.46	2.00 (0.32 – 12.46)
Face coverings are compulsory for visitors/customers/clients.	0.21	0.27 (0.03 – 2.12)	0.10	0.13 (0.01 – 1.44)
PPE are being replaced when they are soiled or contaminated.	0.85	0.91 (0.35 – 2.34)	0.69	1.38 (0.30– 6.39)
Cloth face coverings are washed daily.	0.58	1.15 (0.70 – 1.89)	0.60	0.77 (0.29 – 2.04)
Organisation has a mechanism for reporting PPE when supplies are low.	0.31	0.67 (0.31 – 1.45)	0.27	0.52 (0.16 – 1.67)
Workers are instructed to launder cloth face coverings routinely.	0.32	1.28 (0.79 – 2.08)	0.22	1.82 (0.71 – 4.69)
There is a designated area for donning and doffing cloth face coverings or personal protective equipment (PPE)	0.50	1.18 (0.73 – 1.89)	0.53	1.22 (0.66 – 2.25)

Discussion

This study, involving 373 workers across West and East Malaysia, provides clear evidence of the relationship between workplace readiness, individual control factors and infectious disease history.

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Results on the workplace readiness showed that most companies had some preparation in terms of OSH policies, management support and safety measures. Our finding contrasted with [14], who found that most organization were aware of the COVID-19's risk, but were not fully ready for the pandemic, as individual enterprises may have limited resources to manage the crisis. This could be because most of our respondents were from medium sized and large industries, who had good OSH policies and had international regulations, and demonstrated good management support in any terms of emergency. Some companies may also have good emergency response plan with regards to any infectious disease threats.

Majority of workers agreed on the support received from management in terms of availability of infection control and prevention policies and procedures. In this study, nearly all workers reported they were aware of infectious disease cases in the workplace and knowing of the personnel to report to. The findings align with a previous global study by [15].

Our study points out that the workers need to understand the employer's responsibilities in relation to health aspects. This is in line with some concepts of quality achievement to prevent the transmission of infectious disease in the industry. Audit assessment on ISO standards has proven from other studies which involves good understanding of employers' role is required to safeguard and eliminate any potential infection at the workplace, which includes measures to control infections in cases where a pandemic has occurred [16].

The training in the proper use of PPE has been proven to possibly reduce the association with infectious disease outcome among workers. Globally, PPE use has been proven effective to prevent wearers from various respiratory hazards and infectious diseases related via droplets inhalation [17]. However, ensuring adequacy of PPE and fair distribution remains essential to guaranty adequate supply to those in need during an infectious disease crisis.

The main analysis of this research on the multivariable results revealed that organizations with a history of infectious disease cases were more likely adopt an active Occupational Safety and Health (OSH) strategies and earlier detection system. This suggest that these measures was taken in response to an increase in incidence of infectious disease within individual companies. We postulate this is due to the various governmental approach following infectious disease outbreaks, including imposing laws on Movement Control Orders (MCOs), mandatory masking in public spaces, digital contact tracing by the companies and border controls. Other measures such as workplace standard operating procedures and ventilation guidance by DOSH and Ministry of Health Malaysia were also issued to further enforce organizational readiness [18]. All these governmental measures had increased the surveillance activities of companies with many cases of infectious diseases, and ensure companies take strict control measures.

This study has limitations. Data was collected to respondents via online tool to participating companies, distributed using convenience sampling approach. This is subjected to selection bias, potentially overrepresenting companies with fewer infectious disease cases and good control measures. Additionally, the use of self-reported tool, which is subject to reporting bias Lastly, some workers may perceive the level of adequacy and readiness differs from others depending on their length of work and previous work exposure and overall work experience. The strength in this study is in its large and diverse workplace samples. This offers valuable insights into workplace readiness and infectious disease control across different sectors. Secondly, the use of multivariable logistic regression is a good analytical approach in

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controlling potential confounders. Lastly, the results of this study offers actionable insights to enhance workplace health and safety for future pandemics.

Conclusion

Based on this study, workplaces should strengthen training on employer responsibilities, use of PPE and fair PPE distribution. Proactive measures such as active OSH strategies, early reporting and detection system, collaboration with public health authorities should be in place as standard practice. Industries should also receive adequate government support to develop an effective infectious disease response plans, while government agencies like DOSH must regularly ongoing audit on workplace readiness to ensure prevention and control strategies are optimized in all workplaces.

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