THE CORRELATION BETWEEN ENVIRONMENTAL DETERMINANTS AND EMPLOYEE HEALTH PROTOCOL BEHAVIOR WITH SYMPTOMS OF COVID-19 EXPOSURE IN LABORATORY COMPANIES

Dede Nurhidayanto[*], Yusriani Sapta Dewi[**]
[*]PT. Unilab Perdana
[**]Universitas Satya Negara Indonesia
Correspondent outhor : [*]dedenur@gmail.com
[**]yusrianisaptadewi@usni.ac.id

Abstract

This study aims to determine the correlation between environmental determinants and health protocol behavior with symptoms of Covid-19 exposure. The research method used was survey with a quantitative approach. The data were analyzed using correlation and multiple linear regression. The research was conducted at Laboratory Companies, South Jakarta, from November to January 2024. The sampling technique used was simple random sampling, and the sample size was 31 employees working at Laboratory Companies, in South Jakarta. The results of a regression analysis was the formula of $Y = 36.979 - 0.321X_1 - 0.181X_2$. The results of the significance and linearity test were F_{count} 15.92 > F_{table} 4.04 at α = 0.05. The correlation coefficient between the physical office environment and employee health protocol behavior with symptoms of Covid-19 exposure (r_{yx}) was 0.729, R = 0.53, meaning that the relationship between $X_1 + X_2$ and Y is 53%. The results of the study showed that there was a negative and significant relationship between the physical office environment and employee health protocol behavior with symptoms of exposure to Covid-19.
Key Words: Covid-19; health protocol behavior; determinants protocol; office environment

INTRODUCTION

Corona viruses are a group of viruses that can cause disease in animals or humans. Several types of coronaviruses are known to cause respiratory tract infections in humans, from mild coughs and colds to more severe diseases, including Middle East Respiratory Syndrome (MERS), and Middle East Respiratory Syndrome (SARS). Covid-19 is an infectious disease caused by a new coronavirus. This disease was discovered for the first time in Wuhan, China, in December 2019 (Team 2020). Based on doctors' notes on the symptoms presented by Covid-19 patients, their symptoms of anosmia (loss of the sense of smell) and ageusia (loss of the sense of taste) (Koyama, Ueha, and Kondo 2021). According to World Health Organization's data (WHO, 2023), until the mid 2023 of the Indonesian government had reported 6,813,429 confirmed Covid-19 cases 161,918 deaths and 6,651,511 recovered patients from 514 districts in 34 provinces (World Health Organization 2023).

Minister of Health Decree No. 1405/2002 concerning Health Requirements for Office and Industrial Work Environment states that the condition of the work/industrial environment must be carefully considered, which should help prevent environmental pollution as well as health problems. According to the decree, some points that must be considered include room and building, availability of clean water, air quality, and lighting (Kepmenkes 2002)(Scheuer, Keoleian, and Reppe 2003).

Behavior can be defined as the result of all kinds of human experiences and interactions with the environment, which manifest in the form of knowledge, attitudes, and actions. Behavior is the response/reaction of an individual to stimuli originating from external or internal sources (Kelder, Hoelscher, and Perry 2015).

A person's behavior is a series of actions carried out by him/her in response to a stimulus/stimuli, which then develop into habits due to the values he/she adheres to. Behavior is basically actions or activities carried out by people, either when interacting with their environment or not. The interaction is reflected in his/her knowledge, attitudes and actions. Behavior can be described

more objectively as a reaction of creatures or individuals towards changes outside them. The reaction is framed in two types of structure: separate structures (reactions occurring inside a person that cannot be seen directly by others) and dynamic structures (the point when a person's behavior can be directly observed by others) (Hemsworth et al. 2002).

Impact the Corona Virus Disease (covid-19) pandemic has reduced the stability of the world economy. One of the most common phenomena is the decline in employee performance during the COVID-19 pandemic (Febriani, Gamayuni, and Syaipudin 2023). Social interaction, including interaction in the workplace, affects person-to-person Covid-19 transmission (Maheshwari and Albert 2020). Due to the number of workers working and the interactions between them, business owners play an important role in cutting the transmission chain (Aladejebi 2020). The risk factor that must be considered is the physical environment of offices as the place of interaction. If a workplace environment becomes unhealthy due to contaminations of disease agents, when combined with unhealthy habits of people, disease transmission can easily occur there (Dewi 2021). The Indonesian government officially implemented the Covid-19 safety protocol on May 20, 2020, by passing Ministry of Health Decree number HK.01.07/MElNKElS/328/2020 regarding guidelines for preventing and controlling Covid-19 in office and industrial workplaces (Kemenkes 2020). The ultimate goal of the regulation was to reduce the transmission of Covid-19 in workplaces. Industrial offices and workplaces have to adjust their policies to ensure the continuity of their business activities and adapt to the pandemic (Hou et al. 2021).

When employees do not implement the Covid-19 protocol, it will increase their risk of contracting the disease (Belingheri, Paladino, and Riva 2020). It is really important to keep up with health trends to slow down the spread of Covid. Some of the tips that must be carried out by all groups include social distancing, using masks, and washing hands (Cheng, Lam, and Leung 2022). Even though the government has issued new policies to control and prevent Covid-19 transmission, there are still many employees who did not follow the Covid-19 prevention protocol. This is caused by a number of things, including predisposing factors like knowledge, attitudes, and beliefs, values of environmental determinants, including physical environments and the presence of healthcare facilities, as well as other factors, including attitudes and actions of health workers (Cirrincione et al. 2020). This explains the Covid-19 situation in Indonesia, where 60% of patients were exposed to the virus due to low awareness of Covid-19 prevention (Sulistyawati et al. 2021). According to the research carried out by Herman and Handayani (2016), Indonesia's health facilities and infrastructure are still not yet capable of carrying out efforts to prevent and treat diseases such as Covid-19 (Aminullah and Erman 2021).

Another research revealed that the majority of respondents (97.7%) who did not receive support from health workers did not comply with the efforts to control and prevent Covid-19 (Tripathi et al. 2020). In efforts to prevent Covid-19, showed that 95.7% of people used masks, frequently washed their hands, and maintained physical and social distance from other people (Fakhira et al. 2021). Only 4.2% of people fall into the "good culture" category, but it was still a good figure considering the very fast spread of Covid-19 (Raevskikh, Khalid, and Benghozi 2022). The hypothesis in this research is 1) There is a relationship between physical environmental determinants and symptoms of exposure to Covid-19; 2)There is a relationship between health protocol behavior and symptoms of exposure to Covid-19.

METHOD

This research used a survey with a quantitative approach. Interviews are carried out by asking questions to the resource person regarding the topic to be studied and the data were collected using questionnaires. Observations are carried out by directly observing the object being studied and being interviewed, to obtain an overview of the primary data needed. Quantitative data analysis is carried out as the final process to systematically compile data obtained from interviews, observations and other sources, so that it can be easily understood and the findings can be informed to others. In analytical observational studies, researchers try to establish an association between exposure(s) and outcome(s). Depending on the direction of enquiry, these studies can be directed forwards (cohort studies) or backwards (case–control studies). In this article, we examine the key features of these two types of studies (Ranganathan and Aggarwal 2019).

SAMPLING PROCEDURES

The population in this study was 80 employees at the Laboratorium Companies office, consisting of 51 male employees and 39 female employees. The sample in this study was 31 employees of the Laboratorium Companies, with sampling using a simple random sampling technique (simple random sampling). Samples are taken randomly without selecting the individuals sampled.

MATERIALS AND APPARATUS

The data used in this research is primary data obtained from interviews using a questionnaire. Apart from that, data from observations during the observation was carried out. Secondary data was obtained from health records and morbidity rates due to Covid 19 as well as sick leave certificates

PROCEDURES

The initial step is to conduct research trials to significantly improve user research results by identifying problems early in pilot trials, providing insight into participant behavior and attitudes, and increasing the reliability and validity of research findings. Research trials of 20 employees at a similar environmental laboratory company. Symptoms of Covid-19 are the activity of spreading the infectious virus between one employee and another which can be measured using the Covid-19 symptom assessment scale with a score of 1 if fever, high which can last for 5-7 days, unstable level of consciousness and body aches; scoring 2 if coughing, scoring 3 if shortness of breath, and loss of sense of smell; scoring 4 if diarrhea, vomiting and nausea occur, changes in skin color on the body; and scoring 5 if self-isolation for 14 days and treatment at hospital. Instrument testing on the symptom variable of exposure to Covid 19 was 0.413 at α 0.05 and a confidence level of 85.90%.

For the physical office environment, direct observation was carried out, including observing 1) Warning Signs, including through publicity via billboards and announcements everywhere; 2) Room conditions including temperature, air ventilation, humidity, and light entering the room, as well as clean water quality. 3) Prevention of Covid-19 through employee rapid test regulations, routine cleaning of each room, and a special area for initial handling of Covid-19; 4) Working hours by controlling office hours if a pandemic occurs; 5) Accessibility of clinical gadgets, easy accessibility of masks, hand sanitizers, special waste disposal for all office facilities to tackle Coronavirus.

Employee health protocol behavior is a pattern of actions carried out by employees directly or indirectly to prevent the spread of Covid 19, aspects: 1) Preventive Behavior, with indicators of always cleaning oneself and changing clothes regularly, using masks and hand sanitizer to avoid exposure to Covid-19; 2) Handling Covid-19, with indicators that if you feel unfit and ongoing, immediately see a doctor; 3) Comply with health protocol regulations, with the indicator of always following the regulations that have been made by the government and offices to avoid Covid-19; 4) Maintaining health, with indicators (a) Maintaining the physical condition of the body, (b) regularly consuming vitamins. Scoring , if the employee answers always, scoring 2, if the employee answers sometimes, and scoring 3, if the employee answers no. Instrument testing on the Employee health protocol behavior 0.463 at α 0.05 and a confidence level of 89.30%.

Design and Data Analysis

The dependent variable in this study is symptoms Covid 19 expore (Y). The independent variables in this research are the physical office environment (X_1) and Employee health protocol behavior (X_2). The data analysis technique is to use simple and multiple regression and correlation tests.

$$Y = a + b_1X_1 + b_2X_2 \qquad\qquad\qquad (1)$$

$$r = \sqrt{r^2} = \sqrt{\frac{(b_1 \sum x_1y) + \sqrt{b_2 \sum x_2y}}{\sum y^2}} \qquad\qquad (2)$$

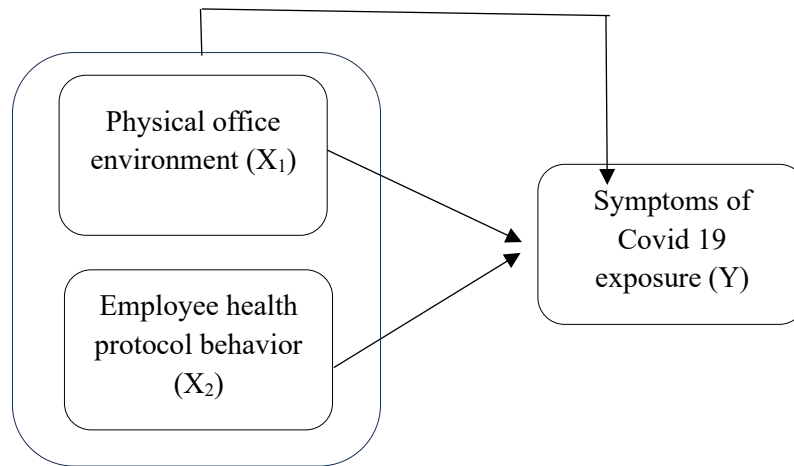|			
Y	= Independent variable	a	= constanta
X_1, X_2	= dependent variables	b_1, b_2	= regression coeffisient

Figure 1. Research Structure

RESULT AND DISCUSSION

The relationship between office physical environment scores and symptoms of exposure to Covid-19 was carried out using simple regression. The linear regression between the physical environment and symptoms of Covid-19 exposure shown by the regression formula of $\hat{Y} = 31.317 - 0.419X_1$ was negative linear, meaning the better the office in implementing health protocols, the smaller the exposure to Covid 19. The result are shown in Table 1.

Table 1. Linear regression of ANAVA Y on X_1; $\hat{Y} = 31.317 - 0.419X_1$

Source of Variants	Degree of Freedom	Sum of Squares	Mean Square	F_{count}	$F_{table,}$ $\alpha\,0.05$
Total	30	407,419	13,581.63		
Regression	1	180,173	180,173	22.99	4.04
Residual	29	227,246	7,836.07		

The results show that the **F_{count}** 22.99 > **F_{table}** 4.04 at $\alpha = 0.05$. The figures indicated significant correlation between the physical environment at the office and symptoms of exposure to Covid-19. The correlation coefficient between the physical environment of the office and symptoms of Covid-19 exposure (**r_{yx}**) was 0.665. R = r^2_{xy} = 0.44 meant that the correlation between X_1 and Y was 44%. This condition means that the influence of the physical office environment on exposure to Covid 19 symptoms is 44%, if other factors are ignored. A study in 2020 found that the relationship between interior office space and health are threefold; with open-plan offices, shared rooms, and higher

background noise being the characteristics most likely to have a negative impact on well-being (Colenberg, Jylhä, and Arkesteijn 2020).
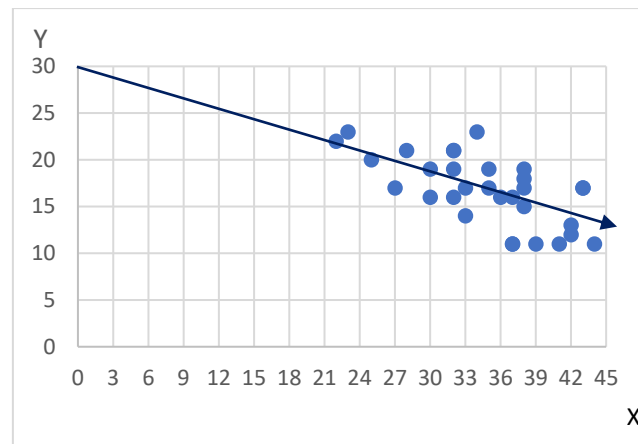

Figure 2. Linear graph of the correlation between physical office environment and symptoms of Covid-19 exposure

The relationship between employee' health protocol behavior and symptoms of exposure to Covid-19 was carried out using simple regression. The linear regression between employee' health protocol behavior and symptoms of Covid-19 exposure shown by the regression formula of $\hat{Y} = 32.152 – 0.306X_2$ was negative linear, meaning the better employee health protocols behavior, the smaller the exposure to Covid 19.

Table 2. Linear regression of ANAVA Y on X_1; $\hat{Y} = 32.152 – 0.306X_2$

Source of Variants	Degree of Freedom	Sum of Squares	Mean Square	F_{count}	$F_{table, \alpha\ 0.05}$
Total	30	407,419	13,581.63		
Regression	1	133,618	133,618	14.15	4.04
Residual	29	273,801	9,441.413		

The results show that the **F_{count}** 14.15 > **F_{table}** 4.04 at $\alpha = 0.05$. The figures indicated significant correlation between the employees' health protocol behavior and the symptoms of Covid-19 exposure.
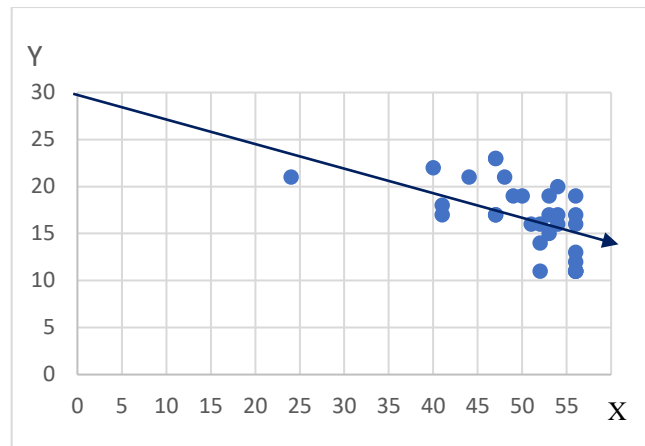
**Figure 3. Linear graph of the correlation between employees' health protocol behavior
and symptoms of Covid-19 exposure**

The correlation coefficient between the employees' health protocol behavior and symptoms of Covid-19 exposure (r_{yx}) was 0.573. R = r^2_{xy} = 0.33 meant that the correlation between X_2 and Y was 33%. This condition means that the influence of the health protocol implemented by employees on exposure to Covid 19 symptoms is 33%, if other factors are ignored.

This is in line of opinion that asymptomatic and mildly symptomatic individuals and heterogeneous symptom presentation, show that commonly used symptoms may not be sufficient criteria for evaluating COVID-19 infection. But, found that exposure both outside and within the household is a major risk factor for users testing positive and build a predictive model to identify likely COVID-positive users. Finally, found that even at the height of lockdowns throughout the United States, the majority of users were leaving their homes, and a large fraction were not engaging in social distancing or face protection (Allen et al. 2020).

The simultaneous correlation between the physical environment of the office and health protocol behavior with the symptoms of Covid-19 exposure. was shown with the formula of $\hat{Y}$ = 36.979 - 0.321X_1 + 0.181X_2. The result are shown in Table 3.

Table 3. The results of ANAVA test on
$\hat{Y}$ = 36.979 – 0.321X_1 – 0.181X_2 multiple regression model

Source of Variants	Degree of Freedom	Sum of Squares	Mean Square	F_{count}	$F_{table, \alpha\,0.05}$
Total	30	407,419	13,581.63		
Regression	2	216,762	108,381	15.92	4.04
Residual	28	190,657	6,809		

The results show that the F_{count} 15.92 > F_{table} 4.04 at α = 0.05. The figures indicated significant correlation between the physical environment of the office and health protocol behavior (simultaneous) with the symptoms of Covid-19 exposure. The multiple regression between the physical environment of the office and health protocol behavior (simultaneous) with symptoms of Covid-19 exposure shown by the formula $\hat{Y}$ = 36.979 – 0.321X_1 – 0.181X_2 was negative linear, meaning that the bigger X_1 and X_2, the smaller Y is. The correlation coefficient between the physical environment of the office and the employees' health protocol behavior (simultaneous) with symptoms of Covid-19 exposure (r_{yx}) was 0.729. The value of determinant R = 0.53 means that the correlation between X_1 + X_2 (simultaneous) and Y was 53%, while the remaining 47 % was influenced by other variables.

The research, it was found too that the determinant factor most related to the formation of compliance to COVID-19 preventive measures. based on the results of a systematic review, is preventive measures by the company, followed by employment status, psychological condition, effectiveness of preventive measures by the government, level of education, knowledge, perceived risk, and individual preventive measures. It can be concluded that the company (workplace) and employment status are the most dominant determinant in the formation of compliance to COVID-19 prevention measures. Therefore, companies play an important role in maintaining and increasing consistent compliance with health protocols, so it is necessary to prepare health promotion programs and monitor employee compliance to COVID-19 prevention measures (Wirasati and Kurniawidjaja 2022).

As in the research carried out Popa, the COVID-19 pandemic has resulted in the imposition of certain changes in the management of organizations and in the behavior and actions of employees. The pandemic effects felt by employees did not directly affect their mental and physical well-being. On the other hand, the COVID-19 pandemic effects felt by employees affected their general work performance. The findings of the study may provide a useful perspective for organizations and their employees in order to adopt the most effective measures to minimize the effects generated by the pandemic. That the COVID-19 pandemic imposes certain changes in the management of organizations. The impact of the pandemic on employees' well-being, as well as on their working performance, has become a key topic during this period. In such emergency situations as the COVID-19 pandemic, employees can react in different ways to stress. In this regard, it is also interesting to study whether health- and work-related stress factors can mediate the relationship between the effects of the pandemic on employees' health and mental well-being and on their working performance (Popa et al. 2022).

CONCLUSION

The hypothesis in this research is proven that there is a relationship between physical environmental determinants and symptoms of exposure to Covid-19; and there is a relationship between health protocol behavior and symptoms of Covid-19 exposure. The results showed significant correlation between the physical office environment and health protocol behavior with symptoms of Covid-19 exposure. The better the office environment and the better the health protocol behavior, the smaller the Covid-19 exposure. With these findings, it can be concluded that to minimize exposure to Covid-19, it is necessary to improve the physical office environment and health protocol behavior. The company (office work environment) is the most dominant determining factor in the formation of compliance behavior with COVID-19 prevention measures. Companies play an important role in maintaining and increasing consistent compliance with health protocols, so it is necessary to prepare health promotion programs and monitor compliance with established COVID-19 prevention measures. Further research is needed on other variables that might help reduce the symptoms of Covid-19 exposure, including concerns for protecting the environment, concerns for encouraging everyone to wear masks and so on.

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