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A Confirmation Factor Analysis of Public Compliance in Implementing Health Protocols Post Covid-19 Pandemic

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Abstract. *The COVID-19 pandemic severely impacted Indonesia, leading to substantial socio-economic disruptions and widespread social anxiety. In response, the government implemented a range of measures, including restrictions and mandatory health protocols, to control the virus. Although the pandemic is officially declared over, the risk of infection remains. Therefore, continued adherence to health protocols is essential. This study aimed to identify the key factors driving public compliance with health protocols in the post-pandemic period within Indonesia, providing valuable insights for policymakers to prevent future outbreaks. The findings revealed that knowledge emerged as the most significant determinant of community adherence to ongoing health protocol implementation. Consequently, the government must consistently emphasize the importance of adhering to health protocols whenever individuals are outside their homes.*

Keywords: *Pandemic, Socioeconomic, Anxiety, Restrictions*

1. INTRODUCTION

The COVID-19 pandemic, a global health crisis that emerged in 2020, had a profound and multifaceted impact on Indonesia. Starting in 2020, the Covid-19 pandemic has caused negative impacts in various sectors. In a study conducted by Susilawati et al., (2023) on the socio-economic impacts during the Covid-19 pandemic, it was shown that three factors influenced the economic impact and three factors that influenced the social impact. The three factors that explain the economic impact are income, quota and gadget purchase, and expenditure. The social impact factors are fear of interacting in public places, fear of doing activities outside the home, and fear of using public facilities.

Several efforts have been taken by the government to suppress the number of Covid-19 cases. Such efforts include limiting community social activities, implementing health protocols, and implementing massive Covid-19 vaccinations. Actions taken in limiting community social activities include maintaining distance, avoiding crowds, limiting travel, no activities outside the home, and limiting activities that cause crowds. Meanwhile, recommendations for implementing health protocols include: always wearing a mask and ensuring hands are clean. The magnitude of the government's efforts to prevent the spread of the Covid-19 virus is because the negative impact caused by the Covid-19 pandemic is very significant. These efforts were taken because Coronavirus disease commonly known

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as Covid-19 is an infectious disease caused by a virus called coronavirus which is included in the SARS-COV-2 type. Covid-19 is an infectious disease that occurs directly from person to person through droplets or water droplets that come out when people talk, cough, and sneeze (Martini et al., 2020).

Currently, the government declared that the handling of the Covid-19 pandemic is under control. The government allows people not to wear masks when doing activities outdoors or in open spaces that are not crowded with people, but the threat of being infected with the Covid-19 virus remains. So, it is important for the public to always comply with implementing health protocols.

Research on community compliance with the Covid-19 protocol has been conducted by Elia et al. (2022). The results show that information sources have a positive effect on attitudes and subjective norms toward preventive behavior. In addition, community compliance is more oriented toward the state and cannot regulate their behavior in complying with the Covid-19 protocol. Another study on compliance with the Covid-19 health protocol was conducted by Sari & Atiqoh (2020), which shows that there is a relationship between community knowledge and compliance with mask use. as an effort to prevent Covid-19 disease in Ngronggah.

Several factors can explain compliance, including knowledge, motivation, perception, and belief. These factors characterize the community in responding to preventive measures so that the Covid-19 pandemic does not spread again. Based on the description above, it is necessary to know the factors that influence community compliance in implementing health protocols after the Covid-19 pandemic, and what are the dominant factors that influence community compliance in implementing health protocols after the Covid-19 pandemic. This research is important to be conducted to provide input to the government to issue regulations to the community to prevent the re-emergence of the Covid-19 pandemic.

2. METHODS

The research location is Bali Province. The data source comes from primary sources taken using a questionnaire. The type of data obtained is data in quantitative and qualitative forms. Sampling in this study was carried out using purposive sampling, that is sampling with certain subjective considerations based on several characteristics/features possessed by the sample, which are considered closely related to previously known population characteristics/features (Slamet, 2006). The considerations used in selecting respondents in

this study were people who were willing to be interviewed. The number of samples taken was 202 respondents.

The variables used in this study are based on respondent characteristics and factors regarding compliance summarized in Table 1 below.

Table 1. Research Variables

Variable	Scale
A. Respondent Characteristics	
1. Age	Ratio
2. Gender	Nominal
3. Level of Education	Ordinal
4. Type of Job	Nominal
5. Use of Masks	Nominal
6. Implementation of Hand Washing	Nominal
7. Avoid Crowds	Nominal
Compliance Factors for Health Protocols	
B. Public Knowledge about Health Protocols	Ratio
C. Perception of Health Protocols	Ratio
D. Motivation to implement health protocols	Ratio
E. Confidence in implementing health protocols	Ratio

The data was obtained from respondents' answers to the questionnaire and then analyzed using statistical methods following the research objectives. All data analysis was performed with the help of the SPSS 23 software package. The data analysis steps used in this study are as follows:

a. Distributing questionnaires to 30 respondents.
b. Validate the questionnaire by calculating the Pearson correlation of each question item with its total score.
c. Conducting questionnaire reliability testing, by calculating the Cronbach's alpha value.
d. Describe data from all research variables by conducting descriptive statistics. Descriptive statistics is a method of how to collect and present data, so as to provide useful information (Walpole, 1995). Another definition is a statistic used to analyze data by describing or depicting the data that has been collected as it is without intending to make conclusions that apply to the public or generalization (Sugiyono, 2013).
e. Conducting association tests between categorical scale respondent characteristic variables with compliance variables for health protocols using the chi-square test, with the null hypothesis (H_0) is that there is no association between the two variables, while

the alternative hypothesis (H_1) is that there is an association of any kind. The test statistics using the following formula:

$$\chi^2_{test} = \sum_{i=1}^{I}\sum_{j=1}^{J}\frac{\left(n_{ij} - \hat{m}_{ij}\right)^2}{\hat{m}_{ij}} \quad (1)$$

with:

n_{ij} = frequency of observations in the i-th row, j-th column

$\hat{m}_{ij}$ = expected frequency in the i-th row, j-th column

The test statistics are then compared to χ^2 distribution with degrees of freedom $(I-1)(J-1)$ and risk of error α, and the rejection criterion is $\chi^2_{test} > \chi_{(\alpha,(I-1)(J-1))}$ (Kleinbaum & Klein, 2010).

f. Conduct factor analysis. Factor analysis is formed from variables grouped based on their correlation. That is, assume all variables in a particular group are highly correlated among themselves but have relatively small correlations with variables in different groups. Then it can be imagined that each group of variables represents one basic construct or so-called factor, which is responsible for the observed correlation (Johnson & Wichern, 2007). This study used confirmatory factor analysis, which is a factor analysis technique used to form a general factor based on existing theoretical foundations (Hair et al., 2019). The steps are as follows:

   1) find out whether all the data that has been taken is sufficient for factoring using Kaiser Olkin (KMO) value with the provision that the KMO value must be less than 0.05.
   2) value to test for correlation between variables using Bartlett's test with the provision that the significance value obtained must be less than 0.05.
   3) calculate the measure of sampling adequacy (MSA) value for each variable to find out which variables are suitable for use in factor analysis, with the provision that if the MSA value > 0.5 indicates that the variable can still be predicted and analyzed further, but if the MSA value < 0.5 then the variable cannot be analyzed and predicted further or must be removed.
   4) perform factor extraction to produce several factors from existing data using principal component analysis.

3. RESULTS AND DISCUSSION

Validation and Reliability Test of Questionnaire

The first step before the questionnaire is distributed to all respondents is to test the validity and reliability of the questionnaire on each dimension. Validity and reliability tests aim to reduce measurement errors. Validity tests are carried out on the first 30 sample data by looking at the Pearson correlation value while the reliability value is calculated using Cronbach's alpha value. The results of the validity and reliability tests on each dimension are shown in Table 2 below.

Table 2. Results of Questionnaire Validity and Reliability Tests

Dimensions	Variable	Correlation	Cronbach's Alpha
P1	P1.1	0.669	0.819
	P1.2	0.849	
	P1.3	0.810	
	P1.4	0.870	
P2	P2.1	0.437	0.747
	P2.2	0.891	
	P2.3	0.746	
	P2.4	0.858	
P3	P3.1	0.701	0.733
	P3.2	0.782	
	P3.3	0.659	
	P3.4	0.844	
P4	P4.1	0.310	0.704
	P4.2	0.822	
	P4.3	0.723	
	P4.4	0.920	

The results of the Pearson correlation analysis demonstrate that all indicators across all dimensions exhibit a correlation value exceeding 0.30, indicating adequate validity and accuracy in representing the intended constructs. Furthermore, the reliability test (Table 2) reveals Cronbach's Alpha values exceeding 0.6 for all dimensions, confirming the questionnaire's reliability and interpretability. Given these findings, the questionnaire is deemed suitable for distribution to all respondents.

Descriptive Research Data

Descriptive analysis was conducted to describe or illustrate respondent information. Respondent characteristics in this study include gender, education, age, and income. This study was conducted in Bali Province, with the number of respondents willing to answer completely as many as 202 respondents.

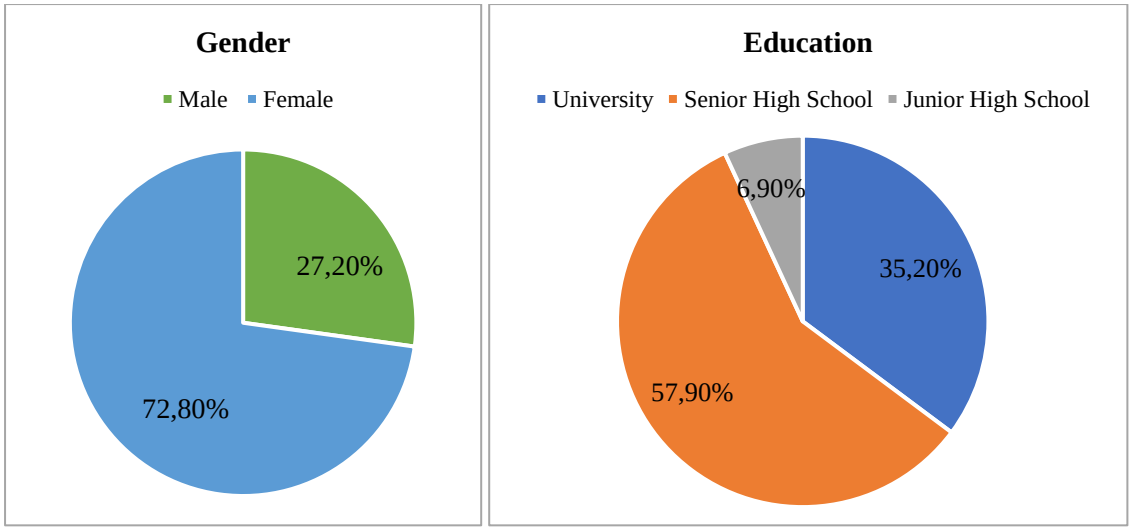

Figure 1. Descriptive Variables of Gender and Education Variables

Based on Figure 1, it can be seen that respondents are dominated by female respondents (78.2%) compared to male respondents, with the highest education being high school or equivalent (57.9%). Meanwhile, Table 3 shows that the average respondent is 24.65 years old, with an average income of 933 thousand rupiah per month. In the income data, the data range is very large, because the income gap of respondents who are mostly students and college students without income compared to working respondents who have the highest income is 10 million rupiah.

Table 3. Descriptive Variables of Age and Income

	Age	Income
N	202	202
Mean	24.65	933415.8416
Std. Deviation	10,963	1889703.63186
Minimum	14	0.00
Maximum	56	10000000.00

Descriptive information about how difficult it is for people to implement health protocols in their daily lives is summarized in Figures 2, 3, and 4.

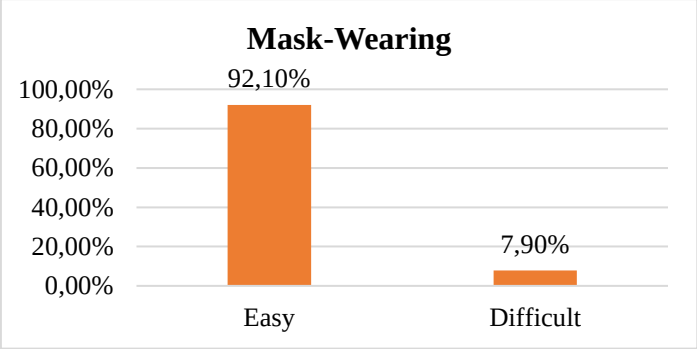

Figure 2. Bar chart of Mask Usage Variables

Respondents' answers when asked about how difficult it is to wear a mask when outside the home, 92.1 percent of respondents stated that it was not difficult to wear a mask (based on Figure 2). This shows that people are used to wearing masks when outside the home, so even though there is no obligation or mandatory mask rule, the use of masks is still carried out.

Figure 3. Bar chart of Hand Washing Variables

As illustrated in Figure 3, a substantial majority (95%) of respondents reported no difficulty in maintaining hand hygiene during outdoor activities. This finding reflects the successful integration of handwashing into daily routines following the widespread public health campaigns emphasizing its importance during the COVID-19 pandemic.

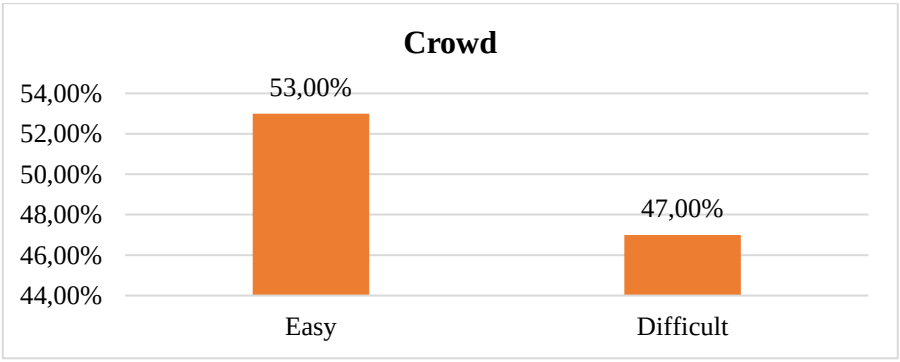

Figure 4. Bar chart of Crowd Variables

Regarding the difficulty of avoiding crowds, the responses were nearly evenly divided between those who found it difficult and those who did not (Figure 4). This suggests that a significant portion of the population still faces challenges in avoiding crowded situations.

Chi-Square Association Test

Next, an association test was conducted to determine whether there was an association between the gender and education of respondents with their opinions about the difficulty of implementing health protocols. The hypotheses tested were:

H_0: There is no association between respondents' gender and education and their opinions on the difficulty of implementing health protocols.

H_1: There is an association between respondents' gender and education and their opinions about the difficulty of implementing health protocols.

The statistic test used is the Chi-Square statistic, with the decision to reject H_0 if the Asymptotic Significance value (2-sided) is smaller than the 5% level. The results of the analysis can be seen in Table 4.

Table 4. Results of the Association Test of Gender and Education Versus Difficulty of Running Health Protocol

Variable Crosstab	Pearson Chi-Square	Asymptotic Significance (2-sided)	Decision
Gender vs Wearing a mask	2,394	0.122	Fail to reject H_0
Gender vs Hand washing	0.866	0.352	Fail to reject H_0
Gender vs. Crowding	1,499	0.221	Fail to reject H_0
Education vs Wearing a mask	0.993	0.609	Fail to reject H_0
Education vs Washing hands	1,387	0.500	Fail to reject H_0
Education vs Crowding	0.748	0.688	Fail to reject H_0

Table 4 reveals that all association tests resulted in a failure to reject the null hypothesis (H_0). This is evident from the Asymptotic Significance (2-sided) values exceeding the 0.05 significance level. The acceptance of H_0 indicates no significant association between gender and education of respondents and their perceived difficulty in implementing health protocols. Consequently, these findings suggest that neither gender nor education level significantly influences individuals' perceptions regarding the difficulty of adhering to health protocols.

Confirmatory Factor Analysis

a. Testing the Assumptions of Factor Analysis

Before conducting factor analysis, several assumptions must be met. first. This assumption test is carried out on each dimension because the factor analysis used is confirmatory. These assumptions are the first KMO Test (Kaiser Meyer Olkin). The KMO test is a test carried out on observation data to determine the feasibility of data with factor analysis. The KMO value based on Table 5 is overall > 0.5, meaning it meets the sufficient assessment for factor analysis. The KMO value for the dimensions of Knowledge (0.796), Perception (0.751), Motivation (0.751), and Belief (0.846) shows

a value greater than 0.5, so it is concluded that it has met the assumptions to continue to factor analysis.

The second assumption is the Bartlett Test which is a test to determine whether there is a relationship or correlation between research variables. It will be seen whether a correlation matrix is formed which is an identity matrix. If the correlation matrix is an identity matrix, then there is no correlation between research variables. Test hypothesis used:

H_0 : The correlation matrix is an identity matrix, so there is no correlation between variables

H_1 : The correlation matrix is not an identity matrix, so there is a correlation between variables

Table 5. Bartlett and KMO Test Output

Dimensions	Bartlett's Test of Sphericity		KMO Value
	Approx. Chi-Square	P-value	
Knowledge	400,008	0,000	0.796
Perception	336,653	0,000	0.751
Motivation	39,301	0,000	0.751
Belief	187,585	0,000	0.846

Based on Table 5, the obtained p-value for all dimensions in the Bartlett test is 0.000, which will be compared with the real level of 0.05. Because the p-value has a value smaller than 0.05, the decision is to reject H_0 which means there is a correlation between variables, so that all assumptions have been met to go to factor analysis.

The third assumption is the Measure of Sampling Adequacy (MSA). MSA has a size ranging from 0 to 1. If it is 1, then each variable is predicted perfectly without any errors. MSA value > 0,5, then the variable can still be predicted and further analysis can be carried out, if the MSA < 0.5, then the variable cannot be predicted and must be removed (Hair et al., 2019). Table 6 shows that the MSA value for all variables is greater than 0.5, so it meets the required assumptions, so factor analysis can be carried out.

b. Communality

Communality (h2) is used to see the variance of the indicator, a communality value of less than 0.5 cannot be used in the analysis because it does not have enough variance to explain the variable (Hair et al., 2019). Communality < 0.5, indicates that

the variance of the statement distributed to the formed factors is less than half. The h2 value characterizes the feasibility of the variable included in the formation of the factor structure.

Table 6. MSA Value, Eigen Value, and Communality

Dimensions	Variable	MSA	Eigen-values	% Cumulative Variance	Communality
Knowledge (P1)	P1.1	0.850	2/830	70,756	0.720
	P1.2	0.786	0.614		0.885
	P1.3	0.772	0.296		0.861
	P1.4	0.798	0.260		0.887
Perception (P2)	P2.1	0.812	2.605	65.133	0.583
	P2.2	0.749	0.783		0.882
	P2.3	0.784	0.363		0.841
	P2.4	0.708	0.248		0.884
Motivation (P3)	P3.1	0.757	2.251	56,270	0.555
	P3.2	0.726	0.682		0.826
	P3.3	0.733	0.525		0.724
	P3.4	0.682	0.736		0.858
Belief (P4)	P4.1	0.846	2.596	64,888	0.727
	P4.2	0.778	0.616		0.832
	P4.3	0.790	0.459		0.801
	P4.4	0.736	0.329		0.856

The communality values of all variables can be seen in Table 6. It can be seen that all variables have communality values of more than 0.5. It can be concluded that all variables have sufficient variance to explain the variables.

c. Factor Extraction

Factor extraction in this study uses the component analysis method by finding the eigenvalue of each variable in the dimension, then the variable that has an eigenvalue greater than 1 is considered significant as a factor. The eigenvalue and cumulative percentage in all dimensions can be seen in Table 6. The Knowledge dimension (P1) has one eigenvalue (2.830) greater than 1, this shows that Knowledge is indeed a factor of compliance, with a cumulative percentage of 70.750 percent. Likewise, the Perception (P2), Motivation (P3), and Belief (P4) dimensions have one eigenvalue greater than 1 with a cumulative percentage of 65.133%, 56.270%, and 64.888%, so that Perception (P2), Motivation (P3), and Belief (P4) are factors of compliance. Meanwhile, the dominant factor that explains community compliance to continue implementing health protocols is the Knowledge factor, because it has the largest cumulative percentage.

4. CONCLUSION

a. The sample predominantly comprised women (78.2%), with the highest educational attainment observed among individuals with a high school diploma or equivalent (57.9%). The average age of respondents was 24.65 years, and their average monthly income was 933 thousand rupiah. A majority (over 90%) reported no difficulty in wearing masks or washing hands, while 47% perceived difficulties in avoiding crowded situations.

b. Chi-Square tests revealed no significant association between gender and education level and the perceived difficulty of implementing health protocols post-pandemic.

c. The factors identified as influencing public compliance with continued health protocols post-pandemic were Knowledge, Perception, Motivation, and Belief, explaining 70.750%, 65.133%, 56.270%, and 64.888% of the variance, respectively.

d. The dominant factor that explains community compliance in continuing to implement health protocols is the knowledge factor.

SUGGESTIONS

1. The government must continuously emphasize the significance of adhering to health protocols whenever individuals are outside their homes.
2. Maintaining a consistent flow of information regarding the implementation of health protocols for activities outside the home is crucial for public awareness and adherence.

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