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Analysis of Concern Level of Health and Feeling When Doing Outdoor Activities During COVID-19 Pandemic Using Chi-Square Method

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Abstract*: The corona virus has had a major impact on Indonesia in various ways. To reduce the impact of corona pandemic, the government has issued several health protocol policies to slow the increase in the number of patients. However, the number of new cases in Indonesia continues to grow to thousands every day. Based on the chi-square analysis and the association test, there is a relationship between the level of concern for health and feelings when doing activities outdoor with gender. Female respondents tend to worry about their health and when doing activities outside the home. Respondents who are not worried to their health and when doing activities outdoor tend no applying health protocols.*

Keywords—COVID-19, pandemic, chi-square, health, protocol, association**.**

1. INTRODUCTION

The world was shocked by the emergence of the Corona virus (COVID-19). COVID-19 caused almost every sectors in the country to collapse. Since the corona virus case was identified on December 2019, the outbreak that caused COVID-19 has not ended. This is indicated by a number of countries that still report a surge in positive cases of contracting the corona virus, although some of them claim there is a slowdown in additional cases. The World Health Organization (WHO) also asks people to apply physical distance and stay at home as much as possible if there is an urgent matter.

The COVID-19 outbreak can indeed cause concern for most people. Worry coupled with feeling bored lead to stress for some people. One of the criteria for stress during COVID-19 is feeling afraid and anxious about the health matters.

New cases of COVID-19 in Indonesia increase day by day. From the first cases detected on March 2, 2020 until November 25, 2020, there have been 511,836 patients who have been confirmed positive for COVID-19 [1]. In a pandemic situation like this, what can be done as a good society is to always comply with the health protocol set by the Ministry of Health of the Republic of Indonesia in the Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07 / MENKES / 382/2020, namely: staying at home, washing hands, wear a mask, and maintain social distance from other people when in public places. Due to new regulations drafted by the government, people are required to stay at home to prevent the formation of a new COVID-19 cluster, however, some parties are forced to move outside their homes to earn a living. But there are also some people who leave the house without urgent need. For example, just for playing, gathering, or other activities that involve many people in one place. Other activities that involve many people - and are still being debated - such as offline elections, recitation events, and weddings are also allowed to be carried out even though they can be very risky to health.

Researchers want to find out whether the aforementioned parties still care about their health and how they feel if they are outside the home in the midst of a pandemic. With the explanation above, we want to analyze the level of concern about personal health and the condition of feelings when leaving the house during the COVID-19 pandemic using the chi-square test analysis.

2. THERORICIAL BASIS

2.1 COVID-19

COVID-19 is a disease caused by the corona virus. This name is given by WHO (World Health Organization) as the official name of this disease. COVID-19 itself stands for Corona Virus Disease-2019[6].COVID-19 is a disease caused by the corona virus which attacks the respiratory tract, causing high fever, cough, flu, shortness of breath and sore throat [2].

The transmission of COVID-19 has made the world restless, including in Indonesia. COVID-19 is a new type of virus so that many parties do not know and do not understand how to deal with the virus [3].

With the outbreak of the Corona or COVID-19 virus in various countries, the Government of the Republic of Indonesia issued a health protocol. The protocol will be implemented throughout Indonesia by the government, guided centrally by the Ministry of Health.

As with the above protocol, conclusions can be drawn regarding the response and prevention of COVID-19 in general, which are correct as follows [4]: Wash your hands frequently, interact less with other people, healthy lifestyle (eating, sleeping, exercise) for body immunity, maintain a safe distance (1 meter) from people who are coughing / sneezing, avoid crowds, avoid touching eyes, nose and mouth, avoid traveling to infected areas or when you are sick, cough and sneeze etiquette, avoid spitting in public places, handle raw meat with care, avoid eating meat of sick / sick animals.

2.2 Level of Concern

According to KBBI, worry is the equivalent of the words fear, anxiety, worry about something that is not yet known for sure. When an individual considers that the information he discloses has a bad impact, there will be concerns. According to references [5], worry is a series of thoughts and images that produce negative feelings. Referring to this definition, in this study concerns are assumed to arise because of the current pandemic situation. With various media reporting about the continuing increase in positive confirmation cases and deaths due to COVID-19, people are becoming worried about the health conditions of themselves and their families. Because the public does not know for sure whether the people who have interacted with him are infected with COVID-19 or not. The public has also become more careful when they have to leave the house to avoid physical contact with unknown people who could be infected with the COVID-19 virus.

2.3 Categorical Data Analysis

In categorical data analysis, the response variables used are categorical data, while the explanatory variables can be continuous or categorical data.

Categorical variables are widespread in social science to measure attitudes and opinions, with categories such as (agree, disagree), (yes, no), and (support, oppose, doubt). This variable also appears frequently in health science, to measure responses such as whether medical treatment was successful (yes, no),

When a categorical variable has more than two categories, we differentiate between the two types of categorical scales. Categorical variables that have an irregular scale are called nominal variables. Examples are religious affiliation (category Christian, Jewish, Muslim, Buddhist, Hindu, none, others), main modes of transportation for work (car, bicycle, bus, subway, walking), and favorite types of music (classical, country , folk jazz, pop, rock).

Variables that have naturally ordered categories are called ordinal variables. Examples are perceived happiness (not very happy, quite happy, very happy), frequency of feeling anxious (never, once in a while, often, always), and painful headaches (none, mild, moderate, severe).

2.4 Two Ways Contingency Table

Contingency tables are data compilation techniques to see the relationship between variables in one table. Contingency table with row b and column k is known as bxk contingency table. The total rows and columns in the table are called marginal frequencies.

Table 1: bxk Contingency Table

		Second Variable				Sum
		1	2	…	*K*	
First Variable	1	n_{11}	n_{12}	…	n_{1k}	$n_{1\square}$
	2	n_{21}	n_{22}	…	n_{2k}	$n_{2\square}$
	⋮	⋮	⋮	⋱	⋮	⋮
	b	n_{b1}	n_{b2}	…	n_{bk}	$n_{b\square}$
Sum		$n_{\square 1}$	$n_{\square 2}$	…	$n_{\square k}$	$n_{\square\square}$

To test the independence / independence hypothesis of the two classification / category variables the hypothesis used are:

H_0: The two variables are independent (independent)

H_1: The two variables are not independent (dependent)

or

H_0: The first variable does not depend on the second variable

H_1: The first variable depends on the second variable

Pearson chi-square test statistics that apply to contingency tables containing i row and j column are defined as follows [6-7] :

Test Statistic(1)

$$\chi^2 = \sum_{i=1}^{b}\sum_{j=1}^{k}\frac{(n_{ij}-e_{ij})^2}{e_{ij}} \sim \chi^2(v); \quad v=(b-1)(k-1) \tag{1}$$

n_{ij} = Observation frequency in row i and column j.

e_{ij} = The frequency of expectations / expectations in row i and column j.

$$e_{ij} = \frac{n_{i\square}\, n_{\square j}}{n_{\square\square}} \tag{2}$$

Test Statistic(2)

$$\chi^2 = n\left(\frac{1}{n_{1\square}}\sum_{j=1}^{k}\frac{n_{1j}^2}{n_{\square j}} + \frac{1}{n_{2\square}}\sum_{j=1}^{k}\frac{n_{2j}^2}{n_{\square j}} + \ldots \frac{1}{n_{b\square}}\sum_{j=1}^{k}\frac{n_{bj}^2}{n_{\square j}} - 1\right) \tag{3}$$

With the critical area is reject H_0 if $\chi^2 > \chi^2_{\alpha;v}$; $v=(b-1)(k-1)$

2.5 Size of Association in Contingency Table

Odds ratio can be defined as the ratio of 2 odds. Odds ratio is a measure that shows the ratio of the chances of an event occurring with the odds of not occurring. Mathematically, the odds ratio in the population that applies to the 2 x 2 contingency table is defines as follows [7] :

$$Odd\ ratio = \theta = \frac{\pi_{11}\pi_{22}}{\pi_{12}\pi_{21}} \quad (4)$$

Odds ratios can also be used to describe conditional relationships or associations in 3-way contingency tables. For 2 x 2 x K contingency tables, odds ratios can be calculated on each K contingency table partially because each partial contingency table has a size of 2 x 2.

2.6 Validity and Reliability Test

The validity test is used to measure the accuracy of the questions on the questionnaire items with existing research problems. Validity tests were mostly carried out in conjunction with each questionnaire question.

The method used to test the validity of the questionnaire is to correlation value, which is to correlate the scores between the questions, each of which has ordinal data (Spearman). Tests were carried out using SPSS. Given that the questionnaire in the form of a Likert scale produces ordinal data, the validity test is carried out using the Spearman Rank correlation statistical approach (Spearman Rho) for each question item with the following formula in equation (5) below [8].

$$\rho = \frac{6\sum D^2}{n(n^2-1)} \quad (5)$$

ρ : Spearman Rank Corellation Coefficient

D : difference between variables

n : Number of Samples

Testing is done by correlating the item score of each question item with the total score, then the interpretation of the resulting correlation coefficient. If the correlation of each of these factors has a p-value less than alpha (5%), it can be said that the questionnaire questions are valid [9].

Reliability is a term used to indicate the extent to which a measurement result is relatively consistent if the measurement is repeated two or more times [9]. A measuring instrument that is reliable is if it produces the same results even though it is measured many times. If the standard deviation of the measurement results is relatively small, then the measuring instrument is said to be reliable. Conversely, if the standard deviation of the measurement results is relatively large, the measuring instrument is said to be unreliable.

Reliability testing can use the Cronbach Alfa method. This method has the advantage that it can be used if the answers are more than 1 and the number of questionnaire questions is the same [10]. The formula for the Cronbach Alpha reliability coefficient can be seen in equation (6) below.

$$r_i = \frac{k}{(k-1)}\left\{1 - \frac{\sum s_i^2}{s_t^2}\right\} \quad (6)$$

Where,

r_i is the Cronbach Alpha reliability coefficient
K is the number of item questions
$\sum s_i^2$ is the sum of the variance in the score of each item
s_t^2 is the total variance
The results of the formula in equation (6) are then interpreted with the coefficient reliability level can be seen in **Table 2**

Table 2: Interpretation Table for Cronbach Alpha Reliability Coefficient

No	r Coefficient	Reliability
1	0,800-1,000	Excellent
2	0,600-0,799	Good
3	0,400-0,599	Acceptable
4	0,200-0,399	Questionable
5	0,000-0,199	Poor

3. RESULT AND ANALYSIS

The data used came from 234 respondents through a questionnaire with a non-probability sampling technique. The involved variables in this research are gender, level of concern about health, feelings when doing outdoor activities, and application of health protocols.

3.1 VALIDITY AND RELIABILITY TEST FOR QUESTIONNAIRE

In the validity test, the components of the questionnaire were analyzed using the Spearman test because the data scale used was an ordinal scale. If the p-value to total is greater than alpha (significance level) of 5%. Then the question component is not valid to be used as a question component in the questionnaire. The following is a table of validity test results:

Table 3: Validity Test Results

Question	P-Value	Result
A1	0,000	Valid
A2	0,000	Valid
A3	0,000	Valid
B1	0,000	Valid
B2	0,000	Valid
B3	0,000	Valid
B4	0,000	Valid
B5	0,000	Valid
C1	0,000	Valid
C2	0,000	Valid
C3	0,000	Valid
C4	0,000	Valid

Way to measure the reliability of the questionnaire items is to use Cronbach's Alfa value (Mardianto, 2019). The following is a table of reliability test results:

Table 4: Reliability Test Results

	Cronbach Alpha Value	Result
Health Concern Questions	0,852	Reliable
Feeling When doing Outdoor Activities	0,891	Reliable
Application of Health Protocols Question	0.714	Reliable

Based on the results above, the Cronbach's Alfa value for data on the variable health concern and feeling when doing ourdoor activities resulting the Cronbach's Alfa value between 0.8 - 1.0, which means that the data in each variable has excellent reliability, while the variable application of health protocols has a Cronbach's Alfa value between 0.6 - 0.8 which means that the data in each variable good reliability.

3.2 DESCRIPTIVE STATISTICS

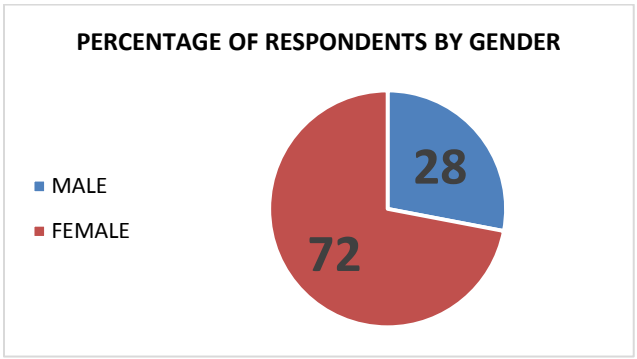

Fig. 1**: Percentage of Respondents by Gender**

Based on **Fig. 1**, the percentage of female respondents in this study was 72% or as many as 168 respondents were female. Meanwhile, the percentage of male respondents in this study was 28% or as many as 66 male respondents.

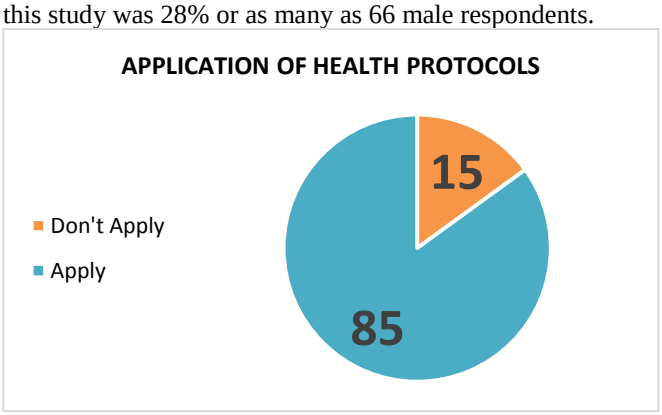

Fig. 2: Application of Health Protocols

Based on **Fig. 2**, the percentage of respondents who always apply health protocols is as many as 85% or as many as 200 people. Meanwhile, 34 respondents did not apply health protocols.

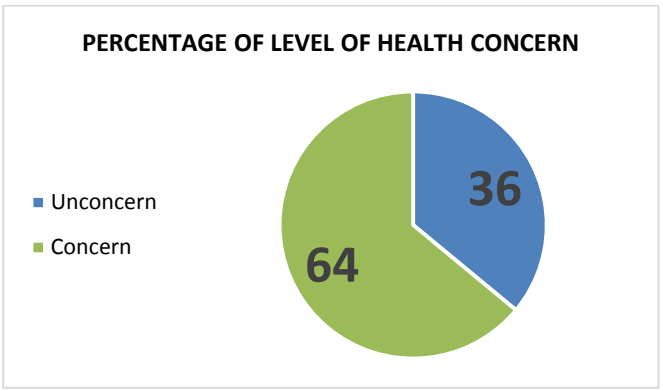

Fig. 3: Percentage of Level of Health Concern

Based on **Fig. 3**, 64% of respondents are worried about their health in the era of the COVID-19 pandemic and the remaining 36% of respondents are not worried.

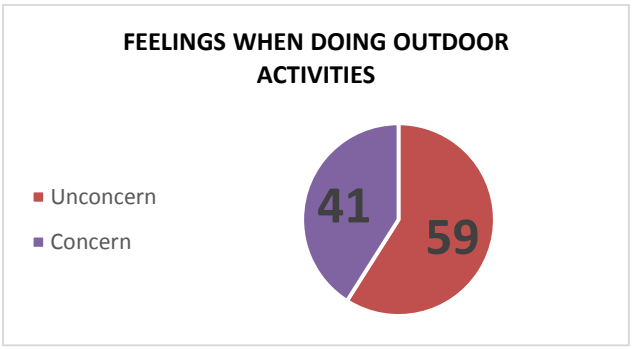

Fig. 4**: Percentage of Level of Health Concern**

Based on **Fig. 4**, more than half of the respondents were not worried when they came out of the COVID-19 pandemic era (59%), and 41% of respondents felt worried when leaving their homes in the era of the COVID-19 pandemic.

3.3 CHI-SQUARE INDEPENDENCE ANALYSIS

Level of Health Concern and Gender

Table 5: Contingency Table for Level of Health Concern and Gender

Level	**Gender**		**Total**
	Female	***Male***	
Unconcern	47	37	**84**
Concern	121	29	**150**
Total	**168**	**66**	**234**

Hypothesis :

H_0: There is no relationship between the level of health health and gender during the COVID-19 pandemic.

H_1: There is a relationship between the level of health concern and gender during the COVID-19 pandemic.

By using $\alpha = 5\%$, the critical area is reject H_0 if $\chi^2 > \chi^2_{\alpha,2}(3{,}8415)$

The Chi-Square value is :

$$\chi^2 = \frac{(47-60{,}31)^2}{60{,}31} + \frac{(37-23{,}69)^2}{23{,}69} + \frac{(121-107{,}69)^2}{107{,}69} + \frac{(29-42{,}31)^2}{42{,}31} = 16{,}242$$

from the calculation, the chi-square value meets the critical area therefore H_0 is rejected, thus, there is a relationship between the level of personal health education and gender during the COVID-19 pandemic.

Feelings when doing an Outdoor Activities and Gender

Table 6: Contingency Table for Feelings when doing an Outdoor Activities and Gender

Level	**Gender**		**Total**
	Female	***Male***	
Unconcern	88	50	**138**
Concern	80	16	**96**
Total	**168**	**66**	**234**

Hypothesis :

H_0: There is no relationship between feelings when doing an outdoor activities and gender during the COVID-19 pandemic.

H_1: There is a relationship between the feelings when doing an outdoor activities and gender during the COVID-19 pandemic.

By using $\alpha = 5\%$, the critical area is reject H_0 if $\chi^2 > \chi^2_{\alpha,2}(3{,}8415)$

The Chi-Square value is :

$$\chi^2 = \frac{(88-99{,}08)^2}{99{,}08} + \frac{(50-38{,}92)^2}{38{,}92} + \frac{(80-68{,}92)^2}{68{,}92} + \frac{(16-27{,}08)^2}{27{,}08} = 10{,}702$$

from the calculation, the chi-square value meets the critical area therefore H_0 is rejected, thus, there is a relationship between the feelings when doing an outdoor activities and gender during the COVID-19 pandemic.

Level of Health Concern and Application of Health Protocols

Table 7: Contingency Table for Level of Health Concern and Application of Health Protocols

Level	**Application of Health Protocols**		**Total**
	Don't Apply	***Apply***	
Unconcern	30	54	**84**
Concern	4	146	**150**
Total	**34**	**200**	**234**

Hypothesis :

H_0: There is no relationship between the level of personal health education and application of health protocols during the COVID-19 pandemic.

H_1: There is a relationship between the level of personal health education and application of health protocols during the COVID-19 pandemic.

By using $\alpha = 5\%$, the critical area is reject H_0 if $\chi^2 > \chi^2_{\alpha,2}(3{,}8415)$

The Chi-Square value is :

$$\chi^2 = \frac{(30-12{,}21)^2}{12{,}21} + \frac{(54-71{,}79)^2}{71{,}79} + \frac{(4-21{,}97)^2}{21{,}97} + \frac{(146-128{,}21)^2}{128{,}21} = 47{,}354$$

from the calculation, the chi-square value meets the critical area therefore H_0 is rejected, thus, there is a relationship between the level of personal health education and application of health protocols during the COVID-19 pandemic.

Feelings when doing an Outdoor Activities and Application of Health Protocols

Table 8: Contingency Table for Feelings when doing an Outdoor Activities and Application of Health Protocols

Level	**Application of Health Protocols**		**Total**
	Don't Apply	***Apply***	
Unconcern	31	107	**138**
Concern	3	93	**96**

Level	Application of Health Protocols		Total
	Don't Apply	*Apply*	
Total	**34**	**200**	**234**

Hypothesis :

H_0: There is no relationship between feelings when doing an outdoor activities and application of health protocols during the COVID-19 pandemic.

H_1: There is a relationship between feelings when doing an outdoor activities and application of health protocols during the COVID-19 pandemic.

By using $\alpha = 5\%$, the critical area is reject H_0 if $\chi^2 > \chi^2_{\alpha,2}(3{,}8415)$

The Chi-Square value is :

$$\chi^2 = \frac{(31-20{,}05)^2}{20{,}05} + \frac{(107-117{,}95)^2}{117{,}95} + \frac{(3-13{,}95)^2}{82{,}05} + \frac{(93-82{,}05)^2}{82{,}05} = 17{,}050$$

from the calculation, the chi-square value meets the critical area therefore H_0 is rejected, thus, there is a relationship between the feelings when doing an outdoor activities and application of health protocols during the COVID-19 pandemic.

3.4 ASSOCIATION TEST

The **Table 6** below is the result of the odds ratio value. these results can inform the magnitude of the influence of the independent variables.

Table 9: Odds Ratio Tabel Results

	Odd Ratio
Level of Health Concern and Gender	0.304
Feelings when doing an Outdoor Activities and Gender	0.352
Level of Health Concern and Application of Health Protocols	20.278
Feelings when doing an Outdoor Activities and Application of Health Protocols	8.981

Result for level of health concern and gender above, an odd ratio value was obtained of 0.304, which means that respondents who were not worried about their health during the COVID-19 pandemic and were female had a tendency of 0.304 times than those who were worried about their health during the COVID-19 pandemic. The odds ratio is 0.304 less than 1, which means that female respondents who are not worried about their health have a smaller chance than those who are worried about their health

Result for feelings when doing an outdoor activities and gender above, an odd ratio value is obtained of 0.352, which means that respondents who were not worried when leaving the house during the COVID-19 pandemic and were female had a tendency of 0.352 times than those who were concerned when leaving the house during the COVID-19 pandemic. The odds ratio is 0.352 less than 1, which means that female respondents who are not worried when leaving the house have a smaller chance than those who are concerned when leaving the house.

Result for level of health concern and application of health protocols above, that the odd ratio value is 20,274, which means that respondents who were not worried about their health and did not apply health protocols during the COVID-19 pandemic had a tendency of 20,274 times more than those who were worried about their health but applied health protocols during the COVID-19 pandemic. The odds ratio is 20.278 more than 1, which means that respondents who do not feel worried about their health are more likely to not apply health protocols than respondents who are worried.

Result for the feelings when doing an outdoor activities and application of health protocols above, that the odd ratio value is 8.981, which means that respondents who were not worried when leaving the house and did not apply health protocols during the COVID-19 pandemic had a tendency of 8.981 times more than those who were worried about their health but applied health protocols during the COVID-19 pandemic. The odds ratio is 8.981 more than 1, which means that respondents who are not worried when leaving the house have a greater chance of not applying health protocols than those who are worried when leaving the house

4. CONCLUSION

From the Chi-Square analysist, the hypothesis results show that there is a relationship between the level of concern for personal health and the condition of feelings with gender. In the association analysis, it was concluded that: Respondents who are female tend to worry about their health in the era of the COVID-19 pandemic, respondents who are female tend to worry when leaving the house during the COVID-19 pandemic era, respondents who are not worried about their health tend not to apply health protocols in the era of the COVID-19 pandemic, respondents who were not worried when leaving the house were less likely to follow health protocols during the COVID-19 pandemic.

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