Prevention Strategy for Covid-19 by Healthy Mobility

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Abstract. Covid-19 become the third major respiratory disease outbreak related to the coronavirus. Globally, there were 177.108.695 confirmed cases with 3.840.223 deaths (CFR 2.1%). The number of positive cases Covid-19 continue to grow and needs the right action to stop the spread of the virus. The purpose of this study was to determine the Covid-19 prevention strategy by healthy mobility. This study used an analytic reseach with a cross sectional design. The population of this study was all people aged >18 years in Medan City with a sample of 395 respondents was obtained. The instrument of this research was google form. The instrument of this research was google form. There were 93.7% of people whose not good at avoiding crowded places whereas 51.9% of people with high mobility. The results of Simple Linear Regression Test showed that there was a moderate relationship between mobility and positive cases of Covid-19 (r = 0.300) with a negative pattern. This means that if people's mobility is reduced, the cases exposed to Covid-19 will be decreased. The result of this study indicates the prevention strategy by Healthy Mobility is a promising strategy and useful for stalling the spread of Covid-19.

Keywords: covid-19, prevention strategy, healthy mobility

1. Introduction
Covid-19 become the third major respiratory disease outbreak in twenty years related to the coronavirus, which has hit the entire world severely [1]. The World Health Organization (WHO) declared an international emergency on 30 January 2020 followed by a pandemic declaration on 11 March 2020 [2]. The virus had infected 177.108.695 people worldwide with 3.840.223 deaths (CFR 2.1%) on June 18, 2021 [3]. Data from the Indonesia Ministry of Health on June 20, 2021 showed there were 1.989.909 confirmed cases, 1.792.528 cases recovered and 54.662 have died [4].

Respiratory droplets produced when a person is infected with sneezing or coughing are the main cause of the spread of Covid-19. These droplets can land on the mouth or nose of people nearby and can even be inhaled into the lungs [5]. Transmission of the coronavirus disease (SARS-CoV2) in the human body causes symptoms of pneumonia and flu like symptoms in general. Some clinical symptoms of Covid-19 are fatigue, high temperature, dry cough, loss of smell or taste and difficulty breathing [6]. However, unlike influenza, the coronavirus can develop rapidly, resulting more severe infections, organ failure, and death. This emergency
condition especially occurs in patients with previous health problems. This makes Covid-19 so dangerous [7], [8].

Several preventive action by the community that have been taken to suppress the number of cases are the widespread of vaccines, social distancing, washing hands and wearing masks [9] but do not exempt the danger of being in a crowd. The Whole Genome Sequencing (WGS) results from National Institute of Health Research and Development (Balitbangkes) defined a spike of Covid-19 cases in Kudus, Central Java after the Eid holiday. The Delta variant of the coronaviros (B.1.617) has been found 28 from 34 people or about 82% [10]. This Delta variant has been spread so quickly because of human-to-human transmission [11]. This has been proven in India and Kudus where the main factor caused the spike of Covid-19 was massive social interactions and violations of health protocol [10], [12]. This also exacerbated by the presence of new virus variants that spread more quickly. The higher of social interaction will increase of the chance of a spike in Covid-19 and lack of discipline in implementing health protocols will increase the transmission of the virus.

Maintaining social distance has been effective in reducing the spread of infectious diseases. This is evidenced by the prevention strategy of distance keeping in the incidence of influenza H1N1 and Ebola 2009. With the same transmission as Covid-19, maintaining social distance is also a strategy echoed by government to suppress the transmission by reducing the frequency of close contact between individuals [13]. Several studies indicate that high mobility will increase the number of people infected with Covid-19 [9], [14], [15].

In this era of new habits, community mobility is high enough to increase the risk of transmission which can cause a continuous domino effect. Therefore, appropriate efforts are needed to suppress the spread of the virus. Several reasons from the respondents are leaving their house for work or other activities, traveling, visiting public service places (banks, government offices and markets), visiting places of worship/plazas/shopping places, frequently going in and out of city and returning to hometown during the holidays. This study aims to determine the Covid-19 prevention strategy by healthy mobility.

2. Methodology
2.1 Subjects
The location of this research was carried out in Medan city on June 2021. North Sumatera become the 13th province with the highest cases of Covid-19 and Medan City become the highest contributor. On June 20, 2021, 17,384 positive cases of Covid-19 were found, with 621 people were died in Medan City [16]. From this result, the CFR of Covid-19 was 3.57%.

The population of this study were all the citizen who live in Medan during the pandemic of Covid-19 and being aged >18 years old. Sample in the study was carried out by stratified random sampling, a sample of 395 respondents was obtained. Thus, a self-administred structured questionnaire was used to collect the data and distributed via google form as the instrument of the research. All the citizens who agreed to participate in this study were included. The process of sampling was performed in “Fig. 1 “ below.

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Define the population target : People in Medan City

Sample frame selection : people aged >18 years old who stayed in Medan City during pandemic Covid-19

Sample technique selection : A stratified random sampling was used based on the city districts (There are 20 districts with number of sample was 395 people) Data was collected by using self-administred questionnaire and distributed via Google form
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**Fig 1.** Sampling Process steps
The questionnaire included characteristics of respondents based on occupation and the frequency of preventive practice (social distancing, washing hands, wearing mask, stay at home, physical activity, avoiding crowd, experiencing Covid-19, and mobility of respondent). All the item of questionnaire was written simple and short. Before drafting the questionnaire, it was subjected to a validity and reliability test and questionnaire was verified as the instrument of this study. The item-level content validity index value for all of the items were > 0.60. The result of Cronbach alpha value of each item’s variances and the total variance obtained was $\alpha = 0.71$, which reflected an adequate consistency. The item-level content validity index value for all of the items were > 0.60.

2.2 Statistic Analysis
The type of research conducted in this study is an analytic survey with a cross-sectional design. The analytical method used was univariate analysis to see the characteristics of each variable with a frequency distribution table. Bivariate analysis to explain the relationship between the independent variable and the dependent variable using the Fisher Exact Test. Multivariate analysis used a simple regression test to see which independent variables are most related to the incidence of Covid-19. From this analysis, a strategy for preventing Covid-19 will be determined. The statistical significance level was set at $p = value < 0.05$.

3. Result And Discussion
The cumulative number of positive Covid-19 in North Sumatra jumped sharply starting from June 2020. This case increased twice, drastically from June to July 25, 2020, from a total of 1,551 people to 3,371 people. At the beginning of the spread of the coronavirus on March 31, the number of people exposed in North Sumatra was still 26 people. This positive number of Covid-19 increased at the end of April to 117 people, and increased again to 409 positive people at the end of May 2020. The results of study on 395 residents in Medan City, showed there were 35 residents had experience suffer from Covid-19, with the biggest risk factor being high mobility, namely 205 people (52%).

Efforts to break the chain of the spread of Covid-19 will not be implemented as long as our public awareness is still low [17] [18]. It is still trivial for people to apply health protocols even though they already know many victims have fallen due to the coronavirus attack, one of which is the high mobility of people who do not pay attention to health protocols.

3.1 Univariate Analysis

Based on “Fig. 2”, the majority occupations were students 46.84%, employee 24.30% and lecturer 16.96%. This varied occupations of the respondents enable a fairly high level of mobility where doing their work. The place
and type of work will faces different risks exposure to Covid-19 [19]. Several studies reported many cases of Covid-19 occur in workers who did not worked from home and have to go to the office. Doing work outside the home will increased the potential of social gathering with other people. This conditions could be increased the anxiety of being exposed by Covid-19 [20], [21]. Previous study found that health care worker such us doctor, nurses, staff of hospital and other have a highest risk exposure to the virus because their work related to patients of Covid-19 [22].

| No. | Variable                             | n  | %    |
|-----|--------------------------------------|----|------|
| 1.  | Social distancing                    |    |      |
|     | Good                                 | 306| 77.5 |
|     | Not good                             | 89 | 22.5 |
| 2.  | Washing hands                        |    |      |
|     | Good                                 | 349| 88.4 |
|     | Not good                             | 46 | 11.6 |
| 3.  | Wearing masks                        |    |      |
|     | Good                                 | 365| 94.4 |
|     | Not good                             | 30 | 7.6  |
| 4.  | Stay at home                         |    |      |
|     | Good                                 | 365| 92.4 |
|     | Not good                             | 30 | 7.6  |
| 5.  | Physical activity                    |    |      |
|     | Good                                 | 208| 52.7 |
|     | Not good                             | 187| 47.3 |
| 6.  | Avoiding crowd                       |    |      |
|     | Good                                 | 25 | 6.3  |
|     | Not good                             | 270| 93.7 |
| 7.  | Experiencing Covid-19 Diseas         |    |      |
|     | No                                   | 360| 91.1 |
|     | Yes                                  | 35 | 8.9  |
| 8.  | Mobility                             |    |      |
|     | High                                 | 205| 51.9 |
|     | Low                                  | 190| 48.1 |
|     | Total                                | 395| 100.0|

Based on “Table I”, most of the respondents have good social distancing (77.5%), wash their hands well (88.4%), wear masks well (88.4%), stay at home well (92.4%), and doing physical activity well (52.7%). But almost all respondents could not avoid crowded (93.7%) with high mobility (51.9%). Although most people have high mobility, they still have efforts to protect themselves from the spread of the virus. They used masks, washing hands, doing physical activities, and staying at home. Nevertheless, the level of exposure to Covid-19 is still high. From this study, one of the problems with the spread of the virus occurs because people very difficult to avoid crowds when they have to leave their homes and carry out daily activities such as work. This condition will increase the potential risk of Covid-19 spread in the community of Medan city. Previous studies predicted the human mobility with positive cases of Covid-19 by epidemic model. The found linear association, the effect of social restrictions through "city lockdown" and "decreased mobility of the population" in containing the spread of COVID-19. The estimated rate of increase is 4.46 times if the application of mobility restraint is not implemented [14], [23].

Even though people try to keep their distance, the high mobility and population density still have a high possibility to experience social contact with other people. This happens when people go out from home to the market, work, visiting relatives and others.
3.2 Bivariate Analysis
The relationship of mobility and experience of Covid-19 was analyzed with Fisher’s Exact Test. The results is displayed in “Table 2”.

| Variable | Exposure to Covid-19 | Total | p-value |
|----------|----------------------|-------|---------|
|          | No       | Yes    | n       | %      | n       | %      |         |
| Mobility | n         | %      | n       | %      | n       | %      |         |
| High     | 17        | 82.9   | 3       | 17.1   | 205     | 100.0  | 0.00     |
| Low      | 19        | 100.0  | 0       | 0.0    | 190     | 100.0  | 0.00     |

Table 2. The Number of Healthcare Workers In Royal Prima Medan Hospital

Based on the bivariate analysis table above, it is known that of the 205 respondents who carried out high activities the majority did not experience Covid-19 of 170 people (82.9%), and the minority experienced Covid-19 disease of 35 people (17.1%), while from 190 respondents with low mobility did not experience covid-19 of 190 people (100%), and minorities did not experience covid-19 as many as 0 (0.0%). Furthermore, the analysis using the Fisher’s Exact Test showed that there was a significant relationship between the mobility of respondents and Covid-19 with p-value = 0.000 (p <0.05). The attack rate of this Covid-19 was 17.07 %. Healthy mobility in this study is an action to prevent the transmission of Covid-19 disease in the community people have high movements, it must be accompanied by efforts to avoid crowds.

The main strategy to prevent the transmission is through social distancing but the implementation of this action will be difficult to achieve if an area or region has high social vulnerability and don't follow health protocols properly. Without strongly mobility restrictions, in the spreading of the virus will be faster in a city areas allowing to spread the other areas nearby [24].

3.3 Multivariate Analysis
A simple regression test was used to see the independent variables are most related to the incidence of Covid-19. The result is displayed in “Table III”.

| Variable | R   | R2  | Line Equation             | p-value |
|----------|-----|-----|---------------------------|---------|
| Mobility | 0.300 | 0.090 | Mobility = 1.341 ± 0.171*Covid-19 | 0.000   |

Table 3. Analysis Of Simple Linear Regression Test

From the results above, it can be interpreted by examining the important values in linear regression including coefficient of determination, equation of line and p-value. The value of the determinant coefficient can be seen with an R Square value of 0.090, meaning that the regression line equation that we get can explain 9.0% of the variation of high mobility respondents or the line equation obtained is very good for explaining the high mobility variable. Furthermore, 'ANOVA', obtained a p value of 0.000, meaning that at 5% alpha we can conclude that the simple regression fits the existing data. The statistical test for the regression coefficient can be known with the value of p = 0.000. So at alpha 0.05 we can reject the null hypothesis, meaning that there is a linear relationship between high mobility and being exposed to Covid-19. From the value of b = 0.171, it means that the risk variable for being exposed to covid-19 will be reduced by 0.171 if reducing high mobility. The relationship between mobility and having experienced Covid-19 shows a moderate relationship (r = 0.300) and has a negative pattern, meaning that the less mobility in the community, the less exposure to Covid-19. The statistical test results found that there was a significant relationship between mobility and Covid-19 (0.000).
According to research, the number of people who have a negative correlation with the spread of Covid-19 shows that a large number of residents in an area is not the main factor influencing the spread of this pandemic, but rather from the way of interaction between individuals in the community. Stefano et al, 2020 shows that people's mobility especially internal mobility correlates with the ejection of Covid-19 cases with R2 up to 0.91 and lagged effects of 14-20 days. This also confirmed that human mobility has a high impact on the spread of the virus [25]. The results of another study in the United States by evaluating 20 districts found that mobility patterns were strongly correlated with a decrease in the growth rate of Covid-19 cases with Pearson correlation coefficients above 0.7 [9]. This is proof that the mobility of people during the pandemic is still high in every country. In this study, residents of Medan also have quite high mobility maybe because of their work that requires them to leave their homes.

Meanwhile, based on the analyzed variables, control over population mobility can be one of the solutions to control the Covid-19 pandemic. Internal mobility within the city and mobility entering from outside the city both show a positive relationship to the increase in the number of positive confirmed cases in DKI Jakarta Province [10]. This is evidenced based on Ningrum 2021 research which shows that the policies implemented by the Indonesian government in suppressing the flow of human mobility entering Indonesia are running effectively, because foreigners entering Indonesia are reduced and can minimize the spread of the increasingly endemic Covid-19 virus [26]. In addition to predicting the dynamics of the Covid-19 outbreak, the results of this study can be used as a basis for planning targeted control.

4. Conclusion
There is a statistical relationship between mobility and the incidence of Covid-19 supported by avoiding crowd, wearing masks and keeping a distance. The instrument of this research was google form. There were 93.7% of people whose not good at avoiding crowded places whereas 51.9% of people with high mobility. The results of Simple Linear Regression Test showed that there was a moderate relationship between mobility and positive cases of Covid-19 (\( r = 0.300 \)) with a negative pattern. This means that if people's mobility is reduced, the cases exposed to Covid-19 will be decreased. The result of this study indicates the prevention strategy by Healthy Mobility is a promising strategy and useful for stalling the spread of Covid-19. Analysis of the strategy that can be formulated in this study is "Healthy Mobility". This means that people who are doing their activities outside of the house are vigilant by carrying out health protocols and consuming nutritious food to increase immunity in the body. The suggestion for the Government of Medan City is to consider Healthy Mobility as a policy to prevent the transmission of Covid-19. It is recommended for people in Medan City for always consider Healthy Mobility in their daily life.

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