Behavioral Compliance Effect of Covid-19 Cases and Casualties and Perceived Community Risk

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ABSTRACT

The research aims at finding the effects of COVID-19 cases and casualties and circulation of information regarding community risk on people's behavior in compliance towards social distancing rules. The methods used are means testing and regressions of the COVID-19 outcomes, new cases, and new deaths with respect to the government's interventions, mobility, information and perception regarding the severity and community risk of the pandemic, and circulation of information, and people's behavior. Two weeks period is chosen as most of the social restrictions implemented use two weeks period at the start of the implementation. This study utilizes data on COVID-19 cases and deaths and big data of COVID-19 Beliefs, Behaviors & Norms Survey published by Massachusetts Institute of Technology. Our results suggest that distancing behavior is found to be correlated with other behaviors such as avoiding sick, cleaning cell phones, washing hands, and face mask usage. Distancing behavior and mask usage is also correlated with perceived community risk positively.

Keywords: big data, COVID-19 pandemic, information and behavior, Indonesia.

1. INTRODUCTION

As the world battling with the coronavirus disease (COVID-19), Indonesia is no exception. In response to the outbreak, the Government has been implementing various social and physical distancing policies starting from 14 March 2020 in the capital city, DKI Jakarta, followed by cities in Java and Bali islands and nationwide from April 2020. This study is aimed at examining the differential effects of various social distancing policies implemented by the Government on people's mobility. Study shows that people's mobility has a strong positive relationship with COVID-19 daily cases and daily deaths. The research aims at finding the effects COVID-19 cases and deaths and circulating information in the community in influencing people's behavior and adherence on social distancing rules. Methodologies: The methods used are means testing and regressions of the COVID-19 outcomes, new cases and new deaths in relation to government's interventions, mobility, information and perception regarding the severity and risk of the pandemic, circulating information and people's behavior. Two weeks period is chosen as most of Indonesian government social restrictions implemented use two weeks period has been the norm for many studies (Sadowski et al., 2021).

2. LITERATURE REVIEW

To prevent the spread COVID-19 disease, people's mobility must be restricted. China along with other countries around the world has conducted numerous non-pharmaceutical interventions to prevent the outbreak conducted numerous non-pharmaceutical

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interventions to prevent the outbreak. The interventions are early detection, isolation, travel restriction, and contact reduction (Lai et al., 2020). In the United States, they restricted the maximum occupancy of public places as well as the mobility restriction (Chang, et al., 2021). Other non-pharmaceutical interventions that have been implemented are school and university closures, business closures, gathering limitation, and stay-at-home order (Brauner, et al., 2021). In European and Central Asian countries, earlier NPI imposition resulting better mortality rates at the peak of the local outbreak (Demirgüç-Kunt et al., 2020).

Different interventions may have different effectiveness in preventing the COVID-19 transmission. In China, early detection and isolation are more effective compared to travel restriction and contact reduction. Those interventions can be combined to generate a stronger effect to prevent the spread COVID-19. In the United States, reducing maximum occupancy for public places is more effective compared to reducing people's mobility (Chang, et al., 2021). In several countries, educational institutions closures, gatherings limited to ten people, and face-to-face businesses closure lowered transmission significantly. However, the effect of stay-at-home instructions was less (Brauner, et al., 2021). Wuhan as the epicenter of the COVID-19 was locked down on January 23, 2020. The Wuhan lockdown significantly reduced people's mobility into Wuhan, out from Wuhan, and within Wuhan. The Wuhan lockdown also significantly reduced the outbreak outside Wuhan (Galeazzi et al., 2021). Based on Facebook users' data in France, the UK, and Italy, Galeazzi et al. (2021) found that in general, lockdown affected people's mobility nationally. From the economic characteristics, they also found that areas with higher durability to disturbance of mobility have a higher value-added per capita (Galeazzi et al., 2021). Politis et al. also found that travel frequencies are decreased due to lockdown in Greece. Based on Google Mobility and John Hopkins University databases, Sadowski et al. (2021) found that the countries' governments should focus on "retail and recreation areas", "transit stations", and "workplaces", respectively, in order to reduce the number of COVID-19 cases. It is also found that the highest correlation between change in mobility and the number of COVID-19 cases appeared in sixteen days (Sadowski et al., 2021).

Besides the physical distancing, other policy that can be applied is targeted lockdown. Based on the multi-group SIR model by Acemoglu et al. (2020), the targeted lockdown based on risk groups can reduce interaction between groups and minimize both economic losses and deaths due to the COVID-1910. On the other hand, school closure was found not to contribute to control the SARS epidemic in mainland China, Hong Kong, and Singapore (Viner at al., 2020). Hence, the government should take more

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consideration in implementing the non-pharmaceutical intervention.

Some interventions may generate negative effects as a trade-off in preventing outbreak. Government intervention in response to some viral cases in France was evident to reduce the prevalence of disease significantly, but these interventions are not cost-effective (Adda, 2016). While during the COVID-19 pandemic, due to mobility restriction, the disadvantaged racial and socioeconomic groups have higher risk to get infected because they are unable to sharply reduce their mobility (Chang et al., 2021). Liu et al. (2021) found that compared to places with lower socioeconomic index, places with higher socioeconomic index show higher reduction in mobility in transit stations, workplaces, and retail and recreation areas during the lockdown. Politis et al. (2021) also found that people with higher income can work remotely and reduce their mobility, while people with lower income must commute during the pandemic.

However, Kishore et al. (2021) found an increase in both local and long-distance movement after the lockdowns were announced and before the implementation in multiple places. Even though the lockdowns are critical, governments as the stakeholders should consider the way to communicate the lockdowns and carefully evaluate the changes in mobility to avoid undesirable events. In line with the communication, people in G7 countries who trust the information provided by the governments, friends, and family will more likely show higher approval and trust in government actions regarding the COVID-19 pandemic mitigation (Vardavas et al., 2021). In a study on risk perception on decision making affecting decision making, it was found that it was difficult for them to implement preventive measure unless the government (Abukhalifeh and Chandran, 2020).

3. METHODOLOGY

This study is aimed to answer the research question whether COVID-19 new cases and casualties, and circulating information regarding community risk on people's behavior in compliance towards the social distancing rules. The method used in this study is linear regression utilizes data on COVID-19 cases and deaths from KawalCovid (kawal.covid19.id), a national COVID-19 data with province-level detail data, COVID-19 Beliefs, Behaviors & Norms Survey published by Massachusetts Institute of Technology. The survey is distributed by Facebook to their users conducted in 19 waves of 2-week period from mid July 2020 to March 2021. We hypothesize that information on the number of new cases and new deaths affects people's behavior.

H_1: information regarding COVID-19 new cases and new deaths affect people's behaviors such as wearing face masks, isolating and maintaining social distancing.

To answer the research question, this study uses the following model:

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$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_{it}$$

Where:

Y = the dependent variable which representing people's behavior including avoiding touching face, wearing face masks, isolating and maintaining social distancing.

X_1 = logarithm of 2-week lag moving average (MA) new cases

X_2 = logarithm of 2-week lag moving average (MA) new deaths

X_3 = dummy variable when people perceived their community has high risk of transmission

X_4 = dummy variable when people perceived their community has low risk of transmission

4. RESULTS

We performed a correlation test on people's behavior by utilizing MIT beliefs and behavior survey which shown in Table 1. The table shows distancing behavior is found to be correlated with other behaviors such as avoid sick, cleaning cell phone, washing hands, and face mask usage. When people perceived the community risk is alarming/dangerous correlates with positive social distancing and face masks usage. Meanwhile, a perception that the community risk is low or not dangerous is correlated with reduced social distancing and face masks usage.

Table 1 Correlation between behaviors and perceived community risks

Variables	Distancing	Face Mask or Covering
MA_New Cases	0.0671	-0.0335
MA_New Deaths	0.1557	0.0307
Avoid Sick	0.4975 **	-0.0060
Dangerous Community Risk	0.6472 ***	0.8253 ***
Not Dangerous Community Risk	-0.6557 ***	-0.8235 ***

The regression model for people's behavior affected by COVID-19 casualties and perceived community risk is presented in Table 2. Using 2-week lag, 2-week moving average of new deaths information was likely to increase avoiding touching face by 18.24 percentage points and increasing isolation by 20.6 percentage points. Log of 2-week MA new deaths also increases social distancing by 7.75 percentage points. While when the community perceive that the community risk is dangerous, it was likely to increase social

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distancing by 36%. Also, when the community perceive the community risk is high face mask use significantly increases by almost 50 percentage points.

Table 2 Regression model of behavior using information and perceived risk

Independent Variable	***Model***							
	Avoid Touching Face		***Isolation***		***Distancing***		***Face Mask***	
(Intercept)	1.25517	***	0.64856	*	0.53204	***	0.44826	***
lag(log(MA_New_Deaths))	0.18244	**	0.20603	**	0.07751	**	-0.02563	
Perceived Community Risk	-0.10141		-0.22114		0.36	**	0.49432	***

5. CONCLUSIONS AND RECOMMENDATION

Our results suggest that distancing behavior is found to be correlated with other behaviors such as avoiding sick, cleaning cell phones, washing hands, and face mask usage. Distancing behavior and mask usage is also correlated with perceived community risk positively. The new cases do not affect people's behavior significantly, while lag 2-week moving average have significant effect on people's behavior in preventing COVID-19 transmission.

The regression model of people's behavior indicates that the information on the number of new deaths was likely to increase isolation and distancing. When people perceive the Distancing behavior and mask usage is also correlated with perceived community risk positively. When the community perceive that the community risk is high, it increases social distancing significantly by 36 percentage points. While the perceived high community risk increase mask usage more pronounced by 50s percentage points.

The results gave insights for policy recommendation, that is to clearly convey the information on community risk of COVID-19 transmission and information on COVID-19 cases accurately. The government must also be able to debunked the misinformation regarding COVID-19 including fake news and infodemic in order to educate the people on the risks of the pandemic and the ways to mitigate the risks.

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