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Community mobility reports predict the national spread of COVID-19 in Indonesia in the new normal era

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ABSTRACT

Indonesia government encouraging to new normal life with obeys the health protocol. In Malaysia, the new normal had a significant impact on mobility trends. This study aimed to analyze the community mobility trend (including six categories) and coronavirus disease (COVID-19) daily cases in Indonesia in new normal era. An observational analytic using cross-sectional design. The community mobility data, include mobility trends for six different location categories, were obtained from Google COVID-19 Community Mobility Reports from May 15-July 14, 2020. The Indonesian's COVID-19 daily cases data were taken from (http://covid19.go.id//) from May 15-July 17, 2020. Time-lag correlation to analyzed community mobility of each location category and COVID-19 daily cases in Indonesia using Pearson Correlation with significance ≤0.05. Recreation, parks, and transit stations have positively strong to very strong, while the residential has negatively strong, and the grocery and pharmacy and workplaces were positively weak to moderate correlations. The community mobility was significantly correlated with the COVID-19 transmission in Indonesia during new normal era, especially in transit stations, retail and recreation. Indonesia government is expected to improve their effort to manage the COVID-19 transmission and consider new policy to curb the COVID-19 transmission.

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1. INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease was first found in Wuhan, China at the end of December 2019 [1]. First two reported cases were in March 2, 2020 and is continue to increase and on July 24, 2020, the number of confirmed COVID-19 cases was 95.418 with 4.665 death [2]. On March 11, 2020, a COVID-19 case is more than 118.000 cases worldwide in 114 countries and 4.291 people have lost their lives, and it was stated as a pandemic [3]. Since the first two cases were reported and the number of cases was increasing, Indonesia Government encouraged the Indonesian people to reduce activities outside the home, including work, study, and worship [4]. The impact reduction of community mobility in any public places such as grocery and pharmacy, transit stations, and work places and increased mobility in home residence [5]. These trends were even more changing since some districts/cities implemented a policy called the large scale social restriction/*pembatasan sosial berskala besar* (*PSBB*). However, this policy has significant effects in severe economic losses, companies, industries, and disruption of any levels of life [6].

According to this condition, many people have lost their job. On May 15, 2020 Indonesia Government has encouraged to back to normal activities but still obey the health protocol such as physical distancing, wearing mask, and washing hands with soap (the new normal) [7]. The transition from government containment policy on COVID-19 in Malaysia, called the movement control order (MCO), to the new normal had a significant impact on mobility trends. The report is not just useful for the implementation of social distancing efforts, but can also be used as a gauge of mobility in the new normal of life post COVID-19 by comparing it with the baseline period [8]. Mobility patterns are strongly correlated with decreased COVID-19 case growth rates for the most affected counties in the USA [9]. With this new normal policy, we're interested to analyze the community mobility trend (including six categories) during this new normal era and its correlation with COVID-19 daily cases in Indonesia.

2. METHOD

This was an observational analytic study with cross-sectional design. The community mobility data were obtained from Google COVID-19 Community Mobility Reports for community mobility in Indonesia on May 15-July 14, 2020. The data include mobility trends for six different location categories including retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residences. These data were publicly in the form of charts that plot country-specific mobility trends and the percentage of changes with respect to a baseline determined by Google.

The COVID-19 daily cases data were taken from *Gugus Tugas Percepatan Penanganan* COVID-19 (http://covid19.go.id//) for Indonesian's COVID-19 daily cases on May 15-July 17, 2020. The data were processed, then analyzed with SPSS. Kolmogorov-Smirnov test was used to determine the normality of the data. The data were considered normally distributed if p-value >0.05. Time-lag correlation was used to find the correlation between the community mobility of each location category with COVID-19 daily cases in Indonesia. Pearson correlation was used when both data was normally distributed, whereas Spearman correlation was used when one or both data were abnormally distributed.

3. RESULTS AND DISCUSSION

3.1. Community mobility and COVID-19 daily cases trends

The community mobility trends in Indonesia were tending to approach the baseline from May 15–July 14, 2020 showed in Figure 1. The lowest mobility was at transit stations (-43.5±7.9)% while the highest value that still below the baseline was at grocery and pharmacy (-5.7±5.9)%. Community mobility in home residence was still above the baseline (13.03±2.8)%.

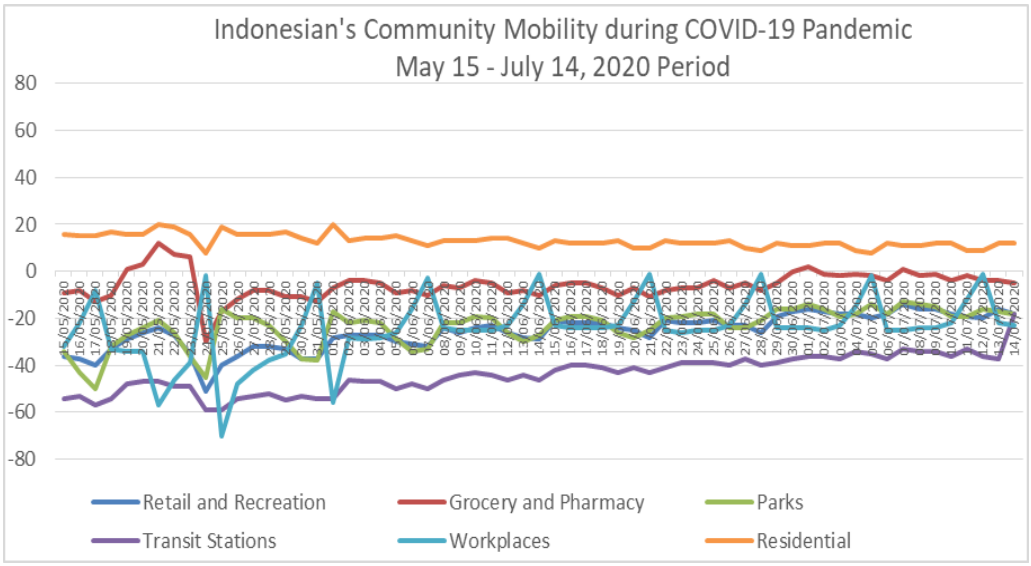

Figure 1. Community mobility trends in Indonesia since new normal era compared with baseline (before COVID-19 pandemic

The increasing trend in the number of daily COVID-19 cases in Indonesia on May 15-July 17, 2020 showed in Figure 2. The daily COVID-19 cases trends in the mid May to first week of June was tended to be stable between 500-1000 cases/day. However, it has begun to increase till July. In the early July, daily cases continued to increase and has peak on July 9, 2020 (2,657 new cases). There was no other day which daily COVID-19 new cases exceed 2,000 cases.

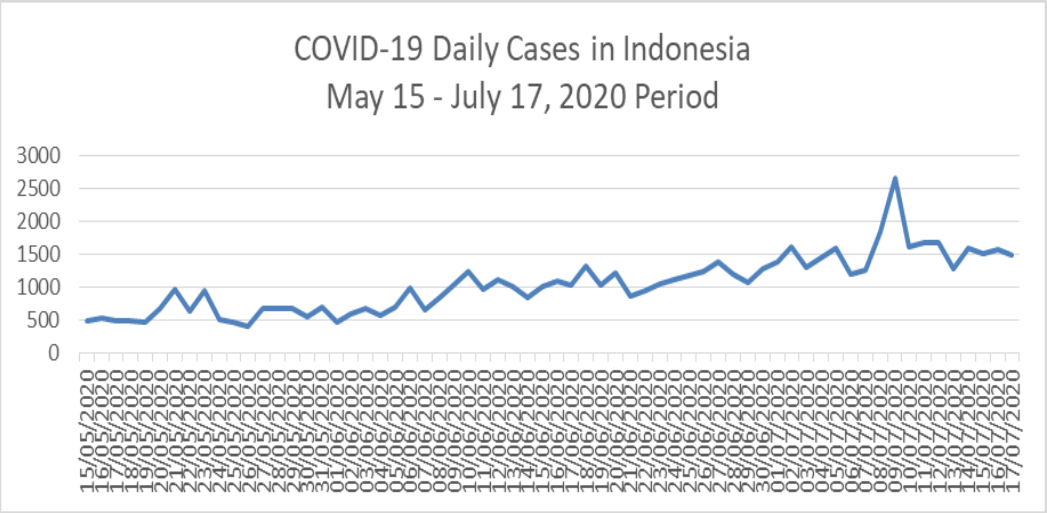

Figure 2. Indonesian's COVID-19 daily cases trends in new normal era

3.2. Correlations between community mobility and COVID-19 daily cases

Normality test with Kolmogorov-Smirnov has indicated that the community mobility in retail and recreation, transit station, daily cases lag-2 and lag-3 were normally distributed ($p>0.05$), while other variable were abnormally distributed ($p<0.05$), so that either Pearson's or Spearman's correlations analysis were utilized to find the correlations between community mobility and COVID-19 daily cases. Table 1 explains relationship between community mobility and COVID-19 daily cases.

Table 1. Correlations between community mobility and COVID-19 daily cases

Mobility	Lag 0	Lag -1	Lag -2	Lag -3
Retail and recreation	0.866**	0.920**	0.826**	0.726**
Grocery and pharmacy	0.530**	0.535**	0.483**	0.365**
Parks	0.622**	0.699**	0.756**	0.670**
Transit stations	0.928**	0.927**	0.819**	0.772**
Workplaces	0.421**	0.301**	0.305**	0.467**
Residential	-0.685**	-0.601**	-0.640**	-0.751**

** $p<0.001$

Very weak 0-<0.2; Weak 0.2-<0.4; Moderate 0.4-<0.6; Strong 0.6-<0.8; Very strong 0.8-1

Positively strong to very strong correlations between community mobility and daily COVID-19 cases were found in retail and recreation, parks, and transit stations on the same day to the next three days showed in Table 1. For the residential, there were negatively strong correlations between community mobility and daily cases on the same day to the next three days. For the grocery and pharmacy and workplaces, there were positively weak to moderate correlations. The highest correlation coefficient of each area were found in lag-1 for retail and recreation ($r=0.92$), lag -1 for grocery and pharmacy ($r=0.53$), lag-2 for parks ($r=0.76$), lag 0 for transit stations ($r=0.93$), lag-3 for workplaces ($r=0.47$), and lag-3 for residential ($r=-0.75$). The scatter plots of each area were showed in Figure 3.

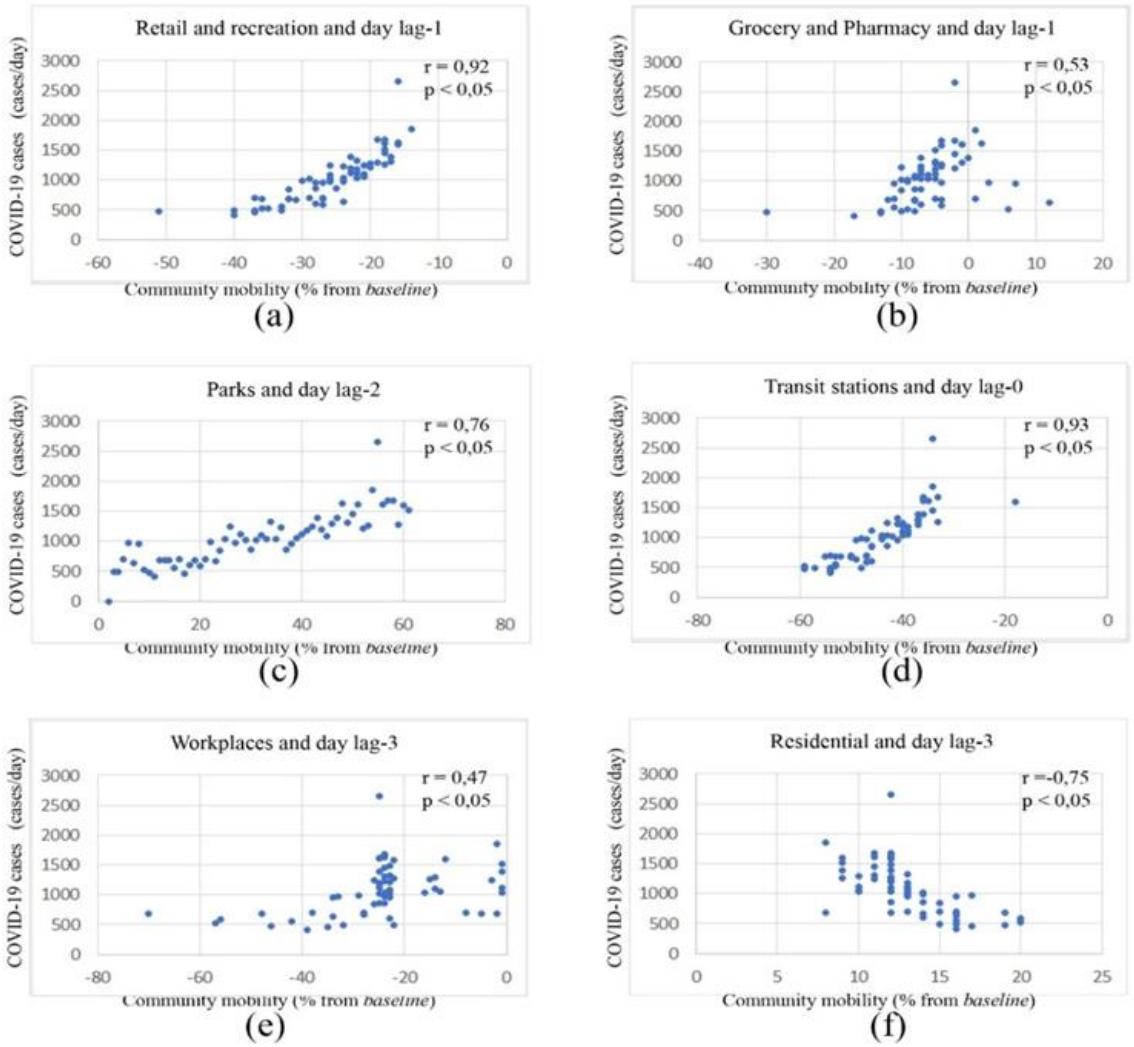

Figure 3. Scatter plots of (a) retail and recreation and lag-1, (b) grocery & pharmacy and lag-1, (c) parks and lag-2, (d) transit stations and lag-0, (e) workplaces and lag-3, and (f) residential and lag-3

Low mobility in transit stations or public transport is due to strict regulations from Ministry of Transportation. It tends to increase and approaching the baseline due to resumption of economic activity. In the new normal, Ministry of Transportation has revised the Minister of Transportation Regulation or *Peraturan Menteri Perhubungan* (*Permenhub*) No. 18 in 2020 concerning Transportation Control in the Context of Coronavirus 2019 (COVID-19) Spread Prevention to *Permenhub* No. 41 in 2020. In that regulation, vehicle and infrastructure operator, and/or freight transportation manager that break the rules such as physical distancing, wearing mask, and passenger capacity restrictions will get the administrative sanctions in the form of written warning, license suspension, license revocation, and/or administrative fine [10]. Moreover, *Gugus Tugas Percepatan Penanganan* COVID-19 issued a regulation in the form of Circular Letter Number seven in 2020 Concerning Criteria and Requirements of People Trip in New Normal Era towards Productive and Safe Society from the Coronavirus Disease 2019 (COVID-19). The requirements of people trip include identity card, rapid test or polymerase chain reaction (PCR) result certificate, certificate of free of influenza-like symptoms if there is no rapid test or PCR in the area [11].

Mobility in residential reflect people staying at home and within their residence. Stay-at-home directives encourage residents to shelter in their house with several provisions and have been followed along with school closures, restrictions on mass assemblies, and the closing of non-essential businesses. These policies are correlated with a major decrease in the observed mobility. It is the only area which has above the baseline [12]. Compared to the other destinations, the increase in mobility to residential is lower than the reductions of other destinations (except for grocery and pharmacy). The reason could be that many people still have to travel to work, education and other essential services [13].

In the early July, daily cases continued to increase. The peak of COVID-19 new cases was on July 9, 2020. On this day, the highest number of cases was in West Java Province (962 cases) which may due to Army Candidate Officer School or *Sekolah Calon Perwira* (*Secapa*) TNI *Angkatan Darat* cluster that has been epidemiologically studied since May, 29 consecutively [14]. The relaxation of the lockdown policy led to the emergence of a second wave pattern in several countries such as Japan, Australia, Morocco, Greece, Hong Kong, Croatia, Israel. Meanwhile, the daily cases of COVID-19 in Indonesia have continued to increase before the new normal era, although the second wave has not yet occurred [15]-[17].

Very strong correlation between community mobility in transit stations may be due to longer duration of person-to-person contact. Duration of contact people is one of the determinants of reproductive number (R_0), the number of secondary infections produced by an infected person. The rate of COVID-19 infection is very much affected by reproductive number [18]. In addition, people sitting or standing in proximity in a closed environment such as public transportation have a greater risk of infections the disease, especially if passengers do not practice coughing and sneezing etiquette. Besides, some areas can be host infectious microorganisms such as handrails, ticket machines, smart card machines, doors, handles, windows, panels, floors, lifts and chairs [19]. In Wuhan, China, there was strong association between travel by train and the number of COVID-19 cases, whereas the associations of two other of transportation (car and airplane) failed to reach statistical significance [20]. Epidemiologists encourage social distancing during this COVID-19 outbreak, as in past epidemics and pandemics, meaning that individuals should be isolated from others by around six feet (or 2 m) or more. Obviously, this measure is directly in contrast to the idea of public transport.

Trips to retail and recreation was also has very strong correlation with COVID-19 cases in the same day to the next two days. The presence and viability of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in outdoor spaces could be influenced by several factors are crowding, wind speed and direction, meteorological condition (such as temperature, humidity, and UV). Precautions must be focused on what is understood about SARS-CoV-2 in indoor and laboratory environments and other pathogens in outdoor environments, since there is insufficient evidence to determine the risk of transmission in outdoor environments. There are many measures currently being taken in Canada to control outdoor recreational spaces and these have distinct federal/provincial versus municipal implications [21].

Community mobility in Parks area has positively strong correlation with COVID-19 cases. Another of the concerns raised by visitors was the risk of COVID-19 being spread via the respiration of other visitors. The outdoor settings (recreation and park) were the area can be visited by people and lead to crowded, so the risk of transmission can be greater. All aerosols are released by coughing, sneezing, talking and even breathing, ranging in size from larger respiratory droplets (>5μm), which sediment rapidly, to very fine droplets (<5μm), which can stay trapped in the air for longer, fly longer distances, and can be inhaled lower respiratory tract [22]. Nevertheless, present data indicates that either the aerosolized virus is no longer viable or that the recovered levels are too tiny to induce infection. Therefore, a great deal of additional knowledge is needed to understand whether COVID-19 can be spread by aerosols, particularly outdoors, where aerosols containing viruses can be dispersed rapidly [23]. More than 80%, the spaces open to the public and on objects that are touched with the hands has frequently detected by the traces of biological fluids [24]. Recommendation of World Health Organization that if people go to a park or open public space to walk, run, or exercise, there is a need to always practice physical distancing [25].

Mobility in grocery and pharmacy was positively weak to moderate correlated with COVID-19 cases. Since COVID-19 is a respiratory disease and the main route of transmission is through person-to-person contact and through direct contact with respiratory droplets produced when an infected person coughs or sneezes, it is very unlikely that people will be able to contact COVID-19 through food or food packages. There is no proof to date of the transmission through food or food packaging of viruses that cause respiratory diseases. As they require an animal or human host to replicate, coronaviruses do not multiply in food [26]. Besides, the regulation by government to restrict people's travel can lead to grocery and pharmacy rarely to be visited, so the risk of transmission can be lower.

There were positively weak to moderate correlation between community mobility in workplaces and COVID-19 new cases. In the cases of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreak, most of the studies focus on work-related transmission among healthcare workers (HCWs), which constituted a large proportion in previous coronavirus outbreaks. In highly affected Asian countries, 37-63% of confirmed cases of extreme acute respiratory syndrome (SARS) and about 43.5% of cases of Middle East respiratory syndrome (MERS) were registered by HCWs [27-29]. In addition, certain professions outside healthcare environments were closely linked to early transmissions of COVID-19 such as taxi driver, salesman, tour guide, and housekeeper and cleaner. Owing to regular interaction with travellers, taxi drivers, sales persons and tour guides are at greater risk to transmission of COVID-19 [30]. Mobility in residential or stay-at-home has negatively strong correlated with the number of COVID-19 cases. Stay-at-

home orders in United States are effective in limiting the spread of COVID-19 and dramatically reduce the fatalities of the disease [31]. Another study suggest that 1% of a weekly increase in being at residential places leads into about 70 less weekly COVID-19 cases and about 7 less weekly COVID-19 deaths [32].

According to these results, we suggest that all of the places outside home are still at risk of COVID-19 transmission. In this new normal era, the COVID-19 daily cases in Indonesia even more increased than previous period called the PSBB. We recommend the government could make more strict regulation concerning health protocols in public places. According to the low mobility in transit stations, the current regulation has been successfully to restrict people to use of public transportation. The government should concern about the health protocols in transit stations because of its very strong correlation with the increased of COVID-19 cases. If the regulations are not enough to encourage people to obey the health protocols and the number of COVID-19 cases does not decrease, the government should consider a policy like *PSBB* to be re-implemented.

4. CONCLUSION

Community mobility in any places were significantly correlated with the COVID-19 transmission in Indonesia during new normal era, especially in transit stations and retail and recreation with very strong correlation. Increased mobility in residential or stay-at-home was strongly correlated with the reduced of COVID-19 spread. These could be utilized by government to improve their effort to manage the COVID-19 transmission in Indonesia and consider new policy to curb the COVID-19 transmission.

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