

How Successful was Large-scale Social Restrictions Policy in Suppressing COVID-19

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Abstract

Large-scale Social Restrictions (LSR) was the Indonesian government's primary instrument to break the chain of coronavirus or COVID-19 transmission at the early phase of the pandemic. LSR implementation such as school and workplace closure, restrictions on religious activities, and or restrictions on activities on public premises or facilities. This study aims to investigate the effect of LSR policy on COVID-19 developments in Indonesia. This study was a cross-sectional study with a total population of 99,077,313 people from three provinces in Indonesia. This research analyzed the LSR policy implemented in the entire province or partially as an exposure and the development of Covid-19 as an outcome. The outcome was measured by doubling the times needed for new cases. Data were taken from secondary source namely from the COVID-19 task force report that has been announced publicly. The unpaired two-tailed Student's t-test was used as statistical analysis of the secondary data. The results showed a significant impact ($p < 0.05$) when comparing the province with full LSR policy with those implementing the LSR policy in some of their selected cities. The LSR policy of total province seems effective to suppress COVID-19 development as indicated by a more rapid and considerable increase in the doubling time of new cases following the implementation of LSR as early as possible in the provinces implementing LSR for their entire region than in the compared provinces. It can be concluded that LSR policy has a significant effect on COVID-19 development in Indonesia as indicated by a significant

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difference in the doubling time of COVID-19 new cases. Each province may have different times of the beginning and end of the COVID-19 epidemic; therefore, each province needs to design their coping strategy based on their particular condition.

Keywords: *disease transmissions, doubling time, new normal, local wisdom, Indonesia*

1. Introduction

The confirmed cases of COVID-19 have been reported throughout the Indonesian archipelago, and the number of areas with local transmissions continue to grow since the first case was detected in early March 2020 (Ministry of Health of the Republic of Indonesia, 2020). Large-scale Social Restrictions (LSR) was the government's primary instrument to break the chain of coronavirus or COVID-19 transmission. The implementation of the LSR itself is stipulated in the Government Regulation No. 21 of 2020 (Jaringan Dokumentasi Dan Informasi Hukum (Legal Documentation and Information Network) [in Indonesia], 2020) signed by the President of the Republic of Indonesia at the end of March 2020. As of July 2020, LSR has been carried out in four provinces and 72 regencies or cities in Indonesia (Aria, 2020), some of which were just about to start LSR as they have just obtained the legal permissions. Meanwhile, some others were about to loosen the LSR.

Social restriction or distancing has been shown in both observational and modelling studies to decrease the spread of infectious diseases, including COVID-19 (Nussbaumer-Streit et al., 2020). In Indonesia, LSR policy implementation occurred at different times and with different levels of adherence because Indonesia is a vast archipelago country with different COVID-19 situations in each of its region and island. In order to implement an LSR policy, an area needs to meet the following criteria: (1) the number of cases and deaths due to the disease has increased and spread significantly and rapidly to several regions; and (2) there are epidemiological links with similar events in other regions or countries (Jaringan Dokumentasi Dan Informasi Hukum (Legal Documentation and Information Network) [in Indonesia], 2020). The smallest level of LSR include school and workplace closure, restrictions on religious activities, and restrictions on activities on public premises or facilities.

The government first imposed the LSR on April 10, 2020 in Jakarta province, after becoming an epicenter of COVID-19 cases. According to the Covid19.go.id (7/4/20), the Capital City recorded 12,039 positive cases of COVID-19 (Central Bureau of Statistics-Statistics of DKI Jakarta Province, 2019). The final period of the LSR which initially was planned to end on April 24 2020 was extended to May 22 and was extended again to June 4 2020, after which the city applied the transitional LSR. It was because, according to the Governor, public discipline in complying with the LSR rules was still low. Some non-essential companies continued to operate during the implementation of the LSR, along with the allowed sectors which included health such as hospitals and clinics); staple goods, energy (water, gas, electricity, fuel stations), communication (communication services and communication media), finance and banking, including the stock market, logistics/ distributor of goods; retail, strategic industries located in the capital.

The latest province imposing a total LSR was West Java which was effective from May 6 2020, as this province is the nearest to epicenter Jakarta and the most populated in Indonesia. As of April 7 2020, West Java has had 3,463 positive cases of COVID-19 (COVID-19 National Task Force, 2020b). Currently, the Government of West Java Province has discussed the possible easing of the LSR. The West Java Governor said that around 63% of the West Java region had the opportunity to be subjected to LSR easing while 37% of them still needed to be monitored. He considered

West Java Province being able to control the coronavirus spread, only if the graphs of new cases consistently sloped down.

Other provinces only imposed partial LSR in some of their regions, including East Java Province which had 13,447 confirmed cases (as of 7/4/20). This variation in LSR policies at this level created a natural experiment before the policy change, allowing examination of the relationship between LSR policy implementation and the case doubling rates for Jakarta (treatment province) versus West Java and East Java (control provinces). Therefore, the purpose of this study was to explore the impact of LSR policy on COVID-19 developments in Indonesia.

2. Materials and Methods

The COVID-19 national task force launched the portal www.covid19.go.id on March 18, 2020 as the official source of information for the prevention of COVID-19 (COVID-19 National Task Force, 2020a). This portal releases daily updated data on COVID-19 incidence in all provinces in Indonesia from Ministry of Health that has been shared to public (East Java Province COVID-19 Response, 2020; Jakarta's COVID-19 Response Team, 2020; West Java Province Information and Coordination Center of COVID-19, 2020). The authors used data between March and July 2020 to estimate the doubling time rate for Jakarta (population, 10,467,629) (Central Bureau of Statistics-Statistics of DKI Jakarta Province, 2019), the earliest province to start LSR policy, and for the surrounding provinces for control. West Java (population, 49,316,712) (Statistics Indonesia-Statistics of West Java Province, 2019) was chosen because it was the latest province imposing LSR and East Java (population, 39,292,972) (Statistics Indonesia-Statistics of East Java Province, 2019) was chosen because it was a province that did not impose total LSR even when the capital of the province became a new epicenter. According to COVID-19 data as of July 4, 2020 (COVID-19 National Task Force, 2020b), Jakarta, and East Java, were among the highest provinces in the number of total confirmed cases. No ethical approval required for this study because it used secondary data that have been announced publicly.

The authors calculated five-day moving averages of the percentage increase in cases in Jakarta versus control provinces to overcome fluctuating numbers of cases. The following formula was used to calculate the doubling time, where T^2 is the doubling time, t is time in days and r is the 5-day moving average in the percentage increase in cases (range, 0–100): (Ebell & Bagwell-adams, 2020; Lauer et al., 2020).

$$T^2 = t \frac{\ln(2)}{\ln(1 + r/100)}$$

3. Results

This research involved data analysis on the three provinces with the highest number of COVID-19 confirmed cases in Indonesia as of July 2020. Data for new cases doubling time by days in weekly average are shown in Table 1, and the doubling time curve for Jakarta, West Java, and East Java in Figure 1. A more rapid and considerable increase in the doubling time was observed following the implementation of LSR as early as possible, than in the control provinces. The authors used excel

software, version 2016, to fit the fixed-effects linear regression model using doubling time as the dependent variable and LSR policy as the independent variable.

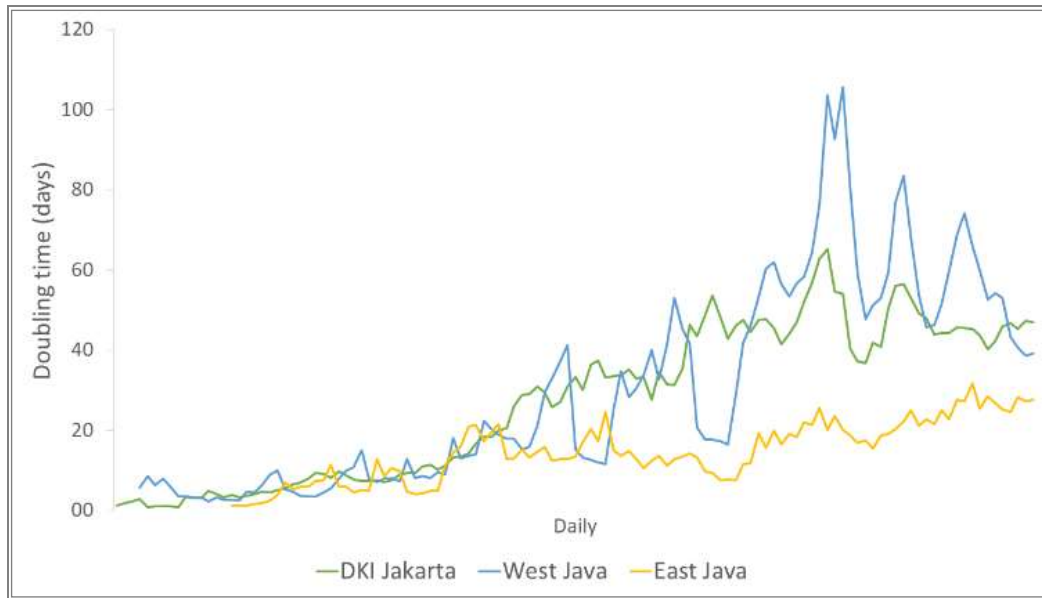


Figure 1: Doubling times in days for Jakarta, West Java, and East Java Provinces

*Data of COVID-19 incidences were taken daily from the date of first confirmed case in Jakarta on March 3, West Java on March 6, and East Java on March 19, until July 3, 2020.

Epidemic doubling times may be described by the sequence of intervals at which the cumulative incidence doubles (Vynnycky & White, 2010). If an epidemic is growing exponentially with a constant growth rate r , the doubling time remains constant and equals $(\ln 2)/r$. The authors believed that this equation was still valid to use since at that moment there was no interfering factors such as vaccination or medicine for COVID-19.

The local model (Table 1) showed a mean increase in the doubling time of 27.9 ± 4.6 days in Jakarta compared to the control provinces (30.4 ± 5.8 and 14.5 ± 1.9 days). An increase in doubling time indicates a slowdown in the local transmissions if the underlying reporting rate remains unchanged (Muniz-Rodriguez et al., 2020a). Using unpaired two-tailed Student’s t-test analysis, both whether early or late LSR policy implementation did not show a significant difference in COVID-19 development ($p=0.3$) although showing the tendency of a more stable graph (Fig. 1) in province with early LSR policy implementation. When compared with East Java Province that did not impose a total LSR policy, both provinces showed significant results (Jakarta $p=0.00$; West Java $p=0.00$).

Table 1. New cases in Jakarta, West Java and East Java Provinces

Weeks	Doubling time (days)		
	Jakarta	West Java	East Java
1	1.7 ± 0.3	6.0 ± 0.7	1.7 ± 0.2
2	3.0 ± 0.6	3.0 ± 0.2	6.2 ± 0.5
3	4.0 ± 0.2	6.5 ± 0.9	7.3 ± 1.3
4	7.3 ± 0.6	5.6 ± 1.0	6.8 ± 1.1
5	8.2 ± 0.3	9.3 ± 1.1	15.2 ± 2.2
6	9.3 ± 0.6	10.7 ± 1.4	15.8 ± 1.3
7	14.0 ± 1.1	17.3 ± 1.4	15.1 ± 1.1
8	24.8 ± 1.9	24.3 ± 3.3	15.7 ± 1.7
9	30.5 ± 1.4	18.8 ± 4.2	13.1 ± 0.4
10	34.2 ± 0.6	34.5 ± 1.8	9.4 ± 0.7
11	35.8 ± 2.5	30.6 ± 5.9	18.8 ± 0.8
12	47.5 ± 1.3	44.2 ± 6.3	21.0 ± 1.1
13	46.5 ± 1.2	67.1 ± 6.7	19.9 ± 1.2
14	53.1 ± 4.0	70.1 ± 8.7	24.2 ± 1.0
15	48.0 ± 3.0	62.0 ± 5.6	27.3 ± 0.9
16	45.9 ± 0.8	61.9 ± 3.1	
17	44.3 ± 0.9	44.9 ± 2.7	
Means	27.9 ± 4.6	30.4 ± 5.8	14.5 ± 1.9 ^{a,b}

Data were shown as seven days (a week) means ± SE, ^ap<0.05 compared to Jakarta, ^bp<0.05 compared to West Java

Figure 1 also showed that West Java Province was having a tremendously fluctuated doubling time of new cases compared to the other two provinces. Meanwhile, we can see that after the imposing of LSR policy, it took time for the impact to take place. This condition is similar to a study in USA which reports that it needed at least five days between the implementation of mandatory distancing and an impact on disease spread, perhaps due to the incubation period of the infection (Ebell & Bagwell-adams, 2020). Ebell & Bagwell-adams (2020) also mentioned that a more extended lag period might also be created by delays in test results, perhaps because of the lack of testing equipment or the report to the Ministry of Health.

4. Discussion

This study showed that the full LSR policy imposed on the entire province was effective to suppress COVID-19 development during this study period. We would expect a gap of at least five days between LSR policy imposition and its impact on the spread of the disease, considering the incubation period of infection. Longer pause period can also be made by delays in reporting test results, which may take place due to the limitation of test coverage. Assuming the average time of 5 days of incubation plus 5 days delay in the test results was consistent with visuals, two folds in the doubling time curve occurred about 10 days after the LSR was imposed in Jakarta Province. There was a different result seen in the West Java Province, where it only needed three days to double the number. Hence, it seems other factors had interfered in the West Java Province since the curve was falling again in day 14 after LSR policy imposition. As the epidemic continues, the effective reproduction number (R_e) offers a time-dependent record of the average number of secondary cases per case as the susceptible persons becomes smaller in number and control interventions take effect. Therefore, we used alternative measurement of epidemic's doubling times, which corresponded to the times when the cumulative incidence doubles and was estimated by using the curve of cumulative daily reported cases.

West Java Province, as a supporting province for Jakarta or directly borders with Jakarta, had a high number of cases. It was probably triggered by active movement of people due to work demands (working in Jakarta) or by the fact that West Java was a tourist destination for Jakarta citizens or others. Those made it possible to relate with Jakarta, which was the epicenter of COVID-19. This situation can be seen by the fact that the 6 cities having the highest number of cases in West Java (West Java Province Information and Coordination Center of COVID-19, 2020) were those with many residents interacting with residents of Jakarta.

It can be seen, on the map released by COVID-19 task force (COVID-19 National Task Force, 2020b), that the supporting districts of Jakarta (such as Bekasi, Bogor, Depok) and areas that became the destinations of tourists originating from Jakarta (such as Bandung) were those areas in West Java with the highest case findings compared to other regions that were not connected with Jakarta. The above description can be used as a reference to determine the prevention, mitigation, and evaluation of programs or as a basis for policy making. Therefore, it can be concluded that human mobility is a significant factor in efforts to prevent the movement of COVID-19 (Muniz-Rodriguez et al., 2020b).

Several issues need to be improved from COVID-19 coping strategies in West Java Province. LSR might still not be optimally implemented considering that the local train of KRL still operated connecting the supporting regions in West Java Province with Jakarta, which allowed mobility and distribution. Hence, COVID-19 transmission may not be maximally stopped. The implementation did not meet the physical distancing rules, and the volume of departure was still large or frequent. Residents should be encouraged to use private vehicles or standardised public vehicles. For example, those implementing restrictions on the distance between passengers and health checks or examinations at each stop location for mass transportation. LSR implementation might not be maximal in some non-food and non-medical sectors. For instance, there was no curfew strictly enforced in several districts, and public awareness was not yet maximal to comply with the regulations.

Other suggestions are that data in the West Java Province official website needs to be updated in detail per day and per district, and map per district or city. In addition, the application needs to be synced to GPS so that people can check their GPS to monitor the incidents around them and raise their awareness. The government can optimize the potential of the Higher Education Institutes

(universities), pharmacies, and many drug manufacturers to collaborate in order to produce vaccines or drugs for COVID-19 optimally. Although there are various aspects influencing LSR making the implementation vary from strict to limited categories in each district, it needs a minimum standard to be required and monitored by the provincial government.

Table 1 shows that there is a significant increase in the doubling time of the COVID-19 pandemic incident in East Java Province. Each case spread over 4.3 folds in approximately 105 days. It was found that the incidence rate on the events in March 19, 2020, was 0.02 cases per 100,000 population and increased to 33.10 cases per 100,000 population in July 3, 2020. Therefore, the government needs to make more efforts to control and deal with the spread of the COVID-19 outbreak. The authors recommend the whole province LSR rather than the selected regions only (Surabaya, Malang, Sidoarjo, Gresik) (Hasani, 2020), because people's movement inter-region still happened, and this has made it harder to prevent the transmission. Proven by the increase of the red area (the region with at least one confirmed case) day by day in East Java Province (East Java Province COVID-19 Response, 2020). The results of this research are supported by other studies measuring the effect of LSR by incidence rate, positivity rate and forecasting modelling of the spread of COVID-19 in Indonesia (Furqon et al., 2020; Saputra & Salma, 2020). Limitations of this study include the fact that province of residence may have been attributed incorrectly and some bias may be caused by different healthcare services and sociodemographics of each province.

Indonesia, as a vast archipelago country, benefits from the natural boundaries (the sea) that help prevent the spread of the disease. Being on the equator also makes the environment (climate and weather) take sides with the host (Oliveiros et al., 2020; Wang et al., 2020). However, COVID-19 epidemic is still existing, and such conditions are likely controlled by "non-weather" factors (non-temperature and humidity). They are expected to be due to the influence of "social behavior" or "social mobility" (Du et al., 2020).

Indonesia is ranked fifth in the world for social capital and ranked first for civil and social participation with the highest number of volunteers compared to any other countries. The level of social capital is measured based on trust, mutual respect, and the desire to help the society by individuals or groups (New Desk, 2019). This culture can be both a local potential that may be directed to support the endeavors to control the COVID-19 outbreak and a threat as it may lead to the violation of distancing rules and may then spread the disease. This culture can be considered a non-budgeting grant from the community alleviating the country's budget burden.

Indonesian people are already accustomed to volunteering to shift guard in security posts. Therefore, it can now be used to monitor a healthy suspect or confirmed case to be kept at home for a self-isolation. They may also help to report to the local government if the residents are having a guest or have just returned from the red zone (Redaksi Nusadaily, 2020). Educating people to do distancing and to practice good hygiene may also be done by announcing these repeatedly through loudspeakers at mosques that are spread all over the country. A repetition will cause a remembrance to make it easier for society to have a new behavior (Acerbi & Tennie, 2016). It can also be done by the help of the available neighboring groups of housewives and volunteer cadres of sustainable health programs (TB cadres, HIV-AIDS cadres, and others). New behaviors will also be easier to form if there are examples and are done with groups (Borek et al., 2019).

Several countries announced new normal lives recently. Those are the countries already succeeding to suppress COVID-19 new cases into almost zero (Crary et al., 2020). None of the provinces in Indonesia has reached the top of the curve; hence, it can be stated that it is still a long way to the new normal. After the curve goes down later, there is still a possibility for a second

wave to be concerned. Nevertheless, it seems the government cannot wait any longer due to economic and other concerns (CNN Indonesia, 2020). The danger of uncontrollable spread is lurking with the easing of LSR. Just a simple new normal life can perhaps be a drug and a toxin at the same time if applied when the incidence rate is still high or the doubling time curve is very low. New clusters may form, high rate of morbidity and mortality may happen. Indonesia needs all its components to work in synergy to deal with the situation. Adaptive implementation and learning process needs multi-sectoral task forces and the engagement of international experts dialogue and knowledge acquisition across a large, diverse group of professionals and decision-makers (Alaerts, 2020; Bigiani et al., 2020; Binagwaho, 2020).

According to WHO (WHO-World Health Organization, 2020), any step to ease restrictions and transition into a new normal must ensure; (1) that evidence shows COVID-19 transmission is controlled; (2) that public health and health system capacities including hospitals are in place to identify, isolate, test, trace contacts and quarantine them; (3) that outbreak risks are minimized in high-vulnerability settings – particularly in elderly homes, mental health facilities and people residing in crowded places; (4) that workplace preventive measures are established – with physical distancing, handwashing facilities, respiratory etiquette in place; (5) that importation risks can be managed; and (6) that communities have a voice and are engaged in the transition.

The authors suggest taking an escape by putting modification on a new normal life by doing it partially and with a single province pilot project at the beginning (perhaps in Jakarta only). Since many of Indonesian citizens are not trained or do not have sufficient knowledge to do a new normal, not to mention the availability of facilities and infrastructure for a new normal, their ability to do that is questionable. If people need to return to work from office, make sure that only the crucial sectors only are opened, distancing needs to be made by shifting the work and by avoiding crowds or gathering. For a vulnerable person such as one with underlying disease or more than 45 years old, need to consider to still work from home or be in a particular separate office room, even a separate hour to shop or to use public facilities (Crary et al., 2020).

Children are also considered the high-risk community (Foreigner, 2020; Yoshikawa et al., 2020), they still need to be kept safe and education can be done from home. The teachers need to be upgraded in this situation by training them to teach by the online system. It may be almost impossible to train children in Indonesia not to stay close to their friends, not to mention the habit of exchanging goods or foods. They may not wear their masks or face shield all the time because they may feel uncomfortable. The decision to re-open schools for children may cause school clusters of COVID-19 epidemic.

Prevention efforts for the danger of the second wave can be done by tracing first cases at a new red zone or a re-new red zone, to keep the cases isolated in a single village area and to prevent them from spreading to the broader area. This isolation is more possible if the policy is done by a local government (village or sub-village) with the help of volunteering citizens. Because the outbreak is an exceptional condition, we need to put public health and safety above privacy protection. This condition is especially when this one person does not know why and how he or she must keep the distance from their family and neighbors.

Further, the authors suggest regulating people's movement by determining which group can be mobile and which cannot. For example, couriers, logistics suppliers, police officers, and health professionals are included as the mobile group, and each need to receive specialized training on how not to spread disease to limited mobility or immobile group. Additional research is needed to explore further which new policies are best to be implemented immediately after the LSR is stopped.

5. Conclusion

This study confirmed that LSR has significant impacts on suppressing COVID-19 development. Each province may have different times of the beginning and end of the COVID-19 epidemic; therefore, each province needs to design their coping strategy according to their particular condition. When possible, a modification of a new normal life needs to be applied with caution, not to cause another wave of the epidemic.

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