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The Impact of Large-scale Social Restrictions on the Incidence of COVID-19 : A Case Study of Four Provinces in Indonesia

Izza Suraya¹, Mochamad Iqbal Nurmansyah^{2*}, Emma Rachmawati¹, Badra Al Aufa³, Ibrahim Isa Koire⁴

¹Faculty of Health Sciences, Universitas Muhammadiyah Prof. Dr. Hamka, Indonesia

²Faculty of Health Science, Universitas Islam Negeri Syarif Hidayatullah Jakarta, Indonesia

³Department of Hospital Administration, Vocational Education Program, Universitas Indonesia

⁴Institute of Science, Istanbul University, Turkey

Abstract

The Indonesian government has chosen to implement large-scale social restrictions (*Pembatasan Sosial Berskala Besar/PSBB*) to minimize the spread of COVID-19. Large-scale social restrictions is a government policy aimed at restricting the internal movement of people in a bid to reduce the spreading of SARS-CoV-2. This study aims at assessing the impact of large-scale social restriction measures on the incidence of COVID-19 cases in the four provinces of Indonesia. Time series analysis was used to describe the trends of COVID-19 case by using surveillance data from the Ministry of Health of Indonesia. Quasi-Poisson regression with an interaction model was used to estimate the incidence rate ratio (IRR). IRR was calculated to compare an incidence rate before and during PSBB implementation. The trend of COVID-19 cases in the provinces of West Java, East Java, Banten, and Jakarta continued to fluctuate. These four provinces continue to experience a significant increase in COVID-19 incidence rate ratio after the first and second PSBB period implementation compared to the time of before PSBB implementation. Lack of proper implementation of the large-scale social restriction led to the PSBB's ineffectiveness in reducing the number of COVID-19 cases in each of the provinces.

Keywords: COVID-19, incidence rate ratio, social restriction, time series analysis

Introduction

Despite the flattening of the coronavirus disease 2019 (COVID-19) curve by some countries, the number of cases in Indonesia continue to increase on a daily basis.¹ By May 11, 2020, the number of confirmed cases had reached 14,265, with 991 deaths.² Although the number of cases is not as high as in other countries, the Indonesian fatality rate from COVID-19 is, unfortunately, the worst among Southeast Asian countries.³ The main transmission routes of COVID-19 are through droplets, contact and aerosols; maintaining an appropriate distance from other people is among the preventive measures.⁴ Given the current situation, with the absence of vaccines and lack of proper treatment for COVID-19 cases, non-pharmaceutical interventions (NPIs) are the only methods to reduce transmission of the virus.⁵ Such measures range from standard precautions such as hand, respiratory and environmental hygiene; in the form of personal protective action taken by individuals, to actions requiring the engagement of communities and the involvement of local, regional or national authorities (e.g., social distancing and travel-related measures).⁶ These in-

terventions were important and necessary to minimize the spread of this epidemic and to reduce on the burden placed on the healthcare service.⁷

Governments' decisions to restrict the mobility of people in order to reduce the risk of spreading the virus have been very diverse; ranging from shutting down schools, workplaces, and transportation; restricting public gatherings; and imposing a 'stay at home' policy.⁸ As a response to the increase in the number of COVID-19 cases, the Indonesian government declared a national public health emergency on March 31, 2020. However, it declined putting the country under total lockdown owing to economic considerations.⁹ Later, the government chose to implement large-scale social restrictions (*Pembatasan Sosial Berskala Besar/PSBB*) as one of the policies aimed at restricting the internal movement of people in a bid to reduce the spread of SARS-CoV-2.¹⁰ PSBB measures included limiting certain activities, the mobility of people and goods within a certain area.¹¹

The scope of PSBB restrictions include: 1) the closure of schools and the workplaces, apart from central government offices, and businesses and transportation com-

Correspondence *: Mochamad Iqbal Nurmansyah, Faculty of Health Science, Universitas Islam Negeri Syarif Hidayatullah Jakarta, Kertamukti Road, South Tangerang 15412, Indonesia, E-mail: iqbalnurmansyah@uinjkt.ac.id, Phone: +62- 825-1618-8190

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panies that serve essential public needs, 2) restrictions on religious activities that involve mass gatherings, 3) limitations on activities in public places or facilities, 4) limitations on social-cultural activities, 5) limitations on modes of transportation, and 6) restrictions on other activities related explicitly to defense and security, but with military and police operation activities allowed. the *PSBB* in all regions of Indonesia, but only in a few, with the criteria for doing so based on the number of cases and/ or deaths due to a significant increase and spread of the virus in those specific regions. A province or city can impose *PSBB* after obtaining approval from the Indonesian Minister of Health. Its implementation for 14 days, based on the longest incubation period, and if there are new cases of COVID-19, this will be extended for an extra 14 days from the date of the last observed infected case.¹²

In May 11, 2020, four provinces and 22 cities were still implementing *PSBB* whereas one city had completed the process. The beginning of *PSBB* implementation among the different regions in Indonesia has been different. Jakarta Province was the first region to implement it, with the first *PSBB* period implemented be April 10-23, 2020, followed by a second period from April 24, 2020 until May 22, 2020. Even though some areas in Indonesia are still implementing *PSBB*, with many others requesting approval from the minister to do so, evidence of its effectiveness in flattening the COVID-19 curve remains unclear. The study aims to evaluate the effectiveness of *PSBB* measures on reducing incidence of COVID-19 in various areas of Indonesia.

Method

The study assessed COVID-19 cases of four provinces in Indonesia before and during *PSBB* implementation. We selected the four provinces with the highest number of confirmed cases in Indonesia, namely Jakarta (5,375 cases), East Java (1,669 cases), West Java (1,545 cases), and Banten (559 cases).¹³ The daily data of confirmed cases in each province in Indonesia was obtained from the Ministry of Health of Indonesia between March 19, 2020 and May 12, 2020. The *PSBB* period in each province was different, since ratification and implementation depended on the development of the specific number of cases in the region. Besides, *PSBB* also allows for the option to not implement it in all the cities in the same province, but only in a few, since not all cities in a province have the same incidence rates. Therefore, in this study West Java, East Java, and Banten Provincial Governments implemented *PSBB* only in regions that had met the criteria for doing so. The period of *PSBB* for each province and its city scopes can be seen in Table 1.

The data were analyzed using statistical software. Data analysis was performed using time-series analysis to observe the trends of COVID-19 cases in each

province. Descriptive statistics were used to calculate the average and standard deviation of confirmed COVID-19 cases before and during *PSBB* implementation. In addition, quasi-Poisson regression with an interaction model was performed to estimate the incidence rate ratio (IRR). The ratio was calculated to compare the incidence rate before and during *PSBB* implementation.

Results

Figure 1 shows the trend of COVID-19 cases in the provinces of West Java, East Java, Banten, and Jakarta, which continues to fluctuate. Table 2 shows the average number of cases in each province before and during the first and second *PSBB* periods. The average number in West Java continued to increase before, and during the first and second *PSBB* periods (19.62 ± 23.32 ; 29.95 ± 24.48 ; 41.14 ± 35.15). In Banten Province, cases before *PSBB* and during the first period decreased, but increased during the second period. In Jakarta, the average number of cases during the first *PSBB* period experienced an increase from the average before implementation, but later experienced a decline during the second *PSBB* period.

Table 3 shows the incidence rate ratio before and during the first and second periods of *PSBB* in the four provinces. We found most of the areas to have experienced a significant increase in the COVID-19 incidence rate ratio in the first and second periods of *PSBB* compared to the period before its implementation. In the first round of *PSBB*, the provinces of West Java, East Java, and Jakarta experienced increased incidences of COVID-19 compared to the pre-*PSBB* period. East Java showed the highest incidence rate ratio compared to the two other provinces, with $IRR = 2.62$ (95% $CI = 2.37 - 2.90$). In the provinces of West Java and East Java, after the adoption of the second round of *PSBB*, the incidence rate ratio was higher than in the first period. In Jakarta, the incidence rate ratio of COVID-19 decreased after the second *PSBB* period, compared to that in the first period.

Discussion

It is shown that the large-scale social restriction policy (partial lockdown) did not have a significant effect on reducing the number of COVID-19 cases in the four provinces studied. These results are different to those of a previous study conducted in Italy and Spain, which showed that the lockdown had an effect by decreasing

Table 1. Pembatasan Sosial Berskala Besar Period for Each Province

Province	Number of Cities	<i>PSBB</i> First Period	<i>PSBB</i> Second Period
Jakarta	2 city	10 April – 23 April	24 April – 22 May
West Java	5 cities	15 April – 28 April	29 April – 21 May
East Java	3 cities	28 April – 11 May	12 May – 25 May
Banten	3 cities	18 April – 1 May	2 May – 17 May

Note: *PSBB*: Pembatasan Sosial Berskala Besar

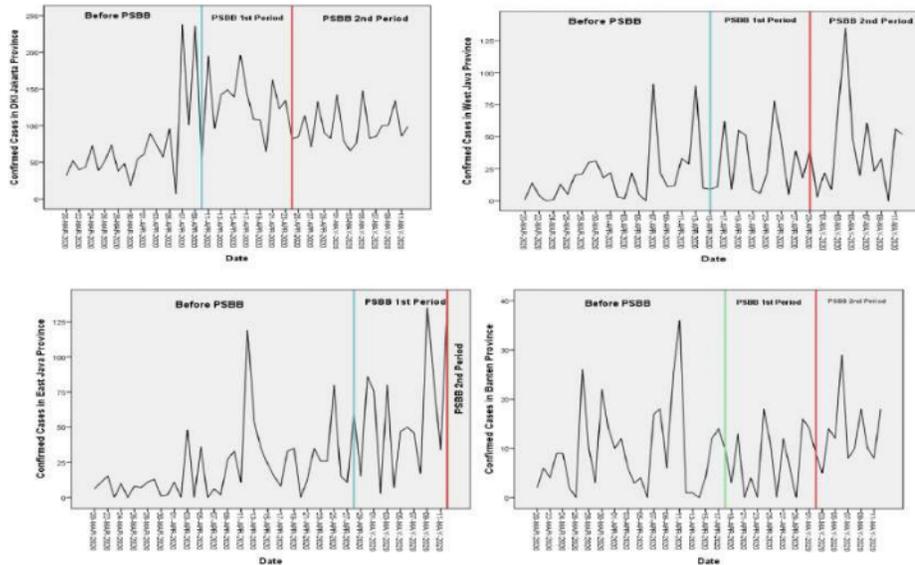


Figure 1. Daily Case of Covid-19 in West Java, East Java, Banten, and Jakarta Province

Table 2. Average Number of Confirmed COVID-19 Cases in Each Province and Period

Province	Mean + SD		
	Before PSBB	First PSBB	Second PSBB
West Java	19.62 ± 23.32	29.95 ± 24.48	41.14 ± 35.15
East Java*	20.18 ± 25.89	52.86 ± 37.05	-
Banten	9.52 ± 9.05	7.64 ± 6.52	12.82 ± 6.75
Jakarta	75.52 ± 59.58	129.36 ± 42.73	97.79 ± 24.76

Notes: PSBB: Pembatasan Sosial Berskala Besar; SD: Standar Deviation; * The second PSBB period had already started in East Java on 12 May 2020

diagnosed cases by 42.1% in Italy and 69.1% in Spain.¹⁴ Another study using the modelling method in India found that preventive measures such as social isolation and lockdown had an impact on the reduction of the spread of the virus.¹⁵ School and workplace closures and social distancing strategies are not new in response to influenza pandemics. A study by Jackson revealed that school closures reduced influenza transmission,¹⁶ while another study indicated that workplace measures could reduce incidence rates and slow the transmission of influenza.¹⁷

This study did not overlook the ineffectiveness of minimized physical contact measures in reducing the number of cases, but instead claims that the lack of community compliance was the real factor why intervention was not significant in suppressing COVID-19 incidents in Indonesia. This is supported by a study which found that PSBB policy was not effective in reducing the entry of human traffic from outside the Jakarta region. The

Table 3. Incidence Rate Ratio of Confirmed COVID-19 Cases Before and During the Pembatasan Sosial Berskala Besar Periods

Province	Incidence Rate Ratio		
	Before PSBB	First PSBB	Second PSBB
West Java	1	1.53 (1.34 – 1.73)*	2.10 (1.86 – 2.36)*
East Java	1	2.62 (2.37 – 2.90)*	6.52 (5.48 – 7.92)*
Banten	1	0.80 (0.64 – 1.00)**	1.35 (1.10 – 1.65)**
Jakarta	1	1.78 (1.67 – 1.91)*	1.35 (1.26 – 1.44)*

Notes: PSBB: Pembatasan Sosial Berskala Besar; *p-value ≤ 0.001; **p-value = 0.004; ***p-value = 0.054

movement of people from Bekasi (West Java) to Jakarta and from Banten to Jakarta after the Jakarta's PSBB policy had been implemented changed little compared to the movements before enactment. Daily mobility analysis has shown that a significant decrease in community mobility only occurred at weekends.¹⁸ A report from the Department of Transportation of Jakarta Province also shows that the number of vehicles entering Jakarta from West Java and Banten during the second period of PSBB was still high.¹⁹ A different report from the Jakarta Metro police states that after 16 days of PSBB, there were around 36,000 violations by motorcycle and car drivers related to PSBB policy, such as not wearing masks and gloves.²⁰ Moreover, the report states that during PSBB many non-essential workplaces were still ignoring the policies and requiring their workers to go to work amidst the physical distancing requirements.²¹

The underlying conditions to explain people's lack of

implementation of *PSBB* protocol are complicated. Restricted social and business processes impose short and possibly medium-term financial burdens.⁷ People, particularly those working in the informal sector, need to continue to work or open their businesses to obtain income. However, adherence to public health protocol might be affected by the existence of financial compensation for losses incurred.²² Research in the United States revealed that 39.8% of respondents reported not complying with social distancing recommendations.²³ Some of the reasons for this were work requirements for non-essential industries; engagement in social, physical or routine activities; and the belief that social distancing was not needed if other preventive measures were in place.²³

Conclusion

The study reveals the failure of *PSBB* policy to reduce the incidence of COVID-19 in Indonesia. We suggest that implementation of the policy is improved so that it achieves its objectives. Timely implementation with high compliance from the community could be a factor in the successful implementation of non-pharmaceutical interventions.²⁴ Therefore, the government needs to be stricter with certain communities and companies to effectively encourage them to adhere to large-scale social restrictions during the pandemic. On the other hand, the community should be more intensively engaged to enable them to manage the epidemic through the implementation of preventive measures at individual, family, and community levels.

Abbreviations

PSBB: Pembatasan Sosial Berskala Besar (Large-scale Social Restrictions); COVID-19: Coronavirus Disease 2019; NPIs: Non-Pharmaceutical Interventions; IRR: Incidence Rate Ratio.

Ethics Approval and Consent to Participate

No ethical approval was required for this study, which relied solely on open-access public data.

Competing Interest

The authors declare that there are no competing interests to disclose.

Availability of Data and Materials

The data that support the findings of this study are available, upon reasonable request.

Authors' Contribution

Izza Suraya and Mochamad Iqbal Numansyah participated in the design of the study; Izza Suraya and Mochamad Iqbal Numansyah participated in data collection; Izza Suraya participated in analysed the data; Izza Suraya, Mochamad Iqbal Numansyah, Emma Rachmawati, Badra Al Aufa and Ibrahim Isa Koire helped to draft the manuscript. All authors revised the manuscript critically and approved the final ver-

sion of manuscript.

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