An evidence-based culture: implementing a large-scale social restriction policy on the COVID-19 prevention protocol in Jakarta

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Abstract. COVID-19 has a severe and widespread impact, especially in Indonesia. One of the efforts of the DKI Jakarta Provincial Government in reducing the risk of spreading the virus is by implementing a Large-Scale Social Restriction (hereafter referred to as PSBB) policy. The hope of implementing this policy is to detain or even reduce active (positive) cases in Jakarta. In this paper, we conduct Exploratory Data Analysis (EDA) to analyze and evaluate the effect of the PSBB policy that has been made by the DKI Jakarta Provincial Government in minimizing the active cases and in increasing the number of tests in Jakarta. The results show that the PSBB policy was not directly able to limit the rate of active cases, but specific cases of people in intensive care were able to be suppressed. The results suggest that the other local governments can use EDA method in making further policies and interventions for handling COVID-19. The results also indicate that the public is expected to continue to take preventive actions, such as complying with health protocols established by the government.

Keywords. PSBB, COVID-19, Jakarta, exploratory data analysis, testing, data-driven policy.

1. Introduction

In December 2019, the COVID-19 outbreak began to spread in Wuhan, China. The World Health Organization (WHO) declared it a "Public Health Emergency of International Concern" on 30 January 2020 and upgraded the status to a pandemic on 11 March 2020 [1]. COVID-19 is a new disease that can cause respiratory problems and pneumonia. This disease is caused by infection with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Clinical symptoms that appear vary, ranging from common cold symptoms (cough, runny nose, sore throat, muscle aches, headache) to severe complications (pneumonia or sepsis). From various studies, the primary method of transmission of this disease can be through respiratory droplets and close contact with sufferers [2]. People who are infected may have mild symptoms, such as fever, cough, and difficulty breathing. Indonesia as the fourth most populous country in the world is predicted to face a significant threat to this pandemic, especially Jakarta...
as the capital city and the centre of the national economy [3] [4]. The spread of COVID-19 cases in Jakarta continues to increase, for instance, people who have been confirmed positive and died due to the COVID-19 virus, from early March 2020. There was quite a stable period between 1 May – 7 July 2020 however, from 8 July to this day, active cases been in an upward trend.

Various efforts by the Indonesia and Jakarta governments have been made in dealing with the transmission of this virus. Governor Regulation 33/2020 concerning the implementation of Large-Scale Social Restrictions (PSBB) was issued on 9 April 2020. A virologist in the United States noted that stopping travel is the best way to stop the spread of the virus [5]. Apart from the social restriction policy, the DKI Jakarta Provincial Government has also increased the testing capacity. According to the World Health Organization (WHO), Jakarta is the only city in Indonesia that has achieved the minimum case detection benchmark, which is 1 per 1,000 populations per week [6]. The increasing capacity of the testing performed, the more active cases were found, both self-isolation patients and under-treatment patients. This means that the hospital bed capacity is reduced. The bed occupancy rate (BOR) has become our concern. BOR is a measure of utilization of the available bed capacity in a hospital. It indicates the percentage of beds occupied by patients in a defined period.

Currently, the development of research on this virus continues to progress and change rapidly until now, including efforts to find a vaccine. On 27 May 2020, WHO published updated interim guidance on the clinical management of COVID-19 [7] [8] and provided updated recommendations on the criteria for discharging patients from isolation. The updated criteria reflect recent findings that patients whose symptoms have resolved may still test positive for the COVID-19 virus (SARS-CoV-2) by RT-PCR for many weeks. Despite this positive test result, these patients are not likely to be infectious and therefore are unlikely to be able to transmit the virus to another person [9] [10] [11]. The reason for the change is that the initial recommendation of two negative RT-PCR tests at least 24 hours apart, has been complicated in light of limited laboratory supplies, health care facilities, and health care workers in areas with highly infectious or transmission. One of the challenges is long periods of isolation for individuals with prolonged viral RNA detection after the resolution of symptoms, affecting individual well-being, society, and access to healthcare [12]. Moreover, insufficient testing capacity to comply with initial discharge criteria happen in many parts of the world. In the Indonesia context, not many cities have adequate health care facilities that could provide all the requirements from WHO.

There was a slight change in terms of terminology based on the Decree of the Minister of Health Number HK.01.07/MENKES/413/2020 [13]. Started 30 July 2020, Jakarta official COVID-19 website also changed the design of the website by focusing more on providing active cases and testing capacity data. As a government, Jakarta Province plays a significant role in making policies related to the COVID-19 pandemic. The government of DKI Jakarta Province considers the balance of various aspects, such as the health side, the limitations of health facilities, the development of science and research, as well as other elements such as economic, social and psychological aspects. In this case, the role of data and analysis can help the government. As written in the journal *The Use of Big Data in The Public Policy Process: Paving the Way of Evidence-Based Governance* which shows that data can be used to increase efficiency, effectiveness, government transparency, and better service providers based on increasing insight into needs and citizen demands, as well as more informed policy-making [14].

This paper aims to analyze the impact of the large-scale restriction on the COVID-19 cases and testing capacity in Jakarta. Data-based evaluation means, in monitoring and evaluating the policies that have been implemented, the Jakarta Provincial Government does not rely solely on intuition or the subjective opinion of policymakers but makes use of the results of data analysis. The approach chosen in this article is exploratory data analysis (EDA). EDA was selected because its application adapted to the context and details of the study. Data is explored from various perspectives so that EDA does not stick to a standard technique. EDA has flexible characteristics and is needed to identify and investigate a phenomenon that occurs when conducting empirical research [15]. Due to balancing the health reason, considering the unnecessarily prolonged the isolation period that excluded from work or other responsibilities, limitation of the healthcare facilities and personnel, the analysis and pattern of the data are expected to give an invaluable contribution to the decision and the making of the better policy.
The structure of the writing of this paper is as follows: Section 2 provides information regarding the data set and methodology used in the study. Section 3 presents the result of the analysis related to the use of EDA method and other research related to the COVID-19 trends. Section 4 discusses how the findings could help with the implication for a concrete recommendation. Finally, Section 5 concludes this paper with conclusions and recommendations.

2. Methodology

Data processing for analysis of the spread of COVID-19 cases and testing in the DKI Jakarta Province consists of several stages. The first stage is getting the data from data sources. The primary data comes from the DKI Jakarta Health Office. The data consists of daily COVID-19 data which comes from the COVID-19 database used by the Health Office, Puskesmas (community health centres), and hospitals. Data collection was carried out by the DKI Jakarta Provincial Health Office Surveillance at each level of health facilities spread across Jakarta. The data period used is from 3 March to 24 August 2020. The data is in a table format and is updated every day. The second stage is data processing by the Jakarta Smart City and the Spatial Planning and Land Service Agency (Dinas Cipta Karya, Tata Ruang, dan Pertanahan or Citata). The third stage is the process of data preparation and cleaning, which is ensuring that there are no redundant data or inconsistent data conditions. Finally, the fourth stage is data visualization to the corona.jakarta.go.id microsite, and it is updated every day. Figure 1 below shows a flow diagram of the data processing process.

![Data Processing Diagram](Figure 1)

The data consists of COVID-19 patient's data along with information on gender, age group, and location. Also contains daily time series summary tables, including the number of active cases, new daily cases, self-isolation patients, under-treatment patients, and the number of testing in the past number of days from which the pandemic started in Jakarta, Indonesia. The data period used is from 3 March to 24 August 2020. These datasets are good quality data because each dataset has the following characteristic elements: credibility, availability, reliability, relevance, and readability [16].

After the quality of the dataset is guaranteed, the next step is to apply the Exploratory Data Analysis (EDA) method. EDA is a data exploration method using basic statistical techniques and data visualization techniques to summarize observational data [17].

![Exploratory Data Analysis Process](Figure 2)

Figure 2 shows how the EDA approach process will be carried out. The first step, namely ‘Types of Data’ or knowing the data type of each field (column) to be used, whether the data is categorized as categorical or quantitative. The next step is ‘Dimensionality of Data’ or knowing the dimensions of the
data, whether the data is one-dimensional (univariate), two-dimensional (bivariate) or multi-dimensional (multivariate). Then the ‘Numerical Summaries of Data’ is carried out or look at the numerical summary of the datasets such as the mean, median, standard deviation and others to find out the statistical conditions of the data. The final stage is ‘Graphical Summaries (Visualization) of Data’ or visualization to get interesting patterns and information related to the dataset being analyzed [18]. Selection of charts is adjusted to the purpose of the information to be obtained, the types and dimensions of data that have been known from the previous process.

With this approach, data can be explored from multiple perspectives because EDA is not fixated on a standard tool or technique [15]. The EDA approach is considered adequate in this context because this study does not require complex analytical methods. It is sufficient to observe patterns in general and see the relationship between several variables.

3. Results

This paper shows data analysis and exploration from Jakarta's COVID-19 data. The policy timeline can be divided into several periods: 1) PSBB Stage I: 10 April – 23 April 2020; 2) PSBB Stage II: 24 April – 22 May 2020; 3) PSBB Stage III: 23 May – 4 June 2020; 4) PSBB Transition Stage I: 5 June – present (on progress extended). Figure 3 shows the gender of COVID-19 patients.

![Figure 3](image3.png)

**Figure 3.** Active Case Gender (cut off 24 August 2020)

As shown in Figure 3, there is no significant difference between the gender affected by COVID-19. It can be assumed that the COVID-19 virus does not have more impact or transmit to a specific gender. Furthermore, Figure 4 shows the affected age groups per gender. The result indicates that up to the cut off on 24 August 2020, women who are involved in the age range of 20-39 years reach 49.17% while men who are involved in the age range of 20-39 years reach 44.18%. From the data, it can be seen that the productive age population dominates the affected age, this is possible because the community of that age is still actively engaged in mobilizing or working activities outside the home.

![Figure 4](image4.png)

**Figure 4.** Active Cases Gender and Age Distribution (cut off 24 August 2020)
From the location data, it can be seen that the most active cases are in the Cilincing sub-district (Figure 5). The map in Figure 5 shows the information by way of color grading. Where the darker the color gradation is shown on the map (sub-district boundary), indicates the more positive case population. Figure 6 shows the distribution of active cases per districts in Jakarta. East Jakarta is the city area with the most active cases (23.87%) if it excludes unknown data.

![Figure 5](image1.png)

**Figure 5.** Mapping of Active Cases per District (cut off 24 August 2020)

![Figure 6](image2.png)

**Figure 6.** Active Cases per Municipality per Gender (cut off 24 August 2020)

![Figure 7](image3.png)

**Figure 7.** Active Cases Trend (3 March – 24 August 2020)

Started 30 July 2020, the design of corona.jakarta.go.id had been changed. The DKI Jakarta Province focuses on giving information about active cases and testing data. From Figure 7, we could see the active case number. In each period of Large-Scale Restriction, it does not appear to be very helpful in reducing
the development and increase of active cases. Active cases are patients with status under treatment (intensive care) or self-isolation. From 1 May – 7 July 2020, it can be said that active cases in Jakarta are relatively stable (there has not been a significant decrease or increase). However, from 8 July until now, active cases have an upward trend. Active cases continue to rise due to new cases continue to increase every day, which we can see in Figure 8.

![New Daily Cases](image)

**Figure 8.** New Daily Cases (3 March – 24 August 2020)

As shown in Figure 8, the addition of new cases was relatively constant from the time the PSBB Stage I was implemented to the end of the PSBB Stage 3. However, since the PSBB Transition Stage I until now, daily new cases tend to experience a sharp increase. This trend does not merely mean the influence of social restriction policies that are not functioning correctly; of course, various factors influence this daily increase. The increment in new daily cases was mainly due to increased testing capacity. On the other hand, we might see from different perspectives such as people and transportation mobility during PSBB, whether we might conclude that people obey this policy. There needs to be further research as well as to how effective the people in Jakarta apply these social restrictions.

![Active Cases](image)

**Figure 9.** Self-Isolation & Intensive Care Cases (3 March – 24 August 2020)

Interestingly, when we look at a fraction of the active case. We can see active cases consisting of self-isolation and under treatment (intensive care) in Figure 9. The data shows that people who were in intensive care gradually decreased in the period from 10 May to 7 July 2020, which reached its lowest point of 405 people. But then it increased until it reached its peak, 2922 people, on 23 August 2020. This result suggests that from the PSBB stage II policy, it was able to reduce the number of people in intensive care, although the last 1.5 months had increased again. The initial hypothesis why patients in intensive care increased again at the end was that health workers were increasingly overwhelmed in
handling COVID-19 patients. We can also see through the chart availability of beds in the hospital below.

In contrast to people in intensive care, people with self-isolation status, in general, continued to experience an exponential increase from the start of cases to the period 21 August 2020, there was a significant decrease on 22–23 August 2020. However, the numbers were still far above those in intensive care. People with self-isolation status indicate the patient's condition is not experiencing severe enough symptoms so that they can carry out self-care and quarantine at home. Also, it is beneficial for overloaded health workers, so that health workers can take care of people who are more in need of the hospital.

The increasing number of active cases is due to the DKI Jakarta Provincial Government implementing active case finding. The number of PCR and RDT tests conducted in DKI Jakarta is the highest compared to other cities in Indonesia and reaches WHO standards. The ability of the number of tests that meet this standard cannot be separated from the cooperation of various parties, both government-owned and private laboratories.

Figure 10. Positivity Rate and Number of Tested People (cut off 23 August 2020)

Figure 11. Bed Occupancy Rate ICU & Isolation (1 – 27 August 2020)

The positivity rate is the ratio between positive people and the number of people tested. As shown in Figure 10, the number of people tested in Jakarta continues to increase. Due to minimum testing, the positivity rate peaked at 56.71%, on 1 April 2020. We could see after the testing capacity increased, it was able to decline and stabilize, the average positivity rate until 23 August was 8.79%.
The data that is also related and needs attention is the bed occupancy rate. The Bed Occupancy Rate (BOR%) is a measure of utilization of the available bed capacity in a hospital. It indicates the percentage of beds occupied by patients in a defined period. From the data from the Jakarta Health Office, as shown in Figure 11, the use of beds in ICU is 79.3% and in isolation 68.29%. This data is data from a total of 67 COVID-19 Reference Hospitals in Jakarta. If it gets higher, of course, it indicates that the beds in the hospital for COVID-19 patients are running low, and this needs to be a common concern.

4. Discussion

This paper shows data analysis and exploration from Jakarta's COVID-19 data. In addition to exploring the Jakarta COVID-19 data, we also saw the impact of large-scale social restriction (PSBB) on the results of active cases, the number of tests, and the implicated bed capacity. The policy timeline can be divided into several periods: 1) PSBB Stage I: 10 April – 23 April 2020; 2) PSBB Stage II: 24 April – 22 May 2020; 3) PSBB Stage III: 23 May – 4 June 2020; 4) PSBB Transition Stage I: 5 June – present (on progress extended).

As research on COVID-19 continues to progress to date, the efforts and policies that are being made by the government of DKI Jakarta Province can be more effective. From the data analysis carried out, we can say that the PSBB policy did not influence efforts to hold back the rate of the addition of active cases in general. However, we can see that specific cases of people in intensive care have been successfully suppressed and even decreased. This information is a good thing considering the capacity or availability of beds in hospitals is also increasingly limited. So that we have to prioritize those who need to be hospitalized, it can be seen that people with an increasing status of self-isolation are a good sign.

Apart from active cases, along with the implementation of this PSBB policy, the Jakarta Provincial Government continues to increase the number of tests. As long as a vaccine has not been found, one indicator of a country or region that can be said to be successful in efforts to deal with COVID-19 is to pay attention to and increase testing capacity, especially PCR. Not only Jakarta, the official website of Tokyo, Japan also emphasized their test number data [19]. The more people who are confirmed positive, the treatment for those in need will be maximized. It is also not dismissed, of course, that the increasing number of tests can increase the number of positive cases (daily and accumulated). Another challenge is how to determine whether these self-isolating patients can completely escape without using multiplex PCR tests, given the limited cost and number of health facilities. In addition, self-isolation for workers who are affected and unable to do work from home needs to be considered for their mental health. We must balance the isolation time, which is not required so that people can also return to their work and their responsibilities; we must keep abreast of the latest research developments.

In this case, the government takes a significant role in making policy. Various aspects are, of course, taken into consideration. So far, the DKI Provincial Government has carried out the Phase I Transition PSBB Extension for the fifth time. How to make policies that emphasize health aspects, limited health facilities, mental and psychiatric health, economy, and various other essential elements is a difficult task and needs consideration and discussion from multiple parties.

5. Conclusion

This study aims to analyze Jakarta's COVID-19 data. Since the beginning of the outbreak of COVID-19 cases in Jakarta in March 2020 until now (cut off 24 August 2020), the age range of those infected with COVID-19 is consistent in the age range of 20-39 years. The PSBB policy carried out by the government was not directly able to restrain the rate of the addition of active cases in general. Still, specific cases of people in intensive care were able to be suppressed and even decreased. This information indicates a good sign considering that there are limited health facilities in the hospital. The number of tests that continues to increase is also a good indicator because the more people who are confirmed positive are found, the treatment for those in need will be maximized. Of course, the increasing number of tests also directly impacts the number of active cases. This paper presents an overview of the government in making additional policies. Since the research on COVID-19 still
progressing, thus the challenge is how the government could take a balanced system and pay attention to various aspects such as health, limited health facilities, mental health, economy, and many other things.

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