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Effects of COVID-19 restriction measures in Indonesia: A comparative spatial and policy analysis of selected urban agglomerations

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ARTICLE INFO

Keywords:
COVID-19 policy analysis
Urban agglomerations
Indonesia

ABSTRACT

With higher densities, urban agglomerations account for the fastest rates of COVID-19 transmission. In Indonesia, one of the most rapidly urbanizing regions in the world, the national government issues overall policy on the pandemic. However, implementation is often contingent on local governments. Many policies aim to stem the spread of infection by controlling people’s mobility or regulating their daily activities. Urban agglomerations are a strategic site of investigation in this light, because they consist of interconnected communities governed by various levels and jurisdictions. This paper analyzes the effects of policy interventions relative to confirmed cases in the seven major urban agglomerations in Indonesia (totaling 30 municipal/district governments). Data were collected from confirmed and fatality trends from March to mid-October 2020, which were contrasted with corresponding policies for each jurisdiction. By sorting the indicators of the spread of the pandemic and its corresponding control measures, we reach conclusions about which dimensions served to curb or trigger the surge of COVID-19 clusters. The analysis unsurprisingly shows that within each agglomeration, the main cities continue to represent the highest number of confirmed cases despite variations between them. This study also highlights two key findings. First, the effectiveness of distancing measures depends considerably on the capacity of governments to implement restrictions. For example, budget limitations resulted in uneven implementation of national mandates by decentralized authority. Facilities and services at different locations also influence our understanding of disease transmission. Second, people’s ability and willingness to engage with a policy regime is contingent upon personal values or economic constraints. The study shows that viewing the spatial distribution of COVID-19 at the scale of urban agglomerations helps to explain key aspects of transmission and policy, pointing to recommendations about pursuing certain protocols. Nevertheless, key challenges remain to meet the full potential of this analytical approach, due to relatively low levels of testing and inadequate data collection measures in Indonesia.

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https://doi.org/10.1016/j.ijdrr.2022.103015
1. Introduction

While global policy guidance on the COVID-19 pandemic is coordinated by the World Health Organization (WHO), nevertheless, most of the policy frameworks and implementation take place within the contours of state policies. This means that protocols on mobility, quarantining, testing, and others are largely facilitated by national governments, with some variations taking place in sub-national policy contexts. Studies have shown considerable differences in terms of centralized approaches that differ within and between regions, such as experiences in East Asia, or country-specific policy studies in Korea [1], China [2], and Vietnam [3], as well as approaches across Asia and Europe [4], the United States, and others. As state policy frameworks differ from one place to the next, so do the overall agencies tasked with overseeing implementation. Some countries employ lead agencies in public health, while others have treated the pandemic as a national emergency or disaster.

Once the disease passes through national border checkpoints, the likeliest and most susceptible areas of transmission are high density cities that have not instituted protocols to physically distance infected populations. Unsurprisingly, large cities across the world have experienced higher risks due to their density, but at the same time also benefit from a higher adaptive capacity due to better access to health care facilities. A case in point is reflected by trends unfolding in the United States, whereby Hamidi et al. [5] concluded that connectivity matters more than density. Accordingly, not only are settlement patterns based on density an important element for understanding transmission, connectivity between neighborhoods and municipal jurisdictions also demands greater attention.

In this paper, we examine Indonesia’s urban metropolitan regions as a way to explore the highest density regions alongside their connectivity across urban agglomerations. We do this by also considering variations between policy interventions across jurisdictional boundaries. Nationally, Indonesia was late to institute public health protocols [6]. As the fourth largest country in the world, spread across a vast archipelago, the dynamics of disease transmission are unique for its connectivity within a state jurisdiction across geographic separation over many islands. Indonesia is also one of the fastest urbanizing countries, with seven rapidly growing urban agglomerations [7]. We employ the phrasing “urban agglomeration” to refer to metropolitan areas that extend across administrative boundaries, consisting of the main city and its neighboring districts/municipalities. The uneven populations across the country create different levels of risk among regions. For example, although Java is home to nearly 60% of Indonesia’s total population, the island only accounts for 6.75% of its land area [8]. Java is also the locus of Indonesia’s economic and political activity. The densely populated island unsurprisingly has higher rates of COVID-19 transmission, and garners greater attention of public services.

Like the rest of the world, Indonesia is facing significant impacts and loss of life from the COVID-19 pandemic. By the end of October 2020, nearly 400,000 people have been exposed to COVID-19 in Indonesia, and more than 13,500 have died [9]. Unlike most natural hazards that have been understood quite well, the virus causes new complexities that state systems have been hitherto unprepared to address. Therefore, all policy measures are being applied at a high level of uncertainty [10]. The policy cannot be focused only on the public health sector, but it needs to be integrated with other related sectors, particularly due to the vulnerability associated with the significant loss of livelihoods. An intense policy debate unfolded at the initial onset of the pandemic, which focused between two seemingly competing choices: lockdown to control the disease spread or maintain economic activity by allowing a limited lockdown. Indeed, the COVID-19 pandemic has made a disaster-prone area like Indonesia even more vulnerable, particularly due to the risk of cascading disasters.

Tapped as the lead agency, the National Disaster Management Agency (BNPB) has treated the pandemic as a disaster, resulting in BNPB establishing a chain of command response structure, supported by an interagency taskforce that includes the Ministry of Health, the Military, and other ministerial agencies [11]. Nevertheless, due to Indonesia’s decentralized governance authority, coordination between the central and local governments in disaster management has faced its challenges [12,13]. The pandemic should be viewed not only in the scope of actions by the national taskforce and oversight within administrative areas, but also in terms of vertical and horizontal coordination and implementation. In particular, there is a capacity gap (in financial capacity, human resources, access to information, and others between jurisdictions) among local governments that hinder collaboration across governmental agencies [14,15]. For instance, DKJ Jakarta is well-endowed with resources to implement policies relative to the urban agglomeration, and though there is interconnectivity of movement, jurisdictional boundaries reshape service delivery.

This paper focuses on explaining the spread of the COVID-19 pandemic from March to mid-October 2020 between the seven major urban agglomerations of Indonesia. We provide a spatial representation of these dynamics through a series of maps and temporal graphs to show the spread of the disease. We thereafter collate various policy responses in each of the jurisdictions of urban agglomerations as a basis for explaining the transmission as well as the impacts of policies that have been sought to stem its expansion. Overall, we are concerned with the convergence of data on the spread of disease amid a pandemic, its relationship to policies addressing continued infections, and the overall disaster management context in which it has taken place. Section two presents our overall methods. Section three highlights key aspects of our findings around the rise of confirmed cases and deaths between March and mid-October 2020 juxtaposed with the implementation of certain non-pharmaceutical interventions (i.e., distancing policies and mobility restrictions). This analysis is backed by spatial representations of findings across the seven major urban agglomerations in Indonesia. The discussion points to issues with data credibility and collection, and though these were triangulated by available media accounts, conclusions imply the importance of better overall planning and coordination that reinforce data-informed decision making and communication systems. Nevertheless, the approach and the findings point to a potential area of development for planners and policymakers to better track the dynamics of a pandemic and the corresponding effectiveness of response measures.

2. Methods and selection of urban agglomerations

Data collection was guided by our interests in identifying confirmed infections and deaths between March to mid-October from selected urban agglomerations. These were then transposed against policies introduced to stem further transmission. The urban
agglomerations include municipalities and districts that are part of the seven continuous and most significant urban agglomerations in Indonesia, spread across Java, Sumatera, Sulawesi, and Bali (see Fig. 1). The selected areas represent the highest numbers of COVID-19 cases in Indonesia and mirror the overall trends of rapidly growing urban agglomerations. The selected agglomerations have various forms between their urban core and surrounding peri-urban areas. Fig. 1 further highlights the seven agglomerations relative to their total area and population. Secondary data on infections and deaths were collected from official government websites providing updates on COVID-19 developments from provincial and municipal/district governments (see Table 1). Demographic and spatial data were also fundamental for this research as we used data on density, case distribution, and spatial clusters to the extent possible in order to highlight the trends of COVID-19 cases in the study areas.

As for demographic and spatial data, we analyzed density, case distribution, and spatial clusters to the extent possible to highlight the trends of COVID-19 cases in the study areas. We use the 2019 latest secondary data from the Central Bureau of Statistics. As the island with the highest density in Indonesia, urban agglomerations located in Java (i.e., Greater Jakarta, Bandung, Semarang, and Surabaya) have a significantly higher population than the urban agglomerations outside Java (Greater Bali, Medan, and Makassar).
comparing the population and total area, it is generally recognized that the population density in the Java urban agglomerations is higher compared to those outside Java. As the national capital, Greater Jakarta produced much more confirmed cases (up to 311,000 until mid-October) compared to the other agglomerations.

As of 28 October, the Government of Indonesia announced 400,483 accumulated (4029 new) confirmed cases of COVID-19, 13,612 (100 new) deaths, and 325,793 recovered cases from 502 districts across all 34 provinces. The daily average number of people tested for COVID-19 with PCR was 27,344 and the cumulative number of people tested was 2,805,313. The percentage of positive samples can be interpreted only with comprehensive surveillance and testing in the order of one person tested per 1000 people per week. This minimum case detection benchmark was achieved in DKI Jakarta, West Sumatera, East Kalimantan, and West Papua for the previous three weeks, but none of these provinces had a positivity rate of less than 5%. The testing ratio data among provinces (see Annex 1. A.3) showed a significant gap between Greater Jakarta and the rest of the agglomerations (see Fig. 2). While Greater Jakarta could test more than 5000 people for every million in population, other agglomerations could only do it to about 300 people at maximum. Greater Bandung could not even test 100 people at the same ratio despite having the second largest population among the seven agglomerations. These testing realities indicate the generally low capacity of the agglomerations other than Greater Jakarta (regarded as an outlier) at conducting their COVID-19 testing.

Our analysis then proceeded to identify case trends in terms of transmission and deaths by presenting statistical data in each of the

![Fig. 2. Testing Ratio per 1 million Population in Each Agglomeration per 29th September 2020. Source: calculated from Ref. [16].](image)

![Fig. 3. Proportion of confirmed cases in the seven selected urban agglomerations from mid-march to mid-october.](image)
jurisdictional areas of an urban agglomeration. The dynamics of COVID-19 development between municipal and peri-urban area
districts/municipalities are also shown spatially as part of the analysis. We then analyzed transmission and deaths relative to the
timeline of policy interventions and sorted them together with the types of different measures from municipal and district govern-
ments. We utilized six types of policy measures: 1) school from home, 2) work from home, 3) mobility control and travel restriction, 4)
limitations on religious activity, 5) limitations on social and cultural activities, and 6) restrictions on the use of public places/facilities
from the selected city and district governments to analyze their effects on the development of COVID-19 cases in the study areas. There
was also mandatory masking, body temperature monitoring, and social distancing for those in public areas or meeting in groups.
However, because these health protocols had to be applied everywhere nationally, in this study we only analyze the different dynamics
that resulted from applications of the six overarching types of policy measures.

We also complemented the data with reports from online news portals to provide supporting evidence on the broader scope of
outbreaks and added nuance to the quantitative data around COVID-19 developments. To show the data of transmission and death
related to COVID-19, we needed to establish a proportion index to better compare the cases between cities. This is because some cities
have a much higher population than their neighboring regions. The proportion index is the number of cases relative to the population
as highlighted in our analysis in Figs. 2 and 3.

Results from the policy analyses were used to examine the connection between COVID-19 transmission and applied policy re-
strictions. The analysis also included the identification of cluster groups based on activity and different policy violations. Overall, we
set out to identify the distribution of cases between the main cities and their corresponding peri-urban areas, as well as dimensions
emerging between agglomerations. Analytical results were also presented by region to highlight specific trends and then scaled out to
identify key similarities and differences between the different sites.

3. Findings

3.1. Cases and fatalities in selected urban agglomerations over time

Along with the release of Presidential Decree September 2020 about the Task Force for Rapid Response to COVID-19 on March 13,
data on COVID-19 cases and fatalities have been reported to the public. The data provided the basis for developing Figs. 2 and 3. Annex
1 provides more detailed compilation of confirmed cases and deaths across the seven urban agglomerations.

Fig. 3 illustrates confirmed cases and highlights several key features. Jakarta, the capital and most populous city, surpasses all other
jurisdictions in terms of total confirmed cases. This is followed by Makassar, Surabaya, Denpasar, and Medan, which are the main cities
of each corresponding urban agglomeration. In comparison to all other jurisdictions, Semarang and Bandung remain at lower rates of
confirmed transmission than other peri-urban areas but are higher relative to their surrounding peri-urban areas. In general, peri-
urban areas have a lower proportion than the main cities. This finding is explained by the higher density of the main cities relative
to their peri-urban areas. Nevertheless, these figures could also be a factor of the availability of testing facilities in the main cities. In
addition, many commuters living in peri-urban areas (particularly Depok) were tested as part of office regiments at their workplaces in
Jakarta, in which the transmission figures were recorded in Jakarta. The mayor of Depok also suggested that up to 70% of confirmed
cases in Depok in August were actually imported cases from people working in the Jakarta area [17]. Despite the steady growth of all
cities and surrounding peri-urban areas, confirmed cases have considerably increased in Jakarta since mid-June. The growth rate was
even higher after the second week of August: About 740 cases were confirmed in mid-March, which significantly grew to 92,780 cases
by mid-October.

For COVID-19 related death rates, Semarang and Surabaya outpaced all other jurisdictions (see Fig. 4). Surabaya was the first to
experience a significant rise in the number of deaths as numbers began to increase rapidly in the second week of May. However,
Semarang exceeded Surabaya in the death rate beginning in August. In Semarang, the number of deaths in April amounted to 30 people and increased to 860 deaths by mid-October. Although Jakarta’s total number of confirmed cases and deaths is far higher than the other main cities and peri-urban areas (see Annex 1), the proportion of the casualties in Semarang and Surabaya is significantly higher than in Jakarta.

There would be two explanations for this. The first is that the death cases may be higher in the smaller cities surrounding the other urban agglomerations as the surrounding cities provide limited health care compared to larger cities (e.g. Jakarta). Another possibility is that death cases are based on reports from hospitals. As the capital city of Central Java and East Java provinces, Semarang and Surabaya need to provide health-care for the entire province, which means that the deaths recorded there is a reflection of the broader region. Some hospitals in the city function as the referral hospital to serve the neighboring districts. It is therefore likely that the death cases of these two cities are not only a reflection of the inhabitants of the core cities.

Despite the differences between cities and peri-urban areas of confirmed cases and deaths illustrated in Figs. 3 and 4, in general, both figures show an increasing trend from March to mid-October. Only the Bandung agglomeration (city and peri-urban) shows a slightly better performance than other urban agglomerations. This may be the case because the Governor of West Java Province took earlier initiative for mass testing than other provinces, in addition to the fact that Bandung City has sufficient laboratories, so they can reduce the time needed to get the result of the test [18]. Indeed, the overall trend shows that all applied restriction policies could not control the spread of the disease up to mid-October. Even though the peri-urban cases are lower in severity than the main city, the close connection between the two generates more potential spread of cases in both types of areas. Higher densities in the main city may also result in additional confirmed cases and deaths.

### 3.2. Policy measures

In this section, we review all policy measures/restrictions introduced to curb the spread of the COVID-19 pandemic beyond the application of basic health protocols of mandatory masking, body temperature checks, and social distancing in public areas or group meetings. These measures are then mapped against each jurisdiction and the timing that each measure was instituted to identify the impacts of each policy measure.¹

During the pandemic, we traced all decrees of each selected province, city, and district. The governments imposed six overall types of restrictions/measures, including (1) schooling, (2) workplace, (3) religious activities, (4) activities at public facilities, (5) socio-cultural activities, and (6) mobility of people and goods. The naming of restrictions in each agglomeration varies but it is commonly known as PSBB (Pembatasan Sosial Berskala Besar or Large-Scale Social Restrictions). All policies are enacted by subnational governments except for the education sector, which is centralized under ministerial jurisdiction. Each city/district applies different levels of restrictions contingent on budget availability. In March 2020, a National Budgeting Policy assisted in regulating the allocation and management of funding to address COVID-19. However, this had a minimal effect because of limited support from the central government. As a result, districts in Maros and Gianyar adopted less restrictive measures. Each type of policy measure is explained in Table 2.

### 3.3. Emerging clusters

The data on clusters highlight extensive transmission at the same place and time. The data also shows that these clusters emerged because of violations against control measures on distancing restrictions. Reports point to the lack of distancing between people

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1. Given that this covers many jurisdictions, the summary data are presented in Annex 2.
Table 3
Emerging clusters in seven major Indonesian urban Agglomerations.

| Agglomeration       | Main City and Peri-urban | Cluster Types                  | No. of Clusters | No. of Cases |
|---------------------|--------------------------|--------------------------------|-----------------|--------------|
| Greater Jakarta     |                          | Residential Complex/Dormitory⁶ | 7               | 238          |
|                     |                          | Religious Activities³          | 7               | 371          |
|                     |                          | Public Facility²               | 4               | 222          |
|                     |                          | Market/Trading Center⁴         | 5               | 164          |
|                     |                          | Office²                        | 67              | 3800         |
| Bogor City**        |                          | Family⁵                        | 1               | 35           |
| Tangerang City**    |                          | Family⁵                        | 1               | 33           |
| Bekasi District**   |                          | Office/Factory²                | 1               | 43           |
| Bekasi City**       |                          | Office/Factory²                | 4               | 1738         |
| Greater Bandung     |                          | Education¹                     | 1               | 1280         |
| Cimahi District**   |                          | Education¹                     | 1               | 99           |
| Greater Surabaya    |                          | Office/Factory²                | 1               | 41           |
|                     |                          | Religious Activities³          | 1               | 167          |
|                     |                          | Market/Trading Center⁴         | 1               | 30           |
| Sidoarjo**          |                          | Residential Complex/Dormitory⁶ | 1               | 24           |
| Semarang City*      |                          | Office²                        | 3               | 91           |
|                     |                          | Office/Factory²                | 1               | 100          |
|                     |                          | Family⁵                        | 3               | 164          |
|                     |                          | Restaurant⁴                   | 1               | 20           |
|                     |                          | Market/Trading Center⁴         | 1               | 28           |
|                     |                          | Health Facility⁴              | 1               | 57           |
| Kendal**            |                          | Education¹                     | 2               | 28           |
| Greater Medan       |                          | Office²                        | 1               | 39           |
| Deli Serdang**     |                          | Education¹                     | 1               | 44           |
|                     |                          | Health Facility⁴              | 1               | 37           |
|                     |                          | Office²                        | 1               | 30           |
| Greater Makassar    |                          | Office²                        | 1               | 11           |
| Makassar*           |                          | Health Facility⁴              | 1               | 20           |
| Gowa**              |                          | Office²                        | 1               | 110          |
|                     |                          | Religious Activities³          | 1               | 23           |
| Maros               |                          | Office²                        | 2               | 68           |
| Denpasar*           |                          | Office²                        | 2               | 212          |

| Agglomeration       | Main City and Peri-urban | Cluster Types                  | No. of Clusters | No. of Cases |
|---------------------|--------------------------|--------------------------------|-----------------|--------------|
| Greater Denpasar    |                          | Health Facility⁴              | 1               | 50           |
|                     |                          | Religious Activities³         | 1               | 15           |
|                     |                          | Market/Trading Center⁴        | 2               | 64           |
| Badung**            |                          | Religious Activities³         | 1               | 60           |
|                     |                          | Office²                       | 2               | 139          |
|                     |                          | Health Facility⁴              | 1               | 19           |
|                     |                          | Market/Trading Center⁴        | 1               | 12           |
| Gianyar**           |                          | Office²                       | 2               | 25           |
|                     |                          | Factory²                      | 1               | 10           |

*: main city  **: peri-urban areas

1-5: Represents key control measure correlated to the cluster types.
1. School from Home (SFH); 2. Work from Home (WH); 3. Limitation on Religious Activities; 4. Limitation on the Use of Public Places and Facilities; 5. Limitation on Socio-Cultural Activities.

Note:
Measure 6. Mobility Control and Travel Restriction correlated to all clusters hence not specified.

Source: Annex 3. C.1. Provides Complete Clusters Data in the Selected Agglomerations
despite control measures instituted by government agencies at cluster sites. The clusters in Table 3 were selected from those that generated a minimum of 20 cases in Java and a minimum of 10 cases from outside of Java. There were 11 types of clusters identified: office, factory, office/factory, religious activities, residential complex/dormitory, public facility, market/trading center, family, health facility, education, and restaurant.

Table 3 shows the 11 types of emerging clusters, which indicate correlation to a specific type of control measure, especially measure 1–5. The correlations are indicated from the emerging cluster types that are derived from the failure of a particular control measure that should be applied. Policy changes, such as those related to returning to work, school openings, and holidays under the “new normal” policy in Indonesia (i.e., easing of PSBB) resulted in more cases of COVID-19 in various types of clusters. The first most typical cluster occurred because of workers returning to office work. The data on clusters also confirms perceptions of stronger transmission rates during holidays due to social/religious gatherings. In these conditions, people let their guard down on distancing measures, especially when the gatherings involve large groups of people. The “new normal” policy also resulted in the re-opening of dine-in restaurants and cafes. More detailed correlations between cluster type and type of control measure are explained as follows.

The education cluster correlated to SfH where some areas loosened restrictions by allowing activities to take place in the school field. SfH has been implemented most consistently even after the relaxation of restrictions in the new normal. A positive impact of implementing this restriction is reflected in the minimal emergence of school clusters except for cases that occurred in boarding schools. This could be seen in the outbreak of the biggest education clusters that occurred in the Greater Bandung agglomeration implementing this restriction.

Workplace clusters (office, factory, and office/factory) dominated both incidents in the main city and those in peri-urban areas within the agglomeration. Workplace clusters correlated to WfH measures, which was gradually eased since the “new normal” in August. The immediate impacts of this easing resulted in the surge of workplace clusters and confirmed cases, especially in Greater Jakarta. The WfH generally operated as a suggestion and was never compulsory for each office [20]. This also related to the government stance that halting people from working would affect the national economy [21]. WfH was also mainly applied to “white collar” industries and were deemed difficult to apply for people working in informal sectors. Many lost their livelihoods because of the first PSBB as economic activities slowed or halted [21]. By the end of September, however, Greater Jakarta was back to applying full PSBB, and required tightening of WfH. The number of cases in Greater Semarang also surged after the outbreak of three workplace clusters that recorded more than 160 cases [22]. Other agglomerations with workplace clusters dominated the case outbreaks, including those in Greater Makassar and Greater Denpasar.

Religious activities clusters showed that limitations did not exert a maximum effect in many agglomerations as the regional government eased the limitation by giving the authority back to local religious figures especially after the Eid holiday. After the easing was carried out, the restriction on religious activities in places of worship changed from “no visitor allowed” to “limit the proportion of visitors” to as much as 50–75% of the total capacity of places of worship. When it came to religious activities, it was difficult to control people’s participation, especially in a mass event. A lot of large religious events drew people from the outside of the host areas, making it more difficult to trace people’s movement compared to routine activities. This situation triggered the occurrence of several religious activity clusters, such as a notable incident in Gowa, Greater Makassar. This religious event recorded hundreds of cases from participants that came from across several provinces [23].

The emerging clusters of public facility, market/trading center, health facility, and restaurant showed that the measure of limitation on the use of public places and facilities were poorly performed. Confirmed cases from these clusters, especially traditional markets, were among the highest [24]. Controlling people’s contact by limiting the visitor capacity to a maximum of 50% was only possible in public facilities like supermarkets and banks. On the other hand, with the setting of traditional markets in Indonesia, it was difficult to impose the minimum-distancing requirement. High numbers of COVID-19 cases recorded in health facilities could possibly be correlated to physical contact between suspected COVID-19 patients with other patients and health workers.

At the “new normal” stage where limitation measures on social and cultural activities were eased, socio-cultural activities were allowed by consistently implementing health protocols and limiting the number of participants to a maximum of 50% of total capacity. The easing of the restriction boosted social activities outside of homes. People began to visit recreational areas and entertainment places after months staying mostly at home. This situation heightened during holidays and increased risks of transmission as people generally loosened their discipline in keeping health protocols [25]. Limitations on social and cultural activities were among the more difficult ones to be applied properly due to cultural inclinations to gather with families and friends. More regular interactions also increased trust among them, lowering the awareness that everyone could transmit the virus. These phenomena led to surges of emerging clusters in residential complex/dormitory settings and across family networks.

While there were direct correlations between the emerging clusters and type of measures discussed above, mobility control and travel restriction measures did not show specific correlation to a certain type of cluster. Rather, this measure correlated to all types of clusters as all activities influence mobility and travel. This measure is applied to all agglomerations even though different degrees of limitations were in place between the cities/districts that implemented PSBB. The same restrictions applied to all agglomerations included the limiting of passengers to a maximum of 50% of vehicle capacity and distancing between passengers to a minimum of 1 m in public transit. However, this measure was counter-productive especially in urban areas where people were still required to work in the office. The decreasing services also drew a backlog of people waiting in the public transport stops and made it harder to practice social distancing [26]. As an alternative, the government encouraged people to ride bicycles to work in some areas, but without enforcing the importance of wearing a mask. This resulted in biking becoming an increasingly popular recreational activity in groups and generated pockets of virus transmission [27].
When the restriction scheme was relaxed, several regions (Denpasar, Badung, Gowa, Greater Semarang, Greater Jakarta—except DKI Jakarta and South Tangerang) began to allow mobility of residents and goods without capacity limitations, provided that health protocols remained in place. Differences in the application of this measure is concerned with the limitation of the cross city/district mobility, which was usually applied only to, and by cities/districts implementing PSBB. An example of limitation on cross-boundary mobility could be found in Greater Jakarta, where DKI Jakarta required people from inside and outside of the city to have SIKM (Surat Izin Keluar Masuk or Entry and Exit Permits) before they entered and exited the city. Issues related to this measure came after the easing of the “new normal” as travel and long-distance transportation services returned to operation. Despite the government’s requirement of proof of negative rapid-test result for air and train passengers, a lot of people still were eager to travel. However, with rapid-test results being less dependable, virus transmission went unnoticed and led to transmission spikes. More cases were recorded with mobility being unmonitored.

3.4. Findings by agglomeration

3.4.1. Greater Jakarta

As the largest agglomeration and national center of economic activities, it was unsurprising that Greater Jakarta had the highest testing capacity and thus the highest incidence of emerging clusters. Dependence on maintaining national economic performance meant that the region is under a lot of pressure to ease restrictions. Accordingly, exponential increases occurred after the easing of PSBB restrictions, which was shifted to a partial restriction (PSBB Transisi). Another factor is the mass homecoming (mudik) during the Eid holiday in June, which undermined PSBB containment measures. Mudik conducted by people from Jakarta to other areas was another reason for transmission to smaller cities and peri-urban areas as the cities served as epicenters at the earlier stages of the pandemic. Travel permits had limited efficacy in keeping people from traveling outside the affected cities/districts.

There were great variations in how the control measures were employed in DKI Jakarta and its peri-urban areas. Some Greater Jakarta peri-urban areas employed double measures as it not only followed their regional government measures but also had to adjust to the Jakarta control measures. After the first PSBB ended, peri-urban areas like Depok and Bogor established their own measures. In general, cases from peri-urban areas of Greater Jakarta contributed up to 30% of confirmed cases that occurred in the main city. Meanwhile, up to 70% of cases in Depok were imported from people working in the Jakarta area. These cases then led to transmission in less populated cores, resulting in the spike of cases from family cluster [17]. A majority of the imported cases from DKI Jakarta caused confusion for local governments regarding how to control resident mobility or to impose regional measures due to commuter volumes. Jakarta announced on September 9th that it would reimpose large-scale social restrictions effective from September 14 amid

![Clusters of COVID-19 cases in greater jakarta.](image-url)
a rising number of cases reported from the capital [28]. The restrictions were less stringent than the first lockdown in April and allowed for some non-essential workplaces to operate if they met specific conditions. However, Tangerang and South Tangerang city consistently performed stricter regulations to minimize the imported cases.

3.4.2. Greater Surabaya
As of early July, 75% of accumulated COVID-19 cases in East Java province were reported from Greater Surabaya [29]. As the capital city of the province, there have been various emerging clusters. Other than office/factory and residential clusters, religious activities also factored as dominant emerging clusters. The PSBB in Surabaya was very loosely implemented, and lacked information and sound preparation. There was also an issue raised with how the local government communicated information and regulations related to COVID-19 control measures [29]. Reduced operation hours in cafes and restaurants did not stop people from gathering and dining in. Sidoarjo had the largest number of people violating the curfew measure. Hundreds of cafes and restaurants have been penalized for violating the operating times restrictions [30].

3.4.3. Greater Bandung
Bandung significantly slowed COVID-19 trends with its first PSBB and began imposing new normals at the end of June. Another important milestone for Bandung is when Governor Ridwan Kamil announced on September 14th that West Java would implement micro-scale social restrictions in COVID-19 red zones in Jakarta’s satellite cities of Bogor, Depok, and Bekasi. Two important events that observed in Greater Bandung occurred over a long weekend of an Eid al-Adha celebration, which caused a spike of confirmed cases in Greater Bandung [31]. Cimahi imposed micro-lockdowns only after a sudden rise of confirmed cases, which occurred because the new normal allowed people to freely travel outside the region [32]. Greater Bandung experienced the highest education clusters, mostly due to some boarding schools remaining active despite the formalized SfH policy.

3.4.4. Greater Semarang
A key change occurred in Semarang after the number of cases appeared to indicate a significant drop after two weeks of PSBB in the city. The decreased number of cases made the local government transition to less strict measures. However, they then faced difficulty in controlling mobility as there were no penalty for violations. Most active cases spread through family clusters, especially in sub-district with concentrated settlement areas on the outskirts of the city. Other than family cluster, education also served as a hotspot sector in peri-urban areas (i.e. Demak and Kendal) which have a lot of Islamic boarding schools. Reluctant to apply SfH, these schools were identified as COVID-19 clusters.

Fig. 6. Clusters of COVID-19 cases in greater surabaya.

![Clusters of COVID-19 cases in greater surabaya.](image-url)
3.4.5. Greater Medan
Similar to most other agglomerations, confirmed cases and deaths in Medan were higher in number than those in its peri-urban areas. COVID-19 clusters with more than 30 confirmed cases began to appear in September and October, although regulations have since been tightened as of late July. The situation in the peri-urban areas of Greater Medan (i.e., Deli Serdang) was very much under control. The COVID-19 cluster in Deli Serdang began to emerge at the end of August and restrictions also tightened. Accordingly, fatality rates in Deli Serdang decreased by October, although confirmed cases were still increasing.

3.4.6. Greater Makassar
The enforcement in Sulawesi was less strict as compared to larger cities in Java. In general, confirmed cases and deaths in Greater Makassar had the same trend between the main city and its peri-urban areas. Maros District did not impose any restrictions (PSBB) or control measures until October, and control measures were not applied until early November. The religious (Ijtima) cluster of Gowa is one of the largest clusters in Indonesia (around 8761 people attended). This incident resulted in 1248 confirmed cases identified over 20 provinces. The Ijtima cluster in Gowa caused cluster outbreaks outside the region, including in NTB (58 positive cases), Kaltara (19 positive cases), and Wonosobo (11 positive cases) [33].

3.4.7. Greater Denpasar
The trend of confirmed cases and deaths in the Bali agglomeration increased from the second week of March to the second week of October. The mobility of the population, especially for work between cities/districts in Greater Denpasar led to the spread of confirmed cases. Denpasar has the largest number of confirmed cases, while Gianyar had the largest number of deaths as of the second week of October. Gianyar, as a peri-urban area of Denpasar, did not employ any restrictions or controls measures until October. Accordingly, the fatality rate in Gianyar was even higher than that of Denpasar (which has the largest number of confirmed cases) from the second week of September. When the “Passing Permit” in Denpasar was implemented, requests boomed among Gianyar residents (especially Sukawati) because a lot of Sukawati residents work in Denpasar. Meanwhile, Badung imposed restrictions by the end of August and experienced declines in death rate by late October. The COVID-19 cluster in the Greater Denpasar (Kumbasari Market Cluster) caused clustering in Badung (12 confirmed cases) and Denpasar (45 confirmed cases).

Fig. 7. Clusters of COVID-19 cases in greater bandung.
4. Discussion

The results show similarities between urban agglomerations as well as geographic differentiation. There were particular incidents that led to outbreaks in specific contexts and common differences between urban cores relative to their peri-urban areas. We have also shown how specific effects of policies unfolded in different regions, especially the temporal relationships with the application, easing, or implementation of certain policies. Broadly, the struggle to control mobility was mostly due to economic reasons, and significant outbreaks were identified through office/factory clusters. The fact that most people work at the city center while living in neighboring districts has led to the complexity of applying particular measures in the context of national policy directives and decentralized governing authority.

Trends on geographic similarity and differentiation were identified in each agglomeration. These were presented in various data formats that allowed for ease of analysis, combining Table 3 with Figs. 5–11, as well as data compiled in Annex 2. Table 4 summarizes the policy measures and application in the selected agglomerations. Presenting variables and modes of an analysis in a dynamic context unfolding under rapid changes of the pandemic affords new methodological entry points of analysis on urban agglomerations.

Although this study was limited to the early period of the pandemic one could easily imagine applying a spatial monitoring system that tracks the effectiveness of particular policies.

At the time of analysis, several key findings are of note across the case studies. Unsurprisingly, the effectiveness of policy restrictions is contingent upon the capacity of governments to implement them. These capacity dimensions include coordinating and collaborating across different agencies vertically and horizontally, especially in relation to mobilizing resources and budgets. Addressing an emergency as complex as the COVID-19 pandemic requires robust governance mechanisms, strong communication systems, adequate resources, and approaches that afford modularity, fail safes, and redundancies. Existing governance conditions in Indonesia reflect decision-making processes and priorities that shape corresponding policies, rules, regulations, and coordination functions between formal institutions and society at large. The gap between national policy mandate carried out by central government institutions and implementation capacity and buy-in among local government authority shows just how much COVID-19 has challenged various aspects of governance in disaster management in Indonesia [11].

In this light, budget limitations present a major concern. This has resulted in uneven implementation of national mandates that are contingent upon decentralized implementation, such as the uneven conditions between health care services and facilities. This dynamic influences testing, reshapes our understanding about the disease, and points to spatial differentiation between and across geographical contexts. Decentralization policy in Indonesia has been implemented since 1999 but has yet to produce its anticipated
outcomes [14,15,34]. On a practical level, the capacity and resources of the central government are insufficient for supporting anticipated local government functions. As a result, initiatives at the local level do not perform effectively [35]. Centralized authority suggests there is a lack of local capacity, whereas regional authorities express a lack of resources and trust to implement their roles. This dynamic has proven especially challenging during the pandemic. Most of the 30 local governments surveyed in this research have shown a limited financial capacity to respond to the pandemic in a timely fashion. In some districts, like Maros in South Sulawesi, no
restrictions were adopted specifically due to a lack of budgets.

Another critical issue related to centralized authority versus decentralized mandate is that mobility patterns cross jurisdictions, which make it difficult to control movement between a jurisdiction’s borders. Since mobility occurs in a temporary or seasonal basis, there is no reference data that could be used to identify movements [36]. Hamidi et al. [5] argued that mobility between metropolitan areas significantly influences the increase of COVID-19 cases. Cases in the core cities, such as Jakarta and Surabaya, were dominated by transmission occurring in neighboring districts. However, due to the decentralized nature of governance structures, the main city restriction is not always in line with the policy applied in the neighboring districts. Furthermore, budgets determine where people are tested and treated, but not necessarily where they live. Thus, it is very likely that transmissions in peri-urban areas are underreported. Economic conditions also pose a difficult choice to institute policy restrictions, especially when people’s livelihoods are so drastically impacted by restrictive measures.

Indeed, the COVID-19 pandemic serves as a valuable lesson to critique aspects of decentralization in regards to urban agglomerations and development. Urban agglomerations in the global south still facing governance challenges of regional disparity, specifically a significant capacity gap between the core region and its surrounding districts [37–39]. Most urban centers in Asia, including Indonesia, have grown beyond its administrative boundaries, expanding without corresponding public services in peri-urban areas [15,40,41]. In the context of COVID-19, this research enriches work by Visagie and Turok [42] that makes a compelling case for reforming regional governance in South Africa and Amaral et al. [43] in Brazil. These examples suggest that decentralization schemes might need to be reviewed for dealing with a pandemic given the significant gap of capacity levels among local governments.

This paper has shown that even when particular measures are in place, the implementation of such policies may not work effectively. This is not just because of limited government capacity in executing the selected measures, but also because of different levels of knowledge, responsibility, capacity, and awareness across stakeholders. All emerging cases at the seven urban agglomerations show that the forefront of protection against the threat of COVID-19 is a personal awareness and overall willingness to follow and reinforce restrictive measures. Such elements were not tested in this research given the emphasis on macro level policy directives and our regional planning research interests, but which are certain to have an outsized influence. There are limiting factors related to people’s ability and willingness to engage with the policy regime due to personal values or economic constraints.

Spikes in cases have shifted through new dimensions and stages of the pandemic, including variants that emerged beyond the study period and time of writing. Governments continue to oscillate between demands to provide public safety and economic opportunity (an obligation or compulsion to not work from home) or the social/personal value and culture (such as the tradition of visiting relatives’ homes for holidays or other important, particularly religious events). At this juncture, analyzing COVID-19 across governing
scales, policy imperative, and spatial distribution in Indonesia points to the importance of promoting certain protocols and highlighting key challenges around low levels of testing and inadequate data collection measures to meet the full potential of the analytical approach described herein.

Fig. 11. Clusters of COVID-19 cases in greater denpasar.
Table 4
Resume of policy measure application in the selected agglomerations.

| Agglomeration | Policy Measure | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------|----------------|---|---|---|---|---|---|
| Greater Jakarta | Most effective measure, no emerging cluster. | New Normal’ have caused WfH requirements lifted in most offices because of economic reason, this generated highest number of workplace clusters. The relaxation of WfH heavily affected the concentration of industrial areas with its workers commuting across areas within the agglomeration. | Moderate control on Eid holidays and after ‘New Normal’ generated religious activities clusters. | Hard to control number of visitor and minimum-distancing requirement in traditional market settings, hence the emerging clusters. | New Normal’ made it easier to hold social gatherings (wedding, funeral, etc), resulting in the emerging family clusters. | The control was strict in general, especially the use of public transport for commuters was relatively higher compared to other agglomerations. However, there was more difficulty in controlling people’s mobility done by private vehicles. |
| Greater Bandung | SfH was not practiced by boarding school resulting in the emerging of the biggest education cluster despite the application of health protocol. | New Normal’ have caused WfH requirements lifted in most offices because of economic reason, this generated highest number of workplace clusters. | Effective measure, no emerging cluster. | | | Cross-boundary measure applied but lifted after ‘New Normal’. Measure for public transit were applied but most people used private vehicles to support their mobility. Characterized as indirect measures that influenced other measures. |
| Greater Surabaya | Most effective measure, no emerging cluster. | Large gathering because of Hajj activity made it hard to impose the control measure. | Hard to control number of visitor and minimum-distancing requirement in traditional market settings, hence the emerging clusters. Measure were violated mostly by restaurants/cafes. | | | |
| Greater Semarang | Effective except for few cases from boarding school where SfH was not practiced eventhough still maintaining health protocol. | Effective measure, no emerging cluster. | Measure for health facility was harder to maintain with the rapid rise of cases. Most emerging clusters from health facility happened in bigger or main cities because it also serves the surrounding areas. | | | Social activity measure within family were rarely applied especially those who live in the same house, resulting in family member infected the rest of the family from workplace clusters case. ‘New Normal’ made it easier to hold social gatherings (wedding, funeral, etc), resulting in the emerging family clusters. Effective measure, no emerging cluster. |
| Greater Medan | Effective except for few cases from boarding school where SfH was not practiced eventhough still maintaining health protocol. | | | | | |

(continued on next page)
5. Conclusion

This paper examined the effects of policy interventions (i.e., measures for limiting interactions among populations) relative to confirmed cases and deaths in the seven major urban agglomerations in Indonesia. In general, all applied policies were not capable of controlling the cases and fatalities up to mid-October. This by no means suggests that the policies in place have not exerted a profound effect in stemming the transmission of COVID-19. Indeed, consistent implementation of measures were shown to have a profound impact. The core cities of an urban agglomeration continue to yield larger nominal case values compared to their peri-urban neighbours, but there are variations between geographic contexts. This implies that the enforcement of mobility restriction policies has delivered successful outcomes, but we have also showed the timing and capability for applying policies also has a significant impact. Likewise, the ways that centralized authority and decentralization policy converge has contributed to the current constraint in optimizing the implementation of protection measures due to the performance capacity and resource gaps among cities/districts. As indicated with the emerging types of clusters, the ineffectiveness of the applied measures is attributed not only to the limitation of government capacity to convince, implement, and apply a policy, but also to the broader stakeholders concerned with these measures.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We would like to express our gratitude to the University of Diponegoro and the Ministry of Education and Culture, grant number 225-112/UN7.6.1/PP/2020 for funding this research. The work was also supported under the framework of international cooperation program managed by the National Research Foundation of Korea (NRF-2020K2A9A1A01095494, FY2020) as well as by Seoul National University Research Grant in 2020. This research is also part of a research collaboration funded by the LuceSEA Transitions project.

Annex 1

A.1 Confirmed Cases in Each Greater Area from March through Mid-October

| City/District       | Population | Population Density/km² | Period |
|---------------------|------------|-------------------------|--------|
|                     | Status     |                         | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
|                    **| Jakarta    | 10,557,810              | 15,804 | 741 | 4138 | 7272 | 11,276 | 21,201 | 40,309 | 74,368 | 92,782 |
| ** Depok            | 2,406,830 | 12,403                  | 42  | 244 | 444 | 772 | 1221 | 1805 | 3769 | 4867 |
| ** South Tangerang  | 1,747,906 | 11,525                  | 0   | 103 | 230 | 404 | 541  | 785 | 1135 | 1357 |
| ** Tangerang        | 2,299,901 | 14,197                  | 0   | 154 | 356 | 475 | 590  | 864 | 1620 | 1923 |
| ** Tangerang District | 2,794,969 | 2912                    | 0   | 80  | 179 | 269 | 353  | 702 | 1459 | 2214 |
| ** Bekasi           | 3,003,920 | 14,190                  | 32  | 82  | 458 | 568 | 849  | 1705| 4204 | 5244 |

(continued on next page)
### A.1 (continued)

| City/District | Popula-tions | Popula-tion Density/km² | Period |
|---------------|--------------|--------------------------|--------|
| **Greater Surabaya** | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| * Surabaya | 2,896,000 | 8233 | 41 | 438 | 2608 | 5815 | 8691 | 12,138 | 14,328 | 15,251 |
| ** Sidoarjo District | 2,249,000 | 3495 | 10 | 102 | 655 | 1579 | 3249 | 5142 | 6332 | 6900 |
| ** Gresik | 1,313,000 | 1090 | 3 | 27 | 173 | 696 | 1819 | 2664 | 3244 | 3463 |
| ** Bangkalan District | 1,076,330 | 854 | 0 | 11 | 42 | 235 | 349 | 418 | 514 | 556 |
| **Greater Semarang** | | | * Semarang | 1,814,110 | 4780 | 0 | 240 | 422 | 1612 | 4018 | 5898 | 8222 | 9330 |
| ** Demak District | 1,162,805 | 1283 | 0 | 0 | 0 | 421 | 905 | 1178 | 1549 | 1690 |
| ** Kendal District | 971,086 | 962 | 0 | 8 | 10 | 59 | 250 | 511 | 1014 | 1260 |
| ** Semarang District | 1,053,786 | 1099 | 0 | 0 | 0 | 72 | 229 | 404 | 833 | 1067 |
| ** Salatiga | 195,010 | 3434 | 0 | 10 | 45 | 83 | 109 | 130 | 171 | 217 |
| **Greater Bandung** | | | * Bandung | 2,507,890 | 14,932 | 20 | 189 | 308 | 374 | 497 | 944 | 1491 | 1865 |
| ** Bandung District | 3,775,280 | 2103 | 5 | 43 | 74 | 106 | 215 | 486 | 679 | 778 |
| ** Cimahi | 554,755 | 13,716 | 4 | 50 | 83 | 100 | 118 | 199 | 301 | 469 |
| ** West Bandung District | 1,667,724 | 1277 | 2 | 26 | 51 | 69 | 101 | 180 | 224 | 327 |
| **Greater Medan** | | | * Medan | 2,279,894 | 8544 | 19 | 88 | 274 | 1006 | 2376 | 4005 | 5501 | 6307 |
| ** Deli Serdang District | 2,195,709 | 962 | 2 | 14 | 53 | 205 | 529 | 872 | 1439 | 2702 |
| **Greater Makassar** | | | * Makassar | 1,526,700 | 8580 | 50 | 268 | 739 | 2741 | 5002 | 6461 | 8119 | 8792 |
| ** Gowa District | 772,700 | 216 | 0 | 29 | 124 | 405 | 861 | 1073 | 1299 | 1383 |
| ** Maros District | 353,100 | 404 | 3 | 29 | 61 | 117 | 286 | 351 | 509 | 559 |
| **Greater Bali** | | | * Denpasar | 947,100 | 7412 | 0 | 52 | 90 | 539 | 1316 | 1627 | 2423 | 2954 |
| ** Badung District | 670,200 | 1601 | 0 | 15 | 53 | 187 | 482 | 710 | 1385 | 1715 |
| ** Gianyar District | 512,200 | 1392 | 0 | 23 | 34 | 109 | 302 | 543 | 1061 | 1315 |

Notes.
*Main city.
** Peri-urban Area.
1 March 5 July.
2 April 6 August.
3 May 7 September.
4 June 8 Mid-October.

### A.2

Death Cases in Each Greater Area from March through Mid-October

| City/District | Popula-tions | Popula-tion Density/km² | Period |
|---------------|--------------|--------------------------|--------|
| **Greater Jakarta** | | | * Jakarta | 10,557,810 | 15,804 | 84 | 381 | 520 | 641 | 836 | 1202 | 1731 | 1970 |
| ** Depok | 2,406,830 | 12,403 | 2 | 14 | 24 | 31 | 41 | 53 | 81 | 89 |
| ** South Tangerang | 1,747,906 | 11,525 | 0 | 19 | 25 | 34 | 38 | 45 | 54 | 70 |
| ** Tangerang | 2,229,901 | 14,197 | 0 | 20 | 29 | 33 | 36 | 51 | 60 | 63 |
| ** Tangerang District | 2,794,969 | 2912 | 0 | 6 | 11 | 14 | 17 | 20 | 37 | 51 |
| ** Bekasi | 3,003,920 | 14,190 | 0 | 4 | 27 | 30 | 30 | 30 | 63 | 100 |
| ** Bekasi District | 2,667,159 | 2094 | 3 | 7 | 9 | 21 | 25 | 39 | 43 | 50 |
| ** Bogor | 1,112,080 | 8849 | 2 | 19 | 13 | 13 | 18 | 21 | 31 | 39 |
| ** Bogor District | 4,699,282 | 1574 | 0 | 4 | 8 | 8 | 11 | 16 | 16 | 16 |
| **Greater Surabaya** | | | * Surabaya | 2,896,000 | 8233 | 2 | 57 | 243 | 454 | 771 | 931 | 1064 | 1124 |
| ** Sidoarjo District | 2,249,000 | 3495 | 1 | 12 | 58 | 115 | 193 | 324 | 427 | 454 |
| ** Gresik | 1,313,000 | 1090 | 1 | 4 | 19 | 70 | 144 | 170 | 196 | 215 |
| ** Bangkalan District | 1,076,330 | 854 | 0 | 0 | 3 | 33 | 46 | 54 | 66 | 67 |
| **Greater Semarang** | | | * Semarang | 1,814,110 | 4780 | 0 | 30 | 40 | 167 | 435 | 619 | 788 | 860 |
| ** Demak District | 1,162,805 | 1283 | 0 | 0 | 0 | 76 | 156 | 208 | 238 | 244 |
| ** Kendal District | 971,086 | 962 | 0 | 0 | 0 | 2 | 17 | 32 | 50 | 61 |
| ** Semarang District | 1,053,786 | 1099 | 0 | 0 | 0 | 9 | 24 | 41 | 56 | 62 |
| ** Salatiga | 195,010 | 3434 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 3 |
| **Greater Bandung** | | | * Bandung | 2,507,890 | 14,932 | 4 | 30 | 37 | 41 | 44 | 49 | 50 | 50 |
| ** Bandung District | 3,775,280 | 2103 | 2 | 4 | 5 | 5 | 8 | 12 | 15 |
| ** Cimahi | 554,755 | 13,716 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 |

(continued on next page)
### A.2 (continued)

| City/District | Populations     | Population Density/km² | Period |
|---------------|-----------------|-------------------------|--------|
|               |                 |                         | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| ** West Bandung District ** | 1,667,724 | 1277 | 2 | 2 | 2 | 2 | 4 | 4 | 6 | 6 |
| Greater Medan |                 |                         |     |     |     |     |     |     |     |     |
| * Medan       | 2,279,894      | 8544 | 2 | 9 | 23 | 61 | 123 | 193 | 237 | 278 |
| ** Deli Serdang District ** | 2,195,709 | 962 | 0 | 3 | 8 | 14 | 33 | 54 | 92 | 96 |
| Greater Makassar |                 |                         |     |     |     |     |     |     |     |     |
| * Makassar    | 1,526,700      | 8580 | 0 | 0 | 0 | 130 | 224 | 254 | 277 | 281 |
| ** Gowa District ** | 772,700 | 216 | 0 | 5 | 9 | 13 | 19 | 22 | 27 | 27 |
| ** Maros District ** | 353,100 | 404 | 0 | 0 | 0 | 2 | 3 | 3 | 8 | 8 |
| Greater Bali  |                 |                         |     |     |     |     |     |     |     |     |
| * Denpasar    | 947,100         | 7412 | 0 | 2 | 9 | 14 | 18 | 50 | 67 |
| ** Badung District ** | 670,200 | 1601 | 0 | 0 | 0 | 2 | 12 | 14 | 35 | 37 |
| ** Gianyar District ** | 512,200 | 1392 | 0 | 0 | 0 | 1 | 6 | 9 | 43 | 55 |

**Notes.**
- * Main city.
- ** Peri-urban Area.
- 1 March 5 July.
- 2 April 6 August.
- 3 May 7 September.
- 4 June 8 Mid-October.

### A.3

Testing Ratio per 1 Million Population in Each Agglomeration

| City/District | Populations | Population Density/km² | Testing Ratio per 1 Mil. Population |
|---------------|-------------|-------------------------|-----------------------------------|
|               |             |                         |                                   |
| Greater Jakarta |             |                         |                                   |
| * Jakarta     | 10,557,810  | 15,804                  | 5.216                             |
| ** Depok      | 2,406,830   | 12,403                  | 20                                |
| ** South Tangerang | 1,747,906 | 11,525                  | 96                                |
| ** Tangerang  | 2,229,901   | 14,197                  | 122                               |
| ** Tangerang District | 2,794,969 | 2912                    | 153                               |
| ** Bekasi     | 3,003,920   | 14,190                  | 25                                |
| ** Bekasi District | 2,667,159 | 2094                    | 22                                |
| ** Bogor      | 1,112,080   | 8849                    | 9                                 |
| ** Bogor District | 4,699,282 | 1574                    | 39                                |
| Greater Surabaya |             |                         |                                   |
| * Surabaya    | 2,896,000   | 8233                    | 41                                |
| ** Sidoarjo District | 2,249,000 | 3495                    | 32                                |
| ** Gresik     | 1,313,000   | 1090                    | 18                                |
| ** Bangkalan District | 1,076,330 | 854                     | 15                                |
| Greater Semarang |             |                         |                                   |
| * Semarang    | 1,814,110   | 4780                    | 38                                |
| ** Demak District | 1,162,805 | 1283                    | 25                                |
| ** Kendal District | 971,086   | 962                     | 21                                |
| ** Semarang District | 1,053,786 | 1099                    | 22                                |
| ** Salatiga   | 195,010     | 3434                    | 4                                 |
| Greater Bandung |             |                         |                                   |
| * Bandung     | 2,507,890   | 14,932                  | 21                                |
| ** Bandung District | 3,775,280 | 2103                    | 31                                |
| ** Cimahi     | 554,755     | 13,716                  | 5                                 |
| ** West Bandung District | 1,667,724 | 1277                    | 14                                |
| Greater Medan |             |                         |                                   |
| * Medan       | 2,279,894   | 8544                    | 159                               |
| ** Deli Serdang District | 2,195,709 | 962                     | 153                               |
| Greater Makassar |             |                         |                                   |
| * Makassar    | 1,526,700   | 8580                    | 76                                |
| ** Gowa District | 772,700   | 216                     | 38                                |
| ** Maros District | 353,100   | 404                     | 18                                |
| Greater Bali  |             |                         |                                   |
| * Denpasar    | 947,100     | 7412                    | 138                               |
| ** Badung District | 670,200   | 1601                    | 98                                |
| ** Gianyar District | 512,200   | 1392                    | 75                                |

**Notes.**
- * Main city.
- ** Peri-urban Area.
### Annex 2

#### B.1

**Policy Review of Work from Home.**

| Work from Home     | City and District               | Period  |
|--------------------|--------------------------------|---------|
|                    |                                | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Greater Jakarta    |                                 | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Main City          | Jakarta                         | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Peri-urban Area    | Depok                           | b | b | b | b | b | b | a | a | a | a | a | a | a | a | a | a | a |
|                    | Bekasi                          | b | b | b | c | c | c | b | b | b | b | b | b | b | b | b | b | b |
|                    | Bekasi District                 | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
|                    | Bogor                           | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
|                    | Bogor District                  | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
|                    | Tangerang                       | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
|                    | Tangerang District              | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
|                    | South Tangerang                 | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Greater Surabaya   |                                 | a | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
| Main City          | Surabaya                        | a | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
| Peri-urban Area    | Sidoarjo District               | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
|                    | Gresik                          | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
|                    | Bangkalan District              |                                 |       |
| Greater Semarang   |                                 | a | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Main City          | Semarang                        | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Peri-urban Area    | Demak District                  | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
|                    | Kendal District                 |                                 |       |
|                    | Semarang District               |                                 |       |
|                    | Salatiga                        |                                 |       |
| Greater Bandung    |                                 | a | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Main City          | Bandung                         | a | a | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
| Peri-urban Area    | Bandung District                | a | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
|                    | West Bandung District           | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b |
|                    | Cimahi                          |                                 |       |
| Greater Medan      |                                 | a | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Main City          | Medan                           | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Peri-urban Area    | Dell Serdang District          | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Greater Makassar   |                                 | a | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Main City          | Makassar                        | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Peri-urban Area    | Gowa District                   | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
|                    | Maros District                  |                                 |       |
| Greater Ball       |                                 | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e |
| Main City          | Denpasar                        |                                 |       |
| Peri-urban Area    | Badung District                 |                                 |       |
|                    | Gianyar District                |                                 |       |

**Legend:**
- **Red** = Tightest control
- **Yellow** = Moderate control
- **Green** = No control

- 1 = 2nd week of March
- 2 = 4th week of March
- 3 = 2nd week of April
- 4 = 4th week of April
- 5 = 2nd week of May
- 6 = 4th week of May
- 7 = 2nd week of June
- 8 = 4th week of June
- 9 = 2nd week of July
- 10 = 4th week of July
- 11 = 2nd week of August
- 12 = 4th week of August
- 13 = 2nd week of September
- 14 = 4th week of September
- 15 = 2nd week of October
- a = WFH except for the 11 main sectors
- b = WFH with leveled office occupancy (25%-75%) applied, except for the 11 main sectors
- c = 50% WFH except for the 11 main sectors, only for sub-district with red zone status
- d = Only restrictions on activities outside the home
- e = There is no WFH provision, but the implementation of WFO is in accordance with the health protocol
- f = Shift working
### B.2
Policy Review of School from Home.

| School from Home | City and District | Period |
|------------------|-------------------|--------|
|                  |                   | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    |
| Greater Jakarta  |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City        | Jakarta           | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Peri-urban Area  | Depok             | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Bekasi            | g     | g     | g     | g     | e     | g     | e     | s     | g     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Bekasi District   | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Bogor             | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Bogor District    | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Tangerang         | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Tangerang District| g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | South Tangerang   | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Greater Surabaya |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City        | Surabaya          | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Peri-urban Area  | Sidoarjo District | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Gresik            | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Bangkalan District| g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Greater Semarang |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City        | Semarang          | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Peri-urban Area  | Demak District    | g     | g     | g     | g     | e     | g     | e     | g     | e     | g     | e     | g     | e     | g     | e     | g     |       |
|                  | Kendal District   | g     | g     | g     | g     | e     | g     | e     | g     | e     | g     | e     | g     | e     | g     | e     | g     |       |
|                  | Semarang District | g     | g     | g     | g     | g     | g     | e     | g     | e     | g     | e     | g     | e     | g     | e     | g     |       |
|                  | Salatiga          | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Greater Bandung  |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City        | Bandung           | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Peri-urban Area  | Bandung District  | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | West Bandung District | g    | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Cimahi            | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Greater Medan    |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City        | Medan             | d     | d     | d     | d     | d     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Peri-urban Area  | Deli Serdang District | d  | d     | d     | d     | d     | d     | d     | d     | d     | h     | h     | h     | h     | h     | h     | h     |       |
| Greater Makassar |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City        | Makassar          | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Peri-urban Area  | Gowa District     | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
|                  | Maros District    | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     | h     |       |
| Greater Bali     |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City        | Denpasar          | g     | g     | g     | g     | g     | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     |       |
| Peri-urban Area  | Badung District   | g     | g     | g     | g     | g     | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     |       |
|                  | Gianyar District  | g     | g     | g     | g     | g     | g     | g     | g     | g     | g     | h     | h     | h     | h     | h     | h     |       |

**Legend:**
- **Red** = Tightest control
- **Yellow** = Moderate control
- **Green** = No control

1. 1st week of March
2. 2nd week of March
3. 3rd week of March
4. 4th week of March
5. 1st week of April
6. 2nd week of April
7. 3rd week of April
8. 4th week of April
9. 1st week of May
10. 2nd week of May
11. 3rd week of May
12. 4th week of May
13. 1st week of June
14. 2nd week of June
15. 3rd week of June
16. 4th week of June

- **d** = Only restrictions on activities outside the home
- **g** = School from home is totally implemented, learning activities at Islamic boarding schools and internships should be appropriate with health protocols kept
B.3
Policy Review of Limitation of Religious Activity.

| Limitation on Religious Activities | City and District | Period |
|-----------------------------------|-------------------|--------|
|                                   |                   | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    |
| Greater Jakarta                   |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City                         | Jakarta           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Depok             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Bekasi            |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Bekasi District   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Bogor             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Bogor District    |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Tangerang         |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Tangerang District|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | South Tangerang   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Greater Surabaya                 |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City                         | Surabaya          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Sidoarjo District |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Gresik            |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Bangkalan District|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Greater Semarang                 |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City                         | Semarang          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Demak District    |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Kendal District   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Semarang District |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Salatiga          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Greater Bandung                  |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City                         | Bandung           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Bandung District  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | West Bandung District|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Cimahi            |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Greater Medan                    |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City                         | Medan             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Deli Serdang District|       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Greater Makassar                 |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City                         | Makassar          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Gowa District     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Maros District    |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Greater Bali                     |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Main City                         | Denpasar          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Badung District   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                  | Gianyar District  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|1  | = 2nd week of March | 12 | = 4th week of August |
|2  | = 4th week of March | 13 | = 2nd week of September |
|3  | = 2nd week of April | 14 | = 4th week of September |
|4  | = 4th week of April | 15 | = 2nd week of October |
|5  | = 2nd week of May | 16 | = 4th week of October |
|6  | = 4th week of May | d | = Only restrictions on activities outside the home |
|7  | = 2nd week of June | i | = Religious activities done at home |
|8  | = 4th week of June | j | = Religious activities in places of worship should be appropriate with health protocols kept |
|9  | = 2nd week of July | k | = Limitation on the number of visitors (20) |
|10 | = 4th week of July |   |   |
|11 | = 2nd week of August |   |   |
### B.4 Policy Review of Limitation of Public Facility Activities.

| Limitation on Public Facility Activities | City and District | Period |
|----------------------------------------|-------------------|--------|
|                                       |                   | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 |
| Greater Jakarta                        |                   |
| Main City                              | Jakarta           | m m m m m m m m m m m |
| Peri-urban Area                        | Depok             | m m m m m m m m m m |
|                                       | Bekasi            | m m m m m m m m m m |
|                                       | Bogor             | m m m m m m m m m m |
|                                       | Bogor District    | m m m m m m m m m m |
|                                       | Tangerang         | m m m m m m m m m m |
|                                       | Tangerang District| m m m m m m m m m m |
|                                       | South Tangerang   | m m m m m m m m m m |
| Greater Surabaya                       |                   |
| Main City                              | Surabaya          | m m m m m m m m m m |
| Peri-urban Area                        | Sidoarjo District | m m m m m m m m m m |
|                                       | Gresik            | m m m m m m m m m m |
|                                       | Bangkal Dist.     | m m m m m m m m m m |
| Greater Semarang                       |                   |
| Main City                              | Semarang          | m,t m,t m,t m,t m,t m,t |
| Peri-urban Area                        | Demak Dist.       | m m m m m m m m m m |
|                                       | Kendal Dist.      | m m m m m m m m m m |
|                                       | Semarang Dist.    | m m m m m m m m m m |
|                                       | Salatiga          | m m m m m m m m m m |
| Greater Bandung                        |                   |
| Main City                              | Bandung           | m m m m m m m m m m |
| Peri-urban Area                        | Bandung Dist.     | m m m m m m m m m m |
|                                       | West Bandung Dist.| m m m m m m m m m m |
|                                       | Cimahi            | m m m m m m m m m m |
| Greater Medan                          |                   |
| Main City                              | Medan             | d d d d m m m m m m m |
| Peri-urban Area                        | Deli Serdang Dist.| d d d d d d m m m m m |
| Greater Makassar                       |                   |
| Main City                              | Makassar          | m m m m m m m m m m |
| Peri-urban Area                        | Gowa Dist.        | m m m m m m m m m m |
|                                       | Maros Dist.       | m m m m m m m m m m |
| Greater Bali                           |                   |
| Main City                              | Denpasar          | m, m, m, m, m, m, m, m, m, m, m, m |
| Peri-urban Area                        | Badung Dist.      | m, m, m, m, m, m, m, m, m, m, m, m |
|                                       | Gianyar Dist.     | m, m, m, m, m, m, m, m, m, m, m, m |

**Legend:**
- Tightest control
- Moderate control
- No control

- 1 = 2rd week of March
- 2 = 4th week of March
- 3 = 2nd week of April
- 4 = 4th week of April
- 5 = 2nd week of May
- 6 = 4th week of May
- 7 = 2nd week of June
- 8 = 4th week of June
- 9 = 2nd week of July
- 10 = 4th week of July
- 11 = 2nd week of August
- 12 = 4th week of August
- 13 = 2nd week of September
- 14 = 4th week of September
- 15 = 2nd week of October
- 16 = 4th week of October
- d = Only restrictions on activities outside the home
- m = Limitation on activities in public facilities, except for the fulfillment of daily needs
- t = Restrictions on operating hours
### B.5

**Policy Review of Limitation on Socio-cultural Activities.**

| Limitation on Socio-cultural Activities | City and District | Period |
|------------------------------------------|-------------------|--------|
|                                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Greater Jakarta                          | n | n | n | o | o | o | o | o | o | o | o | o | o | o | o | o | o |
| Main City                                | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Peri-urban Area                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Jakarta                                  | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Depok                                    | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Bekasi                                   | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Bekasi District                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Bogor                                    | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Bogor District                           | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Tangerang                                | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Tangerang District                       | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| South Tangerang                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Greater Surabaya                         | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Main City                                | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Surabaya                                 | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Sidoarjo District                        | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Peri-urban Area                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Ngosik                                   | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Bangkulangan District                    | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Greater Semarang                         | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Main City                                | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Semarang                                 | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Demak District                           | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Peri-urban Area                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Kendal District                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Semarang District                        | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Salatiga                                 | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Greater Bandung                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Main City                                | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Banjarnegara                             | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Peri-urban Area                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Bandung                                  | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Bandung District                         | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| West Bandung                             | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Cimahi                                   | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Greater Medan                            | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d |
| Main City                                | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d |
| Medan                                    | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d |
| Peri-urban Area                          | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d |
| Deli Serdang District                   | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d | d |
| Greater Makassar                         | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Main City                                | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Makassar                                 | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Peri-urban Area                          | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Gowa District                            | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Maros District                           | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n | n |
| Greater Bali                             | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o |
| Main City                                | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o |
| Denpasar                                 | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o |
| Peri-urban Area                          | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o |
| Badung District                          | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o |
| Gianyar District                         | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o |

**Legend:**
- Red: Tightest control
- Yellow: Moderate control
- Green: No control

1 = 24th week of March  
2 = 4th week of March  
3 = 24th week of April  
4 = 4th week of April  
5 = 24th week of May  
6 = 4th week of May  
7 = 24th week of June  
8 = 4th week of June  
9 = 24th week of July  
10 = 4th week of July  
11 = 24th week of August  
12 = 4th week of August  
13 = 24th week of September  
14 = 4th week of September  
15 = 24th week of October  
16 = 4th week of October  

- d = Only restrictions on activities outside the home  
- n = Limitation on socio-cultural activities (funeral, circumcision, and wedding ceremony are not allowed)  
- o = Socio-cultural activities should be appropriate with health protocols
### B.6 Policy Review of Travel Limitation.

| Travel Limitation | City and District | Period |
|-------------------|-------------------|--------|
|                   |                   | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 |
| **Greater Jakarta** |                   |        |
| Main City         | Jakarta           | p p p p p.s p.s p.s r r r r r r r r r r |
| Peri-urban Area   | Depok             | p p p p r r r r r r r r r r r r r |
|                   | Bekasi            | p p p p p p p p p p p p p p r r |
|                   | Bekasi District   | p p p p r r r r r r r r r r r r |
|                   | Bogor             | p p p r r r r r r r r r r r r r |
|                   | Bogor District    | p p p r r r r r r r r r r r r r |
|                   | Tangerang         | p p p p p r r r r r r r r r r r |
|                   | Tangerang District| p p p p p r r r r r r r r r r r |
|                   | South Tangerang   | p p p p p p p p p p p p p p p |
| **Greater Surabaya** |                 |        |
| Main City         | Surabaya          | p p p p p p p p p p p p p p p p |
| Peri-urban Area   | Sidoarjo District | p p p p p p p p p p p p p p p |
|                   | Gresik            | p p p p p p p p p p p p p p p |
|                   | Bangkalan District|                   |
| **Greater Semarang** |             |        |
| Main City         | Semarang          | p p p p p p p p r.r r.r r.r r.r r.r |
| Peri-urban Area   | Demak District    | p p p p p p p p p p r r r r r r r |
|                   | Kendal District   | p p p p p r r r r r r r r r r r |
|                   | Semarang District | p p p p p p p p p p r r r r r r r |
|                   | Salatiga          | p p p p p p p p p p r r r r r r r |
| **Greater Bandung** |                |        |
| Main City         | Bandung           | p p p p p p p p p p p p p p p |
| Peri-urban Area   | Bandung District  | p p p p p p p p p p p p p p p |
|                   | West Bandung District | p p p p p p p p p p p p p p p |
|                   | Cimahi            | p p p p p p p p p p p p p p p |
| **Greater Medan**  |                   |        |
| Main City         | Medan             | d d d d d d p p p p p p p p p p |
| Peri-urban Area   | Deli Serdang District | d d d d d d d d d d d p p p p p |
| **Greater Makassar** |               |        |
| Main City         | Makassar          | p p p p p q q q q q q q q q q q |
| Peri-urban Area   | Gorwa District    | p p p p p r r r r r r r r r r |
|                   | Maros District    |                   |
| **Greater Bali**  |                   |        |
| Main City         | Denpasar          | p.s p.s p.s p p p p p p r r r r r |
| Peri-urban Area   | Badung District   |                   |
|                   | Gianyar District  |                   |

**Legend:**
- **Red:** Tighest control
- **Yellow:** Moderate control
- **Green:** No control

| Code | Description |
|------|-------------|
| 1    | 2<sup>nd</sup> week of March |
| 2    | 4<sup>th</sup> week of March |
| 3    | 2<sup>nd</sup> week of April |
| 4    | 4<sup>th</sup> week of April |
| 5    | 2<sup>nd</sup> week of May |
| 6    | 4<sup>th</sup> week of May |
| 7    | 2<sup>nd</sup> week of June |
| 8    | 4<sup>th</sup> week of June |
| 9    | 2<sup>nd</sup> week of July |
| 10   | 4<sup>th</sup> week of July |
| 11   | 2<sup>nd</sup> week of August |
| 12   | 4<sup>th</sup> week of August |
| 13   | Any restrictions on activities outside the home |
| 14   | Maximum passenger 70% of the total capacity, applying health protocol |
| 15   | Restrictions on movement across regions, except MAMM/MINASATA residents |
| 16   | Movement of goods and residents according to health protocols, no capacity restrictions |
| 25   | Surat Melintas, SKM (Surat Jln Keluar Masuk) |
| 29   | Restrictions on operating hours |
### Annex 3

**C.1 Complete Clusters Data for the Selected Agglomerations**

| City/ Region          | Locations                                | Case Number | Cluster Types          | Time Stamp         | Source                        | Ref |
|-----------------------|------------------------------------------|-------------|------------------------|-------------------|-------------------------------|-----|
| Greater Jakarta       | Kementerian Perhubungan RI               | 331         | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kementerian Kesehatan RI                | 305         | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Perpuaran Tenggel Ilmu Quran (IQ)       | 247         | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kementerian Pertahanan                  | 166         | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | KPK                                      | 133         | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Polda Metro Jaya                        | 104         | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kemkominfo RI                           | 94          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | BPOM Pusat                              | 89          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kantor PPLP Tj. Priok                   | 88          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Pesantren Ciganjur Jagakarsa            | 88          | Religious Activities   | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Tahanan Polda Metro Jaya                | 84          | Public Facility        | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Bethel Tanah Abang                      | 82          | Religious Activities   | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Masjid Jamii Taman Sari                 | 80          | Religious Activities   | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kementerian Keuangan                    | 78          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kemenpora RI                            | 77          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | BPKP Jaktim                             | 73          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | PT DNPN                                  | 72          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Pasar Cempaka Putih                     | 70          | Market/Trading Center  | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kementerian ESDM RI                     | 67          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Rutan Cipinang                          | 67          | Public Facility        | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kementerian Pariwisata dan Ekonomi Kreatif RI | 63 | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Dinkes DKI Jakarta                      | 61          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Asrama Cendrawasih Pemda Papua          | 60          | Residential Complex/ Dormitory | Oct 30, 2020 | corona.jakarta.go.id         |     |
|                       | PT Bank Rakyat Indonesia (Persero) Tbk   | 56          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | PT. Pertamina Drilling Contractor (PDC) | 54          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | PT. Samuadora Indonesia                 | 54          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | PT Dunia Express Transindo             | 51          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Badan Litbangkes Kemenkes RI            | 50          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Bank BTN Pusat                          | 49          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Pasar Induk Kramat Jati                 | 49          | Market/Trading Center  | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kementerian Bappenas RI                 | 48          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | I-News TV (MNC Tower)                   | 47          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Lembaga Perlindungan Saksi dan Korban   | 44          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | BRI Pusat                               | 44          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | KKP Tanjung Priok                       | 44          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | PT. Pegadaian                           | 43          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kemendikbud RI                         | 43          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kemenkumham RI                          | 43          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Asrama Pendeta Senen                   | 42          | Residential Complex/ Dormitory | Oct 30, 2020 | corona.jakarta.go.id         |     |
|                       | Tahanan Polsek Kalideres               | 41          | Public Facility        | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Bank BJB                                | 37          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Pantj PSTW Margaguna Cilandak           | 36          | Residential Complex/ Dormitory | Oct 30, 2020 | corona.jakarta.go.id         |     |
|                       | Bank Indonesia                         | 33          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Litbang Kemendagri                     | 33          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | BPS Jakarta Pusat                      | 32          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | DPR / MPR RI                           | 32          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Masjid Jamii Tanjung Priok             | 32          | Religious Activities   | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kimia Farma Pusat                      | 31          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | PMI Pusat                              | 31          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Gerja Bethel Cempaka Putih             | 30          | Religious Activities   | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Gerja Tj. Priok                        | 30          | Religious Activities   | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | BRI Kemayoran                          | 30          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | KPU                                    | 30          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Rutan Pondok Bambu                     | 30          | Public Facility        | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Tahilian rt 1 dan 2 wijaya kusuma       | 29          | Religious Activities   | Oct 30, 2020      | corona.jakarta.go.id         |     |
|                       | Kemenakertrans RI                      | 29          | Office                 | Oct 30, 2020      | corona.jakarta.go.id         |     |

(continued on next page)
### C.1 (continued)

| City/ Region | Locations | Case Number | Cluster Types | Time Stamp | Source       | Ref |
|--------------|-----------|-------------|---------------|------------|--------------|-----|
| Bogor**      | Kelurahan Sempak | 35 | Family | Aug 18, 2020 | detik.com | [45] |
| Tangerang**  | Panti Asuhan di Kelurahan Cipadu, Kecamatan Larangan, Kota Tangerang | 33 | Family | Sept 26, 2020 | idntimes.com | [46] |
| Bekasi District** | Pabrik di Jatiuwung | 43 | Office/Factory | Aug 26, 2020 | idntimes.com | [47] |
| Bekasi**     | PT LG Electronic (MM2100) | 250 | Office/Factory | Sept 3, 2020 | ayojakarta.com | [48] |
| Greater Bandung | PT Suzuki Indomobil (MM2100) | 71 | Office/Factory | Sept 9, 2020 | tempo.co | [49] |
| Bandung*     | PT NOK Indonesia (MM2100) | 220 | Office/Factory | Sept 9, 2020 | tempo.co | [49] |
| Cimahi**     | PT Indonesia Epson Industry | 1197 | Office/Factory | Oct 6, 2020 | Kompas.com | [50] |
| Greater Surabaya | PT Bridgestone Tire Indonesia | 22 | Office/Factory | Sept 2, 2020 | Kompas.com | [51] |
| Surabaya*    | PT HM. Sampoerna | 41 | Office/Factory | May 10, 2020 | suarasurabaya.net | [52] |
| Sidoarjo District** | PPIH Asrama Haji | 167 | Religious Activities | May 10, 2020 | suarasurabaya.net | [53] |
| Greater Semarang | Pasar PPI | 30 | Market/Trading Center | May 10, 2020 | suarasurabaya.net | [54] |
| Semarang*    | Jalan S. Parman, Kecamatan Waru | 24 | Permukiman | May 27, 2020 | tribunnews.com | [55] |
| Balalikota | 20 | Office | June 12, 2020 | medinaiindonesia.com | [56] |
| Kecamatan Ngaliyan | 49 | Family | Sept 29, 2020 | Jawapos.com | [57] |
| Kecamatan Semarang Barat | 68 | Family | Sept 29, 2020 | Jawapos.com | [57] |
| Kecamatan Pedurungan | 47 | Family | Sept 29, 2020 | Jawapos.com | [57] |
| RM. Bu Fat | 20 | Rumah Makan | Sept 11, 2020 | Kompas.com | [58] |
| Pabrik di Pedurungan | 100 | Office/Factory | July 8, 2020 | Liputan6.com | [59] |

(continued on next page)
### C.1 (continued)

| City/ Region | Locations | Case Number | Cluster Types | Time Stamp | Source | Ref |
|--------------|-----------|-------------|---------------|------------|--------|-----|
| Kendal District** | RSUP Kariadi Semarang | 57 | Health Facility | April 17, 2020 | Detik.com | [61] |
| | Pondok Pesantren Darul Arqom, Kecamatan Paten | 44 | Education/Religious Activities | Oct 1, 2020 | mediaindonesia.com | [62] |
| | Pondok Pesantren Roudlotul Ursy Qur’an, Kecamatan Singorojo | 34 | Education/Religious Activities | Oct 1, 2020 | mediaindonesia.com | [62] |
| Greater Medan | Medan* | Pengadilan Negeri Medan | 39 | Office | Sept 4, 2020 | Kompas.id | [63] |
| | | Pesantren Raudhatul Hasanah | 44 | Religious Activities | Oct 22, 2020 | www.cnnindonesia.com | [64] |
| Deli Serdang District** | Pesantren Modern Al Azhar Asy Syarif | 37 | Religious Activities | Oct 7, 2020 | sumutkota.com | [65] |
| | RSU Haji Medan | 30 | Health Facility | Oct 20, 2020 | sumut.inews.id | [66] |
| | Bapenda | 11 | Office | Aug 30, 2020 | www.beritasatu.com | [67] |
| Greater Makassar | Makassar* | Rumah Sakit Umum Pusat (RSUP) Wahidin Sudirohusodo | 20 | Health Facility | May 22, 2020 | www.cnnindonesia.com | [68] |
| Gowa District** | Lapas Wanita Kelas IIA Bollangi | 110 | Office | June 24, 2020 | regional.kompas.com | [69] |
| | Ijitala’ Gowa | 23 | Religious Activities | April 25, 2020 | regional.kompas.com | [33] |
| Maros District** | Inspekturat Daerah Kabupaten Maros | 45 | Office | July 24, 2020 | news.detik.com | [70] |
| | Bandara Hasanuddin | 23 | Office | July 20, 2020 | www.tagar.id | [71] |
| Greater Denpasar | Denpasar* | Kantor Pemerintah | 74 | Office | Sept 21, 2020 | regional.kompas.com | [72] |
| | Perusahaan swasta dan BUMN | 138 | Office | Sept 22, 2020 | bali.tribunnews.com | [73] |
| | Tenaga kesehatan | 50 | Health Facility | Sept 21, 2020 | regional.kompas.com | [74] |
| | Ngaben di Sanur | 15 | Religious Activities | Sept 15, 2020 | regional.kompas.com | [75] |
| | Pasar Kumbasari | 45 | Market/Trading Center | June 9, 2020 | merdeka.com | [76] |
| | Pasar Badung | 19 | Market/Trading Center | June 9, 2020 | merdeka.com | [76] |
| Badung District** | Klaster upacara keagamaan | 60 | Religious Activities | Sept 23, 2020 | regional.kompas.com | [77] |
| | Lapas Kerobokan | 125 | Office | Oct 28, 2020 | kumparan.com | [78] |
| | Klaster Made Bali (Hotel Made) | 19 | Health Facility | June 28, 2020 | bali.inew.id | [79] |
| | Klaster pelatihan perusahaan | 14 | Office | July 3, 2020 | regional.kompas.com | [80] |
| Gianyar District** | PT Mitra Prodin | 10 | Factory | July 20, 2020 | merdeka.com | [81] |
| | Klaster toko bangunan | 15 | Office | July 3, 2020 | news.beritabali.com | [82] |
| | Klaster perkantoran | 10 | Office | Aug 19, 2020 | balipost.com | [83] |

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