

Impacts of Regional Economic Factors on the Transmission Of Coronavirus Disease 2019 (COVID-19) in Indonesia

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Abstrak. Dengan 194,109 kasus pada 6 September 2020, Indonesia merupakan salah satu negara yang paling terinfeksi COVID-19. Jumlah total harian kasus COVID-19 dikonfirmasi melewati angka 3,000 untuk pertama kalinya sejak awal pandemi, dengan 3,003 dan 3,308 kasus baru dilaporkan masing-masing pada 28 dan 29 Agustus. Jakarta dan Jawa Timur berkontribusi utama dalam lonjakan tersebut, sementara beberapa provinsi seperti Jawa Barat, Sumatera Utara, dan Kalimantan Timur muncul sebagai hotspot baru. Dengan jumlah kasus yang terus bertambah, penelitian ini berupaya menganalisis keterkaitan situasi ekonomi regional dengan masing-masing kasus COVID 19 di Indonesia. Penelitian ini menganalisis pengaruh perekonomian daerah melalui jumlah kemiskinan di perkotaan dan pedesaan, tingkat hunian kamar hotel, Gini Ratio baik di perkotaan maupun di pedesaan. Variabel data cross section dipilih dari data tahun 2020 di 34 provinsi di Indonesia dari Badan Pusat Statistika Indonesia dan Gugus Tugas Percepatan Penanganan COVID-19 Indonesia. Tulisan ini juga memplot dan menganalisis beberapa data tingkat provinsi pada tahun 2019. Hasil analisis menunjukkan bahwa kemiskinan di pedesaan dan perkotaan, tingkat hunian kamar hotel, dan Gini Ratio di Perkotaan berpengaruh positif dan signifikan terhadap total kasus COVID-19. Analisis plot menunjukkan bahwa kepadatan penduduk, persentase rumah tangga di permukiman kumuh perkotaan, persentase frekuensi rumah tangga yang menggunakan air bekas untuk keperluan lain berhubungan positif dengan penularan COVID-19 di Indonesia. Hingga 6 September 2020, penularan COVID-19 di Indonesia meningkat pesat. Sehubungan dengan situasi tersebut, pemerintah seharusnya memberlakukan aturan yang lebih ketat dalam hal wajib menggunakan masker di ruang publik, social distancing, dan tindakan preventif lainnya di seluruh provinsi di Indonesia.

Kata kunci: Covid-19; kemiskinan; kepadatan penduduk; rasio gini; tingkat hunian hotel

Abstract. With 194,109 cases on 6th September 2020, Indonesia is one of the most infected countries of COVID-19. The daily total number of new confirmed COVID-19 cases passed the 3,000 mark for the first time since the beginning of the pandemic, with 3,003 and 3,308 new cases reported on 28 and 29 August, respectively. Jakarta and East Java mainly contributed to the surge, while several provinces like West Java, North Sumatera, and East Kalimantan emerged as new hotspots. With the high growing case number, this research seeks to analyze the linkages between the regional economic situations and each COVID 19 cases in Indonesia. This research analyzes the effect of regional economic through the number of poverties in urban and rural areas, the hotel room occupancy rate, the Gini Ratio in both urban and rural areas. The cross section data variables are selected from the data in 2020 within 34 provinces in Indonesia from Badan Pusat Statistika Indonesia and Gugus Tugas Percepatan Penanganan COVID-19 Indonesia. This paper also plot and analyze some province level data in 2019. The analysis indicates that poverty in rural and urban areas, hotel room occupancy rate, and Gini Ratio in Urban Area have positive and significant impact on the total COVID-19 cases. The plot analysis show that population density, percentage of households in urban slum, percentage of household frequency of using used water for other purposes have positive relation with transmission of COVID-19 in Indonesia. Until 6th September 2020, the transmission of COVID-19 in Indonesia is increasing rapidly. In regards of this situation, the government should have imposed stricter regulations in the mandatory mask in public spaces, social distancing, and other preventive measures in all provinces in Indonesia.

Keywords: covid-19; poverty; population density; gini ratio; hotel occupancy rate

INTRODUCTION

The COVID-19 pandemic has proven to put pressure on the economic and social conditions in Indonesia since the end of 2019. It's predicted that economic growth will decline to 5.2 percent this year (World Bank, 2020). This could be the deepest recession since the Second World War, with a decline in per capita output since the end of the 18th century. Adding to the previous situation in Indonesia, economic growth has weakened due to trade tensions between the United States and China that preceded the transmission of COVID-19. This economic impact has broad implications in all regions of Indonesia. The economy of each region is under threat, coupled with the regional conditions that are worse than before.

In March 2020, the number of poor people in East Java Province has closed to 2.7 million people. At Sept 2020, the number of COVID-19 cases was 35,634. Meanwhile, the Riau Islands Province with the number of poor people is only 23.11 thousand people, but the number of COVID-19 cases is 1,182, which is far less than East Java Province. This figure is further clarified by the implication of the relationship between the level of inequality, through the Gini

coefficient, and the number of COVID-19 cases. In the same month, West Java and DKI Jakarta, whose high urban Gini coefficients, has a high number of cases. When compared to the provinces of Bangka Belitung and North Kalimantan, which have a low urban Gini coefficient, there are far fewer COVID-19 cases, which are only hundreds of cases adrift. Although all classes of society can be affected equally by these pandemic, marginalized communities, especially the urban poor, casual workers, temporary and informal workers have been disproportionately affected by the pandemic. The immobility of workers from satellite cities and their inability to pay healthcare, adding with the situation which forces them to not come to work makes them more vulnerable to the pandemic (McKibbin & Fernando, 2020).

On March 16, 2020, the government announced new regulations to reduce the spread of COVID-19. This policy generally encourages people to stay at home and work from home. As a developing country, Indonesia has approximately 760 thousand entrepreneurs who must continue to work outside the home. Although some self-employed workers can create a functional workspace at home, they still need financial support that may unavailable when they work outside (Setyawan & Lestari, 2020). Besides, it is more than separating employees to realize that collaboration with colleagues while working from home can be a challenge because they experience difficulties in work life and home life (Flores, 2019).

As mobility plays a significant role in the COVID-19 growth number, the new normal era, as mentioned by many previous papers as a social distancing and shelter-in-place behavior, needs a significant role in how to comply with the government's protocol by everyone (Hall, Laddu, Phillips, Lavie, & Arena, 2020). Many people are taking further action which considers themselves go to work and also to stay safe. Data in July 2020 in Jakarta suggest that the Hotel Room Occupancy rate is 41.03 percent and at South Sulawesi Province the rate is 34.42 percent. Surprisingly, the COVID-19 cases in Jakarta at the same time are 46,333 and in the South Sulawesi is 12,684. Compared with a few provinces with lower Hotel Room Occupancy Rate like Bangka Belitung Islands which is only 17,03 percent and West Sulawesi is only 10,49 percent, both of them only have 662 cases together (BPS, 2020). In general, the form of policy implications that impose a level of mobility shows the unpreparedness of society. So, the increasing number of COVID-19 cases is a form of low compliance in society regarding the implementation of this regulation (Carteni, Di Francesco, & Martino, 2020a).

The success of social distancing policies is directly related to the demographic situation of local communities. There are a few literatures that have examined the demographic situation in Indonesia regarding economic variables such as economic growth, unemployment, and, consumption structures (McDonald, 2014). However, from the perspective of the COVID-19 pandemic wave, it shows the behavior and productivity of the population. For example, DKI Jakarta Province is the most populous province in Indonesia as well as the province that recorded the highest number of COVID-19 cases compared to other provinces, with a 1.7 percent increase in new cases in early August (WHO, 2020).

Based on these conditions, this study aims to find out how regional economic conditions affect the number of COVID-19 cases in Indonesia. The government should be able to take into account the differences in the economic conditions of the people in the regions. So the form of the policy can have overall implications. Although this did not happen immediately, it required a lot of time and higher costs.

METHODOLOGY

This study uses data from 34 provinces in Indonesia in 2019 and 2020. Datasets were obtained from Badan Pusat Statistik of Indonesia and Gugus Tugas Percepatan Penanganan COVID-19 of Indonesia. We conducted multiple linear regressions - robust standard errors using STATA 14 to analyze province level data in 2020. Excel 2010 is also utilized to plot and analyze province level data in 2019.

In this study, following econometrics model is used for our estimation:

$$\text{Log_Number_Covid-19} = \alpha_0 + \alpha_1 \text{UP} + \alpha_2 \text{RP} + \alpha_3 \text{GU} + \alpha_4 \text{GR} + \alpha_5 \text{HROR} + e$$

Where:

Log_Number_Covid-19: Logarithm of Covid-19 Cases per Province

UP : Number of Poverty in Urban Area (Thousand People)

RP : Number of Poverty in Rural Area (Thousand People)

GU : Gini Ratio in Urban Area (0 – 1)

GR : Gini Ratio in Rural Area (0 – 1)

HROR : Hotel Room Occupancy Rate (Percentage)

The following table is the descriptive statistic for all data in this study:

Table 1. Descriptive Statistics (N=34 provinces)

Variables	Obs	Mean	Std.Dev.	Min	Max
Number of Covid-19 Cases per Province,6 Sept 2020	34	5,704	9,818	206	46,333
Number of Poverty in Urban Area (Thousand People), March 2020	34	328.29	589.40	16.58	2,725.91
Number of Poverty in Rural Area (Thousand People), March 2020	33	462.48	601.23	23.11	2,736.97
Gini Ratio in Urban Area, March 2020	34	0.35	0.040	0.276	0.436
Gini Ratio in Rural Area, March 2020	33	0.30	0.044	0.22	0.414
Hotel Room Occupancy Rate (Percentage),July 2020	34	27.98	9.36	2.57	41.03
Population Density (people per sq. km of land area), 2019	34	742	2708	9	15,900
Percentage of Households in Urban Slum, 2019	34	14.05	7.60	3.79	42.73
Percentage of Household Frequency of Using Used Water for Other Purposes, 2019	34	30.04	11.63	14.97	75.73

Source : Badan Pusat Statistik & Gugus Tugas Percepatan Penanganan COVID-19,2020

RESULT AND DISCUSSION

Table 2. Regression Result

VARIABLES	Log Total COVID-19 Cases
Number of Poverty in Urban Area	0.0110985*** (0.000242)
Number of Poverty in Rural Area	0.0012908*** (0.000346)
Hotel Room Occupancy Rate	0.1860435** (0.083091)
Gini Ratio in Urban Area	11.64844* (6.33274)
Gini Ratio in Rural Area	6.521748 (4.491137)
Constant	32.92005 (19.4803)
Observations	33
R-Squared	0.6589

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2 reflects the robust ordinary least square regression. Robust regression is used to compensate for the presence of outliers that could significantly distort the least-squares estimators and cause misleading, inaccurate, and unreliable results (Verardi & Croux, 2009). R-square value of 0.6589 indicates that all the independent variables used in the regression are able to explain 65.89% of the overall model, the rest 34.11% is explained through variables outside the model.

Through Table 2, we can conclude several findings on the variables that affected the total COVID-19 cases throughout 33 provinces in Indonesia. Both numbers of poverty in rural and urban areas have a positive significant (1% significant level) impact on the total of COVID-19 cases in *ceteris paribus*. One reason this happens is that poor individuals and populations are lacking access to health services and are more likely to be misinformed and miscommunicated due to lack of access to information channels, thus, they are more likely to ignore public health warnings (Ahmed, Ahmed, Pissarides, & Stiglitz, 2020). Preceding research by (Patel et al., 2020) states several main reasons such as overcrowded accommodation, limited access to personal outdoor space, non-flexible occupation, and unstable work conditions to be factors that increase exposure to COVID-19 in poor populations. Overcrowded accommodation and limited access to personal outdoor space reduce compliance with social distancing measures. Non-flexible occupation means that these occupations are not able to comply with work from home orders. The discrepancy between the coefficients between rural and urban poverty are significant. This shows that poverty in the urban area have much larger impact on COVID-19 cases than poverty in rural areas. We argue this is caused by several factors such as population density and characteristics of urban poverty. It is a recurring fact that urban areas have higher population density than in rural areas.

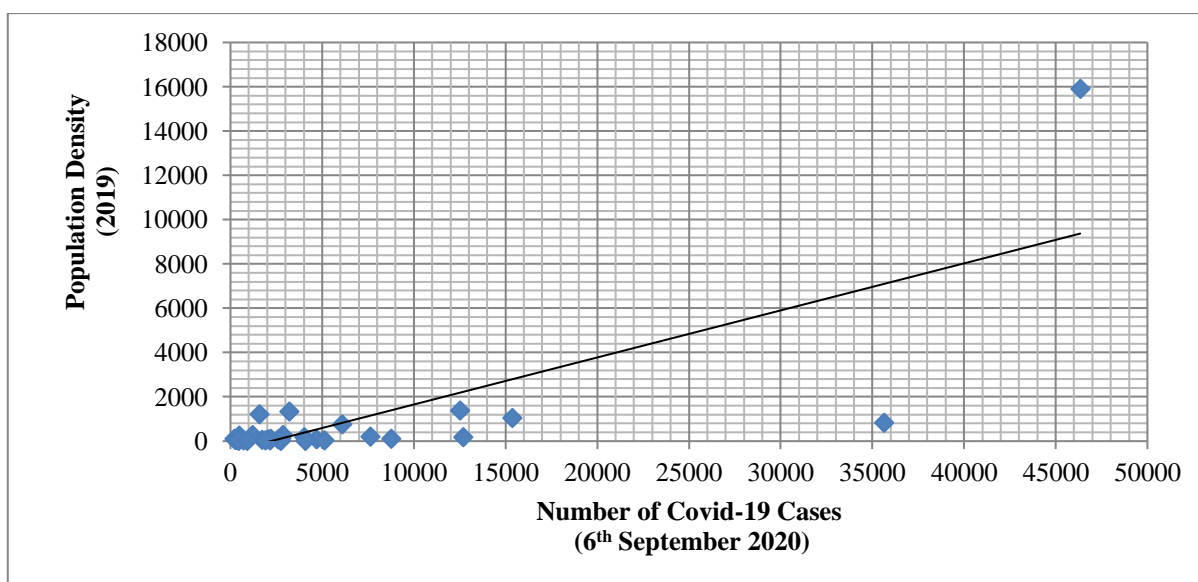
In terms of hotel room occupancy rate, the regression result shows a positive significant (at a 5% significant level) result between hotel room occupancy rate and the total number of cases of COVID-19. We argue that hotel

room occupancy rate affects the spread of COVID-19 through mobility. Mobility plays a significant role in explaining the growth of the number of COVID-19 growth with a threshold of 21 days as its positivity detection time, meaning that the 14 days self-quarantine deemed to be underestimated (Carteni, Di Francesco, & Martino, 2020b). Earlier research in the USA stated that changes in mobility patterns are significant to the decrease in COVID-19 growth rates (Badr et al., 2020).

Lastly, the regression results illustrate the various relationship between inequality proxied by the Gini ratio and the total number of cases of COVID-19. Both the Gini ratio in terms of rural and urban areas have a positive relationship with the number of total cases of COVID-19. However, the urban dimension yielded a significant relationship (at a 10% significant level) while the rural dimension yielded an insignificant relationship to the response variable. In addition, the urban dimension also yielded a higher impact on the number of COVID-19 cases than the rural dimension. Overall, Inequality has always shown disproportionate effect gaps in life expectancy and mortality rate between the richest and the poorest populations (Ahmed et al., 2020). We argue that these discrepancies happen because of similar issues between urban and rural poverty that has been explained previously.

Figure 1 illustrates the relationship between population density in 2019 and the number of COVID-19 cases in 2020. The usage of a different period in between dataset is caused by the availability of the data in which the latest population density data is available in the year of 2019. Other data that have this issue include the percentage of households in urban slums (Figure 2) and the percentage of household frequency of using used water for other purposes (Figure 3).

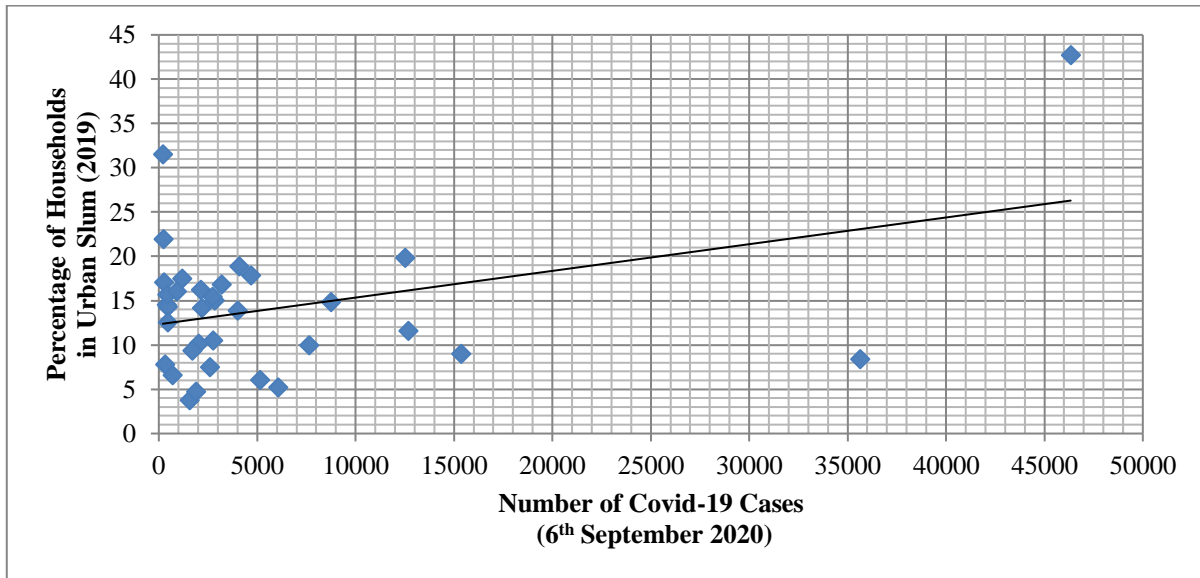
Figure 1 shows a positive relationship between population density and the prevalence of COVID-19 cases, in this case, measured by the number of cases. Population density plays a significant role in COVID-19 growth because it is proportional to the contact rate (Rocklöv & Sjödin, 2020). An earlier study from 2020 in Iran using Partial Correlation Coefficient (PCC) and Sobol-Jansen function confirms that population density has a direct relation with the COVID-19 outbreak (Ahmadi, Sharifi, Dorosti, Jafarzadeh Ghouschi, & Ghanbari, 2020).



Source: Badan Pusat Statistik 2019 & Gugus Tugas Percepatan Penanganan COVID-19 2020

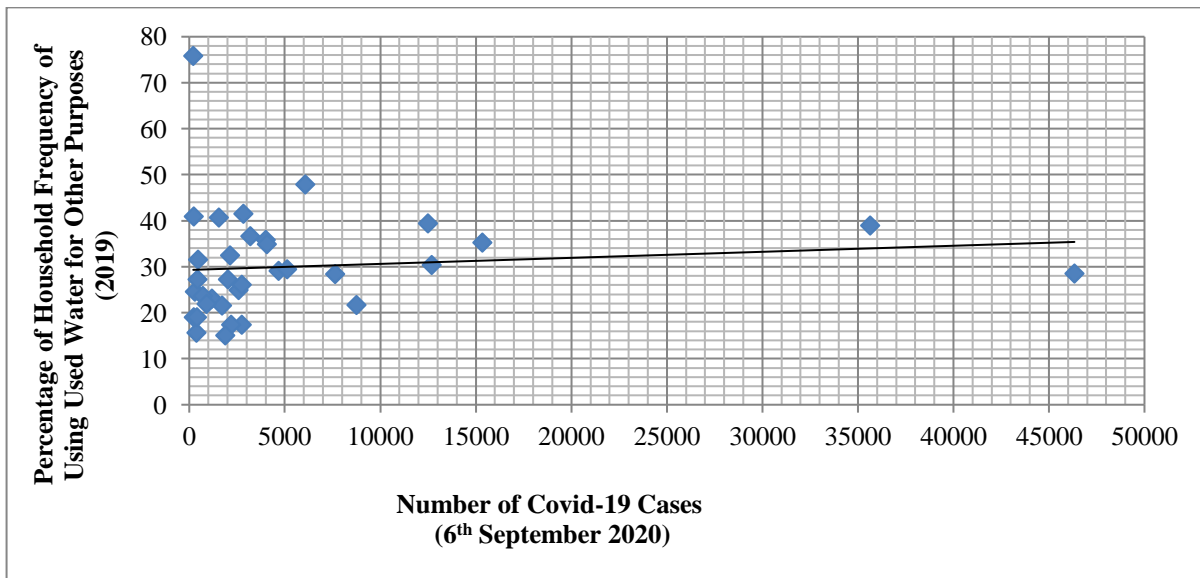
Figure 1. Population Density and Number of Covid-19 Cases

Figure 2 illustrates the relationship between the percentage of households in urban slums and the number of COVID-19 cases. The illustrations show a positive relationship between urban slums and the number of COVID-19 cases. Various studies have shown that the population living in slums is vulnerable to infectious diseases such as COVID-19. This happens because the characteristics in urban slums such as space constraints, violence, and overcrowding created a condition where physical distancing and self-quarantine to be impractical thus increasing the likelihood of infection (Corburn et al., 2020). A Study from 2020 in Ghana also confirms that preventable etiquette such as social distancing is unattainable among slum dwellers (Morgan, 2020). An observational study of urban slums in India also captured that social distancing that would decrease the growth of COVID-19 is impossible if it is not complemented with economic support (Wasdani & Prasad, 2020).



Source: Badan Pusat Statistik 2019 & Gugus Tugas Percepatan Penanganan COVID-19 2020

Figure 2. Percentage of Households in Urban Slum and Number of Covid-19 Cases



is used to analyze various effects on the datasets of 34 provinces in 2019 and 2020. The regression results show that all of the regressors have a positive relationship to the total number of COVID-19 cases. In addition, all of these regressors also have a significant relationship to the total number of COVID-19 cases except for the Gini ratio in the rural area. In terms of poverty, the results show a discrepancy between urban and rural areas. Urban poverty has a higher impact on the total number of COVID-19 cases than rural poverty. These discrepancies between the effect of urban and rural poverty are explained through the characteristic urban areas which involve higher population density, urban slums, and the usage of used water that promotes the number of COVID-19 cases. Hotel room occupancy rate affects the total number of COVID-19 cases through mobility and mobility patterns. Inequality affects the total number of COVID-19 through predetermined gaps between rich and poor populations in life expectancy and mortality rate. These gaps are created through immobility, the inability of the poor population to access health services, and the inability to go to work because of the pandemic. The spread of COVID-19 in Indonesia is increasing rapidly. Stricter regulations and policies are needed to disperse and control the spread of this virus. The government should have imposed stricter regulations in the mandatory mask in public spaces, social distancing, and other preventive measures in all provinces in Indonesia.

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