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Mobility Restriction Policy and Poverty Impact of Covid-19 in Indonesia: Evidence from District-Level Data

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Abstrak:
This paper analyze the poverty impact of Covid-19 on regions of Indonesia using district-level data. Six provinces employed non-pharmaceutical measure namely PSBB (*Pembatasan Sosial Berskala Besar*) mobility restriction are set as the treated group. Meanwhile, our poverty variable is the share of population living below the poverty line against district total, calculated based on the basic needs approach. We employ difference-in-difference (DID) estimator to explore the poverty impact. Results state that while the Covid-19 impact is significant in the more industrialized and globally connected regions such as Java and Bali, provinces implementing PSBB policy suffer from 0.07 – 0.09 percentage points higher poverty incidence compared to the control. The impact is observed to be larger in the urban (city) area compared to the non-urban (districts). The finding suggests inadequacies of the government's complementary responses in controlling poverty increase, suggesting the need for a more inclusive strategy such as implementing Universal Basic Income.

Keywords:
mobility restrictions; Covid-19; poverty; regional analysis; impact evaluation

Introduction

At the beginning of 2020, the coronavirus (Covid-19) pandemic hit China and several other countries and was declared as a global pandemic by the World Health Organization (WHO) in March of that year. By the end of 2020, almost every country in the world have recorded Covid-19 infection. Business and industrial activities were severely affected, if not stopped entirely. IMF (2020) corrected their global growth projections, estimating around 5% of economic contraction due to this problem. Countries with large and young populations suffered highly and the problem has been worse for developing countries. Scholars early on predicted that the poverty impact is serious, especially for this group of countries (Laborde et al., 2020; Sumner et al., 2020; Valensisi, 2020).

The negative impact of a health disaster on the economy has been widely studied previously. Past coronavirus-related epidemics such as SARS and MERS had found to brought negative economic impact, ranging from mild (Keogh-Brown & Smith, 2008)

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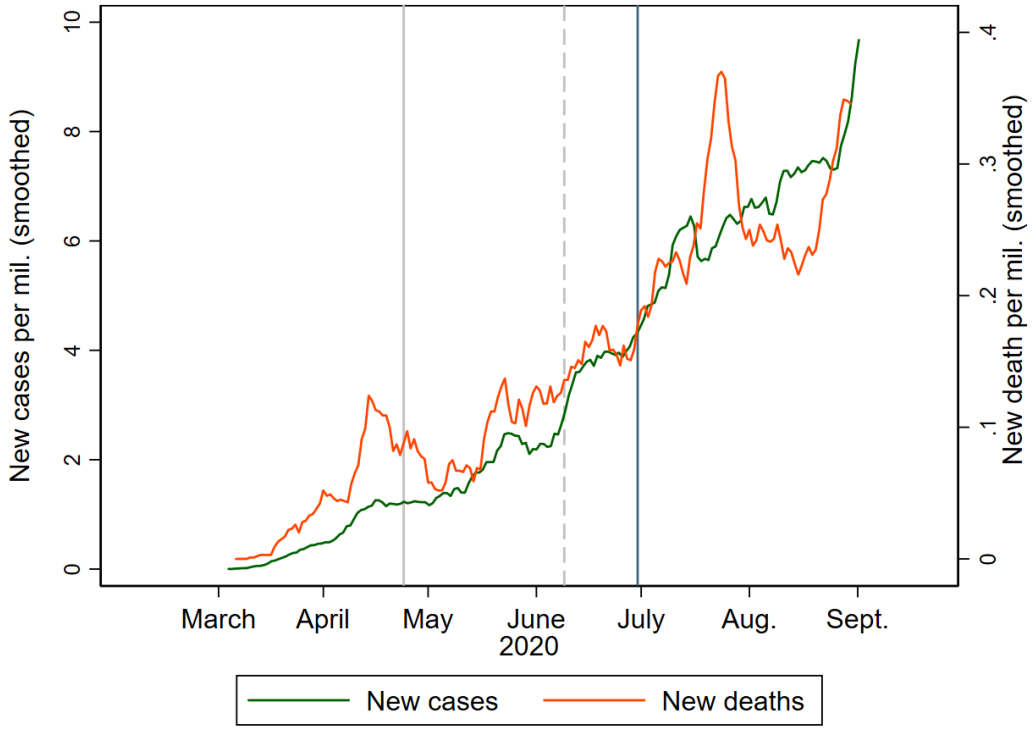
to serious (Beutels et al., 2009; Smith et al., 2019). A recent study looking at the economic impact of the old 1918 "Spanish-flu" pandemic indicates a loss in countries' GDP between 6% and 8% (Robert J. Barro et al., 2020). A study on the 2014 Ebola outbreak in West African countries estimated a loss in GDP ranging from 2.8 to 32.6 billion dollars, while the social cost was much higher).

On the adverse impact of the Covid-19 pandemic, development economists are especially concerned that it will deeply compromise Sustainable Development Goals (SDGs) in 2030 especially for Goal 1 on poverty reduction. Developing countries such as Indonesia certainly are not the exception to this problem. Since restructuring its economy in 1998 the country has been forging backward and forward participation in the global economy, yielding around 5% average growth from 2004 to 2019. The sudden global shock caused by this crisis would obviously disrupt its growth performance in both the short as well as long run. The predicted and observed poverty effect of the pandemic for the country done by a number of studies is ranging from a mild 0.5% to a substantive 3.7% in the first year (Suryahadi et al., 2020; Gibson & Olivia, 2020; Setyadi & Indriyani, 2021; Faudiana, 2021; see also Fitriana & Mabruri, 2022 and Rahmayani et al., 2021).

Since its official discovery in early March, number of cases in Indonesia grew exponentially. By late July the total number of cases reached 100 thousand people with nearly 5000 death. The number of cases is quadrupled at the end of October with as many as 13.869 total death. This escalation has been one of the worst in the Southeast Asian region.

Among the late-emerging ASEAN, Indonesia and the Philippines are hit the worst. Although the number is still significantly lower than that of India, the growth trajectory is very similar between the two countries. Thailand and Malaysia experienced lower cases and the curve had been flattening other than a sudden jump in October for Malaysia. Both countries applied strict non-pharmaceutical intervention (NPI) such as tightening border control and area-wide lockdown. A similar measure was taken in the Philippines with its Barangay lockdown in the Luzon area back in March 2020.

Indonesia on the other hand, despite applying a similar lockdown strategy, did not implement a very strict measure compared to its neighbors. The term used is called Large Scale Social Restrictions (Pembatasan Sosial Berskala Besar, PSBB). The measure was also less centralized, relying on the more active role of the sub-national governments. This not-so-strict nature gave the impression that Jakarta's main concern was to mitigate the adverse economic impact, especially on poverty and unemployment. Figure 1 illustrates the changes in the number of new cases and death following cities and provinces announcement of mobility restrictions. By the end of June, the policy came to an end in most of the regions. The policy to some extent has managed to slow down the spread of Covid-19.



Note : Solid vertical grey line marks the full implementation of PSBB policy in four provinces and 14 cities/districts. Dashed grey line remarks the end of PSBB policy in most of the regions, while the blue line remarks the end of PSBB policy in Jakarta.

Source : John Hopkins University CSSE COVID-19 Data, 2021

Figure 1. Log total number of monthly Covid-19 cases and New Death in Indonesia

Table 1. List of Provinces and Districts Applying the PSBB Policy

Province-level	Region	Period	City/district-level	Region	Period
Jakarta Capital	Java	Apr 10 - Aug 1	Tangerang City	Java	Apr 18 - Jul 26
West Java	Java	Apr 10 - Jun 26	Sth Tangerang City	Java	Apr 18 - Jul 26
West Sumatera	Sumatera	Apr 22 - May 29	Tangerang District	Java	Apr 18 - Jul 26
Gorontalo	Sulawesi	May 4 - Jun 1	Tegal City	Java	Apr 23 - May 22
			Surabaya City	Java	Apr 28 - May 25
			Sidoarjo District	Java	Apr 28 - May 25
			Gresik District	Java	Apr 28 - May 25
			Malang City	Java	May 17 - May 31

Malang District	Java	May 17 - May 31
Pekanbaru City	Sumatera	Apr 17 - May 28
Banjarmasin City	Kalimantan	Apr 24 - May 21
Barito Kuala Dist.	Kalimantan	May 15 - Jun 12
Tarakan City	Kalimantan	Apr 26 - May 30
Makassar City	Sulawesi	Apr 24 - May 21

Note : Province-level PSBB restriction covers a large number of cities/districts and is subject to central government's approval, while District-level PSBB lockdown covers entire areas or cities. Under this type of restriction, social mobilities are limited and only public facilities such as hospitals and markets are allowed to fully operate.

Source : Ariansyah/BNPB, 2020

Although the virus being discovered in early March, immediate response by the government only came starting in April of that year. One of the first major decisions was to shut down all international flights followed by limiting public facilities. Starting in mid-April, four provinces announced the PSBB policy. Those provinces are Jakarta, West Java, West Sumatera, and Gorontalo. Table 1 provides information of cities/districts and provinces that implemented the measures.

The PSBB has been a quasi-decentralized policy since the beginning, relying on the active participation of sub-national government at the province and city/district level. However, PSBB is subject to the central government's approval (sic. The Minister of Health) with the local governments handle the executions. The province-wide PSBB is applied by the governor to the majority number of districts within its jurisdictions. In the case of West Java Province PSBB in April and May, it applied to 27 out of 32 total cities/districts in the province. Meanwhile, district-level PSBB needed approval from both the central government and the province's governor, and it applies to its administrative areas only.

As of late April to June 2020, in addition to the four provinces applying the PSBB, 26 districts submit their PSBB applications. The social restrictions, with the exception of Jakarta, mostly ended by July, and by the following month, the policy was no longer in effect either at the province or district level.

In terms of regions, most of the provinces and districts that implemented the PSBB lockdown are located in Java island, particularly those located close to major cities Jakarta and Surabaya. These are the first and second-largest cities in Indonesia

based on the number of populations. They also serve as the economic hub for their surrounding areas and are connected globally to the international supply chain. The PSBB imposed on these cities, and their surrounding region, will then expectedly affecting the business sector. In terms of administrative status, most of the areas that applied the PSBB are cities. Most of the districts implementing the measure are those whose location is close to major metropolitan area such as Tangerang, Sidoarjo, and Barito Kuala districts.

In the attempt to mitigate the poverty impact resulting from these mobility restrictions, the government through the Ministry of Social Affairs distributed social assistance targeting at the majority poor and near-poor household in areas affected. The program took various forms including conditional cash transfer, food voucher, and subsidy (MOSA 2020). The earlier program is targeted to family/household. It amounts to IDR 600 thousand (USD 45) for the first three months before reduced to IDR 300 thousand (USD 20) for the rest of the months until December 2020. For the affected poor household in the rural areas, the government utilized the Village Funds (Dana Desa). The transfer was distributed in the same sequences and at the same nominal value as the earlier-mentioned program. Another kind of cash subsidy was also given to workers with income below IDR 5 million (USD 355). This program is given in two rounds for the total periods of four months with the same nominal value of IDR 600 thousand (USD 40) per worker. The expected total benefit received by the individual is USD 2.4 million (USD 170).

The government also issue cash transfer for the small and micro enterprises distributed through the Ministry of Cooperatives and the SMEs. The cash given to each applicable enterprise is IDR 2.4 million (USD 170), and it is targeting 12 million small and micro businesses all over Indonesia. However, as of November 2020 the program is yet to reach a large scale of the targeted group. Furthermore, the government also provides incentives for the poor and near-poor household that includes electricity subsidies given up to December 2020, and skill training packages through the "Kartu Prakerja" program targeting the unemployed person.

Much of the above-described effort in combating this pandemic was concentrated in cushioning the short-term poverty impact rather than dealing with the mid to long-term impacts such as contact tracing and testing (Sparrow et al., 2020). The strategy has been working in suppressing poverty escalation between the first half of 2019 and the first half of 2020 (BPS 2020). For the adult population (age 18 y.o. or more) it was slightly increasing from 8.32% to 8.65%. Likewise for the younger group (age below 18 y.o.) poverty incident was also slightly increasing from 11.76% to 12.23%. As of the time of this writing, poverty data for the latter part of the year has not been released, but one might expect to see a larger increase.

Table 2 Poverty Share of Provinces (% of Population) 2019 - 2020

No.	Province	2019	2020	Change	No.	Province	2019	2020	Change
1	Aceh	15.32	14.99	-0.33	18	West Nusa Tenggara	14.56	13.97	-0.59
2	North Sumatra	8.83	8.75	-0.08	19	East Nusa Tenggara	21.09	20.90	-0.19
3	West Sumatra	6.42	6.28	-0.14	20	West Kalimantan	7.49	7.17	-0.32
4	Riau	7.08	6.82	-0.26	21	Central Kalimantan	4.98	4.82	-0.16
5	Jambi	7.60	7.58	-0.02	22	South Kalimantan	4.55	4.38	-0.17
6	South Sumatra	12.71	12.66	-0.05	23	East Kalimantan	5.94	6.10	0.16
7	Bengkulu	15.23	15.03	-0.20	24	North Kalimantan	6.63	6.80	0.17
8	Lampung	12.62	12.34	-0.28	25	North Sulawesi	7.66	7.62	-0.04
9	Bangka Belitung	4.62	4.53	-0.09	26	Central Sulawesi	13.48	12.92	-0.56
10	Riau Islands	5.90	5.92	0.02	27	South Sulawesi	8.69	8.72	0.03
11	Jakarta	3.47	4.53	1.06	28	Southeast Sulawesi	11.24	11.00	-0.24
12	West Java	6.91	7.88	0.97	29	Gorontalo	15.52	15.22	-0.30
13	Central Java	10.80	11.41	0.61	30	West Sulawesi	11.02	10.87	-0.15
14	Yogyakarta	11.70	12.28	0.58	31	North Maluku	17.69	17.44	-0.25
15	East Java	10.37	11.09	0.72	32	Maluku	6.77	6.78	0.01
16	Banten	5.09	5.92	0.83	33	West Papua	22.17	21.37	-0.80
17	Bali	3.78	3.79	0.01	34	Papua	27.53	26.64	-0.89

Source: BPS, 2020

The loose intervention nature of PSBB has led to the continuously increasing number of cases, reaching all provinces and cities/districts at the end of 2020 with more than 500 thousand total cases. Table 2 presents the poverty share of province's total population. At a glance, we can see that many provinces are actually exhibiting decreasing poverty share. The exception of this is the more industrialized provinces such as Riau Island and all of the provinces in Java island. Apart from Java, only Riau Islands, East Kalimantan, and North Kalimantan exhibit increasing poverty incidences. Provinces with a very high poverty rate such as Papua and West Papua did not experience increasing poverty. Finally, we can see that provinces implementing the PSBB policy do not necessarily exhibit increasing poverty. West Sumatera and

Gorontalo are among provinces without increasing poverty rates despite employing the policy.

In studying the impact of lockdown measures, Chen et al. (2020) found out that the policy is less effective for developing countries. They suggest that different kinds of restrictions other than just stay-at-home instruction. Banning social gatherings and closing schools contribute the largest to flattening the number of cases, followed by mask usage, mass testing and contact tracing, and workplace closure. However, the latter would affect GDP growth deeply.

Chathukulam and Tharamangalam (2021) highlighted the important role of the local government in combating the pandemic. They brought up the case of the Indian state Kerala and highlighting its initial success in the early part of the year. The success owed to the state's institutional and cultural endowment. However, the success did not last as political problems convoluted the effort in combating the pandemic. A similar challenge was pointed out by others (Asmorowati, Schubert, & Ningrum, 2021) specifically related to inter-governmental complexity and its inherent political dimension which hampered the mitigation effort.

In the case of Indonesia, Suharyadi et al. (2020) using CGE modeling predicted that the pandemic would result in a mild 0.5% increase in the national poverty rate, and as many as 1.3 million people are subject to impoverishment. Yusuf's (2020) estimation using the same approach was more severe, calculating an additional 2.5 – 4.1 million people dragged below the poverty line. The manufacturing-industry sector is also estimated as the hardest hit sector. As most of the industries operated in urban areas, the impact on the agricultural sector is less severe (Yusuf et al. 2020).

This paper seeks to estimate the poverty impact of Covid-19 in Indonesia using district-level data. We follow a quasi-experimental design with cities' and provinces' Covid-19 mobility restriction measure (Pembatasan Sosial Berskala Besar, PSBB) set as the treatment variable. The policy impact has not been thoroughly measured apart from the pioneering work carried out by Suharyadi et al. (2020) and Yusuf (2020) using projection based method. In addition, the results do not capture the dynamics at the sub-national level. Other studies has explored the PSBB policy impact on people's mobility (Khoirunofik, et al., 2022), the spread of the pandemics (Syafarina et al., 2021; Auliya et al., 2021), and the environment (Anugerah, et al., 2021).

We present three main objectives in this paper. First, we aim to highlight the poverty impact of Covid-19 in the region applying the PSBB policy and compare it with the impact on industrialized regions i.e. Java region, and other measurements. Secondly, we extend our impact analysis using urban and non-urban regional distinctions. Lastly, we offer policy recommendations in order to further mitigate the impact in the short and medium run, focusing on the role of the local government.

Methods

In measuring poverty in Indonesia, Statistics of Indonesia (Indonesian abbreviation; BPS) employed the basic needs approach (BPS 2020) which defines poverty as an individual's ability to fulfill his basic needs. This is constructed from a nationwide survey covering 375.000 households done yearly. The basic needs are classified into two components that are food and non-food consumption. The food component measures the daily fulfillment of 2100 kilocalories per individual among 52 types of food commodities. Those whose consumption lies below this line are categorized as poor. Equations (1) and (2) below describe how the food component of poverty (Food Poverty Line, FPL) is measured.

$$FPL_{jP} = \sum_{k=1}^{52} P_{jkp}.Q_{jkp} = \sum_{k=1}^{52} V_{jkp} \quad \dots (1)$$

where P_{jkp} is the average price of commodity k in the area j in province p. The j is binary division of urban and rural area, with p is 34. Q_{jkp} represents the quantity of commodities consumed by the individual in the area j in province p. Lastly, V_{jkp} is the total output value. However, equation (1) needed to be converted into the kilocalories measurement with 2100 as the reference. To do that, the average price of calories is calculated as shown in equation (2)

$$\overline{CP}_{jp} = \frac{\sum_{k=1}^{52} V_{jkp}}{\sum_{k=1}^{52} K_{jkp}} \quad \dots (2)$$

with $\overline{CP}_{jp}$ as the average price of calories in area j in province p, and K_{jkp} is the calorie content of commodity k in area j in province p.

Meanwhile the non-food component measures the minimum need for housing, clothes, education, and health service. The non-food commodities are different between urban and rural regions with the former consists of 52 commodities and the latter 47 commodities. Spending ratio of such commodities is added as the weight for the measurement, which is shown in the following equation (3)

$$NFPL_{jP} = \sum_{k=1}^{47/52} r_{jkp}.V_{jkp} \quad \dots (3)$$

where the $NFPL_{jP}$ is the measurement of non-food component of poverty in area j and province p. Meanwhile, r_{jk} is the spending ratio of the non-food commodity k to individual income.

Bodies of literature have been linking the negative impact of the pandemic on poverty rates since its beginning in early 2020. The economic impact of Covid-19 in

developing countries is arguably outweighing its health impact. Meanwhile, the global headcount ratio of poverty is estimated to increase by around 0.9% (Valensisi, 2020). At the household level, Midões and Seré (2021) confirm the negative impact on the vulnerable household using European Central Bank's household survey. Out of the large EU-7 countries, the poor in Italy and Portugal are the most affected by the pandemic.

Our methodology (following Gathergood & Guttman-Kenney, 2021; Oosterbeek et al., 2010; Duflo, 2001; Card & Krueger, 1994) assume that there is time difference impact of poverty; before and after the pandemic started, and we also assume that there are locational differences between provinces with PSBB and others. The fact that the policy disrupted social and economic activity, serves as the main vindication for the differences with the other region. In constructing our policy shock, other than using province we also treated multi-districts PSBB as a province level PSBB. Thus multi-district PSBB announced in Sidoarjo, Surabaya, Gresik, Malang city, and Malang district, all located in East Java, is considered as a province on. The other case is the multi-district PSBB employed in three cities in Banten province.

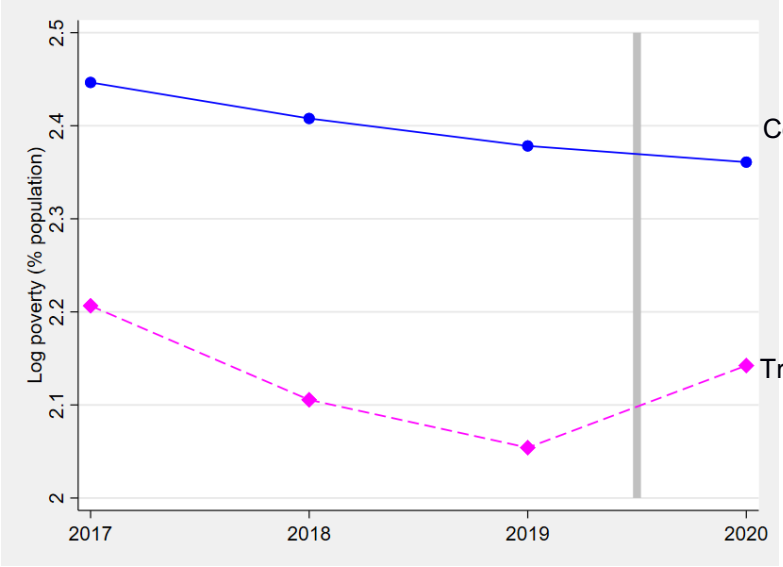
With regards to the two groups, with and without the policy, in two-period differences, we label treat=1 and post=1 for the provinces employing the policy in the period after the pandemic started, and 0 is given otherwise. The DID equation can be presented as follow

$$\delta = \left(Pov_{treat=1,post=1} - Pov_{treat=1,post=0}\right) - \left(Pov_{treat=0,post=1} - Pov_{treat=0,post=0}\right) \quad \dots (4)$$

We carry equation 1, altering the DID coefficient δ with the change in poverty (ΔPov), into the regression model below

$$\Delta Pov_{ij} = \alpha_{ij} + \beta_1 treat + \beta_2 post + \beta_3 (treat * post)_{ij} + \beta_4 \sum X_{ij} + \sigma_{ij} + \varepsilon_{ij} \quad \dots (5)$$

with i =1 ,..., N, and $\sum X_{ij}$ signifies vector of endogenous variables; Human Development Index (HDI), log number of workers, and log GRDP, all reported in lagged 1 year value. σ_i denotes district fixed-effects while ε_j is the error term. Our regression results employ heteroskedasticity robust standard errors in order to account for serial autocorrelation within the same group. As the study covers all of the 514 districts in Indonesia, the standard errors are likewise clustered at the district level.



Source: Author

Figure 2. Parallel-Trend Line

To ensure the validity of our DID model we construct parallel trend lines between the treatment and the control group. A failure to confirm this trend would lead to a bias estimation result. To do this we gathered the pre-treatment period of poverty data at the district level in the years 2017, 2018, and 2019. Figure 2 shows that from 2017 to 2019 poverty incidence has been decreasing across all districts, and the rate is very similar between our two target groups, despite the rate was larger for the treated group. However starting in 2020, we see a significant spike that violated the parallel line. This confirms the parallel trend assumption of our DID model.

One of the main technical weaknesses of employing this strategy is that the observation for the post-treatment period is only available in a single year. Further extension of this research could account for an additional number of years. With longer time observation, we can then apply time fixed-effects properly into the model. Secondly, biased result due to measurement error is to be expected. As described in the previous section, poverty data used in this paper have not fully captured the poverty issue for the last quarter of the year (October – December). Future research could serve as a robustness test for the finding in this paper. Lastly, the number of endogenous variables employed could be increased upon the availability of more district data in the future. This is important in order to prevent biased estimation due to unobserved heterogeneity.

Table 3 Summary Statistics and Variable Descriptions

Variables	Obs.	Mean	Std. Dev.	Definition
Poverty	1,028	12.0	7.6	Number of people live below district's poverty line (% population)
Log poverty (all)	1,028	2.3	0.6	

2019 (without PSBB)	411	2.4	0.6	
2019 (with PSBB)	103	2.0	0.5	
2020 (without PSBB)	411	2.4	0.6	
2020 (with PSBB)	386	2.1	0.5	
HDI $_{(t-1)}$	1,028	69.2	6.6	1-100 Composite index
Log worker $_{(t-1)}$	1,028	11.9	1.1	Num. of workers within working-age population
Log GRDP $_{(t-1)}$	1,028	9.1	1.3	GRDP based on expenditure approach, measured in 2010 constant IDR billion

Source: BPS, 2021

Table 3 provides the summary statistics of the data. The data covers the years of 2019 and 2020, before and after the pandemic started. The data also covers all cities and districts within the 34 provinces in Indonesia, with a total number of 514 districts. On average poverty share of the population is recorded at 12% with 7.6% variation range. Poverty incidence is shown to be higher in the non-PSBB provinces which are possibly due to most of the policies are implemented in urban and industrial regions, while those not implementing the policy are mostly agriculture-based areas. However, in 2020, we can see from the table that the log number of poverty is increasing in provinces employing PSBB policy. The change is marginal, but we suspect it is consistent.

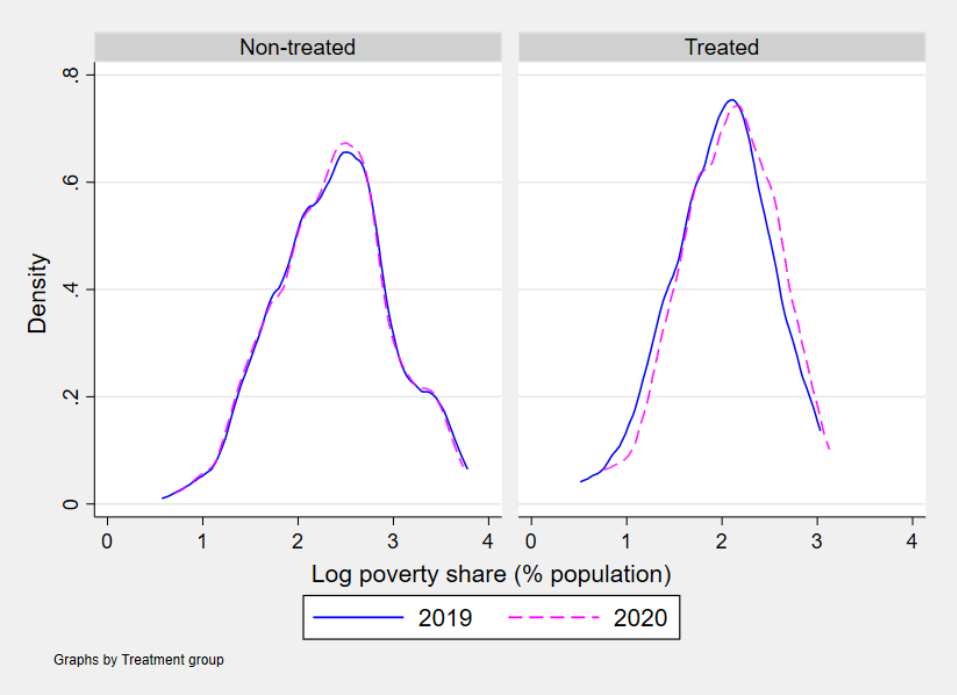
We employ several control variables that are considered endogenous to poverty. Due to the unavailability of district-level data in 2020, only three variables are used. To avoid endogeneity issues, all of the controls are set at lag 1 year. The first control variable is the Human Development Index (HDI), which is a composite index measuring the population's average education, health (life expectancy), and per capita expenditure. The variable is presented as a 1-100 index, with 100 being the highest score. On average, the national level HDI stands at 69.2 for the year 2018 and 2019. Secondly, number of workers is used as the next endogenous variable. It is defined as the number of the working-age population engaged in paid activities. Lastly, Gross Regional Domestic Product (GRDP) is presented as the final control variables, measured at 2010 constant value in IDR. We use GRDP data that is based on expenditure approach, as this is the figure that is consistently available at the district level.

Poverty impact of Covid-19 in Indonesia

This section will start with the discussion on our non-parametric result finding, before continuing with parametric analysis as specified in equation (4) and (5), and finally we present our arguments based on the result in the discussion part. Both

results dictate that there is a significant difference between the treatment and control group in between the two periods of time. The change is positive and significant, signifying that in general the PSBB policy has led to the increase of poverty.

Figure 3 shows the probability density of poverty for the two groups within two time periods of 2019 and 2020. On the left side of the figure, which represents the non-treated provinces, we fail to detect any significant difference in the two periods as the line is almost perfectly similar. Contrastingly, the right-side picture showing data for the provinces employing PSBB policy, we see a quite visible gap between the two years. This suggests that there is real difference between the treated and the non-treated group in terms of poverty incidence.



Source: Author

Figure 3. Kernel Density Estimation

We would like to test the finding in the previous section using our preferred design. Table 4 presents the DID estimation result across different specifications. Our DID coefficient is the interactional term *treat*post*. Column (1) through (4) presents the baseline estimation, counting only the exogenous shock due to the pandemic. These are also known as the unconditional treatment effect. Column (1) shows the effect in the highly industrialized Java region. We found that the effect is positive and significant, with the coefficient stands at 0.113. Therefore, it suggests that there is an increase in the poverty rate in the region. This effect persists when we add Bali province as a treated group (column 2), but somehow it has a slightly lower coefficient at 0.106.

Table 4. Estimation Result

Variables	Dependent variable: Log poverty rate (% of population)						
	Baseline result:				Main result:		
	Java region	Java + Bali	Covid-19 case	PSBB Policy	PSBB Policy	PSBB - City	PSBB - District
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
post	-0.017***	-0.017***	-0.009***	-0.009***	0.013	-0.022	0.008
	(0.002)	(0.002)	(0.002)	(0.002)	(0.011)	(0.040)	(0.009)
treat*post	**0.113*** **	**0.106*** **	**0.049*** **	**0.091*** **	**0.072*** **	**0.083*** **	**0.066*** **
	(0.006)	**(0.006)**	**(0.008)**	**(0.009)**	**(0.008)**	**(0.017)**	**(0.008)**
HDI $_{(t-1)}$					-0.006	0.035	-0.002
					(0.013)	(0.046)	(0.011)
Log worker $_{(t-1)}$					0.032*	-0.028	0.036**
					(0.018)	(0.111)	(0.014)
Log GRDP $_{(t-1)}$					-2.756***	-5.025***	-2.112***
					(0.351)	(1.371)	(0.289)
Log GRDP^2 $_{(t-1)}$					0.138***	0.267***	0.104***
					(0.019)	(0.059)	(0.015)
Constant	2.298***	2.298***	2.298***	2.298***	15.769***	22.477***	12.606***
	(0.001)	(0.001)	(0.001)	(0.001)	(1.797)	(7.569)	(1.507)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1028	1028	1028	1028	1028	204	824
Adj. R^2	0.573	0.532	0.120	0.343	0.442	0.540	0.407
F-stat.	202.12***	168.26***	17.69***	58.88***	44.53***	17.13***	45.39***

Note:- For column (3) we use 5 provinces with the highest number of covid cases as the treated group

- PSBB policy refers to the social restrictions measure imposed by either the central or local governments, those provinces are West Sumatera, Jakarta, West Java, East Java, Banten, and Gorontalo.
- City and district classification follows definition provided by BPS
- Robust standard errors in parentheses, * p<0.1 ** p<0.05 *** p<0.01

Source: Author

In column (3) we further test this trend, this time using the number of confirmed Covid-19 cases. 5 provinces with the highest cases are set as the treated group. Those provinces are West Sumatra, Jakarta, West Java, Central Java, and Papua. Four of these provinces were applying the PSBB restrictions between April to July 2020. We can see in this column that a higher number of cases were also correlated with increasing poverty, but in this case the coefficient is shown to be much smaller (0.049). Furthermore, the model does not sufficiently explain the change due to its small R^2 (0.12). This suggests that the number of cases might not be the single most determinant cause of poverty increase during the pandemic. Thus, we proceed with the PSBB Policy, our main interest variable.

Column (4) shows that the PSBB policy is shown to contribute to poverty increase, and the result is significant at 0.09 percentage points. The result retain its significance after controlling for a vector of endogenous variables, as shown in column (5). The control variables do not show abnormality. A higher score of HDI in the previous year contribute to the decrease in the poverty rate, but the result is not significant. Meanwhile, an increasing number of workers positively correlated with poverty. Then lastly, per capita income (GRDP) is negatively correlated with poverty.

We perform subsequent heterogeneity checks by separating the result based on administrative status. We initially stated that the negative impact of the pandemic is deeper in the more globally connected and industrialized regions i.e. the Java provinces. Following this argument, there should be a very good reason to suspect that the impact is worse for the city region, and less for the non-city, or district, region. The concept is quite closely associated with urban-rural distinction, with the city serves as urban. In doing this, we follow the administrative classification set by BPS (2010), categorizing cities as urban areas which are measured by population density, availability of public facilities, and share of agricultural household. Areas with a higher score of population density and with a lower share of agricultural household are categorized as a city, otherwise district. As of 2019, out of 1028 total cities and districts, 204 are classified as city, and the rest are districts. And from the total of 204 cities in Indonesia, 30 are on Java island. Specific for the Jakarta capital, out of its six sub-administrative units, only the Thousand Island district is categorized as non-urban. The district is located offshore outside of mainland Jakarta. Its low population density and lacking public facilities compared to the other regions accounted for its status as a district entity.

For the city region, we found that the policy has a considerably higher impact compared to the district region. An increasing number of workers correlates negatively with poverty in the city, although not significant, but in the district region an increasing number of workers is shown to push higher poverty rate. We also observe that the effect of per capita GRDP has a significantly larger coefficient in the city than in the district. The model also shows higher explanatory power for city (0.54) compared to district (0.41). This might suggest that there are more variances and coonfounding factors in the district.

Mitigating Adverse Impact of the Pandemic

Despite some methodological and data limitations, we have estimated the poverty impact of Covid-19 at Indonesian districts. The disruption on global and domestic trade and transport has a higher effect on the region such as Java and Bali. Furthermore, we also see that number of Covid cases itself is a good predictor of poverty, despite its much smaller coefficient. However, other confounding effects such as the implementation of PSBB policy should also be observed and discussed separately.

All six provinces that employed the PSBB measure experienced increasing poverty share, and the coefficient is significantly higher compared to the model that uses only the number of cases (Table 4 column 3), but sits a little bit lower when compared to the impact in Java region. This suggests two things. First, this implies that larger disruption is happening due to the economic shock impact than the covid itself. Disruption of global trade, in addition to the mobility restriction policy, resulted in larger poverty impact. Secondly, this also implies that the government's other covid-related programs such as social assistance has not been able to prevent poverty increase. Weak institution and coordination between the central and local government could be an underlying reason. The arrest of Indonesian Minister for Social Affairs in December 2020 due to the alleged corruption of Covid-19 social assistance program, with issues relate to local political interests, confirms this institutional concern (Akbar, 2021).

This research confirmed other earlier findings on the less-desired side of government's NPI effort (Chen et al., 2021; Suharyadi et al., 2020), while also revealed other weaknesses particularly of the government (Chathukulam and Tharamangalam, 2021; Asmorowati et al., 2021). In general, this finding would obviously hurt poverty eradication measures by the government as well as any other related development target set by the government. In the past couple of years before covid, the poverty rate has been subsequently reduced reaching an all-time low of 9.2% in 2019.

The heterogeneity analysis further revealed that the poverty impact differs between regions. Urban regions are shown to exhibit a larger poverty impact compared to the non-urban region. This is mainly due to the nature of the social restriction itself. Most PSBB are implemented in cities and its suburban areas, with

stricter measures compared to the rural areas. This contributes to the larger differences in poverty rate, on top of the demand shock in this region.

The result in the districts, or non-urban region, might also indicate the more effective use of Village Funds, which a large proportion of it was distributed as social assistance as well as for other Covid-19 related measures in the villages. This is, of course, a rather simplification of an issue that needs to be addressed in future studies. Another explanation for the lower impact in the non-urban regions might be related to their higher share of agricultural activities. This sector was not heavily affected by the policy, and they were also less heavily dependent on the international supply-chain.

Our results open room for discussion on the needs for an alternative approach to deal with poverty in the times of deep crisis. Our recommendation to policy makers is to approach for a Universal Basic Income (UBI). Combined with existing policy at the rural area, this works better to mitigate poverty shock as UBI is a long-term intervention that allows people below poverty line to guarantee certain income level and making some adjustments. However, the challenge is huge as deeper tax reform is necessary to sustain this policy.

Conclusion

After one year of Covid-19 pandemic in Indonesia, the poverty impact at Indonesia's district level can be assessed. This paper is particularly interested in estimating the impact of government's NPI measure in the form of PSBB mobility restriction. Scholars have predicted that the effect on the economy would be negative, but the magnitude is not noticeably clear yet.

We use district-level data issued by BPS in late 2020 for estimating the policy impact. It is initially found that the impact is larger for the highly industrialized Java region, and it is less severe for the six provinces that enacted PSBB policy, but the difference is very marginal. Our DID estimator, comparing those six provinces with others that did not implement PSBB, shows that the policy has been significantly contributes to the poverty increase at around 7 to 11 percentage points. Our result is robust after controlling for more covariates. The following heterogeneity analysis showed that the effect is larger in the city region compared to district one. The main reason for this is due to the fact that most PSBB policy is implemented in cities, and due to their characteristics as industrial and service-center, that was prone to this kind of government intervention. The distribution of social assistance and other kinds of measures seem to not able to suppress the adverse impact, although it could be justified from political points of view. To this end, we recommend a Universal Basic Income approach which is considered as a better alternative for long term intervention in mitigating poverty shock.

Our results confirm various modeling and predictions done earlier, but it is still early to precisely measure the effect due to data limitation. The poverty survey done by BPS was done extensively in March 2020, with follow-up survey in September that

year. However, this might not properly capture any escalation that occurred in the fourth quarter of 2020 (October to December) and obviously did not capture the situation in early 2021. Future research should address not only this issue but should also the heterogeneous effect in district areas and whether the government's social assistances are justified in mitigating the Covid-19 impact.

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Data availability

District poverty data is available on the Statistics of Indonesia website: https://www.bps.go.id/ indicator/23/621/1/persentase-penduduk-miskin-menurut-kabupaten-kota.html

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