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Determinants of Poverty in East Java During The COVID-19 Pandemic

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ABSTRACT

The global COVID-19 pandemic has infected million people in Indonesia. East Java has experienced Indonesia's epicentre of positive COVID-19 cases. The economic disruption in East Java due to COVID-19 pandemic has led to increase the number of poor people. This study aims to examine the determinants of poverty during the pandemic outbreak. In this study, we employed multiple linear regression. The results reveals that simultaneously the cumulative number of COVID-19, unemployment rate, Gini Ratio, population density, human development index (HDI), and GRDP per capita affect the risk of poverty in East Java. Partially, the cumulative number of COVID-19, unemployment rate, population density, and HDI shows a significant effect to poverty. While the Gini ratio and GRDP per capita has an insignificant effect. The increase on cumulative number of COVID-19 cases is likely to increase the risk of poverty. Similarly, unemployment has a positive significant affect on poverty. The increase on unemployment rate tends to increase the number of poor people. Contrary, the HDI and population density have a negatively significant effect to poverty. The increase on HDI and population density tends to increase the number of poor people.

Keywords: Poverty; Covid-19; HDI; Gini Ratio; Population Density; East Java

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INTRODUCTION

The Global COVID-19 pandemic has infected millions of the world's populations rapidly. Its emergence has brought down the economic activities due to the restriction on mobility to prevent the disease's spread. Over some decades, the world has not witnessed such an experience. However, it has a significant impact on various economies due to shocks emanating from

deteriorating human and health conditions (World Bank, 2020). This pandemic caused not only a health crisis but also social and economic crisis exceedingly.

The COVID-19 was first detected in Wuhan, China in the end of 2019. On January 2020, the WHO reported that the pandemic has spread across the world with a shocking speed (WHO, 2020). The first case in Indonesia was announced by President Jokowi on March 2020. It rapidly continued to spread and caused million people infected. As of December 2021, The Ministry of Health announced the number of confirmed cases was approximately 6 million cases and caused more than 150 thousand deaths (Satgas COVID-19, 2021).

Since the COVID-19 pandemic outbreak in Indonesia, the highest number confirmed cases was reported in DKI Jakarta, West Java and East Java, as the first case of COVID-19 was detected in DKI Jakarta and the second case was reported in East Java. To reduce the pandemic spreading, the government announced mobility restriction regulations. This led to an economic downturn which is Indonesia experienced a deep contraction to -2.7 percent when pandemic hit in 2020 (BPS, 2020).

East Java, as one of the most populous provinces in Indonesia, is one of the most affected due to COVID-19 pandemic. East Java once experienced as the Indonesia's epicenter which recorded 1,828 infections, over taking Jakarta 17,79 in July, 2020. The economic growth was contracted by -5.90 in the second quartal of 2020 (BPS, 2020). During the pandemic, many people lost their income which led to the increasing number of poor families. In 2020, the poverty rate in East Java reach 11.46 percent, an increase of 166.9 thousand people compared to 11.09 percent on March 2020 (BPS, 2020).

Since the pandemic outbreak, several studies were conducted to examine how the pandemic impact on poverty. As well, some researchers examine the determinants affected poverty, including the number of positive cases. Study in Indonesia to examine whether COVID-19 pandemic increase the risk of poverty. The study employed multiple linear regression with variables including the number of positive cases of COVID-19, life expectancy, Gini ratio, and GDP per capita. The results showed that the number of positive cases of COVID-19 had a significant positive effect on poverty. The GDP per capita had a significant negative impact on poverty. While Gini Ratio and Life Expectancy had an insignificant effect on poverty.

Our study examines the determinants affected poverty during COVID-19 pandemic in East Java. A model in this study by adding independent variables, including unemployment rates, population density, and Human Development Index (HDI), further to sharpen the analysis.

LITERATURE REVIEW

Understanding the Phenomenon of Poverty

Definition of poverty, from a social perspective, is a status of humiliation, the sense of being dependent and being forced to accepts rudeness and indifference. Varying institutions have different views on poverty definition. The United Nation defined poverty as the severe deprivation of basic human needs reflected in the low consumption of food, lack of access to safe drinking water and sanitation facilities, low health condition and low housing conditions (UN, 2020). The World Bank (2018) defines poverty as the inability to attain a minimum standard of living. In particular, the World Bank determined a minimum standard of living as $1.90 per person per day. People who is indeed difficult for living on $1.90 per day was typically trapped on "extreme" poverty.

BPS-Statistics Indonesia measured poverty based on Cost of Basic Need (CBN) approach. The poverty line was measured by calculating the cost of a basket of food consumables needed to fulfill a minimum nutrition requirement of 2,100 kilo calories person per day. Not only consumables food, several essential nonfood expenditures were also included in measuring poverty line. The calculation includes 52 commodities of food consumption and 51 items nonfood consumption for urban areas while 47 items for rural areas (BPS, 2016).

Determinants of Poverty

Several previous studies revealed that poverty was affected by unemployment rate, human development index (HDI), Gini ratio, population density, and gross domestic product per capita. During the pandemic outbreak, the confirmed cases also increase the risk on poverty. Unemployment rate played a vital role in increasing poverty. Leonita & Sari (2019) conducted a study on poverty using regression method with panel data compiled by BPS-Statistic Indonesia. The results concluded that simultaneously the rate of GDP, HDI, and unemployment rate influenced poverty. Partial testing showed unemployment and GDP affected poverty level.

Over time, the linkage between human development and income per capita on the reduction of poverty are getting strengthened. Study in India that examining the relationship between human development and income per capita to poverty. The study revealed that both variables played a significant role in the perspective of poverty reduction. Prasetyoningrum & Sukmawati (2018) discovered that HDI directly had a negative impact on the poverty level. It means the increase on HDI significantly reduce the poverty level. Dahliah & Nur (2021) conducted study on how HDI, GDP and unemployment affected poverty. The results concluded that simultaneously HDi, GDP and unemployment have a significant effect on poverty.

Tinsley and Bishop (2006) examined the relationship between poverty and population density. The finding revealed that the poverty rate in the low density is higher than in area with larger population. Another study conducted by Nyompa et al (2019), examined the relationship between density and poverty in Makassar using linear regression. The study revealed that population density in Makassar increase year by year from 2014 to 2018, yet the number of poor people experienced a declining growth.

Litchfield (1999) conducted study to analyze poverty and welfare. The findings revealed that inequality is closely related to poverty. Setyadi & Indriyani (2021) conducted study on poverty using linear regression method. The results show that simultaneously the number of positive cases, life expectancy, inequality and GRDP affected poverty. Inequality was measured by the Gini coefficient.

The Economic Impact of COVID-19 Pandemic on Poverty

The economic fallouts due to global pandemic has driven the increase on poverty incidence as shown in Figure 1.

Figure 1 shows the COVID-19 outbreak caused a decrease in economic activities. First, the shock in supply and demand led to decline on economic activity. Many people experienced a declining income which led to declining average household expenditure. The distributional impact on household expenditure increased poverty incidence.

Previous Study

Previous study on poverty during pandemic was conducted by Suryahadi et al (2020),the study predicted the economic impact of COVID-19 on poverty in Indonesia.

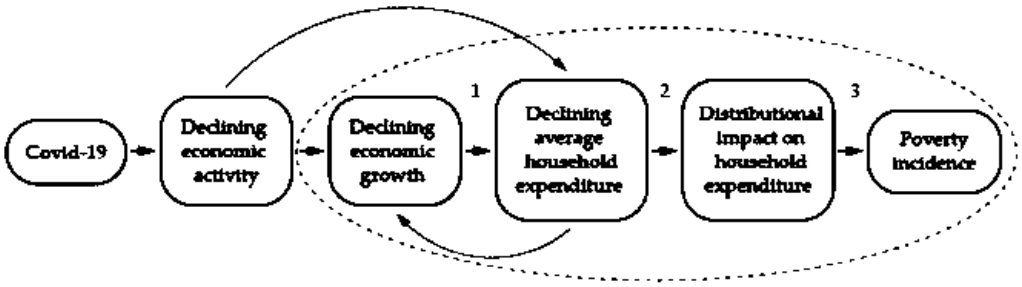

Figure 1

Transmission Mechanism: From Shock to Poverty Incidence (Suryahadi et al, 2020)

Results showed that the COVID-19 severely reducing the economic growth from about 5 percent to minus 3.5 percent. The worst-case scenario estimates 19.7 million more people tend to become poor due to COVID-19 pandemic.

Another research on poverty was conducted by Setyadi and Indriyani (2021). The study aimed to see COVID-19 pandemic increased the risk of poverty. The results showed that the number of positives cases of COVID-19 significantly impact to poverty. Another empirical study was conducted Dahliah & Nur (2021). The study aimed to analyze the effect of unemployment, HDI, and GDP on the poverty level. The study employed multiple linear regression model. The results indicated that simultaneously the three variables affected poverty levels. Partially, only unemployment rate and HDI had a significant impact on poverty.

Research Framework

Based on the previous empirical studies, the research framework was shown in Figure 2. Our hypothesis as follow (1) Simultaneously, cumulative COVID-19 cases with other independent variables (unemployement rate, gini ratio, population density, HDI, GRDP per capita) affect the poverty; (2) Partially, the cumulative COVID-19 case has a significant effect on poverty; (3) Other independent variables partially influence the risk on poverty.

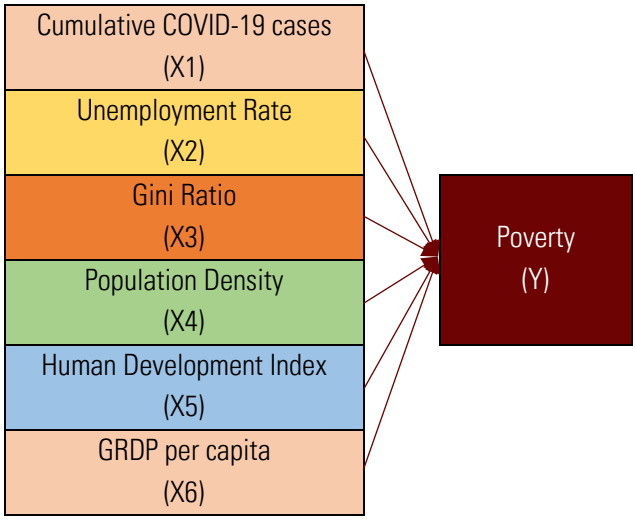

Figure 2

Research Framwork (Ajzen, 2015)

METHODOLOGY

Data

The dataset used in this study was a quantitative data. The dependent variables of this study are the number of poor people (Y), and independent variables consisting of the number of positive cumulative cases of Covid-19 (X1), Unemployment rate (X2), the Gini ratio (X3), population density (X4), the Human Development Index (X5), and the Gross Regional Domestic Product per Capita (X6).

In this study, the areas covered were districts and cities in East Java. While the time period used

is the data condition 2021. This is because the 2022 data is still not fully available. The entire data is secondary data obtained from BPS-Statistics Indonesia and Satuan Tugas COVID-19. The details of each variable used in this study can be seen in the following table:

Table 1

Independent and Dependent Variables

No	Variable	Volume	References
1	Number of poor people	Thousand	Statistics Indonesia
2	Cumulative number of positive cases Covid-19	Cases	COVID-19 Force
3	Gini Ratio	Point	Statistics Indonesia
4	Population density	people/m^2	Statistics Indonesia
5	Human Development Index (HDI)	Point	Statistics Indonesia
6	GRDP per capita	million/people	Statistics Indonesia
7	Unemployment rate	point	Statistics Indonesia

Model Development

This research is a development of the results of Setyadi and Indriyani (2021) research on the impact of the Covid-19 Pandemic on the increased risk of poverty in Indonesia. In the study, the independent variables used included positive cases of Covid-19, Life Expectancy, Gini Ratio, and GDP per Capita using multiple linear regression methods for 34 provinces in Indonesia.

The development aspects of this research model are to add other variables, such as the population density of each district / city, the Human Development Index which also accommodates life expectancy in it, and confirmed cases of Covid-19 used are accumulated cases to further sharpen the analysis of the pandemic's influence on poverty.

The results of research with global coverage often do not apply to local or specific regions. This study seeks to obtain information on whether there are similar results of the study when applied to the East Java region considering that East Java is one of the provinces with the largest population and is one of the most affected areas due to the Covid-19 Pandemic.

Method

The method used to perform data analysis in this study is multiple linear regression, which is a model for looking at causal relationships between independent variables to dependent variables (Nursiyono and Pray, 2021). Given that the study will also look at the influence of the independent variables used on the amount of poverty, the multiple linear regression model is relevant for use. The cross-sectional data used in this study covered 38 districts / cities in East Java. While the tool used for modeling and analysis is public R Studio version 4.0.2.

The multiple linear regression models in this study are written as follow :

$$Pov_i = \beta_0 + \beta_1 CumCov_{1i} + \beta_2 Unem_{2i} + \beta_3 GR_{3i} + \beta_4 Dens_{4i} + \beta_5 HDI_{5i} + \beta_6 GRDP + \varepsilon_i \quad (1)$$

Notes:

Pov_i :Number of poor people regency-i

$CumCov_{1i}$:Cum cases of COVID-19 regency -i

GR_{2i} :Gini Ratio regency-i

$Dens_{3i}$:Population Density regency-i

HDI_{4i} :Human Development Index regency-i

$GRDP_{5i}$:Gross Regional Domestic Product regency-i

ε_i :Error $i = 1, 2, 3, \ldots, 38$

In theory, a good linear regression model in describing cause-and-effect relationships should meet some classical assumption tests. By meeting the classical assumption test, a linear regression model has a BLUE (Best Linear Unbiased Estimator) guesser. To that end, some of the classical assumption tests used in this study include normality tests, non-multicollinearity tests, non-autocorrelation tests, and homoskedastity tests (Nursiyono and Dyah, 2021).

Normality Test

The normality test is a test commonly used in simple and multiple linear regression modeling. By conducting a normality test against the residual model, a decision will be obtained whether the linear regression model that occurs whether has an average of zero and a constant variance. To apply the residual normality test, the study used the Kolmogorov-Smirnov test (KS test). When the p-value > 0.05 then the residual model is concluded to have followed the normal distribution with an average of 0 and a constant variance (Putra et al, 2022).

Non-Multicollinearity Diagnostic

A non-multicollinearity test is a test that aims to see whether there is a perfect linear relationship among independent variables used in linear regression models. In this study, the test used the Variance Inflation Factor (VIF) values of each independent variable included in the model. If a VIF value < 10 is obtained, then the independent variable used has been freed from multicollinearity (Lina & Hendy, 2022).

Non-Autocorrelation Test

This test is used to see if there is a serial correlation among the residual models formed. In practice, the usual non-autocorrelated test uses the Durbin-Watson test (DW test) for the entire residual model. When the test results are obtained a p-value of > 0.05, then the residual model is said to have been free from autocorrelation disorder (Ningsih & Akhmadi, 2022). This test is usually used in linear regression modeling with time series data. However, the study still uses this test as a basis for ensuring that linear regression models in the formed parameters have been free from autocorrelation.

Homoskedasticity Test

The homoskedasticity test is a classical assumption test closely related to the residual normality test of linear regression models. This test provide evidence of whether the variance of the residual regression model is constant (does not change each increment) or has a different value for each observations (not constant). The application of the homoskedasticity test of this study used the Breush-Pagan test (BP test). If the p-value > 0.05 then the residual linear regression model has met the assumption of homoskedasticity (Yuniarin et al, 2022). This test is very necessary especially if using cross section data, because heteroskedasticity disorders tend to occur more often in cross section data.

Model Performance

Once the linear regression model is formed and has met the entire classical assumption test, the next stage is to look at the performance of the model. This measure of performance can be viewed based on the adjusted value of R square to see how well all independent variables are able to explain the proportion of diversity of dependent variables. According to Nursiyono and Pray (2016), adjusted R square is a measure of model performance that is

able to correct any addition of independent variables to the model [2]. Adjusted R square is the main measure in regression analysis to see if the regression line obtained is able to explain the actual data or not (goodness of fit) [9]. Mathematically this size can be written as follows:

$$R^2_{Ajd} = 1 - \left(\frac{n-1}{n-k}\right)(1-R^2) \quad (2)$$

Notes:

n : the number of observation

k : the number of independent variables

R^2 : the value of R square regardless of the aspect of adding or subtracting independent variables

Research Steps

Research using this multiple linear regression model consists of several steps ranging from data preparation to inference analysis. The steps in detail are written on the following points :

1. Data exploration by looking at the distribution of variables used;
2. Perform multiple linear regression modeling;
3. Examine simultaneous influence through the p-value of the F test;
4. Examine the influence of each independent variable through the p-value of the t-test;
5. Conduct a classic assumption test against residual models and independent variables;
6. View model performance based on adjusted R square values.

RESULT AND DISCUSSION

As this study employ linear regression, classical assumption was employed. The results of classical assumption test are shown in Table 2. The Shapiro-Wilk value is 0.97207 with p-value > alpha = 0.05 which means data used in this study were normally distributed.

The outcome of Durbin Watson test is 1.942 with p-value 0.3228. It indicates that there is no evidence indicates autocorrelation among residual. In this study, the p-value of Breusch-Pagan test is about 0.83, indicating the residual is not homoscedastic.

Table 2
Classical Assumption Diagnostic Results

Weight Statistics			
R-squared	0.6747	Durbin-Watson test	1.9428, p-value 0.3228
Adjusted R-squared	0.6117	Breusch-Pagan test	2.7762, p-value 0.8364
Prob (F-statistic)	1.924E-06		
Shapiro Wilk	0.97207, p-value 0.45		

Source: Author Estimation (2022)

Table 3 represents the multicollinearity diagnostic result. As shown in Table 3, the VIF obtained for all independent variables are less than 10, it means associated variable is not collinear with other variables in the model

Table 3
Variance Inflation Factor (VIF) Test Results

Variables	X1	X2	X3	X4	X5	X6
VIF	1,334	2,486	1,301	2,845	3,821	1,396

Source: Author Estimation (2022)

Simultaneously, the independent variables affect the dependent variables as the probability F-statistic is less than 5 percent (Table 2). The strength of the model is predicted by R square. The value of adjusted R-square is 0.6117, indicates that independent variables are able to explain 61.17% dependent variable. The rest 38,83% is explained through variables outside the model.

The multiple linear regression results are shown in Table 4. The estimated coefficients of explanatory variables which shows statistically significant impact are cumulative number of COVID-19 cases, unemployment rate, population density, and HDI (Human Development Index). While the Gini Ratio and GRDP per capita show an insignificant *p-value.*

Table 4

Linear Regression Test Result

Variables	Coefficients	p-value
Intercept	9,09	0,000*
Cumulative number of COVID-19 cases	3,18	0,000*
Unemployment rate	1,56	0,013*
Gini Ratio	-3,56	0,221
Population Density	-1,43	0,025*
HDI	-1,06	0,001*
GRDP per capita	6,43	0,733

*Significant 5%

Source: Author Estimation (2022

$$Pov_i = 9.09 + 3.18CumCov_{1i} + 1.56Unem_{2i} - 3.56GR_{3i} - 1.43Dens_{4i} - 1.05HDI_{5i} + 6.43GRDP + \varepsilon_i \quad (3)$$

The regression result of cumulative number of COVID-19 cases shows a strong significant result with *p-value* < 0.05. Increasing the number of COVID-19 cases tends to increase poverty. The increase 1 positive case of COVID-19 tends to made 3 person fall into poverty, at ceteris paribus. This result is in line with the previous study (Anser et. al, 2020), the COVID-19 pandemic made millions of people fall into poverty due to shortages health resources and lack of income.

Similar to Cumulative number of COVID-19, unemployment rate shows a positively significant effect to poverty in East Java during pandemic outbreak. 1 point increase of unemployment rate tends to increase 1-2 person fall into poverty. This is inline with previous study conducted by Muhammad & David (2019), There is a proportionate relationship between poverty and unemployment that unemployment caused poverty.

Surprisingly, population density shows a significantly negative impact on poverty. Accordingly, the increase on population density as 1 people/m^2 will leads to the decrease on the number of poor people by 1. The increase number of population are followed by the decrease the number of poor people due to the growth of employment opportunities (Nyompa et.al, 2019).

Similar to population density, Human Development Index (HDI) show a significantly negative impact on poverty. The regression results obtained coefficient of HDI -1.56. It means 1 point the HDI increase is likely to decrease the number of poor people 1 person. This finding is in line with previous study conducted by Singh (2012) as the

HDI represented quality of life, the increase on HDI tends to decrease the poverty level.

CONCLUSION AND RECOMMENDATION

The COVID-19 pandemic has a significant impact on poverty alleviation in East Java, as East Java experienced the Indonesia's epicenter of COVID-19 confirmed cases. The study's finding that simultaneously cumulative number of COVID-19 cases, unemployment rate, population density, Gini ratio, human development index (HDI), and gross domestic product per capita (GRDP) affected the risk of poverty. Partially, the cumulative number of COVID-19 cases, Unemployment rate, population density, and HDI statistically show significant impact on poverty. While Gini ratio and GRDP per capita has an insignificant impact on poverty.

Based on the regression results, the cumulative number COVID-19 positive cases associated to poverty positively. It means the increase on the cumulative number COVID-19 positive cases tends to increase the number of poor people. Similar to the cumulative number of COVID-19 positive case, the increase on unemployment rates is likely increase the number of poor people. Population density and HDI shows a significant negatively effect on poverty. The increase on population density and HDI tends to decrease the number of poor people. Among independent variables, the cumulative COVID-19 case has the biggest coefficient in the model. This result implies that COVID-19 play a bigger role than others in increasing the risk of poverty in East Java.

Thus, East Java government should take steps to prevent spread of coronavirus disease such as implementing vaccination-booster program over 90% population. Accelerating the poverty alleviation, government should address the unemployment issues, such as provide wage subsidies for company to pay worker's wages during the pandemic.

To future research, it might be including other variables that affect poverty such as COVID-19 fatality rate. Future studies need to employ more rigorous methodology such as Geographically Weighted Regression (GWR). The Geographically Weighted Regression considers spatial/regional aspects in its modelling, in order to obtain better prediction.

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