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The Effect Of The Development Of Electricity, Sanitation, Health, And Education Infrastructure On District/City Poverty In Lampung Province

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Abstract

This study aims to analyze how infrastructure, which consists of electricity, sanitation, health and education, affects the poverty rate in 15 regencies/cities in Lampung Province. This study uses quantitative methods in the form of multiple regression analysis with panel data. The type of data used is secondary data from 15 districts / cities in Lampung Province for the period 2018-2022 obtained from the Central Bureau of Statistics (BPS) which includes: percentage of poor people, percentage of households that have access to PLN electricity, percentage of households that have access to proper sanitation, average years of schooling, and life expectancy. The results of the analysis using the selected fixed effect model approach show that sanitation, health, and education have a significant negative effect on the poverty rate. This means that an increase in each infrastructure has an impact on decreasing the percentage of poor people in districts/municipalities in Lampung Province. Meanwhile, the electricity variable has a positive and insignificant effect on poverty. This means that an increase in the electricity variable has no impact on reducing poverty in districts/municipalities in Lampung Province.

Keywords: poverty rate, infrastructure, panel data, quantitative.

INTRODUCTION

Economic development that runs until now is a continuous process in an effort to improve welfare. As stated in the Preamble of the 1945 Constitution, economic development in the past was a continuous process to improve public welfare. An indicator

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of the level of public welfare is poverty (Marisa, 2019). Poverty is still a homework for many developing countries such as indonesia. Indonesia's geographical condition which is very diverse in terms of natural and human resources creates variations in inequality in many dimensions (Ratih et al (2023)). Compared to other ASEAN countries, in 2019 Indonesia ranks second in extreme poverty after Laos, making it the country with the highest number of extreme poverty cases in ASEAN. More than 10.5 million Indonesians still live in extreme poverty (Kumaat, 2021).

On the island of Sumatra itself, the province with the highest percentage of poor people in 2022, the poverty rate in Lampung Province is below Aceh, Bengkulu and South Sumatra. In Lampung Province itself, North Lampung Regency has been the highest for the last 5 years. During this period there were 3 districts that had the highest percentage in a row, namely North Lampung, Pesawaran, and East Lampung. (Badan Pusat Statistik Indonesia, 2023).

According to the World Bank (2004), one of the causes of poverty is the lack of income and assets to fulfill basic needs such as food, clothing, housing and acceptable levels of health and education. In addition, poverty is also related to limited employment opportunities and usually those who are categorized as poor are unemployed, their level of education, availability of infrastructure and health are generally inadequate.

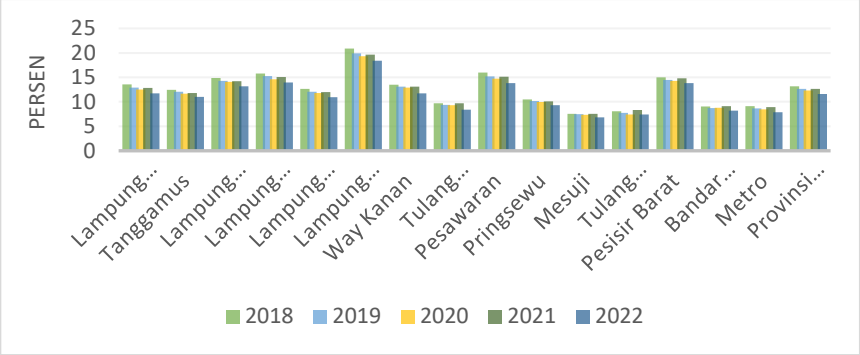


Figure 1. Percentage of Poor Population by Regency/City in Lampung Province 2018-2022

Figure 1 Based on the percentage of the number of poor people in Lampung Province from 2018 to 2019, there is a downward trend in the number of poverty populations from year to year. In 2018, it decreased to 13.14% in 2018. In 2019, there was also a decrease in the percentage of poor people by 11.61% and continued to decline until 2020 by 11.34%. But in 2021 there was an increase in the percentage of poor people

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of 11.61% due to the virus outbreak that hit, namely Covid 19. In the following year 2022 it fell again after the spread of covid 19 could be overcome so that the percentage of poor people in Lampung Province was 11.57%. The increase and decrease in the poverty rate each year in Lampung Province indicates that the government continues to try to reduce poverty.

The significant differences in poverty rates between districts/municipalities in Lampung Province are related to the unequal distribution of growth outcomes between regions. In addition, this is caused by the minimum standard of living that varies greatly from one region to another. These differences are caused by regional conditions such as: Strong dependence on customs, access to transportation, geographical location, etc. Differences in welfare levels between regions also include the provision of quality infrastructure, particularly in the areas of electricity, sanitation, education, and health.

Referring to the previous explanation, it can be said that the level of multidimensional poverty in Lampung is caused by several factors, including unequal infrastructure development in each district/city and limitations on the facilities provided. Therefore, there is a need for government attention to reduce the poverty rate. With the improvement of infrastructure, it is expected to reduce the poverty rate.

METHODOLOGY

This study uses a quantitative method in the form of multiple regression analysis with panel data. Type of data used is secondary data of 15 districts/cities in Lampung Province for the period 2018-2022 obtained from the Central Bureau of Statistics. The data includes: (Y) percentage of poor people, (X1) electricity distribution (X2) access to proper sanitation, (X3) life expectancy, and (X4) average years of schooling. To analyze the effect of electricity, sanitation, health, and education infrastructure on poverty, four dependent variables are used, including electricity, sanitation, health, and education infrastructure. Meanwhile, the percentage of poor people is used as the independent variable. The model used to estimate the effect of the dependent variables on the independent variables is formulated as follows :

$$PPMit = \beta_0 + \beta_1 DLSit + \beta_2 ASLit + \beta_3 KESit + \beta_4 PENit + \varepsilon t$$

Description:

PPM	: Percentage of Poor Population (percent)
β_0	: Constant
$\beta_1, \beta_2, \beta_3, \beta_4$	: Coefficients
DLS	: Electricity Distribution (percent)

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ASL	: Access to Proper Sanitation (percent)
KES	: Healthy (year)
PEN	: Education (year)
I	: District/City
t	: Year
εt	: Disturbance Variable

RESULT AND DISCUSSION

Model Specifications Test

1). Chow Test

The Chow test is conducted to select the best model between the Common Effect Model (CEM) and the Fixed Effect Model (FEM). If the probability value (P-value) is smaller than the significance level (a), then the Fixed Effect Model (FEM) model is best, but if the probability value (P-value) is greater than the significant level (a), then the Common Effect Model (CEM) model is best. The following is the hypothesis in the chow test:

H_0 : CEM (Common Effect Model)

H_a : FEM (Fixed Effect Model)

The following are the results of the Chow Test:

Table 1. The Chow Test's Summary

Effects Test	Statistic	d.f.	Prob.
Cross-section F	557.033733	(14,56)	0.0000

The results show that the Cross-Section F probability value is 0.0000 smaller than the alpha value (0.05). Then the test result is to reject H0, which means that the Fixed Effect Model (FEM) is better used for this study than the Common Effect Model (CEM). The Chow Test results selected the Fixed Effect Model (FEM) , so it can proceed to the next method, namely the Hausman Test.

2). Hausman Test

The Hausman test is conducted to select the best model between the Random Effect Model (REM) and the Fixed Effect Model (FEM). If the probability value (P-value) is smaller than the significance level (a), then the Fixed Effect Model (FEM) model is the

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best, but if the probability value (P-value) is greater than the significant level (a), then the Random Effect Model (REM) model is the best. The hypothesis in this test is as follows:

H_0 : REM (Random Effect Model)

H_a : FEM (Fixed Effect Model)

The following are the results of the Hausman Test:

Table 2. Hausman Test's Summary

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.637350	4	0.0462

Based on the results above the value of Prob. 0.0462 < (0.05). The test result is to reject H0, which means that the Fixed Effect Model (FEM) is better used for this study than the Random Effect Model (REM). The Hausman Test results selected the Fixed Effect Model (FEM), so it is not continued to the Lagrange Multiplier Test (LM Test).

Classical Assumption Test

1). Normality Test

Normality test is used to determine the normality of error terms, independent variables, and dependent variables..

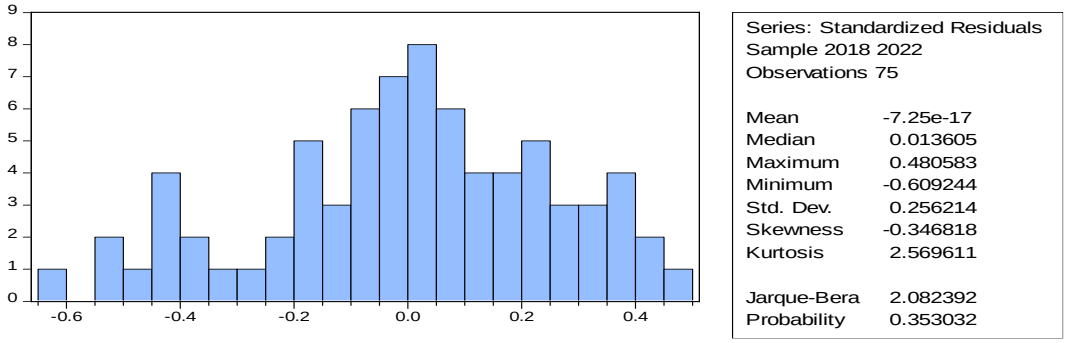


Figure 2: The Normality Test's Summary

Based on the results of the residual normality test, the Jarque-Bera value is 2.0823092 with a probability of 0.353032> 0.05, so the result is H0 accepted. So it can be concluded that the residuals are normally distributed.

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2). Multicollinearity Test

Multicollinearity test to determine whether the independent variables contained in the equation model have a strong relationship or not. If there is a relationship between the independent variables in one regression, multicollinearity is detected. Meanwhile, a good model is a model in which multicollinearity is not detected or there is no correlation between the independent variables. In this study, to determine whether there is multicollinearity, namely by looking at the Variance Inflation Factor (VIF) value and Tolerance value

Table 3. Multicollinearity Test's Summary

Variable	VIF	Description
DLS	1.508571	Tolerable
ASL	1.429829	Tolerable
KES	1.724620	Tolerable
PEN	1.509659	Tolerable

From the results above, it can be seen that the centered VIF value for the six independent variables is less than 10 where the VIF of electricity is 1.508571, VIF of sanitation is 1.429829, VIF of health is 1.724620, and VIF of education is 1.509659. This indicates that there is no multicollinearity problem.

3). Heteroscedasticity Test

Heteroscedasticity test is a form of violation of Linear Regression Model (CLRM) assumptions that often arise in cross-section data, which results in biased and irrelavant error estimates. Heteroscedasticity uses the Glesjer Test model with the absolute value of the residual regressed on the value of the independent variable. If the probability value of each independent variable is more than 0.05, then the model does not detect heteroscedasticity.

Table 4. Heteroscedasticity Test's Summary

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.494140	8.385742	-0.535926	0.5937
DLS	0.032944	0.035533	0.927163	0.3570
ASL	-0.017926	0.021275	-0.842576	0.4023

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KES	0.107289	0.149015	0.719992	0.4739
PEN	-0.284608	0.221573	-1.284490	0.2032

Based on the test results, it is found that the probability of each variable of electricity distribution is 0.3570, access to proper sanitation is 0.4023, health is 0.4739, and education is 0.2032, all independent variables are more than 0.05, it can be concluded that the Fixed Effect Model (FEM) used in this study does not detect heteroscedasticity.

4) Autocorrelation Test

Autocorrelation means that there is a correlation between members of one observation and other observations at different times. When associated with the assumptions of the OLS method, autocorrelation is a correlation between one disturbance variable (error term) and another disturbance variable. To determine whether or not there is a correlation between error terms, one of them is the Durbin-Watson method. The presence or absence of autocorrelation can be seen from the count statistic (d) which is compared with the critical values dL and dU at a (5%) or 0.05 significant level as follows:

If the probability > a (5%), then there is no autocorrelation

If the probability < a (5%), then there is an autocorrelation problem

Table 5. Autocorrelation Test's Summary

Durbin-Watson	2.210798

Based on the test results as obtained, it can be seen that the results of the autocorrelation test by looking at the Durbin-Watson value are 2.217. to see whether there is an autocorrelation problem or not, it is known by comparing the Durbin-Watson value with the Durbin-Watson table. In this study, the value of n = 75 and k = 4 was obtained, obtained dl = 1.515 and du = 1.734. With a Durbin-Watson value of 2.217. Where Durbin-Watsonstat lies between du and 4-du. So it can be concluded that there is no autocorrelation problem

Panel Data Regression Estimation Results

The choice of the fixed effect model as a panel data regression model results in a more detailed multiple linear regression estimation as follows:

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Table 6. Panel Data Regression Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	147.7441	10.95905	13.48147	0.0000
DLS	0.005364	0.009420	0.569431	0.5713
ASL	-0.005931	0.004613	-1.285629	0.2039
KES	-2.086672	0.178169	-11.71178	0.0000
PEN	-1.058037	0.272817	-3.878190	0.0003
R-squared	0.994069			
Adjusted R-squared	0.982163			
F-Statisctic	521.4757			
Prob(F-statistic	0.000000			

The following is the output interpretation based on the panel data estimation results above:

1. The coefficient value of the electricity distribution variable is 0.005364, meaning that if the electricity distribution variable increases by 1 unit, it will increase the percentage of poor people by 0.005364%, assuming ceteris paribus.
2. The coefficient value of the proper sanitation access variable is -0.005931, meaning that if the proper sanitation access variable increases by 1 unit, it will reduce the percentage of poor people by 0.005931%, assuming ceteris paribus.
3. The health variable has a coefficient value of -2.086672. If the value of other variables remains constant and the health variable decreases the percentage of poor people by 2.086672% with the assumption of ceteris paribus.
4. The education variable has a coefficient value of -1.058037. If the value of the other variables remains constant and the education variable increases by 1 unit, it will reduce the percentage of poor people by 1.058037%, assuming ceteris paribus.

Hypothesis t-Statistic Test

The T test or individual parameter test is a test used to determine the effect of the independent variable on the dependent variable individually.

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Table 7. t-test results

Variable	t-Statistic	Prob.	Conclusion
DLS	0.569431	0.5713	Not Significant
ASL	-1.285629	0.2039	Not Significant
KES	-11.71178	0.0000	Significant
PEN	-3.878190	0.0003	Significant

F-Statistic Test

The f-statistic test is conducted to determine whether all independent variables together have a significant effect on the independent variable.

Table 8. f-test result

F-statistik	F-tabel	Probabilitas	Conclusion
521.4757	2,50076	0.000000	Significant

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Testing the Coefficient of Determination (R^2)

Table 9. R^2 test result

R-squared	0.994069
Adjusted R-squared	0.982163

The Adjusted R-squared value is 0.994069 or 99.4069%. The coefficient of determination shows that the independent variables consisting of electricity, sanitation, health and education are able to explain the district/city poverty variable in Lampung Province by 99%, while the remaining 1% is explained by other variables that are not included in this study.

The Effect of Electricity Distribution on the Percentage of Poor Population

Based on the regression results of the Fixed Effect model, the electricity distribution variable has a positive and insignificant effect on the percentage of poor people in the Regency / City in Lampung Province. The electricity distribution variable has a coefficient value of 0.005364, meaning that for every 1 unit increase in electricity distribution, the percentage of poor people increases by 0.005364%. The effect of the positive sign on the electricity distribution coefficient means that the higher the amount of

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electricity distribution will have an impact on the higher percentage of poor people in a region. This is not in accordance with the initial hypothesis that electricity distribution has a negative effect on poverty. The results of this study are in line with research conducted by Shiffa Fardilla (2020), which states that electricity distribution has a positive effect on the percentage of poor people. However, in contrast to the results of other research conducted by Fery and Khaira (2023), it states that electricity distribution has a negative and significant effect on poverty.

The Effect of Access to Adequate Sanitation on the Percentage of Poor Population

Based on the regression results of the Fixed Effect model, the access to proper sanitation variable has a positive and insignificant effect on the percentage of poor people in the Regency / City in Lampung Province. The access to proper sanitation variable has a coefficient value of -0.005932, meaning that every increase in access to proper sanitation by 1 unit, the percentage of poor people decreases by 0.005932%. The effect of the negative sign on the coefficient of access to proper sanitation means that the higher the number of acces to proper sanitation, the lower the percentage of poor people in a region. This is in accordance with the initial hypothesis that access to proper sanitation has a negative effect on poverty. The results of the study are in line with research conducted by Fery Andrianus and Khaira (2023), Adithya and Agus (2022) which state that access to proper sanitation has a negative effect on the percentage of poor people.

The Effect of Health on the Percentage of Poor Population

Based on the regression results of the Fixed Effect model, the health variable has a negative and significant effect on the percentage of poor people in the Regency / City in Lampung Province. The health variable has a coefficient value of -2.086672, meaning that for every 1 unit increase in health, the percentage of poor people increases by 2.086672%. The effect of the negative sign on the health coefficient means that the higher the ratio of health workers, the lower the percentage of poor people in a region. This is in accordance with the initial hypothesis that health has a negative effect on poverty. The results of this study are in line with research conducted by Wayrohi M (2020), which states that health has a negative effect on the percentage of poor people.

The Effect of Education on the Percentage of Poor Population

Based on the regression results of the Fixed Effect model, the education variable has a negative and significant effect on the percentage of poor people in the Regency /

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City in Lampung Province. The education variable has a coefficient value of -1.058037, meaning that for every 1 unit increase in education, the percentage of poor people decreases by 1.058037%. The effect of the negative sign on the education coefficient means that if more education will have an impact on the percentage of poor people falling in a region. This is in accordance with the initial hypothesis that education has a negative effect on poverty. The results of this study are in line with research conducted by Annisa and Anwar (2021) which state that education has a negative effect on the percentage of poor people.

CONCLUSION

Based on the previous results and analysis, it can beIt can be concluded that electricity distribution has an insignificant effect and a positive direction on poverty rate, proper sanitation has an insignificant effect and a negative direction on the poverty rate, health has a significant effect and a negative direction on the poverty rate, and education has a significant effect and a negative direction on the poverty rate. This it is evident that an increase in each of the sanitation variables, health and education have a significant effect on reduction in the percentage of poor people in Indonesia.

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