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The Role of Infrastructure on Poverty in Papua Island of Indonesia

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ABSTRACT

This research aims to analyze the influence of infrastructure on poverty levels in 21 districts/cities of Papua Province. This research uses a quantitative approach by combining cross section data from 21 districts/cities in Papua Province and time series data for 2008, 2011, 2014, 2018 and 2021. The data used comes from Village Potential statistical data provided by the Central Statistics Agency (BPS). The method used in this research is the panel data regression method with an estimation method from the selected model, namely the Fixed Effect Model (FEM) after testing classical assumptions and selecting the best model. The research results show that health facilities, cell phone signals, electricity users, and street lighting simultaneously have a significant effect on poverty levels. Partially, health facilities, electricity users and street lighting have a significant effect on poverty levels, while cell phone signals do not have a significant effect on poverty levels.

Keywords: Poverty, Infrastructure, Panel Data, Papua Province, Podes.

1. INTRODUCTION

Poverty is a problem in the inability to meet clothing, food and shelter (Rahayu *et al* , 2019). The problem of poverty is a complex and multidimensional problem so that it is a priority in the economic development of every country. In September 2015, all developed and developing countries agreed to make eradicating extreme poverty the main goal on the Sustainable Development Goals (SDGs) program agenda by 2030 (United Nations, 2015). Therefore, one indicator of success in a country can be seen based on the poverty rate in that country.

World Bank (2004) states that one of the causes of poverty is a lack of income and assets *to* fulfill basic needs such as food, clothing, shelter, health services and education (Ferezagia, 2018). This shows the importance of the government's role in paying attention to economic, social and infrastructure aspects in an effort to reduce poverty levels in a country. Poor communities are often identified in areas with unfavorable geographic conditions, such as remote geographic locations, inadequate transportation, and areas that frequently experience disasters (Zhou and Huang, 2022). According to the World Bank (2020), Indonesia is one of the countries with relatively high poverty vulnerability (Purwono et al, 2021).

Poverty in Indonesia has become a critical issue due to social and economic disparities (Luckyardi et al, 2022). With increasing economic growth, poverty levels will decrease (Muryani et al, 2021). One of the government's efforts to increase economic growth is by utilizing tourism destinations in Indonesia (Muryani et al, 2020). Even though the government has made several efforts to eradicate poverty, there are still several major challenges that cannot be overcome to achieve the goal of alleviating poverty, such as low levels of education, lack of access to health services, lack of job opportunities, low wages for hard workers. workers and unequal geographical conditions.

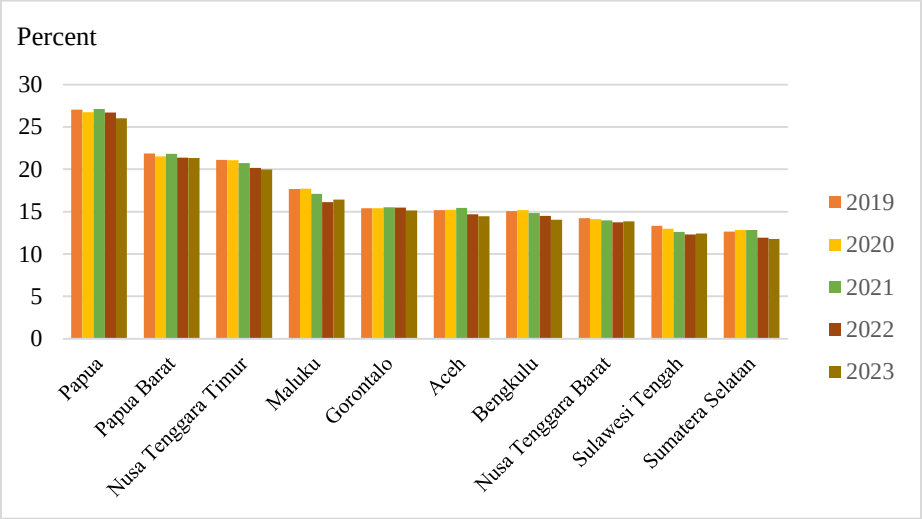

Figure 1: 10 Provinces with the Highest Poverty Rates in Indonesia 2019 – 2022 (Percent)

Source: Central Statistics Agency (2019 – 2023)

Figure 1 shows the 10 provinces with the highest percentage of poor people in Indonesia over the last five years. Based on data, the province with the highest average poverty rate over the last 5 years is Papua Province with an average of 26.89 percent. Even though the poverty rate in Papua Province tends to decrease, the poverty rate is still above the national average poverty rate, indicating that poverty in Papua Province is an important problem that must be addressed with more intensive reduction efforts. Meanwhile, the province with the lowest poverty rate in the last five years is South Sumatra Province with an average of 12.54 percent.

Poverty can be caused by limited infrastructure such as lack of access to health services, economic centers and transportation facilities (Bauze *et al*, 2012). Poverty alleviation can be realized quickly if infrastructure development can be carried out on target to meet community needs. Good infrastructure can contribute to reducing poverty levels, while a lack of infrastructure or poor infrastructure will actually increase poverty levels. One type of infrastructure that has an impact on poverty alleviation is road infrastructure. To make optimal use of road infrastructure, it is necessary to construct street lighting to provide safety for road users when driving and increase economic activities carried out at night.

Apart from that, electricity is also an important infrastructure in regional development, because electricity is widely used in daily life and is the main source of energy needed by society. Therefore, increasing electricity supply is very important for the economic and social development of communities in all regions (Siyaranamual et al, 2020). Communication infrastructure is also one of the infrastructures that can contribute to increasing people's income. Limited communication infrastructure, such as a lack of cell phone signal, can also be one of the main factors causing high poverty rates in an area. With the presence of cell phone signals in rural areas, communication between regions can be carried out more easily, so that the opportunity to earn additional income will be greater and community welfare will increase (Jiménez and Navarro, 2020).

Investing in health infrastructure is an important responsibility for the government. The distribution of health facilities can have an impact on curing people's illnesses or detecting illnesses early, so that people can remain productive in work and other economic activities. Therefore, the availability of health facilities in rural areas is very important, so that people in rural areas receive health services that are equivalent to those in urban areas (Hedman et al, 2022). This means increasing the number of health facilities and ensuring that people have easier access to hospitals and health centers is part of the government's efforts to reduce poverty levels (Goyenechea, 2016).

Over the last 5 years, Papua Province has remained the province with the highest poverty rate in Indonesia, so poverty in Papua Province has become a big problem that has received special attention from the government. Poverty

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can influence and be influenced by all factors, one of which is infrastructure factors. Therefore, it is very important to carry out research on the influence of health facilities, cell phone signals, electricity users, and street lighting on poverty levels in 21 districts/cities of Papua Province.

2. LITERATURE REVIEW

2. 1 Theoretical basis

2. 1. 1 Poverty Concept

According to Todaro and Smith (2008) poverty is a social gap in all countries involving interrelated factors, such as income, health, education, access to goods and services, geographic location, and environmental conditions (Purnomo et al, 2021). Poverty remains a major challenge throughout the world and continues to be the main focus in the Sustainable Development Goals (SDGs) program (Sugiharti et al, 2022). People who have limited access to education and decent work will be more vulnerable to poverty, compared to groups who receive more decent education and work. Therefore, the gap between poor and rich people must be used as a basis for consideration before formulating public policies related to poverty alleviation (Alkire et al, 2021).

Poverty has a long-term impact on individuals and society so that it can create an environment that makes it difficult to get out of poverty. Schiller (1997) states that a person's character defects or moral defects such as promiscuity and laziness can cause poverty (Rzechula and Kujawska, 2022). Poverty also has a serious impact on health, education and individual welfare. Poverty can also cause uneven economic growth and trigger social problems such as crime and inequality. In overcoming poverty, comprehensive policies are needed that are supported by sustainable programs in order to overcome problems that have existed between generations.

The Central Statistics Agency (2023) measures poverty as the inability to meet minimum standards for basic needs which include food and non-food needs. A person can be said to be poor if the income received is below the poverty line. The poverty line is a representation of the minimum amount of rupiah needed to meet basic needs, both food and non-food needs. The approach used in this research is the Head Count Index (HCI-P0) approach, which is the percentage of poor people who live below the poverty line.

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - yi}{z}\right]^\alpha$$

Where:

P = Poverty

α = 0

n = Number of residents

q = Population below the poverty line

z = Poverty Line

y_i = Average expenditure of the population below the poverty line for one month.

2.1.1.1 Circle of Poverty Theory

The vicious circle concept explained by Nurkse (1953) in Jhingan (2012:33), explains that poverty is caused by low productivity. People who do not have permanent jobs or work part time tend to be trapped in the poor

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community group. Underdevelopment, market imperfections and lack of capital are the main factors causing low productivity. The following is an overview of the vicious circle of poverty:

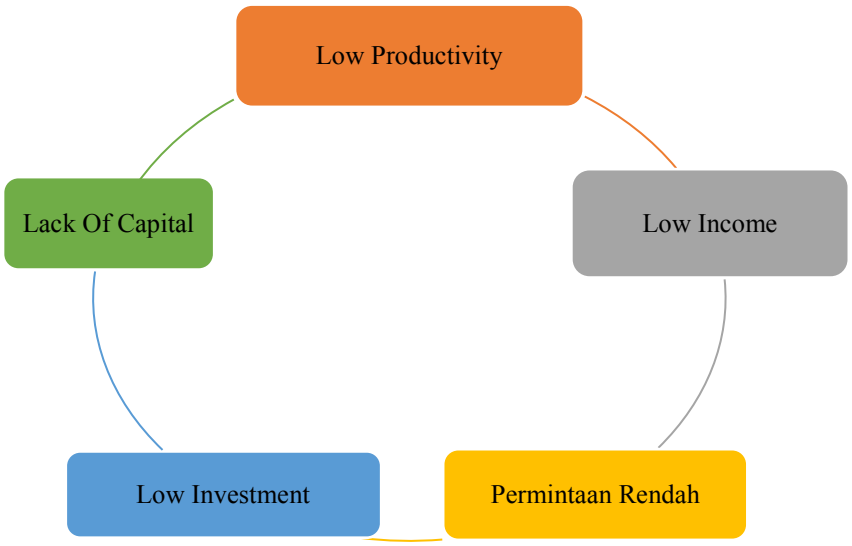

Figure 2: Circle of Poverty Nurkse

Source: Nurkse (1953) in Jhingan (2012:33)

Figure 2.1 depicts the cycle of poverty proposed by Regnar Nurkse (1953). Nurkse (1953) in Jhingan (2012) argues that poverty is a condition that has no end or beginning, where all elements that contribute to poverty are interconnected with each other. Regions that suffer from poverty find it difficult to escape the grip of poverty and remain trapped in poor conditions. According to this theory, low productivity can result in low income received. The lack of income will affect people's lack of savings and investment, which is also a cause of poverty. So that a decrease in productivity caused by a lack of capital and low income can form a vicious cycle of poverty. People living in poverty may face difficulty meeting their basic needs, such as food, shelter, and education.

2. 1. 2 Public Goods Theory

Public goods are goods whose use cannot be limited, meaning that all people can use public goods that are available either for free or for a fee and will not reduce their benefits when consumed by many people (Stanford Encyclopedia of Philosophy, 2021). Samuelson (1954) defines public goods as goods that can be enjoyed collectively, meaning that consumption by one individual does not reduce the consumption available to other individuals. According to Samuelson (1954), public goods have two main characteristics: non-rival and non-excludable. Non-rival means that consumption by one individual does not reduce the availability of the good for other individuals, so that this consumption can be carried out jointly by many individuals without reducing its availability. Non-excludable means that the benefits or impacts of a public good cannot be denied to anyone, at least without great difficulty or expense.

Another theory that discusses public goods is Pigou's theory, which is famous for the concept of externalities. One of the main ideas in his thinking is that to be considered a public good, a good must provide benefits to more than one consumer. According to Mangkoesoebroto (1993:86), Pigou's theory explains the provision of public goods funded through taxes collected from society. Pigou argues that public goods must be provided until the individual's level of satisfaction with the public good is equal to his level of dissatisfaction with the taxes levied to support the public goods provision program planned by the government.

Health facilities are an example of a public good because the use of health facilities by one individual will not reduce its usefulness for other individuals. According to Liu et al (2023), poverty and health have a close relationship. Poor people often experience poor health due to limited resources and access to health services, such as hospitals and

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community health centers. The existence of more hospitals and health centers has the potential to prevent disease from becoming more severe and allow treatment to be carried out more quickly, which in turn can improve the general health of the community. People with good health tend to be more active in economic activities, so that they can increase people's income and reduce poverty levels (Oshio, 2019).

Another example of a public good is cellular telephone services which provide communication access to the wider community. Expanding cellular telephone signals is very important to increase people's productivity (Fluhrer and Kraehnert, 2023). With ease in communication, individuals can look for additional work, market products or services, and collaborate with other parties, all of which can increase income and reduce poverty levels (Jiménez and Navarro, 2020). The development of cellular telephone signals in various regions can make a significant contribution to poverty alleviation efforts, by facilitating access to economic opportunities so as to improve the quality of life of underprivileged people.

Providing electricity in every village is also a public good that can be utilized by every community without reducing its benefits for other communities. To improve people's living standards, the government can encourage the development of electricity infrastructure in rural areas that are still underdeveloped (Xia et al, 2022). As a source of life for society, the function of electricity is not only limited to lighting, but also supports all community activities in various sectors. Installing electricity can have an effect on improving community welfare so that it can support the use of other infrastructure, such as education and health infrastructure (Lozano et al, 2023).

One of the most important uses of electricity today is as a source of lighting, especially for public street lighting (Susilo et al, 2023). Public street lighting is an example of a public good according to Samuelson (1954) which is non-rival and non-excludable, meaning that its existence can be used by every community and does not require costs. In Samanta's research (2015), it is explained that the development of street lighting infrastructure has an important role in regional development. Street lighting infrastructure can provide people with access to various facilities, reduce disparities between regions, facilitate access to employment opportunities, and encourage local economic growth. Street lighting can encourage economic activities carried out at night, such as sellers who continue to sell on the side of the road and individuals who need access to work at night will feel safer. In this way, people's income in the region will increase and have the potential to reduce poverty levels.

3. RESEARCH METHODS

3. 1 Research Scope

The approach used in this research is a quantitative approach by orienting the problem according to the relationship of influence, so that the problem can be explained as a relationship between different variables. This approach was taken to determine the influence of health facilities, cell phone signals, electricity users, and street lighting obtained from Village Potential statistical data on poverty levels obtained from the Central Statistics Agency. This research used 21 districts/cities in Papua Province with a time span of five years, namely 2008, 2011, 2014, 2018 and 2021.

3. 2 Variable Operational Description

a. Poverty Level Variable

The dependent variable used in this research is the poverty level. According to the Central Statistics Agency (2023), the poverty rate is the percentage of poor people who are below the Poverty Line (GK) in percent (%).

b. Health Facilities Variable

The health facility variable used in this study is measured by the number of villages that have hospitals (general), maternity hospitals and community health centers in one district/city. The unit used in this variable is village (PODES BPS, 2021).

c. Cell Phone Signal Variables

The telephone signal variable in this study is measured by the number of villages that are connected to a cellular telephone signal in one district/city. The unit used in this variable is village (PODES BPS, 2021).

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d. Electricity User Variables

The electricity use variable is measured based on the number of villages that are connected to electricity in one district/city. Both electricity installed by PLN and non-PLN (batteries or generators). The unit used is village (PODES BPS, 2021)

e. Street Lighting Variables

The street lighting variable is measured based on the number of villages that have street lighting in one district/city. Both lights that use electricity from the central government/regional government and non-electric lights (solar powered). The unit used in this variable is village (PODES BPS, 2021).

3. 3 Estimation Model

This research uses a panel data regression analysis model to find out the influence of each variable used and to determine the best model, it is carried out through two tests including the Chow Test and the Hausman Test. The dependent variable used is poverty level and the independent variables used are health facilities, cell phone signals, electricity users, and street lighting. This research also includes Classical Assumption Tests (Multicollinearity Test, Autocorrelation Test, Heteroscedasticity Test) and Statistical Tests (t-statistical test, f-statistical test, coefficient of determination). The empirical model used refers to Rahayu et al (2019) research, which is as follows:

$$\mathbf{POV}_{it} = \beta_0 + \beta_1 \mathbf{lnKESit} + \beta_2 \mathbf{lnSYL}_{it} + \beta_3 \mathbf{lnLIS}_{it} + \beta_4 \mathbf{lnPJL}_{it} + \mathbf{e}_{it}$$

Information:

β_0	= Intercept
$\beta_1 - \beta_6$	= Slopes
POV_{it}	= Poverty level
$lnKES_{it}$	= Natural log of the number of villages that have a general hospital, maternity hospital and community health center t
$lnSYL_{it}$	= Natural log of the number of villages with a cellular telephone signal t
$lnLIS_{it}$	= Natural log of the number of villages with electricity installed t
$lnPJL_{it}$	= Natural log of the number of villages that have street lighting t
e,i,t	= *Error Term*
i	= *Cross Section* (21 districts/cities in Papua Province)
t	= *Time Series* (2008, 2011, 2014, 2018, 2021)

4. RESEARCH RESULT

4. 1 Description of Research Results

Descriptive statistics is a statistical tool used to analyze data by describing or illustrating the data that has been collected (Sugiyono, 2019). Table 1 is presented in the form of original numbers before being transformed into natural logarithms to maintain appropriate interpretation of each variable. This table shows the values that have not been changed, making it easier to understand the original data before the transformation process is carried out. This research involved 105 observations for each variable, with a sample covering 21 districts/cities in Papua Province.

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Table 1 Descriptive statistics

Variable	Notation	n	Mean	Std. Dev	Max	Min
Poverty Rate (percent)	POV	105	29.55667	10.86197	50.92	10.16
Health Facilities (village)	KES	105	16.99048	8.653029	46	2
Cell Phone Signal (village)	SYL	105	29.08571	24.52789	109	1
Electricity Users (villages)	LIS	105	110.2667	93.56294	535	1
Street Lighting (village)	PJL	105	22.84762	27.27382	164	1

Source: STATA 14, data processed.

Table 1 displays the mean, standard deviation, maximum and minimum values of each variable in 21 districts/cities of Papua Province in 2008, 2011, 2014, 2018 and 2021. In this study, the dependent variable is explained by the Poverty Level, which has an average -an average of 29.5567 percent. The highest poverty level was recorded at 50.92 percent in Supiori Regency, while the lowest value was 10.16 percent in Merauke Regency. The first independent variable in this research is Health Facilities with an average variable of 16 villages. The highest score for Health Facilities is located in Yahukimo Regency, namely 46 villages, with the lowest score being 2 villages.

The next independent variable is Cell Phone Signal with an average variable of 29 villages. The minimum number of cell phone signals was in 1 village with the highest value being 109 villages in Jayawijaya Regency. Another independent variable is Electricity Users with an average variable of 110 villages. The highest value of electricity users is in Tolikara Regency, namely 535 villages and the lowest is 1 village. The Street Lighting variable in this study has an average variable of 22 villages. The lowest value in Street Lighting was 1 village and the highest value was 164 villages, namely in Biak Numfor Regency.

4. 2 Selection of Analysis Models

There are three models that can be used to carry out panel data regression analysis, namely the Common Effect Model, Fixed Effect Model , and Random Effect Model. To determine the most appropriate model for estimating panel data regression, tests were carried out to determine the best estimation model, namely the Chow Test and the Hausman Test. Based on the tests that have been carried out, the best model chosen to analyze the influence of Health Facilities, Cell Phone Signals, Electricity Users, and Street Lighting on Poverty Levels in 21 districts/cities of Papua Province is the Fixed Effect Model (FEM).

Table 2 Selection of Analysis Models

Test	Mark
Test Chow	0,000
Hausman test	0.0038

Source: STATA14, data processed.

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4. 3 Classic assumption test

4. 3. 1 Normality test

Table 3 Shapiro-Wilk Test

Variable	Obs	W	V	z	Prob > z
resident	105	0.98134	1,605	1,052	0.14639

Source: STATA 14, data processed.

Table 3 shows the results of the Shapiro-Wilk test. Meanwhile, if the p-value < 0.05 then H_0 is rejected; data is not normally distributed. Prob > z in the table above is 0.14639 or greater than 0.05. This means that H_0 is rejected, which concludes that the data is normally distributed. The W value in the table above is 0.98134, which means that the data most likely comes from a normal distribution, because a value closer to 1 indicates that the data is normally distributed. Meanwhile, the z value in the table above is 1.052, which shows that the smaller the z value, the closer the data is to a normal distribution.

4. 3. 2 Multicollinearity Test

Table 4 VIF test

Variable	VIF	1/VIF
lnLIS	2.01	0.498328
lnSYL	1.91	0.523122
lnKES	1.57	0.637043
lnPJL	1.46	0.682863
Mean VIF	***1.74***	

Source: STATA14, data processed.

Table 4 shows that the VIF value is < 10 and the tolerance value is > 0.1, which indicates that the six independent variables in this study did not detect multicollinearity. A VIF value above 10 is a strong indication that the variable has a high correlation with other variables in the model.

4. 3. 3 Heteroscedasticity Test

Table 5 Glejser test

abscess	Coef.	Std. Error	Q	P>|t|
lnLIS	-0.0466658	0.5176088	-0.09	0.928
lnSYL	-0.2627248	0.5427201	-0.48	0.629
lnKES	0.4619469	0.8832065	0.52	0.602
lnPJL	0.7107245	0.3932431	1.81	0.074
_cons	4.230968	2.179838	1.94	0,000

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Source: STATA 14, data processed.

Table 5 shows the results of the Glejser test with a p-value for the lnLIS variable of 0.928; lnSYL of 0.629; lnKES 0.602; and lnPJL 0.074. The four independent variables tested have probability values greater than the significance level (0.05), which states that the regression model is free from heteroscedasticity problems.

4. 3. 4 Autocorrelation Test

Table 6 Breusch-Godfrey test

lags(p)	chi2	df	Prob > chi2
1	7,413	1	0.0065

Source: STATA 14, data processed.

Table 6 shows the results of the Breusch-Godfrey test. The probability value in this test is 0.0065, which means it is smaller than the significance level (0.05) and the chi-square value is 15.342, which means it is not close to zero. This shows that there is no residual pattern that is statistically related to the independent variables in model. To overcome autocorrelation problems in regression models, the *Prais-Winsten method* can be used as a method to cure autocorrelation problems (Bottomley et al, 2022).

Table 7 : Prais-Winsten Method

Durbin-Watson (original)	1.022218
Durbin-Watson (transformed)	2.063587

Source: STATA 14, data processed.

Table 4.8 shows the results of the Prais-Winsten method in dealing with autocorrelation problems. After applying the Prais-Winsten method to overcome the autocorrelation problem, the Durbin-Watson (transformed) value is 2.063587 which indicates that the autocorrelation problem has been successfully resolved. These results provide confidence that the regression model is more accurate and reliable for further analysis.

4.4 Statistic test

4. 4. 1 T-statistic test (Partial)

The t-statistical test is a statistical test used to evaluate the individual significance of regression coefficients in a regression model. In the context of linear regression, the t-statistical test measures how significant the influence of each independent variable is on the dependent variable.

1. The health facility variable has a p-value of 0.000, which means it is smaller than the significance level (10%, 5% and 1%). This means that the health facilities variable has a partially significant influence on the poverty level variable.
2. The cell phone signal variable has a p-value of 0.220, which means it is greater than the significance level. This means that the cell phone signal variable partially does not have a significant influence on the poverty level variable.
3. The electricity user variable has a p-value of 0.005, which means it is smaller than the significance level (10%, 5% and 1%). This means that the electricity user variable has a partially significant influence on the poverty level variable.
4. The street lighting variable has a p-value of 0.000, which means it is smaller than the significance level (10%, 5% and 1%). This means that the street lighting variable has a partially significant influence on the poverty level variable.

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4. 4 f-Statistics Test (Simultaneous)

The estimation results show that the f-statistic probability value is 0.000. This value is smaller than the significance level (10%, 5%, and 1%) which indicates that the independent variables in the model (health facilities, cell phone signals, electricity users, and street lighting) simultaneously have a significant effect on the dependent variable (poverty level) in 21 districts/cities of Papua Province. The chosen coefficient of determination is the overall r-squared, which is 0.6618, which shows that the model can explain the influence of the independent variable on the dependent variable by 66.18%. The rest is influenced by variables outside the model.

4. 5 Regression Estimation Results

Table 8 Regression Estimation Results

Dependent variable: POV				
	Coefficient	**Std. Error**	**t-statistics**	**Probability**
lnKES	-0.04226633	1.017095	-4.16	0,000***
lnSYL	-0.00656568	0.5307887	-1.24	0.220
lnLIS	-0.02133934	0.4685324	-4.55	0.005***
lnPJL	-0.01225935	0.426971	-2.87	0,000***
cons	54.95775	2.516458	**21.84**	0,000
R-squared	0.6618			
Observation (n)	105			
Prob > F	0.0000			

Note: () standard error; * p < 0.1; ** p < 0.05; *** p < 0.01

Source: STATA 14, data processed.

Table 8 presents the results of the regression estimation of poverty levels in Papua Province using the Fixed Effect Model (FEM) estimation method. The independent variables consisting of health facilities, electricity users, and street lighting have a significant negative effect on the dependent variable, namely the poverty level, while the cell phone signal variable does not have a significant effect on the poverty level. The R-squared value for the Fixed Effect Model (FEM) method is 0.6618. This means that the FEM model can explain the real situation regarding the influence of the independent variable on the dependent variable by 66 percent.

5. Discussion of Research Results

5. 1 Simultaneous Influence of Health Facilities, Cell Phone Signals, Electricity Users, and Street Lighting on Poverty Levels

The results of the simultaneous test show a prob-f value of 0.000, which means that the variables of health facilities, cell phone signals, street lighting and electricity users simultaneously have a significant effect on the poverty level. The simultaneous test result of 0.6618 explains that the model is able to explain the relationship between the

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independent variable and the dependent variable by 66.18 percent and the rest is explained by variables outside the model. In the next step, the partial relationship between the independent variable and the dependent variable will be explained.

5. 2 The Influence of Health Facilities on Poverty Levels

The estimation results show that the health facilities variable has a significant effect and is negatively related to the poverty level, which indicates that increasing the number of villages that have hospitals and health centers can reduce the poverty level in 21 districts/cities of Papua Province. By increasing the number of villages that have health facilities such as hospitals and health centers, communities can have easier access to detect disease early and receive appropriate treatment, thus enabling communities to remain productive and generate income. People can more quickly overcome health problems to maintain work productivity, reduce work absenteeism and maintain income stability. Thus, the availability of hospitals and community health centers has the potential to reduce poverty levels.

These findings support research conducted by Anderson and Billou (2007), Brierly et al (2014), Wang et al (2016), and Ahmed et al (2019), which emphasize that health facilities such as hospitals and health centers must be available in every regional, widely accepted, and most importantly easily accessible to the poor and people in rural areas. Research by Wong et al (2020) also underlines the crucial role of travel time to hospital, showing that the availability of hospitals in various regions can speed up health care. However, the results of this study are different from research conducted by Rahayu et al (2019) which concluded that the development of hospital infrastructure does not have a significant effect on reducing poverty levels, because the presence or absence of hospitals does not have a significant impact on reducing poverty.

5. 3 The Effect of Cell Phone Signals on Poverty Levels

Based on tests that have been carried out, it shows that the number of villages connected to cellular telephone signals does not have a significant effect on the poverty level in 21 districts/cities of Papua Province. The cell phone signal variable tends to fluctuate while the poverty level variable shows a decreasing trend so it does not form a pattern and does not have a significant effect. This finding is in line with research conducted by Fjeldstat et al (2001) which emphasized that the presence of cell phone signals is not relevant in efforts to reduce poverty. Meanwhile, research conducted by Anderson et al (1998), Rahayu et al (2019), Sahrina and Anis (2019), and Jiménez and Navarro (2020) shows that signals on cell phones have an important role in increasing economic growth and reducing poverty levels. These differences in results may also be caused by different factors, such as differences in social structure, economy, and infrastructure in each study area.

Although signals on cell phones make it easier for people to communicate with other areas anytime and anywhere, their impact on poverty levels is not always significant. This may be due to the very diverse geographical conditions in the districts/cities of Papua Province, where most areas are still difficult to reach, thus becoming an obstacle in installing cell phone signal towers (Kominfo, 2023). Cellular telephone signals in Papua Province are available only to certain providers so that not all areas in Papua Province have the same access to these telecommunications services. Therefore, although cellular telephone signals can be a link between regions, their uneven distribution can hinder their use, especially for people who still lack access to these services.

5. 4 The Influence of Electricity Users on Poverty Levels

Apart from education and health, electricity is also a crucial basic infrastructure. Statistical estimation results show that the electricity user variable has a significant effect and is negatively related to the poverty level in 21 districts/cities of Papua Province. The more electricity installed in a village in a district/city, the poverty level in that area will decrease. Electricity is closely related to poverty because electricity is the main energy source for carrying out various business activities, including operating machines in large-scale industry. The availability of electricity allows employment opportunities to be more widely available, thus potentially providing people with jobs and income

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that can accelerate the reduction in poverty levels.

These findings are in line with research conducted by Wahyuda and Santosa et al (2015), Rahayu et al (2019), Bahaj et al (2019), Xia et al (2022), Song et al (2022), and Lozano et al (2022). Which shows that the availability of electricity has a positive impact on community welfare and has the potential to reduce poverty levels. These studies highlight the important role of electricity in increasing the accessibility of services, opening employment opportunities, and increasing incomes, contributing to economic growth and reducing poverty. Findings from research conducted by Chen et al (2019) also confirm that the availability of electricity can increase the operational time of health facilities. This means that health services that are available at any time to the community can speed up the process of healing disease and enable people to return to work as usual so that economic activity can immediately be restored.

5. 5 The Effect of Street Lighting on Poverty Levels

The estimation results of the street lighting variable have a significant effect and are negatively related to poverty levels in 21 districts/cities of Papua Province. This means that if the number of villages that have street lighting increases in one district/city, then the poverty level in that district/city will decrease. To optimize the use of road infrastructure, street lighting is needed so that road infrastructure can be used optimally. Increasing street lighting can facilitate economic activities at night, have the potential to create new jobs, and improve public safety. These results are in line with the theory presented in the research of Samanta et al (2015), Bryzhko, V. & Bryzhko, I. (2019), Rahayu et al (2019), Sutopo et al (2020), and Abbasi et al (2022), which shows that increasing the number of street lights can create a safer environment and inCrease community economic activity, which in turn can potentially reduce poverty levels.

6. Closing

Based on the results of the analysis and discussion, it can be concluded that improving health facilities, increasing installed electricity, and improving street lighting in an area can have an impact on reducing poverty in 21 districts/cities in Papua Province from the 2008 - 2021 period. These findings indicate that investment in health infrastructure and the provision of basic services such as electricity and street lighting have the potential to encourage economic growth and improve the welfare of people in the region so that poverty reduction can be realized more quickly.

Based on the conclusions that have been explained, the following suggestions can be given regarding the results of this research, namely as follows:

1. For the government, it is hoped that it can optimize infrastructure provision, especially in the health, electricity, street lighting and cell phone signal sectors. One example is by increasing investment in building hospitals and health centers in remote areas, which can expand people's access to quality health services. In addition, increasing the flow of electricity and placing more efficient street lighting will improve safety and mobility at night, while improving cell phone signals will open wider access to information and communications technology, supporting economic growth and social connectivity.
2. The next researcher who will use research on a similar topic is expected to be able to include other variables that can influence poverty levels, such as illiteracy rates.

Bibliography

Abbasi, M., et al. (2022). Analysis of Crash Severity of Texas Two Lane Rural Roads Using Solar Altitude Angle Based Lighting Conditions. *Sustainability* , 14(3), 1692.

DOI: 10.47505/IJRSS.2025.6.6

Ahmed, J.U., et al. (2019). Friendship Floating Hospitals : Healthcare for The Riverine People of Bangladesh. *Journal of Developing Societies* , 35(1), 175 – 194.

Alkire, S., et al. (2021). Examining Multidimensional Poverty Reduction in India 2005/6-2015/16: Insights and Oversights Of The Headcount Ratio. *World Development* , 14(2), 105454.

Anderson, Jamie. & Niels, Billou. (2007). Serving The World's Poor: Innovation At The Base Of The Economic Pyramid. *Journal of Business Strategy* , 28(2), 14 – 21.

Anderson, JE, et al. (1998). Telephone Coverage and Measurement of Health Risk Indicators: Data From The National Health Interview Survey. *American Journal of Public Health* , 88(9), 1392 – 1395.

Bahaj, A., et al. (2019). The Impact of An Electrical Mini-grid on The Development of A Rural Community in Kenya. *Energies* , 12(5), 778.

Bauze, A., et al. (2012). Equity and Geography: The Case of Child Mortality in Papua New Guinea. *PLoS ONE* , 7 (5).

Bottomley, C., et al. (2022). In Praise of Prais-Winsten: An Evaluation of Methods Used To Account For Autocorrelation in Interrupted Time Series. *Statistics in Medicine* , 42(1), 9669.

Brierly, C.K., et al. (2014). Healthcare Access and Health Beliefs of The Indigenous Peoples In Remote Amazonian Peru. *The American Journal of Tropical medicine and Hygiene* , 90(1), 180 – 193.

Bryzhko, V.G. & Ilya, V.B. (2019). Comprehensive Assessment of The Impact of Road Infrastructure Development In A Rural Municipal Area (Russia). *Espacious* , 40(37), 19.

Central Bureau of Statistics. (2008). *Papua Province Village Potential Statistics 2008* . BPS, Papua.

Central Bureau of Statistics. (2011). *Papua Province Village Potential Statistics 2011* . BPS, Papua.

Central Bureau of Statistics. (2014). *Papua Province Village Potential Statistics 2014* . BPS, Papua.

Central Bureau of Statistics. (2018). *Papua Province Village Potential Statistics 2018* . BPS, Papua.

Central Bureau of Statistics. (2021). *Papua Province Village Potential Statistics 2021* . BPS, Papua.

Central Bureau of Statistics. (2023). *Percentage of Households with PLN Electric Light Source (Percent) 2020 – 2022* . BPS, Indonesia.

Central Bureau of Statistics. (2023). *Percentage of Poor Population by Province and Region 2018–2022* . BPS, Papua.

Central Bureau of Statistics. (2023). Poverty Profile in Indonesia March 2023. *Official Statistics News No. 07/47/Th. XXVI.*

Chen, YJ, et al. (2019). Effect of Reliable Electricity on Health Facilities, Health Information, and Child and Maternal Health Services Utilization: Evidence From Rural Gujarat, India. *Journal of Health, Population and Nutrition* , 38(1), 7.

Ferezagia, Debrina Vita. (2018). Analysis of Poverty Levels in Indonesia. *Journal of Social Humanities* , 1(1).

Fjeldstat, O. & Semboja, J. (2001). Why People Pay Taxes: The Case Of The Development Levy in Tanzania. *World Development* , 29(12), 2059 - 2074.

Fjeldstat, O. & Semboja, J. (2001). Why People Pay Taxes: The Case Of The Development Levy in Tanzania. *World Development* , 29 (12), 2059 – 2074.

Fluhrer, S., & Kati, K. (2023). Telephone Network Expansion and Agricultural Income: A Panel Study. *Agricultural Economics* , 12803.

Goyenechea, M. (2016). Public Health Infrastructure Investment Difficulties in Chile: Concessions and Public Tenders. *Medwave* , 16 (04).

Hedman, M., et al. (2022). Doctor's Experiences Of Providing Care In Rural Hospitals In Southern New Zealand: A Qualitative Study. *BMJ Open* , 12(12).

DOI: 10.47505/IJRSS.2025.6.6

Jhingan, ML 2012. *Economics of Development and Planning* . Jakarta: PT. Raja Grafindo Persada.

Kenny, Charles. (2015). Goal 1-End Poverty in All It Forms Everywhere.

Liu, Xiaoyun., et al. (2023). Poverty Alleviation and Health Services For The Poor In China: Evidence From National Health Service Surveys in 2013 and 2018. *International Journal for Equity in Health* , 22 (1), 221.

Lozano, F., et al. (2023). Reducing Energy Poverty in Small Rural Communities Through In Situ Electricity Generation. *Discover Sustainability* , 4(1).

Luckyardi, S., et al. (2022). Significances Of Marketing Education In Reducing Poverty In Indonesia: Special Review On Quality Of Life. *Journal Of Eastern European And Central Asian Research* , 9 (1).

Mangkoesoebroto, Guritno. (1993). *Public Economics (3rd Edition)* . Yogyakarta: BPFE.

Muryani., et al. (2020). Determinants of Tourism Demand in Indonesia: A Panel Data Analysis. Tourism Analysis, 25 (1), 77 – 89.

Muryani., et al. (2021). Dynamics of Income Inequality, Investment, and Unemployment in Indonesia. Journal Of Population and Social Studies, 29, 660 – 678.

Oshio, Takashi. (2019). Exploring The Health-Relevant Poverty Line: A Study Using The Data Of 663,000 Individuals in Japan. *International Journal For Equity In Health* , 18(1).

Purwono, R., et al. (2021). Poverty Dynamics In Indonesia: Empirical Evidence From Three Main Approaches. *World Development Perspectives* , 23, 100346.

Rahayu, H., et al. (2019). Geography And Infrastructure Dimension On Poverty In Riau Province: Panel Data Approach At The Village Level. *Journal Of Southwest Jiaotong University* , 54(5).

Rahayu, HC, et al. (2018). Dimensions of Poverty in Coastal Areas in Indragiri Hulu Regency, Riau Province. *Journal of Organization and Management* , 14(1), 21 – 29

Rzechula, AS & Aghnieszka, K.K. (2022). Assessment of the Development of Poverty in EU Countries. *International Journal of Environmental Research and Public Health* , 19(7), 3950.

Samanta, P. K. (2015). Development of Rural Road Infrastructure in India. *Pacific Business Review International* , 7(11).

Samuelson, Paul A. (1954). The Pure Theory of Public Expenditure. *The Review of Economics and Statistics,* 36, (4), 387 – 389.

Siyaranamual M., et al. (2020). Consumer's Willingness To Pay For Electricity Service Attributes: A Discrete Choice Experiment in Urban Indonesia. *Energy Reports* , 6, 562 – 571.

Sugiharti, L., et al. (2022). Poverty Dynamics in Indonesia: The Prevalance And Causes Of Chronic Poverty. *Journal Of Population and Social Studies (JPSS)* , 30, 423 – 447.

Sugiyono. (2019). *Quantitative and Qualitative Research Methodologies And R&D* . Bandung: ALFABETA.

Susilo, RA, et al. (2023). Planning for Public Street Lighting Installations on Jalan Sungai Kapih, Sambutan Samarinda District. *Journal of Engineering and Sustainable Technology* , 9(2).

Sutopo, W., et al. (2020). A Model To Improve The Implementation Standards Of Street Lighting Based on Solar Energy: A Case Study. *Energies* , 13(3), 630.

Wahyuda. & Budi, Santosa. (2015). Dynamic Pricing in Electricity: Research Potential in Indonesia. *Procedia Manufacturing* , 4, 300 – 306.

Wang, Xuan., et al. (2016). Evaluation of Performance And Impacts of Maternal And Child Health Hospital Services Using Data Envelopment Analysis in Guangxi Zhuang Autonomous Region, China: A Comparison Study

DOI: 10.47505/IJRSS.2025.6.6

Among Poverty And Non-Poverty Country Level Hospitals. *International Journal For Equity In Health* , 15(1), 131.

Wong, KLM (2020). Too Poor Or Too Far? Partitioning The Variability of Hospital-Based Childbirth By Poverty And Travel Time in Kenya, Malawi, Nigeria, and Tanzania. *International Journal for Equity in Health.* 19(1), 15.

Xia, X., et al. (2022). Decoupling Analysis of Rural Population Change and Rural Electricity Consumption Change in China. *International Journal of Environmental Research and Public Health* , 19(11), 6676.

Zhou, Y. & Han, H. (2023). Geo-Environmental And Socioeconomic Determinants Of Poverty In China: An Empirical Analysis Based On Stratified Poverty Theory. *Environmental Science And Pollution Research* , 30, 23836 – 23850.

DOI: 10.47505/IJRSS.2025.6.6