

EXPLAINING POVERTY REDUCTION IN EAST JAVA: ASSESSING THE RELATIVE EFFECTS OF INFRASTRUCTURE, EDUCATION, HEALTH, AND ECONOMIC PERFORMANCE

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ABSTRACT

Poverty remains a persistent challenge in East Java despite ongoing efforts to promote regional development and improve public welfare. Differences in poverty levels across regencies and municipalities suggest that the effectiveness of development outcomes may vary according to local socioeconomic conditions. Within the framework of population economics, poverty is often linked to the quality of human capital, particularly education and health, as well as the availability of supporting infrastructure and economic opportunities. This study aims to examine the influence of education, health, infrastructure, and economic performance on poverty levels across regencies and municipalities in East Java. In addition, it seeks to identify whether human capital factors play a more prominent role than regional development factors in explaining variations in poverty. This study employs a quantitative approach using cross-sectional data from 38 regencies and municipalities in East Java. Multiple linear regression analysis with robust estimation is used to assess the relationship between poverty and several explanatory variables, including average years of schooling, life expectancy, road infrastructure quality, gross regional domestic product (GRDP) per capita, open unemployment rate, and health insurance coverage. The findings reveal that the proposed model explains a substantial share of regional poverty variation. Among the variables examined, average years of schooling demonstrates the strongest and most consistent association with poverty reduction. Meanwhile, health, infrastructure, economic performance, and unemployment do not exhibit statistically significant effects within the estimated model. These results indicate that improvements in educational attainment are more closely associated with lower poverty levels than other development indicators. Strengthening educational outcomes therefore remains a critical pathway for reducing poverty disparities across East Java.

Keywords: economic development, education, health, infrastructure, poverty.

1. INTRODUCTION

Poverty is the most pressing challenge in the complex environment of development in emerging countries. Despite the implementation of various policy alternatives and poverty alleviation programs in many countries over the last few decades, the persistent presence of economically vulnerable groups clearly demonstrates that economic growth does not always result in equitable distribution of well-being. Poverty is not only related to limited income; it also reflects the population's limited access to healthcare, education, employment opportunities, and various basic services that can support an improved quality of life. Poverty reduction activities require a holistic approach that considers the many interconnected facets of human resource development.

In Indonesia, a decline in poverty rates is regarded as a hallmark of successful national development. The Indonesian government has demonstrated a consistent prioritization of poverty reduction in various development planning documents. Examples include the National Long-Term Development Plan (RPJPN) and the National Medium-Term Development Plan (RPJMN). Poverty reduction is also one of the global development goals outlined in the Sustainable Development Goals (SDGs), specifically Goal 1 - No Poverty. Nevertheless, the progress achieved in reducing poverty across Indonesian regions continues to exhibit significant disparities. The unique challenges confronting each region in Indonesia are a consequence of differences in social, macroeconomic, and demographic conditions, (Lestari, Robiani, & Sukanto, 2023). These findings suggest that the success of development programs is not solely determined by regional economic growth, but is also influenced by the quality of human resources and equitable access to public facilities.

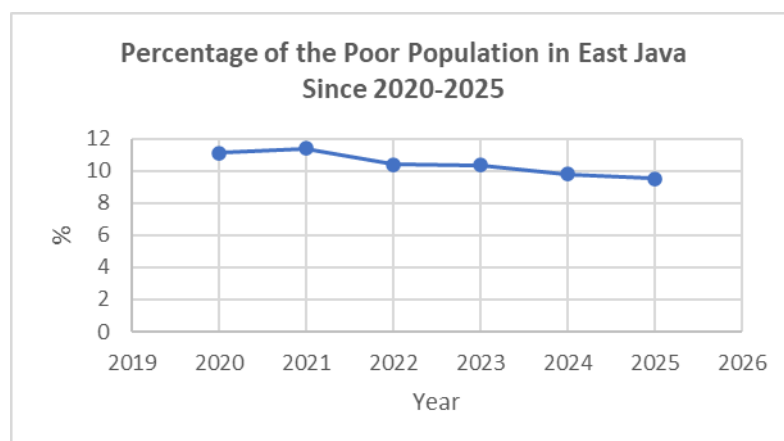


Figure 1. Trend Toward Percentage of Poor People in East Java

East Java Province is a strategic region within the framework of national development. It has a substantial population and makes a significant economic contribution to Indonesia's economic growth. The poverty rate in East Java has clearly shown a downward trend in recent years as shown in Figure 1. However, this achievement does not yet fully reflect the equitable distribution of prosperity across all regencies and districts in the province. There's no doubt that

a considerable economic disparity persists between regencies and cities in East Java. It is clear that certain regions have achieved a notable reduction in poverty levels, while others are still struggling. These disparities clearly indicate that the factors influencing poverty levels across regions do not operate uniformly throughout the province. It is imperative to identify the factors that most significantly influence poverty reduction to support data-driven, effective, and targeted development policies.

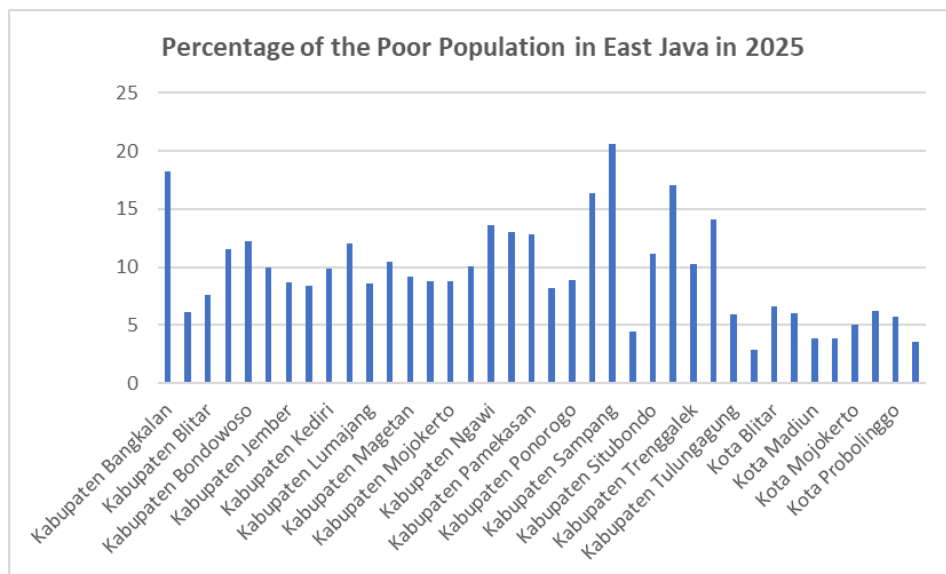


Figure 2. Percentage of the Poor Population in East Java in 2025

From the perspectives of development economics and population economics, the quality of human resources (human capital), the availability of infrastructure, and regional economic conditions are generally influential factors in the determination of poverty levels. According to the principles of human capital theory, education and health are regarded as "long-term investments" that have the potential to enhance individual productivity, broaden employment opportunities, and consequently increase income. Individuals with higher levels of education tend to have a greater capacity to secure formal employment. In a similar vein, when confronted with economic shifts, individuals who have received more extensive education tend to demonstrate a stronger capacity to secure higher incomes by entering the formal labor market. Good health also impacts the economy because healthy individuals are more productive. These conditions then contribute continuously to improvements in household well-being.

A multitude of prior studies have investigated the association between educational attainment and poverty. Studies indicate that higher education reduces poverty because it improves the quality of the workforce and enhances competitiveness in the labor market. In addition to educational attainment, health status has been identified as a key factor influencing societal well-being. Individuals who boast optimal health generally exhibit higher levels of productivity and a reduced risk of poverty when compared to those with severely limited access to healthcare.

Another perspective posits that infrastructure development serves as a pivotal catalyst for economic growth and the alleviation of poverty. The existence of adequate infrastructure has been demonstrated to improve regional connectivity, reduce transportation costs, expand market access, and stimulate economic activity among communities. A variety of studies have demonstrated a correlation between the quality of road infrastructure and improved well-being, as evidenced by enhanced accessibility and economic mobility. Moreover, economic performance indicators such as Gross Regional Domestic Product (GRDP) per capita are frequently employed to assess a region's level of prosperity. The expectation is that high economic growth will result in the creation of new jobs and an increase in household income, thereby helping to reduce poverty.

Despite the growth in research on poverty, previous studies have several limitations. Most studies examine the effects of education, health, infrastructure, or economic growth separately. Research comparing the relative contributions of human capital and regional development factors in explaining variations in poverty remains limited, particularly at the district and city levels. Previous studies have yielded mixed findings regarding the effects of health, infrastructure, and economic growth on poverty. These differing results highlight the need for empirical studies capable of simultaneously testing various factors within the context of specific regions.

The objective of this study is clear: first, to provide answers to two fundamental inquiries. The initial inquiry concerns the influence of specific conditions on poverty levels in East Java Province. The investigation focuses squarely on the role of education, health, infrastructure, and macroeconomic performance in shaping the region's economic landscape. Secondly, this study identifies the factors that most contribute to explaining regional differences in poverty levels. It generates appropriate policy recommendations. The research findings will provide local governments with the recommendations they need to determine more effective development priorities. These recommendations will reduce disparities in community welfare among regencies and cities in East Java. This study will make a significant contribution to the existing body of research on the relationship between human capital, regional development, and poverty levels at the subnational level.

The novelty of this study lies in its attempt to directly compare the influence of human capital factors (represented by education and health) with regional development factors (represented by infrastructure and economic performance) in explaining variations in poverty across all regencies and cities in East Java. Contrary to the majority of preceding studies, which concentrated on the partial relationships between variables, this study underscores the identification of the most salient factors in explaining poverty. Correspondingly, this study endeavors to enhance the existing body of knowledge by offering a more comprehensive understanding of the development priorities that must be reinforced to support the acceleration of poverty reduction in East Java.

2. LITERATURE REVIEW

a. Poverty from the Perspective of Regional Development and Demographics

Poverty is a frequently utilized metric in the evaluation of development effectiveness. Poverty is a clear indicator of a population's ability to meet basic life needs. Poverty is divided into two categories: absolute and relative. Absolute poverty is defined as the condition in which an individual or family is unable to meet basic needs, including clothing, food, housing, education, and healthcare. Relative poverty is when an individual or family's standard of living is lower than the community's standard of living. The difference between these two ideas highlights the many sides of poverty. It's not just about money. It's also about an individual's social status and their ability to fully participate in the economy and society.

Recent advancements in the domain of development studies have led to a significant expansion in our understanding of poverty. The conventional income-based approach to poverty assessment has evolved into a more comprehensive framework that incorporates a variety of factors. Poverty is now recognized as a multidimensional phenomenon encompassing various forms of deprivation, including but not limited to low levels of education, poor health, limited access to public services, limited employment opportunities, and restricted access to economic resources. From this perspective, an individual may be considered impoverished even if their income is relatively sufficient, provided they encounter obstacles in accessing fundamental services that are crucial for enhancing their quality of life. Consequently, strategies designed to reduce poverty must not exclusively concentrate on augmenting individuals' income, but also must encompass a more extensive array of factors contributing to human development, (Zulkifli & Abidin, 2023).

In demographic studies, poverty is closely linked to the quality of the population. Under the concept of People-Centered Development, the population is viewed not merely as passive recipients of government programs, but also as active participants who drive and determine the success of development itself, (Ampadu, 2023). Population quality, as reflected in educational attainment, health status, labor productivity, and the ability to adapt to economic changes, influences the capacity of individuals and households to improve their well-being. In contrast, low human capital can increase the risk of poverty by limiting people's access to productive employment and decent wages.

The Capability Approach theory is also consistent with the concept of people-centered development. According to this theory, development is a process of expanding individuals' capabilities to lead lives they find meaningful. Within the framework of the Capability Approach, poverty is viewed not only as a lack of income, but also as a limitation in the ability to access various opportunities available in society, (Pitasse Fragoso, 2025). Individuals with low levels of education, poor health, and limited access to public facilities will face greater obstacles in improving their well-being. The situation is different for groups of individuals with better human capital.

Furthermore, from the perspective of Human Development theory, investment in the education and health sectors is the cornerstone of long-term human development, (Puteri & Marwan, 2023). Improving human capital not only benefits the individual but also has a broader

impact on economic productivity, regional growth, and poverty reduction. The Human Development perspective in this theory positions humans as both the “goal” and the “agents” in the development process. Finally, the success of development is not measured solely by regional economic growth, but also by improvements in the quality of life for the community.

b. The Effect of Educational Attainment on Poverty

Education is one of the aspects most frequently associated with poverty reduction efforts. Education is considered to be directly linked to improvements in the quality of human resources, (Suhendar, Sari, Pangesti, Putra, & Santoso, 2024). It is viewed as a form of investment that yields economic benefits in the future. Individuals who allocate time and resources to obtain an education generally possess better knowledge, skills, and capacity to participate in economic activities. Therefore, education not only benefits the individuals concerned but also contributes to increased labor productivity and broader economic development.

At the regional level, the quality of education is often measured using the average years of schooling indicator. This indicator reflects the accumulated educational attainment of the population and is often used as a measure of human capital quality. The higher the average years of schooling in a region, the greater the opportunities for its residents to secure more productive, stable, and higher-paying jobs. Conversely, if the average years of schooling in a region is low, residents’ access to formal employment is often limited. This, in turn, increases the risk of rising poverty rates in that region.

The relationship between education and poverty can also be explained through Social Mobility Theory, (Roshan & Rahman, 2025). Education opens opportunities for individuals to improve their social and economic status compared to previous generations. Through education, individuals have the opportunity to secure better jobs, increase their income, and expand their access to various economic resources. In this context, education is often viewed as an effective tool for breaking the intergenerational cycle of poverty that occurs within households and specific communities.

Various previous studies have consistently shown a negative correlation between education and poverty, (Zaqiah, Triani, & Yeni, 2023). Regions with higher levels of education tend to have lower poverty rates compared to regions where the quality of education remains lagging. Education contributes to increasing employment opportunities, raising income, and strengthening individuals’ ability to adapt to changing economic conditions. Nevertheless, most previous studies have treated education as a standalone factor without considering its interrelationship with health, regional economic conditions, or regional development. Furthermore, many studies have been conducted at the individual or household level, so empirical evidence regarding the impact of education on poverty at the district and city levels remains relatively limited. These circumstances highlight the need for research that examines the role of education alongside other development factors in explaining regional variations in poverty.

c. The Impact of Access to Health Care on Poverty

Health is one of the key dimensions of human development because it determines the population’s ability to engage in economic activities and maintain its productivity, (Lewis,

2014). At the regional level, the quality of public health is generally represented by life expectancy and health insurance coverage rates. These two indicators not only reflect the health status of the population but also illustrate the extent to which the public has access to adequate health services. Therefore, improving the quality of health services is viewed as a prerequisite for enhancing public well-being and reducing poverty.

Life expectancy is widely used as an indicator of the success of health development because it captures the aggregate health status of the population, (Egidi & Spizzichino, 2008). A high life expectancy generally indicates that people have a longer life expectancy as a result of improved nutrition, disease control, enhanced quality of health care, and a healthier environment. Conversely, a low life expectancy is often associated with a high disease burden, limited access to health facilities, and poor quality of public services. In the context of regional development, an increase in life expectancy not only reflects the success of the health sector but also indicates an improvement in the overall quality of life of the population.

A number of previous studies have shown that life expectancy is closely linked to poverty levels. Regions with higher life expectancy tend to have a lower proportion of poor residents compared to regions with poorer health conditions, (Feng, 2025). These findings suggest that people who are healthier have greater opportunities to work productively, earn a more stable income, and maintain household well-being. Thus, improving health quality through increased life expectancy is a key pathway to supporting poverty reduction.

In addition to life expectancy, health insurance coverage has also become an increasingly common indicator used to describe the public's access to health services. Health insurance programs play a role in reducing financial barriers when people need medical care, (Aljuaid et al., 2022). Without such protection, medical costs can become a significant burden for households, particularly those with low incomes. This situation often forces households to cut back on spending for other needs, sell productive assets, or even delay treatment—thereby worsening their health and well-being.

Various research findings from Aljuaid et al., (2022) & Fan, Li, & Song, (2024) indicate that expanding health insurance coverage contributes to reducing people's economic vulnerability. Households protected by health insurance schemes tend to face a lower risk of incurring catastrophic health expenditures. Such protection enables people to access necessary health services without having to bear the full cost of treatment on their own. Other commonly observed impacts include increased utilization of health facilities, improved public health, and a reduced risk of falling into poverty due to high healthcare costs.

Nevertheless, the relationship between health indicators and poverty has not yet yielded entirely consistent results. Some studies have found that life expectancy has a significant impact on poverty reduction, while others show a relatively small effect after controlling for other socioeconomic variables, (Lawanson & Umar, 2021). Similar results have been observed regarding health insurance enrollment rates. In some regions, the expansion of health insurance coverage correlates with a decline in poverty rates, but in other regions, this effect is not yet clearly evident. These differences indicate that the effectiveness of health development is not solely determined by the availability of services but is also influenced by regional economic

conditions, population characteristics, the quality of health services, and the level of service utilization by the community.

Another limitation still found in previous studies is the partial use of health indicators. Some studies use life expectancy as the sole proxy for population health, while others focus solely on health insurance coverage, (Aljuaid et al., 2022). Such approaches may not be able to fully capture the overall health status of the population. Therefore, this study integrates both indicators to represent the dimensions of health, with the aim of providing a more comprehensive picture of the relationship between health development and poverty levels at the district and city levels in East Java Province.

d. The Impact of Infrastructure Development on Poverty

Infrastructure is a key component of regional development because it serves as a means of supporting the social and economic activities of the community, (Vasin, 2024). The availability of adequate infrastructure not only facilitates the mobility of people and the distribution of goods, but also creates an environment conducive to economic growth. In the context of regional development, the quality of infrastructure is often viewed as a prerequisite for enhancing a region's competitiveness, expanding access to public services, and reducing development disparities between regions. Therefore, infrastructure development has become one of the key tools the government relies on to improve public welfare and reduce poverty levels, (Az Zakiyyah, 2023).

Among various types of infrastructure, road networks play a highly strategic role because they determine a region's level of accessibility. Good road infrastructure connects production areas with commercial centers, facilitates the flow of goods and services, and eases labor mobility. These conditions contribute to lower transportation costs, increased efficiency in economic activities, and the creation of new business opportunities for the community. Conversely, regions with poor road quality tend to face higher logistics costs, limited market access, and low economic competitiveness, which can potentially perpetuate higher poverty rates.

In addition to driving economic activity, infrastructure development also plays a role in improving public access to basic services. Better road infrastructure makes it easier for residents to reach educational and health care facilities, especially for those living in remote areas. Easier access enables people to obtain a better education, make more optimal use of health care services, and improve their quality of life in the long term. Thus, the impact of infrastructure development on poverty occurs not only through increased economic activity but also through improved access to various public services that support human development.

Various previous studies have shown that infrastructure development has a positive correlation with a reduction in poverty rates. Regions with better-quality road infrastructure generally exhibit higher economic growth, broader employment opportunities, and improved levels of community well-being, (Nur Amalia & Sitti Jamiah HA, 2024). Improvements in transportation networks have also been shown to enhance interregional market integration, thereby providing communities with greater access to economic opportunities and sources of income. However, some studies have also found that the impact of infrastructure on poverty is not always direct. In certain regions, infrastructure development has not been able to

significantly reduce poverty unless accompanied by improvements in human capital, expanded employment opportunities, and productive economic activities, (Chotia & Rao, 2017). These findings indicate that infrastructure serves as a supporting factor that strengthens the effectiveness of development, but its benefits for poverty reduction are heavily influenced by the community's ability to take advantage of the access and economic opportunities created. Therefore, the relationship between infrastructure development and poverty must be analyzed alongside other development factors to gain a more comprehensive understanding of the determinants of community well-being at the regional level.

e. The Impact of Regional Economic Growth on Poverty

One of the key indicators used to assess a region's ability to increase production and create added value over a specific period is regional economic growth. At the regional level, economic growth is typically measured by the increase in Gross Regional Domestic Product (GRDP). GRDP per capita is used to illustrate the average economic capacity of a region's population. The RDP per capita is a key indicator of a region's economic potential, as it directly correlates with its capacity to generate income, create jobs, and provide essential public services that enhance community well-being. Therefore, RDP per capita is frequently utilized as a measure of a region's prosperity.

In the field of development theory, it is generally accepted that economic growth is a key factor in poverty reduction, ("Fostering Economic Growth to Reduce Poverty," 2025). This growth is expected to lead to increased employment opportunities, rising incomes, and the expansion of local economic activity. As the economy grows, demand for labor tends to increase, creating greater opportunities for individuals to find employment and improve their economic conditions, (Jayakumar, 2023). This perspective is further substantiated by prior research, which indicates that regions demonstrating higher economic growth tend to experience a more rapid decrease in poverty rates compared to those with lower economic growth. These findings suggest that enhancing regional economic capacity could be a valuable strategy for promoting improvements in community well-being, (Pramu & Hutajulu, 2023).

However, developments in the literature over the past few years suggest that the relationship between economic growth and poverty is not always linear. The concept of inclusive growth emphasizes that the success of development is not measured solely by high rates of economic growth, but also by the extent to which the benefits of that growth are felt by all segments of society, (Hakobyan & Gevorgyan, 2025). Economic growth that is concentrated only in certain groups or regions has the potential to widen income disparities, thereby limiting its impact on poverty reduction. A number of studies show that some regions are able to achieve high economic growth but still face relatively high poverty rates. This situation indicates that an increase in per capita GRDP does not necessarily lead to a more equitable distribution of income or improved well-being for low-income groups, (Hakobyan & Gevorgyan, 2025). Conversely, there are also regions with more moderate economic growth that have been able to reduce poverty more effectively because the benefits of development are distributed more inclusively through increased employment opportunities, expanded access to education and healthcare, and more targeted social protection policies, (Cuesta, Negre, Revenga, & Silva-Jauregui, 2020). These findings show that the impact of economic growth on poverty is heavily

influenced by the quality of that growth. Thus, an analysis of the relationship between per capita GRDP and poverty must consider not only the magnitude of economic growth but also how the benefits of that growth are distributed among different social groups and regions.

3. METHODS

This study employs a quantitative approach with an explanatory design, as it aims to analyze the impact of various development indicators (health, education, infrastructure, and economic development) on poverty levels in East Java. The independent variables in this study include average years of schooling, life expectancy, the percentage of the population with health insurance, and the condition of roads. The dependent variables analyzed are the poverty rate/percentage and per capita GRDP. The data used are secondary cross-sectional data from 2025 sourced from the Central Statistics Agency (BPS) and the East Java Provincial Department of Public Works and Highways. Data collection was conducted through documentation.

The study population comprises all 38 regencies and cities in East Java, using a saturation sampling technique. This sampling technique was chosen due to the limited size of the regional population and the availability of complete data across all regencies and cities. Data analysis was performed using multiple linear regression to test the effect of each independent variable on poverty levels in the regencies and cities of East Java. Before interpreting the model, diagnostic tests were first conducted, including a multicollinearity test using the Variance Inflation Factor (VIF), a normality test of the residuals using the Shapiro–Wilk and Jarque–Bera tests, and a heteroscedasticity test using the Breusch–Pagan and White tests. The test results indicate that the model does not suffer from multicollinearity and that the residuals are normally distributed; however, there are indications of heteroscedasticity. Therefore, parameter estimation was performed using robust standard errors (Huber–White heteroskedasticity-consistent standard errors) to ensure that the standard errors, test statistics, and coefficient significance levels are more reliable. The entire analysis was conducted at a 5% significance level to test the effects of the study variables on poverty levels.

4. RESULTS AND DISCUSSION

a. Results

The analysis began by evaluating the suitability of the regression model before interpreting the relationships among the study variables. This stage aimed to ensure that the model built had sufficient capacity to explain variations in poverty levels across 38 regencies and cities in East Java Province. The estimation results show that the model has a coefficient of determination (R^2) of 0.727, meaning that approximately 72.7% of the variation in poverty levels can be explained by the combination of variables: education, health, infrastructure, economic performance, and labor market conditions used in this study. Meanwhile, the Adjusted R^2 value of 0.674 indicates that, even after accounting for the number of independent variables in the model, the model's explanatory power remains at a relatively high level. In other words, most

of the variation in poverty across regions can be explained by the analyzed variables, while the remainder is influenced by other factors outside the scope of this study.

The model's reliability is also demonstrated by the results of the simultaneous test using the robust F-test with the Huber-White Heteroskedasticity Consistent Standard Errors (HC1) approach. An F-statistic value of 18.57 with a probability of 4.97×10^{-9} indicates that the model as a whole is significant at the 95 percent confidence level. These results indicate that the independent variables included in the model collectively have a significant relationship with poverty levels. Thus, the regression model is suitable for use as a basis for testing research hypotheses and explaining variations in poverty levels across regencies and cities in East Java Province.

Table 1. Goodness-of-Fit Statistics.

Statistic	Value
Number of observations	38
R-squared	0.727
Adjusted R-squared	0.674
Robust F-statistic	18.570
Prob > F	4.97×10^{-9}
Estimation Method	OLS with HC1 Robust Standard Errors

Before interpreting the regression coefficients, a series of diagnostic tests was conducted to ensure that the model met the requirements for multiple linear regression analysis. The first test examined the possibility of multicollinearity among the independent variables using the Variance Inflation Factor (VIF). All variables showed VIF values below the critical threshold of 10. The highest value was obtained for the average years of schooling variable at 5.27, while the other variables ranged from 1.78 to 3.43. These findings indicate that the relationships among the independent variables remain at an acceptable level, so there is no indication of multicollinearity that could disrupt the stability of the regression coefficient estimates. Thus, each variable is still capable of providing relatively independent information in explaining variations in poverty levels.

Table 2. Multicollinearity Test Results (Variance Inflation Factor/VIF)

Variabel Independen	Tolerance	VIF	Keterangan
Road Condition Index	0,485	2,06	There is no multicollinearity
GRDP per Capita	0,457	2,19	There is no multicollinearity
Open Unemployment Rate	0,562	1,78	There is no multicollinearity
Mean Years of Schooling	0,190	5,27	There is no multicollinearity
Life Expectancy	0,292	3,43	There is no multicollinearity
Health Insurance Coverage	0,406	2,46	There is no multicollinearity

The next test was designed to evaluate the residual characteristics of the model. The results of the normality tests using the Shapiro–Wilk and Jarque–Bera methods yielded p-values of 0.998 and 0.992, respectively. Both values are far greater than the 5 percent significance level, so the residuals can be considered normally distributed. This indicates that the deviation of the residuals from a normal distribution is relatively small, thus fulfilling the normality assumption in the regression model.

On the other hand, the heteroscedasticity tests yielded different findings. The Breusch–Pagan test produced a probability value of 0.024, while the White test showed a probability of 0.006 for the F-statistic. These results indicate the presence of unequal residual variances across some observations. Although heteroscedasticity does not affect the magnitude of the regression coefficients, this condition can cause the standard errors produced by the Ordinary Least Squares (OLS) method to be less accurate. Therefore, all parameter estimates in this study are interpreted using Huber–White Robust Standard Errors (HC1) so that the statistical tests are more reliable and robust to violations of the assumption of homogeneity of variances.

Table 3. Diagnostic Tests of Regression Model Assumptions

Assumption	Test	Test Statistic	p-value	Decision
Residual Normality	Shapiro–Wilk	W = 0.998	0.998	Residuals are normally distributed
	Jarque–Bera	JB = 0.016	0.992	Residuals are normally distributed
Heteroskedasticity	Breusch–Pagan (LM)	LM = 14.016	0.034	Evidence of heteroskedasticity
	Breusch–Pagan (F)	F = 3.108	0.024	Evidence of heteroskedasticity
	White (LM)	LM = 24.981	0.131	No evidence of heteroskedasticity
	White (F)	F = 2.945	0.006	Evidence of heteroskedasticity

After the model was deemed valid and corrected using the robust standard errors approach, the analysis continued by testing the effect of each independent variable on the poverty rate. The HC1 approach was used to ensure that the standard errors, test statistics, and probabilities remained consistent despite indications of heteroscedasticity in the data. Consequently, the interpretation of the significance of the regression coefficients is more reliable than if only conventional OLS estimates had been used.

In general, the direction of the relationships obtained from the regression results is consistent with the study’s conceptual framework. The education variable, represented by average years of schooling, shows a negative relationship with the poverty rate. The infrastructure variable, represented by road condition, and the economic performance variable, measured using GRDP per capita, also exhibit negative coefficients, although their levels of significance require further evaluation. Conversely, the open unemployment rate, life expectancy, and health insurance coverage showed positive coefficients of varying magnitudes. However, not all of these coefficients were found to be statistically significant after correction using robust standard errors.

The estimation results also indicate that only some variables make a significant contribution to explaining inter-regional variations in poverty. These differences in significance levels indicate that the impact of each development indicator on poverty is not uniform. Therefore, each regression coefficient must be interpreted individually to gain a more comprehensive understanding of the role of each variable in explaining the dynamics of poverty in East Java Province.

Table 4. Multiple Linear Regression Results Using Huber–White Robust Standard Errors (HC1)

Variables	Coefficient (β)	Robust Std. Error	t-value	p-value	Decision
Constant	-0.556	71.328	-0.008	0.994	Not Significant
Road Condition Index	-0.035	0.055	-0.646	0.523	Not Significant
GRDP per Capita	-0.960	0.845	-1.136	0.265	Not Significant
Open Unemployment Rate	0.059	0.595	0.099	0.922	Not Significant
Mean Years of Schooling	-2.273	0.407	-5.587	<0.001	Significant
Life Expectancy	0.470	0.980	0.479	0.635	Not Significant
Health Insurance Coverage	0.091	0.040	2.305	0.028	Significant

Based on the regression estimates using Huber–White Robust Standard Errors (HC1), only two independent variables exhibit a statistically significant association with the poverty rate at the 5% significance level. Mean Years of Schooling has a negative and significant coefficient ($\beta = -2.273$; $p < 0.001$), indicating that districts and cities with higher average educational attainment tend to experience lower poverty rates. In contrast, Health Insurance Coverage shows a positive and statistically significant coefficient ($\beta = 0.091$; $p = 0.028$). Meanwhile, Road Condition Index, GRDP per Capita, Open Unemployment Rate, and Life Expectancy do not demonstrate statistically significant effects on poverty, as all corresponding p-values exceed the 0.05 threshold. These findings suggest that, within the estimated model, educational attainment emerges as the most influential factor associated with poverty variation across districts and municipalities in East Java, whereas the remaining development indicators do not provide sufficient statistical evidence of a direct relationship with poverty during the study period.

b. Discussion

The results of the regression analysis show that not all development indicators have a significant impact on poverty levels in the regencies and cities of East Java Province. Of the six independent variables analyzed, only average years of schooling and health insurance coverage were found to have a statistically significant effect, while road condition, GRDP per capita, the open unemployment rate, and life expectancy did not show a significant relationship. These findings suggest that poverty reduction does not always occur as a direct consequence of improvements in all development indicators. The socioeconomic characteristics of each region, differences in institutional capacity, and disparities in the distribution of development outcomes appear to remain factors shaping inter-regional variations in poverty.

The lack of a significant effect of road condition indicates that the presence of physical infrastructure does not necessarily lead immediately to a reduction in poverty. Infrastructure is indeed viewed as a crucial prerequisite for regional development because it enhances connectivity, facilitates the distribution of goods and services, and opens access to economic hubs. However, these benefits generally do not materialize instantly. Infrastructure serves merely as a means to enable economic activity to flourish, while its impact on community well-being depends heavily on the population's ability to capitalize on available opportunities. In some regions, roads that are already in good condition have not been accompanied by the

growth of productive activities, investment, or employment opportunities capable of increasing community income. This situation explains why the impact of infrastructure on poverty in this study is not yet directly evident.

Similar results were also found for the per capita GRDP variable. Although the coefficient obtained was negative, its effect was not statistically significant. This finding suggests that regional economic growth does not always go hand in hand with a reduction in poverty. The perspective of inclusive growth holds that economic growth will only improve well-being if its benefits are widely shared across all segments of society. In reality, increases in a region's economic value added are often concentrated in specific business groups or sectors, so their impact on low-income communities remains relatively limited. In other words, high economic growth does not necessarily reflect equitable welfare if the distribution of development outcomes remains unbalanced.

The open unemployment rate variable also does not show a significant influence on the poverty rate. These results suggest that the relationship between unemployment and poverty is not always linear. In many regions of Indonesia, some people still have jobs even though they are in the informal sector with low productivity and income. Statistically, they are not categorized as unemployed, but their economic conditions remain around or even below the poverty line. Conversely, there are also individuals who are classified as temporarily unemployed because they are seeking jobs requiring a higher level of education, yet they still receive financial support from their households. This situation means that the open unemployment rate does not fully capture the economic vulnerability of communities at the regional level.

Life expectancy has also not shown a significant impact on poverty. Theoretically, improvements in health should boost the population's productivity, thereby increasing income and well-being. However, life expectancy is an indicator that reflects the aggregate health status of the population over the long term. Changes in this indicator tend to occur slowly, so variations across regions are relatively small. Under such conditions, its impact on poverty levels is difficult to identify through cross-sectional analysis. Furthermore, rising life expectancy is not always accompanied by improvements in job quality or better income opportunities. Thus, health is a crucial prerequisite for human development, but its contribution to poverty reduction often operates through longer-term and indirect mechanisms.

In contrast to other variables, average years of schooling emerges as the most consistent factor influencing poverty rates. The negative coefficient indicates that the higher the average years of schooling in a region, the lower its poverty rate. This result aligns with the concept of Human Capital Theory, which views education as an investment that enhances the quality of human capital. Education not only expands knowledge but also builds skills, fosters the ability to adapt to changes in the labor market, and creates opportunities for employment with higher productivity and income. From a human development perspective, improved education also enhances individuals' capacity to make economic decisions, access information, and utilize

various public services. Therefore, regions with better educational outcomes tend to have a greater ability to escape the poverty trap.

Findings regarding the impact of education further reinforce the view that the quality of the population is the primary capital of development. The population is no longer viewed merely as the object of development but as an actor that determines the success of regional development. As investment in education increases, the community's ability to generate economic productivity also grows. The impact is evident not only in increased individual income but also in households' ability to maintain long-term well-being. These conditions explain why education emerged as the most dominant variable compared to other development indicators in this study.

Concurrently, health insurance coverage has been demonstrated to exert a positive and significant effect on poverty levels. Upon initial observation, the result appears to be at odds with the conceptual framework that posits health protection as a means of reducing household economic vulnerability. However, this relationship is better understood as a consequence of the targeting mechanisms of social protection programs. In regions characterized by elevated poverty rates, there is often a wider availability of health insurance coverage, primarily due to a significant proportion of the population receiving government-funded premium subsidies. Consequently, the expansion of health insurance coverage does not constitute the primary factor contributing to rising poverty; rather, it is indicative of a government intervention strategy that is disproportionately allocated to regions characterized by relatively high poverty rates. These findings imply that social protection indicators must be interpreted with caution, as the statistical relationships observed do not always indicate a direct cause-and-effect relationship.

5. CONCLUSION AND LIMITATION

The results of statistical analysis show that not all indicators of human development and regional development have a significant influence on the poverty rate in East Java Province. Of the six independent variables analyzed, only average length of schooling and health insurance ownership were shown to have a significant effect. Average length of schooling has a negative relationship with poverty rates, which suggests that increased educational attainment is related to lower poverty rates. In contrast, health insurance ownership shows a positive relationship, which is more reflective of the magnitude of the coverage of social protection programs in areas with relatively high poverty rates. Meanwhile, the level of road stability, GDP per capita, open unemployment rate, and life expectancy have not shown a significant influence on the variation in poverty rates between districts/cities in East Java Province. Therefore, poverty alleviation policies must focus more on improving the quality and level of education among the population. The government must ensure that the benefits of economic development and various social protection programs reach their intended recipients.

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