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Determinants of Income Inequality, Average Years of Schooling, Economic Growth, Domestic Investment on Poverty Rates in the Special Region of Yogyakarta Province

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A B S T R A C T

This study analyzes the impact of income inequality, average length of schooling, economic growth, and domestic investment (PMDN) on poverty levels in the Special Region of Yogyakarta (DIY) from 2009 to 2023. Despite positive economic growth, DIY has the highest poverty rate in Java. Secondary time series data from five districts/cities in DIY were used, sourced from the Central Statistics Agency and the Regional Development Planning, Research, and Innovation Agency. Using multiple linear regression and classical assumption tests, the results show that income inequality, economic growth, and PMDN do not significantly affect poverty levels, while average length of schooling significantly reduces poverty. These findings highlight the importance of education and income equality in addressing multidimensional poverty.

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INTRODUCTION

Improving public welfare is the main goal of national development as mandated in the Preamble to the 1945 Constitution. This welfare is achieved when the basic needs of the community—both material, spiritual, and social—can be met, allowing them to live decently and actively participate in social and economic activities. One important indicator in measuring the level of welfare is the poverty level level; the lower the poverty level level, the higher the overall welfare of the community.

However, in developing countries like Indonesia, poverty level remains a complex and ongoing structural challenge. Poverty level is not only related to lack of income, but is also a multidimensional phenomenon that includes aspects of education, health, access to basic services, and economic opportunities. Therefore, poverty level alleviation efforts require a comprehensive and coordinated approach across sectors so that the interventions carried out truly target the most vulnerable groups in society (World Bank, 2019).

Poverty level in Indonesia is also greatly influenced by the quality of human resources, especially in terms of education and health. Individuals who have access to adequate education and health services tend to have higher productivity and economic competitiveness. The relationship between the two shows that improving the quality of human capital is an important strategy in overcoming poverty level (Purwanto et al., 2020); (Effendy, 2017).

At the regional level, the Special Region of Yogyakarta (DIY) Province is a real example of how poverty level can persist even though the region has recorded relatively stable economic growth. Data shows that the percentage of poor people in DIY is still higher than the other five provinces in Java, which are the centers of national economic activity. This condition reflects that economic growth has not been fully enjoyed equally by all levels of society, especially in rural areas such as Kulon Progo and Gunungkidul. Social, cultural, and macroeconomic structural factors contribute to the high poverty level rate in this region.

One of the main causes of poverty level that continues to emerge is income inequality. The inequality of income distribution between high-income and low-income groups has narrowed opportunities for social mobility. In the Province of DIY, income inequality has a direct impact on poverty level rates, because the wider the gap, the more difficult it is for the poor to escape the cycle of poverty level. This is exacerbated by limited access to education, health services, and economic opportunities that are only enjoyed by a small portion of the upper economic group.

Education itself is an important pillar in poverty level reduction efforts. The increase in the average length of schooling reflects the improvement in access to education in DIY, which is expected to improve the quality of life of the community in the long term. In addition, economic growth is also an important benchmark in measuring the success of development. During the 2009–2023 period, DIY recorded a relatively stable economic growth trend and did not show sharp fluctuations, indicating economic resilience to external shocks. However, if it is not accompanied by equal distribution of development results, this

economic growth will not necessarily contribute significantly to poverty level reduction.

Another factor that is also considered in the context of poverty level alleviation is investment, especially Domestic Investment (PMDN). PMDN has the potential to create jobs, increase income, and encourage local economic activity. However, data shows that the value of PMDN in DIY has experienced significant fluctuations from year to year, without a consistent growth pattern. This indicates that the role of PMDN in reducing poverty level is not optimal, possibly because investment allocation does not directly target sectors that are closely related to the lives of poor people.

Based on the description, it can be concluded that poverty level in the Special Region of Yogyakarta Province is influenced by various interacting factors, such as income inequality, education level, economic growth, and fluctuations in domestic investment. Therefore, this study aims to analyze the influence of these variables on the poverty level rate in DIY in the period 2009–2023. It is hoped that the results of this study can provide empirical evidence as a basis for formulating more targeted and sustainable poverty level alleviation policies in the region.

LITERATURE REVIEW

Poverty Level

The poverty rate is the percentage of the population whose expenditure is below the poverty line, which is the minimum limit to meet basic needs such as food, clothing, shelter, education, and health. Poverty is a social problem in addition to economic problems. It is a social problem in addition to economic and political problems, which includes limited access to resources and opportunities (Wijayanti, 2019). Poverty itself is a multidimensional phenomenon, it not only includes low income but also the inability of people or organizations to provide for needs including health, education, and decent housing.

Poverty in structural functional theory is described as the impact of an unequal social structure, where resources and wealth are only concentrated in special groups, while the majority of society remains in a limited economic situation. In the framework of development economic theory, poverty levels are also associated with social structures and unequal distribution of wealth, as explained in structural functional theory and the Kuznets hypothesis which describes the inverted U-shaped relationship between economic growth and inequality. The formula for calculating poverty level is:

$$Poverty = \frac{Number\ of\ Poor\ People}{Number\ of\ Population}\ x\ 100\ \%$$

Income Inequality

Income inequality describes the imbalance in income distribution between groups in society and is measured by the Gini Index. High inequality indicates the accumulation of wealth in certain groups, thus increasing the potential for poverty. In human capital theory, differences in mastery of skills and production assets are the main sources of inequality. Previous research shows that inequality has a positive correlation with poverty, especially when the distribution of development outcomes is uneven (Fauzi & Arifin, 2020).

Income inequality describes the imbalance in the distribution of income among the population. One of the most commonly used measures is the Gini Index, which is calculated based on the Lorenz Curve. This curve compares the cumulative percentage of the population with the cumulative percentage of income. The more the Lorenz Curve curve is away from the line of perfect equality, the higher the inequality. The Gini Index formula based on the Lorenz Curve is:

$$A = \sum fi\ [Yi + yi - 1]$$

Description:

- fi = total percentage (%) of income recipients in class i.
- Yi = cumulative total (%) of income in class i.

Average Length of Schooling

Average Length of Schooling provides an overview of the level of community education participation and is often used as one of the main markers in measuring the progress of education in a country or region. Schultz and Becker explained that one of the ways to try to improve the quality of human resources is by regulating the implementation of formal education at the elementary, secondary, and advanced levels (Jhingan, 2010).

In relation to this, increasing the Average Length of Schooling in a region can be an effective strategy in poverty alleviation efforts, because the quality of life and economic welfare of the community can be improved with the important role of education. The formula for calculating the average length of schooling is:

$$ALS = \frac{Total\ number\ of\ years\ of\ study\ completed}{Number\ of\ population\ aged\ 15\ years\ and\ over}$$

Economic Growth

Economic growth indicates an increase in the production capacity of a region in producing goods and services. Theoretically, economic growth can expand employment opportunities and increase people's income. However, if it is not inclusive, growth will only widen the gap. According to Solow (1956), long-term growth is determined by technological progress and capital accumulation. In general, economic growth reflects changes in people's economic welfare and improves the quality of life, especially through job creation, increased income, and infrastructure improvements. However, this growth must be accompanied by equality to avoid social inequality and poverty. Quantitative economic growth can be calculated using the formula:

$$\mathrm{EG} = \frac{EG\ current\ year - EG\ previous\ year}{EG\ previous\ year}$$

Economic growth indicators include GDP and GNP. GDP reflects total domestic production, while GNP includes citizens' income, including that from abroad (Adisasmita, 2009:29).

Domestic Investment

Investment is the allocation of resources such as money, time, or energy to acquire assets or finance a project with the expectation of future profits.

Economically, investment plays a role in driving growth, creating jobs, and increasing long-term production capacity. It can take the form of physical investment such as factory and infrastructure construction, or financial investment such as purchasing stocks, bonds, or other capital market instruments.

Domestic Investment is an investment originating from domestic business actors that can drive productivity, job creation, and local economic growth. Domestic investment is very important in development because it not only increases production capacity but also strengthens the strategy of sectors such as Micro, Small, and Medium Enterprises and infrastructure. Domestic Investment trends are still fluctuating and have not shown a significant contribution to poverty reduction, which indicates the need for a more targeted and equitable investment strategy (Elilian, 2021).

Domestic Investment does not have a standard mathematical formula like the formula in macroeconomics. However, if you want to calculate the total value of Domestic Investment, usually data from the Investment Coordinating Board or the regional Investment Office is used, which presents the investment value based on :

$$Total\ PMDN = \sum (Number\ of\ projects \times Investment\ value\ per\ project)$$

METHODOLOGY

This study uses a quantitative approach with the aim of analyzing the effect of income inequality, average length of schooling, economic growth, and domestic investment on the poverty rate in the Special Region of Yogyakarta (DIY) Province during the period 2009 to 2023. The quantitative approach was chosen because it is able to explain the relationship between variables systematically and measurably through numerical data processing.

The type of data used is secondary data obtained from publications by the Central Statistics Agency (BPS) and the Regional Development Planning, Research, and Innovation Agency (Bapperida) of the Daerah Istimewa Yogyakarta Province, as well as from various relevant literature and previous studies. Data were collected through documentation and library study methods.

The variables in this study consist of one dependent variable, namely the poverty rate (Y), and four independent variables: income inequality (X1), average length of schooling (X2), economic growth (X3), and domestic investment (X4). To test the relationship between these variables, a multiple linear regression model is used with the following formula:

$$Y = a + b1X1 + b2X2 + b3X3 + b4X4 + \ldots. + bnXn + e$$

The formulation was changed in line with the research for this study. The multiple linear regression formula for this study is:

$$P = a + b1II + b2AYS + b3EG + b4DI + e$$

Description:

- P : Poverty level
- a : Constant
- b : Regression Coefficient
- II : Income Inequality

- AYS : Average Years of Schooling
- EG : Economic Growth
- DI : Domestic Investment
- e : Standard Error

Data analysis was performed with the help of IBM SPSS Statistics software. Before conducting the regression analysis, a classical assumption test was first performed to ensure that the model used met the BLUE (Best Linear Unbiased Estimator) requirements. The classical assumption tests used include:

1. Normality Test using Kolmogorov-Smirnov with the basis for decision making is generally taken from the Sig. Kolmogorov-Smirnov value when the Sig. value in the normality test exceeds 0.05.
2. Multicollinearity Test with Commonly used methods are Variance Inflation Factor (VIF) and tolerance, if VIF <10 and tolerance> 0.1, the model is considered not affected by multicollinearity.
3. Heteroscedasticity Test using the Spearman's rank test to detect whether there is a non-constant variant in the residual. There is no heteroscedasticity event when the Sig. Residual value exceeds 0.05.
4. Autocorrelation Test is carried out using the Durbin-Watson Test to test whether there is a correlation between residuals.

Furthermore, hypothesis testing is carried out through:

1. Coefficient of Determination (R^2) Test to determine the extent of the contribution of independent variables to the dependent variable.
2. Simultaneous Test (F Test) to test the effect of all independent variables together on the dependent variable.
3. Partial Test (t-Test) to determine the influence of each independent variable on the dependent variable individually.

RESEARCH RESULT

In this research, the multiple linear regression analysis method was utilized with the assistance of SPSS (Statistical Product and Service Solutions) software to process the data and generate regression coefficients. These coefficients are essential for hypothesis testing and predicting the relationships between variables. This method is employed to examine the effect of the independent variables—on the dependent variable. The analysis results yield the following regression equation:

Table 1. Multiple Linear Regression Coefficient Results

Coefficients[a]		
Model		Unstandardized Coefficients
		B
1	(Constant)	55.993
	Ketimpangan Pendapatan (X1)	-35.963
	Rata Lama Sekolah (X2)	-2.900

	Pertumbuhan Ekonomi (X3)	-.046
	PMDN (X4)	- 1.179E-14

Source: SPSS Output (Appendix)

$$Y = 55.993 - 35.963X1 - 2.900X2 - 0.046X3 - 1.179x10^{-4} + e.$$

This equation shows that if all independent variables are held constant. To ensure the validity of the regression model used, various classical assumption tests were carried out, known as the BLUE (Best Linear Unbiased Estimator) concept, which includes testing for normality, multicollinearity, heteroscedasticity, and autocorrelation.

Table 2. Normality Test Results

One-Sample Kolmogorov-Smirnov Test			
			Unstandardized Residual
N			15
Asymp. Sig. (2-tailed)			.200[d]
Monte Carlo Sig. (2-tailed)	Sig.		.776
	99% Confidence Interval	Lower Bound	.765
		Upper Bound	.787

Source: SPSS Output (Appendix)

Based on the results of the Normality Test using Kolmogorov-Smirnov above, the Sig. (2-tailed) value is 0.776 > 0.05, so it is concluded that there is a normal distribution in the residual value.

Table 3. Multicollinearity Test Results

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Ketimpangan Pendapatan (X1)	.557	1.795
	Rata Lama Sekolah (X2)	.391	2.557
	Pertumbuhan Ekonomi (X3)	.920	1.087
	PMDN (X4)	.477	2.097

Source: SPSS Output (Appendix)

Based on the output table of Coefficients above, it is known that the VIF value of all variables is <10 and the Tolerance value of all variables is >0.1, so it can be concluded that there is no multicollinearity event in the regression model.

Table 4. Results of Heteroscedasticity Test

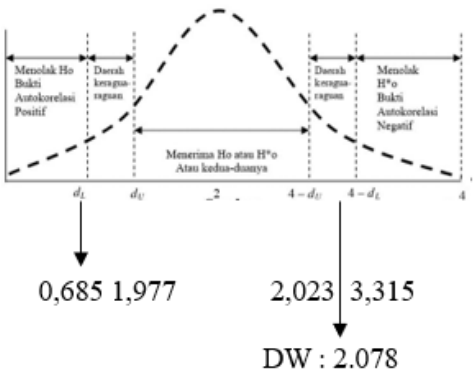
Correlations			
			Unstandardized Residual
Spearman's Rho	Ketimpangan Pendapatan	Sig. (2-tailed)	.241
	Rata Lama Sekolah	Sig. (2-tailed)	.840
	Pertumbuhan Ekonomi	Sig. (2-tailed)	.845
	PMDN	Sig. (2-tailed)	.919
	Unstandardized Residual	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	15

Source: SPSS Output (Appendix)

The significant level of the Spearman Test coefficient, income inequality variables (0.241), average length of schooling (0.840), economic growth (0.845), PMDN (0.919) on the residual is higher than 0.05 in line with the results above. Related to this, it can be noted that there is no heteroscedasticity event.

Table 5. Autocorrelation Test Results

Durbin-Watson
2.078



Runs Test	
Asymp. Sig. (2-tailed)	.986

Source: SPSS Output (Appendix)

Based on the "Model Summary" output, the D-W value of 2.078 is compared to the table value at 5% significance with parameters (k = 4; N = 15), namely dL = 0.685 and dU = 1.977. Because the DW value is between 4–dU (2.023) and 4–dL (3.315), it cannot be concluded with certainty whether or not there is autocorrelation. However, the results of the alternative test using the Runs Test show an Asymp. Sig. (2-tailed) value of 0.986 (> 0.05), so it is concluded that there are no symptoms of autocorrelation.

Table 6. F Test Results

ANOVA[a]			
Model		F	Sig.
1	Regression	15.463	<.001[b]
	Residual		
	Total		

Source: SPSS Output (Appendix)

The "ANOVA" output table above shows that the calculated F of 15.463 > F table 3.36 and Sig. is <.001. This shows that the Income Inequality Variable (X1), Average Length of Schooling (X2), Economic Growth (X3), and Domestic Investment (X4) together have an effect on the Poverty Level variable (Y).

Table 7. Results of the Determination Coefficient Test

Model Summary[b]	
Model	R Square
1	.861

Source: SPSS Output (Appendix)

The results of the output table "Model Summary" above show that the value of the coefficient of determination or R Square is 0.861. The R Square value of 0.861 comes from the squaring of the R value, which is 0.928 x 0.928 = 0.861. The amount of R Square is equal to 86.1%. This figure means that the Dependent Variable influences the Poverty Level variable (Y) by 86.1%. On the other hand, the rest (100% - 86.1% = 13.9%) is influenced by factors that are not studied or variables that are not included in this regression equation.

Table 8. Partial t-Test Results

Coefficients[a]			
Model		t	Sig.
1	(Constant)	6.808	<.001
	Ketimpangan Pendapatan (X1)	-2.007	.073
	Rata Lama Sekolah (X2)	-3.341	.007
	Pertumbuhan Ekonomi (X3)	-.383	.710
	PMDN (X4)	-.510	.621

Source: SPSS Output (Appendix)

DISCUSSION

Analysis of the Influence of Income Inequality (X1) on Poverty Levels (Y) in the Special Region of Yogyakarta Province

The results of the analysis show that during the period 2009–2023, income inequality in DIY had a negative but insignificant effect on the poverty rate. According to economic theory, the more even the distribution of income (the lower the Gini index), the poverty should decrease. Several studies such as Oktaviani et al. (2022), Novela Wenda et al., (2025), and Zulham et al., (2017)state that unequal income distribution tends to increase poverty. However, the findings in this study are not in line with this theory, because inequality has not been shown to have a significant effect on poverty in DIY. This shows that even though there is inequality, it does not directly have a major impact on poverty rates in the region.

Analysis of the Influence of Average Length of Schooling (X2) on Poverty Level (Y) in the Special Region of Yogyakarta Province

The research findings show that the average length of schooling has a significant negative effect on the poverty rate in DIY during 2009–2023. This is in line with the Human Capital theory which states that investment in education can increase productivity and people's standard of living. The higher the level of education, the greater the opportunity for individuals to get decent jobs and avoid poverty. This result is also supported by Faritz's research (Faritz, 2020), which concluded that education plays an important role in reducing poverty rates. Thus, increasing the average length of schooling has proven effective in reducing poverty in DIY.

Analysis of the Influence of Economic Growth (X3) on Poverty Levels (Y) in the Special Region of Yogyakarta Province

The results of the study show that during the period 2009–2023, economic growth in the Special Region of Yogyakarta had a negative but insignificant effect on poverty rates. This means that although in theory economic growth should reduce poverty—as explained in the Trickle-Down Effect theory—its impact in the Special Region of Yogyakarta has not been felt evenly. Growth is enjoyed more by the upper class, while the poor have not received direct benefits. This is thought to be because growth has not touched labor-intensive sectors such as agriculture, which absorbs a lot of poor labor. Thus, this finding shows that economic growth in the Special Region of Yogyakarta is not inclusive enough to significantly reduce poverty rates.

Analysis of the Influence of Domestic Investment (X4) on Poverty Levels (Y) in the Special Region of Yogyakarta Province

The analysis shows that during 2009–2023, domestic investment (PMDN) had a negative but insignificant effect on the poverty rate in DIY. This means that increasing investment does tend to reduce poverty, but the impact is still weak. Theoretically, investment should encourage economic growth and create jobs, which ultimately reduces poverty. However, the effect has not been optimally felt by the wider community. This finding is in line with previous studies such

as Aloisius (2023) and Hanifah & Hanifa (2021), which also found that PMDN only had a small impact on reducing poverty rates.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the results of the analysis of the influence of Income Inequality, Average Length of Schooling, Economic Growth, and Domestic Investment on the poverty rate in the Special Region of Yogyakarta Province during the period 2009 to 2023, it was found that only the education variable had a significant effect. Income inequality was not proven to have a significant impact on poverty, because the inequality of income distribution in that period was not strong enough to influence poverty reduction. On the other hand, the average length of schooling had a negative and significant effect on the poverty rate, reflecting that increased education contributed to better job opportunities and increased income. Meanwhile, economic growth did not show a significant effect due to social inequality and uneven distribution of development outcomes, so that the benefits of growth have not been fully felt by the poor. Likewise, domestic investment (PMDN) also did not have a significant impact on poverty reduction, allegedly due to the dominance of the tourism and service sectors which did not absorb labor from the poor in general.

Recommendation

This study has several limitations, including using only four independent variables, whereas poverty is influenced by many other factors such as unemployment, inflation, access to health services, and social infrastructure that were not analyzed. The time series data range of 2009–2023, although quite long, is still limited to capturing the impact of long-term structural changes or major events such as the COVID-19 pandemic. In addition, the coverage area which only focuses on the Special Region of Yogyakarta limits the generalization of the findings to other regions with different characteristics. The use of the multiple linear regression method also has strict assumptions, so that the possibility of non-linear relationships or dynamic effects between variables is not fully described. Finally, reliance on secondary data from BPS carries the risk of limitations in terms of accuracy, completeness, and the inability to reflect actual conditions in the field in real time.

ADVANCED RESEARCH

Further research is recommended to include additional social variables such as poverty rates, inflation, HDI, and access to health to provide a more comprehensive picture of poverty. A panel data approach across districts/cities or spatial methods can also be used to capture geographic distribution and inequality between regions. In addition, qualitative or mixed methods through direct interviews or surveys will enrich the understanding of socio-cultural factors that influence poverty. Evaluation of the impact of specific policies such as poverty alleviation programs or educational scholarships is also important to explain. Finally, research can focus on crisis or post-crisis periods, such as the COVID-19 pandemic, to examine its impact on vulnerable groups.

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