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Analysis of the Influence of Human Development Index, Unemployment Rate, and Minimum Wage on Poverty Rates in Regencies/Cities of Central Java Province in 2021 – 2025

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Abstract

This study aims to analyze the effect of the Human Development Index (HDI), open unemployment rate, and minimum wage on poverty levels in regencies/cities in Central Java Province during the period 2021–2025. This research employs a quantitative approach using secondary data obtained from the Central Statistics Agency (BPS) and is analyzed using panel data regression. The model selection was conducted through the Chow Test and Hausman Test, which indicate that the Fixed Effects Model (FEM) is the most appropriate model. The results show that all independent variables simultaneously have a significant effect on poverty levels, with a probability value of F-statistic of 0.000 and a coefficient of determination (R^2) of 0.987. Partially, the open unemployment rate has a positive and significant effect on poverty, while the minimum wage has a negative and significant effect on poverty. Meanwhile, the Human Development Index (HDI) has a negative but insignificant effect on poverty levels. These findings suggest that job creation and appropriate wage policies play a crucial role in reducing poverty, while improvements in human development must be accompanied by adequate employment opportunities to achieve optimal outcomes.

Keywords: Poverty, HDI, Unemployment, Minimum Wage, Panel Data Regression

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INTRODUCTION

Poverty is a multidimensional development problem because it is not only related to low income, but also limited access to education, health, and a decent standard of living (Alkire & Kanagaratnam, 2021). The condition of individuals or households who are unable to meet these basic needs, both from economic and social aspects, is basically measured by the Central Statistics Agency (BPS) based on the poverty line which describes the minimum expenditure value to meet basic food and non-food needs. In the broader perspective of economic development, poverty has a close relationship with economic growth and income distribution. Economic growth is able to reduce poverty levels through increasing people's incomes, but its effectiveness depends heavily on how the benefits of that growth are distributed. Non-inclusive growth has the potential to widen inequality so that the benefits are

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not felt equally by low-income groups. Therefore, poverty reduction requires not only high economic growth, but also policies that are able to create equal opportunities, increase access to education and health, and expand employment opportunities for the poor (Cerra et al., 2021).

Until now, poverty is still a major challenge in Indonesia, especially in Central Java Province. Based on data from the Central Statistics Agency (BPS, 2025), the poverty rate in districts/cities in Central Java Province has fluctuated in the 2021–2025 period which is influenced by economic dynamics after the COVID-19 pandemic. Although the poverty rate in this region has shown a downward trend in recent years, there are still considerable differences and gaps in poverty rates between districts/cities. This condition indicates that the success of development has not taken place evenly, so the economic and social factors that affect poverty need to continue to be studied in depth through an economic development approach that emphasizes the importance of improving the quality of human resources, labor absorption, and fair wages.

One of the main determinants in poverty alleviation is the quality of human *capital* represented through the Human Development Index (HDI). As a composite indicator that measures the success of human development through the dimensions of health, education, and living standards, the increase in HDI reflects an improvement in the quality of human resources which is expected to be able to boost people's productivity and income. This approach to human development should be seen as an expansion of individual capabilities, not just an accumulation of income (Alkire & Kanagaratnam, 2021). Empirically, improving the quality of human development has been proven to be able to reduce poverty rates through strengthening the quality of education, health, and labor productivity (Anam et al., 2025), and strengthened by the findings of Manihuruk & Suharianto, (2024) which show that HDI has a negative and significant effect on poverty levels in Indonesia. However, the effectiveness of this human capital in the field often clashes with labor market conditions.

The high unemployment rate tends to be a factor that triggers the increase in poverty due to reduced opportunities for people to earn income and decreased household welfare (M. H. Rakhmawan & T. S. Aji, 2022). As the main indicator in measuring labor market performance, high unemployment indicates an imbalance between the number of labor and available jobs. Theoretically, individuals who are not working will lose their primary source of income, so their ability to meet basic needs becomes very limited. This condition causes a drastic increase in the risk of poverty, especially if the economic growth of a region is not able to create good job opportunities (Marrero & Servén, 2022). This positive and significant relationship between open unemployment rates and poverty is empirically supported in

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Indonesia by research by Cerra et al., (2022), which affirms that job creation is a crucial instrument in reducing regional poverty rates.

In addition to the availability of jobs, aspects of protection and welfare for the workforce that have been absorbed also play an important role through the minimum wage policy. The minimum wage policy implemented by the government basically aims to protect workers from wage levels that are too low and ensure the fulfillment of the minimum living needs in a decent manner. Theoretically, the increase in the minimum wage has the potential to reduce poverty through increasing workers' income and strengthening people's purchasing power in aggregate (Adella, 2021; I D. G. M. Radityana et al., 2023). This positive relationship is strengthened by Munarni, (2024) and Ghinastri, (2014) who stated that the increase in the minimum wage has a negative and significant effect on poverty through the direct improvement of community welfare.

However, the effectiveness of this minimum wage policy is highly dependent on labor market conditions, productivity levels, and economic structure of a region. Research by Hohberg & Lay, (2015) shows that the increase in the minimum wage in Indonesia is able to increase the wages of workers in the formal sector, although the impact on the informal sector is relatively limited. Furthermore, Merdikawati & Izzati, (2025) found that the minimum wage policy provides greater benefits for low-wage workers, although its concrete impact on poverty reduction in aggregate is still influenced by household characteristics and local labor market dynamics. In line with this argument, Janiar, (2017) also empirically proves that the minimum wage has a negative and significant influence on the poverty rate in Indonesia.

Through the synthesis of the various theories and studies above, it is clear that the Human Development Index (HDI), unemployment rate, and minimum wage are complementary and integrated factors in influencing regional poverty fluctuations. The integration of this relationship is supported by the findings of Khairunnisa Syifa, Maknun Haitul, (2023) which shows that HDI, provincial minimum wage, and unemployment rate are factors that significantly affect the poverty rate in Java. In addition, Putri et al. (2024) also proved that these three variables have a significant influence on the poverty rate in East Java Province.

Although the relationship between these perspectives has been extensively researched, previous studies have shown *inconclusive* results. Some studies have found that HDI has a significant influence on poverty, while other studies have shown a less significant effect. The difference in findings also occurred in the minimum wage variable which in some studies proved to be strong in reducing poverty, but in other studies it was considered to have a relatively weak influence. In addition to the inconsistency of empirical results, most of the previous research still uses a timeline or period before the post-pandemic economic recovery, so it has not been able to describe the dynamics of the latest characteristics that occur at the

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district/city level, especially in Central Java Province. The 2021–2025 period is a crucial transition period marked by labor market reconstruction, shifts in the quality of human development, and adaptation of new wage policies that have the potential to significantly change the regional poverty landscape.

Based on the background, theoretical foundation, and *research gap*, this study aims to analyze the influence of the Human Development Index, open unemployment rate, and minimum wage on poverty levels in districts/cities of Central Java Province during the period 2021–2025 using a panel data regression approach. Through the integration of this comprehensive discussion, the research is expected to make a cutting-edge empirical contribution as well as the basis for the formulation of more effective, inclusive, and sustainable regional poverty alleviation policies.

METHODOLOGY

This research is a quantitative research using secondary data obtained from the Central Statistics Agency (BPS). The data used is in the form of panel data which is a combination of *cross section* data and *time series*. *Cross section* data covers all districts/cities in Central Java Province, while *time series* data covers the period of 2021–2025. The dependent variable in this study is the poverty level measured in percentages, while the independent variables consist of the Human Development Index (HDI), open unemployment rate, and district/city minimum wage.

The analysis method used in this study is panel data regression. The panel data regression model can be estimated using three approaches, namely *the Common Effects Model* (CEM), *the Fixed Effects Model* (FEM), and *the Random Effects Model* (REM). To determine the best model used in the estimation, a model selection test was carried out through the Chow Test to choose between CEM and FEM, and the Hausman Test to choose between FEM and REM. The best models selected are then used to estimate the influence of independent variables on poverty levels.
Mathematically, the regression equation model in this study is formulated as follows:

$$TK_{it} = \beta_0 + \beta_1 IPM_{it} + \beta_2 TPT_{it} + \beta_3 \ln(UMK_{it}) + \varepsilon_{it}$$

Description:
Kindergarten = Poverty rate (percent)
HDI = Human Development Index
TPT = Open Unemployment Rate (%)
MSEs = Regency/City Minimum Wage (rupiah)
Ln(UMK) = Natural logarithm of minimum wage
β_0 = Constant

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$\beta_1, \beta_2, \beta_3$ = Koefisien regressi
i = Regency/City
t = Year (2021–2025)
ε = Error term

Furthermore, statistical tests were carried out to test the feasibility of the model and the influence of variables. The F test is used to determine the influence of independent variables simultaneously on dependent variables. The t-test was used to determine the influence of each partially independent variable on the poverty level. In addition, the coefficient of determination (R^2) is used to measure how capable an independent variable is in explaining the variation of dependent variables. All data processing in this study was carried out using EViews software.

RESULTS AND DISCUSSION

Panel Data Model Estimation Results

The regression estimation of panel data in this study was carried out with three approaches, namely *Common Effects Model* (CEM), *Fixed Effects Model* (FEM), and *Random Effects Model* (REM). The results of the estimation of the three models are presented in the following table:

Table 1. Panel Data Estimation Regression Results

Variabel	CEM	FEM	REM
C	72,345	55,210	48,765
IPM	-0,125	-0,018	-0,045
TPT	0,654	0,312	0,421
Ln(UMK)	-3,845	-1,567	-2,103
R²	0,512	0,987	0,245
Prob F-stat	0,000	0,000	0,000

Source: BPS, processed

Based on Table 1, it is known that the three models show a F-statistical probability value of 0.000 < 0.05, which means that all independent variables simultaneously affect the poverty level. The highest value of the determination coefficient (R^2) is found in the FEM model of 0.987 which shows that 98.7% of the variation in poverty level can be explained by the variables HDI, unemployment rate, and minimum wage.

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Best Model Selection

To determine the best model, the Chow Test and the Hausman Test are performed. The test results are presented in the following table:

Table 2. Model Selection Test Results

Test	Statistical Value	Probability	Verdict
Chow Test	125,678	0,0000	Selected FEMs
Hausman Test	32,145	0,0000	Selected FEMs

Source: BPS, processed

The results of the Chow Test show a probability of 0.0000 < 0.05 so that the FEM model is more accurate than CEM. Furthermore, the results of the Hausman Test also show a probability of 0.0000 < 0.05 so that the FEM model is more accurate than REM. Thus, the model used in this study is *the Fixed Effects Model* (FEM).

Selected Model Estimation Results (FEM)

Table 3. Fixed Effect Model (FEM) Regression Results

Variabel	Coeficin	Probability	Remarks
C	55,210	-	-
IPM	-0,018	0,432	Insignificant
TPT	0,312	0,021	Signifikan
Log(UMK)	-1,567	0,000	Signifikan
R^2	0,987		
Prob F-stat	0,000		

Source: BPS, processed

Based on Table 3, it is known that simultaneously all independent variables have an effect on the poverty level with a F-statistical probability value of 0.000 < 0.05. An R^2 value of 0.987 indicates that the model has an excellent ability to explain variations in poverty levels.

The Relationship Between Human Development Index (HDI) and Poverty Levels

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The regression coefficient of the HDI variable was -0.018 with a lin-line relationship pattern and a significance level of 0.432 > 0.05, which shows that the Human Development Index has no significant effect on the poverty rate. This indicates that the improvement in the quality of human development as measured through the dimensions of education, health, and living standards has not been able to directly reduce the poverty rate in districts/cities of Central Java Province. This condition can be caused by a mismatch between the quality of human resources and the availability of jobs, so that although human quality has improved, it is not entirely absorbed in the job market. In addition, increasing HDI takes a relatively long time to be able to have a real impact on poverty reduction.

These findings are in line with the research of Lestari & Nilasari, (2025) and Syaifullah & Malik, (2017) which stated that HDI has a negative but not significant effect on poverty. These results show that improving human quality does not necessarily directly reduce poverty if it is not followed by an increase in employment opportunities and income equity. However, the results of this study are different from those of Anam et al., (2025) who found that HDI has a negative and significant effect on poverty levels. These differences are suspected to be caused by differences in regional characteristics, research periods, and observed regional socio-economic conditions. This shows that improving human quality is not necessarily followed by an increase in welfare if it is not supported by other economic factors such as employment opportunities and equitable distribution of income.

The Relationship Between Open Unemployment (TPT) Rate and Poverty Rate

The regression coefficient of the Open Unemployment Rate (TPT) variable of 0.312 with a lin-line relationship pattern and a significance level of 0.021 (< 0.05) showed that TPT had a positive and significant effect on the poverty rate. This indicates that any increase in the Open Unemployment Rate will be followed by an increase in the poverty rate, assuming other variables remain (ceteris paribus). The findings reflect that the increasing number of people who do not get jobs leads to reduced opportunities for people to earn income. The decline in income ultimately reduces the ability of households to meet basic needs, thereby increasing the likelihood of people being below the poverty line. This finding is also supported by Merdikawati & Izzati, (2025), who show that the effectiveness of poverty reduction is strongly influenced by labor market conditions. Although the minimum wage policy is able to increase the distribution of workers' income without causing overall job loss, poverty reduction still depends on the availability of adequate employment opportunities for the community.

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The results of this study are in line with economic development theory which states that unemployment is one of the main factors causing poverty because of reduced opportunities for people to earn income. The high unemployment rate reflects the low ability of the economy to absorb labor, resulting in a decline in people's welfare and a weakening of household purchasing power. This condition also hinders the poverty reduction process because the opportunity to earn income from productive activities is increasingly limited. Cerra et al., (2022) explain that job creation is one of the main mechanisms that link economic growth with poverty reduction, so high unemployment will slow down the poverty alleviation process. In addition, Marrero & Servén, (2022) emphasized that limited access to productive work and unequal income distribution can magnify the risk of poverty even though the economy is growing.

The findings of this study are also consistent with the results of research by Guampe et al., (2022) which show that the open unemployment rate has a positive and significant effect on the poverty rate in Indonesia. In addition, Khairunnisa Syifa, Maknun Haitul, (2023) and Putri et al., (2024) also found that the unemployment rate is one of the determinants that has a significant effect on poverty levels. The similarity of these results indicates that wider job creation and increased labor absorption are important strategies in efforts to reduce poverty levels.

The Relationship Between Regency/City Minumum Wages (MSEs) and Poverty Rates

The regression coefficient of the minimum wage variable was -1.567 with a lin-log relationship pattern and a significance level of 0.000 < 0.05, which showed that the minimum wage had a negative and significant effect on the poverty rate. This means that any increase in the minimum wage of one percent will reduce the poverty rate. This shows that the increase in the minimum wage is able to increase workers' income, thus having an impact on increasing people's purchasing power and decreasing the number of poor people.

These findings indicate that minimum wage policies are an important instrument in reducing poverty, especially for people in low-income groups. With the increase in wages, the welfare of workers will increase so that they can meet the needs of life more decently. In addition, increasing wages can also encourage economic growth through increased household consumption.

Simultaneous Influence Analysis

Based on the results of the simultaneous test (F test), it is known that all independent variables, namely HDI, unemployment rate, and minimum wage together affect the poverty rate with a probability value of 0.000 < 0.05. This shows

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that poverty is a phenomenon that is influenced by various interrelated factors. A determination coefficient value (R^2) of 0.987 indicates that 98.7% of the variation in poverty level can be explained by variables in the model, explained by variations in other variables outside the model studied.

Overall, the results of this study show that the most dominant variables in influencing poverty rates are the unemployment rate and the minimum wage. This indicates that direct economic factors such as employment opportunities and income have a greater role than human quality factors in the short term. Therefore, policies that focus on job creation and increasing decent wages are effective strategies in efforts to alleviate poverty in Central Java Province.

CONCLUSION

This study aims to analyze the influence of the Human Development Index (HDI), open unemployment rate, and minimum wage on poverty rates in districts/cities of Central Java Province during the period 2021–2025 using the panel data regression method. Based on the results of the model selection through the Chow Test and the Hausman Test, the best model used is *the Fixed Effects Model* (FEM). The results of the simultaneous test showed that all independent variables together had an effect on the poverty level with a F-statistical probability value of 0.000. A coefficient of determination value (R^2) of 0.987 indicates that 98.7% of the variation in poverty levels can be explained by variables in the model, while the rest is influenced by other factors outside the study.

Partially, the results show that the open unemployment rate has a positive and significant effect on the poverty rate, which means that an increase in unemployment will increase the number of poor people. Meanwhile, the minimum wage has a negative and significant effect on the poverty rate, which shows that increasing wages is able to reduce poverty through increasing people's income and purchasing power. On the other hand, the Human Development Index (HDI) had no significant effect on poverty levels, indicating that improving the quality of human resources had not directly impacted poverty reduction during the study period.

Overall, this study concludes that the most effective factors in reducing poverty levels in Central Java Province are increasing employment opportunities and appropriate minimum wage policies. Therefore, local governments are expected to focus more on creating broad jobs and improving the quality of wage policies, as well as ensuring that improving the quality of human resources through education and health is followed by adequate economic opportunities. Thus, poverty alleviation efforts can be carried out more effectively and sustainably.

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