

The Effect of Economic Growth, per Capita Expenditure, and Poverty Levels on the Human Development Index in Central Java Province

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ABSTRACT

This study aims to analyze the effect of economic growth, per capita expenditure, and poverty level on the Human Development Index (HDI) in Central Java Province using multiple linear regression analysis. The research utilizes data from 35 regencies/cities in 2019 obtained from the Central Bureau of Statistics. Classic assumption tests were conducted, and the regression model was found to be BLUE (Best Linear Unbiased Estimator). The results show that per capita expenditure and poverty levels significantly affect HDI, while economic growth does not show a significant partial effect. The regression model explains 86.1% of the variation in HDI, indicating its reliability as a predictive tool for regional human development planning.

Keywords: Human Development Index, Economic Growth, Per Capita Expenditure, Poverty, Multiple Linear Regression, Central Java.

INTRODUCTION

Human development is a fundamental objective of modern development strategies and serves as a key indicator of the well-being of a population. Rather than focusing solely on economic performance, human

development takes a broader, multidimensional approach that includes health, education, and standard of living. The Human Development Index (HDI), introduced by the United Nations Development Programme (UNDP), is widely used to measure these aspects by aggregating indicators such as life expectancy, educational attainment, and adjusted per capita income.

In Indonesia, the Central Bureau of Statistics (Badan Pusat Statistik, BPS) publishes HDI scores annually at the national, provincial, and district/city levels. These scores not only serve as benchmarks for development progress but also reveal disparities across regions. Understanding the factors that influence HDI is crucial, especially in the era of regional autonomy where provincial governments are increasingly responsible for planning and implementing their own development agendas.

Central Java Province, one of Indonesia's most populous and economically active regions, faces unique challenges in improving its HDI. Although Central Java's HDI reached 71.73 in 2019—a figure categorized as “high” according to BPS standards—this level still falls behind the national average and shows significant variation among its 35 districts and cities. This disparity highlights the need for a

deeper understanding of the underlying economic drivers that may affect human development outcomes.

Among the economic indicators frequently associated with human development are economic growth, per capita expenditure, and poverty levels. Economic growth, typically measured by the increase in Gross Regional Domestic Product (GRDP), is often considered a proxy for development success. However, empirical evidence suggests that growth alone does not guarantee improvements in human well-being unless accompanied by equitable distribution and increased access to basic services. Per capita expenditure, on the other hand, is a more direct measure of household living standards and is closely linked to the consumption dimension of HDI. Conversely, high poverty levels are strongly correlated with limited access to education and health services, thereby hindering human development.

Previous studies in various regions of Indonesia have examined the impact of these economic variables on HDI, but limited research has been conducted specifically for Central Java using a comprehensive regression model. This study seeks to fill that gap by investigating the simultaneous and partial effects of economic growth, per capita expenditure, and poverty rates on the HDI across all districts and cities in Central Java in the year 2019.

To achieve this, the study employs a quantitative approach using multiple linear regression analysis. This method allows for the estimation of the relative contributions of each independent variable to variations in HDI, while controlling for the influence of others. The validity and reliability of the model are tested through classical assumption checks, including tests for normality, linearity, homoscedasticity, multicollinearity, and autocorrelation.

The findings of this research are expected to contribute to both academic discourse and practical policymaking. By identifying which economic factors most significantly influence HDI in Central Java, the results can inform more targeted and effective

development policies aimed at reducing inequality, alleviating poverty, and enhancing the quality of life for all residents in the province.

LITERATURE REVIEW

Human development is a multidimensional process that encompasses improvements in quality of life, education, health, and a decent standard of living. As stated by Todaro and Smith (2006) [1], development should not be assessed solely through economic growth but must also include social aspects such as access to education and healthcare. The Human Development Index (HDI), developed by the United Nations and adopted in Indonesia by the Central Bureau of Statistics (BPS), reflects this comprehensive view by combining indicators of health, education, and income (BPS, 2015) [2]. HDI data are published regularly at national, provincial, and regional levels and serve as essential benchmarks for development planning.

Several studies have explored the factors influencing HDI in various regions. Arif, Tasri, and Firdaus (2012) [3] analyzed HDI in West Sumatra and emphasized the role of per capita expenditure in improving living standards. Ginting, King, and Roy (2008) [4] highlighted that investments in education and healthcare significantly impact productivity and income, especially among the poor. Similarly, Ayomi (2014) [5] found that the growth of key economic sectors indirectly affects HDI by influencing poverty and unemployment rates in the Madiun region.

Poverty, in particular, has been widely recognized as a major barrier to human development. Dewi, Yusuf, and Iyan (2017) [6], in their study of Riau Province, confirmed a significant negative relationship between poverty and HDI. This supports the view that reducing poverty is essential to improve overall human well-being. The Central Java Regional Development Planning Agency (Bappeda Jawa Tengah, 2019) [7] aligns with this perspective by placing the enhancement of human capital at

the core of its vision to create a prosperous and self-reliant province.

To analyze the relationships among economic growth, per capita expenditure, poverty, and HDI, multiple linear regression is a commonly used method. According to Ghozali (2006) [8], this approach enables researchers to measure the simultaneous effect of multiple independent variables on a dependent variable, provided the model satisfies classical assumptions such as normality, homoscedasticity, and the absence of multicollinearity. This methodological framework is supported by Nduru, Situmorang, and Tarigan (2014) [9], who demonstrated the effectiveness of regression models in assessing agricultural productivity, and by Hatidja (2006) [10], who stressed the importance of model validation in statistical analysis.

BPS offices, such as BPS Kabupaten Wonogiri (2021) [11], play a vital role in supplying accurate and region-specific data that inform development policies. Pratomo and Astuti (2015) [12] underlined the importance of accurate statistical analysis for interpreting patterns in economic behavior, particularly in retail consumer contexts. Mustafid (2003) [13] and Sugiharto (2009) [14] further highlighted the necessity of hypothesis testing to determine whether the relationships between variables are statistically significant and reliable.

Beyond regression analysis, proper diagnostics are essential for ensuring the validity of statistical models. Djazari, Rahmawati, and Nugraha (2013) [15] and Hati and Nugroho (2016) [16] emphasized that testing classical assumptions—such as linearity, independence of residuals, and normality—is crucial in regression-based research. This aligns with Priyatno (2010) [17], who provides practical guidance on using SPSS for data analysis and interpretation in academic research, ensuring that statistical findings are both valid and applicable.

In conclusion, the literature underscores that while economic growth, per capita expenditure, and poverty are key variables

influencing HDI, their effects may vary depending on context, data quality, and policy implementation. Accurate statistical analysis supported by validated models is essential for drawing meaningful conclusions and formulating effective development strategies.

MATERIALS & METHODS

This study adopts a quantitative descriptive research design aimed at analyzing the influence of economic growth, per capita expenditure, and poverty level on the Human Development Index (HDI) in Central Java Province. The analysis uses a cross-sectional approach, utilizing data from 35 regencies and cities within the province for the year 2019. The research is conducted using a census method, meaning all available units within the population are included in the analysis, thus eliminating the need for sampling techniques.

Data were obtained from both primary and secondary sources. Primary data were collected through direct interviews with officials at the Central Bureau of Statistics (Badan Pusat Statistik, BPS) of Wonogiri Regency, particularly regarding data on the regional Gross Domestic Product (GRDP), adjusted per capita expenditure, poverty rates, and HDI. Secondary data were gathered from the official website of BPS Central Java Province, which provided standardized statistical data for all 35 districts and cities in the region.

The dependent variable in this study is the Human Development Index (HDI), denoted as Y . The independent variables include Economic Growth X_1 , measured as the percentage increase in GRDP; Per Capita Expenditure X_2 , measured in thousands of rupiah adjusted for purchasing power parity; and Poverty Rate X_3 , measured as the percentage of the population living below the poverty line.

Data collection involved a combination of interviews, document analysis, and online archival research to ensure the validity and comprehensiveness of the dataset. The data were analyzed using Minitab 16, a statistical

software tool well-suited for regression analysis and diagnostic testing. The primary method of analysis is multiple linear regression, which enables the researcher to measure the simultaneous effect of several independent variables on one dependent variable. The regression model is expressed mathematically as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon,$$

where β_0 is the constant term, β_1 , β_2 , and β_3 are the regression coefficients for the independent variables, and ε represents the error term.

To ensure the robustness of the model, several classical assumption tests were conducted. These include the linearity test to determine whether the relationship between variables is linear; the normality test using probability plots and the Kolmogorov-Smirnov test to assess whether residuals are normally distributed; the homoscedasticity test to verify that the variance of residuals is constant; the multicollinearity test using the Variance Inflation Factor (VIF) to detect

intercorrelations among predictors; and the autocorrelation test using the Durbin-Watson statistic to examine the independence of residuals. Lastly, the model's validity was assessed by comparing the Standard Error of Estimate (SEE) with the standard deviation of the dependent variable. The regression model is considered valid for prediction purposes if the SEE is smaller than the standard deviation of HDI.

RESULT

We will search the relation of the two main variables. The figure below presents a scatter plot of per capita expenditure (in thousand rupiahs) versus the Human Development Index (HDI) for 35 regencies/cities in Central Java Province in 2019. A positive relationship is clearly observable, where the data points tend to follow an upward trend. This indicates that higher per capita expenditure in a region tends to be associated with a higher HDI value. This pattern supports the previous regression analysis results, which demonstrated that per capita expenditure has a significant and positive partial effect on HDI.

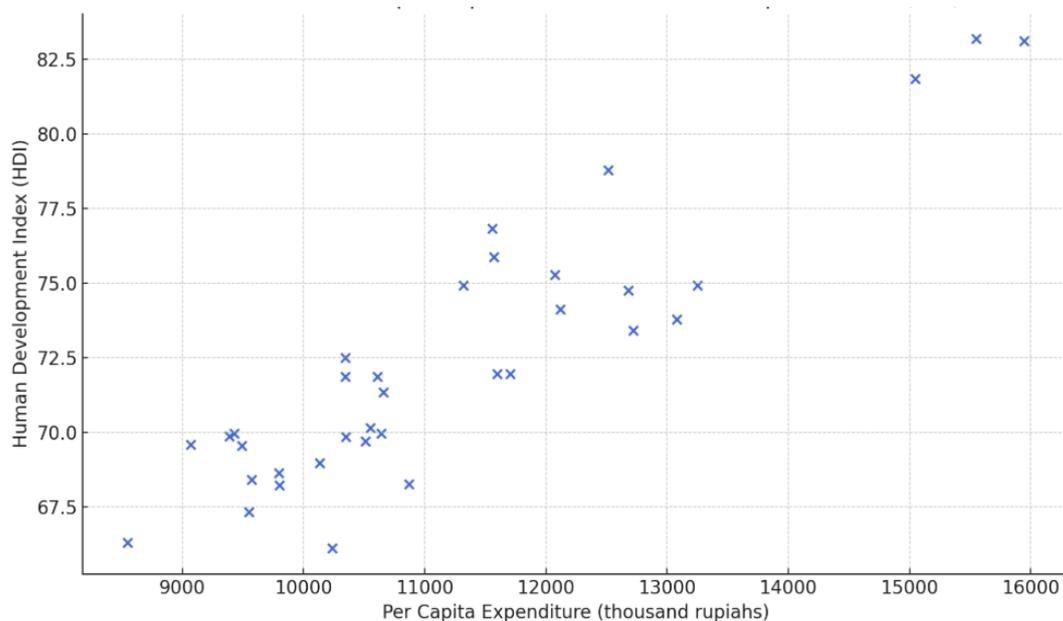


Figure 1. Scatter Plot of Per Capita Expenditure versus Human Development Index (HDI) for 35 Regencies/Cities in Central Java, 2019

After we know this figure, we search the relation more analytically. The analysis began with testing the classical assumptions

to ensure the validity and reliability of the multiple linear regression model. The linearity test, conducted through Analysis of

Variance (ANOVA), showed a p-value of 0.000, indicating a statistically significant linear relationship between the independent variables—economic growth, per capita expenditure, and poverty rate—and the dependent variable, Human Development Index (HDI). This confirms that the linear regression approach is appropriate for this study.

The normality of residuals was assessed using both a probability plot and the Kolmogorov-Smirnov test. The visual inspection of the probability plot indicated that the residuals followed a normal distribution, as the points were closely aligned along the diagonal line. Moreover, the Kolmogorov-Smirnov test yielded a p-value of 0.404, which is greater than the 0.05 significance level, confirming that the residuals are normally distributed.

The homoscedasticity assumption was tested using the scatter plot of residuals versus fitted values. The plot showed that the residuals were randomly dispersed around the horizontal axis with no distinct pattern, indicating that the assumption of constant variance (homoscedasticity) holds. Furthermore, the multicollinearity test, using the Variance Inflation Factor (VIF), revealed VIF values of 1.152 for economic growth, 1.733 for per capita expenditure, and 1.566 for poverty rate—all well below the threshold of 10. This suggests that multicollinearity among the independent variables is not a concern in the model.

The Durbin-Watson test was conducted to assess the presence of autocorrelation in the residuals. The computed Durbin-Watson statistic was 1.795, which falls within the acceptable range based on the number of predictors and observations, indicating that there is no significant autocorrelation in the regression model.

With all classical assumptions satisfied, the multiple linear regression model was constructed. The resulting equation was:
$$\text{HDI} = 54.209 + 0.0323 \text{ Economic Growth} + 0.00189 \text{ Per Capita Expenditure} - 0.3066 \text{ Poverty Rate}.$$

This equation shows that, holding other variables constant, every 1% increase in economic growth is associated with a 0.0323-point increase in HDI. Likewise, an increase of Rp1,000 in per capita expenditure is associated with a 0.00189-point increase in HDI. Conversely, a 1% increase in the poverty rate is associated with a 0.3066-point decrease in HDI.

The goodness-of-fit of the model was evaluated using the F-test. The results revealed a p-value of 0.000 and an F-statistic significantly greater than the critical value, indicating that the model is statistically significant and that the independent variables, when considered together, have a meaningful effect on HDI.

Further analysis using the t-test showed that per capita expenditure ($p = 0.000$) and poverty rate ($p = 0.008$) have a statistically significant effect on HDI when considered individually. However, economic growth ($p = 0.934$) did not have a statistically significant partial effect. This suggests that while economic growth contributes to human development in theory, its direct impact may be limited, potentially due to unequal income distribution or short-term data limitations.

The coefficient of determination (R^2) for the model was 86.1%, indicating that 86.1% of the variation in HDI across the 35 regencies and cities in Central Java can be explained by the combined influence of economic growth, per capita expenditure, and poverty rate. The remaining 13.9% is attributed to other factors not included in this model.

Finally, the Standard Error of Estimate (SEE) was 1.71956, which is lower than the standard deviation of the HDI variable (4.403). This confirms that the model provides an accurate and valid prediction of HDI, reinforcing its reliability for policy recommendations and future research.

DISCUSSION

The findings of this study reveal that per capita expenditure and poverty levels have a significant impact on the Human Development Index (HDI), while economic growth does not show a notable effect when

considered independently. This indicates that improvements in human development are more directly influenced by the actual economic conditions experienced by individuals—such as their spending power and ability to meet basic needs—rather than the overall pace of economic expansion. An increase in per capita expenditure reflects better access to health, education, and living facilities, while a higher poverty rate restricts access to these essential services, thereby lowering HDI outcomes.

Despite the common assumption that economic growth drives development, the results suggest that growth alone is not sufficient unless it is inclusive and equitably distributed. The data support the idea that household-level welfare improvements and poverty reduction strategies are more effective in enhancing human development. Therefore, policymakers should focus on designing programs that directly support income generation, social protection, and equal access to public services rather than solely prioritizing macroeconomic growth. This approach is more likely to yield meaningful progress in the quality of life across different regions.

CONCLUSION

This study concludes that per capita expenditure and poverty level significantly influence the Human Development Index (HDI) in Central Java Province, while economic growth does not exhibit a direct partial effect. The regression model used is statistically valid, explaining 86.1% of the variation in HDI across the region. These findings emphasize that improving household welfare and reducing poverty are more critical to advancing human development than focusing solely on economic growth. Therefore, development policies should prioritize equitable income distribution, poverty alleviation, and increased access to essential services to achieve sustainable and inclusive human development outcomes.

Declaration by Authors

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