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Assessing the Impact of Human Development Index Components on Economic Growth: A Case Study of the Special Region of Yogyakarta

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Abstract

The study examines the influence of Human Development Index (HDI) components—education, health, and per capita expenditure—on the economic growth of the Special Region of Yogyakarta, Indonesia, from 2013 to 2022. Using panel data regression with the Common Effect Model, the research identifies the varying impacts of these components. Results indicate that education positively and significantly contributes to economic growth, while health and per capita expenditure exhibit a negative yet significant relationship. These findings highlight the importance of strategic policies to enhance human capital, reduce regional disparities, and optimize socio-economic outcomes. The study underscores the need for targeted public investments in education and healthcare infrastructure while addressing the unique economic challenges of areas with aging populations and low per capita expenditures. This research contributes to the growing body of literature on regional economic development and offers actionable insights for policymakers to foster sustainable economic growth.

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1. Introduction

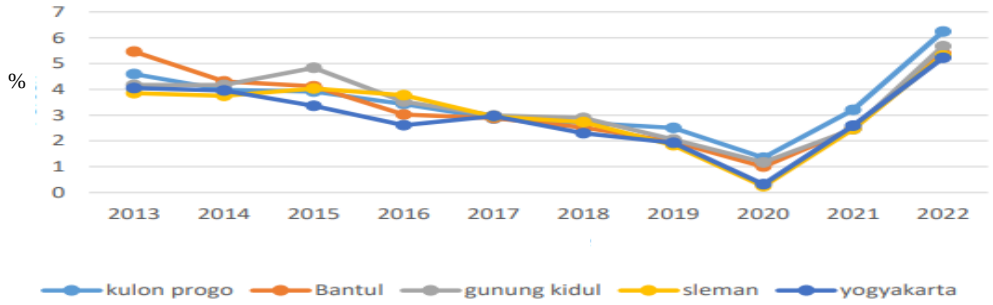
Economic growth is an essential aspect of a nation's development, directly reflecting its level of prosperity and societal welfare. High economic growth signifies economic resilience and progress, while stagnation indicates challenges in societal prosperity (Yuniarti et al., 2020). Numerous factors influence economic growth, with human resources (HR) being one of the most critical. Productive and skilled labor enhances the quality and competitiveness of goods and services, thereby fostering regional economic growth (Jumantoro et al., 2019).

Manuhutu (2016) identifies four pillars essential for economic growth through HR quality: fostering a productive workforce, enhancing utilization skills, promoting environmentally conscious technological innovation, and developing institutional frameworks and legal systems. Among these, education serves as a strategic measure to improve HR quality, aligning with theories like Human Capital Theory, which emphasize the positive correlation between education and economic growth (Nurkholis, 2013).

The Special Region of Yogyakarta (DIY) provides a compelling case for studying economic growth and its influencing factors. DIY experiences steady economic growth driven by HR quality, population, land area, natural resources, and technological advancements (Bahri, 2022). However, disparities in development persist between urban centers like Sleman and Yogyakarta City and rural areas such as Gunung Kidul and Kulon Progo. These disparities underscore the significance of the Human Development Index (HDI), which measures education, health, and welfare through variables like literacy, life expectancy, and per capita expenditure (Muda et al., 2019).

The trajectory of economic growth in DIY over the past decade reflects these dynamics. Figure 1.1 illustrates the region's economic growth from 2013 to 2022, highlighting fluctuations influenced by external factors like the COVID-19 pandemic. The lowest economic growth occurred in Sleman in 2020, with a growth rate of only 0.24%, while the highest growth occurred in Kulon Progo in 2022, with a rate of 6.24%.

Figure 1. Economic Growth of the Special Region of Yogyakarta (2013–2022)



Source: BPS (Badan Pusat Statistik)

Similarly, Table 1. shows the HDI trends across DIY's districts, emphasizing consistent improvements in literacy rates, health indicators, and per capita expenditures. However, gaps remain, particularly in districts like Gunung Kidul, which consistently scores lower compared to the urban areas of Yogyakarta City.

Table 1. Human Development Index (HDI) in the Special Region of Yogyakarta

District/City	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Kulon Progo	70.1	70.7	71.5	72.4	73.2	73.8	74.4	74.5	74.7	75.5
Bantul	76.8	77.1	78.0	78.4	78.7	79.5	80.0	80.0	80.3	80.7
Gunung Kidul	66.3	67.0	67.4	67.8	68.7	69.2	70.0	70.0	70.2	71.0
Sleman	80.2	80.7	81.2	82.2	82.9	83.4	83.9	83.8	84.0	84.3
Yogyakarta City	83.6	83.8	84.6	85.3	85.4	86.1	86.7	86.6	87.2	87.7

Source: BPS (Badan Pusat Statistik)

This study investigates the impact of HDI components—education, health, and per capita expenditure—on economic growth in DIY. Utilizing panel data regression analysis through the Common Effect Model, the research provides insights into how these components influence economic performance. The findings aim to guide policymakers in addressing disparities and formulating strategic interventions to ensure equitable and sustainable economic development.

2. Literature Review

Economic growth is influenced by multiple factors, including human resource quality, natural resources, and technological advancements (Yadi, 2023). Among these, the quality of human resources, as measured by the Human Development Index (HDI), plays a significant role. The HDI encompasses education, health, and welfare, making it a comprehensive

indicator for understanding economic dynamics (Muda et al., 2019). This section reviews the theoretical and empirical foundations of the relationships between education, health, per capita expenditure, and economic growth.

Education and Economic Growth

Education is a cornerstone of economic development, as it enhances individual productivity and societal competitiveness. The Human Capital Theory, introduced by Becker and Schultz, highlights that investment in education leads to greater economic returns by improving skills and knowledge (Nurkholis, 2013). Empirical evidence supports the positive relationship between education and economic growth. For instance, Lucya and Anis (2019) found that increased schooling years significantly improved regional economic performance in Indonesia.

Table 1. shows the HDI trends in Yogyakarta, where education is measured through literacy rates and average years of schooling. Over the decade, districts with higher educational attainment, such as Yogyakarta City and Sleman, demonstrated superior economic growth compared to regions like Gunung Kidul and Kulon Progo.

The disparities emphasize the need for targeted education policies to address regional imbalances and enhance overall economic performance.

Health and Economic Growth

Health is another critical component of HDI, reflecting the capability of the workforce to contribute effectively to economic activities. Improved health outcomes, as measured by life expectancy, have been linked to increased productivity and economic growth (Rahayu Utami, 2012). However, findings from the Special Region of Yogyakarta suggest a complex relationship. While improved life expectancy indicates better health infrastructure, the aging population in the region, particularly in rural areas like Kulon Progo, may reduce overall workforce productivity (Suparno, 2015).

Figure 1. illustrates the economic growth fluctuations in Yogyakarta, where health-related factors significantly influenced performance during the COVID-19 pandemic. The pandemic's impact highlighted the vulnerability of regions with insufficient healthcare infrastructure to external shocks.

Per Capita Expenditure and Economic Growth

Per capita expenditure serves as a proxy for welfare and purchasing power, directly impacting economic demand and growth. According to Silvia et al. (2021), increased per capita expenditure signifies higher living standards and contributes to economic expansion. However, in Yogyakarta, disparities in per capita expenditure across districts remain evident. For example, the average per capita expenditure in Gunung Kidul is significantly lower than in urban areas like Sleman and Yogyakarta City, as shown in Table 1.

While higher per capita expenditure generally correlates with economic growth, findings from Yogyakarta indicate a nuanced dynamic. Limited income and lower living standards in rural areas constrain their contribution to regional economic performance, necessitating targeted interventions to reduce disparities (Dewi & Sutrisna, 2014).

Integration of HDI Components

The interplay between education, health, and per capita expenditure forms a holistic framework for understanding economic growth. Policies that integrate these dimensions are crucial for fostering sustainable development. For example, investment in education enhances skill development, while improved health infrastructure ensures workforce productivity. Similarly, increasing per capita expenditure through better income distribution stimulates economic demand and growth (Manuhutu, 2016; Muda et al., 2019).

This review highlights the importance of HDI components in driving economic growth and reducing regional disparities in Yogyakarta. By addressing gaps in education, health, and welfare, policymakers can develop strategies that promote equitable and sustainable development. The subsequent analysis will explore these relationships empirically, using panel data regression models to assess their significance.

3. Methodology

This study applies a quantitative research approach to analyze the relationship between the Human Development Index (HDI) components—

education, health, and per capita expenditure—and economic growth in the Special Region of Yogyakarta (DIY) during the period 2013–2022. The methodology employs panel data regression, incorporating the Common Effect Model (CEM) as the chosen estimation technique.

Data Sources

The study utilizes secondary data from the Indonesian Central Statistics Agency (BPS). The dataset includes cross-sectional data from the five districts/cities in DIY—Yogyakarta City, Sleman, Bantul, Kulon Progo, and Gunung Kidul—and time-series data from 2013 to 2022.

Variables

Dependent Variable:

Economic growth (Y): Measured by the percentage change in Gross Regional Domestic Product (GRDP).

Independent Variables:

Education (X1): Measured by the average years of schooling.

Health (X2): Proxied by life expectancy at birth.

Per Capita Expenditure (X3): Represented in thousands of Indonesian Rupiah (IDR).

Model Specification

The panel data regression model is expressed as:

$Yit=\beta0+\beta1X1it+\beta2X2it+\beta3X3it+\epsilon it$

Where: Yit: Economic growth (GRDP) for district i at time t, β0: Intercept term, β1, β2, β3: Coefficients of the independent variables, X1it: Education (average years of schooling), X2it: Health (life expectancy), X3it: Per capita expenditure (in thousands of IDR), ϵit: Error term.

Panel Data Analysis

The analysis uses panel data regression, which integrates both cross-sectional and time-series dimensions, providing robust results. The following tests are conducted to determine the appropriate model:

Chow Test: To choose between the Common Effect Model (CEM) and Fixed Effect Model (FEM).

Hausman Test: To compare the Fixed Effect Model (FEM) and Random Effect Model (REM).

Lagrange Multiplier (LM) Test: To decide between the Common Effect Model (CEM) and Random Effect Model (REM).

Classic Assumption Tests

To ensure the validity of the model, classic assumption tests are performed:

Multicollinearity Test: Checks for high correlations among independent variables using the correlation matrix. The absence of high correlation (<0.85) indicates no multicollinearity.

Heteroskedasticity Test: Examines whether the variance of the residuals is constant. This is assessed using graphical residual plots and statistical methods.

Autocorrelation Test: As the dataset includes both cross-sectional and time-series components, this test is omitted for panel data.

4. Results

This section presents the findings from the panel data regression analysis using the Common Effect Model (CEM). The analysis examines the impact of education, health, and per capita expenditure on economic growth in the Special Region of Yogyakarta (DIY) from 2013 to 2022. The results include descriptive statistics, model selection tests, and regression output.

Descriptive Statistics

Table 2 summarizes the descriptive statistics for the variables used in the study. The results show variations in economic growth and the HDI components across the districts of DIY over the study period.

Table 2. Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
Economic Growth (Y)	3.2408%	3.0050%	6.2400%	0.2400%	1.3356%	50
Education (X1)	9.3500	9.2750	11.8900	6.2200	1.6588	50
Health (X2)	74.3348	74.0000	75.2800	73.2200	0.5968	50
Per Capita Expenditure	13,338.04	14,441.00	19,125.00	8,202.00	3,681.40	50

Source: Eviews Output

Model Selection Tests

Three tests were conducted to select the most suitable panel data model:

Chow Test: The Chow test compared the Common Effect Model (CEM) and the Fixed Effect Model (FEM). Results are shown in Table 3.

Table 3. Chow Test Results

Effect Test	Statistic	df	Prob.
Cross-section F	1.0312	(4, 420)	0.4024
Cross-section Chi-square	4.6841	4	0.3213

Since the p-value > 0.05, the CEM is preferred.

Hausman Test: The Hausman test compared the Fixed Effect Model (FEM) and the Random Effect Model (REM). Results are shown in Table 4.

Table 4. Hausman Test Results

Test Summary	Chi-Sq Statistic	Chi-Sq df	Prob.
Cross-section Random	3.9651	3	0.2653

A p-value > 0.05 indicates that the REM is more suitable than the FEM.

Lagrange Multiplier Test: The LM test assessed the suitability of the CEM versus the REM. Results are shown in Table 5.

Table 5. LM Test Results

Hypothesis Test	Cross-section	Time	Both
Breusch-Pagan	2.1369 (0.1438)	76.5275 (0.0000)	78.6644 (0.0000)

The cross-section p-value > 0.05 supports the use of the CEM.

Based on the results of these tests, the Common Effect Model (CEM) was chosen for regression analysis.

Regression Results

The regression results from the Common Effect Model (CEM) are summarized in Table 6. The findings provide insights into the relationships between the independent variables (education, health, and per capita expenditure) and economic growth.

Table 6. Regression Results (Common Effect Model)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant (β0)	651.7033	0.1728	3.7732	0.0003
Education (X1)	13.0086	0.0198	2.4967	0.0162
Health (X2)	-138.3624	0.0519	-2.6696	0.0105
Per Capita Expenditure (X3)	-8.5839	0.0031	-2.7722	0.0080

Source: Eviews Output

Findings

Education (X1): The coefficient for education is positive (13.0086) and significant ($p=0.0162<0.05$), indicating that higher average years of schooling positively influence economic growth.

Health (X2): The coefficient for health is negative (−138.3624) but significant ($p=0.0105<0.05$), suggesting that while health improvements generally enhance productivity, the aging population in DIY may negatively impact economic growth.

Per Capita Expenditure (X3): The coefficient for per capita expenditure is negative (−8.5839) and significant ($p=0.0080<0.05$), implying that increasing expenditure does not proportionally translate to economic growth, potentially due to income disparities and low purchasing power in certain areas.

5. Discussion

This study investigates the influence of Human Development Index (HDI) components—education, health, and per capita expenditure—on the economic growth of the Special Region of Yogyakarta (DIY) from 2013 to 2022. The findings highlight nuanced relationships between these components and economic performance, providing critical insights into regional economic development.

Impact of Education on Economic Growth

The analysis reveals a positive and significant relationship between education and economic growth ($p=0.0162$), with a coefficient of 13.0086. This finding aligns with the Human Capital Theory, which posits that investment in education enhances workforce productivity, driving economic progress (Nurkholis, 2013). Higher levels of education equip individuals with skills that improve employability and income potential, fostering regional economic development.

As seen in Table 2, districts with higher educational attainment, such as Sleman and Yogyakarta City, exhibit stronger economic growth compared to rural areas like Gunung Kidul and Kulon Progo. These findings are consistent with Lucya and Anis (2019), who demonstrated that increased

schooling years significantly contribute to regional economic performance.

To address disparities, policies that improve access to education in underserved regions are imperative. Government interventions such as scholarships and infrastructure development in rural districts could bridge educational gaps and stimulate broader economic growth.

Impact of Health on Economic Growth

The relationship between health and economic growth is negative but significant (p=0.0105), with a coefficient of −138.3624. While health generally enhances productivity, the findings suggest a unique dynamic in DIY, potentially influenced by its aging population. The average life expectancy in DIY is among the highest in Indonesia (74.3 years), surpassing the productive age range defined by the International Labour Organization (ILO) (Suparno, 2015). This demographic shift reduces the proportion of active contributors to the economy, dampening growth.

Figure 1 illustrates the region's economic growth trajectory, which experienced significant disruptions during the COVID-19 pandemic due to heightened healthcare challenges. These results align with findings from Dianaputra and Aswitari (2017), who reported that health improvements might not uniformly drive growth if other socio-economic factors, such as workforce structure, are misaligned.

Addressing this issue requires a dual approach: enhancing healthcare to support productivity and implementing workforce policies to maximize the potential of younger demographics. Additionally, vocational training programs could empower older populations to contribute to the economy in non-physically intensive roles.

Impact of Per Capita Expenditure on Economic Growth

The study finds a **negative and significant relationship** between per capita expenditure and economic growth (p=0.0080), with a coefficient of −8.5839. This result contrasts with theoretical expectations, suggesting that increased per capita expenditure in DIY may not directly translate to economic growth. The disparity is likely attributable to income inequality and low purchasing power in rural areas.

Table 1. highlights the variation in per capita expenditure across districts, with rural areas like Gunung Kidul and Kulon Progo lagging behind urban centers. The low average per capita expenditure in these areas

reflects limited economic activity, constraining their contribution to regional growth. These findings resonate with Dewi and Sutrisna (2014), who argued that unequal income distribution diminishes the positive effects of consumption on economic performance.

Policy efforts should focus on reducing income inequality through job creation and income support programs. Encouraging local entrepreneurship and improving infrastructure in rural areas could also stimulate economic activity and enhance the effectiveness of household spending.

Integration of HDI Components

The interplay between education, health, and per capita expenditure demonstrates their collective importance in driving economic growth. The high R2 value (92.15%) indicates that these variables significantly explain variations in economic growth. However, disparities across districts underscore the need for tailored interventions that address regional socio-economic characteristics.

As illustrated in Table 6., the combined influence of these variables is statistically significant ($F=325.8960$, $p<0.05$). This finding underscores the importance of integrated policies that align investments in education, healthcare, and income support to maximize regional development outcomes.

Policy Implications

Education: Strengthen rural education systems through targeted investments in infrastructure and teacher training. Incentivize higher education to promote skill development and reduce unemployment.

Health: Expand healthcare access and develop workforce policies to optimize contributions from all age groups. Introduce programs that promote preventive care to reduce long-term healthcare costs.

Per Capita Expenditure: Address income inequality through localized job creation and support for small and medium enterprises (SMEs). Enhance rural infrastructure to stimulate economic participation and increase household consumption efficiency.

The study highlights the critical roles of education, health, and per

capita expenditure in shaping economic growth. While education emerges as a positive driver, health and per capita expenditure reveal challenges linked to demographic and economic disparities. These findings call for comprehensive and region-specific strategies to foster equitable and sustainable development across Yogyakarta.

6. Conclusion

This study evaluates the influence of Human Development Index (HDI) components—education, health, and per capita expenditure—on the economic growth of the Special Region of Yogyakarta (DIY) during the period 2013–2022. The analysis employs a panel data regression approach with the Common Effect Model (CEM), providing valuable insights into the dynamics of regional development.

Key Findings

Education and Economic Growth Education positively and significantly impacts economic growth, with a coefficient of 13.0086 ($p=0.0162$). This finding underscores the role of education as a driver of productivity and economic performance. Districts with higher levels of education, such as Sleman and Yogyakarta City, exhibit stronger growth trajectories, reflecting the benefits of improved human capital (Lucya & Anis, 2019).

Health and Economic Growth The relationship between health and economic growth is negative yet significant, with a coefficient of -138.3624 ($p=0.0105$). While improved health generally enhances workforce productivity, the aging population in DIY, characterized by high life expectancy, reduces the proportion of economically active individuals. This demographic trend imposes constraints on regional growth, particularly in rural areas (Suparno, 2015).

Per Capita Expenditure and Economic Growth Per capita expenditure negatively and significantly influences economic growth, with a coefficient of -8.5839 ($p=0.0080$). This result reflects the impact of income inequality and limited purchasing power in rural districts such as Gunung Kidul and Kulon Progo. These disparities hinder the positive effects of household spending on economic activity (Dewi & Sutrisna, 2014).

Integrated Analysis

The combined influence of education, health, and per capita expenditure explains a substantial proportion of the variation in economic growth (R^2 = 92.15%). This highlights the interconnectedness of HDI components in shaping regional development. The findings emphasize the need for tailored policies that address educational disparities, enhance workforce productivity, and reduce income inequality to foster sustainable growth.

Policy Recommendations

Enhance Education Systems:

Increase access to quality education in rural areas through infrastructure development and teacher training.

Provide scholarships and incentives to encourage higher educational attainment.

Strengthen Healthcare Policies:

Develop programs to support the aging population while enhancing productivity among younger demographics.

Expand access to preventive healthcare to reduce long-term costs.

Address Economic Inequality:

Implement localized job creation initiatives and support small and medium enterprises (SMEs).

Invest in rural infrastructure to boost economic participation and consumption efficiency.

Limitations and Future Research

This study focuses on three HDI components and their impact on economic growth. Future research could expand the scope to include other factors such as technological adoption, labor market dynamics, and regional infrastructure development. Additionally, comparative studies with other regions could provide a broader perspective on the effectiveness of HDI-based interventions.

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