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The Contribution of Education, Health, and Unemployment on HDI in East Java, Indonesia

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ABSTRACT

Purpose: This study aims to analyse the influence of education, health, and unemployment on the Human Development Index (HDI) in East Java, Indonesia. Given the disparities in HDI across regions, this research seeks to identify the extent to which these factors contribute to HDI variations in the province.

Design/methodology/approach: A quantitative research approach was employed, using secondary data from the Central Bureau of Statistics (BPS) of East Java for the years 2021 and 2022. The study analysed data from 38 regencies/cities in East Java, using multiple linear regression to examine the impact of education (average years of schooling), health (number of hospitals), and unemployment (percentage of the labour force) on HDI.

Findings: The results indicate that education and health have a significant positive impact on HDI, while unemployment has a significant negative effect. The findings confirm that increasing education levels and improving healthcare access contribute positively to human development, whereas higher unemployment rates hinder HDI growth. The coefficient of determination (R^2) suggests that these three factors collectively explain a substantial portion of HDI variation in East Java.

Research limitations/implications: This study is limited to secondary data analysis and does not consider qualitative factors such as policy effectiveness, governance, and social infrastructure that may also influence HDI. Future research should incorporate qualitative methods and longitudinal data to capture broader determinants of human development.

Practical implications: The findings provide valuable insights for policymakers in East Java to focus on education and healthcare improvements while addressing unemployment challenges. Policy recommendations include expanding access to quality education, improving healthcare facilities in underdeveloped areas, and implementing effective employment programs to reduce regional disparities in HDI.

Originality/value: This research contributes to the understanding of HDI determinants at the provincial level in Indonesia, offering empirical evidence on the interplay between education, health, and unemployment. The study highlights the need for integrated policy approaches to enhance human development in East Java.

Paper type: Research paper

Keyword: *Education, Health, Unemployment, Human Development Index, East Java, Indonesia, Multiple Linear Regression*

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I. INTRODUCTION

The Human Development Index (HDI) is a critical indicator used to measure the quality of life in a region (Jam'an et al., 2024). HDI encompasses three main dimensions: education, health, and a decent standard of living (Morse, 2023). East Java, as one of the provinces with the largest population in Indonesia, plays a strategic role

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in contributing to the national HDI. However, despite the national increase in HDI, East Java's HDI growth still faces significant challenges (Sari, 2022).

According to data from the Central Statistics Agency (BPS), East Java's HDI ranks at a medium level compared to other provinces in Indonesia. Several regencies/cities in East Java exhibit relatively low HDI achievements, particularly in rural and underdeveloped areas. This highlights the inequality in human development, which may hinder efforts to improve welfare evenly across the region (BPS Jawa Timur, 2021).

Education is a major contributing factor to HDI, but disparities remain in the average years of schooling and expected years of schooling across various areas in East Java. Limited access to quality education in remote areas is one of the primary causes of this issue (Setyadi, 2022).

Similarly, the health dimension also impacts HDI achievements. Although life expectancy in East Java tends to increase, challenges persist due to the lack of healthcare facilities in certain areas and unequal access to healthcare services between urban and rural regions. These issues are exacerbated by the high prevalence of stunting and maternal mortality rates compared to more developed provinces in Indonesia (Hosokawa et al., 2020).

Additionally, unemployment is a serious issue that contributes to the low standard of living among the population. Data shows that while East Java's unemployment rate is generally lower than the national average, several areas still report high levels of open unemployment. This condition affects the community's ability to meet basic needs related to education and health (Prayitno & Kusumawardani, 2022).

This phenomenon indicates a strong correlation between education, health, and unemployment levels in determining HDI achievements in East Java. Therefore, this study aims to analyse the extent to which these factors influence HDI in East Java. This research is expected to provide a more comprehensive understanding of the dynamics of human development in the province and to offer effective policy recommendations to improve HDI in the future.

Numerous studies have investigated the relationship between education, health, unemployment, and the Human Development Index (HDI) in various regions of Indonesia. These factors are widely recognized as key determinants influencing human development outcomes.

1. Education and HDI

Education plays a crucial role in shaping human development, as it enhances individuals' knowledge and skills, thereby improving economic opportunities and overall well-being. Research conducted in Aceh Province confirms that government investment in education significantly contributes to HDI improvement (Siregar, 2024). Similarly, a study in South Sulawesi found that education influences economic growth, which is an integral component of human development (Dinar et al., 2022). Moreover, research on unemployment in Sumatra reveals that education has a notable impact on reducing joblessness, indirectly influencing HDI (Manihuruk et al., 2024).

2. Health and HDI

Health is another fundamental pillar of HDI, as it directly affects life expectancy and quality of life. Studies in South Sumatra indicate that health investments have a strong correlation with economic growth, which in turn enhances HDI (Hidayat & Sahri, 2023). Furthermore, research in Yogyakarta confirms that improvements in HDI are significantly driven by healthcare development (Suci et al., 2023). These findings reinforce the idea that better healthcare services contribute to higher HDI levels by reducing mortality rates and increasing productivity.

3. Unemployment and HDI

Unemployment is a critical factor that negatively impacts HDI, as it limits individuals' access to income, education, and healthcare. Research in East Luwu suggests that lower unemployment rates contribute to higher HDI, as more people gain access to better living conditions (Dahliah & Nur, 2021). Similarly, a study in Central Java highlights the significant relationship between unemployment and HDI, where a decrease in unemployment is associated with poverty reduction and improved human development (Handayani, 2023). Additionally, an analysis in Jakarta confirms that human capital development through education and employment opportunities helps lower the unemployment rate, leading to enhanced HDI (Darodjatun et al., 2021).

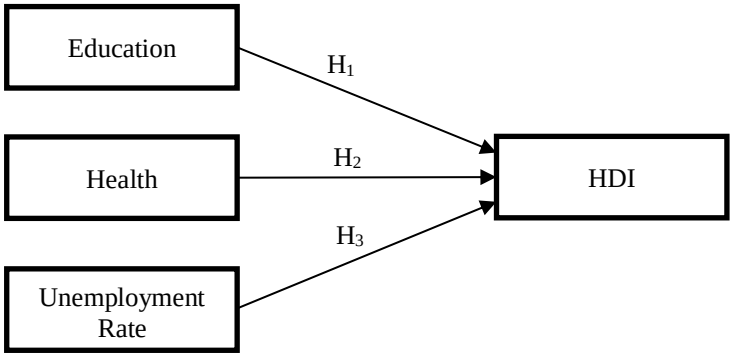

Figure 1 Conceptual framework

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Based on these empirical findings, this study proposes the following hypotheses:
H1: Education has a significant effect on the Human Development Index (HDI) of East Java Province.
H2: Health has a significant effect on the Human Development Index (HDI) of East Java Province.
H3: Unemployment Rate has a significant effect on the Human Development Index (HDI) of East Java Province.

II. METHODS

This research adopts a quantitative approach aimed at analysing the impact of education, health, and unemployment on the Human Development Index (HDI) in East Java. Employing a descriptive and explanatory approach, the study seeks to provide a comprehensive overview and explain causal relationships among variables.

The population comprises all regencies and cities in East Java Province, totalling 38 administrative regions. Using a total sampling technique, every regency and city is included as the research subject to ensure comprehensive representation. Secondary data obtained from the East Java Central Bureau of Statistics (BPS) and other official sources were used. These data cover education (mean years of schooling in years), health (number of health facilities such as hospitals), unemployment rate (percentage), and HDI. The data span two years, 2021 and 2022, allowing for the analysis of patterns and trends.

Data collection was conducted through access to official reports published by BPS, local governments, and supporting documents. Data validation was carried out by cross-referencing multiple sources to ensure consistency. The study considers three independent variables and one dependent variable: education (X_1), measured by mean years of schooling; health (X_2), measured by the number of health facilities; unemployment (X_3), measured by the open unemployment rate; and HDI (Y), measured by official HDI figures.

The data were analysed using multiple linear regression, employing the equation:

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

where:

Y represents the HDI,
X_1, X_2, X_3 denote education, health, and unemployment, respectively,
β_0 is the constant,
β_1, β_2, β_3 are the regression coefficients, and
ε is the error term.

Statistical tests include:

1. t-tests to assess the significance of each independent variable's influence on the dependent variable,
2. F-tests to evaluate the simultaneous influence of all independent variables, and
3. Coefficient of determination (R^2) to measure the extent to which the independent variables explain variations in the dependent variable.

The data analysis was conducted using statistical software, such as SPSS or EViews. The research hypotheses are formulated as follows:

1. H_0: Education, health, and unemployment have no significant impact on HDI in East Java.
2. H_1: Education, health, and unemployment have a significant impact on HDI in East Java.

The results are expected to provide empirical evidence on the relationships among the study variables.

III. RESULTS AND DISCUSSION

A. Result

Table 1 Descriptive Statistic

Variable	*Mean*	*Std. Deviation*
Education (average years of schooling)	*8.217*	*1.624*
Health (number of hospitals)	*10.737*	*10.650*
Unemployment Rate	*5.152*	*1.776*

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HDI (Human Development Index)	*72.968*	*5.050*

The data provides descriptive statistics for several key variables related to human development in East Java. The variable "Education," measured as the average years of schooling, has a mean of 8.217 years with a standard deviation of 1.624. This suggests that on average, individuals in East Java have just over eight years of schooling, with some variability around this mean, indicating that education levels are spread across a range of values, but not extremely diverse. The standard deviation value shows that most individuals' years of schooling are concentrated relatively close to the mean, but there are still some with considerably higher or lower years of education.

The "Health" variable, represented by the number of hospitals in the region, has a mean value of 10.737, with a relatively high standard deviation of 10.650. This indicates a wide variation in the distribution of hospitals across East Java, suggesting that while some areas have a relatively low number of hospitals, others have a significantly higher number. This variability reflects the uneven distribution of healthcare infrastructure, with some regions possibly having better access to healthcare services than others.

The "Unemployment Rate" stands at a mean of 5.152% with a standard deviation of 1.776. This indicates a moderate unemployment rate in East Java, with some variation between regions. The standard deviation suggests that while some areas might have relatively low unemployment, others experience higher unemployment, contributing to the overall variability in this metric. This rate reflects the economic health of the region and is a critical indicator of the labour market's functioning.

Finally, the "Human Development Index" (HDI) has a mean of 72.968 with a standard deviation of 5.050. The HDI is a composite index used to measure human development, considering factors such as life expectancy, education, and standard of living. The mean value of 72.968 indicates a relatively high level of human development in East Java, while the standard deviation suggests that there is moderate variation in HDI values across the region. This variability may be influenced by factors such as regional differences in education, healthcare, and economic opportunities.

The data suggests that East Java experiences variability in all the key indicators of human development, with education and health services showing some level of inequality, and unemployment rates fluctuating across the region. The moderate variation in HDI implies that while the general level of human development is high, there are areas with considerable room for improvement, especially in terms of education, healthcare infrastructure, and reducing unemployment.

Table 2 R and R-square

Model	*R*	*R Square*
1	*0.980*	*0.960*

The data presents the values of the correlation coefficient (R) and the coefficient of determination (R^2) for a regression model, with predictors including the unemployment rate, education (average years of schooling), and health (number of hospitals). The correlation coefficient (R) is 0.980, which indicates a very strong positive relationship between the dependent variable (Human Development Index, HDI) and the independent variables (unemployment rate, education, and health). This suggests that changes in these predictors are closely related to variations in the HDI, with the model explaining a substantial portion of the variability in HDI.

The R^2 value is 0.960, meaning that 96% of the variance in the HDI can be explained by the independent variables in the model. This is a high R^2 value, indicating that the predictors (unemployment rate, education, and health) collectively account for a very large portion of the changes in the HDI. The remaining 4% of the variability in HDI is due to factors not included in the model, which could involve other social, economic, or environmental factors influencing human development.

The R and R^2 values suggest that the regression model is highly effective in explaining the variation in HDI, with education, health, and unemployment rate playing significant roles in determining human development outcomes in East Java. The strength of the relationship highlighted by these values provides confidence in the model's ability to predict and explain the factors influencing HDI.

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Table 3 ANOVA (F-test)

Model	*df*	*F*	*Sig.*
Regression	*3*	*890.027*	*0.000*
Residual	*110*		
Total	*113*		

The ANOVA (Analysis of Variance) table presents the results of the F-test for the regression model, where the dependent variable is the Human Development Index (HDI) and the independent variables are the unemployment rate, education (average years of schooling), and health (number of hospitals). The model has 3 predictors, and the degrees of freedom for the regression are 3, as indicated in the table. The F-statistic is 890.027, which is extremely high, suggesting that the model explains a significant portion of the variation in HDI.

The p-value (Sig.) associated with the F-statistic is 0.000, which is well below the commonly used threshold of 0.05. This indicates that the overall regression model is statistically significant, meaning that at least one of the predictors (unemployment rate, education, or health) has a significant effect on HDI. The significance level of 0.000 shows strong evidence that the relationship between the independent variables and HDI is not due to random chance.

Table 4 Patial Test (T-test)

Variable	*Coefficient*	*t*	*Sig.*
(Constant)	*48.704*	*96.152*	*0.000*
Education (average years of schooling)	*2.917*	*39.847*	*0.000*
Health (number of hospitals)	*0.061*	*5.451*	*0.000*
Unemployment Rate	*-0.070*	*-0.914*	*0.363*

Based on the provided data, the regression equation for the model can be expressed as:

$$HDI=48.704+2.917Education+0.061Health-0.070Unemployment\ Rate+\varepsilon$$

Model Interpretation:

1. Education has a significant positive impact on HDI (p-value<0.05), with a coefficient of 2.917. This means that for each additional year of schooling, HDI increases by 2.917 units, assuming other variables remain constant.
2. Health also positively influences HDI (p-value<0.05), with a coefficient of 0.061, indicating that an increase in the number of hospitals improves HDI.
3. Unemployment Rate has a negative but statistically insignificant effect on HDI (p-value=0.363)), meaning it does not have a strong direct impact on HDI in this model.
4. The Rsquare value is 0.960, suggesting that 96% of the variation in HDI is explained by the model.

B. Discussion

1. The Influence of Education on HDI in East Java

From the regression table, it can be observed that the education variable has a positive regression coefficient (2.917) and is statistically significant (p-value < 0.000). This indicates a positive correlation between education levels and HDI. In other words, the higher the education level of a region or individual, the higher the HDI value.

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The effect of education on HDI is not coincidental and is statistically significant. This means we can be reasonably confident that education is one of the factors contributing to the increase in HDI.

Education equips people with the skills and knowledge they need to work productively and earn better incomes (King, 2023). This contributes to per capita income growth, which is one of the main factors in calculating HDI. Education enables individuals to actively participate in society—politically, socially, and economically. This active participation fosters the development of better communities.

Education provides people with opportunities to develop their potential and improve their quality of life. Educated individuals tend to have easier access to information, technology, and other opportunities (Burbules et al., 2020).

Both studies emphasize the significant role of education in shaping the Human Development Index (HDI), yet they approach the subject with different focuses and methodologies. The first study, *The Influence of Education on HDI in East Java*, presents a statistical analysis demonstrating a positive and significant relationship between education levels and HDI, with a regression coefficient of 2.917 and a p-value of less than 0.000. This result confirms that higher education levels contribute to increased HDI by equipping individuals with essential skills and knowledge, which in turn enhances productivity and income levels. As stated by King (2023), "education equips people with the skills and knowledge they need to work productively and earn better incomes," which ultimately contributes to per capita income growth—one of the key components in calculating HDI. Furthermore, education fosters active participation in political, social, and economic spheres, leading to the development of better communities. Burbules et al. (2020) highlight that "education provides people with opportunities to develop their potential and improve their quality of life," as educated individuals have greater access to information, technology, and various opportunities that enhance their overall well-being.

In contrast, the second study, *Education and HDI*, examines the relationship between education and HDI from a broader regional perspective, incorporating findings from multiple provinces in Indonesia. It highlights the role of government investment in education as a significant driver of HDI improvement, as demonstrated by Siregar (2024), who states that "research conducted in Aceh Province confirms that government investment in education significantly contributes to HDI improvement." Additionally, Dinar et al. (2022) emphasize the economic impact of education, stating that "a study in South Sulawesi found that education influences economic growth, which is an integral component of human development." Beyond economic growth, education also plays a crucial role in addressing unemployment, as evidenced by research in Sumatra. Manihuruk et al. (2024) assert that "education has a notable impact on reducing joblessness, indirectly influencing HDI," further reinforcing the argument that education is a fundamental pillar of human development.

While both studies align in their conclusion that education is essential for HDI improvement, they differ in their analytical approaches. The first study provides a precise, quantitative assessment based on statistical regression for East Java, offering concrete evidence of the direct impact of education on HDI. Meanwhile, the second study adopts a comparative, regional perspective, drawing on findings from various provinces to illustrate the broader implications of education on economic growth, government investment, and unemployment. Despite these differences, both studies reinforce the fundamental idea that education is a key driver of human development, influencing income levels, societal participation, and overall quality of life.

2. The Influence of Health on HDI in East Java

The regression table shows that the health variable has a positive regression coefficient (0.061) and is statistically significant (p-value < 0.000). This indicates a positive correlation between health status and HDI. In other words, the better the health status of a region or individual, the higher the HDI value.

The effect of health on HDI is not coincidental and is statistically significant. This means we can be reasonably confident that health is a factor contributing to the increase in HDI. Healthy people tend to be more productive. They can work more efficiently and contribute to economic growth (Umair et al., 2024).

Good health ensures that children can attend school regularly and receive quality education, which also contributes to improving HDI. Furthermore, health enhances the quality of life in society. Healthy individuals enjoy life more and have a greater sense of well-being (Yogiantoro et al., 2019).

Both studies highlight the crucial role of health in determining the Human Development Index (HDI), yet they approach the topic from different perspectives and contexts. The first study, *The Influence of Health on HDI in East Java*, presents a statistical analysis showing a positive and significant relationship between health status and HDI, with a regression coefficient of 0.061 and a p-value of less than 0.000. This finding suggests that improved health conditions contribute to a higher HDI by enhancing individual productivity, facilitating access to education, and improving overall well-being. As stated by Umair et al. (2024), "healthy people tend to be more productive. They can work more efficiently and contribute to economic growth." Additionally, good health ensures that "children can attend school regularly and receive quality education, which also contributes to improving HDI" (Yogiantoro et al., 2019). These findings confirm that health plays a crucial role in shaping human development, making it a key driver rather than a mere correlation.

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In contrast, the second study, *Health and HDI*, adopts a broader perspective, examining the relationship between health and HDI across different Indonesian regions, specifically South Sumatra and Yogyakarta. It underscores the strong correlation between health investments and economic growth, reinforcing the argument that better healthcare services play a critical role in increasing HDI. As noted by Hidayat & Sahri (2023), "studies in South Sumatra indicate that health investments have a strong correlation with economic growth, which in turn enhances HDI." Similarly, Suci et al. (2023) confirm that "improvements in HDI are significantly driven by healthcare development" in Yogyakarta, demonstrating that enhanced healthcare services contribute to higher HDI levels by reducing mortality rates and increasing productivity.

While both studies align in their conclusion that health is a fundamental pillar of HDI, the first study provides a more quantitative and region-specific analysis with statistical evidence from East Java, whereas the second study presents a broader, comparative discussion supported by findings from multiple regions. The key difference lies in their methodological approaches—one relying on statistical regression and the other on regional case studies—yet both reinforce the critical role of health in shaping human development outcomes.

3. The Influence of Unemployment on HDI in East Java

Based on the research results, the regression coefficient for the unemployment variable is –0.70, which is not statistically significant (p-value = 0.363). In other words, there is insufficient strong evidence that the unemployment rate has a significant impact on HDI.

In other words, changes in the unemployment rate do not have a direct and significant impact on HDI. Although the negative regression coefficient is not significant, it suggests that an increase in the unemployment rate is theoretically associated with a decrease in HDI.

In contrast, several empirical studies conducted in other regions found a significant negative relationship between unemployment and HDI. A study in East Luwu (Dahliah & Nur, 2021) suggests that lower unemployment rates contribute to higher HDI by increasing access to income, education, and healthcare. Similarly, research in Central Java (Handayani, 2023) highlights that a decrease in unemployment is significantly linked to poverty reduction and improved human development. Additionally, a study in Jakarta (Darodjatun et al., 2021) confirms that human capital development through education and employment opportunities helps reduce unemployment, ultimately enhancing HDI.

The key difference lies in the statistical significance of the findings. While the East Java study found no significant relationship, the studies in East Luwu, Central Java, and Jakarta all identified a meaningful negative correlation between unemployment and HDI. These differences may be attributed to regional economic contexts. Jakarta, as an economic hub, offers more employment opportunities and resources for human capital development, making unemployment a more critical factor in determining HDI. Meanwhile, East Java's economy may be influenced by other dominant factors such as the informal sector, government policies, or labor migration, which could overshadow the impact of unemployment on HDI.

Moreover, variations in research methodologies, data periods, and control variables could also contribute to these differing results. While economic theory generally supports the notion that unemployment negatively affects HDI, specific regional dynamics may alter this relationship. Therefore, further analysis is needed to identify the key factors shaping HDI in different regions and to understand why the impact of unemployment appears to vary across studies.

IV. CONCLUSION

The study investigates the effects of education, health, and unemployment on the Human Development Index (HDI) in East Java. The results indicate that education has a positive and statistically significant influence on HDI, with a regression coefficient of 2.917 and a p-value less than 0.000. This means that an additional year of schooling is associated with a 2.917-point increase in HDI, holding other factors constant. Education plays a crucial role in enhancing individual productivity, income levels, and active participation in society, all of which are key contributors to improving HDI. Furthermore, education provides individuals with the necessary skills and knowledge to contribute more effectively to economic growth and societal development, thereby improving overall quality of life.

Health, represented by the number of hospitals, also demonstrates a positive and statistically significant impact on HDI, with a regression coefficient of 0.061 and a p-value less than 0.000. The results suggest that an increase in the availability of healthcare services is positively correlated with higher HDI values. This highlights the importance of accessible healthcare in promoting better health outcomes, which in turn improves productivity, educational attainment, and the general well-being of the population. Health improvements contribute

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significantly to a higher quality of life and foster a more prosperous society by ensuring that individuals are healthy enough to work and contribute to economic and social development.

On the other hand, the unemployment rate, with a regression coefficient of -0.070, does not have a statistically significant effect on HDI (p-value = 0.363). This indicates that the unemployment rate, despite its negative regression coefficient, does not directly impact HDI in a statistically meaningful way in this model. While the negative sign of the coefficient suggests that higher unemployment could theoretically reduce HDI, the lack of statistical significance implies that other factors might be influencing HDI more strongly in the context of East Java. Therefore, while reducing unemployment could have indirect benefits on HDI, it does not appear to be a primary determinant in this study.

The model overall shows excellent performance, with an R2R^2R2 value of 0.960, indicating that 96% of the variation in HDI can be explained by the three variables (education, health, and unemployment). The F-test result of 890.027 ($p < 0.000$) confirms the statistical significance of the model as a whole, further supporting the validity of the findings. In conclusion, the study emphasizes the critical role of education and health in driving human development in East Java. While unemployment has a negative association with HDI, its impact is not statistically significant, suggesting that addressing unemployment might not directly affect HDI in this region. However, improving education and healthcare services remains a vital strategy for enhancing human development outcomes in the area.

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