

## Determination of the Human Development Index in Regencies/Cities of East Java Province for 2019–2023 Through a Static Model Approach

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### ABSTRACT

This research examines how life expectancy, the poverty headcount, labor force participation, and regional economic output shape the Human Development Index (HDI) across East Java's regencies and cities between 2019 and 2023. Panel data techniques were applied, with the Fixed Effects Model chosen after Chow and Hausman testing confirmed it as the best fit for capturing both cross-regional and time-based variation. Three of the four predictors life expectancy, poverty levels, and regional GDP were found to positively and significantly shape HDI outcomes, whereas labor force participation showed a positive direction without reaching statistical significance. This limited influence likely stems from East Java's labor market being heavily concentrated in informal, low-productivity work, compounded by uneven access to quality employment across the province. Collectively, the four variables account for a striking 99.90% of HDI variation ( $R^2 = 0.9990$ ), underscoring the model's strong explanatory power. The evidence points to health, economic hardship, employment structure, and growth as core levers for human development progress. Policy efforts in East Java should therefore center on strengthening human capital, revitalizing productive sectors, and closing regional development gaps.

Keywords: Life Expectancy; Number of Poor People; Labor Force Participation Rate; Gross Regional Domestic Product; Human Development Index



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## INTRODUCTION

Assessing how well a region is developing often comes down to one benchmark: the Human Development Index (HDI). It captures the degree to which people can realize better lives across three core areas: physical well-being, learning, and living conditions, making it a trusted gauge of both human capital quality and societal welfare. East Java's HDI trajectory has been upward year after year, yet that growth has not translated into balanced outcomes across the province. Gaps persist between its regencies and cities, signaling that development gains are still unevenly felt.

Economic momentum has continued, but not everyone in the population appears to be sharing in its benefits.

**Table 1. Development of the Human Development Index (HDI) in East Java Province from 2019 to 2023**

| Province  | Year | Human Development Index |
|-----------|------|-------------------------|
| East Java | 2019 | 71.50                   |
| East Java | 2020 | 71.71                   |
| East Java | 2021 | 72.14                   |
| East Java | 2022 | 72.75                   |
| East Java | 2023 | 73.38                   |

Source: Badan Pusat Statistik (BPS) of East Java Province

The table illustrates East Java's HDI rising from 71.50 in 2019 to 73.38 by 2023, indicating gradual gains in health, education, and living standards. Yet the pace of improvement remains modest, and the benefits are not spread evenly across districts and cities, pointing to persistent disparities in how development outcomes are distributed. A mix of social and economic conditions typically drives these regional gaps. Longevity serves as a proxy for population health and signals how well local governments are delivering public services. Poverty, meanwhile, tends to move inversely with HDI; the more people struggle economically, the harder it becomes for them to access education, healthcare, and decent living conditions. Workforce engagement, captured by the Labor Force Participation Rate (LFPR), matters too, as it reflects how much of the productive-age population contributes to the regional economy. Rounding out the picture, Gross Regional Domestic Product (GRDP) signals a region's economic capacity to fund improvements in public welfare over time.

Existing literature on HDI determinants in Indonesia tends to focus on national-level analyses, often overlooking district- or city-level disparities. Much of this earlier work also predates 2020 and thus misses the economic and social shifts triggered by the COVID-19 pandemic. These gaps point to a clear need for research that looks more closely at specific locations and more recent timeframes. This study addresses that need by examining how Life Expectancy (LE), Number of Poor People (NPP), Labor Force Participation (LFPR), and Gross Regional Domestic Product (GRDP) jointly shape HDI outcomes in East Java from 2019 to 2023. In doing so, it aims to sharpen understanding of regional development drivers and inform policies that are both more inclusive and more equitable.

## THEORETICAL FRAMEWORK AND HYPOTHESES

### Human Development Index

Todaro and Smith (2020) frame human development as the expansion of people's choices and abilities to live lives they find meaningful. Built around three pillars longevity and health (measured through life expectancy), knowledge (captured via schooling years, both actual and expected), and living standards (based on income adjusted for purchasing power) the HDI offers a composite snapshot of how much progress a country has made in raising overall quality of life, spanning both economic and social dimensions.

### Life Expectancy

How long people are expected to live doubles as a signal of public health quality and government effectiveness in service delivery. Amartya Sen's (1999) Human Development Theory challenges purely economic measures of progress, arguing that a population's ability to live long, healthy lives matters as much. Good health, in this view, isn't just a byproduct of development; it actively shapes people's capacity to make sound life choices and contribute to society. Todaro and Smith (2020) echo this, positioning life expectancy as central to the HDI because it captures how effectively a country improves health outcomes. Gains in life expectancy tend to go hand in hand with stronger public health systems, a more productive workforce, and greater overall development potential.

### Number of Poor People

Poverty and HDI typically move in opposite directions; when more people fall below the poverty line, their access to education, healthcare, and basic living standards tends to shrink accordingly.

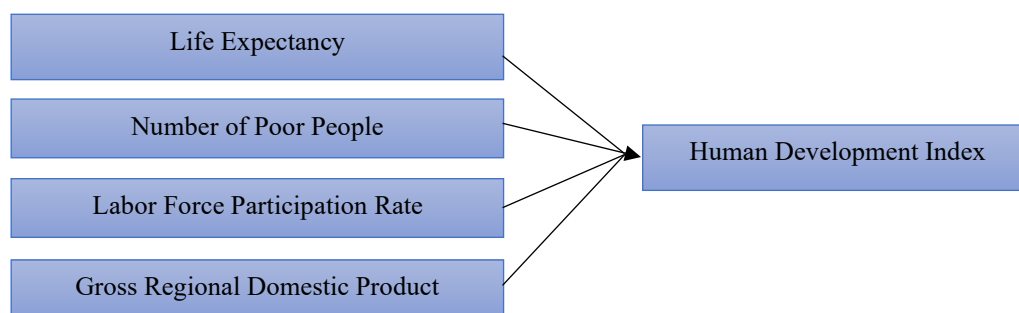
Sen's (1999) Capability Theory frames poverty as more than just a lack of income; it also represents constrained access to education, health services, and economic opportunity. Streeten (1981), through his Basic Needs framework, similarly insists that development must begin by meeting fundamental requirements such as food, health, and schooling, warning that neglecting these needs undermines overall welfare. Todaro and Smith (2020) add that poverty actively impedes human development by limiting people's access to education, healthcare, and stable employment. Where poverty is widespread, social inequality deepens, and people's ability to engage productively in the economy weakens, ultimately dragging down HDI progress.

### Labor Force Participation Rate

The Labor Force Participation Rate (LFPR) measures the share of the working-age population that is actively contributing to the regional economy. Adam Smith's (1776) Theory of Production Factors identified labor as the primary driver of economic advancement, while Solow and Swan's (1956) Neoclassical Growth Theory argued that expanding the productive workforce fuels sustained economic growth and, by extension, human development. Todaro and Smith (2020) build on this, suggesting that higher labor participation reflects more effective use of human capital—workforce engagement, particularly among women, signals rising productive capacity within society. When combined with quality education and healthcare, greater labor force participation tends to drive economic growth and improve living standards, ultimately lifting the HDI.

### Gross Regional Domestic Product

Gross Regional Domestic Product (GRDP) reflects a region's economic muscle and its capacity to fund improvements in public welfare over time. Adam Smith's (1776) Classical Growth Theory holds that expanding output of goods and services fuels economic growth and raises societal wealth. Solow and Swan (1956), in their Neoclassical Growth Theory, attribute economic expansion to the combined effects of capital accumulation, labor input, and technological advancement, all of which contribute to rising GRDP. Todaro and Smith (2020) argue that as regional income rises, so does public access to education and healthcare, which in turn drives improvements in HDI.



**Figure 1. Conceptual Framework**

### Hypothesis

#### Partial

1) Life expectancy figures( $X_1$ ):

$H_0 : \beta_1 = 0$ , there is no significant effect of Life expectancy figures on the Human Development Index in East Java Province in 2019–2023.

$H_1 : \beta_1 \neq 0$ , there is a significant effect of Life expectancy figures on the Human Development Index in East Java Province in 2019–2023.

2) Number of Poor People ( $X_2$ ):

$H_0 : \beta_2 = 0$ , there is no significant effect of the Number of Poor People on the Human Development Index in East Java Province in 2019–2023.

$H_1 : \beta_2 \neq 0$ , there is a significant effect of the Number of Poor People on the Human Development Index in East Java Province in 2019–2023.

3) Labor Force Participation Rate ( $X_3$ ):

$H_0 : \beta_3 = 0$ , there is no significant effect of the Labor Force Participation Rate on the Human Development Index in East Java Province in 2019–2023.

$H_1 : \beta_3 \neq 0$ , there is a significant effect of the Labor Force Participation Rate on the Human Development Index in East Java Province in 2019–2023.

4) Gross Regional Domestic Product ( $X_4$ )

$H_0 : \beta_4 = 0$ , there is no significant effect of Gross Regional Domestic Product on the Human Development Index in East Java Province in 2019–2023.

$H_1 : \beta_4 \neq 0$ , there is a significant effect of Gross Regional Domestic Product on the Human Development Index in East Java Province in 2019–2023.

**Simultaneous**

$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ , there is no significant effect of Life Expectancy, Number of Poor People, Labor Force Participation Rate, and Gross Regional Domestic Product on the Human Development Index in East Java Province in 2019–2023.

$H_1 : \text{At least one } \beta_i \neq 0$ , there is a significant effect of Life Expectancy, Number of Poor People, Labor Force Participation Rate, and Gross Regional Domestic Product on the Human Development Index in East Java Province in 2019–2023.

## METHODS

### Research Type and Approach

This research adopts a quantitative, panel-data-based approach to examine how regional macroeconomic factors shape human development outcomes in East Java Province from 2019 to 2023. A quantitative lens was chosen for its capacity to objectively test relationships between variables using numerical data and statistical tools (Sugiyono, 2019). Panel data was the preferred design because it captures both time-series and cross-sectional dimensions at once, allowing the study to trace patterns across districts/cities as well as over the full observation window. Baltagi (2005) notes that panel data typically yield more efficient and information-rich estimates than relying on time-series or cross-sectional data alone.

### Research Location and Time

The study covers all 38 regencies and cities in East Java Province, selected based on data availability and relevance to the research variables. The observation period from 2019 to 2023 yields a balanced panel of 190 observations.

### Type and Source of Data

All data used here are secondary, drawn from official BPS (Central Statistics Agency) publications at both the provincial and regency/city level, primarily annual reports such as "East Java in Figures" and "Regencies/Cities in Figures." Secondary sources were selected for their objectivity, accessibility, and prior validation by the national statistics authority (Wooldridge, 2019).

### Research Variables and Operational Definitions

The study features one dependent variable and four independent variables, with full operational definitions provided in Table 2 below.

**Table 2. Operational Definitions of Research Variables**

| Variable                               | Notation | Unit                               | Source | Description                                                                                                                              |
|----------------------------------------|----------|------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Human Development Index</b>         | HDI      | Index (0–100)                      | BPS    | Dependent variable that describes human development achievements through three main dimensions: health, education, and living standards. |
| <b>Life Expectancy</b>                 | LE       | Year                               | BPS    | The average number of years a person is expected to live from birth; represents the health dimension.                                    |
| <b>Number of Poor People</b>           | NPP      | Thousands of souls                 | BPS    | The number of people with per capita expenditure below the poverty line.                                                                 |
| <b>Labor Force Participation Rate</b>  | LFPR     | Percentage (%)                     | BPS    | The percentage of the working-age population that is economically active, either employed or seeking employment.                         |
| <b>Gross Regional Domestic Product</b> | logGRDP  | Billion rupiah (natural logarithm) | BPS    | Gross value added based on constant 2010 prices, logarithmized to stabilize interregional variance.                                      |

Source: Badan Pusat Statistik (BPS) of East Java Province

### Research Model Specifications

The model is built to capture how macroeconomic variables influence HDI across East Java's districts and cities over the 2019–2023 period. Using a balanced panel structure that blends cross-sectional and temporal data, it traces changes both across regions and through time. The specification is expressed as follows:

Where:

= district/city,

= year,

= constant,

= regression coefficient, and

= error term reflecting random factors and unobserved variables

Here,  $i$  denotes district/city,  $t$  denotes year,  $\beta_0$  is the constant,  $\beta_1$  through  $\beta_4$  are regression coefficients, and  $\varepsilon_{it}$  captures the error term reflecting unobserved factors and randomness. The GRDP variable was log-transformed to reduce data variance and interregional heterogeneity, while also allowing results to be interpreted in elasticity terms (Gujarati & Porter, 2020).

### Model Testing and Classical Assumption Testing

Model selection relied on the Chow and Hausman tests. The Chow test helps decide between the Common Effect and Fixed Effect specifications, while the Hausman test determines whether Fixed Effect or Random Effect better fits the data. Once the optimal model was identified, classical assumption checks were conducted to assess multicollinearity and heteroscedasticity and confirm that the model satisfies the Best Linear Unbiased Estimator (BLUE) criteria. Autocorrelation testing was not treated as mandatory here, since such checks carry less weight when the panel's time dimension is short or when the data structure naturally accounts for intertemporal linkages (Baltagi, 2005). On that basis, a separate autocorrelation test was deemed unnecessary for validating this model. Significance testing was conducted through both partial (t-test) and simultaneous (F-test) methods at a 5% significance level ( $\alpha = 0.05$ ), using a two-tailed approach that allocates a 2.5% rejection region to each tail. The coefficient of determination ( $R^2$ ) was used to gauge how well the model explains variation in the dependent variable (Gujarati, 2003).

### Data Analysis Tools

All data processing relied on EViews 12, which was used to estimate the panel models Pooled Least Squares (PLS), Fixed Effects Model (FEM), and Random Effects Model (REM), as well as to run the Chow and Hausman selection tests. The software also handled the log transformation of GRDP and performed the classical assumption checks for normality, multicollinearity, and heteroscedasticity.

**Table 3. Chow Test**

| Effects Test             | Statistic   | d.f.     | Prob.  |
|--------------------------|-------------|----------|--------|
| Cross-section F          | 860.627180  | (37,148) | 0.0000 |
| Cross-section Chi-square | 1021.440769 | 37       | 0.0000 |

Source: Eviews-12 Output Results

The Chow test yields a Cross-section F probability of 0.0000, guiding the choice between the Common Effect Model (CEM) and Fixed Effect Model (FEM). At the 5% significance threshold (0.05), this probability falls well below  $\alpha$  ( $0.0000 < 0.05$ ), leading to rejection of the null hypothesis ( $H_0$ ), which proposed CEM as the better fit. The alternative hypothesis ( $H_1$ ) is therefore accepted, confirming that the Fixed Effect Model offers a statistically stronger fit for interpreting this study's panel data.

**Table 4. Hausman Test**

| Test Summary         | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob.  |
|----------------------|-------------------|--------------|--------|
| Cross-section random | 65.294891         | 4            | 0.0000 |

Source: Eviews-12 Output Results

Similarly, the Hausman test returns a cross-sectional random probability of 0.0000, informing the choice between FEM and the Random Effects Model (REM). Since this value sits far below the 0.05 threshold ( $0.0000 < 0.05$ ),  $H_0$ , which favored REM, is rejected. This confirms FEM as the most suitable model for the study.

**Table 5. Equation Regression Estimates (Pooled Data)**

| Variable   | Coefficient | Std. Error | t-Statistic | Prob.  |
|------------|-------------|------------|-------------|--------|
| C          | -88.99005   | 3.451805   | -25.78072   | 0.0000 |
| LE         | 1.893257    | 0.076106   | 24.87642    | 0.0000 |
| NPP        | 0.007671    | 0.002457   | 3.121968    | 0.0022 |
| LFPR       | 0.016538    | 0.007584   | 2.180537    | 0.0308 |
| Log(GRDP)  | 5.297057    | 1.190402   | 4.449805    | 0.0000 |
| Bangkalan  | -4.764728   |            |             |        |
| Banyuwangi | -1.099712   |            |             |        |
| Blitar     | -4.775019   |            |             |        |
| Bojonegoro | -5.361718   |            |             |        |
| Bondowoso  | 4.955885    |            |             |        |
| Gresik     | -1.060442   |            |             |        |
| Jember     | -3.029407   |            |             |        |
| Jombang    | -0.703581   |            |             |        |
| Kediri     | -2.280583   |            |             |        |

|                  |           |
|------------------|-----------|
| Kota Batu        | 4.971478  |
| Kota Blitar      | 7.326734  |
| Kota Kediri      | -0.004865 |
| Kota Madiun      | 9.798257  |
| Kota Malang      | 5.475625  |
| Kota Mojokerto   | 7.680136  |
| Kota Pasuruan    | 7.781475  |
| Kota Probolinggo | 7.455075  |
| Kota Surabaya    | -1.167629 |
| Lamongan         | -1.171332 |
| Lumajang         | -2.880998 |
| Madiun           | 1.774262  |
| Magetan          | 1.912076  |
| Malang           | -6.618018 |
| Mojokerto        | -1.758852 |
| Nganjuk          | 0.862451  |
| Ngawi            | -1.299971 |
| Pacitan          | -2.242648 |
| Pamekasan        | 3.609835  |
| Pasuruan         | -4.142674 |
| Ponorogo         | -1.813074 |
| Probolinggo      | 1.735359  |
| Sampang          | -2.023841 |
| Sidoarjo         | -0.275107 |
| Situbondo        | 1.772966  |
| Sumenep          | -5.727834 |
| Trenggalek       | -4.417247 |
| Tuban            | -4.932631 |
| Tulungagung      | -3.559705 |

The following is the Fixed Effects Model (FEM) equation used in this study:

**Table 6. Fixed Effects Model (FEM) Equations by Regency/City**

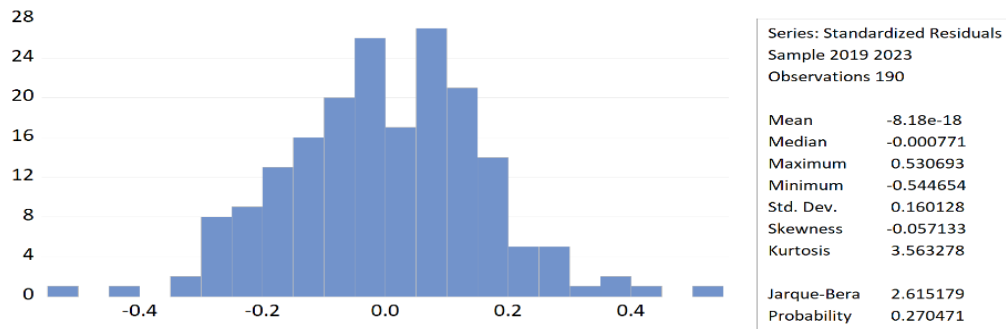
| No. | Regency/City   | Constant ( $\alpha_i$ ) | LE    | NPP   | LFPR  | Ln (GRDP) |
|-----|----------------|-------------------------|-------|-------|-------|-----------|
| 1   | Bangkalan      | -93.755                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 2   | Banyuwangi     | -90.090                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 3   | Blitar         | -93.765                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 4   | Bondowoso      | -94.452                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 5   | Bojonegoro     | -84.036                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 6   | Gresik         | -90.050                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 7   | Jember         | -92.019                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 8   | Jombang        | -89.694                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 9   | Kediri         | -94.021                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 10  | Kota Batu      | -84.019                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 11  | Kota Blitar    | -81.663                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 12  | Kota Kediri    | -88.995                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 13  | Kota Madiun    | -79.192                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 14  | Kota Malang    | -83.513                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 15  | Kota Mojokerto | -81.110                 | 1.893 | 0.008 | 0.017 | 5.297     |

| No. | Regency/City     | Constant ( $\alpha_i$ ) | LE    | NPP   | LFPR  | Ln (GRDP) |
|-----|------------------|-------------------------|-------|-------|-------|-----------|
| 16  | Kota Pasuruan    | -81.209                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 17  | Kota Probolinggo | -81.535                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 18  | Kota Surabaya    | -90.158                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 19  | Lamongan         | -89.161                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 20  | Lumajang         | -91.879                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 21  | Madiun           | -87.216                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 22  | Magetan          | -87.078                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 23  | Malang           | -95.608                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 24  | Mojokerto        | -89.149                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 25  | Ngawi            | -89.854                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 26  | Nganjuk          | -90.209                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 27  | Pacitan          | -91.215                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 28  | Pamekasan        | -85.380                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 29  | Pasuruan         | -90.073                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 30  | Ponorogo         | -90.803                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 31  | Probolinggo      | -87.255                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 32  | Sampang          | -91.014                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 33  | Sidoarjo         | -89.265                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 34  | Situbondo        | -89.963                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 35  | Sumenep          | -94.718                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 36  | Trenggalek       | -93.407                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 37  | Tuban            | -93.489                 | 1.893 | 0.008 | 0.017 | 5.297     |
| 38  | Tulungagung      | -92.550                 | 1.893 | 0.008 | 0.017 | 5.297     |

The fixed-effects estimation reveals that each district or city has its own intercept. At the same time, the coefficients for life expectancy (LE), poverty headcount (NPP), labor force participation (LFPR), and log-transformed GRDP remain constant across all regions. These varying intercepts point to underlying differences in baseline development conditions between areas that the model's independent variables alone can't fully account for. Across the board, every region posts a negative intercept, to varying degrees. In practical terms, this means that if all independent variables were hypothetically set to zero, most East Java districts and cities would start from a fairly low baseline HDI, underscoring just how much life expectancy, poverty reduction, labor participation, and GRDP matter in lifting development outcomes from that starting point.

These intercept gaps reflect bigger structural and socioeconomic differences between regions. Areas with steeper negative intercepts Malang District (-95.608), Sumenep (-94.718), and Bondowoso (-94.452) appear to face tougher structural barriers to HDI improvement, potentially including weak access to education and health services, entrenched inequality, and underdeveloped infrastructure. By contrast, regions like Madiun City (-79.192), Mojokerto City (-81.110), and Blitar City (-81.663) show less negative intercepts, suggesting a comparatively stronger starting position likely thanks to better infrastructure, higher baseline welfare, and more effective local governance. Taken together, these patterns confirm just how much baseline development conditions vary across East Java, making a one-size-fits-all policy approach ill-suited to closing HDI gaps evenly. Regions starting from a weaker position need targeted investment in education, health care access, infrastructure, and community economic empowerment. Meanwhile, regions already ahead should focus on improving human capital quality, fostering innovation, and reinforcing economic

competitiveness to sustain their lead. Ultimately, these findings make the case for development strategies tailored to each region's specific context, an approach far more likely to deliver inclusive, lasting HDI gains across East Java.



**Figure 2. Normality Test**

A normality check was run to confirm that the regression residuals follow a normal distribution. The Jarque-Bera test yields a p-value of 0.270471, comfortably above the 0.05 threshold ( $0.270471 > 0.05$ ), so the null hypothesis (that the residuals are normally distributed) holds. The model therefore satisfies the normality assumption.

**Table 7. Multicollinearity Test**

|            | LE        | NPP       | LFPR      | Log (GRDP) |
|------------|-----------|-----------|-----------|------------|
| LE         | 1.000000  | -0.387228 | -0.030833 | 0.214222   |
| NPP        | -0.387228 | 1.000000  | 0.035301  | 0.456479   |
| LFPR       | -0.030833 | 0.035301  | 1.000000  | -0.211696  |
| Log (GRDP) | 0.214222  | 0.456479  | -0.211696 | 1.000000   |

Multicollinearity was assessed using the correlation matrix of the independent variables. None of the pairwise correlations exceed the 0.8 threshold, with the highest absolute value sitting at just 0.45647. This confirms that the model is free of meaningful multicollinearity.

**Table 8. Heteroscedasticity Test**

| Description             | Statistics chi-square | Table chi-square | Testing Criteria                             | Conclusion                                 |
|-------------------------|-----------------------|------------------|----------------------------------------------|--------------------------------------------|
| Heteroscedasticity Test | 189.81                | 217.73           | Statistics: chi-square;<br>Table: chi-square | <b>No heteroscedasticity (valid model)</b> |

Heteroscedasticity was tested by comparing computed and critical Chi-square values. The calculated figure (189.81) is below the table value (217.73), meeting the criterion for accepting the null hypothesis that no heteroscedasticity is present and confirming the model's validity.

**Table 9. Uji F**

| Description           | F-Statistics | F-Table ( $\alpha = 0,05$ ) | Probability (F-Statistic) | Results                          | Description                                                                 |
|-----------------------|--------------|-----------------------------|---------------------------|----------------------------------|-----------------------------------------------------------------------------|
| F-test (Simultaneous) | 3626.139     | 2.420479                    | 0.0000                    | <i>H<sub>0</sub> is rejected</i> | <b>Simultaneously, the independent variables have a significant effect.</b> |

The F-test evaluates whether all independent variables jointly influence the dependent variable. With an F-statistic far below the 0.05 significance threshold and a value (3626.139) that dwarfs the F-table benchmark (2.420479),  $H_0$  is decisively rejected, confirming that the four predictors together exert a significant simultaneous effect on HDI.

**Table 10. T-test**

| Independent Variable            | t-Statistics | t-Table ( $\alpha = 0,05$ ) | Probability | Results               | Description                         |
|---------------------------------|--------------|-----------------------------|-------------|-----------------------|-------------------------------------|
| Life expectancy                 | 24.87642     | 1.97287                     | 0.0000      | $H_0$ is rejected     | Significantly affecting the HDI     |
| Number of Poor People           | 3.121968     | 1.97287                     | 0.0022      | $H_0$ is rejected     | Significantly affects the HDI       |
| Labor Force Participation Rate  | 2.180537     | 1.97287                     | 0.0308      | $H_0$ is not rejected | Not significantly affecting the HDI |
| Gross Regional Domestic Product | 4.449805     | 1.97287                     | 0.0000      | $H_0$ is rejected     | Significantly affecting the HDI     |

The partial t-test breaks down each variable's individual effect on HDI. Life expectancy ( $p = 0.0000$ ), poverty headcount ( $p = 0.0022$ ), and GRDP ( $p = 0.0000$ ) all clear the 0.025 significance bar, while labor force participation falls just short. Every variable's t-statistic exceeds the critical value of 1.9729. In short: life expectancy, poverty levels, and GRDP each significantly shape HDI, while LFPR's effect is not statistically significant.

**Table 11. Determination Test**

| Description | Value    | Interpretation                                                                       |
|-------------|----------|--------------------------------------------------------------------------------------|
| R-squared   | 0.999006 | The independent variable explains 99.90% of the variation in the dependent variable. |

The R-squared value of 0.999006 indicates that the model's four predictors LE, NPP, LFPR, and GRDP, collectively account for 99.90% of HDI variation, leaving just 0.10% attributable to factors outside the model.

**Table 12. Correlation Test**

| Description        | Value    | Interpretation                                                                       |
|--------------------|----------|--------------------------------------------------------------------------------------|
| Adjusted R-squared | 0.998730 | After adjusting for the number of variables, the model remains very robust (99.87%). |

Backing this up, the Adjusted R-squared of 0.998730 shows the model retains near-identical explanatory strength (99.87%) even after adjusting for the number of predictors—evidence of a robust, well-fitted model.

### The Effect of Life Expectancy on the Human Development Index

The hypothesis test confirms a statistically significant link between life expectancy (LE) and HDI, with a p-value of 0.0000, well below the 0.025 threshold, and a positive coefficient of 1.893257. In practice, this means that each additional year of life expectancy is associated with roughly a 1.893-point increase in HDI, holding other factors constant. This reinforces the idea that longer lifespans meaningfully drive human development forward. Regions with stronger public health tend to post higher HDI scores, as healthier populations can engage more productively and access better socioeconomic opportunities. This aligns with Sen's (1999) Capability Approach, which treats the ability to live long, healthy lives as a defining measure of development success. Longer-living individuals gain more time and opportunity to build their potential, whether through education or economic contribution. Rising LE also signals how effectively government policy is improving

health, sanitation, and nutrition services. It reinforces the point that good health isn't merely an outcome of development; it's a foundation for it, setting the stage for stronger human capital.

Todaro and Smith (2020) list life expectancy among the three core pillars of HDI, alongside education and living standards, meaning that, methodologically, gains in life expectancy naturally push up overall HDI scores. This carries clear policy implications: improving life expectancy signals that local governments are succeeding in building healthier environments and delivering better public services. Since healthier, longer-living populations tend to be more productive and innovative, prioritizing gains in life expectancy should be high on the regional development agenda.

### **The Effect of the Number of Poor People on the Human Development Index**

Interestingly, the estimation shows poverty headcount is positively linked to HDI, with a coefficient of 0.007671 and a probability of 0.0022, both below the 0.025 threshold. In other words, rising poverty numbers here coincide with rising HDI, a result that runs counter to the conventional assumption that more poverty should drag HDI down. On the surface, more people falling into poverty should signal weaker access to education, healthcare, and adequate living conditions. Sen's (1999) Capability Theory frames poverty as more than a lack of income; it also restricts people's freedom and ability to pursue a life they value. Streeten's (1981) Basic Needs framework similarly stresses that development hinges on meeting essentials such as food, health, and education; neglecting these essentials worsens overall welfare. Todaro and Smith (2020) argue poverty undermines development by limiting people's access to education, healthcare, and steady work. Yet this counterintuitive finding may reflect other forces at play. It could point to the effectiveness of recent government social programs. Even as poverty numbers rose, the quality of public services, especially in education and health, appears to have genuinely improved. Programs like Non-Cash Food Assistance, the Family Hope Program, the Smart Indonesia Card, and BPJS Kesehatan have expanded poor households' access to essential services. So even amid growing poverty statistics, HDI kept climbing, driven by gains in average education levels and life expectancy. This suggests that the increase in HDI here reflects progress in non-material dimensions (health, education) rather than genuine economic improvement among people with low incomes.

This pattern may also reflect uneven pacing across HDI's components. Since HDI blends health, education, and living standards, short-term gains in health and education tend to show up faster, driven by visible policy actions like expanded school access or improved primary healthcare, while economic improvements tied to poverty reduction take longer to materialize. So even if poverty ticks upward, other HDI components can still push the overall score higher, illustrating that HDI progress doesn't always move in lockstep with poverty reduction. Regional sample variation may add another layer to this story. High-poverty areas can still register meaningful education and health gains thanks to local government programs or NGO interventions, producing a cumulative HDI rise even where poverty persists. Ultimately, human development progress hinges not just on poverty levels but also on policy effectiveness, fiscal capacity, and the inclusiveness with which local governments deliver basic services. So while theory suggests that rising poverty should drag down the HDI, this study's findings show that development can still advance even amid a rise in poverty, largely thanks to effective social policy and improved public services. This underscores that human development success in Indonesia depends on more than economic conditions alone; social and institutional factors that widen access to education and healthcare matter just as much.

### **The Effect of Labor Force Participation Rate on the Human Development Index**

The partial test confirms that LFPR influences HDI in East Java, as evidenced by a t-statistic of 2.180537 and a significance value of 0.0308, just above the 0.025 threshold. This suggests that as more working-age people engage economically, human development tends to edge upward too. Because this study used a two-tailed test at 5% significance (splitting the rejection region into 2.5% on each side), a p-value above 0.025 means the relationship, while positive in direction, doesn't clear the bar for statistical significance. This suggests that growth in labor force participation isn't

consistently translating into a better quality of life. A likely explanation: much of East Java's workforce remains tied to low-productivity, low-income informal work, which may be blunting the connection between rising employment figures and tangible welfare gains. These results still align with Adam Smith's (1776) Theory of Production Factors, which casts labor as the central driver of economic value creation; more active workers should, in principle, lead to more output and greater collective welfare. Solow and Swan (1956) reinforce this through their Neoclassical Growth Theory, positioning productive labor as a key engine of sustained economic expansion. Todaro and Smith (2020) frame the rise in labor force participation as a sign that human resources are being put to more effective use. People engaged in economic activity typically gain better income prospects, which opens doors to education and healthcare, two pillars of HDI. So an increase in LFPR can signal both economic momentum and broader gains in human capability. Within East Java, high-LFPR regions like Surabaya, Gresik, and Sidoarjo post stronger HDI scores than low-LFPR areas such as Bondowoso, Sampang, and Sumenep, suggesting that greater workforce engagement generally tracks with better quality of life. This points to labor force participation as a meaningful lever for human development. Local governments should focus on strengthening employment policy, expanding vocational training, and empowering women in the workforce, boosting participation in both scale and quality, alongside productivity gains.

#### **The Effect of Regional Gross Domestic Product on the Human Development Index**

GRDP also shows a clear, statistically significant relationship with HDI, with a t-statistic of 4.449805 and significance level of 0.0000, well under the 0.025 threshold. The coefficient of 5.297394 confirms this impact is real: a 1% rise in GRDP is estimated to lift HDI by roughly 5.297%, all else held equal. Rising GRDP typically means greater production capacity and income across society, widening access to education and healthcare, and improving living conditions. This aligns with Adam Smith's (1776) Classical Growth Theory, which links the expansion of output of goods and services to broader economic and societal gains. Solow and Swan's (1956) Neoclassical Growth Model supports this, suggesting that as economic output, as reflected in GRDP, climbs, so does government and society's capacity to advance welfare. Sen (1999), through his Capability Theory, frames economic growth not as an end goal but as a means of expanding human capability, enabling people to live with dignity. Rising GRDP gives communities better access to education, healthcare, and other essentials, directly feeding into HDI's core dimensions of longevity, education, and living standards.

In East Java, high-GRDP regions like Surabaya, Sidoarjo, and Gresik also post high HDI scores, reinforcing the link between economic strength and quality of life. Conversely, lower-GRDP areas like Sumenep, Bondowoso, and Pacitan tend to lag in HDI as well, hampered by limited economic activity and constrained access to public services. These patterns confirm that sustainable, equitably distributed economic growth is foundational to progress in human development. Local governments should push for balanced growth across all regions by upgrading infrastructure, attracting productive investment, and building out strategic local industries.

#### **The Effect of Life Expectancy, Number of Poor People, Labor Force Participation Rate, and Gross Regional Domestic Product on the Human Development Index**

The F-test confirms these four variables jointly exert a significant effect on HDI across East Java from 2019 to 2023 ( $F = 3626.139$ ,  $p = 0.0000$ ). Together, they explain 99.90% of the variation in HDI ( $R^2 = 0.999006$ ), leaving just 0.10% to unmodeled external factors. This lines up with Sen's (1999) Human Development Theory, which frames development as the expansion of human capacity to live healthy, educated, prosperous lives improvements that stem not from any single cause, but from the interplay of health, economic, and social forces. Life expectancy stands out as a critical marker of health-sector progress; rising LE signals improved health and nutrition services, which directly feed into the longevity and well-being components of the HDI (Todaro & Smith, 2020). Poverty headcount, meanwhile, drags on HDI by restricting access to education and healthcare. Within Sen's (1999) Capability Theory and Streeten's (1981) Basic Needs framework,

poverty isn't just about low income; it's a barrier to living a dignified life. Reducing the poverty count should, in principle, translate into immediate gains in HDI.

Labor force participation reflects how actively the working-age population engages in the economy. Per Neoclassical Growth Theory (Solow & Swan, 1956) and Adam Smith's (1776) productivity framework, a more engaged workforce drives growth, lifts incomes, and raises living standards, all of which are central to HDI improvement. GRDP, the final variable, captures a region's economic vitality. Todaro and Smith (2020) argue that economic progress, reflected in rising GDP, expands the government's capacity to improve education, health, and access to infrastructure, thereby reinforcing the HDI's three pillars: longevity, knowledge, and living standards. Taken together, these findings make clear that lifting East Java's HDI can't rely on any single lever. Life expectancy, poverty reduction, labor force participation, and economic growth work in tandem, forming an interconnected cycle that drives sustainable human development.

## CONCLUSION

This study finds that life expectancy (LE) and Gross Regional Domestic Product (GRDP) both exert a significant, positive influence on East Java's Human Development Index (HDI), providing evidence that stronger public health and steady economic growth translate into real gains in community well-being. The poverty headcount (NPP) also shows a significant positive relationship with HDI, suggesting that poverty-alleviation efforts and government welfare programs such as PKH, BPNT, and JKN (National Health Insurance) have been genuinely effective in raising living standards. Labor force participation (LFPR), meanwhile, trends positively but falls short of statistical significance largely because much of the workforce remains concentrated in low-income informal work. Together, these four factors meaningfully shape HDI, with its growth stemming from the interplay of economic, social, and employment dynamics reinforcing one another. These results point to a clear priority for East Java's provincial government: strengthening human capital through coordinated investment in education, health, and employment. Building a stronger workforce requires vocational training, skills development, and greater support for women workers, ensuring that labor participation grows in both scale and economic productivity. Equitable growth across all regions also requires channeling productive investment into underdeveloped areas, narrowing GRDP disparities while lifting HDI more evenly province-wide. Beyond that, government poverty-reduction efforts need sharper, data-driven targeting alongside expanded access to education and health services. Sustained collaboration between government, the private sector, and educational institutions will be essential to building a development ecosystem that's both inclusive and lasting. Ultimately, raising East Java's HDI demands a holistic approach- one that strengthens human capital broadly, addressing economic, social, and labor dimensions together rather than in isolation

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