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The effect of average length of schooling, life expectancy, and labor force participation rate on the provincial Human Development Index (HDI) in 34 provinces of Indonesia, 2020

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Abstract
This study aims to analyze the effect of Average Length of Schooling (ALS), Life Expectancy (LE), and Labor Force Participation Rate (LFPR) on the Human Development Index (HDI) in Indonesia in 2020. This paper is a quantitative study employing a multiple linear regression analysis. The data that is applied in the present research is secondary data, which is official publications of the Central Statistics Agency (BPS) of 2020. The level of significance (alpha) used was 0.05 to find out the impact of each variable. The findings reveal that, to a certain extent, the Human Development Index is significantly influenced by the Average Length of Schooling and Life Expectancy, and there is no significant influence of Labor Force Participation Rate. Simultaneously, these three variables are proven to affect the Human Development Index, indicating that education, health, and labor conditions remain important components in supporting human development. Overall, these findings highlight that improving the quality of education and health plays a more dominant role in increasing Indonesia's Human Development Index in 2020 compared to the aspect of labor force participation.
Keywords: Human Development Index, Average Length of Schooling, Life Expectancy, Labor Force Participation Rate, Indonesia.

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INTRODUCTION

Human development is an essential factor in assessing the success of a nation's development process. The main focus is on economic growth and assessing the extent to which development is capable of creating a healthy, educated, and prosperous society. Human development in this case is viewed as a process of increasing the choices of people to enable them engage fruitfully in the social and economic life. One of the most comprehensive measures to reflect the level of human development is the Human Development Index (HDI) (Zea Tazliqoh, n.d.). The HDI not only reflects economic achievements but also illustrates a region's success in improving the living standards, health levels, and quality of education of its population. Through the HDI, the government can evaluate the effectiveness of development policies and identify regions that are still lagging behind in terms of human resource quality, so that development efforts can be focused on achieving more equitable

Adam Smith (1776), a pioneer of classical economics, showed that economic development is the result of a free market system that encourages the expansion of economic activity, technological progress, and increased productivity and consumption among the population. According to Smith, economic growth is influenced by three important factors, namely the availability of natural resources, population size, and the accumulation of physical and financial capital (Dwi & Hendarto, 2023). Sustainable economic growth is believed to improve public welfare through increased income, equitable distribution of employment opportunities, and advances in education and health, which are crucial factors in determining the Human Development Index (HDI). Therefore, inclusive and sustainable economic development serves as a crucial foundation for promoting the improvement of human development in a country (Parapa et al., 2023).

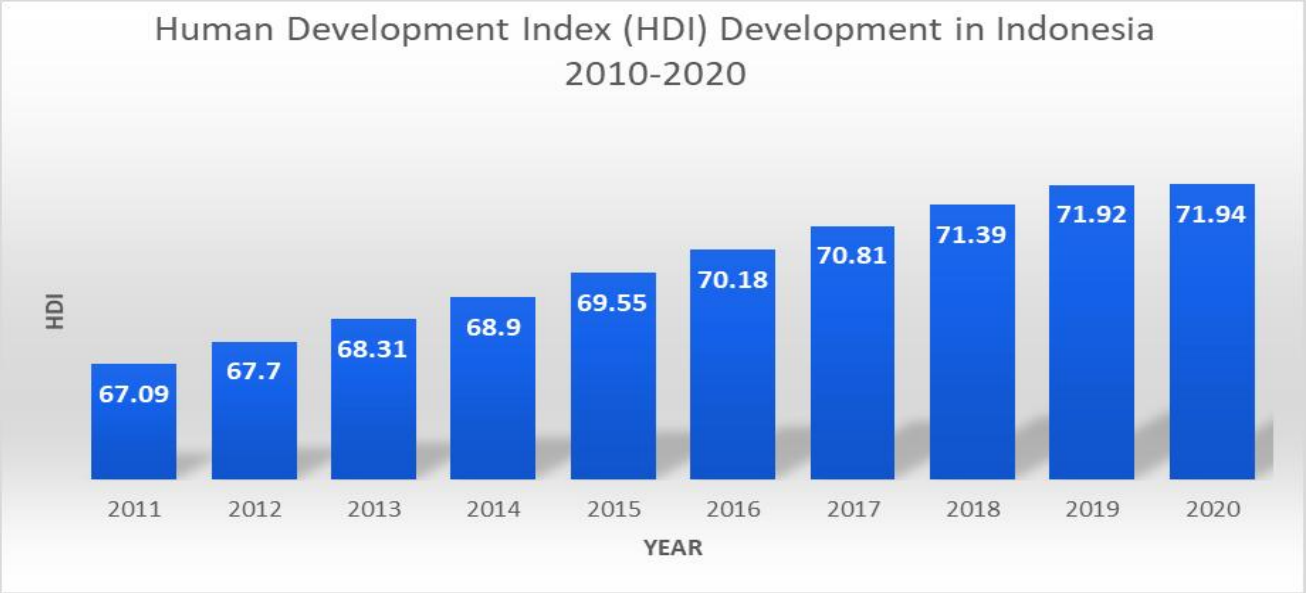

Figure 1. Development of the Human Development Index (HDI) in Indonesia in 2010-2020
Source : Badan Pusat Statistik (2025)

Based on Figure 1, Indonesia's Human Development Index (HDI) has shown steady progress throughout the last decade, from 67.09 in 2011 to 72.81 in 2020. However, this improvement has not been accompanied by an even distribution of human development outcomes across regions. In 2020, there was still a significant gap between the province of DKI Jakarta, which had the highest

HDI value of 81.92, and Papua, which had the lowest HDI value of 61.22, indicating differences in the level of human development in various regions in Indonesia.

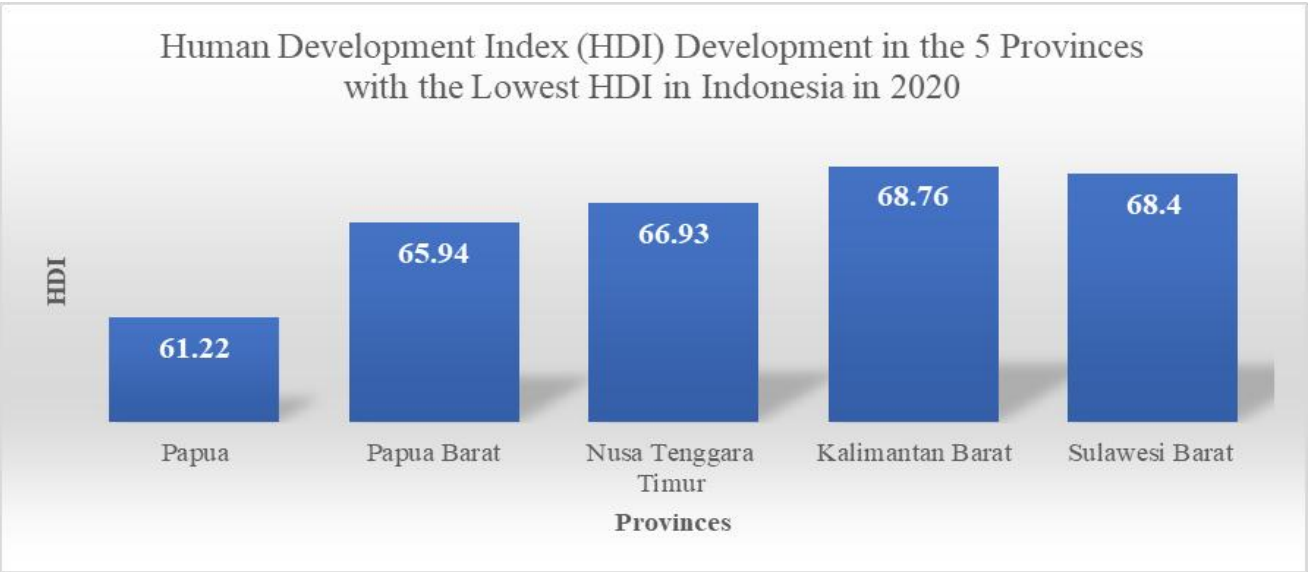

Figure 2. Development of the Human Development Index (HDI) of the 5 Lowest Provinces in Indonesia in 2020
Source: Badan Pusat Statistik (2025)

Based on Figure 2, Indonesia's overall Human Development Index (HDI) is 72.81, which shows an improvement in overall human development quality compared to previous years. However, this achievement is not yet fully evenly distributed throughout Indonesia. When viewed from a provincial comparison, there are still significant gaps between regions with high HDI and regions with low HDI. The five provinces with the lowest HDI scores in 2020 were Papua (61.22), West Papua (65.94), East Nusa Tenggara (66.93), West Sulawesi (68.40), and West Kalimantan (68.76). The average HDI of these five provinces is 66.65, or about 6.16 points lower than the national average. This difference reflects the continuing inequality in human development between regions, especially between western and eastern Indonesia. Low HDI in several provinces is generally influenced by limited access to education and health services, uneven infrastructure conditions, and low levels of economic participation. Therefore, a more inclusive and equitable development strategy is needed to encourage.

Efforts to improve the Human Development Index (HDI) in regions with low achievements such as Papua, West Papua, East Nusa Tenggara, West Sulawesi, and West Kalimantan need to focus on the main aspects that shape the HDI. With reference to the human development concept by the United Nations Development Program (UNDP), the HDI is comprised of three dimensions which include: health, education, and decent living standards (Jasasila, 2020). Health dimensions are reflected in Life Expectancy (LE), which according to the theory of health capital by Grossman (1972), is a form of human capital that can be improved through investment in education, medical services, and a healthy lifestyle. The greater the investment, the higher the productivity and life expectancy of the community, which ultimately drives an increase in HDI.(Grossman, 2001).

Furthermore, the aspect of education is measured through Average Length of Schooling (ALS), which reflects the level of knowledge and skills of the population. Based on the human capital theory proposed by Theodore W. Schultz (1961–1962), Education is an important indicator of human capital accumulation in a region. This view is reinforced by Gary Becker (1964) and Jacob Mincer (1974), who emphasize that education is a long-term investment that can increase productivity, income, and economic competitiveness (Wahyudi & Leny, 2025). On the other

hand, the dimension of a decent standard of living is reflected in the Labor Force Participation Rate (LFPR), which indicates the extent to which the productive-age population is involved in economic activities. Based on Becker's Theory of Time Allocation (1965), an individual's decision to work is influenced by wage levels, opportunity costs of time, and preferences for productive activities (Gary S. Becker, n.d.). Therefore, improving LE, ALS, and LFPR is an integral strategy in strengthening the quality of human development and reducing HDI disparities between provinces in Indonesia.

In accordance with the context of the current study, the hypothesis is to examine how the variables of Average Length of Schooling, Life Expectancy, and Labor forrce Participation Rate affect the Human Development Index in 2020 in Indonesia.

This study formulates the problem by focusing on how the development of Average Length of Schooling (ALS), Life Expectancy (LE), and Labor Force Participation Rate (LFPR) are related to the Human Development Index (HDI) in Indonesia. The other aim of the research is to quantify the strength of each variable effect on the HDI in isolation and also to analyse the total effect of the three variables on the HDI increment. By conceptualizing the issue in this way, the research is expected to provide more insight into the issues that contribute to enhancing the quality of human development in Indonesia.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Theoretical Study

1. Human Development Index (HDI)

The human development index (HDI) is a composite measure that can be used to measure the human development (Wulan et al., n.d.). It is evaluated through three main dimensions, namely health and life expectancy, education or knowledge levels, and decent living standards (Sabardin et al., 2025). The HDI assesses economic growth alone, as well as the broader quality of life of the community(Remario & Setya Wijaya, 2024). As an indicator of development outcomes, the HDI enables analysis of the success of education, health, and labor policies (Jasasila, 2020).

2. Average Length of Schooling (ALS)

Average Length of Schooling (ALS) refers to the average number of years of formal education completed by the population in a particular region. This indicator reflects the level of educational attainment and is commonly used to represent the quality of human capital (Cempaka Sari & Febriyastuti Widyawati, 2025). A higher ALS indicates better skills and knowledge among the population, which can enhance productivity and employability (Nastiti & Nailufar, n.d.).

Education is a fundamental factor in human development because it improves individuals' capacity to participate in economic and social activities. Better education also increases access to employment opportunities and public services, thereby contributing to higher living standards. In the HDI framework, ALS represents the education dimension and is considered an important determinant of human development outcomes across region (Anshori et al., n.d.). Several studies in Indonesia show that ALS exerts a beneficial effect on HDI (Halal & Aji, 2025).

3. Life Expectancy (LE)

Life Expectancy (LE) is an estimate of the expected lifespan starting from birth, based on health and environmental conditions, with current mortality rates. LE reflects the health, nutrition, and social-health facilities in a region(Alifah Handayani et al., n.d.). An increase in HLE indicates a better quality of life and greater human capacity to contribute socio-economically.

Research in Indonesia, for example, has found that HLE exerts a positive influence on the Human Development Index (HDI) (Grossman, 2001).

4. Labor Force Participation Rate (LFPR)

The Labor Force Participation Rate (LFPR) measures the proportion of the working-age population that is economically active, either employed or actively seeking employment. Based on Becker's Theory of Time Allocation (1965), individuals allocate their time between work and non-work activities to maximize utility, implying that labor market participation is influenced by expected economic returns. In this context, a higher LFPR reflects greater utilization of labor resources that may contribute to income generation and improved living standards, thereby supporting human development. Consequently, LFPR is often employed as a proxy for the decent living standard dimension of the Human Development Index (HDI) (Gary S. Becker, n.d.). However, LFPR captures only the extent of labor participation and does not account for employment quality, wage levels, or productivity. In developing economies such as Indonesia, high LFPR may be dominated by informal and low-income employment, which limits its ability to represent actual welfare conditions. Empirical studies in Indonesia also report mixed and largely insignificant effects of LFPR on HDI, indicating (*36.+Noor+Hafifah_1810311120007*, n.d.). Therefore, this study incorporates LFPR to reassess its influence on provincial variations in HDI in Indonesia in 2020 and to evaluate its relevance as a proxy for the decent living standard dimension.

Conceptual Framework

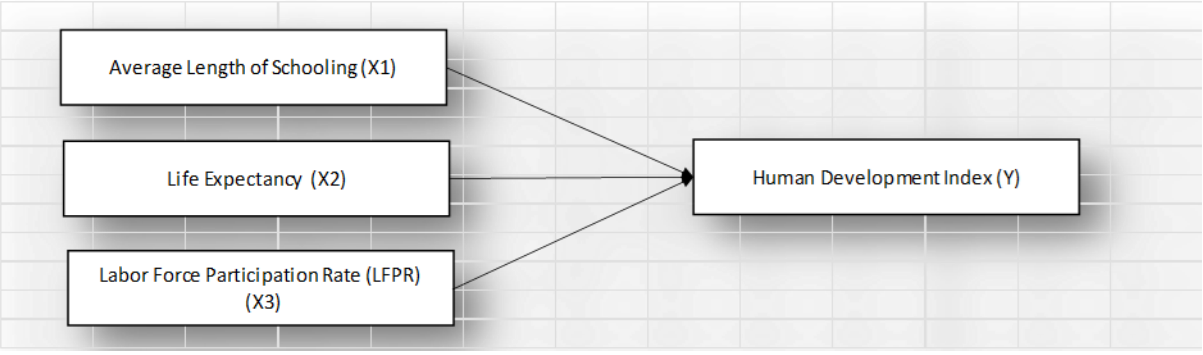

Figure 3. Conceptual Framework
Source: Author, 2025

Hypothesis:

H1: It is estimated that there is a positive and significant effect of Average Length of Education on the Human Development Index.

H2: It is estimated that there is a positive and significant effect of Life Expectancy on the Human Development Index.

H3: It is estimated that there is a positive and significant effect of Labor Force Participation Rate on the Human Development Index.

H4: It is estimated that there is a positive and significant simultaneous effect of Average Length of Education, Life Expectancy, and Labor Force Participation Rate on the Human Development Index in Indonesia.

RESEARCH METHOD

Types and Approaches in Research

Quantitative research methods are defined as systematic and objective methods for collecting and analyzing numerical data. This research has structured stages, starting from problem identification, literature review, hypothesis formulation, variable determination, instrument preparation, data collection, data processing and analysis using statistical methods, to drawing conclusions

Research Population and Sample

Cross-sectional research is an observational study that measures variables only once at a specific point in time. This method is generally used to check how often a condition occurs or to identify the relationship between risk factors and their effects in a population. In this design, the measurement of risk factors and effects is carried out simultaneously without follow-up on the subjects. Relative risk estimates are generally expressed as prevalence ratios, which are comparisons of the number of subjects experiencing a particular condition to the total number of subjects observed.(Kesmodel, 2018)

This study employs 34 observational units representing all provinces in Indonesia, which constitute the complete population of subnational administrative entities. Accordingly, the analytical objective is not to infer conclusions at the individual or household level but to examine inter-provincial variation in the Human Development Index (HDI). Since every existing province is included, the dataset reflects a population census of provincial units rather than a sample drawn from a larger population. This methodological position provides a definitive justification for the use of 34 units despite the numerical limitations identified in conventional recommendations for multiple regression analysis. The use of a full-population provincial dataset ensures that statistical inferences remain valid within the scope of provincial-level analysis.

Types and Sources of Data

This study is an official document from the Central Statistics Agency (BPS) containing data from censuses, surveys, and other statistical publications. The data is collected and processed systematically by BPS and is used as a highly valid and reliable secondary source for statistical analysis purposes. This approach is efficient because it does not require direct data collection in the field, but rather utilizes data that has been officially documented by the relevant institutions.(Febrina Situmorang, 2024)

Operational Definition of Variables

Table 1. Variable Type Data

Variable Types	Code	Operational Definition	Unit
Dependent Variable	Y	Human Development Index (HDI)	%
Independent Variable 1	X1	The Effect of Average Length of Schooling (ASL)	%
Independent Variable 2	X2	Life Expectancy (LE)	%
Independent Variable 3	XE	Labor Force Participation Rate (LFPR)	%

Source: BPS, 2025

Data Analysis Models and Techniques

In this study, the analysis method used was Multiple Linear Regression, utilizing the IBM SPSS Statistics 25 statistical program to perform Multiple Linear Regression analysis.
Multiple Linear Regression Method

Multiple linear regression is a statistical model that identifies and predicts the value of one dependent variable using two or more independent variables at the same time. This method is used to determine the combined effect of independent variables on the dependent variable in a mathematical model. Multiple linear regression helps model cause-and-effect relationships by considering several factors simultaneously, which allows for a more complete picture and a higher level of accuracy regarding the data being studied. (Sudariana, 2019)

The regression equation model used is as follows:

$HDI_i = \beta_0 + \beta_1(ALS_i) + \beta_2(LE_i) + \beta_3(LFPR_i) + \varepsilon_i$

Description:

HDI_i = Human Development Index

ALS_i = Average Length of Schooling

$LFPR_i$ = Labor Force Participation Rate

β_0 = Constant

β_1, β_2, β_3 = Regression coefficients of each independent variable

ε_i = Error term

Normality Test

Ghozali (2018) states that "Normality testing is performed to test whether the residual variables in a regression model are normally distributed or not." In evaluating a well-constructed regression model, it is assumed that the residuals should have a normal or near-normal distribution. A test used to test this is the Kolmogorov-Smirnov test where the null hypothesis formulates that the model residues are normally distributed. If the significance of the test exceeds 0.05, the residuals are considered normal. In addition, another approach that can be applied is to look at graphs, such as the Normal Probability Plot, to ascertain the residual data having a normal distribution, i.e., whether it follows a diagonal line or not. This normality test is crucial to ensure the validity of statistical analysis results in research, especially those requiring multivariate analysis and regression.

The Multicollinearity Test

Ghozali (2018) states that "The purpose of this test is to identify whether there is a strong relationship between independent variables in the regression model". On a good model analysis, It must be considered that high correlation cannot occur between the independent variables. This test generally uses the measurement of Variance Inflation Factor (VIF) and tolerance, provided that the VIF is above 10 and the tolerance is below 0.1 indicates the existence of multicollinearity. This condition can cause regression results to be unstable and biased.

Autocorrelation Test

Ghozali (2018) states that "The autocorrelation test aims to test whether in the linear regression model there is a correlation between the error (residual) in period t and the previous period (t-1)". Autocorrelation occurs if the residuals at consecutive times are interrelated, which can cause the regression results to be invalid. This test is usually done with Durbin-Watson, where certain statistical values indicate the presence or absence of autocorrelation in the regression model.

Ghozali (2018) states that "The autocorrelation test is performed using the Durbin-Watson statistic, which has a value between 0 and 4. A value around 2 indicates no autocorrelation, a value close to 0 indicates positive autocorrelation, and a value close to 4 indicates negative autocorrelation." The autocorrelation assessment also refers to the lower limit (dL) and upper limit (dU) of the Durbin-Watson table. If the DW value is between dL and dU, the test result is uncertain; if DW is less than dL, positive autocorrelation occurs; if DW is greater

than 4-dL, negative autocorrelation occurs; while a DW value between dU and 4-dU indicates an autocorrelation-free model.

Heteroscedasticity Test

Ghozali (2018) states that "The heteroscedasticity test aims to test whether there is inequality in the residual variance from one observation to another in the regression model." To assess whether the regression model is a good model, it is important for the residuals to show consistent variance, also known as homoscedasticity. A commonly applied approach for identifying heteroscedasticity is the Glejser test. This method involves regression between independent variables and residual values in absolute form. In cases where the significance level of the independent variable exceeds 0.05, this indicates the absence of heteroscedasticity. But, the significance value of less than 0.05 is the evidence of heteroscedasticity. It is important to perform this test to ensure that the classical assumptions of regression are met, so that the results of the analysis can be trusted and relied upon to draw conclusions in research and journal publications.

Partial Test (t-test)

Ghozali (2018) states that "The partial test (t-test) is used to test the effect of each independent variable on the dependent variable separately." The testing condition is that in case the computed t-value exceeds the t-value in the table or the significance value (p) falls below 0.05, the independent variable exerts a significant influence on the dependent variable. On the other hand, when the computed t-value is lower than the t-table or p is more than 0.05, it means that the independent variable is not significant. This test helps determine which variables partially influence the regression model's dependent variable.

The Simultan Test (F Test)

Ghozali (2018) states that "The simultan test or F test is used to determine whether independent variables collectively influence the dependent variable." This test also plays a role in assessing whether the regression function is suitable for estimating actual values through model suitability measurements. In this test the null hypothesis is rejected when calculated F exceeds the critical F value at significant level of 0.05. This means that the independent variables have a statistically meaningful overall impact on the dependent variable. On the other hand, when the F value calculated is below the critical F value, the independent variables do not interact with each other on the dependent variable.

Correlation Coefficient Test (r)

Ghozali (2018) states that "The correlation coefficient test is used to determine and test the relationship between two variables with interval or ratio data scales." This correlation coefficient provides details regarding the direction and strength of a linear association between the two variables, whereby a positive value signifies a direct relationship (both increase or decrease jointly) and a negative value indicates an oppositional association. The nearer the value to 1 or -1, the higher the correlation is deemed to be; the nearer the value to 0, the very weak correlation or none at all. The interpretation of the strength of the correlation is categorized from very low to very strong based on the existing value range.

Determination Coefficient Test (R squared)

Ghozali (2018) states that "The determination coefficient (R squared) is used to determine the magnitude of the simultaneous influence of independent variables on dependent variables." Its value spans between 0 and 1. As the value approaches 1, the greater the possibility

for the model to explain the variance occurring in the dependent variable. Conversely, a value close to 0 indicates that the model is less capable of describing the variation.

RESULTS AND DISCUSSIONS

Research Results

Normality Test and Classical Assumptions

1. Normality Test

Table 2. Normality test

Variable	Kolmogorov–Smirnov Statistic	df	Sig.	Shapiro–Wilk Statistic	df	Sig.
Human Development Index (HDI/IPM)	0.171	34	0.013	0.939	34	0.058
Average Length of Schooling (ALS)	0.057	34	0.200*	0.986	34	0.931
Life Expectancy (LE)	0.069	34	0.200*	0.977	34	0.665
Labor Force Participation Rate (LFPR)	0.112	34	0.200*	0.962	34	0.284

Source: Processed Data IBM SPSS Statistics 25

Referring to Table 2, the significance values (Sig.) of the Shapiro-Wilk test for each variable can be explained as follows: one of them is the IPM variable with a significance value (0.0580), the LE variable (0.665), the LFPR variable (0.284), and the ALS variable (0.931). All of the above significance values are above the significance level of $\alpha = 0.05$, namely 0.058 > 0.05; 0.665 > 0.05; 0.284 > 0.05; and 0.931 > 0.05. This indicates that the four research variables are normally distributed.

2. Classical Assumption Tests

Classical assumption tests are important analyses conducted to detect and address assumption problems in Ordinary Least Square (OLS) linear regression models. These classical assumptions must be met in order for the regression results to be valid and reliable. Violations of these assumptions can cause the regression model to produce biased, inconsistent, and inefficient estimates. Classical assumption tests include testing for residual normality, homoscedasticity, autocorrelation, and multicollinearity. (Mardiatmoko, 2020)

2.1. Test for Multicollinearity

Table 3. Multicollinearity

Variable	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.	Tolerance	VIF
(Constant)	-25.456	13.228		1.924	0.064		
Average Length of Schooling (ALS)	2.503	0.416	0.534	6.018	0.000	0.733	1.364
Life Expectancy (LE)	0.957	0.124	0.619	7.693	0.000	0.891	1.122

Variable	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.	Tolerance	VIF
Labor Force Participation Rate (LFPR)	0.099	0.116	0.074	0.853	0.401	0.773	1.294

Source: Processed data from IBM SPSS Statistics 25

Referring to Table 3, it is obtained that the Variance Inflation Factor (VIF) values for the variables Life Expectancy (LE), Labor Force Participation Rate (LFPR), and Average Length of Schooling (ALS) are 1.122, 1.294, and 1.364, respectively. All of these values are well below the maximum limit of 10. Meanwhile, the Tolerance values for the three variables also exceed 0.10, namely 0.891, 0.773, and 0.733. The low VIF and strong Tolerance values indicate that the independent variables do not have a strong correlation. Therefore, it is possible to affirm that the regression model used in this paper does not have multicollinearity problems.

2.2. Heteroscedasticity Test

Table 4. Heteroscedasticity Test

Variabel	Coefficient	Std.Error	t Statistic	Prob.
Constant	-25.456	13.228	-1.924	0.064
Average Length of Schooling (ALS)	2.503	0.416	6.018	0.000
Life Expectancy (LE)	0.957	0.124	7.693	0.000
Labor Force Participation Rate (LFPR)	0.099	0.116	0.853	0.401

Source: Processed Data from IBM SPSS Statistics 25

Based on Table 4, it can be seen that the points are scattered randomly above and below the zero line without showing any particular pattern. This random pattern of distribution shows that the regression model is not subjected to heteroscedasticity. Thus, the assumptions are fulfilled by the model that is applied and can be used further.

2.3. Autocorrelation Test

Table 5. Autocorrelation Test

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate	Durbin–Watson
1	0.909	0.827	0.809	1.70324	1.407

Source: Data processed using IBM SPSS Statistics 25

According to Table 5 results, the R value (0.909) shows that the independent and dependent variables are linked by a highly robust association. The value of R-squared (0.827) shows that the model is able to explain 82.7% change in the dependent variable. Meanwhile, the Adjusted R-Square value (0.809) provides a more accurate measurement because it is adjusted for the number of variables in the model, thus reflecting the model's ability more realistically. The Durbin-Watson is 1.407, which shows that there is no severe autocorrelation. Therefore, this regression model is considered to have met all the necessary assumptions and is valid for further analysis.

3. Regression Analysis Results

3.1. Regression Coefficients

Table 6. Regression Coefficients

Variable	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.	Tolerance	VIF
(Constant)	-25.456	13.228		1.924	0.064		
Average Length of Schooling (ALS)	2.503	0.416	0.534	6.018	0.000	0.733	1.364
Life Expectancy (LE)	0.957	0.124	0.619	7.693	0.000	0.891	1.122
Labor Force Participation Rate (LFPR)	0.099	0.116	0.074	0.853	0.401	0.773	1.294

Dependent Variable: Human Development Index (IPM)

Source: Processed Data from IBM SPSS Statistics 25

Based on the Regression Coefficients in Table 6, this can be demonstrated through the regression equation:

$$\text{IPM}_i = -25.456 + 2.503\ (\text{ALS}_i) + 0.957(\text{LE}_i) + 0.099(\text{LFPR}_i) + \varepsilon_i$$

Interpretation:

- β_0 = -25.456, when the independent variable is equal to the constant, the value of the Human Development Index (HDI) variable is -25.456%.
- β_1 = 2.503 (ALS), when the Average Length of Schooling (ALS) variable increases by 1%, the HDI will increase by 2.503%.
- β_2 = 0.957 (LE), when the Life Expectancy (LE) variable increases by 1%, the HDI will increase by 0.957%.
- β_3 = 0.099 (LPR), when the Labor Force Participation Rate (LPR) variable increases by 1%, the HDI will increase by 0.099%.

3.2. Partial Test (t-test)

Table 7. Partial Test (t-test)

Variable	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.	Tolerance	VIF
(Constant)	-25.456	13.228		1.924	0.064		
Average Length of Schooling (ALS)	2.503	0.416	0.534	6.018	0.000	0.733	1.364
Life Expectancy (LE)	0.957	0.124	0.619	7.693	0.000	0.891	1.122
Labor Force Participation Rate (LFPR)	0.099	0.116	0.074	0.853	0.401	0.773	1.294

Source: Processed Data from IBM SPSS Statistics 25

Drawing from the partial (t-test) results presented in Table 7, it can be seen that the variable Average Length of Schooling (X1) shows a t-value of 6.018 with a significance of 0.000. Because the t-value (6.018) is greater than the critical t-value (2.042272456) and the significance value of 0.000 is below 0.05, it can be interpreted that Average Length of Schooling (X1) exerts a significant positive influence on the Human Development Index (HDI).

Furthermore, the LE variable (X2) produced a t-value (7.693) at a significance value of 0.000. The t-value (7.693) is above the critical t-value (2.042272456) and the significance value of 0.000 is below 0.05, indicating that LE (X2) exerts a statistically significant positive influence on the Human Development Index (HDI).

Meanwhile, the LFPR variable (X3) has a t-value (0.853) at a significance value of 0.401. Because the t-value (0.853) is below the critical t-value (2.042272456) and the significance value of 0.401 is above 0.05, it may be inferred that LFPR (X3) has no effect and is not significant on the HDI.

3.3. Simultaneous Test (F-Test)

Table 8. Simultaneous Test (F-Test)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	415.383	3	138.461	47.728	0.000
	Residual	87.031	30	2.901		
	Total	502.414	33			

Source: Processed Data from IBM SPSS Statistics 25

According to the outcome of the concurrent test in Table 9, the computed F value is 47.728 that exceeds the critical F value of 2.922. Also, the value of the significance of 0.000 is lower as compared to that of $\alpha = 0.05$. This finding indicates that the regression model constructed is simultaneously significant. Thus, it can be concluded that the variables of Average Length of Schooling (ALS), Life Expectancy (LE), and Labor Force Participation Rate (LFPR) together have a significant effect on the Human Development Index (HDI).

3.4. Correlation

Table 9. Correlation

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate	Durbin–Watson
1	0.909	0.827	0.809	1.70324	1.407

Source: Processed Data from IBM SPSS Statistics 25

Referring to the table above, the correlation coefficient (R) value obtained is 0.909. This value indicates a very strong positive relationship between the independent variables, namely Average Length of Schooling (ALS), Life Expectancy (LE), and Labor Force Participation Rate (LFPR), and the dependent variable, Human Development Index (HDI).

3.5. Determination

Table 10. Determination

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate	Durbin–Watson
1	0.909	0.827	0.809	1.70324	1.407

Source: Processed Data from IBM SPSS Statistics 25

From the output results in Table 10, an R-squared value of 90.827 was obtained. This value indicates that the ALS, LE, and LFPR variables are able to explain 82.7% of the variation in the HDI. Thus, the regression model applied shows adequate capability and excellent explanatory power. The other 17.3 percent is represented by other variables that are not included within the limits of this research which did not feature in the analysis.

Discussion:

a. The Effect of Average Length of Schooling (ALS) on the Human Development Index (HDI)

Based on the partial test results, the Average Length of Schooling (ALS) variable shows a t-statistic of 6.018 with a significance level of 0.000. Since the t-value exceeds the critical value 2.042272456 and the p-value is below 0.05, it can be concluded that ALS has a positive and statistically significant effect on the Human Development Index (HDI) in Indonesia in 2020. This finding indicates that provinces with higher average years of schooling tend to achieve higher levels of human development.

This result is consistent with the findings of Asmawani and Eddy Pangidoan (1990), who reported that education, as measured by years of schooling, significantly contributes to HDI improvement. Similar evidence is also found in more recent studies in Indonesia, which emphasize that increased educational attainment enhances human capital and plays a crucial role in improving human development outcomes. The consistency of these findings confirms that education remains a key determinant of HDI across different periods and regional contexts.

From a human development perspective, education is a strategic investment that expands individual capabilities, improves skills and knowledge, and enhances productivity and competitiveness at the regional level. Higher educational attainment enables individuals to access better employment opportunities and income, which in turn supports improvements in health and overall quality of life. Therefore, policies aimed at expanding equal access to education, improving the quality of learning, and strengthening educational infrastructure are essential to support sustained increases in ALS and, consequently, HDI across regions in Indonesia.

b. The Effect of Life Expectancy (LE) on the Human Development Index (HDI)

Based on the partial test results, Life Expectancy (LE) exhibits a t-statistic of 7.693 with a significance level of 0.000. Since the t-value exceeds the critical value 2.042272456 and the p-value is below 0.05, it can be concluded that LE has a positive and statistically significant effect on the Human Development Index (HDI) in Indonesia in 2020. This finding indicates that provinces with higher life expectancy tend to achieve higher levels of human development.

This result is consistent with the study of Asmawani and Eddy Pangidoan (1990)**,** which also found that life expectancy has a significant positive impact on HDI. Similar conclusions have been reported in more recent empirical studies, suggesting that improvements in population health are a fundamental driver of human development outcomes. The consistency of these findings reinforces the importance of the health dimension as a core component in the HDI framework.

From a human development perspective, life expectancy reflects a population's ability to live longer and healthier lives, which is closely related to the availability of health services, adequate nutrition, and a supportive living environment. Regions that succeed in improving these conditions are more likely to experience increases in life expectancy, thereby strengthening the longevity dimension of HDI. Therefore, sustained investment in health infrastructure and public health programs is essential to promote human development and reduce interregional disparities in Indonesia.

c. The Effect of Labor Force Participation Rate (LFPR) on the Human Development Index (HDI)

Based on the partial test results, the Labor Force Participation Rate (LFPR) shows a t-statistic of 0.853 with a significance level of 0.401. Since the t-value is lower than the critical value 2.042272456 and the p-value exceeds 0.05, it can be concluded that LFPR does not have a statistically significant effect on the Human Development Index (HDI) in Indonesia in 2020. This finding indicates that variations in labor force participation across provinces are not directly associated with differences in human development outcomes.

This result is consistent with the study of Anggi Wida Nastiti (2023), which also reported that LFPR has no significant influence on HDI in Indonesia. The consistency of these findings suggests that labor participation alone is insufficient to explain improvements in human development, particularly when employment opportunities are dominated by informal or low-wage jobs. In such conditions, participation in the labor market does not necessarily translate into higher income or better living standards.

Several factors may explain the insignificance of LFPR in this study. First, a substantial proportion of the working-age population may choose to continue education rather than immediately entering the labor market, indicating that lower labor force participation does not necessarily reflect weaker human development, but may instead signal investment in human capital through education. Second, the limited availability of productive and decent jobs constrains the ability of labor participation to translate into improved welfare, particularly when employment is dominated by low-productivity and informal sectors. Furthermore, the relatively low variation of LFPR across provinces reduces its explanatory power in a cross-sectional analysis with only 34 observations. Finally, as an aggregate indicator, LFPR fails to capture employment quality, productivity, income levels, and income distribution, which are more directly linked to the standard of living dimension of HDI. Overall, these findings suggest that while labor force participation is an important economic indicator, its contribution to human development is not automatic and depends critically on the quality and productivity of employment rather than merely the level of participation.

d. The Effect of Average Length of Schooling (ALS), Life Expectancy (LE), and Labor Force Participation Rate (LFPR) on the Human Development Index (HDI)

Based on the results of the simultaneous test, the calculated F-statistic of 47.728 exceeds the critical F value of 2.922, with a significance level of 0.000, which is below $\alpha = 0.05$. This indicates that ALS, LE, and LFPR jointly have a statistically significant effect on the Human Development Index (HDI) in Indonesia in 2020. These findings confirm that the regression model is appropriate and that the three explanatory variables collectively contribute to variations in HDI across provinces.

This result is consistent with the general findings of previous studies on human development in Indonesia, which emphasize that education and health, together with economic participation, play important roles in shaping HDI outcomes. Empirical evidence in the literature commonly reports that multidimensional factors are required to explain human development, rather than relying on a single indicator. Thus, the simultaneous significance found in this study supports the multidimensional framework of HDI proposed by the United Nations Development Programme (UNDP).

Nevertheless, the partial test results reveal that only ALS and LE have significant individual effects on HDI, while LFPR does not. This suggests that the contribution of LFPR becomes meaningful only when it is considered together with education and health factors, but it is not strong enough to independently explain variations in HDI. In this context, LFPR may function as a complementary variable that reflects the broader economic environment supporting human development, rather than as a primary determinant.

Overall, the findings indicate that improvements in human development are predominantly driven by progress in education and health dimensions, as reflected in ALS and LE. Although labor force participation remains an important aspect of economic activity, its impact on HDI appears to be conditional and indirect. Therefore, policies aimed at enhancing human development in Indonesia should prioritize investments in education and health, while simultaneously creating productive employment opportunities to strengthen the supporting role of labor conditions

CONCLUSION

Average Length of Schooling (ALS) has a positive and significant impact on the Human Development Index (HDI). Such results reveal that the better the education level the population is able to attain, the more it is able to contribute towards the betterment of the human resources. This condition ultimately encourages an increase in HDI achievement in a region. Life expectancy has been proven to have a positive and significant impact on HDI. These results confirm that improvements in the quality of public health will have an impact on HDI, because a healthy community tends to have better productivity and quality of life, which is reflected in an increase in HDI values. The Labor Force Participation Rate (LFPR) has no partial and insignificant impact on HDI. This condition shows that the labor force participation rate does not directly reflect an increase in living standards, so its contribution to the HDI does not show a significant effect. Simultaneously, ALS, LE, and LFPR have a significant impact on the HDI. Therefore, these three factors collectively play a crucial role in explaining HDI variations, although the greatest influence comes from the dimensions of education and health.

This study is limited by the small number of observations (n = 34), which may reduce statistical power and the robustness of the regression model. The cross-sectional design with aggregated provincial data also restricts data variability. Therefore, the findings should be interpreted with caution, and future research is recommended to use panel data or more detailed units of analysis.

The government needs to improve equitable access to education by providing adequate facilities, improving the quality of teaching staff, and expanding education programs in areas with low Human Development Index (HDI) scores. These efforts are important for improving community competence and strengthening the contribution of education to the Human Development Index (HDI). Health services must be strengthened in a sustainable manner by improving health infrastructure, the availability of medical personnel, and disease prevention and treatment programs. Improving the quality of public health will directly contribute to raising life expectancy and, in turn, support an increase in the HDI. The government needs to optimize employment policies by encouraging the creation of productive jobs, improving the quality of job training, and matching the skills of the workforce with the needs of industry. This measure should boost the role of LFPR so that it will be able to affect the HDI in a greater way. Collaboration between the education, health, and labor sectors needs to be enhanced to promote more comprehensive human development. Integration of policies across sectors can produce more effective synergies in enhancing the community's overall well-being.

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