

THE EFFECT OF LIFE EXPECTANCY, POVERTY RATE AND THE NUMBER OF GOVERNMENT HEALTH INSURANCE PARTICIPANTS ON THE HUMAN DEVELOPMENT INDEX IN EAST JAVA PROVINCE IN 2023

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Abstract

The issues of poverty, low quality of life, and development inequality are still central issues in the socioeconomic dynamics in East Java Province. Within this framework, increasing community participation in national health insurance programs, such as BPJS Kesehatan, is seen as one of the strategic instruments in reducing the level of social vulnerability. This study aims to analyze the effect of Life Expectancy (LE), Poverty Rate (PR), and Number of Health Insurance Participants (NHIP) on the Human Development Index (HDI) in East Java Province in 2023. Using an associative quantitative approach and secondary data from 38 districts/cities, the analysis was conducted through the application of multiple linear regression to test the relationship between the variables studied. The results showed that the LE and NHIP variables had a significant positive effect on HDI, while the PR variable showed a significant negative effect. Simultaneously, the three variables were able to explain 80.64% of the variation in HDI. This study provides the latest empirical contribution related to the dynamics of human development in 2023 and shows disparities between regions in East Java Province. The findings underscore the importance of increasing the number of health insurance participants and improving health conditions in expanding social security coverage, while poverty remains a major constraint. Therefore, efforts to increase life expectancy, alleviate poverty, and strengthen health insurance participation need to be integrated synergistically in the formulation of social protection policies to encourage more inclusive and sustainable human development.

shown to contribute to awareness and enrollment in health insurance schemes (Ramudzuli, 2019; Lestari et al., 2021). While economic and structural factors are often the main focus, such social dimensions cannot be overlooked.

Therefore, this study aims to empirically analyze how HDI, life expectancy, and poverty levels affect the number of health insurance participants in East Java Province. Given the ongoing development disparities between regions, the findings of this research are expected to provide more targeted policy recommendations and support the achievement of Universal Health Coverage (UHC) in a sustainable manner.

LITERATUR REVIEW

HUMAN DEVELOPMENT INDEX

The Human Development Index (HDI) is a composite indicator designed to evaluate a country's level of development based on three main dimensions: population health, access to education, and a decent standard of living. This index provides a quantitative framework for assessing and comparing human development achievements both between countries and over time (Prathamesh Muzumdar, 2025). The HDI is also used to categorize and rank countries based on their scores in these three dimensions (Amalia et al., 2023). The HDI plays a crucial role for policymakers, development observers, and social activists in analyzing and monitoring human development progress in a region (G. Cambel, 2020). The HDI was first introduced by the United Nations Development Programme (UNDP) as a composite measure to represent societal well-being by assessing health status, education quality, and income levels. This approach enables a more comprehensive assessment of population well-being and national development (Kuldeep Singh, 2025).

According to (Biao, 2011), education, per capita income, and health are the three main elements of the Human Development Index (HDI), which reflects the development of the modern world from the emergence of classical economic theory to the emergence of the concept of sustainable economic welfare. Research by (Wisana, 2023) suggests that an increase in the HDI is positively correlated with higher community involvement in the National Health Insurance Program (JKN) among groups with higher levels of education and income, as they generally have a higher level of awareness and understanding of the importance of health services and broader access to health information (Andry Alamsyah, 2018). These findings indicate that the HDI plays a role as a determining factor in encouraging an increase in the number of BPJS Kesehatan participants.

Research by Alkire (2010) in the UNDP Human Development Report 2010 introduced for the first time a human development index adjusted for inequality (HDI) for many countries (Michael Hopkins, 1991). The HDI reflects adjustments to average human development achievements by taking into account the level of inequality in each dimension. On the other hand, the ability of communities to access welfare, basic health services, and adequate education also shapes a new paradigm in the direction and change of human development goals (Izete Pengo Bagolin, 2008). Research conducted by (Aolin Wang, 2017) using World Health Survey data from 42 low- to middle-income countries found that the human development index (HDI) has a positive influence on individual health status, particularly through the Education dimension.

LIVE EXPECTANCY

Life expectancy reflects the projected average age that a person is expected to live after reaching a certain age in a given period. This indicator can also be

interpreted as the average number of years an individual is expected to live after their birthday (Cao et al., 2020). Life expectancy is one of the benchmarks used to assess the government's performance in improving public welfare, which is measured by the number of babies expected to live longer each year. Over the past few decades, the increase in life expectancy has been largely due to a linear shift from the younger age group to the older age group (Alho, 1989).

The DEALE (Declining Exponential Approximation of Life Expectancy) method assumes that life expectancy follows a simple exponential decline pattern. Life expectancy at birth is an important component of the HDI, where the health index value is calculated based on the ratio between the life expectancy of a region and the global minimum and maximum limits. This value is then combined with the education index and income index using the geometric mean method to produce the final HDI score. (SG Pauker, 1982) shows that life expectancy plays an important role in determining the HDI value, along with education levels and national income. One important aspect of AHH is its ability to reveal patterns of variation and similarity in previous empirical studies related to its contribution to the Human Development Index (HDI). For example, (I Iskandar, 2017) notes a significant increase in human development quality in 23 districts/cities in Aceh Province influenced by special budget allocations for the health and education sectors. This significant increase in AHH has been proven to drive the HDI toward greater sustainability (K. Harttgen & Klasen, 2019).

On a national scale, (PY Wijaya, 2021) researched the relationship between socioeconomic conditions and life expectancy in several prospective European Union member countries. Their findings revealed that high per capita income and low infant mortality rates significantly contribute to increased life expectancy, which in turn positively impacts the improvement of the Human Development Index (HDI). In other words,

the better the quality of healthcare services, nutrition, and social conditions in a society, the higher the life expectancy, which further drives the improvement of the HDI. Thus, life expectancy has a positive impact on the improvement of the HDI (K. S. K. Harttgen, 2011).

Research (Trisnantoro, 2019) also confirms that AHH is not merely a health indicator, but can also reflect the fulfillment of various basic human needs. Therefore, an increase in AHH reflects the success of comprehensive human development and makes this indicator one of the most important benchmarks for assessing the quality of life in a region. (Srijit Mishra & Hippu Salk Kristle Nathan, 2018).

POVERTY RATE

In general, poverty refers to a situation in which individuals do not have sufficient means to meet their basic needs in life. In Indonesia, poverty levels are calculated by the Central Statistics Agency (BPS) using specific measurement criteria and minimum per capita expenditure thresholds. (Putri, 2024) states that there is a negative relationship between poverty levels and the Human Development Index (HDI), as well as with community participation in social protection programs, including participation in the Health Social Security Agency (BPJS Kesehatan) (Syarif et al., 2023). Conceptually, poverty is classified into two main types: absolute poverty and relative poverty (Marcin Dudziński & Joanna Kaleta, 2021). Absolute poverty describes a situation where a person's income is below the minimum required to meet basic needs, such as food, clothing, and shelter. Conversely, relative poverty arises when a person's income is far below the average income of the surrounding community, thereby limiting that individual's ability to participate socially and economically, even though they are not considered poor in absolute terms (Mahoney, 2015).

In the context of the social health insurance system, poverty acts as an enabling factor that can influence the decisions of

individuals or households to participate in health insurance programs. High levels of poverty often result in limitations in paying premiums, accessing health care facilities, and understanding the benefits of available programs. To address these barriers, the government typically implements subsidy policies, such as the Premium Assistance Recipient (PBI) scheme, to ensure that the poor remain protected under the National Health Insurance (JKN) system. Thus, poverty is not merely an economic indicator but also a reflection of the effectiveness of the social system and the government's responsibility in ensuring collective well-being. In this study, the poverty rate is positioned as one of the independent variables to evaluate the extent of the influence of economic limitations on the level of community participation in the BPJS Health program (J. Robert Beck, M.D. · Jerome P. Kassirer, M.D. · Stephen G. Pauker, 2025).

A study conducted by (UWKS, 2023) identified that poverty in East Java Province is influenced by several factors, including the Human Development Index (HDI), open unemployment rate, and population size. In this context, the poor tend to be highly dependent on the BPJS Health Insurance Premium Assistance Program (PBI), which is funded by the government budget (orge M. Bravo, 2021). Poverty is one of the main obstacles to increasing BPJS Health coverage. (Simbareja, 2020) revealed that individuals with low incomes tend to be inconsistent in paying their National Health Insurance (JKN) premiums, putting them at risk of being disconnected from services. Economic factors are a key element influencing both the ability and willingness of individuals to participate in health insurance schemes (Eileen M. Crimmins, 2019).

Research by (FN Keliat, 2024) confirms that socioeconomic status has a significant influence on the level of participation in the BPJS program. People with a good level of knowledge and a positive perception of the benefits of BPJS services are more likely to register and remain active as participants.

Further research by Eurostat Your Key to European statistics, 2020). The poverty risk rate (At-Risk-Of-Poverty rate or ARPR) is defined as the percentage of the population whose income does not exceed 60% of the national median income. One of the initial approaches developed by (Zielinski, 2009) involves constructing a non-parametric confidence interval without assumptions about the data distribution for ARPR. Another innovative approach was proposed by (Luo, 2023) through the concept of intervals for the Low-Income Proportion (LIP) measure, which is a form of ARPR. A study utilizing data from the China Health and Retirement Longitudinal Study (CHARLS) to evaluate the impact of health insurance system integration in urban and rural areas shows that the risk of chronic poverty decreased by 6.3% after the implementation of the integrative policy (PubMed). These findings confirm that inclusive insurance structures, such as subsidized social security models (e.g., Penerima Bantuan Iuran/BPJS PBI in Indonesia), not only play a role in expanding access to health services but also contribute significantly to reducing poverty levels (Jonneke Bolhaar, 2012).

(I Vilcu, 2016) in his publication in the International Journal for Equity in Health examined the effectiveness of premium subsidy programs in increasing the participation of poor communities in health insurance in various Asian countries (George Loewenstein, 2013). The study found that insurance subsidy schemes significantly encourage the participation of poor groups in health insurance programs, while reducing out-of-pocket expenses for health services. Thus, premium subsidies not only expand coverage but also contribute to poverty alleviation by strengthening financial protection for vulnerable groups (P. Tuppin, 2010).

BPJS HEALTH PARTICIPANTS

Based on Law Number 40 of 2004 concerning the National Social Security System (SJSN), this system is a form of social protection program implemented by a number of social security institutions. The

implementation of this system is based on fundamental principles such as human values, usefulness, and social justice. The primary objective of implementing this system is to provide protection and create social justice for all Indonesian citizens (Hasan et al., 2022). The social security programs covered by this system include health insurance services, protection against workplace accidents, old-age insurance, pension benefits, and death benefits (Susanto & Wijaya, 2024). To achieve this, a social security agency was established with legal entity status and carries out its duties based on the principles of mutual cooperation, non-profit orientation, and upholding the values of transparency, prudence, accountability, portability, mandatory participation, trust-based fund management, and professional governance for the benefit of participants and program development (S. S. Putri & Suryawati, 2022). As a concrete manifestation of this policy, the government established the Social Security Agency (BPJS) in 2014. Pursuant to Article 5(2) of Law No. 24 of 2011, BPJS consists of two main bodies: BPJS Health, which focuses on implementing health insurance programs, and BPJS Employment, which manages social protection programs such as work accident insurance, old-age insurance, pensions, and death insurance (Cheng et al., 2025).

Protection in the health sector is realized through health insurance, which aims to guarantee participants' access to medical services and fulfill basic health needs (Djoni Rolindrawan, 2015). These services are provided to individuals who have paid premiums, either independently or through government subsidies (Sosial, 2019). In Indonesia, health insurance is implemented through the National Health Insurance Program (JKN), which is managed by BPJS Kesehatan as the official implementing agency (Wilson et al., 2024). However, in its implementation in the field, this program still faces a number of obstacles. One of the main problems faced is the high potential for financial deficits, which continue to increase every year and could threaten the sustainability of the program (N. K. Putri et al., 2023).

Despite facing various challenges, National health insurance remains committed to expanding the reach of health services so that they are accessible to all segments of society. However, achieving the target of universal health coverage (UHC) still faces obstacles, particularly related to the low level of public participation in the program (Muhlis, 2022). BPJS Kesehatan is an integral part of the National Health Insurance, designed to ensure equitable access to healthcare services for all citizens (Endri Kristanto et al., 2019). Participation in this program is influenced by various factors, such as individual income, education level, health status, and government policies and support (Ministry of Health, 2023).

(JMF Contró, 2021) using an economic theory approach, shows that health insurance subsidies are the most effective instrument in expanding social protection coverage, especially for poor communities. Compared to insurance schemes without subsidies, subsidy mechanisms have proven to be more effective in improving equitable access to health services. This finding is highly relevant to Indonesia's BPJS Health Premium Assistance Program (PBI), which provides premium financing for low-income communities. In this context, government subsidies not only encourage increased participation in the National Health Insurance (JKN) program but also contribute to reducing economic vulnerability and poverty, while strengthening the role of social security as a tool for equitable welfare distribution (Sparrow et al., 2013).

An analysis of RISKESDAS 2018 data published by BMC Public Health (2023) shows that individuals from poor groups covered by government health insurance are 4.26 times more likely to use hospital services than those without insurance. This finding underscores the importance of enabling factors in Andersen's theory, particularly poverty, as determinants of participation in the health insurance system. The existence of premium subsidies for the poor, such as in the BPJS PBI program, plays a significant role in

overcoming financial barriers and expanding access to health services, especially for vulnerable groups.

This study is based on the welfare economics theory framework and the health service utilization behavior model developed by Andersen (1995). Welfare economics theory views that the state has an important role in ensuring the fair distribution of resources and the provision of basic public services, especially when market mechanisms are unable to meet the needs of the community evenly. In the context of human development, government intervention through health insurance programs such as BPJS Kesehatan can be seen as a form of correction for market failure. This program enables low-income groups to access quality healthcare services, which in turn supports improvements in quality of life and life expectancy. More equitable access to healthcare services, together with poverty alleviation efforts, is an important part of the strategy to improve the Human Development Index (HDI) (Harves S. Rosen, 2004)

Meanwhile, the Andersen Model provides a behavioral approach to explaining how individuals decide to use health services. This model highlights three groups of factors that influence these decisions, namely predisposing factors (such as age, gender, and education), enabling factors (including income and insurance coverage), and need factors (both subjective and objective). Within this framework, the existence of government health insurance functions as an enabling factor that expands individuals' access to healthcare services. When individuals have health insurance and recognize their need for medical services, they are more likely to actively use healthcare facilities. Therefore, the higher the participation in health insurance programs, the greater the likelihood of an increase in life expectancy.

By integrating these two approaches, this study positions variables such as life expectancy, poverty rates, and participation in government health

insurance as important factors that can influence human development outcomes. Welfare economics theory explains the urgency of state intervention in improving collective welfare, while the Andersen Model clarifies how such intervention translates into actual public health behavior.

METHODOLOGY

This study uses a quantitative approach that aims to examine the influence of Life Expectancy (LE), Poverty Rate (PR), and the number of health insurance participants (NHIP) on the Human Development Index (HDI) in 38 cities and districts in East Java Province in 2023. The quantitative method was chosen because it is suitable for testing the relationship between variables through numerical data and inferential statistical analysis (John W. Creswell, 2014).

The data used in this study is secondary cross-sectional data obtained from official sources such as the Central Statistics Agency (BPS), BPJS Kesehatan, and the East Java Provincial Health Office. The data includes information related to HDI, LE, PR, and NHIP for each district/city in East Java Province in 2023. The data collection process was carried out through access to various official publications, annual reports, and online statistical databases (BPS, 2023).

Data processing in this study uses a multiple linear regression approach, which allows testing the magnitude of the influence of independent variables on dependent variables, both simultaneously and individually.

The regression equation used in this study is as follows:

$$\text{HDI} = \beta_0 + \beta_1\text{LE} + \beta_2\text{PL} + \beta_3\text{NHIP} + \varepsilon$$

Explanation:

- HDI: Human Development Index
- LE: Life Expectancy
- PR : Poverty Rate
- NHIP: Number of health insurance participants
- β_0 : Constant
- β_1 - β_3 : Regression coefficients
- ε : Error term. Before performing regression analysis, a series of classical

assumption tests were conducted to ensure that the model met the BLUE (Best Linear Unbiased Estimator) criteria. These tests included normality testing using the Jarque-Bera approach, multicollinearity testing using the Variance Inflation Factor (VIF), and heteroscedasticity testing using the Breusch-Pagan method.

This study refers to the theoretical framework and methodology of several previous studies that also used multiple linear regression to analyze the determinants of participation in social security programs. Aji et al. (2017) showed that socioeconomic variables such as education and income influence the willingness to pay for insurance. Panda et al. (2020) in their systematic review also confirmed that demographic and economic factors greatly influence the level of health insurance participation in developing countries (World Health Organization, 2022).

- **Residual Normality Test**
Residual normality testing is performed to evaluate whether the residuals in the regression model are normally distributed. This test plays an important role in ensuring the validity of statistical analysis results. The Jarque-Bera method is used in this test, with the condition that the residuals are considered normally distributed if the probability value exceeds 0.05.
- **Multicollinearity Test**
Multicollinearity testing is performed to detect strong correlations between independent variables in the regression model. The evaluation is done by reviewing the Variance Inflation Factor (VIF) and Tolerance values. If the VIF value is below 10 and the Tolerance value exceeds 0.1, it can be concluded that the model does not have multicollinearity issues.
- **Heteroscedasticity Test**
The heteroscedasticity test is conducted to assess whether the residual variance in the regression model is homogeneous. The

presence of unstable variance (heteroscedasticity) can reduce the efficiency of the estimation results. This test uses the Glejser method, where the model is considered free of heteroscedasticity if the significance value exceeds 0.05.

- **Multiple Linear Regression Test**
Multiple linear regression is used to evaluate the influence of the variables Life Expectancy, Poverty Rate, and Number of Health Insurance Participants. The test is conducted using the F-test to assess the simultaneous influence of the three variables, while the t-test is used to assess the contribution of each variable individually. Additionally, the coefficient of determination (R^2) is used to measure the extent to which the independent variables can explain the variation in the dependent variable.

RESULT AND DISCUSSION

Results

Residual Normality Test

variable	obs	Pr (skewness)	Pr (kurtosis)	Adj chi2(2)	Prob>chi2
resid	38	0.5505	0.7847	0.44	0.8019

Normality tests are conducted to assess whether the residual values in the regression model follow a normal distribution, which is one of the basic assumptions in the application of OLS (Ordinary Least Squares) regression analysis. In this study, the normality of residuals was tested using the Skewness/Kurtosis (sktest) method, which combines information from two aspects of distribution, namely skewness and kurtosis. This test simultaneously tests whether the residual data has a normal distribution. Based on the test results, a probability value (Prob > chi2) of 0.8019 was obtained, which substantially exceeds the significance threshold of 0.05. This indicates that the residuals in the model are normally distributed. With the assumption of residual normality fulfilled, the regression

model is considered suitable for use in further analysis. This means that the estimation results and statistical tests in this model can be interpreted as valid.

Additionally, other supporting statistical information shows that:

- Pr(Skewness) is 0.5505, indicating that the skewness of the residual distribution is not significantly different from the normal distribution.
- Pr(Kurtosis) is 0.7847, indicating that the kurtosis of the residual distribution also does not deviate significantly from the normal distribution.
- The number of observations is 38, which is sufficient to detect residual distribution patterns statistically.

Overall, the test results indicate that the residual distribution does not deviate from the normal distribution, both in terms of skewness and kurtosis, and the regression model has met the assumption of residual normality.

Multicollinearity Test (VIF)

Variable	VIF	1/VIF
PR	1.51	0.661815
LE	1.51	0.664441
NHIP	1.01	0.986930
MEAN VIF	1.34	

Multicollinearity testing is performed to evaluate the existence of strong linear relationships among independent variables in a regression model. High multicollinearity can cause instability in regression coefficient estimates, increase variance, and reduce statistical significance. One common method for identifying multicollinearity is to examine the Variance Inflation Factor (VIF) value. Generally, if the VIF value is below 10, the model is considered to have no serious multicollinearity issues. However, some scientific references propose more conservative limits, such as 5 or even 2.5, depending on the context and field of study.

Based on the VIF test results, it is known that:

- Variable x2 (PR) has a VIF value of 1.51
- Variable x1 (LE) has a VIF value of 1.51
- Variable x3 (NHIP) has a VIF value of 1.01

- The mean VIF is 1.34

All VIF values are well below the maximum limit of 10, and even below 5, so it can be concluded that this model is free from multicollinearity issues. Thus, the relationship between the independent variables is not strong enough to cause interference with the stability of the regression coefficient estimates. This condition indicates that the regression model used has a good arrangement of independent variables and is suitable for further analysis without any concerns about distortion due to multicollinearity.

Heteroscedasticity Test

Breusch-pagan / cook-weisberg test for heteroskedasticity

H0	Contant variance
variables	Fitted values of x1
Chi2(1)	2.29
Prob>chi2	0.1303

A test for heteroscedasticity is performed to determine whether the variance of the residuals in the regression model is constant (homoscedasticity) or variable (heteroscedasticity). One important assumption in classical linear regression (OLS) is that the error has a constant variance across all predictor values. If this assumption is violated (heteroscedasticity occurs), the estimates become inefficient and statistical tests may become invalid. To detect heteroscedasticity, the Breusch-Pagan/Cook-Weisberg test is used, with the null hypothesis (H_0) stating that the variance of the residuals is constant (no heteroscedasticity occurs).

source	ss	df	ms	Number obs	=38
modal	762.030974	3	254.010325	F(3,34)	=47.20
residual	182.965294	34	5.38133219	Prob > F	=0.000
total	944.965294	37	25.5404397	R-Squared	=0.8064
				AdjR-SSquared	=0.7893
				RootMSE	=2.3198

The test results show a chi2(1) value of 2.29 with a probability value (Prob > chi2) of 0.1303. Since this value is higher than the significance level of 0.05, there is insufficient evidence to reject the null

hypothesis. Thus, it can be concluded that the regression model does not show signs of heteroscedasticity. This means that the error variance is constant, and the assumption of homoscedasticity in the model has been met, so the model used is considered suitable for further analysis without being affected by the problem of irregular residual variance.

Multiple Linear Regression Test

var	coef	Std.err	t	p> t	[95% Conf Interval]
LE	1.059437	.2360285	4.49	0.000*	.5797695 1.539105
PR	-.6739903	.1112597	-6.06	0.000*	-.9000073 - .4478833
NHIP	.0793122	.030412	2.61	0.013*	.0175075 .1411169
_cons	-.0604546	17.93107	-0.00	0.997	-36.50078 36.37987

Multiple linear regression was used to analyze the effect of Life Expectancy (x1), Poverty Rate (x2), and Number of Health Insurance Participants (x3) on the Number of Health Insurance Participants (y). From the model estimation results based on 38 observations, the $F(3, 34)$ value was 47.20 with Prob > F of 0.0000. These results indicate that the regression model as a whole is significant at the 95% confidence level. Thus, the three independent variables simultaneously have a significant effect on the number of health insurance participants.

The R-squared value of 0.8064 indicates that 80.64% of the variation in the number of health insurance participants can be explained by the Human Development Index, Life Expectancy, and Poverty Rate variables. Meanwhile, the adjusted R-squared value of 0.7893 shows that the model has a good level of stability and is not overly influenced by the number of independent variables used. The Root Mean Square Error (Root MSE) value of 2.3198 reflects the average prediction error produced by the model.

The regression analysis results show that Life Expectancy, Poverty Rate, and Number of Health Insurance Participants (JPAK) have a significant effect on the Human Development Index (HDI). The F-

statistic value of 47.20 with a probability level of 0.0000 indicates that the three independent variables together have a significant effect on the HDI. Furthermore, the R-squared value of 0.8064 indicates that approximately 80.64% of the variation in HDI can be explained by these three variables, while the remainder is influenced by other factors outside the model. The adjusted R-squared value of 0.7893 indicates that this model has a fairly good ability to represent the relationship between the variables studied.

Partially, the Life Expectancy variable has a positive and significant influence on the number of health insurance participants, with a coefficient of 1.059 and a significance value of 0.000. This indicates that the higher the life expectancy in a region, the higher the number of health insurance participants tends to be. Conversely, the Poverty Rate variable shows a significant negative influence, with a coefficient of -0.674 and a significance level of 0.000, indicating that an increase in poverty levels leads to a decrease in the number of health insurance participants. Meanwhile, the Human Development Index variable shows a significant positive influence, with a coefficient of 0.079 and a significance level of 0.013, indicating that the higher the level of human development, the more likely the community is to participate in health insurance programs.

Thus, it can be concluded that the three independent variables play an important role in explaining the variation in the number of health insurance participants, and the direction of their influence is in line with existing theory and empirical logic. These results indicate that efforts to improve human development, extend life expectancy, and alleviate poverty can be effective strategies in expanding health insurance coverage in the community.

Discussions

The multiple linear regression model used in this study has met all the basic assumptions of classical regression, so it is considered valid and suitable for further analysis. The normality test results show

that the model residuals have a distribution pattern that is close to normal, which is an important prerequisite for obtaining unbiased parameter estimates. In addition, the model was also found to be free from indications of multicollinearity, suggesting that there was no high linear correlation between the independent variables, so that each variable could be interpreted separately with greater accuracy. Testing for residual variance stability also showed that there were no signs of heteroscedasticity, meaning that the error dispersion was uniform across all predicted values. Overall, the model has a good level of significance in explaining the relationship between the independent variables and the number of health insurance participants, and is able to capture most of the variation in the observed data. Therefore, this model not only passes the technical statistical aspects but also demonstrates adequate predictive power in answering the research questions. These findings align with the approach proposed by Schreiber-Gregory and Bader (2018), which emphasizes the importance of residual distribution validity in producing accurate estimates of the impact of the Human Development Index (HDI) on individual health status, thereby strengthening the validity of analysis in human development studies.

The multiple linear regression model used in this study has met all the basic assumptions of classical regression, so it is considered valid and suitable for further analysis. The normality test results show that the model residuals have a near-normal distribution pattern, which is an important prerequisite for obtaining unbiased parameter estimates. In addition, the model was also found to be free from any indication of multicollinearity, indicating that there is no high linear correlation between the independent variables, so each variable can be interpreted separately with greater accuracy. The residual variance stability test also showed no signs of heteroscedasticity, meaning that error dispersion was uniform across predicted values. Overall, the model has a good

level of significance in explaining the relationship between the independent variables and the number of health insurance participants, and is able to capture most of the variation in the observed data. Therefore, the model not only fulfills the technical aspects of statistics but also shows adequate predictive power in answering the research questions. This finding is in line with the approach proposed by Schreiber-Gregory and Bader (2018), which emphasizes the importance of the validity of the residual distribution in generating accurate estimates of the impact of the Human Development Index (HDI) on individual health status, thus strengthening the validity of the analysis in human development studies.

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The Breusch-Pagan test for heteroscedasticity produced significant findings, indicating that the variance of the residuals in the regression model is constant or homogeneous. This means that there is no evidence of heteroscedasticity in the model used. Thus, the regression model can be said to be efficient and has fulfilled one of the important assumptions in classical linear regression. The absence of heteroscedasticity increases the level of confidence in the parameter estimates produced, as the results can be considered more stable and reliable. This condition supports the view of Publication (2011), which states that stability in human development variables, such as the Human Development Index (HDI), can only be translated into effective social policies if based on regression results free from bias due to non-uniform residual variance.

The regression model applied in this study shows a high level of significance, which means that the three independent variables Life Expectancy, Poverty Rate, and Number of Health Insurance Participants simultaneously contribute significantly to the Human Development Index (HDI). This model is able to explain a large proportion of the variation in the data, while the remainder is influenced by

other variables outside the scope of the model under study. Therefore, this model can be categorized as one with good predictive power and high relevance in supporting the formulation of development policies. These findings are consistent with the behavioral model of health service utilization introduced by Mateko et al. (2024), which states that individual decisions to access health services—including participation in health insurance programs—are influenced by various predisposing factors, such as life expectancy, poverty levels, and participation in health insurance.

The Life Expectancy Variable has been proven to have a positive and significant impact on the Human Development Index (HDI). This indicates that an increase in life expectancy reflects improvements in the health dimension, which is one of the main components in measuring the HDI. As the health status of the population improves, overall quality of life also improves, thereby contributing to human development progress. These findings are consistent with the findings of Hamzah et al. (2023), who revealed that an increase in life expectancy also contributes to improvements in the quality of health services and the well-being of the population. Afifah (2024) also emphasizes that investment allocation in the health sector and social protection systems plays a crucial role in extending life expectancy, which ultimately has a positive effect on increasing the HDI value.

The poverty level variable shows a significant negative effect on the Human Development Index (HDI). This means that the higher the poverty rate in a region, the lower the HDI achievement in that area. This situation illustrates that economic limitations can hinder people's access to education and health services and reduce their overall quality of life. This finding aligns with Afifah's (2024) research, which states that poverty has a negative correlation with the HDI, as poor communities often struggle to meet their basic needs. Additionally, Adinda et al. (2024) emphasize that low income limits

individuals' ability to improve their standard of living, ultimately having a detrimental impact on the human development index value.

The variable Number of Health Insurance Participants has a positive and significant effect on the Human Development Index (HDI). This indicates that the higher the level of human development, which includes aspects of education, health, and income, the greater the community's participation in health insurance programs. This finding reflects that improvements in quality of life encourage individuals' awareness and ability to access social protection in the health sector. These results align with the research by Firori and Wisana (2023), which identified a positive relationship between public awareness of the importance of health insurance and human development levels. The HDI, as a composite indicator encompassing education, income, and health dimensions, is directly related to the readiness and tendency of the public to participate in health insurance programs, as these factors also shape individual social and economic behavior.

Thus, the results of this study not only reinforce the theoretical basis of previous studies but also provide empirical evidence that increases in life expectancy, increases in the number of health insurance participants, and reductions in poverty rates play an important role in driving improvements in the Human Development Index. In the context of sustainable development, as outlined in the Human Development Report by UNDP (2021), these findings emphasize that improving the quality of life, expanding access to health services, and reducing poverty are the main pillars in designing human development policies in Indonesia.

CONCLUSION

It can be concluded that Life Expectancy (LE), Poverty Rate (PR), and Number of Health Insurance Participants (NHI) have a significant relationship with the Human Development Index (HDI). Partially, LE

and NHIP have a positive and significant influence, indicating that human development and increased life expectancy encourage community participation in health insurance programs. Conversely, the Poverty Rate shows a significant negative influence, indicating that the poor still face barriers in accessing health services, despite the availability of subsidy programs such as PBI. These findings underscore the importance of integrating social and economic development policies, particularly in strengthening the quality of life and expanding the coverage of health insurance programs equitably across the entire region of East Java.

RECOMMENDATION

Based on the findings of this study, it is recommended that local governments in East Java Province prioritize improving the quality of human development by strengthening access to education, health, and economic welfare. Improving the HDI has been shown to contribute to community participation in health insurance programs, so development policies should focus on improving the quality of basic public services that support the three dimensions of the HDI. Additionally, efforts to increase life expectancy should be made through the equitable distribution of health facilities, the addition of medical personnel in remote areas, and health education campaigns to raise public awareness of preventive health measures.

Regarding poverty, since this variable has been proven to have a significant negative impact on the number of health insurance participants, poverty alleviation must be a priority through more targeted social assistance programs. The government needs to integrate poverty data accurately and dynamically, and strengthen the implementation of JKN premium subsidies for vulnerable groups through the Premium Assistance Recipient (PBI) scheme. Additionally, public literacy regarding the benefits of BPJS Health must be improved so that this program is not merely a formal administrative process but is actively

utilized by participants, especially in areas with high poverty rates.

Finally, inter-sectoral collaboration, such as between the Health Department, Social Affairs Department, and BPJS, must be strengthened to expand health insurance coverage. By considering the determinants of HDI, AHH, and TK in an integrated manner, the social security system in East Java Province can become more inclusive, adaptive, and sustainable in ensuring the public's basic right to health services.

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