

ANALYSIS OF THE EFFECT OF POVERTY, LIFE EXPECTANCY AND AVERAGE YEARS OF SCHOOLING ON GROSS REGIONAL DOMESTIC PRODUCT (GRDP) IN NORTH SUMATERA PROVINCE

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Abstract

North Sumatra Province is one of the provinces that has a significant contribution to the economy on the island of Sumatra, so the success of this region's economy is an important factor in supporting regional and national economic growth. Economic growth in North Sumatra Province influenced by the development of Gross Regional Development Product (GRDP) still faces various challenges, such as high levels of poverty, disparities in the quality of health, and education between districts/cities that affect economic growth in this province. This study aims to analyze the effect of poverty, life expectancy (LE or AHH), and average years of schooling (AYS or RRLS) on GRDP in North Sumatra Province. The data used in this study is panel data which is a combination of time series data for the period 2017–2024 and cross sections of 33 districts/cities in North Sumatra Province obtained from the Central Statistics Agency of North Sumatra Province. The analysis method used is panel data regression with the selected model, namely the Fixed Effect Model (FEM). The results of the study indicate that poverty has a negative and significant effect on GRDP, while LE and AYS have a positive and significant effect on GRDP in North Sumatra Province. The North Sumatra Provincial Government and the district/city governments in this province are expected to be able to reduce poverty levels and improve the quality of health and education through targeted policies to encourage higher and sustainable economic growth in all districts/cities.

Keywords: Poverty, Life Expectancy, Average Years of Schooling, GRDP

INTRODUCTION

Economic growth is one of the main indicators for measuring the success of a country's or region's development. Increased economic growth will encourage the development of economic activity, which will result in expanded employment opportunities and increased income, ultimately improving public welfare. A country's economic growth is generally measured by Gross Domestic Product (GDP) at the national level. Gross Domestic Product (GDP) is the total final goods and services produced within a country during a specific period. To understand the factors influencing economic growth, various experts have developed several theories. Solow (2010) developed a growth model that emphasizes the role of physical capital, labor, and technological progress. Furthermore, Romer (1986) and Lucas (1988), using endogenous growth theory, assert that economic growth originates from within the economic system itself, primarily through the accumulation of knowledge and technological innovation.

To obtain a more detailed picture for each region, a similar measurement is applied at the regional level through Gross Regional Domestic Product (GRDP). GRDP is defined as the sum of the added value generated by all business units within a region, or the total value of final goods and services produced by all economic units within a region (BPS Sumatera Utara, 2020). GRDP itself is divided into two types, namely Gross Regional Domestic Product at Constant Prices which is the real added value of goods and services calculated using prices in a certain base year, so

that it purely shows production growth without inflation bias, and Gross Regional Domestic Product at Current Prices is the total nominal added value of final goods and services produced in a region in a certain period calculated using prices in the current year. Therefore, this study uses GRDP as the main indicator because it is more appropriate in reflecting the real economic growth of a region. In reality, some people still live in conditions of economic hardship or poverty. According to the Central Statistics Agency of North Sumatra Province (BPS), poverty is defined as the economic inability to meet basic needs, both food and non-food (BPS Indonesia, 2024), as measured by monthly per capita expenditure below the poverty line. Therefore, it is important to monitor developments in poverty levels to determine the extent to which the results of economic development are being enjoyed by all levels of society. According to data from the North Sumatra Provincial Health Office, the Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) remain a concern, despite showing a downward trend. Infectious diseases such as tuberculosis (TB), malaria, and diarrhea remain prevalent, particularly in areas with limited access to healthcare. Furthermore, the prevalence of non-communicable diseases such as hypertension, diabetes mellitus, and heart disease continues to rise. This reflects the persistent disparity in healthcare services between urban and rural areas in North Sumatra (North Sumatra Health Office, 2024).

Besides health, education is a crucial component in improving the quality of human capital and driving economic growth. According to Becker (1975), education and health are investments in human capital that can improve the skills, productivity, and effectiveness of the workforce, thereby supporting sustainable economic development and growth. In this study, education is proxied by the Average Years of Schooling (AYS), which reflects the number of years of formal education completed by the population aged 25 and over. AYS is also a fundamental indicator that equips individuals with the skills and knowledge to drive innovation and sustainable economic growth. A country that pays more attention to education for its citizens will generate better economic growth than one that does not. In other words, investment in human resources through educational advancement will result in higher national income and economic growth (Becker, 1975).

Research purposes

Based on the background and problem formulation above, the research objectives are as follows:

1. To determine the influence of poverty on GRDP in North Sumatra Province.
2. To determine the influence of Life Expectancy on GRDP in North Sumatra Province.
3. To determine the influence of Average Length of Schooling on GRDP in North Sumatra Province.
4. To determine the influence of poverty, Life Expectancy, Average Length of Schooling simultaneously on GRDP in North Sumatra Province.

LITERATURE REVIEW

Economic Growth

Economic growth shows the extent to which economic activities can generate additional income for the community in developing production factors to produce output, and then this process in turn will produce a flow of rewards for the production factors owned by the community (Lubis, 2012). Economic growth is the process of increasing a country's capacity to produce goods and services over a specific period of time. This means that economic growth reflects a country's ability to increase its economic output over time (Astriana & Siregar 2024).

Solow (2010) developed a growth model that places physical capital, labor, and technological progress as the three main pillars of economic growth. Solow introduced the concept of Total Factor Productivity (TFP), which explains that growth is not solely determined by the amount of input, but also by how efficiently the input is used. Solow's model implicitly recognizes that better labor quality will further increase production efficiency. Solow also states that the economy will reach a steady state where long-term growth can only be maintained through technological progress supported by quality human resources.

Romer (1986) and Lucas (1988), using endogenous growth theory, assert that economic growth originates within the economic system itself, primarily through the accumulation of knowledge and technological innovation. Romer emphasized that knowledge is non-rivalrous and generates spillover effects, so that investments in health and education not only benefit individuals but also provide positive externalities for society at large. In this context, improving the quality of human resources through health and education is key to driving innovation and sustainable economic growth.

Poverty

People living in low-income conditions are categorized as poor, namely individuals whose average monthly expenditure per person falls below the poverty threshold, as measured by basic needs such as food and non-food items. Poverty can be defined as a situation where a person is unable to meet their basic needs, such as food, clothing, health care, education, and shelter (BPS Indonesia, 2024).

Nurkse (1958) in his *Problems of Capital Formation in Underdeveloped Countries* introduced the concept of the vicious cycle of poverty, which describes how poverty tends to perpetuate itself. Nurkse explained that low income leads to low savings, which leads to low investment and productivity, thus keeping income low and poverty persisting. In the context of economic growth, this vicious cycle hinders the accumulation of human capital because the poor are unable to invest in quality education and health care. Therefore, government intervention through poverty alleviation policies is an important prerequisite for breaking this cycle and encouraging economic growth.

Todaro and Smith (2011) in their paper on *Economic Development* view poverty as a multidimensional phenomenon that is not only related to low income but also includes limited access to education, health, and economic opportunities. Todaro and Smith also emphasize that poverty and low quality human resources mutually reinforce each other in a development trap. People living in poverty tend to have poor health and limited access to education, so their productive capacity remains low and ultimately hinders aggregate economic growth. Therefore, a comprehensive poverty alleviation strategy must include improving the quality of health and education as a long-term investment for economic growth.

Life Expectancy

Health and education are important components of human capital, which play a role in driving economic growth. Schultz (1961) stated that investment in education and health can improve the quality of human resources, thereby increasing labor productivity and economic output.

Grossman (1972) in *On the Concept of Health Capital and the Demand for Health* developed a model that positions health as a form of investable human capital. Grossman argued that individuals not only consume health as a consumer good, but also invest it as capital that increases their productive capacity. A high stock of health enables individuals to work more, be more productive, and earn a higher income. In a macroeconomic context, regions with high Life Expectancy reflect good public health, which directly contributes to increased labor productivity and regional economic growth.

Average Years of Schooling

According to the Central Statistics Agency of North Sumatra Province (2025), the Average Years of Schooling (AYS) is the number of years spent by residents aged 25 and over in formal education. AYS indicates the "stock" of education attained by residents in a region and is used as an indicator in the Human Development Index (HDI) (BPS Indonesia, 2024).

Becker (1975) states that health and education are important components of human capital, which plays a major role in driving economic growth. Education improves the abilities, skills, and productivity of the workforce, while good health enables individuals to work more effectively and efficiently. Thus, investment in education and health not only improves the quality of life of the community but also contributes directly to increasing economic output and the long-term growth of a region.

Relationship between Variables

Romer (1986) and Lucas (1988) in their theory revealed that endogenous (internal) factors such as knowledge and human capital are the drivers of long-term growth. Reduced poverty allows more individuals to participate in knowledge accumulation and innovation, which are the engines of growth in this theory.

Schultz (1961) in his theory "Investment in Human Capital" emphasized that education and health are investments that increase economic output. Increased longevity and good health contribute to the extension of the productive period, thus encouraging investment in education and long-term economic growth. Becker (1975) stated that education is a form of individual investment. The higher a person's education, the greater their well-being. This, of course, impacts the long-term sustainability of a country's well-being and economic growth. Poverty, health (LE), and education (AYS) are not standalone variables but rather interlocking elements within an economic development ecosystem. This is in accordance with the endogenous growth theory of Romer (1986) and Lucas (1988), where long-term economic growth is highly dependent on the quality of human capital. If low poverty levels provide individuals with accessibility to adequate nutrition and healthcare, this will directly increase Life Expectancy (LE).

Healthy individuals have the physical capacity to pursue higher education (AYS), which then produces a skilled and innovative workforce. This synergy between physical resilience (health) and intellectual acuity (education) is what increases the marginal productivity of the workforce. This increase in productivity ultimately becomes the main engine in driving GRDP and creating sustainable economic growth, while breaking the chain of structural poverty. Therefore, these three variables constitute a unified indicator of quality of life that simultaneously determines economic acceleration in North Sumatra Province.

Research Hypothesis

A hypothesis is a tentative assumption made by a researcher, but its validity must still be proven or tested. The hypothesis in question is an assumption that may or may not be true. Based on the researcher's problem formulation and supporting theories, the researcher formulated the following hypothesis:

H₁: Poverty has a negative effect on GRDP in North Sumatra Province

H₂: Life expectancy has a positive effect on economic GRDP North Sumatra Province

H₃: Average Years of Schooling has a positive effect on GRDP in North Sumatra Province

H₄: Poverty, Life Expectancy, and Average Years of Schooling influence GRDP in North Sumatra Province

METHOD

Research Objects and Location

The object of this study is the GRDP as the dependent variable, while poverty, Life Expectancy, and Average Years of Schooling are the independent variables. The research was conducted in 33 districts/cities in North Sumatra Province from 2017 to 2024.

Data Types and Sources

This study uses panel data, a combination of time series data for the 2017–2024 period and cross-sectional data covering 33 districts/cities in North Sumatra Province. Thus, the number of observations in this study is 264 observations. The data used includes poverty, Life Expectancy, Average Years of Schooling, and Gross Regional Domestic Product at Constant Prices (GRDP-CP). All data were obtained from the Central Statistics Agency of North Sumatra Province. The data period used is the last eight years, namely from 2017 to 2024.

Data Collection Technique

In this study, data collection was conducted through documentation methods, utilizing secondary data obtained from official publications of the North Sumatra Provincial Statistics Agency. This data covers various economic and social indicators relevant to the research variables.

Operational Definition of Variables

1. Gross Regional Domestic Product (GRDP) is the total value of goods and services produced by a region using GRDP at Constant Prices (GRDP-CP) with prices in the base year 2010. GRDP-CP data for districts/cities in North Sumatra Province was obtained from the Statistics Indonesia of North Sumatra Province and is measured in rupiah.
2. Poverty is a condition where an individual or group is unable to meet basic needs, both food and non-food, resulting in an inability to live a decent life. In this study, the poverty variable is measured using the number of poor people based on the poverty line established by the Statistics Indonesia of North Sumatra Province.
3. Life expectancy (LE/AHH) is an indicator that shows the average estimated life expectancy of a person from birth, reflecting the level of public health. In this study, LE is used to describe the life expectancy of the population in each district/city in North Sumatra Province. Data were obtained from the Statistics Indonesia of North Sumatra Province and measured in years.
4. The Average Years of Schooling (AYS/RRLS) is an indicator that shows the average number of years of formal education completed by residents aged 25 and over. In this study, AYS is used to describe the education level of the population in each district/city in North Sumatra Province. The data used were obtained from the Statistics Indonesia of North Sumatra Province and measured in years.

Data Analysis Methods

This study uses a panel data estimation model to analyze the influence of independent variables, namely poverty, life expectancy, and average years of schooling, on economic growth in 33 districts/cities in North Sumatra Province

during the period 2017-2024. According to Gujarati and Porter (2013), panel data is a combination of cross-sectional data (across individuals, regions, or units of analysis) and time series (across time). The use of panel data provides methodological advantages because it is able to capture the dynamics of change over time while paying attention to differences in characteristics between regions. In addition, panel data increases the number of observations, resulting in more efficient and reliable parameter estimates than conventional regression models.

The following is a model of panel data regression used in the research:

$$\ln(\text{GRDP}_{it}) = \beta_0 + \beta_1 \ln(\text{POV}_{it}) + \beta_2 \text{LE}_{it} + \beta_3 \text{AYS}_{it} + \varepsilon_{it}$$

Notation:

GRDP	= Gross Regional Domestic Product at Constant Prices Base Year 2010 (Rupiah)
POV	= Poverty (Number of Persons)
LE	= Life Expectancy (Years)
AYS	= Average Years of Schooling (Years)
Ln	= Natural Logarithm
β_0	= Constant
$\beta_1 - \beta_3$	= Regression Coefficients
ε_{it}	= Error Term
I	= 33 Regencies/Cities in North Sumatra Province
t	= Years 2017-2024

Panel Data Regression Estimation Model

In estimating a model using this method, three approaches are required to be selected including the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM).

Panel Data Model Selection

According to Gujarati and Porter (2013), three tests, namely the Chow test, the Hausman test, and the Lagrange Multiplier test, can be used to obtain the regression equation to be estimated.

Chow Test

The Chow test is used to determine whether the Common Effects (CEM) or Fixed Effects (FEM) model is more appropriate. This test examines whether there are differences in intercepts between individuals (districts/cities) in panel data. The hypotheses in this study are:

1. If the probability value (p-value) < 0.05, then H_0 is rejected (the Fixed Effect model is selected)
2. If the probability value (p-value) $\geq$ 0.05, then H_a is accepted (the Common Effect model is used)

Hausman test

The Hausman test is used to determine whether the Fixed Effect (FE) or Random Effect (RE) model is more appropriate for estimating the panel data regression. This test examines whether there is a correlation between the individual effects and the independent variables in the model, which serves as the basis for choosing between the two estimation approaches. The hypotheses in this study are:

1. If the probability value (p-value) < 0.05, then H_0 is rejected (the Fixed Effect model is selected)
2. If the probability value (p-value) $\geq$ 0.05, then H_a is accepted (the Random Effect model is used)

Lagrange Multiplier Test

The Lagrange Multiplier (LM) test is used to determine whether the Random Effect (RE) or Common Effect (CE) model is more appropriate for estimating the panel data regression. This test examines whether there is significant variance in the individual effects across cross-sectional units, which indicates whether the Random Effect model is needed. The hypotheses in this study are:

1. If the probability value (p-value) < 0.05, then H_0 is rejected (the Random Effect model is used)
2. If the probability value (p-value) $\geq$ 0.05, then H_a is accepted (the Common Effect model is used)

Classical Assumption Test

Classical assumption tests are conducted to ensure that the regression model meets the basic requirements necessary for reliable estimation results and is suitable for further analysis. According to Gujarati and Porter (2013),

meeting regression assumptions is a crucial requirement for the Ordinary Least Squares (OLS) estimator to produce unbiased and efficient values. In this study, the classical assumption tests used include normality tests, multicollinearity tests, and heteroscedasticity tests.

In this study, normality testing was performed using the Jarque-Bera test, which utilizes information regarding residual skewness and kurtosis. If the Jarque-Bera probability value is greater than the 0.05 significance level, the residuals are considered to follow a normal distribution. To detect the absence of heteroscedasticity in this study, the Residual Absolute (RESAB) test was used. The decision-making criterion in this test is that if the probability value of each independent variable is greater than the 0.05 significance level, then it can be concluded that there is no heteroscedasticity in the regression model (Gujarati & Porter, 2013).

RESULTS AND DISCUSSION

Estimation Results and Hypothesis Proof

Chow Test

Table 4.1 Chow Test Results

Effects Test	Statistics	df	Prob.
Cross-section F	1243.780240	(32,228)	0.0000
Cross-section Chi-square	1364.355441	32	0.0000

Source: Data processing results, 2026

Based on Table 4.1 above, the Chi-Square probability value $< \alpha 5\%$ is $0.0000 < 0.05$. This means that the Fixed Effect model is better to use than the Common Effect model based on the results of this test. Therefore, the Hausman test is continued.

Hausman test

Table 4.2 Hausman Test Results

Test Summary	Chi-Sq. Statistic	Chi-Sq. df	Prob.
Random cross-section	236.082096	3	0.0000

Source: Data processing results, 2026

Based on Table 4.2 above, the Chi-Square probability value $< \alpha 5\%$ is $0.000 < 0.05$. This means that the Fixed Effect model is better and more appropriate to use than the Random Effect model, based on the results of this test. This model is the best model, so there is no need for further Lagrange multiplier testing. Therefore, the selected model in this study is the Fixed Effect model (FEM).

Classical Assumption Test

Normality Test

Table 4.3 Normality Test

Jarque-Bera	Probability	Information
3.974184	0.137094	Normally distributed

Source: Data processing results. 2026

Based on table 4.3 above, the results obtained from the normality test with a Jarque-Bera (JB) value of 3.974 with a probability value of 0.137, it can be concluded that this research model is normally distributed because the probability value is $0.137 > 0.05$.

Multicollinearity Test

Table 4.4 Multicollinearity Test

Correlation	Ln_POV	LE	AYS
Ln_POV	1,000,000	0.026962	-0.103099
LE	0.026962	1,000,000	0.455958
AYS	-0.103099	0.455958	1,000,000

Source: Data processing results, 2026

Based on the table above, it can be concluded that this regression model does not exhibit multicollinearity. This is evidenced by all correlation coefficients between independent variables consistently being below 0.80. Thus, it is certain that there is not a strong linear relationship between the independent variables.

Heteroscedasticity Test

Table 4.5 Heteroscedasticity Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.495860	0.242582	2.044091	0.0421
Ln_POV	-0.042933	0.020852	-2.058952	0.0606
LE	0.000984	0.000615	1.599697	0.1111
AYS	-0.010832	0.005661	-1.913467	0.0669

Source: Data processing results, 2026

Based on Table 4.5, it can be seen that the probability of each variable is all above 0.05. The value for poverty (POV) is $0.06 > 0.05$, LE is $0.11 > 0.05$, and AYS is $0.06 > 0.05$. Because all variables are greater than 0.05, it means that the variable data does not show symptoms of heteroscedasticity. Therefore, the distribution of errors is quite even and the model results can be said to be stable.

Panel Data Regression Analysis

The model selected in this study is the Fixed Effect Model (FEM). Below are the regression results for the Fixed Effect model, which is the selected model:

Table 4.6 Fixed Effect Model (FEM) Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	31.96883	0.445065	71.82966	0.0000
Ln_POV	-0.374677	0.038257	-9.793801	0.0000
LE	0.010077	0.001129	8.925108	0.0000
AYS	0.105738	0.010386	10.18057	0.0000

Source: Data processing results, 2026

Based on the result of the Fixed Effect Model estimation in Table 4.6, the following regression equation is obtained:

$$\text{Ln}(\text{GRDP}_{it}) = 31.97 - 0.37\text{Ln}(\text{POV}_{it}) + 0.01(\text{LE}_{it}) + 0.11(\text{AYS}_{it})$$

The coefficient value of the constant (C) is 31.97, which means that if the variables Ln POV, LE, and AYS are equal to zero, then the natural logarithm of GRDP in the district/cities of North Sumatra Province is 31.97.

ANALYSIS OF THE EFFECT OF POVERTY, LIFE EXPECTANCY (AHH) AND AVERAGE DAYS OF SCHOOLING (RRLS) ON ECONOMIC GROWTH IN NORTH SUMATRA PROVINCE

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The poverty coefficient value is -0.37, which means that if the natural logarithm of poverty in North Sumatra Province increases by 1%, it will reduce the natural logarithm of GRDP in the districts/cities of North Sumatra Province by 0.37% with the assumption that the variables LE and AYS remain constant.

The coefficient value of LE is 0.01, which means that if LE in North Sumatra Province increases by 1 year, it will increase the natural logarithm of GRDP in the districts/cities of North Sumatra Province by 1% (0.01×100) with the assumption that the poverty and AYS variables remain constant.

The coefficient value of AYS is 0.11, which means that if the AYS in North Sumatra Province increases by 1 year, it will increase the natural logarithm of the GRDP in the districts/cities of North Sumatra Province by 11% from the previous condition (0.11×100) with the assumption that the poverty and LE variables remain constant.

Partial Test (t-Test)

Table 4.7 Partial Test Results (t-Test)

Independent Variable	t-statistic	t-Table	Alpha	Prob.	Information
Ln_POV	-9,793801	2,343	0.01	0.0000	Significant
LE	8.925108	2,343	0.01	0.0000	Significant
AYS	10,18057	2,343	0.01	0.0000	Significant

Source: Data processing results, 2026

Based on Table 4.7, the calculated t-value for poverty is $|-9.793| >$ from the t-table of 2.343 and the significance value is $0.0000 < 0.01$. This indicates that the poverty variable has a negative and significant influence on GRDP variable in North Sumatra Province at the 1% level (0.01).

The calculated t value of LE is $|8.925| >$ from t-table 2.343 and significant $0.0000 < 0.01$. This shows that LE variable has a positive and significant influence on GRDP variable in North Sumatra Province at the 1% level (0.01).

The calculated t-value of AYS is $|10.180| >$ from t-table 2.343 and significant $0.0000 < 0.01$. This shows that AYS variable has a positive and significant influence on GRDP variable of North Sumatra Province at the 1% level (0.01).

Simultaneous Test (F-Test)

Table 4.8 Simultaneous Test Results (F-Test)

F statistic	F-Table	Alpha	Probability	Information
7,745,189	3.86	0.01	0.000000	Significant

Source: Data processing results, 2026

It can be seen from table 4.81 that the F statistic value $>$ F table is $7,745.189 > 3.86$ with a probability of $0.000000 < 0.01$, so : rejected and : accepted. This means that the variables of poverty, LE, and AYS together have a significant effect on GRDP in North Sumatra Province.

Coefficient of Determination Test

Table 4.9 Results of the Determination Coefficient

R-Squared	0.999160	Mean dependent variable	29.78669
Adjusted R-Squared	0.999031	SD dependent var	1.090441

Source: Data processing results, 2026

From table 4.9 above, it can be seen that the Adjusted R-Squared value is 0.999031, meaning that the poverty, LE, and AYS variables are able to explain approximately 99.90% of the variation in GRDP in 33 districts/cities of North Sumatra Province, while the other 0.10% of the variation is influenced by factors outside the variables of this study.

The Effect of Poverty on GRDP

Based on the research results, the poverty variable used in this study has a negative and significant impact on GRDP in 33 districts/cities in North Sumatra Province. This indicates that if poverty increases, GRDP will decrease. This is in accordance with the initial hypothesis that poverty has a negative impact on GRDP in 33 districts/cities in North Sumatra Province.

The results of this study are consistent with the theory of the "Vicious Circle of Poverty" proposed by Nurkse (1953). Nurkse explained that poverty creates a cycle that is difficult to break; low income leads to low savings, low investment, low productivity, and a return to low income. This condition directly hinders capital accumulation, which is the driving force of economic growth. Furthermore, Romer's (1986) endogenous growth theory also explains that high levels of poverty limit people's access to education and health care, thereby hampering economic growth.

The Effect of Life Expectancy on GRDP

Based on the research results, the Life Expectancy variable used in this study has a positive and significant impact on GRDP in 33 districts/cities in North Sumatra Province. This indicates that if Life Expectancy increases, GRDP will also increase. This is in accordance with the initial hypothesis that Life Expectancy has a positive impact on GRDP in 33 districts/cities in North Sumatra Province.

The results of this study are in accordance with the theory of "Investment in Human Capital" proposed by Schultz, (1961) which states that health and education are a form of human capital investment. Healthy individuals have better physical and mental abilities to work productively in the long term which ultimately can drive economic growth. This finding is in line with the research of Alrivaldi and Sihalo (2023) which shows that Life Expectancy has a positive and significant influence on the Gross Regional Domestic Product of 34 provinces in Indonesia. Also in line with the research of Huda and Indahsari (2021) which shows that Life Expectancy has a positive effect on economic growth in East Java Province. And in line with the research of Rasnino et al., (2022) which shows that Life Expectancy has a positive and significant influence on economic growth in districts/cities in Lampung Province. In line with the research of Harman et al., (2022) which shows that Life Expectancy has a positive and significant influence on economic growth in Bone Regency.

The Effect of Average Years of Schooling on GRDP

Based on the research results, the Average Years of Schooling variable used in this study has a positive and significant impact on GRDP in 33 districts/cities in North Sumatra Province. This indicates that if the Average Years of Schooling increases, GRDP will also increase. This is in accordance with the initial hypothesis that the Average Years of Schooling has a positive impact on GRDP in 33 districts/cities in North Sumatra Province.

The results of this study align with the endogenous growth theory developed by Lucas (1988) and Romer (1986), which states that the accumulation of human capital through education and health is a primary source of long-term economic growth. Education enhances the workforce's ability to adopt new technologies, innovate, and increase productivity. This is reinforced by Becker (1975), who stated that education and health are essential components of human capital, playing a significant role in driving economic growth.

CONCLUSION

Based on the analysis that has been carried out using a panel data regression model (Fixed Effect Model) on 33 districts/cities in North Sumatra province for the period 2017-2024, the following conclusions can be drawn:

1. Poverty has a negative and significant effect on GRDP in 33 districts/cities in North Sumatra Province. This means that an increase in the natural logarithm of the number of poor people is associated with a decrease in GRDP in districts/cities in North Sumatra Province.
2. Life expectancy has a positive and significant effect on GRDP in 33 districts/cities in North Sumatra Province. These results indicate that an increase in life expectancy is associated with an increase in GRDP. This condition indicates that the quality of public health, as reflected in life expectancy, can support increased labor productivity as part of human capital development, which in turn is related to increased regional economic output.
3. Average Years of Schooling has a positive and significant effect on GRDP in 3 districts/cities in North Sumatra Province. These results indicate that an increase in Average Years of Schooling is associated with an increase in GRDP. The better the quality of a region's human resources, the greater the potential for increased labor productivity and regional economic output.
4. Simultaneously, poverty, Life Expectancy, and Average Years of Schooling were proven to have a significant influence on GRDP in 33 districts/cities in North Sumatra Province.

Recommendations

Based on the research findings and conclusions, the author makes the following suggestions:

1. Regional governments in 33 districts/cities in North Sumatra need to strengthen integrated poverty alleviation programs with a region-based approach, considering that poverty levels between districts/cities in North Sumatra still show quite high disparities, especially between urban areas and island/rural areas such as the Nias Islands.
2. The government needs to increase investment in the health sector, particularly in providing equal access and quality of health facilities even in remote areas, so that the increase in life expectancy can be felt evenly and truly contribute to optimal regional economic productivity.
3. The government, through the Department of Education, needs to expand access to education and reduce the dropout rate, especially in districts/cities with a low average length of schooling, so that improving the quality of human capital can have a more significant impact on regional economic growth in the long term.

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