

Analysis of Socio-Economic Factors Affecting Income Inequality in North Sumatra Province

Tri Ade Mardinata, Suhendi, Rahmad Sembiring

Abstract

This study aims to examine whether socio-economic factors significantly affect income inequality in North Sumatra Province. The research employs time series data covering the period from 2015 to 2024, published by the Badan Pusat Statistik (BPS) of North Sumatra Province. This study seeks to analyze both the simultaneous and partial effects of the independent variables (X) on the dependent variable (Y). The independent variables in this study are the Human Development Index (HDI), the Poverty Rate, and the Unemployment Rate, while the dependent variable is income inequality as measured by the Gini ratio. The results indicate that simultaneously, the three independent variables have a significant effect on income inequality in North Sumatra Province during the 2015–2024 period. Partially, the Human Development Index has a negative and significant effect on income inequality, while the Unemployment Rate has a positive and significant effect on income inequality in North Sumatra Province during the same period. Meanwhile, the Poverty Rate shows a negative but insignificant effect on income inequality. Based on these findings, this study is recommended as a reference for the government in formulating policies related to regional economic development. Furthermore, this study is expected to serve as a reference for future researchers and to contribute to the existing literature.

Keywords: Income Inequality, Human Development Index, Poverty Rate, Unemployment Rate.

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Introduction

One of the issues that significantly influences economic dynamics in a region is income inequality within society. Income disparities between high-income groups—such as the wealthy and upper-middle class—and low-income groups or the poor remain a persistent concern in regional development and overall economic growth. This problem may arise from various factors present within society. When economic growth occurs in a region, it is expected that its benefits will be evenly distributed across all segments of society. High-income groups or wealthy individuals are expected to contribute to driving economic activity, which in turn improves the living standards or economic conditions of low-income or lower-middle-income communities. However, this is not always the case in practice. In reality, economic growth tends to be disproportionately enjoyed by wealthy groups. Individuals with extremely high incomes continue to experience significant increases in income and wealth, while workers or laborers in lower-income groups rarely experience wage increases. This situation occurs because capital ownership, which is largely controlled by high-income or wealthy individuals, enables faster and higher returns on investment that support wealth accumulation. In contrast, workers or laborers face limitations in increasing their wealth, as their income primarily depends on wages or monthly salaries that are generally constrained by minimum wage standards.

In measuring income inequality, the standard indicator used is the Gini ratio. The Gini ratio ranges from 0 to 1, where a higher Gini ratio indicates a more unequal distribution of income within a region. The Gini ratio in North Sumatra Province is generally better when compared to the national Gini ratio. Nevertheless, changes arising from fluctuations in Indonesia's economic conditions may

affect income distribution within society. In North Sumatra Province, income inequality during the period 2015–2024 has shown a relatively positive trend in relation to economic development. Over the past ten years, the Gini ratio trend in North Sumatra Province has tended to decline, although fluctuations occurred in several periods. The Gini ratio data for North Sumatra Province, sourced from (<https://www.bps.go.id/>; BPS, 2025), are presented in the table below.

Table 1. Gini Ratio in North Sumatra Province up to 2024

No.	Tahun	GINI RATIO SUMATERA UTARA
Sumatera Utara		
1	2015	0,336
2	2016	0,319
3	2017	0,315
4	2018	0,3176
5	2019	0,3165
6	2020	0,3161
7	2021	0,3145
8	2022	0,312
9	2023	0,309
10	2024	0,297

Under prevailing societal conditions, income inequality tends to have negative impacts on social and economic dynamics. Unequal income distribution within society often leads to social jealousy and resentment among community members. Differences in living standards and purchasing power between two social groups namely the wealthy and the poor can increase the potential for social conflict. Such conflicts may also contribute to rising crime rates. Another consequence of income disparity within society is an increase in the number of people living in poverty, as a larger proportion of the population has low income and limited purchasing power,

which hinders their ability to achieve prosperity. This situation can lead to instability in economic, social, and even political conditions within a region. Research by Suhendi et al., (2024) indicates that income inequality, as measured by the Gini ratio, together with other independent variables, has a significant effect on poverty levels. The study reveals that poverty in society can, in part, be attributed to unequal income distribution.

Although income inequality tends to have negative effects, under certain conditions the Gini ratio within a region may have a positive influence on the economy. High levels of investment and savings among upper-income groups can contribute to increased regional development. This condition has the potential to create new employment opportunities, thereby enhancing economic growth within society and providing job opportunities for individuals of productive age with adequate skills and qualifications.

Income inequality in a region is also closely related to the quality of human resources possessed by the population. Low human resource quality, as reflected in a suboptimal Human Development Index, can hinder communities particularly those in lower-income groups from striving to obtain additional income or wealth. To compete within the intense dynamics of a regional economy, well-developed human resource quality often serves as a fundamental foundation for improving living standards and accumulating wealth. This condition is largely influenced by factors such as the quality of education, health and productivity, and the standard of living.

Referring to the study by Febriyanti (2022), improvements in human resource quality, as reflected in an increasing Human Development Index, may lead to enhancements in public health and productivity within a region. Limited educational quality can exacerbate income inequality, as lower-income groups tend to have restricted educational attainment, limited access to higher education, inadequate access to skills development, and fewer opportunities to enhance skills due to household economic constraints. These conditions reduce their chances of improving their living standards. Health quality also plays a crucial role in improving living standards. Lower and middle income groups tend to reside in environments that are more vulnerable to health risks. This situation is further aggravated by limited access to adequate health care facilities. The relationship between health and poverty often forms a vicious cycle within the economic context. Individuals who are vulnerable to health problems tend to have lower productivity, which, in the case of poor communities, further worsens their opportunities to accumulate wealth. In addition to reflecting education and health quality, the Human Development Index also serves as an indicator of per capita income. It highlights issues such as the inability of lower income groups to multiply their asset values due to limited income, which constrains their capacity to allocate income toward savings and investments unlike higher income groups. Consequently, differences in asset accumulation can widen income inequality in the future.

In North Sumatra Province, the human development index, which reflects the quality of human resources and public health, has shown a positive trend with a tendency to increase annually. Nevertheless, the human Resources value cannot yet be considered outstanding, as it has remained in the range of the low 70s over the past decade. In 2024, the human resources of North Sumatra Province reached 75.76 (BPS North Sumatra, 2024). Further improvement in the human Resources in North Sumatra Province remains necessary to support regional economic development and to reduce income inequality and poverty.

The issue of income inequality is closely associated with poverty within society. The number of people living in poverty may increase when high and prolonged income inequality occurs in a region. This condition arises from the inability of poor communities to escape the poverty trap due to low purchasing power, limited opportunities to save and invest, and restricted access to credit for business capital.

Poverty that entraps individuals and communities can persist across generations. Poor households are more likely to transmit poverty to subsequent generations. Within the framework of economic and demographic paradoxes, this phenomenon is commonly observed

in many parts of the world. Economically disadvantaged communities tend to have higher fertility rates than wealthier groups, which can exacerbate income inequality due to the growing proportion of the poor population.

The poverty rate in North Sumatra Province has experienced fluctuations over the past decade. The dynamics of poverty rate changes in North Sumatra Province must continue to be controlled to prevent increases in the future, despite a positive trend in poverty reduction observed in recent years. In 2024, the poverty rate in North Sumatra Province, as measured by the Poverty Severity Index (P2), was 0.30 (BPS North Sumatra Province, 2024).

The relationship between unemployment and high income inequality is also strongly interconnected. According to Suhendi (2017), a population with strong and well maintained productivity, supported by high quality human resources, can serve as a driving force for regional economic growth, as emphasized in development economics studies. Therefore, society is expected to remain productive and not remain unemployed for extended periods. Unemployed individuals with no income or zero earnings stand in stark contrast to upper-income groups with high earnings. This disparity inevitably widens income inequality between the two groups. Unemployed individuals also tend to deplete their savings to meet daily needs, resulting in a continuous erosion of their savings. In contrast, upper-income groups with high earnings are able to accumulate savings and investments at an accelerating rate over time. This process of decapitalization within the economy can further exacerbate economic dynamics within a region.

Unemployment is also caused by a mismatch between the competencies of the available labor force and the skills demanded by companies. This mismatch leads to an oversupply of workers in certain fields, forcing them to accept lower wages due to intense competition for jobs. On the other hand, there are occupations that are urgently needed by companies but attract fewer applicants, typically because they require up-to-date expertise or are influenced by rapid technological advancements. As a result, companies are willing to offer higher wages to recruit workers in these fields. Such conditions tend to contribute to high income inequality within a region.

Along with the poverty rate, the unemployment rate in North Sumatra Province has also fluctuated over the past decade. In the context of regional economic development, this issue requires crucial attention from the government so that it does not hinder economic growth and regional development. In 2024, the Open Unemployment Rate in North Sumatra Province was 5.60 percent (BPS North Sumatra Province, 2024). In socio economic analyses examining factors that influence income inequality within a region, these conditions may worsen income inequality if they are not addressed promptly. A simple cyclical relationship describing this situation indicates that when communities lack adequate human resource quality and health, they face difficulties in obtaining decent and high-paying jobs. Under such conditions, they tend to remain trapped in a cycle of poverty. This situation becomes more apparent when compared with other groups that possess better human resource quality and health, hold jobs with adequate income, and are able to accumulate wealth through effective income management. Consequently, income inequality may persist and even intensify over time, thereby affecting long-term regional economic development.

To proceed with this study, the author identifies several issues related to the socio-economic factors affecting income inequality in North Sumatra Province. These include the persistent inequality in access to quality education and adequate health services, which can reduce labor productivity and exacerbate income inequality; the continued fluctuations in poverty levels that influence income inequality in North Sumatra Province; and the ongoing fluctuations in unemployment rates, which may also affect income inequality in the region.

To support this study, several previous research studies are used as references to build the research framework. These studies include research by Ersad (2022), which revealed that all research variables simultaneously affect income inequality. Partially, the Human Development Index (HDI) and poverty rate do not have a significant effect on income inequality, while among

the variables examined, only the unemployment rate has a negative effect on income inequality. According to Lala (2023), the Human Development Index and other variables simultaneously influence income inequality in cities within North Sulawesi Province, while partially, the Human Development Index has a negative and significant effect on income inequality. Firdaus (2023) found that income inequality in Bali Province during the 2015–2022 period was influenced by the unemployment rate, the Human Development Index, and other examined variables. Research by Ardiani (2024) showed that partially, the poverty variable has a positive effect, while the Human Development Index has a negative effect on income inequality. Simultaneously, poverty, the Human Development Index, and other related variables have a positive and significant effect on income inequality. Referring to the study by Febriyanti (2022), it was stated that the Human Development Index has a positive but insignificant effect on income distribution inequality, while simultaneously, the Human Development Index together with other variables has a significant effect on income distribution inequality. According to Jannah (2022), the Human Development Index has a positive effect on income inequality. Meanwhile, Salsabila (2023) revealed that the Human Development Index and the Open Unemployment Rate have an impact on income distribution inequality.

Literature Review

Income Inequality

The Gini ratio is a tool used to measure the degree of inequality in income distribution. Unequal income distribution leads to income disparities, which may ultimately result in poverty (Maulana et al., 2022). The Gini ratio, as an indicator of income equality, ranges from 0 (zero) to 1 (Heryanah, 2017). Several theories explain the role of income inequality in economic dynamics, including theories of distributive justice such as those proposed by John Rawls. This theory emphasizes that income distribution should be based on principles of justice prevailing in society in order to reduce income inequality, which tends to disadvantage vulnerable groups (Siti, 2025).

In addition, the Inverted U-Curve Theory proposed by Kuznets states that economic development initially leads to increasing income inequality during the early stages of development. However, as development progresses, income inequality begins to stabilize and eventually declines in the later stages of development. This theory is cited in Kuncoro (2006) as referenced in Jurnal Cetta (2025).

Human Development Index

According to Tambunan (2003), the Human Development Index (HDI) is an indicator used to measure one of the important aspects related to the quality of economic development outcomes, namely the level of human development. The HDI is a composite index based on three indicators: (a) health, (b) educational attainment, and (c) standard of living. According to Ginting (2008), human development in Indonesia is generally pursued through poverty alleviation. Investment in education and health is more important for the poor than for the non-poor, as these sectors represent the primary assets of poor populations. The availability of affordable education and health facilities is therefore essential in efforts to increase community productivity.

As stated by Azfirmawarman (2023), in 1990 the United Nations Development Programme (UNDP) defined human development as a process that does not depend solely on economic aspects; rather, human development encompasses stages related to human well-being itself. According to Soleha (2016), the application of the Human Development Index in development provides an advantage in explaining to stakeholders that human achievement should be the main focus of national development, alongside efforts to improve economic performance.

Referring to the Badan Pusat Statistik (BPS, 2023), there are several advantages in utilizing the Human Development Index. The human development index serves as an important

parameter in measuring improvements in the standard of living, reflects economic and development progress within a region, and functions as strategic data for Indonesia not only as an indicator of government performance but also as a basis for projecting general allocation funds.

Poverty Rate

Citing Sumedi and Supadi (2004) as referenced in Purnama (2017), poverty is defined as a condition experienced by individuals or groups who are unable to sustain their lives at a level considered humane. According to Chamsyah (2006), poverty refers to a living condition characterized by deprivation or difficulty in fulfilling basic life necessities. An individual is considered poor when they experience difficulties in meeting their basic needs. Based on Arifin (2024), which cites Mubyarto (2003), key strategies in poverty alleviation include rural infrastructure development, community economic empowerment, social safety net programs, and increased community participation. In Nurjihadi (2016), citing Nurkse (1961), the phenomenon of the vicious cycle of poverty is explained as a condition that traps poor communities in developing countries. Low levels of real income result in limited saving capacity and weak capital accumulation for investment, which in turn leads to low productivity and ultimately reinforces low-income levels. In line with this theory, Myrdal (1964) stated that weak total savings in poor regions result in minimal investment, leading to low regional productivity and eventually low regional income. Referring to the study by Lindrianti (2022), the vicious cycle of poverty emerges due to unequal income distribution, limited and low-quality resources among lower-income groups, and disparities in human resource quality. Low human resource quality implies low productivity, which subsequently leads to low wages. Another contributing factor to poverty is inequality in access to capital.

Unemployment Rate

Unemployment refers to individuals within the labor force (aged 15 to 64 years) who are actively seeking employment but have not yet found a job. Unemployment is a phenomenon faced not only by developing countries but also by developed countries. In general, unemployment is defined as a condition in which a person classified as part of the labor force does not have a job and is actively seeking employment (Muana, 2005). According to Mankiw (2019), unemployment can be classified into several types, including structural, frictional, and cyclical unemployment. Structural unemployment occurs due to a mismatch between the skills possessed by workers and the demands of the labor market. In addressing global economic challenges, unemployment can generally be categorized into several forms, including frictional unemployment, which arises when workers voluntarily leave their jobs to search for better or more suitable employment; structural unemployment, which results from changes in the structure of the economy; and cyclical unemployment, which occurs due to an excess of natural unemployment and arises as a consequence of a decline in aggregate demand (Sadono Sukirno, 2000). In understanding the concept of unemployment, several economic theories have been proposed by economists. One of them is the Keynesian theory, which states that employment levels are primarily determined by firms, with wages considered given or based on past wage levels. According to this theory, excess supply and demand in the labor market may persist, as reductions in unemployment are determined solely by firms' labor demand. Firms set wages based on the Marginal Revenue Product of Labor (MRPL) (Teguh Yudo Wicaksono, 2002). Lewis' theory argues that surplus labor represents an opportunity rather than a problem. Excess labor in one sector can contribute to output growth and provide labor for other sectors. Thus, according to Lewis, an excess supply of labor does not hinder economic development; instead, it serves as capital for income accumulation, assuming that labor transfers smoothly from the subsistence sector to the modern capitalist sector without creating excessive labor surplus (Mulyadi, 2003).

Research Methodology

This study employs an associative/quantitative research approach. Quantitative data are data presented in numerical form or data that can be quantified (Sugiyono, 2015). According to Suhendi et al. (2025), hypothesis formulation is required in quantitative research. These hypotheses represent provisional assumptions that are tested for their validity through data collection and analysis methods. Therefore, this study aims to test and analyze the socio-economic factors affecting income inequality in North Sumatra Province. This study examines four variables, consisting of three independent variables and one dependent variable. The independent variables include the Human Development Index, the poverty rate, and the unemployment rate, while the dependent variable is income inequality as measured by the Gini ratio. This study utilizes secondary time series data published by the Central Bureau of Statistics (BPS) of North Sumatra Province for the period 2015–2024. The data analysis is conducted using multiple linear regression analysis, with data processing performed using the SPSS application.

Multiple linear regression analysis is used to measure and examine the effect of independent variables on the dependent variable. This analysis is conducted to determine the relationships among variables, both simultaneously and partially. In multiple linear regression analysis, several tests are applied, including the coefficient of determination, the simultaneous significance test (F-test), and the partial significance test (t-test). Prior to conducting these tests, classical assumption tests are performed to ensure that the regression model is valid, unbiased, efficient, and consistent. These tests include the normality test, multicollinearity test, heteroskedasticity test, and autocorrelation test.

Classical Assumption Tests

Classical assumption testing in multiple linear regression analysis consists of four tests, namely:

According to Ghozali, as cited in Sumantri et al. (2018) and Tanujaya (2020), the normality test is conducted to examine whether both the dependent and independent variables in a regression model are normally distributed. In this testing procedure, the criteria can be assessed using the Kolmogorov–Smirnov test. The Kolmogorov–Smirnov test is a non-parametric statistical test used to examine the normality of residuals (Darmadi, 2013). In the Kolmogorov–Smirnov test, the data are considered to be normally distributed if the Asymp. Sig. (2-tailed) value is greater than 0.05. In addition to the Kolmogorov–Smirnov test, data normality is also examined through the Normal P–P Plot. In the Normal P–P Plot, the diagonal line serves as a reference, and the data are considered normally distributed if the points are scattered around this diagonal line.

Multicollinearity Test

According to Ghozali, as cited in Sumantri et al. (2018) and Tanujaya (2020), the multicollinearity test aims to determine whether there is a correlation among independent variables in the regression model. A commonly used cutoff value to indicate the presence of multicollinearity is a tolerance value of ≤ 0.10 or an equivalent Variance Inflation Factor (VIF) value of ≥ 10 .

Heteroskedasticity Test

According to Ghozali, as cited in Sumantri et al. (2018) and Tanujaya (2020), the heteroskedasticity test aims to determine whether there is an inequality of variance in the residuals from one observation to another in the regression model used in the study. If the variance of the residuals from one observation to another remains constant, the condition is referred to as homoskedasticity, whereas if the variance differs, it is referred to as heteroskedasticity.

The presence or absence of heteroskedasticity can be identified through the observation of a scatter plot graph. If a specific pattern appears in the graph, such as a wave-like pattern, widening, or narrowing, it indicates that the data do not pass the heteroskedasticity test (Ghozali, 2006).

Autocorrelation Test

According to Ghozali, as cited in Herdiyanto (2015) and Tanujaya (2020), the autocorrelation test aims to examine whether, in a linear regression model, there is a correlation between the disturbance term in period t (current period) and the disturbance term in period t-1 (previous period). Furthermore, Ghozali (2007), as cited in Sorongan (2015), states that the criteria used in the autocorrelation test based on the Durbin-Watson (D-W) statistic are as follows: a D-W value between 0 and 1.5 indicates the presence of positive autocorrelation, a D-W value between 1.5 and 2.5 indicates no autocorrelation, and a D-W value between 2.5 and 4 indicates the presence of negative autocorrelation.

In this analysis, the hypothesis formulation is structured in the form of the following model:

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

The explanation of the regression model is that economic growth is equal to a constant plus the coefficients of x1, x2, and x3, plus an error term.

Coefficient of Determination Test

According to Amimah (2022), the coefficient of determination test is intended to show the ability of the model to explain the dependent variables. If the R-square value is small, the ability of the independent variables to explain the dependent variable becomes limited. The coefficient of determination or R² used in this study is the Adjusted R-square, as this value is more appropriate when the model includes more than one independent variable.

Simultaneous Significance Test (F-test)

The F-statistical test basically indicates whether all independent variables included in the model have a simultaneous effect on the dependent variable (Herdiyanto, 2015). According to Amimah (2022), if the significance value is greater than 0.05 and the calculated F value is less than the F-table value, this indicates that the independent variables do not have a significant simultaneous effect on the dependent variable.

Partial Significance Test (t-test)

The t-statistical test basically shows how far an individual independent variable partially influences the variation of the dependent variable (Herdiyanto, 2015). According to Amimah (2022), if the significance value is less than 0.05 and the calculated t-value is greater than the t-table value, this indicates that the independent variable has a significant partial effect on the dependent variable.

Results

Descriptive Statistics

Table 2. Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
IPM	10	69,51	75,76	72,5860	2,25575
TK	10	,30	,49	,3800	,06218
Ketimpangan Pendapatan	10	,30	,34	,3153	,00964
Tingkat Pengangguran	10	5,41	6,91	6,0010	,51274

Valid N (listwise)	10			
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Based on the descriptive statistical data above, it can be explained that:

- The Human Development Index (HDI) has a sample size of 10, with the lowest and highest values ranging from 69.51 to 75.76, a mean value of 72.586, and a standard deviation of 2.25575.
- The Poverty Rate (PR) has a sample size of 10, with the lowest and highest values ranging from 0.30 to 0.49, a mean value of 0.3800, and a standard deviation of 0.06218.
- The Unemployment Rate has a sample size of 10, with the lowest and highest values ranging from 5.41 to 6.91, a mean value of 6.0010, and a standard deviation of 0.51274.
- Income Inequality has a sample size of 10, with the lowest and highest values ranging from 0.30 to 0.34, a mean value of 0.3153, and a standard deviation of 0.00964.

Based on the observation of the data description above, the data distribution does not indicate the presence of extreme data imbalance (outliers), as the standard deviation values are not greater than the mean values.

Normality Test

Table 3. Normality Test
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual	
N		10	
Normal Parameters ^{a,b}	Mean	,0000000	
	Std. Deviation	,00241041	
Most Extreme Differences	Absolute	,174	
	Positive	,110	
	Negative	-,174	
Test Statistic		,174	
Asymp. Sig. (2-tailed) ^c		,200 ^d	
Monte Carlo Sig. (2-tailed) ^e	Sig.	,530	
	99% Confidence Interval	Lower Bound	,517
		Upper Bound	,542

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

e. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 299883525.

The normality test is a stage within the classical assumption tests. Based on the results of the normality test shown in the One-Sample K-S Test table above, the Asymp. Sig. (2-tailed) value is 0.200, which is greater than 0.05. This indicates that the data are normally distributed.

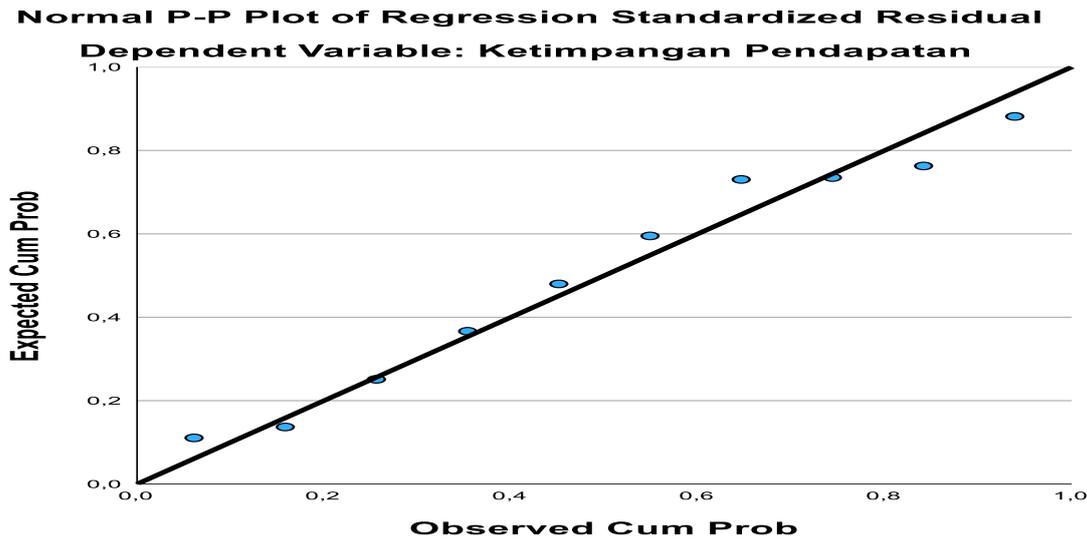


Figure 1. Normal P–P Plot Graph

Subsequently, an observation of the Normal P–P Plot of Regression was conducted. Based on the figure above, it can be seen that the data points are distributed around the diagonal line, indicating that the data are normally distributed. The fulfillment of this test suggests that the hypothesis testing can be appropriately continued.

Multicollinearity Test

Table 4. Multicollinearity Test Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	IPM	,359	2,789
	TK	,345	2,898
	Tingkat Pengangguran	,880	1,136

The next analysis conducted by the researcher is the multicollinearity test. Based on the results, it is found that the Human Development Index (HDI) variable has a tolerance value of $0.359 > 0.10$ and a VIF value of $2.789 < 10$, indicating that there is no multicollinearity in the HDI (X_1) variable. The Poverty Rate (PR) variable shows a tolerance value of $0.345 > 0.10$ and a VIF value of $2.898 < 10$, which means that there is no multicollinearity in the poverty rate (X_2) variable. Meanwhile, the Unemployment Rate variable has a tolerance value of $0.880 > 0.10$ and a VIF value of $1.136 < 10$, indicating that this variable also does not experience multicollinearity. Based on these results, it can be concluded that all three independent variables do not exhibit multicollinearity; therefore, the analysis can be continued to the next stage.

Heteroscedasticity Test

The next classical assumption test is the heteroscedasticity test. In this test, it can be observed from the scatterplot below that the data are evenly distributed both below and above the zero value with reference to the Y-axis. Therefore, it can be concluded that there is no heteroscedasticity problem in this study.

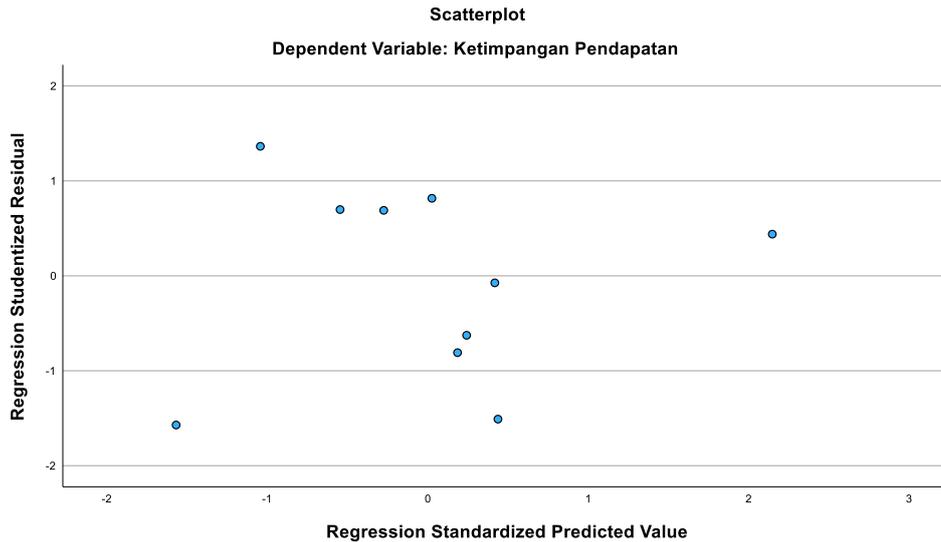


Figure 2. Heteroscedasticity Test Graph

Autocorrelation Test

Table 5. Autocorrelation Test

Model Summary ^b			
Change Statistics			
Model	df2	Sig. F Change	Durbin-Watson
1	6	<,001	2,181

In the autocorrelation test above, it can be seen that the Durbin-Watson (DW) value in this study is 2.181. Therefore, based on these observations, the autocorrelation value from the test falls within the range of 1.5 to 2.5, or $1.5 < 2.181 < 2.5$. Thus, it can be concluded that no autocorrelation occurs in this study, allowing the research to proceed to the next stage.

Multiple Linear Regression Analysis

The multiple linear regression analysis in the study on the socio-economic factors influencing income inequality in North Sumatra Province can be seen in the model below.

Table 6. Regression Analysis Results

Coefficients ^a						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	,628	,059		10,692	<,001
	IPM	-,005	,001	-1,139	-6,682	<,001
	TK	-,064	,027	-,410	-2,357	,056
	Tingkat Pengangguran	,011	,002	,569	5,232	,002

Based on the data table above, the regression equation for economic growth can be established as follows:

$$Y = 0.628 - 0.005X_1 - 0.064X_2 + 0.011X_3 + \epsilon$$

In the model above, it can be observed that the Human Development Index (HDI) has a coefficient with a negative effect on income inequality, the poverty rate has a coefficient with a negative effect on income inequality, and the unemployment rate has a coefficient with a

positive effect on income inequality. The discussion regarding the significant influence of the independent variables (X) on the dependent variable (Y), both simultaneously and partially, will be presented through the simultaneous significance test and the partial significance test, namely the F-test and T-test.

Coefficient of Determination Test

Table 7. Coefficient of Determination Test
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,968 ^a	,937	,906	,00295

In this coefficient of determination test, it can be seen that the results show an adjusted R-squared value of 0.906, or 90.6%, indicating that the ability of the independent variables—comprising the Human Development Index, Poverty Rate, and Unemployment Rate—to influence the dependent variable, income inequality, is very high. The remaining 9.4% of the variation in the dependent variable is affected by other variables not examined in this study.

Simultaneous Significance Test (F-test)

Table 8. Results of the Simultaneous Significance Test

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,001	3	,000	29,965	<,001 ^b
	Residual	,000	6	,000		
	Total	,001	9			

a. Dependent Variable: Income Inequality

b. Predictors: (Constant), Unemployment Rate, IPM, TK

In the simultaneous significance test, or F-test, it can be observed that the calculated F-value is greater than the F-table value, namely $29.965 > 4.757$, indicating that the independent variables comprising the Human Development Index, Poverty Rate, and Unemployment Rate jointly have a significant effect on income inequality. This is further supported by the F-test significance value of 0.001, which is less than the threshold of 0.05 (sig. = 0.05). Based on these results, it can be concluded that, simultaneously, the independent variables Human Development Index, Poverty Rate, and Unemployment Rate have a significant influence on income inequality in North Sumatra Province.

Partial Significance Test (T-test)

Table 9. T-test Results
Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	,628	,059		10,692	<,001
IPM	-,005	,001	-1,139	-6,682	<,001
TK	-,064	,027	-,410	-2,357	,056
Unemployment Rate	,011	,002	,569	5,232	,002

Based on the results of the T-test above, the T-table value is 2.44691. The test results show that the independent variable, Human Development Index, has a calculated T-value greater than

the T-table ($6.682 > 2.44691$) with a significance value of 0.001, which is less than 0.05. This indicates that, partially, the HDI has a significant negative effect on income inequality in North Sumatra Province. The Poverty Rate variable has a calculated T-value less than the T-table ($2.357 < 2.44691$) with a significance value of 0.056, which is greater than 0.05. This suggests that the Poverty Rate has a negative effect on income inequality, but it is not statistically significant. The Unemployment Rate variable has a calculated T-value greater than the T-table ($5.232 > 2.44691$) with a significance value of 0.002, which is less than 0.05. This indicates that the Unemployment Rate has a positive and significant effect on income inequality. From this test, it can be concluded that among the three independent variables examined, only the Poverty Rate does not have a significant effect on income inequality in North Sumatra Province, while the other two independent variables human development index and unemployment rate have a significant influence on income inequality in the province.

The Effect of the Human Development Index on Income Inequality in North Sumatra Province

Based on the results of the test above, the Human Development Index, which is one of the independent variables in this study, has a negative and significant effect on income inequality in North Sumatra Province, as indicated by the calculated T-value being greater than the T-table ($6.682 > 2.44691$) with a significance of $0.001 < 0.05$. Therefore, it can be concluded that an increase in the Human Development Index in North Sumatra Province can reduce the GINI ratio or income inequality in the province.

An increase in the human development index has a negative effect on income inequality, indicating that improvements in the quality of education and human resources, enhancements in health standards, and overall living conditions particularly for the lower and middle income population can contribute to reducing income disparity. Such improvements provide opportunities and hope for lower- and middle-income groups to improve their living standards and break free from the cycle of poverty. This is in line with the definition put forward by UNDP (1990), which states that human development does not depend solely on the economic sector but is also related to the various stages of human life and well-being. The results of this study also align with the benefits of utilizing the human development index, as outlined by the Badan Pusat Statistik (BPS) in 2023, which states that the human development index can indicate economic progress and regional development. With an increase in the human development index in North Sumatra Province, it is expected that income inequality can be reduced to a minimal level, thereby contributing to the achievement of optimal regional development.

Referring to previous studies, the results of this study are in line with several other research findings. For instance, Febriyani (2022) stated that the human development index has a significant effect on income distribution inequality, and together with other variables, the human development index significantly influences income distribution inequality. Ardiani (2024) revealed that the human development index has a negative effect on provincial income inequality in Indonesia. Simultaneously, the variables of poverty, economic growth, and human development index have a positive and significant effect on income inequality. Similarly, Lala (2023) explained that the human development index has a negative and significant effect on income inequality, and together with other variables, it significantly affects income inequality.

The Effect of the Poverty Rate on Income Inequality in North Sumatra Province

Based on the results of the previous tests, it was found that the Poverty Rate has a negative and insignificant effect on income inequality in North Sumatra Province, as the calculated T-value is less than the T-table ($2.357 < 2.44691$) with a significance level above 0.05 ($0.056 > 0.05$). Based on this test, it can be concluded that the dynamics of the Poverty Rate in North Sumatra Province do not have a significant effect on income inequality.

In this study, it was found that the Poverty Rate has a negative effect on income inequality, meaning that an increase in the Poverty Rate would reduce income inequality in North Sumatra Province, or conversely, a decrease in the Poverty Rate could increase income inequality in society. However, in this study, this effect was not statistically significant. This pattern occurs because a reduction in the Poverty Rate in North Sumatra Province does not necessarily lead to a decrease in income inequality. If economic growth is accompanied by an increase in the income of the population, for the lower- and middle-income groups, this can improve their living standards. However, if the increase in income is predominantly enjoyed by the wealthy, then even though the poor experience an improvement in living standards and poverty declines, income inequality may remain high or even increase, as the income of the rich rises at a much faster rate. In relation to regional economic development on a macro scale, Suhendi et al., (2025) explain that the enhancement of welfare and economic development at the regional level can be influenced by variables other than the GINI ratio, which measures income inequality. Furthermore, it is necessary to strengthen accessibility and opportunities within the region to achieve more balanced development.

This study is in line with Ersad (2022), which showed that the Poverty Rate does not have an effect on income inequality. Similarly, Syahri (2020) revealed that poverty has a negative effect on income inequality in North Sumatra during the period 2015–2019.

The Effect of the Unemployment Rate on Income Inequality in North Sumatra Province

In this study, the Unemployment Rate has a positive and significant effect on income inequality in North Sumatra Province. This can be seen from the partial significance test, where the calculated T-value is greater than the T-table ($5.232 > 2.44691$) with a significance level below 0.05 ($0.002 < 0.05$). Therefore, it can be concluded that any increase in the Unemployment Rate may lead to a rise in income inequality in North Sumatra Province. If there is a surge in unemployment in North Sumatra, it means that many people will have zero or no income for a certain period. This will exacerbate the income gap between unemployed individuals and those who are employed, particularly wealthy individuals with high incomes. According to Yoertiara (2022), income inequality can also occur if the unemployment rate in a region is high. Unemployment is one of the main challenges in developing countries. A high unemployment rate prevents individuals from receiving wages or income, thereby widening the gap between the rich and the poor.

The results of this study are consistent with previous research. In Yoertiara (2022), the open unemployment rate was found to have a positive and significant effect on income inequality. Similarly, Ersada (2020) revealed that the unemployment rate significantly affects income inequality. Firdaus (2023) also reported that the unemployment rate has a significant positive effect, meaning that an increase in the Unemployment Rate leads to a rise in income inequality. These findings indicate that the Unemployment Rate has a positive and significant influence on income inequality.

The Effect of the Human Development Index, Poverty Rate, and Unemployment Rate on Income Inequality in North Sumatra Province

Collectively, the three independent variables have a significant effect on income inequality in North Sumatra Province during the period 2015–2024. The results of the simultaneous significance test (F-test) show that the calculated F-value is greater than the F-table value ($29.965 > 4.757$) with a significance level below 0.05 ($0.001 < 0.05$). Based on the results of the coefficient of determination test, the adjusted R-squared value in this study is 90.6%, which is very high. This indicates that the three variables examined have a strong ability to explain income inequality, suggesting that the findings of this study are robust and can serve as a reliable reference for research applications.

Based on the influence of the three independent variables, it can be concluded that socio-economic factors related to the quality of human development—reflected in the quality of

human resources in terms of education and skills, health quality, and living standards—along with poverty levels and employment opportunities to earn income, remain strong factors affecting income inequality, particularly in North Sumatra Province.

The results of this study are consistent with previous research. Ersad (2020) showed that, simultaneously, the three variables have an effect on income inequality. According to Ardiani (2024), poverty and the Human Development Index, along with other variables, simultaneously influence income inequality. Similarly, Lala (2023) stated that economic growth and the Human Development Index simultaneously affect income inequality in the cities of North Sulawesi Province.

Conclusion

This study shows that socio-economic factors, such as the Human Development Index, Poverty Rate, and Unemployment Rate, have a simultaneous effect on income inequality in North Sumatra Province, with an adjusted R-squared value of 90.6%, which is very high. This indicates that the independent variables examined in this study are able to explain the phenomenon of income inequality quite effectively. Partially, the study shows that the human development index and the Unemployment Rate have a significant effect on income inequality in North Sumatra Province during the period 2015–2024. To reduce income inequality in a region, it is expected that the government plays a role in formulating policies related to regional economic development, focusing on income redistribution, reducing poverty and unemployment, and improving the quality of human resources and living standards. These measures aim to create a prosperous and high-quality society, achieve optimal economic growth, and support sustainable and effective regional development.

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