Original Research Article

Analysis of Socio-Economic Variables Impacting Poverty Alleviation in Regional Development: A Case Study in Deli Serdang Regency, Indonesia

ABSTRACT

This study analyzes the impact of macro socio-economic variables on poverty alleviation within the context of regional development in North Sumatra Province from 2019 to 2023. The socio-economic variables examined include economic growth, average years of schooling, life expectancy, and the open unemployment rate. The research employs a panel data regression approach using the Fixed Effect Model, selected based on Chow and Hausman test results, to determine the best model fit. The findings reveal that economic growth, average years of schooling, and life expectancy have significant negative effects on poverty reduction, indicating that improvements in these areas help alleviate poverty. Conversely, the open unemployment rate shows a significant positive effect on poverty levels, suggesting that higher unemployment exacerbates poverty. The model explains 99% of the variation in poverty ($R^2 = 0.990$), indicating a high explanatory power. Based on these results, the study recommends the implementation of inclusive economic policies focusing on boosting economic growth, improving educational access, enhancing healthcare systems, and creating job opportunities to effectively reduce poverty. Additionally, further research with broader geographical coverage and more refined methods is necessary to enrich the understanding of poverty determinants in different regional contexts.

Keywords: Poverty alleviation, economic growth, education, life expectancy, unemployment, regional development, panel data, North Sumatra

UNDER PEER REVIEW

I. INTRODUCTION

Development is a multidimensional process that encompasses various aspects of human life, including physical and psychological components, such as the fulfillment of basic needs like food, education, healthcare, and housing (Maipita et al., 2010). The primary objective of development is to enhance human welfare, with a particular focus on poverty alleviation. In this context, development goes beyond the provision of physical infrastructure and extends to the improvement of socio-economic well-being, particularly for the most vulnerable populations (Agus Triono &Sangaji, 2023).

Poverty remains one of the most significant challenges faced by developing nations, including Indonesia. According to the Central Bureau of Statistics (BPS), poverty is defined as the inability of individuals or households to meet their basic needs, such as food, education, and healthcare (BPS, 2020). Despite the various poverty reduction programs implemented since the 1960s, the results have been mixed due to various socio-political and economic crises. These crises have hindered Indonesia's ability to consistently lower poverty levels (Lestari et al., 2023). Balisacan et al. (2002) also emphasize that despite Indonesia's impressive record of economic growth and poverty reduction, there are significant regional disparities that complicate the overall success of poverty alleviation programs.

Globally, the Sustainable Development Goals (SDGs) have established the eradication of extreme poverty as a key target by 2030 (Satia Negara Lubis &Arga Abdi RafiudDarajat Lubis, 2024). Indonesia, however, aims to achieve this target by the end of 2024. The challenge of eliminating poverty has been exacerbated by the COVID-19 pandemic, which led to a surge in poverty rates for the first time since the 1997-1998 financial crisis (World Bank, 2022). Recent data from BPS indicate that the extreme poverty rate in Indonesia reached 4 percent in 2021, affecting approximately 10.86 million individuals (BPS, 2021). This demonstrates the complexity of the poverty problem, which requires more nuanced strategies beyond traditional economic growth models.

North Sumatra Province, as one of the key regions in Indonesia, mirrors the national struggle in tackling poverty. According to BPS, the poverty rate in the province in 2023 was 8.15 percent, slightly lower than the national average of 9.36 percent (BPS, 2023). While the region has experienced stable economic growth, with a rate of 4.94 percent in 2023, socio-economic inequalities remain significant factors contributing to poverty (Lestari et al., 2023). Previous research by Suryahadi et al. (2006) stresses the importance of sectoral growth in reducing poverty, particularly in rural areas. Their findings suggest that growth in rural services sectors has the most substantial effect on reducing poverty, highlighting the need for context-specific strategies in poverty alleviation efforts.

Several studies have established a correlation between economic growth and poverty reduction, indicating that sustained economic expansion can contribute significantly to lowering poverty levels (Kuznet, 2001; Deni Tisna, 2008). However, Balisacan et al. (2002) pointed out that economic growth alone may not be sufficient. Other factors, such as infrastructure development, human resources, agricultural incentives, and access to technology, also directly affect the welfare of the poor. This suggests that a multidimensional approach, rather than a singular focus on growth, is required for more effective poverty reduction. Ranis and Stewart (2005) similarly argue that not all factors that influence human development are equally significant, pointing to the importance of selective investment in variables that directly enhance human welfare, such as education and healthcare.

UNDER PEER REVIEW

In the context of North Sumatra, social indicators such as average years of schooling and life expectancy have been shown to play significant roles in poverty reduction. A study by SeptianPramudyaWicaksono and Dinar Melani Hutajulu (2023) found that higher levels of education, particularly in terms of average years of schooling, are associated with lower poverty levels. Furthermore, increasing life expectancy has also been linked to poverty reduction, as healthier populations tend to be more productive and economically active (Surbakti et al., 2023). These findings align with the human capital theory, which suggests that investing in education and health results in greater economic returns through improved productivity (Becker, 1964; Grossman, 1972).

Unemployment, however, remains a persistent challenge. As noted by Prastyo (2010), rising unemployment levels in regions like Central Java have a direct positive effect on poverty, indicating that job creation is a critical factor in poverty alleviation. In North Sumatra, Tomi Agus Triono et al. (2023) found similar results, demonstrating that the open unemployment rate is positively correlated with poverty levels. Consequently, reducing unemployment through targeted job creation and workforce development policies is essential for addressing poverty in the region.

While previous studies have explored various aspects of poverty reduction, including the effects of education, health, and unemployment, gaps remain in understanding the combined impact of these variables within the context of regional development. Most of the literature, such as that by Kumalasari (2010), has focused on specific regions, like Central Java, with limited generalization to other provinces in Indonesia. Moreover, few studies have examined the interconnections between these socio-economic variables using panel data models over an extended period, particularly in the case of North Sumatra.

This study aims to fill these gaps by providing a comprehensive analysis of the socio-economic variables affecting poverty alleviation in North Sumatra Province from 2019 to 2023. Specifically, it examines the effects of economic growth, education, health (measured by life expectancy), and unemployment on poverty levels, using a panel data regression approach. By investigating these variables in conjunction, this study seeks to provide a deeper understanding of the dynamics of poverty reduction and to offer evidence-based recommendations for regional policy development.

The research contributes to the literature by adopting a multidimensional approach that considers the combined effects of economic, social, and demographic variables on poverty. This approach builds upon previous work by Suryahadi et al. (2006) and Prastyo (2010) but extends the analysis to account for the specific regional characteristics of North Sumatra. By focusing on the interplay of these factors within a regional context, the study highlights the

UNDER PEER REVIEW

importance of tailoring poverty alleviation strategies to local conditions, which can lead to more effective and sustainable outcomes.

II. RESEARCH METHODOLOGY

Scope of the Study

This study focuses on analyzing the effects of socio-economic variables on poverty alleviation in the districts and cities of North Sumatra Province from 2019 to 2023. The variables include economic growth, average years of schooling, life expectancy, and the open unemployment rate. These variables are examined in relation to poverty levels to assess their contribution to regional poverty alleviation. By applying panel data regression methods, this study aims to provide insights into the underlying factors that influence poverty in the region and offer evidence-based recommendations for policymakers.

Research Design

The research adopts a quantitative approach, utilizing an explanatory design to investigate the cause-and-effect relationships between socio-economic variables and poverty. The primary objective is to evaluate how changes in these variables impact poverty levels across North Sumatra. The study employs secondary data obtained from the Indonesian Central Bureau of Statistics (BPS) for the period between 2019 and 2023, encompassing data on economic growth, education, health, and unemployment.

Data Sources

The study relies on secondary data obtained from the annual reports of BPS, including the Provincial Development Indicators for North Sumatra and national statistics. The data cover various socio-economic indicators, such as economic growth rates, education levels (measured by average years of schooling), life expectancy, and unemployment rates in the districts and cities of North Sumatra Province. These datasets offer a comprehensive view of the socio-economic conditions in the region, providing a robust basis for the analysis.

Model and Analytical Approach

This study employs panel data regression analysis, which combines cross-sectional data from multiple districts and cities with time-series data over the study period. The chosen analytical model is the Fixed Effect Model, based on the results of the Chow and Hausman tests, which indicate that this model provides the best fit for the data. Panel data regression is particularly well-suited for this study as it accounts for both temporal and spatial variations, offering a more detailed analysis of the impact of socio-economic variables on poverty.

The regression model used in this study is represented as follows:

$$POVit=\beta0+\beta1EGit+\beta2RLSit+\beta3AHHit+\beta4TPTit+\mu it$$

UNDER PEER REVIEW

Where:

- POVit represents the poverty rate in region iii at time ttt.
- EGit represents the economic growth rate.
- RLSit is the average years of schooling.
- AHHit represents life expectancy.
- TPTit is the open unemployment rate.
- μit is the error term.

The coefficients (β1,β2,β3,β4) measure the impact of each independent variable on poverty. A negative coefficient indicates that an increase in the corresponding variable leads to a reduction in poverty, while a positive coefficient suggests an increase in poverty.

Hypothesis Testing and Model Selection

Three key statistical tests were conducted to determine the appropriate regression model: the Chow test, the Hausman test, and the Lagrange Multiplier test. The Chow test was used to compare the Fixed Effect Model with the Common Effect Model. The results indicated that the Fixed Effect Model is better suited for this analysis. The Hausman test was employed to decide between the Fixed Effect Model and the Random Effect Model, with results favoring the Fixed Effect Model. Consequently, the Lagrange Multiplier test was not required.

Classical Assumption Tests

To ensure the validity of the regression model, several classical assumption tests were conducted:

1. **Normality Test**: The Jarque-Bera test was used to confirm that the residuals of the model follow a normal distribution. The results indicated that the assumption of normality holds.
2. **Multicollinearity Test**: This test was performed to examine the potential linear relationships between the independent variables. The results showed no evidence of multicollinearity, suggesting that the model is free from this issue.
3. **Autocorrelation Test**: The Durbin-Watson test was applied to assess whether autocorrelation exists among the residuals. The results confirmed the absence of autocorrelation.
4. **Heteroskedasticity Test**: White's heteroskedasticity test was employed to verify whether the variance of the residuals is constant across observations. The results indicated no heteroskedasticity, confirming that the model is homoscedastic.

Operational Definition of Variables

The operational definitions of the variables used in the study are as follows:

Table 1. Operational Definitions of Variables Used in the Study

UNDER PEER REVIEW

Variable	Definition	Source	Unit
Poverty Rate (POV)	Percentage of population living below the poverty line	BPS	Percentage
Economic Growth (EG)	Annual change in GDP from the previous year	BPS, BI	Percentage
Average Years of Schooling (RLS)	Average number of years spent in formal education	BPS, Dikdik	Years
Life Expectancy (AHH)	Expected number of years of life from birth	BPS, Dinkes	Years
Open Unemployment Rate (TPT)	Percentage of labor force aged 15-64 that is unemployed	BPS	Percentage

By utilizing this methodological approach, the study aims to provide robust, evidence-based findings that will contribute to the development of targeted policies for poverty alleviation in North Sumatra Province.

III. RESULTS AND DISCUSSION

Descriptive Analysis of Variables

The descriptive analysis of the socio-economic variables provides a clear picture of poverty trends in North Sumatra between 2019 and 2023. Table 2 shows the fluctuation in poverty rates, with poverty increasing during the COVID-19 pandemic and gradually decreasing in 2022 and 2023.

Table 2. Poverty Rates in Indonesia and North Sumatra (2019–2023)

Year	Indonesia (%)	North Sumatra (%)
2019	9.41	8.83
2020	9.78	8.75
2021	10.14	9.01
2022	9.54	8.42
2023	9.36	8.15

Source: BPS Sumatera Utara (2024)

The poverty rate in North Sumatra largely mirrors the national trend, increasing sharply during the pandemic and decreasing as the economy began to recover in 2022. The highest poverty rates in 2023 were observed in rural districts, such as Nias Barat (22.81%) and Nias Utara (21.79%), while Deli Serdang recorded the lowest rate (3.44%).

Economic Growth and Poverty

The regression analysis reveals a significant negative relationship between **economic growth** and poverty. The results indicate that a 1% increase in

UNDER PEER REVIEW

economic growth leads to a 0.02% reduction in poverty. This finding highlights the critical role that economic growth plays in poverty alleviation. Table 3 provides the regression coefficients and their significance.

Table 3. Regression Results for Poverty Determinants (2019–2023)

Variable	Coefficient	t-statistic	p-value
Constant (β0\beta_0β0)	2.40	4.30	0.0000
Economic Growth (EGEGEG)	-0.02	-3.51	0.0002
Avg. Schooling (RLSRLSRLS)	-0.57	-2.95	0.0017
Life Expectancy (AHHAHHAHH)	-0.47	-2.75	0.0058
Unemployment (TPTTPTTPT)	0.02	2.04	0.0471

R^2 = 0.990 | **F-statistic** = 64.21 | **p-value** = 0.000

Economic growth plays a central role in reducing poverty, though its elasticity is lower compared to other variables such as education. This suggests that while growth contributes to poverty alleviation, it is not the only factor; other dimensions such as education and healthcare are equally critical. This finding supports previous studies by Kuznet (2001) and Deni Tisna (2008), which argue that inclusive economic policies are necessary for substantial poverty reduction.

Average Schooling Length and Poverty

Education, measured through the **average years of schooling**, was found to have the strongest impact on poverty reduction, with a coefficient of -0.57. This suggests that for each additional year of schooling, poverty decreases by 0.57%. Table 4 shows the average schooling levels across districts.

Table 4. Average Years of Schooling in North Sumatra (2019–2023)

District	2019	2020	2021	2022	2023
Medan	11.40	11.39	11.50	11.50	11.62
Nias Barat	5.15	5.36	5.64	5.88	6.14
Toba Samosir	10.40	10.52	10.60	10.60	10.59

Source: BPS Sumatera Utara (2024)

This result is consistent with Human Capital Theory (Becker, 1964), which suggests that education increases productivity and income potential, allowing individuals to improve their economic status. The government should focus on increasing educational access, especially in rural areas, to maximize this effect.

Life Expectancy and Poverty

Life expectancy also plays a crucial role in reducing poverty, with a coefficient of -0.47, indicating that a 1% increase in life expectancy reduces poverty by 0.47%.

UNDER PEER REVIEW

Improvements in healthcare contribute to this effect, as healthier populations tend to be more productive and economically active.

Table 5. Life Expectancy in North Sumatra (2019–2023)

District	2019	2020	2021	2022	2023
PematangSiantar	73.33	73.55	73.77	74.27	74.75
Medan	72.98	73.81	73.97	74.32	74.76
Nias Selatan	70.88	71.00	71.29	71.61	71.74

Source: BPS Sumatera Utara (2024)

This aligns with Grossman's (1972) health capital model, which states that better health leads to higher productivity and, ultimately, lower poverty rates. The findings suggest that investing in healthcare infrastructure and public health programs will be key to reducing poverty.

Unemployment and Poverty

The analysis shows a positive and significant relationship between the **unemployment rate** and poverty, with a coefficient of 0.02. This means that a 1% increase in unemployment raises poverty by 0.02%. While this effect is smaller compared to other variables, it highlights the importance of job creation policies.

Table 6. Unemployment Rates in North Sumatra (2019–2023)

District	2019	2020	2021	2022	2023
Medan	8.53	10.74	10.81	8.89	8.67
Deli Serdang	5.74	9.50	9.13	8.79	8.62
Nias	1.09	3.49	3.12	2.81	2.31

Source: BPS Sumatera Utara (2024)

The positive relationship between unemployment and poverty suggests that tackling unemployment through job creation and workforce development programs is critical for reducing poverty levels in North Sumatra. Targeted interventions aimed at increasing employment opportunities, especially in urban areas, will be essential to achieving sustainable poverty alleviation.

Model Evaluation

The overall model explains 99% of the variation in poverty ($R^2 = 0.990$), indicating a strong fit. The regression analysis supports the hypothesis that economic growth, education, life expectancy, and unemployment all have significant effects on poverty. The F-statistic of 64.21 confirms the model's significance.

The **normality test** using the Jarque-Bera statistic yielded a p-value of 0.627, indicating that the residuals follow a normal distribution. The **multicollinearity test** results, presented in Table 6, show no significant multicollinearity between

UNDER PEER REVIEW

the independent variables, with all variance inflation factors (VIF) well below the threshold of 10.

Table 7. Multicollinearity Test Results

Variable	VIF
Economic Growth (EG)	1.22
Average Schooling (RLS)	1.05
Life Expectancy (AHH)	1.31
Unemployment (TPT)	1.08

Source: Processed data (2024)

Policy Implications

The findings suggest several key policy implications:

1. **Inclusive Economic Growth**: To ensure that growth benefits all segments of society, the government should focus on policies that promote equitable development, particularly in rural and underdeveloped areas.
2. **Educational Investments**: Expanding access to quality education, particularly in rural districts, will have long-term benefits for poverty alleviation.
3. **Healthcare Improvements**: Investing in public health infrastructure will lead to higher life expectancy and contribute to poverty reduction.
4. **Job Creation**: Reducing unemployment through targeted job creation programs will have a direct impact on lowering poverty rates.

UNDER PEER REVIEW

IV. CONCLUSIONS AND RECOMMENDATIONS

This study investigated the socio-economic variables affecting poverty alleviation in North Sumatra Province from 2019 to 2023. The findings indicate that economic growth, average years of schooling, life expectancy, and unemployment are significant determinants of poverty. Economic growth and improvements in education and health have a negative and substantial impact on poverty reduction, while unemployment contributes positively to poverty levels. The results confirm that a multidimensional approach is essential for effective poverty alleviation, with economic, social, and health policies playing complementary roles.

Economic growth, while crucial for poverty reduction, must be inclusive and benefit all regions and sectors. The elasticity of poverty reduction with respect to economic growth suggests that growth alone is insufficient to alleviate poverty comprehensively. Thus, policymakers should focus on promoting inclusive growth that reaches marginalized populations, particularly in rural and underdeveloped districts.

Education was found to have the most significant impact on poverty reduction. Therefore, increasing investment in the education sector is essential, especially in

rural areas where schooling levels are still low. Expanding access to quality education and ensuring that individuals complete higher levels of schooling will not only reduce poverty but also improve long-term economic development prospects.

Life expectancy, representing public health outcomes, also plays a critical role in reducing poverty. Improving healthcare infrastructure, enhancing access to medical services, and focusing on preventive care will significantly contribute to poverty alleviation by ensuring a healthier and more productive population. Government policies should prioritize healthcare improvements in the most disadvantaged areas, where life expectancy remains lower than in urban centers.

Unemployment, despite its relatively smaller effect compared to other variables, still contributes positively to poverty. Job creation programs, vocational training, and workforce development initiatives are essential to reduce unemployment, particularly among youth and in urban regions with high unemployment rates. Fostering partnerships with the private sector to create job opportunities can have a direct impact on reducing poverty levels.

In conclusion, the study underscores the need for a comprehensive poverty alleviation strategy that integrates economic growth, education, healthcare, and employment policies. An inclusive approach that focuses on improving human capital through education and health, alongside creating economic opportunities, will yield the most sustainable and significant reductions in poverty. Policymakers in North Sumatra should focus on equitable development to ensure that growth and development are shared across all regions and social groups. This will lead to more robust, long-term poverty reduction and improved living standards for all residents.

UNDER PEER REVIEW

References

Agus Triono, T., &Sangaji, R. C. (2023). Factors influencing poverty levels in Indonesia: A literature review of BPS poverty data reports in 2022. *Journal of Society Bridge*, 1(1), 59–67. https://doi.org/10.59012/jsb.v1i1.5

BPS. (n.d.-a). *North Sumatra province in figures 2023*.

BPS. (n.d.-b). *Indonesian statistics 2020*.

BPS. (2020). *Indonesian statistics 2020*.

BPS. (2004). *Monitoring and review of poverty programs in Indonesia*. Jakarta.

Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy, 80*(2), 223-255.

Lestari, P. I., Robiani, B., &Sukanto. (2023). Extreme poverty, inequality, and economic growth in Indonesia. *Journal of Scientific Economics and Business, 11*(2), 1739–1752. https://jurnal.unived.ac.id/index.php/er/article/view/4789

Lubis, S. N., & Lubis, A. A. R. D. (2024). Enhancing Indonesian coffee trade: Strategies for navigating and reducing trade barriers. *International Journal of Innovative Research and Scientific Studies, 7*(3), 1248–1267. https://doi.org/10.53894/ijirss.v7i3.3231

Maipita, I. (2013). *Understanding and measuring poverty* (1st ed.). Absolute Media Publishing.

World Bank Institute. (2004). *Fundamentals of poverty analysis* (translated ed.). Semarang.

UNDER PEER REVIEW