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Analysis Of Factors Affecting Poverty In The Nias Islands

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Abstract

This study aims to determine the effect of education level, unemployment rate, gross regional domestic product (GRDP), and population on poverty in five regions in Nias Islands, namely West Nias, North Nias, South Nias, Nias, and Gunungsitoli. The type of research used is a quantitative causality approach. This research data is panel data which is a combination of cross-section and time series. Cross section data is the 5 regions with the highest percentage of poor people in North Sumatra Province, and the time series is 2014-2023. The research data collection was carried out using secondary data published by Statistics Indonesia (BPS), (BPS) of North Sumatra Province. The results showed that simultaneously the independent variables of Education Level, Unemployment Rate, Gross Regional Domestic Product (GRDP), and Total Population had a significant effect on the Poverty Level in 5 regions in the Nias Islands in the 2014-2023 period. Partially, it is known that the Education Level variable has a positive but insignificant effect on the Poverty Level. The Unemployment Rate variable has a positive and significant effect on the Poverty Level. The GRDP variable has a negative and significant effect on the Poverty Level. Meanwhile, the Total Population variable has a negative but insignificant effect on the Poverty Level.

Keywords: *Education; Unemployment; GRDP; Population; Poverty*.

1. Introduction

Poverty is a complex problem for all countries in the world. Globally, poverty eradication efforts are also part of international commitments through the Sustainable Development Goals (SDGs) set by the United Nations. The SDGs consist of 17 goals, with the first goal specifically targeting: "*End poverty in all its forms everywhere*." This goal emphasizes that poverty alleviation is a key prerequisite for achieving sustainable, inclusive, and equitable development. Indonesia, as a member state of the United Nations, has adopted the SDGs into its national development policy direction, prioritizing poverty reduction as a top priority.

However, poverty remains a complex socio-economic issue and continues to be a major challenge for national development in Indonesia [1]. High poverty rates not only reflect the low quality of life of the population but also hinder the achievement of equitable well-being [2] One of the objectives of Indonesia's national development, as stated in the Preamble to the 1945 Constitution, is to improve the welfare of the people. The welfare of the people reflects the fulfillment of the material, spiritual, and social needs of the population.

One indicator of successful development is increased economic growth, which is expected to reduce poverty levels [3] This aligns with the view of [4], who argues that increased economic growth will impact poverty levels because higher economic growth signifies improved living standards for the population. Economic growth can be represented by the Gross Regional Domestic Product (GRDP) [5].

Data on GRDP based on current prices shows DKI Jakarta as the province with the largest GRDP of around Rp3,443 trillion, followed by East Java with Rp2,953 trillion and West Java with Rp2,625 trillion. Provinces on the island of Java dominate as the national economic center, while outside Java, North Sumatra and Riau recorded GRDPs above Rp1,000 trillion.

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Table 1. 10 Provinces with the Highest GRDP at Current Prices in Indonesia in 2023 (Billions)

Provinces	GRDP at Current Prices (Rp)
DKI Jakarta	3,443,026.23
Jawa Timur	2,953,546.98
Jawa Barat	2,625,225.72
Jawa Tengah	1,695,621.57
Sumatera Utara	1,050,995.41
Riau	1,026,472.05
Kalimantan Timur	843,571.25
Banten	814,122.03
Sulawesi Selatan	652,648.09

Source: Statistics Indonesia

However, high GRDP does not always reflect equitable welfare across all regions. North Sumatra Province, despite having a relatively high GRDP, still includes underdeveloped areas such as the Nias Islands. According to Presidential Regulation No. 63 of 2020 on the designation of underdeveloped regions for 2020-2024, there are 62 underdeveloped regions in Indonesia, four of which are in North Sumatra: West Nias, North Nias, South Nias, and Nias. Upon further investigation, it was found that these four regions rank at the top in terms of the Highest Percentage of Poor Population in North Sumatra Province.

Table 2. 10 Districts/Cities with the Highest Percentage of Poor Population in North Sumatra Province from 2014 to 2023 (%)

Districts/Cities	The Years									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Nias Utara	29.3	32.6	30.9	29.1	26.6	25.0	25.1	25.7	23.4	21.8
Nias Barat	28.1	30.0	28.4	27.2	26.7	25.5	25.7	26.4	24.8	22.8
Gunungsitoli	27.6	25.4	23.4	21.7	18.4	16.2	16.4	16.5	14.8	14.8
Nias Selatan	17.8	19.1	18.6	18.5	16.7	16.5	16.7	16.9	16.5	16.4
Nias	16.4	18.1	17.6	18.1	16.4	15.9	16.6	16.8	16.0	15.1
Tapanuli Tengah	14.5	15.0	14.6	14.7	13.2	12.5	12.4	12.7	11.7	11.5
Tanjungbalai	14.0	15.1	14.5	14.5	14.6	14.0	13.3	13.4	12.5	12.2
Samosir	13.2	14.1	14.4	14.7	13.4	12.5	12.5	12.7	11.8	11.7
Sibolga	12.3	13.5	13.3	13.7	12.4	12.4	12.0	12.3	11.5	11.4
Labuhanbatu Selatan	11.5	11.7	11.5	11.6	10.0	8.9	8.3	8.5	8.1	8.1

Source: Statistics Indonesia

The statistical data in Table 1.2 shows that the regions in the Nias Islands, namely Nias Barat, Nias Utara, Nias Selatan, Nias, and Gunungsitoli, consistently have a higher percentage of poor people population than other regions in North Sumatra Province. This indicates a significant development gap between the provincial economic center and the underdeveloped regions that have not been able to benefit optimally from economic growth. This disparity indicates that the high economic growth at the provincial level has not been able to reach all segments of society evenly.

The poverty measurement in the table above, conducted by the Badan Pusat Statistik (BPS), is based on the poverty line determined by the fulfillment of basic needs, which sets the minimum individual expenditure required to meet food consumption equivalent to 2,100 calories per day and non-food needs. Therefore, an individual is considered poor if their income is insufficient to meet these food and non-food consumption needs [6]. Thus, it can be concluded that poverty is a condition where an individual's basic needs primary, secondary, and even tertiary are not met, which can be caused by various factors.

Therefore, measuring poverty levels and identifying the factors that cause it are important steps in formulating policies to alleviate poverty [1]. According to [7], higher levels of education contribute to increased individual competence, thereby expanding opportunities to enter the job market and create independent businesses. [8] found that each additional year of education can reduce the risk of poverty and social exclusion by ±29%.

Additionally, population size is a crucial factor in economic development. Uncontrolled population growth has the potential to hinder improvements in societal well-being [6]. [4] emphasize that a population surge not matched by economic growth will exacerbate poverty due to pressure on limited resources.

The unemployment rate is also an important indicator, where the imbalance between labor force growth and formal job creation leads to low labor absorption, thereby exacerbating poverty [4]. According to Keynesian theory, unemployment can also occur as a result of low aggregate demand, which is caused more by weak consumption than low production. The free-market mechanism is considered incapable of overcoming this, because an increase in the labor force tends to lower wages, which has an impact on purchasing power and has the potential to increase poverty. Thus, unemployment indirectly encourages an increase in poverty, especially when income is below the poverty line.

Based on this, this study aims to analyze the influence of education level, unemployment rate, Gross Regional Domestic Product (GRDP), and population size on poverty in the Nias Islands. The results of this study are expected to serve as a reference for local governments in formulating targeted poverty alleviation policies.

2. Literature Review

2.1. The Theory of Structural Poverty

According to [9], structural poverty is poverty caused by demographic and economic factors that influence individual behavior or poverty. With this theory, there are other factors besides economics that contribute to poverty, namely demographic factors.

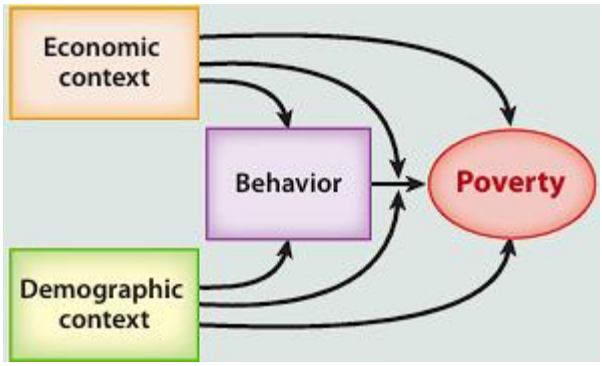

Figure 1. The Structural Poverty Model

2.2. Structural Poverty Model

According to [9], structural theory focuses on how demographic and economic factors influence poverty. These two factors influence poverty in three ways, as follows:

1. Indirect Influence: Structural conditions, such as economics and demographics, can create situations that encourage problematic behavior (e.g., low levels of education or limited job opportunities).
2. Direct Influence: Structural factors themselves, without the need for behavioral changes, can directly cause poverty.
3. Structural and Behavioral Interaction: Structural factors also play a role in strengthening or weakening the relationship between individual behavior and poverty.

It can therefore be concluded that structural poverty occurs as a result of limitations caused by social structures and economic conditions, making it difficult for certain groups in society to take advantage of existing economic opportunities.

2.3. The Theory of the Poverty Cycle

The Theory of the Poverty Trap [10] explains that poverty persists due to mutually reinforcing factors. Low income reduces purchasing power, demand, investment, and employment. Low savings hinder capital accumulation, keeping productivity low, thus trapping communities in a difficult-to-break cycle of poverty.

2.4. Types of Poverty

According to [2], poverty can be divided into two types based on the measurement method. Absolute poverty occurs when a person's income is insufficient to meet basic needs (food, clothing, shelter, health, and education). This measurement is used by BPS with a poverty line as the minimum per capita expenditure limit. Meanwhile, relative poverty is related to income distribution gaps between social groups, but it is difficult to measure because it is influenced by income fluctuations. This study focuses on absolute poverty as defined by [7], namely the percentage of the population with expenditures below the poverty line that covers basic food and non-food needs.

2.5. Factors that influence poverty

According to [9], the causes of poverty are broadly divided into three theories, namely:

1. Behavioral theory emphasizes individual behavior driven by incentives and culture that can influence poverty either directly or indirectly.
2. Structural theory emphasizes demographic and economic factors that influence individual behavior and poverty.

3. Political theory argues that power and institutions shape policies that cause poverty and moderate the relationship between behavior and poverty.

Therefore, this study is based on the Structural Poverty Theory, where the increase in poverty is influenced by economic and socio-demographic factors. Economic factors are represented by the unemployment rate and GRDP, while socio-demographic factors are represented by population size and education level.

2.6. The Relationship Between Education Level and Poverty

According to [8], studies in 23 European countries show that an additional year of education can reduce poverty levels by up to 29%. Education not only reduces poverty but also increases labor force participation, full-time employment opportunities, health, and individual perceptions of well-being.

Meanwhile, the Capability Theory developed by Amartya Sen [4] emphasizes that poverty is not merely a lack of income, but rather a limitation of freedom and life opportunities, such as access to education, health, and decent work. Therefore, poverty alleviation must focus on enhancing individual capabilities.

2.7. The Relationship Between Unemployment Rates and Poverty Rates

According to Keynesian theory, unemployment occurs due to low aggregate demand, not production constraints. Low consumption slows economic growth, and free-market mechanisms cannot address this issue. An increase in the labor force actually suppresses wages, which results in a decline in people's purchasing power and has the potential to increase poverty. Thus, unemployment contributes indirectly to poverty, as low income can place individuals below the poverty line.

2.8. The Relationship Between GRDP and Poverty Levels

According to [4], increased economic growth has a direct impact on reducing absolute poverty. An increase in GDP drives job creation, income growth, productive investment, and expands the government's capacity for social spending and infrastructure development, thereby improving public access to education, healthcare, and economic opportunities. However, if growth is uneven and only enjoyed by certain groups, its impact on poverty reduction becomes limited. Therefore, Todaro emphasizes the importance of equity and the participation of all segments of society, not just the wealthy, so that economic growth can truly optimize poverty alleviation.

2.9. The Relationship Between Population Size and Poverty Levels

The Malthusian theory proposed by Thomas Robert Malthus (1798) in [11], 2014 explains that population growth that outpaces food production can trigger food shortages and increase poverty. To overcome this, Malthus proposed two mechanisms: preventive checks (delaying marriage and controlling births) and positive checks (famine, disease, and conflict) that naturally suppress population growth. Although influential, this theory has been widely criticized for ignoring the role of technology and social change in increasing food productivity and influencing population growth dynamics.

3. Research Method

This study uses a quantitative method with a causal approach to analyze how education level, unemployment rate, Gross Regional Domestic Product (GRDP), and population size as independent variables affect poverty level as a dependent variable in five districts/cities in the Nias Islands, namely West Nias, South Nias, North Nias, Nias, and Gunungsitoli from 2014 to 2023. The data used in this study is panel data (pooled data) accessed online on the website of the Central Statistics Agency of North Sumatra Province.

The data for the education level variable uses the average length of schooling, the unemployment rate variable uses the open unemployment rate, GRDP uses GRDP at current prices, population uses the population within the region, and the poverty variable uses the percentage of the poor population. The data used for all these variables is at the district/city level administratively located in the Nias Islands for the period 2014-2023.

The analysis method used in this study is panel data regression analysis using Eviews 12 software. There are three approaches in this analysis method, namely Pooled Least Squares (PLS) or Common Effects Model (CEM), Fixed Effects Model (FEM), and Random Effects Model (REM). From these three approaches, the most appropriate one will be selected. In this study, the Chow test, Hausman test, and Langrange Multiplier test will be conducted. The Chow test is intended to select the most appropriate approach between the common effects model and the fixed effects model. The Hausman test is used to select the most appropriate

approach between the fixed effects model and the random effects model. The Langrange Multiplier test is used to select the most appropriate approach between the random effects model and the common effects model.

The advantages of using panel data are richer information, greater variability, and lower collinearity, resulting in higher degrees of freedom and more efficient estimates [12]. Panel data can also detect and measure impacts that cannot be captured by cross-sectional or time series methods and allow for more complex behavioral analysis. Additionally, testing with panel data does not require classical assumption tests [12].

The regression equation model to be analyzed in this study can be written as follows:

$$Y = \beta_0 + \beta_1 X1_{it} + \beta_2 X2_{it} + \beta_3 X3_{it} + \beta_4 X4_{it} + \varepsilon_{it}$$

Y	: Poverty Rate (percentage of poor population) in region i at year
β_0	: Constant (intercept).
$\beta_1,\beta_2,\beta_3,\beta_4$	: Regression coefficients indicating the effect of each independent variable on the poverty rate.
$X1_{it}$	: Education Level (average years of schooling) in region i at year ttt
$X2_{it}$	: Unemployment Rate (TPT) in region i at year t.
$X3_{it}$	: Gross Regional Domestic Product (GRDP) in region i at year t.
$X4_{it}$	: Population in region i at year t.
ϵ_{it}	: Error term (unexplained factors in the model).
i	: Region index (Nias Regency, North Nias, West Nias, South Nias, and Gunungsitoli City).

4. Results and Discussion

4.1. Estimation Model Selection

The appropriate model approach will be determined based on the Chow test, Hausman test, and Langrange Multiplier test. The following are the results of the Chow test.

4.1.1 Chow Test Result

Table 3. Chow Test Result

Effect Test	Prob.
Cross-Section F	0.0000
Cross Section Chi Square	0.0000

Source: Research Data (2025)

The Chow test stipulates that if the probability value is < 0.05, then FEM is selected. Conversely, if the probability value is > 0.05, then CEM is selected. The table (fill in table number) shows a probability value of 0.000. This probability value is lower than the alpha value of 5% (0.000 < 0.05). Thus, the results of the Chow test indicate that FEM is the most appropriate model compared to CEM.

Next, the Hausman test is performed to determine the most appropriate model between FEM and REM. If the probability value is < 0.05, then FEM is selected. Conversely, if the probability value is > 0.05, then REM is selected.

4.1.2 Hausman Test Result

Table 4. Hausman Test Result

	Chi-Sq Statistic	Prob.
Cross-Section Random	187.456359	0.0000

Source: Research Data (2025)

The table (fill in table number) shows a probability value of 0.000. This probability value is lower than the alpha value of 5% (0.000 < 0.05). Thus, the Hausman test results indicate that FEM is the most appropriate model compared to REM.

Since the Chow test and Hausman test selected FEM, there is no need to perform the Langrange Multiplier test. This is because the Langrange Multiplier test is used to determine the most appropriate estimation model between REM and CEM, while the two tests still indicate the FEM model approach.

4.2. Panel Data Regression Analysis

The selected model approach based on the model selection test is the Fixed Effect Model. The following is a summary of the data analysis results using FEM, presented in the table below.

4.2.1 Fixed Effect Model (FEM) Output Results

Table 5. Fixed Effect Model (FEM) Output Result

Variable	coefficient	Prob.
C	140.2907	0.1119
Education	1.571627	0.2376
Unemployment	0.766357	0.0001
GRDP	-11.74993	0.0000
Population	-2.922340	0.6973

Source: Research Data (2025)

Based on the summary of the analysis results presented in the table 4.3, the following regression equation is obtained:

$$Y = 140.29 + 1.57(X1) + 0.76(X2) - 11.74\ LOG(X3) - 2.92LOG(X4) + eit$$

The interpretation of the panel data regression model is as follows:

a. The regression estimation results show a constant coefficient (C) value of 140.29, which means that if all independent variables (X1, X2, LOG(X3), and LOG(X4)) are constant, the poverty rate (Y) increases by 140.29%.
b. The estimation results for variable X1 (Education Level) show a coefficient value of 1.57, which means that every 1-year increase in average years of schooling will increase the poverty rate by 1.57%, assuming all other variables remain constant.
c. The estimation results for variable X2 (Unemployment Rate) show a coefficient value of 0.76, meaning that every 1% increase in the unemployment rate will increase the poverty rate by 0.76%, assuming all other variables remain constant.
d. The estimation results for the LOG(X3) variable (GRDP in log/billion rupiah) show a coefficient value of -11.74, which means that every 1% increase in GRDP will reduce the poverty rate by 11.74%, assuming other variables remain constant.
e. The estimation results for the LOG(X4) variable (population in log/soul) show a coefficient value of -2.92, which means that every 1% increase in population will reduce the poverty rate by 2.92%, assuming other variables remain constant.

4.2.2 Simultaneous Significance Test Results (F-Test)

Table 6. F-Test Result (simultaneous)

F-statistic	101.1669
Prob (*F-statistic*)	0.000000

Source: Research Data (2025)

The results of the simultaneous significance test (F-statistic test) on the regression model show an F-statistic value of 101.1669 with a probability value of 0.000000. This probability value is smaller (<) than the significance level $\alpha = 5\%$ (0.05). Therefore, it can be concluded that the independent variables consisting of Education Level (X1), Unemployment Rate (X2), Regional Domestic Product (X3), and Population Size (X4) collectively (simultaneously) have a significant influence on Poverty Level (Y) in the Nias Islands from 2014 to 2023.

4.2.3 Determination Coefficient Test Results

Table 7. R-Squared Result

R-squared	0.951784
Adjusted R-squared	0.942376

Source: Research Data (2025)

The results of the coefficient of determination (R-squared) test on the regression model show that the R-squared value is 0.951784. This value can be interpreted as meaning that approximately 95.18% of the variation in poverty levels (Y) can be explained by all the independent variables in the regression model. Meanwhile, the adjusted R-squared value of 0.942376 is a value that has been corrected by considering the number of independent variables and the degrees of freedom in the model. Thus, it can be interpreted that approximately 94.24% of the variation in poverty levels can still be explained by all the independent variables in the regression model.

4.2.4 T-test results (partial)

Table 8. T-Test Result (Partial)

Variabel	Koefisien	Prob.
C	140.2907	0.1119
Education	1.571627	0.2376
Unemployment	0.766357	0.0001
GRDP	-11.74993	0.0000
Population	-2.922340	0.6973

Source: Research Data (2025)

The t-test results in the table show that the variables Unemployment Rate (Prob. 0.0001) and GRDP (Prob. 0.0000) have a significant effect on the dependent variable at a significance level of 5%, with a positive direction for the Unemployment Rate and a negative direction for GRDP. Meanwhile, the variables Education Level (Prob. 0.2376) and Population Size (Prob. 0.6973) do not have a significant effect because their probability values exceed 0.05. Thus, this model confirms that the dynamics of unemployment and GRDP are the main determinants in explaining the variation in the dependent variable, while education and population size do not have a significant effect.

4.3. Discussion

4.3.1 The Effect of Education Level on Poverty

Based on the results of the hypothesis test, the education level variable has a coefficient of 1.571627 with a probability of 0.2376 (> 0.05), so it does not have a significant effect on the poverty level. Thus, the first hypothesis (H1) is rejected. This finding differs from previous studies [1]; [7]; [13]; [8], which indicate that education has a negative effect on poverty. However, the results of this study are in line with Putra et al. (2023), who found that the average length of schooling actually has a positive effect on poverty. This occurs because the low quality of education causes the competitiveness and productivity of the community to remain weak, thereby preventing an increase in income.

The United Nations Development Programme (UNDP) in Putra et al. (2023) also emphasizes that the average length of schooling indicator does not fully reflect the quality of education. Simply attending school does not guarantee competence, quality of learning, or adequate access to teachers. Therefore, the quantity of education alone is insufficient to reduce poverty; the quality of education is the key factor for education to be effective in improving the economic conditions of the community.

4.3.2 The Impact of Unemployment Rates on Poverty

Based on the results of the hypothesis test, the unemployment rate variable has a coefficient of 0.766357 with a probability of 0.0001 (< 0.05), thus significantly influencing poverty levels, and the second hypothesis (H2) is accepted. This finding is in line with the research of [1], [7], and [13], which states that unemployment has a positive effect on poverty, meaning that the higher the unemployment rate, the higher the poverty rate.

Unemployment is a major contributor to poverty because the loss of employment means the loss of income to meet basic needs. This condition reduces purchasing power and community welfare, so that unemployed individuals tend to fall below the poverty line. Thus, high unemployment rates have been proven to contribute significantly to an increase in the number of poor people.

4.3.3 The Effect of GRDP on Poverty

Based on the results of the hypothesis test, the GRDP variable has a coefficient of -11.74993 with a probability of 0.0000 (< 0.05), thus having a negative and significant effect on the poverty rate. Therefore, the third hypothesis (H3) is accepted. These results are consistent with the research of [1], [7], [13], and [2] which show that economic growth, through the GRDP indicator, plays an important role in reducing poverty.

This finding is in line with Todaro theory, which states that economic growth can reduce poverty through job creation, increased income, and investment in productive sectors. Todaro also emphasizes that poverty alleviation is the collective responsibility of all elements of society, so that the benefits of economic growth can be felt in a more inclusive and sustainable manner.

4.3.4 The Effect of Population Size on Poverty

Based on the results of the hypothesis test, the population size variable has a coefficient of -2.922340 with a probability of 0.6973 (> 0.05), so it does not have a significant effect on the poverty rate, and the fourth hypothesis (H4) is rejected. This result differs from the findings of [2] and the views of Malthus who assert that population growth has the potential to increase poverty due to pressure on resource availability.

However, the research by [14] and [15] presents a different perspective, suggesting that population growth can actually reduce poverty if it is concentrated in the agricultural sector. This sector has proven capable of absorbing poor labor, strengthening

household food security, and providing relatively stable livelihoods. In fact, de Janvry & Sadoulet emphasize that GDP growth from the agricultural sector is three times more effective in increasing the income of the poor than the non-agricultural sector.

This condition is relevant to the reality of the Nias Islands, where the majority of the population in Nias Regency (83.87%), South Nias (81.49%), West Nias (82.76%), and North Nias (73.80%) still depend on the agricultural sector (2014–2021). This shows that the agricultural sector has a strategic role in providing employment, strengthening household economic resilience, and supporting poverty alleviation based on local potential. Thus, optimizing the agricultural sector is an important step in reducing poverty in this region.

5. Conclusions

Based on the analysis results, it can be concluded that the level of education measured by the average length of schooling has no effect on the poverty rate, while the unemployment rate has a positive and significant effect, and the Gross Regional Domestic Product (GRDP) has a negative and significant effect on the poverty rate in the five regions of the Nias Islands during the period 2014–2023. Conversely, the number of residents does not show a significant effect on poverty levels. Simultaneously, the variables of education level, unemployment rate, RDP, and number of residents have a significant effect on poverty levels. Therefore, poverty alleviation efforts in the Nias Islands should focus on improving the quality of education, controlling unemployment rates through the creation of productive jobs, and strengthening inclusive local economic growth. Additionally, optimizing the potential of the agricultural sector, ensuring equitable infrastructure development, and enhancing human resource quality are crucial strategies to strengthen community economic resilience and sustainably reduce poverty rates.

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