

THE INFLUENCE OF POVERTY LEVELS, THE HUMAN DEVELOPMENT INDEX, AND GROSS REGIONAL DOMESTIC PRODUCT ON INCOME INEQUALITY IN ACEH PROVINCE

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ABSTRACT

This study aims to analyze the influence of the poverty rate, the Human Development Index (HDI), and Gross Regional Domestic Product (GRDP) on income inequality in Aceh Province during the 2018–2024 period, using a panel data regression model. The results indicate that, individually, the poverty rate and the HDI have a positive and significant effect on income inequality, while GRDP has a negative and significant effect. Simultaneously, the poverty rate, the HDI, and GRDP significantly influence income inequality in Aceh Province. These findings confirm that reducing poverty, improving the quality of human resources, and fostering economic growth are key factors in mitigating income inequality in Aceh.

Keywords: Income Inequality, Poverty Rate, HDI, GRDP

1. Background

In general, every country in the world aims to improve the standard of living and well-being of its entire population through sustainable economic development efforts. Development is also directed toward accelerating economic growth, reducing income inequality, and alleviating poverty so that the fruits of development can be enjoyed more equitably by all segments of society. As a developing nation, Indonesia faces various challenges, such as high levels of poverty and income inequality. These factors impact the success of economic development in fostering the equitable distribution of welfare across society.

Economic growth is a means to increase public income; however, rapid economic growth can also lead to income inequality. Income inequality frequently emerges as a socio-economic issue, particularly in regions with diverse characteristics, thereby influencing each region's capacity for development.

Aceh is a province located at the westernmost point of Indonesia, at the northern tip of Sumatra Island. Its strategic location offers diverse potential and advantages,

ranging from natural resources to demographic conditions that vary across its regencies and cities. These differing characteristics result in an uneven distribution of income—particularly between regencies and cities—thereby giving rise to income inequality. To assess the level of income inequality, the Gini Ratio (or Gini Index) serves as the primary indicator for measuring inequality in income distribution within a region. A high Gini coefficient indicates a greater degree of income inequality, whereas a low Gini coefficient reflects a fairer and more equitable distribution of income.

Aceh Province's Gini Ratio was recorded at 0.294 in September 2024. This indicates that Aceh has the fifth-lowest level of inequality nationwide. This figure is significantly lower than the national Gini Ratio of 0.381 (classified as moderate inequality). The Gini ratios for regencies and cities in Aceh Province showed a fluctuating pattern between 2018 and 2024. During the COVID-19 pandemic, economic pressures led to a decline in business activity and reduced household incomes, thereby widening the inequality gap across various regions. However, as post-pandemic conditions improved and the economy recovered, the Gini index figure dropped significantly during the 2023–2024 period.

The variation in Gini indices across Aceh's regencies and cities represents a form of income inequality driven by numerous factors, including economic and social elements. The Gini index is heavily influenced by the poverty level in a given region. Poverty is a key factor affecting income inequality, as it reflects the inability of certain segments of the population to access economic resources.

Aceh Province has the highest poverty rate on the island of Sumatra. According to BPS data, Aceh's poverty rate stood at 14.23 percent in March 2024; this placed it tenth highest nationally and above the national average of 9.03 percent. Furthermore, poverty rates across Aceh's 23 regencies and cities between 2018 and 2024 showed a downward trend, with the best results observed in urban areas such as Banda Aceh, Langsa, and Lhokseumawe. In contrast, regions such as Simeulue, Aceh Singkil, Pidie, Gayo Lues, and Bener Meriah have continued to experience relatively high poverty rates over the past decade. Economic development can be considered successful if a region manages to boost economic growth and equitably improve the community's standard of living; HDI serves as one of the indicators for this. The HDI reflects human development achievements across various dimensions of quality of life, such as a decent standard of living, longevity, and health. Investment in the health sector is one way to drive economic growth. The level of the HDI impacts the population's productivity; a low HDI is associated with low levels of population productivity.

Aceh's HDI reached 75.36 in 2024, placing the province 11th nationally and fifth highest in Sumatra (BPS Aceh, 2024). Data on the HDI across Aceh's 23 regencies and cities from 2018 to 2024 reveals an annual upward trend, signifying tangible

improvements in education, health, and the community's standard of living. Banda Aceh City recorded the highest index—placing it in the "high" category—followed by major cities such as Lhokseumawe, Langsa, and Sabang. Conversely, Subulussalam, Simeulue, South Aceh, and Southwest Aceh remain below the national average. Income inequality within a region is also influenced by economic growth dynamics, as indicated by GRDP figures. This phenomenon arises because economic activities and infrastructure development tend to be concentrated in specific areas. Consequently, equitable economic development across all regencies and cities in Aceh has not yet been optimally achieved. GRDP data for the 23 regencies and cities from 2018 to 2024 shows an upward trend, indicating continued economic growth in every area. North Aceh recorded the highest economic growth, followed by Banda Aceh, Aceh Besar, and Bireuen. In contrast, areas such as Sabang, Simeulue, Subulussalam, and Aceh Jaya showed the lowest growth rates. Although aggregate poverty levels have tended to decline, and both HDI and GRDP have risen across the 23 regencies and cities, income inequality in Aceh continues to fluctuate and shows significant disparities between regions. This situation indicates that the benefits of economic and social development have not yet been fully distributed equitably across the province.

Several empirical studies indicate that poverty levels and HDI have a negative impact on income inequality (Farhan and Sugianto, 2022). On the other hand, HDI has a positive effect on income inequality, whereas GRDP has a negative effect on it (Janah, 2022). These findings indicate that poverty, economic growth, and the HDI must be accompanied by policies promoting equitable distribution to prevent the widening of the income gap.

2. Research Methodology

The scope of this research is limited to the variables of poverty rate, HDI, GRDP, and income inequality across 23 regencies/cities in Aceh Province during the 2018–2024 periods. This study utilizes secondary data from the Aceh Province Central Statistics Agency (BPS). A panel data analysis method is employed, featuring income inequality (Y) as the dependent variable and three independent variables: poverty rate (X_1), HDI (X_2), and GRDP (X_3). Consequently, the estimated equation model is: $KP_{it} = \alpha + \beta_1 TK_{it} + \beta_2 IPM_{it} + \beta_3 \ln PDRB_{it} + \epsilon_{it}$

Where:

- KP_{it} = Income inequality in regency/city i at period t
- α = Constant
- $\beta_1 TK_{it}$ = Poverty rate in regency/city i at period t
- $\beta_2 IPM_{it}$ = HDI in regency/city i at period t
- $\beta_3 \ln PDRB_{it}$ = GRDP of regency/city i at period t

- ε_{it} = Error term for regency/city i at period t

The panel data regression modeling involves the following approaches:

1. CEM, This model assumes data homogeneity, disregarding differences in characteristics across regions and time; thus, the data is pooled and estimated using the OLS method.
2. FEM, This model accounts for constant characteristic differences specific to each regency/city.
3. REM, This model assumes that inter-regional differences are random and constitute part of the error term component; estimation is performed using the GLS method.

Several testing stages are conducted to determine the best model: Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test. The Chow Test is used to select the most appropriate model between FEM and CEM for the panel data analysis. The Hausman test is used to select the more appropriate model between FEM and REM in panel data analysis. The LM test is used to determine the more appropriate model between REM and CEM.

To evaluate the relationship between the dependent and independent variables, three primary hypothesis tests are generally conducted: the t -statistic test, the F -statistic test, and the Coefficient of Determination (Adjusted R^2) test. The t -statistic test is used to assess the individual significance of independent variable coefficients in relation to the dependent variable by comparing the probability value against a significance level of $\alpha = 5\%$ (or 0.05). The F -statistic test is used to examine the overall significance of the regression model, with the testing decision based on the probability value derived from the analysis. Meanwhile, the Coefficient of Determination (Adjusted R^2) test measures the extent to which the independent variables explain the variation in the dependent variable.

Variable	Terminology	Scale
Ketimpangan Pendapatan (Y)	Ketimpangan pendapatan adalah perbedaan dalam pendapatan yang diterima oleh masyarakat, yang menyebabkan adanya jurang yang besar antara kelompok kaya dan miskin. Dampaknya adalah orang-orang yang sudah kaya akan semakin memperbesar kekayaannya, sementara mereka yang miskin akan semakin terpuruk. Diukur menggunakan Indeks Gini (Gini Ratio), yaitu koefisien yang menggambarkan tingkat ketidakmerataan distribusi pendapatan antarindividu atau rumah tangga di suatu wilayah.	Rasio
Tingkat Kemiskinan (X ₁)	Persentase penduduk miskin (<i>Head Count Index/HCI</i>), yaitu proporsi penduduk yang	Rasio

	pengeluaran per kapita per bulannya berada di bawah Garis Kemiskinan (GK) yang ditetapkan BPS. Kemiskinan yang dimaksud adalah kemiskinan absolut berdasarkan pendekatan kebutuhan dasar (<i>basic needs approach</i>).	
Indeks Pembangunan Manusia (X2)	Indeks yang mengukur capaian pembangunan manusia berbasis sejumlah komponen dasar kualitas hidup. Sebagai ukuran kualitas hidup, IPM dibangun melalui pendekatan tiga dimensi dasar. Dimensi tersebut mencakup kesehatan, pendidikan, dan kehidupan yang layak.	Rasio
Produk Domestik Regional Bruto (X3)	Nilai total produksi barang dan jasa yang dihitung berdasarkan harga pasar tahun berjalan (ADHB), yang mencerminkan nilai nominal dari kinerja perekonomian daerah. Digunakan untuk melihat besarnya nilai tambah yang dihasilkan oleh seluruh sektor ekonomi di wilayah tersebut	Rasio

3 Research Results

Aceh Province is the westernmost province in Indonesia, situated at the northwestern tip of Sumatra Island. It comprises 23 regencies/cities (consisting of 18 regencies and 5 cities), 290 districts, and 6,516 villages, with a population of approximately 5.5 million in 2024. Aceh is recognized as a region with special status regarding governance, as stipulated in Law Number 11 of 2006 concerning the Government of Aceh. The province possesses diverse natural resource potential, serving as a crucial foundation for long-term regional economic development. Key economic sectors with high potential include agriculture, tourism, and mining and energy. Overall, Aceh Province possesses significant assets for development. Based on the data analysis, the descriptive statistics are:

Table 1: Descriptive Statistics

	Y	X1	X2	X3
Mean	0.281019	15.35957	72.95391	8.761925
Median	0.279000	15.32000	72.12000	8.830000
Maximum	0.391000	21.25000	88.85000	10.31000
Minimum	0.159000	6.900000	63.48000	7.240000
Std. Dev.	0.037015	3.386788	4.690840	0.752572
Observations	161	161	161	161

The descriptive table provides an overview of data variation for Y, X1, X2, and X3 across 161 observations, as follows:

1. Gini Ratio: The highest Gini coefficient was 0.391 (Sabang City, 2022), while the lowest was 0.159 (Nagan Raya Regency, 2024). The average Gini coefficient across the 23 regencies/cities in Aceh Province was 0.281 during

- the 2018–2024 periods.
2. Poverty Rate: The highest poverty rate was 21.25 percent (Aceh Singkil Regency, 2018), while the lowest was 6.90 percent (Banda Aceh City, 2020). The average poverty rate across the 23 regencies/cities in Aceh Province was 15.35 percent during the 2018–2024 period. These descriptive statistics reveal a significant gap between the highest and lowest poverty rates in Aceh Province.
 3. HDI: The highest HDI score was 88.85 (Banda Aceh City, 2024), while the lowest was 63.48 (Subulussalam City, 2018). The average HDI score across the 23 regencies/cities in Aceh Province was 72.95 during the 2018–2024 periods. These descriptive statistics reveal a significant gap between the highest and lowest HDI scores in Aceh Province.
 4. Regarding GRDP, the highest value—10.31—was recorded in North Aceh Regency in 2024, while the lowest value—7.24—was recorded in Banda Aceh City in 2018. The average HDI value across the 23 regencies/cities in Aceh Province was 8.76 during the 2018–2024 period. The descriptive statistics above reveal a substantial gap between the highest and lowest GRDP values in Aceh Province.

The Chow test, used to determine the optimal model between CEM and FEM, indicates that if the cross-section F-test probability is less than the significance level of $\alpha = 0.05$ (probability < 0.05), the FEM is selected. Conversely, if the cross-section F-test probability exceeds the significance level of $\alpha = 0.05$ (probability > 0.05), the CEM is selected.

Table 2: Chow Test Results

Effects Test	Statistic	d.f.	Prob.
Cross-section F	11.575115	(22,135)	0.0000
Cross-section Chi-square	170.656881	22	0.0000

The Chow Test results yielded a cross-section F-statistic probability value lower than the significance level of $\alpha = 0.05$ ($0.0000 < 0.05$). Therefore, it can be concluded that the optimal model for this analysis is the FEM.

The Hausman Test was conducted by examining the probability output for the cross-section random component. If the probability value is less than the significance level of $\alpha = 0.05$ (probability < 0.05), the selected model is the FEM. Conversely, if the probability value exceeds the significance level of $\alpha = 0.05$ (probability > 0.05), the selected model is the REM.

Table 3: Hausman Test Results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	57.656483	3	0.0000

The Hausman test results show a cross-section random value of 0.0000, which is below the significance level of $\alpha = 0.05$ ($0.0000 < 0.05$). Therefore, it can be concluded that the FEM is the best model to use, and there is no need to proceed to the Lagrange Multiplier test since the FEM was selected. This conclusion is based on the model selection test results—specifically the Chow test and the Hausman test—which indicate that panel data regression using the FEM is more appropriate than the other models.

Table 4: Panel Data Processing Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.333784	0.266282	1.253496	0.2122
X1	0.017089	0.005926	2.883858	0.0046
X2	0.007056	0.002655	2.657884	0.0088
X3	-0.094729	0.025168	-3.763829	0.0002
Fixed Effects (Cross)				
ACEHBARAT--C	-0.009895			
ACEHBARATDAYA--C	-0.028941			
ACEHBESAR--C	0.111279			
ACEHJAYA--C	-0.031239			
ACEHSELATAN--C	0.065913			
ACEHSINGKIL--C	-0.124100			
ACEHTAMANG--C	0.087087			
ACEHTENGAH--C	0.010582			
ACEHTENGGARA--C	0.029199			
ACEHTIMUR--C	0.084571			
ACEHUTARA--C	0.109327			
BANDAACEH--C	0.198885			
BENERMERIAH--C	-0.125170			
BIREUEN--C	0.118494			
GAYOLUES--C	-0.126875			
LANGSA--C	0.094380			
LHOKSEUMAWE--C	0.103826			
NAGANRAYA--C	-0.033508			
PIDIE--C	-0.050524			
PIDIEJAYA--C	-0.176315			
SABANG--C	-0.149792			
SIMEULUE--C	-0.087264			
SUBULUSSALAM--C	-0.069919			

Based on the table above, the regression equation for this study is as follows: $KPit = \beta_0 0.333784 + \beta_1 0.017089 + \beta_2 0.007056 - \beta_3 0.094729$. The regression equation above can be explained as follows:

1. The constant value β_0 (α) is 0.333784. This figure implies that if the variables for poverty rate, HDI (Human Development Index), and GRDP (Gross

Regional Domestic Product) are equal to zero, the average income inequality in Aceh Province stands at 0.333784.

2. The coefficient value β_1 of 0.017089 indicates that every 1% increase in the poverty rate within a regency/city leads to a 0.017089 increase in income inequality.
3. The coefficient value β_2 of 0.007056 indicates that every 1% increase in HDI within a regency/city leads to a 0.007056 increase in income inequality, assuming other variables remain constant.
4. The coefficient value β_3 of -0.094729 indicates that every 1% increase in GRDP within a regency/city leads to a 0.094729 decrease in income inequality, assuming other variables remain constant.

Based on the panel data regression estimation conducted across 23 regencies/cities in Aceh Province, it was found that each region possesses a distinct intercept value. In the regression, the intercept value represents the predicted logarithmic value of income inequality when all independent variables in the research model—namely poverty rate, HDI, and GRDP—are equal to zero ($\log(1) = 0$). Consequently, the magnitude of the intercept value provides an initial indication of a region's income inequality that is not directly influenced by the variables under study. The following are the adjustments made after the model captured the differences in actual conditions across regions regarding income inequality:

Table 5: Intercept Values for Regencies/Cities in Aceh Province

No	District	Constanta	Fixed Effect	Intercept
1	Banda Aceh	0.333784	0.198885	0.532669
2	Bireuen	0.333784	0.118494	0.452278
3	Aceh Besar	0.333784	0.111279	0.445063
4	Aceh Utara	0.333784	0.109327	0.443111
5	Lhokseumawe	0.333784	0.103826	0.437610
6	Langsa	0.333784	0.087087	0.420871
7	Aceh Timur	0.333784	0.094380	0.428164
8	Aceh Tamiang	0.333784	0.084571	0.418355
9	Aceh Selatan	0.333784	0.065913	0.399697
10	Aceh Tenggara	0.333784	0.029199	0.362983
11	Aceh Tengah	0.333784	0.010582	0.344366
12	Aceh Barat	0.333784	-0.009895	0.323889
13	Aceh Jaya	0.333784	-0.031239	0.302545
14	Aceh Barat Daya	0.333784	-0.028941	0.304843
15	Nagan Raya	0.333784	-0.033508	0.300276
16	Pidie	0.333784	-0.050524	0.283260
17	Subulussalam	0.333784	-0.069919	0.263865

18	Simeulue	0.333784	-0.087264	0.246520
19	Aceh Singkil	0.333784	-0.124100	0.209684
20	Bener Meriah	0.333784	-0.125170	0.208614
21	Gayo Lues	0.333784	-0.126875	0.206909
22	Sabang	0.333784	-0.149792	0.183992
23	Pidie Jaya	0.333784	-0.176315	0.157469

Based on the table above, each regency/city in Aceh Province has a distinct intercept value. These differences reflect the unique characteristics of each region. A high intercept value generally indicates a tendency toward high income inequality, whereas a low or negative intercept value suggests a state of lower income inequality.

Income inequality in Aceh is heavily influenced by the spatial economic structure of each region. More advanced regencies/cities tend to exhibit higher income inequality, while less developed areas appear to have greater equality. This situation reflects uneven economic growth in Aceh, where the benefits are largely captured by specific groups in more advanced regions, leaving lagging areas without significant impact. An independent variable is considered to have a partial effect on the dependent variable based on a 5% significance level; if the calculated t-value exceeds the t-table value (or if the significance value is less than 0.05), the independent variable individually influences the dependent variable, whereas if the significance value exceeds 0.05, it does not.

Table 6: t-test Data Processing Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.333784	0.266282	1.253496	0.2122
X1	0.017089	0.005926	2.883858	0.0046
X2	0.007056	0.002655	2.657884	0.0088
X3	-0.094729	0.025168	-3.763829	0.0002

Based on the t-test results table above, it can be observed that:

1. The Poverty Rate variable has a probability of $0.0046 < \alpha (0.05)$; this indicates that the Poverty Rate has a positive and significant partial effect on Income Inequality in Aceh Province.
2. The HDI variable has a probability of $0.0088 < \alpha (0.05)$; this indicates that the HDI has a positive and significant partial effect on Income Inequality in Aceh Province.
3. The GRDP variable has a probability of $0.0002 < \alpha (0.05)$; this indicates that GRDP has a negative and significant partial effect on Income Inequality in Aceh Province.

Table 7: F-test Data Processing Results

F-statistic	14.21138	Durbin-Watson stat	1.938172
Prob(F-statistic)	0.000000		

Based on the F-test results, the Prob (F-statistic) value was 0.000, which is less than 0.05 ($0.000 < 0.05$); therefore, H1 is accepted. Thus, it can be concluded that the Poverty Rate, Human Development Index, and GRDP simultaneously influence Income Inequality in Aceh Province. Furthermore, the magnitude of the influence of X1, X2, and X3 on Y can be determined by calculating the R-squared value.

Table 8: R-Squared Data Processing Results

R-squared	0.724650	Mean dependent var	0.281019
Adjusted R-squared	0.673659	S.D. dependent var	0.037015

Table 8 above presents the results of the coefficient of determination (R^2) test. Based on these results, an R-squared value of 0.7246 (72.46%) was obtained. This indicates that 72.46% of the variation in income inequality is explained by the poverty rate, HDI, and GRDP. Meanwhile, the remaining portion ($100\% - 72.46\% = 27.54\%$) is influenced by other variables not addressed in this study.

Based on the tabulated results, the poverty rate variable (X1) yielded a coefficient of 0.017089, with a t-statistic of 2.883858 and a probability of 0.0046; this signifies that the poverty rate has a positive and significant effect on income inequality in Aceh Province during the 2018–2024 period. Consequently, a 1% increase in the poverty rate drives a 0.017089-point rise in the Gini index, assuming other variables remain constant. This indicates that poverty not only suppresses the welfare of lower-income groups but simultaneously widens the income gap between the poor and the wealthy in Aceh Province. These findings align with those of Darmuji et al. (2024), who utilized panel data from 34 provinces (2019–2023) and found that poverty has a positive and significant impact on income inequality, with rising poverty rates shown to worsen income distribution. Similarly, a study by Hindun et al. (2019), which analysed panel data at the regency/city level, also noted that the poor population variable has a positive and significant effect on income inequality, indicating that a similar pattern exists not only at the provincial level but also within smaller units of analysis such as regencies and cities.

These findings indicate that efforts to address poverty in Aceh cannot focus solely on increasing household income; they must also expand access to basic services such as education and healthcare, in line with the "Capability Approach." Social assistance that merely provides hand outs—without simultaneously building the community's capacity for economic self-reliance—risks fostering long-term dependency and fails to truly resolve the root causes of inequality. Therefore, the required policies must be comprehensive, addressing multiple aspects of life, and

sustainable, ensuring that poverty reduction is accompanied by a narrowing of the income gap between different segments of society in Aceh.

Based on the data analysis, HDI variable (X₂) yielded a coefficient of 0.007056, with a t-statistic of 2.657884 and a probability of 0.0088. This indicates that the HDI has a positive and significant effect on income inequality in Aceh Province; specifically, every 1 percent increase in the HDI drives a 0.007056 increase in the Gini index. In other words, the rise in Aceh's HDI moves in tandem with the rise in the Gini index. This occurs because human development is not yet evenly distributed across all regencies and cities. Data covering the entire region reveals that higher HDI achievements are concentrated in regencies and cities characterized by urban settings and access to comprehensive facilities, whereas regencies in remote areas still lag behind in meeting basic needs. The rise in the HDI figure does not yet reflect improvements felt equitably across every region; as long as these inter-regional disparities remain wide, income inequality may actually widen, even if the average HDI figure appears favorable.

While these results may seem counterintuitive to conventional expectations, they can be explained by Amartya Sen's "Capability Approach." Under this theory, an increase in a region's average HDI does not necessarily reflect an equitable distribution of capabilities among population groups. If HDI gains are concentrated solely in specific groups or already advanced regions—while disadvantaged groups or remote areas lag far behind—the aggregate HDI rises, yet the capability gap between groups or regions widens. This specific dynamic is reflected in the rising Gini figure, which indicates an expansion of income inequality.

These research findings align with the study by Amali & Syafri (2023), which analyzed income inequality across 33 Indonesian provinces from 2000 to 2020. They found that the HDI positively influences income inequality, arguing that higher levels of HDI disparity within a region lead to a widening of income inequality. In line with this, Satriawan and Aisyah (2025) conducted a study across seven Indonesian provinces during the 2018–2023 period and found that the Human Development Index (HDI) has a positive and significant effect, indicating that the quality of the HDI remains a driving factor of income inequality.

These findings underscore that the priority lies not merely in raising the average Human Development Index (HDI) at the provincial level, but in ensuring its equitable distribution across all regions. The Aceh government needs to prioritize human development budgets—particularly for education and health—for regencies and cities that are lagging behind, rather than focusing solely on more advanced urban areas. Failure to achieve this equity risks an overall rise in HDI occurring alongside a widening regional income gap, rather than the reduction of inequality that is ideally expected.

GRDP variable (X₃) yielded a coefficient of -0.094729, with a t-statistic of -

3.763829 and a probability of 0.0002; this indicates that GRDP has a significant negative impact on income inequality in Aceh Province, meaning that every 1% increase in GRDP reduces the Gini Index by 0.094729 points, assuming other variables remain constant. This implies that economic growth—reflected in rising GRDP—is effective in curbing income inequality; the higher a regency or city's economic output, the greater the opportunity for lower-income segments of society to share in the benefits of that growth, thereby gradually narrowing the income gap between groups. These results can be explained through the Capability Approach theory, which posits that economic growth (as reflected in increased GRDP) can expand people's capabilities if the benefits are distributed equitably. When regency or city's GRDP rises, more resources become available for investment in public services, infrastructure, and employment opportunities; this ultimately strengthens the capabilities of low-income groups to participate more productively in economic activities, thereby narrowing the income distribution gap and reducing inequality as the regency or city's GRDP increases.

The results of this study align with the findings of Andrianto and Setyowati (2025) regarding Central Java Province (2020–2024); using a panel data regression approach, they found that Gross Regional Domestic Product (GRDP) has a significant negative impact on income inequality—meaning that higher economic growth correlates with a lower Gini Ratio. Similarly, Ririn Nur Indah Sari (2021) analysed the impact of GRDP on income inequality across five regencies/cities in the Special Region of Yogyakarta (2014–2019) using panel data regression and also found a significant negative relationship, indicating that an increase in regional economic output effectively suppresses income inequality.

These findings demonstrate that while economic growth in Aceh has the potential to reduce the gap between the rich and the poor, this does not happen automatically. The outcome depends on the specific sectors driving that growth. If growth stems primarily from the mining sector or large-scale projects reliant on machinery and heavy capital investment, employment opportunities remain limited; consequently, the benefits are largely captured by a handful of capital owners rather than the general public. Conversely, if growth is driven by labor-intensive sectors—such as agriculture, fisheries, or small and medium-sized enterprises (SMEs)—a larger segment of the population can participate in the workforce and share in the benefits of that growth. Therefore, the Aceh government should not focus solely on achieving high economic growth figures but must also consider which sectors are being promoted. By fostering sectors that are labour-intensive and aligned with local potential, the benefits of economic growth can be more widely shared.

4. Conclusions

1. The poverty rate has a positive and significant effect on income inequality in Aceh Province. Every 1% increase in the poverty rate drives a 0.017089-point increase in the Gini index. This implies that the higher the percentage of the poor population in a regency or city, the wider the income distribution gap becomes.
2. HDI has a positive and significant effect on income inequality in Aceh Province. Every 1% increase in the HDI raises the Gini index by 0.007056 points. These results indicate that the rise in the average HDI in Aceh Province has not been evenly distributed across groups and regions. HDI improvements concentrated in urban areas—such as Banda Aceh, Lhokseumawe, and Langsa—actually widen the capability gap relative to lagging areas, thereby increasing aggregate income inequality.
3. GRDP has a negative and significant effect on income inequality in Aceh Province. Every 1% increase in GRDP lowers the Gini index by 0.094729 points. This demonstrates that economic growth at the regency/city level—reflected in rising GRDP—can expand public access to employment, public services, and economic opportunities more equitably, thereby narrowing the income distribution gap between groups.
4. Simultaneously, the poverty rate, HDI, and GRDP significantly affect income inequality in Aceh Province, with a Prob (F-statistic) value of 0.000 (< 0.05). The R-squared value of 72.46% indicates that these three variables strongly explain the variation in income inequality in Aceh Province, while the remaining 27.54% is influenced by factors outside this research model.

5. Recommendations

1. Given that poverty levels have been shown to exacerbate income inequality, the Aceh Government needs to intensify more targeted poverty alleviation programs—particularly in regencies and cities with high poverty rates—through cross-agency coordination led by the Aceh Regional Development Planning Agency (Bappeda). This should include optimizing the Special Autonomy Fund to foster economic empowerment based on local potential and expanding access to capital for small and medium-sized enterprises (SMEs).
2. Given that uneven improvements in the Human Development Index (HDI) drive widening inequality, the Aceh Government must ensure equitable human development investment across regions. It should direct the Aceh Education Agency and the Aceh Health Agency to look beyond urban areas and genuinely reach remote regions; this entails improving facility quality as well as the welfare of educators and medical personnel in inland areas.

3. Given that Gross Regional Domestic Product (GRDP) has proven effective in curbing income inequality, the Aceh Government needs to promote the equitable distribution of economic activity to regions that have historically lagged behind. It should instruct the Aceh Industry and Trade Agency and the Aceh Investment and One-Stop Integrated Services Agency (DPMPTSP) to facilitate investment and strengthen connectivity infrastructure in areas with low GRDP.
4. Future researchers are advised to incorporate additional variables suspected of influencing income inequality in Aceh Province—such as open unemployment rates, local government spending, and investment—to obtain a more comprehensive picture, especially considering that 27.54% of the variation remains unexplained by the model used in this study.

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