Priviet Social Sciences Journal
E-ISSN 2798-866X
P-ISSN 2798-6314
https://doi.org/10.55942/pssj.v5i9.721

Volume 5
Issue 9
September Edition 2025

The influence of the gini ratio and inflation on the Human Development Index (HDI)

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Received 7 August 2025
Revised 11 September 2025
Accepted 19 September 2025

ABSTRACT

The purpose of this study is to examine how inflation and the Gini Ratio affect Indonesia's Human Development Index (HDI).Multiple linear regression using secondary data was used for the analysis.The results show that the HDI is negatively and significantly impacted by inflation, suggesting that rising inflation can lower the quality of human development by stifling people's purchasing power and restricting access to healthcare and education.Income inequality has not yet emerged as a major factor impacting HDI accomplishment during the study period, as seen by the Gini Ratio's lack of a substantial impact on the HDI.The HDI is significantly impacted by both independent variables at the same time, with the model accounting for 23.9% of the variation in the HDI and other factors influencing the remaining variation.These results emphasize how crucial inflation control measures are to promoting the enhancement of Indonesia's human development, especially with regard to food items and essentials.

Keywords: Human Development Index (HDI), Gini Ratio, Inflation, Income Inequality

1. INTRODUCTION

Over the past decade, Indonesia has experienced substantial advancements in human development, reflecting improvements in various social, economic and health indicators. Based on data published by the Central Statistics Agency, the country's Human Development Index (HDI) reached 74.39 in 2023, an increase from 73.77 in 2022. Human development is crucial for measuring a country's progress or success. Unlike economic growth, human development emphasizes individual capabilities, including healthy living, good education, and an adequate standard of living. Therefore, human development is not just about increasing income; it also encompasses social, health, and educational dimensions that are directly related to a community's quality of life (Todaro & Smith, 2020).

Indonesia's Human Development Index (HDI) shows an upward trend in 2023, reaching 0.728, ranking 113th in the world (UNDP, 2023). However, Indonesia currently faces challenges such as disparities between regions, education quality, and access to healthcare (BPS, 2022). Therefore, Indonesia must focus on one of the factors influencing the HDI: income inequality. The Gini ratio in Indonesia, published by the BPS in 2024, reached 0.349, indicating that income inequality in Indonesia is unequal and potentially limits access to basic services (BPS, 2024). Conversely, inflation was controlled at 2.37% in July 2025. This fact means that inflation stability helps maintain people's purchasing power. However, some low-income communities remain vulnerable to inflation, which can ultimately hinder their quality of life and slow down the increase in the HDI (BPS, 2024; Coordinating Ministry for Economic Affairs, 2024).

Human development is a key indicator for assessing a country's growth. The Human Development Index (HDI), developed by the UNDP, shows development achievements in health, education, and human living standards, making it an important benchmark for formulating development policies (UNDP, 2023). In Indonesia, the HDI has increased, but it still faces serious challenges related to equity across regions and communities (BPS, 2022). Two macroeconomic factors that influence HDI are the Gini ratio and inflation. Inequality, as measured by the Gini ratio, can hinder access to education, health services, and other basic needs for low-income communities, resulting in no increase in human development achievements (Economics & Sociology, 2020). Meanwhile, high inflation tends to weaken purchasing power in society, which can reduce consumption for nutrition, education, and health, ultimately slowing the progress of human development (EUDL, 2021). However, researchers have found mixed results, with some finding a significant effect of inflation on the HDI, while others have shown inconsistencies (Herman, 2021). This indicates a research gap that requires further investigation, particularly by examining the influence of the Gini ratio and inflation on the HDI in Indonesia. This research, in addition to providing theoretical contributions, can also provide practical benefits as a basis for the government in deciding policies on equitable development, controlling inflation that favors vulnerable groups, and improving the quality of life of the community.

In this regard, it is crucial to conduct research on the influence of the Gini ratio and inflation on development in Indonesia. Although various government policies have been implemented to reduce inequality and maintain inflation stability, the policy's goal of improving development outcomes remains a crucial objective. This analysis is necessary for the government to understand whether a reduction in the Gini ratio and controlled inflation truly contribute to a sustainable increase in the Human Development Index (HDI). This study is expected to bridge the existing research by providing empirical evidence of the relationship between macroeconomic stability, social equity, and human development. It can then serve as a reference for formulating policies to achieve inclusive and sustainable policies in Indonesia.

Furthermore, the World Bank report confirms that improving the quality of education and healthcare services is key to improving human development in Indonesia. However, regional disparities in Indonesia remain a major obstacle to improved development (World Bank, 2023).

2. METHODS

This study aims to analyze the influence of the Gini ratio and inflation on the Human Development Index (HDI). To achieve this objective, this study uses a quantitative approach with explanatory research

methods. The data used in this study are secondary data obtained from the Central Statistics Agency (BPS). The variables in this study are the Gini ratio and inflation as independent variables, while the HDI is the dependent variable. The analysis used in this study uses multiple linear regression with the assistance of IBM SPSS 27 software.

3. RESULTS AND DISCUSSION

3.1 Descriptive Statistics

In this study, descriptive statistics were used to provide an initial overview of the research data. This analysis presents information on the maximum, minimum, average, and standard deviation values of the Gini ratio, inflation, and human development index data, thus facilitating an understanding of the data before conducting further analysis (Field, 2018). Theve analysis are presented in Table 1.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Gini Ratio	38	.24	.43	.3409	.04632
Inflasi	38	1.05	4.19	2.4474	.59837
HDI	38	-12.78894	7.04176	.0000000	4.49179963

Based on the table above, the Gini ratio indicates that income inequality across Indonesia's provinces is moderate, with some regions experiencing relatively moderate income distribution but with considerable variation across regions. Meanwhile, the inflation variable shows that the inflation rate in most Indonesian provinces remains within a relatively controlled range, although price differences and inflationary pressures persist in some regions.

Meanwhile, the Human Development Index data show striking differences in human development across Indonesia's provinces. However, the overall distribution is still acceptable, with a deviation of 4.4918.

Overall, the results of these descriptive statistics provide an initial indication that the Gini ratio, inflation, and HDI variables have sufficient variation for further analysis of human development achievements in Indonesia.

3.2 Classical Assumptions

The next analysis is a regression analysis, which tests the classical assumptions to ensure that the regression model meets the BLUE criteria (Gujarati & Porter, 2009). The normality test in this study was conducted to determine whether the residual data were normally distributed, which is an essential prerequisite for further analysis. A multicollinearity test was conducted to detect whether the data for further analysis had a high correlation between independent variables, which could affect the stability of the regression coefficients. Furthermore, the heteroscedasticity test was used to ensure that the variance was constant across all levels of the independent variables.

3.2.1 Normality Test

Before conducting a linear regression analysis, the data must be normally distributed. A normality test is used to determine whether the residual data from the regression model is normally distributed. In this study, the Shapiro-Wilk test was used because the data used were less than 50% with a significance level of 5%.

Hypothesis:
Ho: Data is not normally distributed
H1: Data is normally distributed.
The results of the normality test are as follows:

Table 2. Normality Test

	Shapiro-Wilk		
	Statistic	df	Sig.
Gini Ratio	.971	38	.421
Iflasi	.945	38	.059
HDI	.959	38	.180

Test criteria:
If the significance value is >0.05, then Ho is rejected.
If the significance value is <0.05, then Ho is accepted.

Based on Table 2, the Gini ratio has a sig value of 0.421 > 0.05, meaning Ho is rejected, and the data is normally distributed. For inflation, the sig value is 0.059 > 0.05, meaning Ho is rejected, and the inflation value is normally distributed. The HDI has a sig value of 0.80 > 0.05, meaning that Ho is rejected, and the HDI data are normally distributed.
Thus, the three research variables met the requirements for normality testing and could proceed to further analysis.

3.2.2 Test of Multicollinearity

A multicollinearity test was conducted to ensure that the research data did not have a high correlation with the regression model. High multicollinearity can cause instability in regression coefficients, making them difficult to interpret.
Hypothesis:
Ho: There are no signs of multicollinearity between the Gini ratio and inflation.
H1: There are signs of multicollinearity between the Gini ratio and inflation.
Test criteria:
1. If the tolerance value is > 0.10 and the VIF is < 10, then multicollinearity does not occur.
2. If the tolerance value is < 0.10 and the VIF is > 10, then multicollinearity does not occur**.**

Table 3. Multicollinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-3.029E-14	6.038		.000	1.000		
	Gini Ratio	.000	16.648	.000	.000	1.000	.970	1.031
	Iflasi	.000	1.289	.000	.000	1.000	.970	1.031
a. Dependent Variable: HDI								

Based on the results in Table 3, it can be concluded that the tolerance value for the Gini ratio and inflation is 0.970 > 0.10, and the VIF value is 1.031 < 10, indicating no multicollinearity. Thus, it can be concluded that the independent variables in this study do not significantly influence each other; therefore, this regression model is free from multicollinearity, meaning that the data in this study can be used for further analysis.

3.2.3 Heteroscedasticity Test

Next, this study will test for heteroscedasticity using the Glejser test. The purpose of this test is to regress the absolute value of the residuals against the Gini ratio and inflation variables in the model. The criterion for this test is that if the Glejser test result is greater than 0.05, it can be concluded that heteroscedasticity does not occur.

Table 4. Heteroscedasticity Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.733	3.698		-.739	.465
	Gini Ratio	8.855	10.195	.141	.869	.391
	Inflasi	1.266	.789	.261	1.604	.118
a. Dependent Variable: ABS						

Based on the results in Table 4, it can be seen that the Gini ratio is 0.391 > 0.05 and inflation is 0.118 > 0.05, indicating no heteroscedasticity. This indicates that the regression model is suitable for further analysis.

3.3. Regression Analysis

The multiple linear regression analysis used in this study aims to determine the effect of the Gini ratio and inflation on the Human Development Index (HDI). This method allows researchers to observe the partial and simultaneous effects of the Gini ratio and inflation on HDI. Table 5 presents the results of the multiple linear regression analysis.

Table 5
Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	75.868	6.038		12.565	.000
	Gini Ratio	19.925	16.648	.179	1.197	.239
	Inflasi	-4.197	1.289	-.488	-3.257	.003
a. Dependent Variable: HDI						

The general regression equation is expressed as:
$Y=a+b1X1+b2X2$
Based on the regression results, the equation is as follows:
$HDI=75.868+19.925(\text{Gini Ratio})-4.197(\text{Inflation})$
Interpretation

a. Constant (a = 75.868)
   The constant value of 75.868 indicates that when both the Gini ratio (X_1) and inflation (X_2) are equal to zero, the baseline Human Development Index (HDI) is estimated at 75.868.
b. Gini Ratio Coefficient (b_1 = 19.925)
   The positive coefficient suggests that for every one-unit increase in the Gini ratio, the HDI is expected to rise by 19.925 points, assuming that inflation remains constant. However, with a significance value of 0.239 (> 0.05), the effect of the Gini ratio on HDI is statistically insignificant. This implies that income inequality does not substantially impact changes in the HDI within this model.

c. Inflation Coefficient (b_2 = -4.197)
The regression results indicate that when the Gini ratio is held constant, a one-unit increase in inflation corresponds to a reduction of approximately 4.197 points in the Human Development Index (HDI). Moreover, the associated p-value of 0.003, well below the 0.05 threshold, confirms the statistical significance of this relationship, thereby demonstrating that inflation has a substantial and adverse effect on human development outcomes.

Based on the data analysis results, the constant and regression coefficients for each independent variable are presented in the Coefficients Table. These values are subsequently used to construct the multiple linear regression equation, which serves as the foundation for interpreting the effects of the Gini ratio and inflation on the HDI.

3.3.1 The partial test (t-test)

The partial t-test in this study was used to determine the effect of the Gini ratio on the Human Development Index and the effect of inflation on the Human Development Index. The test criteria in this study were: if the significance value is <0.05, then Ho is rejected; if the significance value is >0.05, then Ho is accepted. The following are the hypotheses in this study:H_{01}: does not have a significant effect on the Gini ratio on the HDI.
H_{11}: has a significant effect Gini ratio on the HDI.
H_{02}: does not have a significant effect Inflation on the HDI.
H_{12}: has a significant effect Inflation on the HDI.
The decision criteria are as follows:
If (Sig.) value < 0.05, Ho rejected
If (Sig.) value > 0.05, Ho accepted

Table 6. T Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	75.868	6.038		12.565	.000
	Gini Ratio	19.925	16.648	.179	1.197	.239
	Inflasi	-4.197	1.289	-.488	-3.257	.003
a. Dependent Variable: HDI						

Based on Table 6, the significance value of the Gini ratio variable is 0.239 > 0.05, meaning that Ho is accepted. If Ho is accepted, there is no significant influence between the Gini ratio and the HDI. Second, inflation has a significance value of 0.003 < 0.05, meaning that Ho is rejected. If Ho is rejected, there is a significant influence of inflation on the HDI.

Based on the previously explained results, there was no significant effect between the Gini ratio and the Human Development Index (HDI). This finding indicates that inequality does not directly affect HDI in Indonesia. These results indicate that in some regions in Indonesia, despite existing inequality, income levels and access to services are still sufficient to support improvements, particularly in education, health, and the standard of living, which are components of the HDI. Therefore, inequality is not always an obstacle to human development itself.

Furthermore, inflation significantly impacts the Human Development Index (HDI). These results indicate that price fluctuations affect human development. High inflation can typically reduce people's purchasing power, especially among those with low incomes, impacting access to quality food, health care, and education. Conversely, controlled inflation can foster economic growth and improve living standards. Therefore, controlling inflation must be a priority for the government when formulating policies to support the human development.

3.3.2 Simultaneous Test (F-test)

The Simultaneous Test (F-test) in this study was used to determine whether the Gini ratio and inflation variables significantly influenced the Human Development Index (HDI). The significance level in this study was 0.05. The test criteria in this study were: if the Sig value is <0.05, Ho is rejected; if the Sig value is >0.05, Ho is accepted. The hypotheses of this study are as follows:
Ho: There is no significant effect of the Gini ratio and inflation on the Human Development Index
H1: There is a significant effect of the Gini ratio and inflation on the Human Development Index

Table 7. F test

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	234.897	2	117.449	5.506	.008[b]
	Residual	746.522	35	21.329		
	Total	981.419	37			
a. Dependent Variable: HDI						
b. Predictors: (Constant), Inflasi, Gini Ratio						

Based on the results of the simultaneous test in Table 7, the significance value obtained was 0.008 < 0.05, meaning that Ho was rejected; thus, there was a significant influence of the Gini ratio and inflation on the human development index.

Furthermore, the findings highlight the fact that while inflation has a noteworthy partial impact on HDI on its own, when combined, the two independent factors significantly contribute to the explanation of HDI fluctuations

3.3.3 Coefficient of Determination

The Human Development Index (HDI) is the dependent variable, and the coefficient of determination (R^2) measures how much the independent variables, inflation and the Gini Ratio, account for changes in it (see Table 8).

Table 8. R Square

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.489[a]	.239	.196	4.61835
a. Predictors: (Constant), Inflasi, Gini Ratio				

The Model Summary table shows that the R2 value is 0.239, or 23.9%, meaning that the combination of the Gini Ratio and inflation explains 23.9% of the variation in the HDI. Other variables not covered in this study, such as infrastructure, government policies, per capita spending, and educational attainment, account for the remaining 76.1% of the difference.

In addition, the Adjusted R^2 value of 0.196, or 19.6%, represents the explanatory power of the independent variables after considering the number of variables and sample size. The slightly lower Adjusted R^2 compared to R^2 suggests that, while the regression model provides a reasonable explanation of HDI variation, it does not fully capture all influencing factors.

Therefore, although the model demonstrates the simultaneous effect of the Gini Ratio and Inflation on the HDI, additional variables need to be considered to offer a more comprehensive understanding of the factors driving changes in human development.

Based on the above results, it was found that the Gini ratio and inflation have a significant influence on the Human Development Index. This finding indicates that macroeconomic factors play a crucial role in driving human development.

The influence of these two variables can explain the interactive relationship between the Gini ratio and inflation rate. On the one hand, a high Gini ratio will make it difficult for people with low incomes to gain access to basic services such as education, healthcare, and a good standard of living. This will also hinder human development. However, unstable inflation can reduce people's purchasing power, thereby reducing their needs. Thus, the Gini ratio and inflation are a combination that influences both the increase and decrease in human development. This finding aligns with Todaro and Smith (2020), who found that human development depends not only on economic growth but also on stable macroeconomic distribution and income. Therefore, the Indonesian government needs to address inflation and inequality and adopt pro-poor policies to strengthen the economic sector so that improvements in the Human Development Index (HDI) are felt equally by all levels of society.

4. CONCLUSION

The results indicate that inflation negatively affects the Human Development Index (HDI), whereas the Gini Ratio does not have a statistically significant impact. This finding implies that an increase in inflation can reduce the quality of human development, whereas income inequality does not exhibit a meaningful influence. Other factors beyond the scope of this model remain dominant in explaining changes in the HDI.

Ethical Approval
Ethical approval was not required for this study.

Informed Consent Statement
Not Applicable.

Author Contributions
RR led the study design and project coordination. IDP conducted the literature review. All authors approved the final manuscript, with Reka Ramadhan as the corresponding author of the manuscript.

Disclosure Statement
The authors declare no potential conflicts of interest.

Data Availability Statement
The data presented in this study are available upon request from the corresponding author for privacy reasons.

Funding
This study received no external funding.

Notes on Contributions

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