

EFFECTS INFLATION, HDI, CONSUMPTION, AND SOLAR SUBSIDIES ON POVERTY IN INDONESIA

Syarifah Syafira¹*, Euridika Estefani Simalango²

¹Faculty of Economics and Business Universitas Malikussaleh, Lhokseumawe

²Student of the Development Economics Program at the Universitas Malikussaleh

E-mail: syarifahsyafira@unimal.ac.id², euridika.210430081@mhs.ac.id

Received : 10 March 2026

Accepted : 01 April 2026

Revised : 15 March 2026

Published : 10 April 2026

Abstract

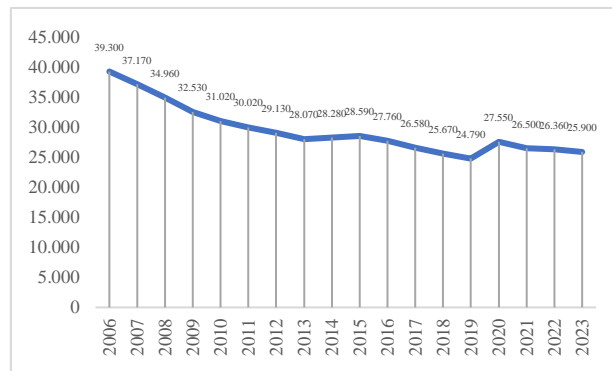
This study carried out to view the effects of inflation and Human Development Index (HDI), diesel consumption, and diesel subsidies on poverty levels in Indonesia during 2006–2023. The data utilized in this study are secondary in nature. time-series data obtained from Central Statistics Agency and Ministry of Finance. The study applies multiple linear regression analysis was performed to test the classical assumptions and validate model. The results are inflation has a positive and significant effect on poverty, indicating that rising prices of goods and services reduce the purchasing power of low-income households and increase poverty levels. HDI have the positive not significant impact poverty, suggesting to signify on education, health, and living standards have not yet significantly reduced poverty during the study period. Diesel consumption stated a negative related in poverty, the impact not statistic significant, cause a change energy usage do not significantly influence poverty levels. Diesel subsidies also show have (-) but insignificant impact poverty, although they help maintain energy price stability and reduce the burden on low-income communities. Simultaneously, these four variables significantly affect Indonesia poverty, highlighting importance inflation control, Human Development Index improvement, effective diesel consumption and subsidy management as strategies for poverty reduction.

Keywords: *Inflation, HDI, Solar Consumption, Solar Subsidies, Poverty*

INTRODUCTION

Poverty is multidimensional problem that is not only related to low income, as well as limited access education and health, and a living conditions. CSA research, poverty levels Indonesia's has fluctuated on recent years, mainly due to the pressure of the Covid-19 pandemic. Several macroeconomic factors are thought to influence poverty, including inflation, human development quality, and energy policies such as consumption and solar subsidies. High inflation can reduce people's purchasing power, especially among the poor. Meanwhile, the rise in the HDI is expected to slow down poverty through improvements in education and health conditions. Solar consumption, solar subsidies are also important variables because the transportation, agriculture, and small industry sectors are highly dependent on this fuel. Price increases or subsidy reductions can increase production costs and potentially exacerbate poverty. Based on this background, the purpose of this study analyze the effects inflation, HDI, diesel consumption, and solar subsidies on poverty in Indonesia. A long journey of poverty alleviation in Indonesia is reflected not just in statistical figures, at the same time on the social aspect, economic, and policy dynamics of each period. The data presented provides an overview of how poverty alleviation efforts have brought about significant changes, while also highlighting the challenges that still need to be addressed. By understanding the trends and fluctuations that have occurred, we can assess the extent to which the strategies implemented have been can provide the needs of the residents, as well as how external factors have influenced these achievements.

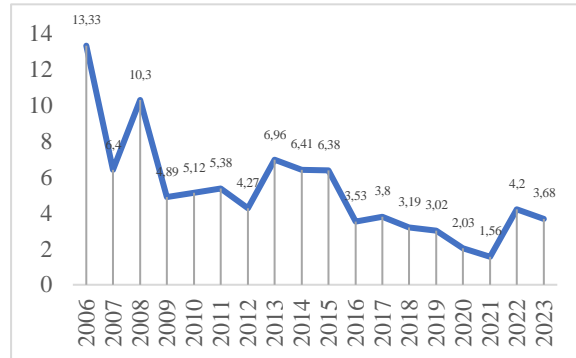
Figure 1. Poverty in Indonesia from 2006 to 2023 (millions of people)



Source: Central Statistics Agency, 2025

Figure 1 shows a fairly consistent decline from a peak of 39.3 million people to 25.9 million people. At the beginning of the period, poverty rates were still relatively high because many people were unable to meet their basic needs. Over time, various government policies such as the Family Hope Program (PKH), food stamps, and rice aid began to have an impact, causing poverty rates to gradually decline. However, in 2019–2020, poverty rose from 9.22% to 10.19% due to the pressure of the COVID-19 pandemic and a decline in purchasing power. Based on data from BPS (2025), the size of people living in poverty stands at 26.5 million in 2021, then fell to 25.900 million in 2023. This decline was driven by economic recovery, lower unemployment, and controlled inflation. The government is targeting a reduction in the poverty rate in 2024 as part of its efforts to accelerate post-pandemic recovery. In Indonesia, inflation trends from 2006 to 2023 show a variety of patterns, ranging from sharp spikes to periods of stability and even significant declines, influenced by both domestic and international factors. Understanding these trends is important because inflation is directly related to public welfare, the investment climate, and the sustainability of national economic growth.

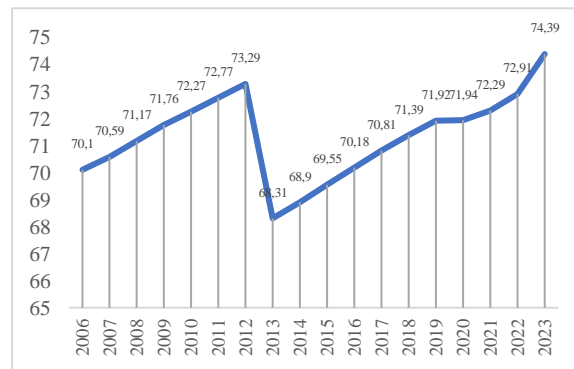
Figure 2: Inflation in Indonesia, 2006–2023 (%)



Source: Central Statistics Agency, 2025

Figure 2 shows that Indonesia’s inflation rate from 2006 to 2023 fluctuated quite significantly. The highest inflation rate occurred in 2006 at 13.33%, after which it declined and remained relatively stable in the 5–6% range from 2010 to 2015. Thereafter, inflation continued to decline, reaching a low of 1.56% in 2021 due to weakening demand and the impact of COVID-19 pandemic. In 2022–2023, inflation rose moderately to 4.2% and 3.68%, respectively, in line with economic recovery and increases in global energy and food prices. Overall, this trend highlights the importance of government policies in maintaining price stability to prevent prices from becoming either too high or too low. In the Indonesian context, the trajectory of HDI from 2006 to 2023 reveals an interesting dynamic, characterized by both a consistent upward trend and fluctuations that warrant further scrutiny.

Figure 3: Human Development Index (HDI) in Indonesia, 2006–2023 (points)

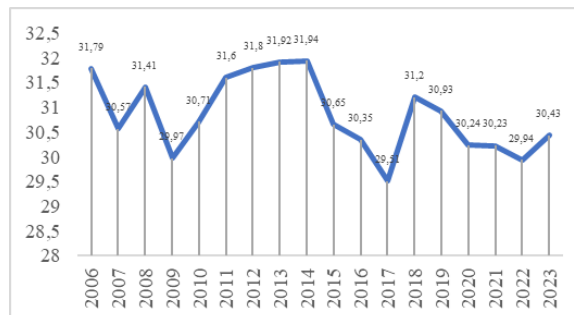


Source: Central Statistics Agency, 2025

Indonesia’s Human Development Index (HDI) shows a consistent upward trend from 2006 to 2023, rising from approximately 70 to over 74 points. This reflects improvements in education, health, and living standards. However, a sharp decline occurred around 2013, which stands as an anomaly in the long-term trend, indicating a disruption in aspects of human development or a change in measurement methodology. Generally, an increase in the HDI contributes to poverty reduction, making the stability and improvement of the HDI key elements in poverty alleviation strategies. Changes in consumption patterns over time demonstrate how external factors such as energy policies, global economic conditions, and technological advancements influence domestic demand. By examining solar consumption trends from 2006 to 2023, one can gain a deeper understanding of how Indonesia’s energy needs fluctuate, while also assessing the extent to which energy management policies can maintain a balance between supply and demand.

The following is data on diesel consumption in Indonesia from 2006 to 2023:

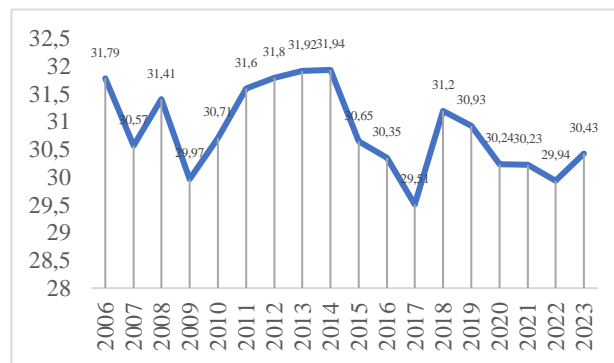
Figure 4: Diesel Consumption in Indonesia, 2006–2023 (Kiloliters)



Source: Ministry of Finance, (data processed), 2025

During the 2006–2023 period, diesel consumption exhibited a fluctuating pattern with several phases of sharp declines and increases. A significant decline occurred in 2007 and reached its lowest point in 2011, before surging to its peak in 2013. After that, consumption gradually declined again until 2016 and remained relatively stagnant from 2017 to 2020, even reaching a low point in 2020. Entering the 2021–2023 period, diesel consumption has consistently increased again. Overall, this pattern reflects the dynamics of diesel demand, which is influenced by changes in economic activity and user-sector demand over time. The fluctuations observed from year to year indicate that Indonesia’s diesel subsidy policy is adaptive, responding to both external pressures and internal needs. By tracing the subsidy trends from 2006 to 2023, we can understand the direction of the government’s energy policy while assessing its impact on society and the national economy.

Figure 5: Diesel Subsidies in Indonesia, 2006–2023 (Rupiah)



Source: Ministry of Finance, (data processed), 2025

Diesel subsidies in Indonesia showed significant fluctuations throughout the observation period. In 2006, subsidies were at a high level of approximately 64.2 trillion rupiah, then dropped sharply to around 19 trillion. After briefly rising again in 2008, subsidies fell to a low of approximately 10.4 trillion in 2009. Subsequently, subsidies rose sharply from 21.8 trillion in 2010 and peaked at 74.8 trillion in 2014. However, this was followed by a drastic decline to 6.5 trillion in 2016. In the final period, subsidies tended to remain at a lower and relatively stable level compared to the beginning of the period, indicating a trend toward tightening or adjustment of subsidy policies by the government.

METHODS

Data Types and Sources

This study utilizes quantitative data in format secondary time-series data spanning 18 years, start 2006 to 2023. To obtain accurate data, the researcher sourced data from CSA and Ministry of Finance databases. This data includes inflation, HDI, diesel consumption, diesel subsidies, and poverty rates.

Data Analysis Method

This research examines the degree to which inflationary implications, the HDI, diesel consumption, and diesel subsidies on poverty Indonesia by means of multiple linear regression approach with the assistance of EViewsemploying the following approach:

$$\log Kms = \beta_0 + \beta_1 Inf_t + \beta_2 IPM_t + \beta_3 \log KS_t + \beta_4 \log SS_t + e_t$$

Notes:

- Kms = Poverty
- β_0 = Constant
- Inf = Inflation
- HDI = Human Development Index
- KS = Diesel Consumption
- SS = Diesel Subsidy
- $\beta_1 \beta_2 \beta_3 \beta_4$ = Regression Coefficients
- ε = Error Term
- log = Logarithm

RESULTS AND DISCUSSION

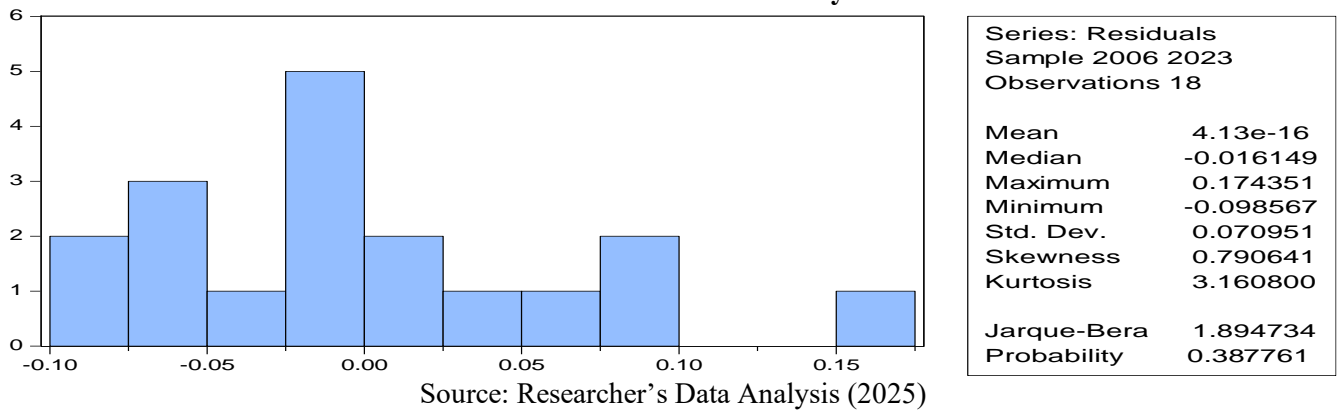
Tests performed:

In general, the following techniques are used in econometric analysis:

1. Normality Test
2. Classical Assumptions Test
3. Hypothesis Testing

4. RESULTS AND DISCUSSION

Results of the Normality Test
Table 1 Results of the Normality Test



Normality test results are shown in table 1, which determines whether the residuals value follows the normal distribution by examining probability number. Since the probability value (Prob) of 0.387761 is bigger than 0.05, the residuals can be said to be normally distributed.

Test of Classical Assumptions

Autocorrelation Test
Table 2: Autocorrelation Test Results

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.479319	Prob. F(2,11)	0.6316
Obs*R-squared	1.442930	Prob. Chi-Square(2)	0.4860

Source: Researcher's Data Analysis (2025)

Referring to Table 2, the probability of Obs*R-square is $1.442930 > 0.5692$ and Since the Chi-Square probability value ($0.4860 > 0.05$), there is no autocorrelation in the data.

Heteroscedasticity Test
Table 3 Results of the Heteroscedasticity Test

Heteroskedasticity Test: White

F-statistic	2.330343	Prob. F(13,4)	0.2148
Obs*R-squared	15.90054	Prob. Chi-Square(13)	0.2545
Scaled explained SS	8.960620	Prob. Chi-Square(13)	0.7759

Source: Researcher's Data Analysis Results (2025)

Referring to Table 3 of the Breusch–Pagan–Godfrey test results, it is evident which indicates that the value of Obs*R-squared (15.90054) exceeds 0.2545 and the probability (Prob. Chi-Square) of $0.2545 > 0.05$; thus, could be concluded is not detectible of heteroskedasticity.

Multicollinearity Test
Table 4 The results of the Multicollinearity Test

Covariance Analysis: Ordinary
 Date: 02/24/26 Time: 23:42
 Sample: 2006 2023
 Included observations: 18

Correlation t-Statistic	LOG_KMS	INF	IPM	LOG_KS	LOG_SS
LOG_KMS	1.000000 -----				
INF	0.799979 5.332945	1.000000 -----			
IPM	-0.243650 -1.004883	-0.444241 -1.983427	1.000000 -----		
LOG_KS	-0.008687 -0.034748	0.216545 0.887231	-0.121114 -0.488050	1.000000 -----	
LOG_SS	0.288409 1.204835	0.544421 2.596154	-0.317146 -1.337639	0.291493 1.218904	1.000000 -----

Source: Researcher’s Data Analysis (2025)

By means of the multicollinearity test obtained through the Ordinary Covariance Analysis output, it was found is the total correlation coefficient of the independent variable were below 0.80. The correlation coefficient between inflation and the human development index is -0.4442, the correlation between inflation and diesel subsidies is 0.5444, and the correlation between diesel consumption and diesel subsidies is 0.2914. All of these correlation coefficients have absolute values less than 0.80, to signify there is no strong linear relationship on the independent variables. Therefore, it can be concluded that the regression model used in this study does not exhibit multicollinearity.

Multiple Linear Regression Analysis
Table 5 Analisis Regresi Linear Berganda

Dependent Variable: LOG_KMS
 Method: Least Squares
 Date: 02/25/26 Time: 00:09
 Sample: 2006 2023
 Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.51512	2.564978	4.879230	0.0003
INF	0.044225	0.008697	5.085045	0.0002
IPM	0.009901	0.013988	0.707777	0.4916
LOG_KS	-0.137155	0.135993	-1.008541	0.3316
LOG_SS	-0.026998	0.031722	-0.851100	0.4101
R-squared	0.705375	Mean dependent var		10.28220
Adjusted R-squared	0.614722	S.D. dependent var		0.130715
S.E. of regression	0.081136	Akaike info criterion		-1.955256
Sum squared resid	0.085579	Schwarz criterion		-1.707931
Log likelihood	22.59731	Hannan-Quinn criter.		-1.921154
F-statistic	7.780984	Durbin-Watson stat		1.918526
Prob(F-statistic)	0.001983			

Source: Researcher’s Data Analysis (2025)

Based on Table 5 presents the results of multiple linear regression is:

1. The regression coefficient for poverty variable is (+) 12.51512, indicating the value when all independent variables (inflation, HDI, diesel consumption, diesel subsidies) are zero. In other words, if the explanatory factors have no effect, the estimated baseline poverty rate is approximately 12.5 units
2. The regression coefficient for inflation variable is positive (+) at 0.044225, meaning that if the inflation rate increases by 1%, the poverty rate in Indonesia is estimated to increase by 0.044225 units. In other words, the higher

the inflation rate, the greater the potential for an increase in poverty. This indicates a positive correlation between inflation and poverty in Indonesia.

3. The regression coefficient for the Human Development Index (HDI) variable is positive (+) at 0.009901, meaning that if the HDI increases by 1%, the poverty rate in Indonesia is estimated to increase by 0.009901 units. Theoretically, a higher HDI should reduce poverty, but the regression results show a positive direction. Therefore, although statistically there is a positive relationship between the Human Development Index (HDI) and poverty, these results need further analysis to understand other factors that may influence this relationship.

4. The regression coefficient for the diesel consumption variable is negative (-) at -0.137155, meaning that if diesel consumption increases by 1%, the poverty rate is estimated to decrease by 0.137155 units. This indicates a negative association between diesel consumption and poverty in Indonesia, where an increase in diesel consumption has the capacity to lower poverty rate.

5. The regression coefficient for the solar subsidy variable is negative (-) at -0.026998, meaning that if solar subsidies increase by 1%, the poverty rate in Indonesia is estimated to decrease by -0.026998 units. This indicates that an increase in solar subsidies has the potential to reduce poverty, thus there is a (negative) relationship between solar subsidies and poverty.

Research Hypothesis Testing

1. Results of the Partial Test (Ujit)

1. The inflation variable has a positive and significant effect on the poverty rate variable in Indonesia at a 5% significance level. This is based on the t-calculated value of 5.085045 > t-table value of 2.160, so H_1 is accepted. This means that an increase in inflation statistically contributes to an increase in poverty. This is also reinforced by the probability value (P-value) of 0.0002 < 0.05, which indicates a significant effect.

2. The HDI variable has a positive but insignificant effect on the poverty rate in Indonesia at a 5% significance level. This is based on the t-calculated value of 0.707777 < t-table 2.160, so H_0 is accepted. This means that an increase in the HDI has not been statistically proven to affect poverty levels. The P-value of 0.4916 > 0.05 supports this conclusion.

3. The solar consumption variable has a negative but insignificant effect on poverty levels in Indonesia at the 5% significance level. This is based on the t-calculated value of -1.008541 < t-table 2.160, so H_0 is accepted. This means that although the direction of the relationship indicates that an increase in solar consumption tends to reduce poverty, the effect is not yet statistically strong. The p-value of 0.3316 > 0.05 supports this conclusion.

4. The diesel subsidy variable has a negative but insignificant effect on poverty levels in Indonesia at the 5% significance level. This is based on the t-value of -0.851100 < t-table 2.160, so H_0 is accepted. This means that diesel subsidies have not yet shown a statistically significant effect on poverty. The P-value of 0.4101 > 0.05 reinforces this conclusion.

2. Results of the Simultaneous Test (F-Test)

According to the regression results to determine simultaneous (combined) effects of the variables inflation (inf), human development index (HDI), diesel consumption (ks), and diesel subsidies (ss) on the poverty rate (kms) in Indonesia, an F-test was conducted. To obtain the F-table value, the degrees of freedom formula was used: $df = (k - 1) = (5 - 1) = 4$; $df = (n - k) = (18 - 5) = 13$. At a significance level of $\alpha = 5\%$, the F-table value for (4, 13) is 3.18. Meanwhile, based on the regression output, the calculated F-value (Fhitung) is 7.780984 and the probability value (P-value) is 0.001983. Since $F_{\text{calculated}} > F_{\text{table}}$ or $7.781 > 3.18$, we reject H_0 and accept H_a , which means that the variables of inflation, diesel consumption, diesel subsidies, and the Human Development Index (HDI) simultaneously have a significant effect on the poverty rate in Indonesia. This is further supported by the P-value of $0.001983 < 0.05$, indicating that the regression model as a whole is significant.

3. Coefficient of Determination Test (R^2)

Based on the regression results in the previous table, it was found that the adjusted R-squared value is 0.614722. This means that variations in inflation (inf), the human development index (HDI), diesel consumption (ks), and diesel subsidies (ss) can explain 61.47% of the variation in poverty rates (kms) in Indonesia, while the remaining 38.53% is influenced by other variables outside this research model. The relatively high Adjusted R^2 value indicates that the regression model has a strong ability to explain the relationship between the independent variables and the dependent variable simultaneously.

The Effect of Inflation on Poverty Rates in Indonesia

Based on the results of the partial t-test, it can be concluded that the inflation variable has a positive and significant effect on poverty rates in Indonesia. This means that the higher the inflation rate, the higher the poverty rate. This reflects that rising price pressures can reduce people's purchasing power, particularly among vulnerable groups, thereby driving an increase in poverty rates. According to the Purchasing Power Theory, inflation causes an increase in the prices of goods and services. When people's incomes—especially those of low-income groups—do not rise proportionally, their purchasing power decreases. This decline in purchasing power makes it difficult to meet basic needs, thereby driving an increase in poverty rates. The findings of this study align with the results of Permana & Pasaribu (2023), what indicate that inflation have a (positive) and significant impact on poverty in Sumatra, particularly among low-income households.

The Effect of the Human Development Index on Poverty Rates in Indonesia

According to the results of the partial test (t-test), it can be concluded that the HDI variable has a positive but insignificant effect on poverty rates in Indonesia. The positive regression coefficient of 0.875787 indicates that the HDI has a positive relationship with poverty. This means that, statistically speaking in this model, an increase in the HDI is followed by an increase in poverty, although not significantly. However, this result contradicts human development theory, which states that an increase in the HDI should reduce poverty levels through improved access to education, health care, and income. Human Development Theory states that human development is measured through three main dimensions: education, health, and standard of living. An increase in the HDI implies that the population has better access to education and health care, as well as higher income. Theoretically, this should improve the quality of life and reduce poverty levels. The findings of this study align with a study carried out by Alvia et al. (2025), which showed that the HDI has a positive but insignificant impact poverty rates in Indonesia. This means that an increase in the HDI reduces poverty rates, consistent with human development theory.

The Effect of Diesel Consumption on Poverty Rates in Indonesia

According on the findings o artrial test (t-test), it can be inferred that the variable of diesel consumption does not have a significant effect on poverty rates in Indonesia. The negative regression coefficient indicates that diesel consumption has a negative relationship with poverty. This means that, theoretically, an increase in diesel consumption can stimulate economic activity and mobility, which has the potential to reduce poverty levels. However, in this model, this effect is not yet statistically significant. Adam Smith's classical economic growth theory posits that economic activity is highly dependent on the mobility of goods and services. As a fuel for transportation and distribution, diesel plays a crucial role in facilitating trade. An increase in diesel consumption reflects rising economic activity, which theoretically can reduce poverty. These findings align with the study by Nasution & Hidayat (2023), which states that energy consumption, including diesel, has a negative impact on poverty, particularly in areas with limited transportation access. However, these results align with the findings of Wulandari & Prasetyo (2024), who showed that diesel consumption does not influence poverty because uneven distribution and usage efficiency across various regions.

The Effect of Diesel Subsidies on Poverty Rates in Indonesia

Based on the results of the partial t-test, it can be concluded that the diesel subsidy variable does not have a significant effect on poverty rates in Indonesia. The negative regression coefficient indicates that diesel subsidies have a negative relationship with poverty. This means that, theoretically, an increase in solar subsidies could help reduce poverty levels by lowering the energy cost burden on low-income households. However, in this model, that effect is not yet statistically significant. Solar subsidies often fail to reach their intended recipients. Most of the benefits are actually enjoyed by the middle-to-upper class, such as private vehicle owners or large industries, rather than poor households. Consequently, the direct impact on poverty reduction is weak. These findings align with the study by Gobel et al. (2024), which states that energy subsidies have the otential to reduce poverty, particularly in remote areas dependent on subsidized fuel. However, these results do not align with the findings of Gusfira et al. (2024), which indicate that diesel subsidies are ineffective in reducing poverty due to misdirected distribution and the industrial sector's dependence on such subsidies.

CONCLUSION

Based on the results of a study on the effects of inflation, diesel consumption, diesel subsidies, and the Human Development Index (HDI) on poverty in Indonesia, the following conclusions were drawn:

1. Inflation has a significant positive effect on poverty rates in Indonesia. This means that an increase in inflation clearly drives an increase in poverty rates.
2. The Human Development Index (HDI) has a positive but insignificant effect on poverty rates. This result contradicts theory and requires further analysis.
3. Diesel consumption have a negative yet insignificant impact on poverty rates. Although the direction of the relationship aligns with theory, its effect has not been statistically proven to be strong.
4. Diesel subsidies have a negative but insignificant effect on poverty rates. This indicates that subsidies have not yet had a strong impact on reducing poverty.

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