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The Effect of Human Development Index, Income Inequality And Percentage of Poor Population On Poverty Gap Index In 10 Sumatran Provinces

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Abstract

This study aims to examine and analyze the influence of the human development index, income inequality, and the percentage of poor people on the poverty depth index in 10 provinces on the island of Sumatra. The type of research used in this research is descriptive quantitative while the data source used in this research is secondary data from BPS. The object of this research is 10 provinces of Sumatra Island. This study uses panel data with a cross section of 10 provinces on the island of Sumatra and a time series for 6 years, starting from 2018 to 2023. The data analysis technique in this study uses the Regression Panel method with testing using Eviews 12. The results showed that the best model was Random Effect. Based on the regression results, it is known that partially the independent variable percentage of poor people has a positive and significant effect on the poverty depth index. Meanwhile, the human development index and income inequality variables have no influence on the poverty depth index. Simultaneously, the independent variables, namely the human development index, income inequality, and the percentage of poor people have a significant influence on the poverty depth index in the 10 provinces of Sumatra island with a Prob (F-statistic) value of 0.00000 <0.05.

Keywords: Poverty Gap Index; Human Development Index; Income Inequality; Panel Regression; Percentage of Poor Population

1. Introduction

Poverty is a complex and complicated phenomenon that is important to analyze because poverty alleviation is one of the goals of the Indonesian state as stated in the preamble of the 1945 Constitution, which is to promote general welfare. To see the welfare of society can be seen from the poverty rate. In measuring poverty, the concept of the ability to meet basic needs (Basic Needs Approach) is used. One of the indicators used is the Poverty Gap Index or Poverty Depth Index, which is a measure of the average expenditure gap of each poor person against the poverty line [1]. By looking at the value of the poverty gap index (P1), the government can determine how much effort is needed to lift the poor out of poverty [2]. The following is the data on the poverty gap index in the 10 provinces of Sumatra Island in 2023:

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Table 1. Poverty Gap Index in Sumatran Provinces

No	Provinsi	2023
1	Aceh	2,76
2	Bengkulu	2,14
3	South Sumatera	1,72
4	Lampung	1,64
5	North Sumatera	1,26
6	Jambi	1,19
7	Riau	1
8	Riau Islands	0,82
9	West Sumatera	0,82
10	Bangka Belitung Islands	
	Indonesia	**1,53**

Source: Statistic Indonesia, 2023

Judging from the current poverty conditions in Indonesia, poverty problems also occur in the 10 provinces of Sumatra Island. For this reason, research on the 10 provinces on the island of Sumatra is important to do because there are still 4 provinces (Aceh, Bengkulu, South Sumatra, and Lampung) that are above the average gap of poverty

The high gap of poverty is certainly influenced by several contributing factors. In [3] entitled Economic Development, there are several factors that cause poverty including uneven economic growth, and inequality in income distribution. According [4] in his book entitled Economic Development: Process, Problems, and Policy Basis. Poverty is often caused by income inequality, lack of investment in human capital, high population growth, and a less competitive market structure. The strategy to overcome poverty is to increase access and quality of education, which is reflected in an increase in the human development index. The human development index is used to measure the achievement and quality of human life in a region in terms of development formed by three factors, namely the Human Development Index [5].

The human development index is a composite index compiled from three indicators: length of life as measured by life expectancy at birth; education as measured by average years of schooling and literacy rate of the population aged 15 years and above; and standard of living as measured by per capita expenditure (PPP rupiah). The index value ranges from 0-100 [6].

In addition to the human development index, income inequality is one of the factors that influence the gap of poverty. Income inequality can hinder the reduction of poverty inequality [7]. This is because income inequality is a major problem in macroeconomics. To measure income inequality in the 10 provinces of Sumatra island can be done by using the Gini index. If the gini index is equal to zero (0), then there is a perfect income distribution, which means that each population group receives the same share of income. If the gini index equals one (1), then there is perfect income inequality, which means that only one person earns the entire income. Therefore, an increase in income inequality will have an impact on the poverty gap index. Another factor that drives poverty is the high percentage of poor people [8].

From the growth data of the percentage of poor people in 2023, Aceh is the province with the largest growth rate of the percentage of poor people, namely 14.45%, while Bangka Belitung Islands is the country with the lowest urbanization growth rate of 4.52% [9]. For this reason, this study aims to determine the partial and simultaneous effects of the variables of the human development index, income inequality, and the percentage of poor people on the poverty depth index in the 10 provinces of Sumatra island.

2. Literature Review

2.1 Poverty Theory

Poverty it self is defined as a condition of lack of welfare. In this case, people poor means those who do not have enough income to put themselves above the minimum adequate level that is adequate. Those categorized as poor may have inadequate income, inadequate education, be in poor health, feel helpless, and lack certain rights in the community [10]. Therefore, [11] mentioned that poverty is influenced by economic, labor, health, and education aspects, and education In measuring poverty, [12] uses the concept of the ability to fulfill basic needs basic needs. The concept refers to the Handbook on Poverty and Inequality published by the World bank. The population will be categorized as poor if it has an average monthly per capita per capita

expenditure per month below the poverty line. The Poverty Line reflects the rupiah value of the minimum expenditure needed by an individual to fulfill his or her basic needs for a month [13].

2.2 The Theory Of The Poverty Cycle

Nurkse (1961) in [14] explains the phenomenon of the poverty trap as an issue faced by the poor in developing countries. Low real income leads to low savings and capital investment, which results in low productivity and ultimately weakens income levels. This cyclical process makes it difficult for the poor to escape poverty.

2.3 Poverty Gap Index (P1)

Poverty Gap Index (P1) or poverty depth index is defined as a measure of the gap in the average expenditure of each poor person against the poverty line. This index can serve as a comparison between regions, where the higher the P1 value of a region, the more severe the poverty depth index [15]. The interpretation of this index is that the higher the P1 value of a region, the further the average expenditure of the region's population is from the poverty line. From the poverty line, so this measure can be used to determine if the poor are becoming poorer. By looking at the value of the poverty depth index (P1), the government can determine how much effort is needed to lift the poor out of poverty. The poverty depth index (P1) is defined as a measure of the gap between the average expenditure of each poor person and the poverty line.

2.4 Human Development Index

The human development index is a composite index used to measure a country's achievements, which includes three basic factors: 1) life expectancy measured by average life expectancy, 2) education measured by average level and literacy rate of population aged 15 years and above and 3) standard of living measured by per capita consumption. The value of the Human Development Index ranges from 0 to 100.

2.5 Income Inequality

Uneven development between regions leads to income inequality between regions [16]. Economic inequality is not only influenced by one factor, but many interdependent factors. These factors are geographical characteristics, the status of natural resources, human resources, and the economy of a region. Therefore, differences in the resource potential of each region in Indonesia greatly affect income inequality. The relationship between inequality and poverty is pragmatic, income inequality exacerbates poverty or inequality is a form of poverty [17].

2.6 Percentage of Poor Population

The percentage of poor people is the percentage of poor people who are below the poverty line. A high percentage of poor people indicates that the poverty rate in an area is also high [18].

3. Research Method

The type of research used is quantitative research. Research quantitative aims to show the development of research hypotheses by using research tools to collect data. Based on the type of data used in this research, namely secondary data. The data used are data on the level of income inequality, unemployment, and urbanization from 10 provinces, namely Aceh, North Sumatra, West Sumatra, Jambi, Riau, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands, and Riau Islands. The data used in this study was collected from calculations by BPS from 2018-2023.

The data analysis technique used is the Panel Regression. Panel Regression aims to analyze the effect of independent variables on the dependent variable, both partially and simultaneously. The general Panel Regression model used in this study is:

$$Y_{it} = \beta_0 + \beta_1 X1_{it} + \beta_2 X2_{it} + \beta_3 X3_{it} + e_{it}$$

4. Results and Discussion

4.1 Descriptive Statistics

Descriptive statistics are a description of the data that can be seen from the average value, standard deviation, maximum, and minimum on each of the variables studied. The dependent variable in this study is the Poverty Gap Index and the independent variables are Human Development Index, Gini Ratio, and Percentage of Poor Population. The results are as follows:

Table 2. Descriptive Analysis Results

Descriptive Analysis	Poverty Gap Index	Human Development Index	Income Inequality	Percentage of Poor Population
Mean	1.514500	73.11433	0.314100	9.520667
Maximum	2.950000	79.08000	0.362000	15.97000
Minimum	0.430000	69.02000	0.194000	4.450000
Std. Dev	0.695909	2.101719	0.030273	3.692301
Number of Observations	60	60	60	60

Source: Output Eviews 12

Based on the table above:

1. From the table above, the distribution of poverty gap index variable data shows a minimum value of 0.43 index which is Bangka Belitung Islands figure in 2022, a maximum value of 2.95 index which is Aceh figure in 2021, with an average value of 1.51 index and a standard deviation of 0.69 index. The results show that the average poverty gap index in each province of Sumatera Island is relatively small by looking at the proximity of the average and minimum values. While the variance of the data is relatively small by looking at the standard deviation value which is smaller than the average value.
2. The table above also shows the distribution for the human development index variable. The data distribution shows a minimum value of 69.02 index which is Lampung figure in 2018, a maximum value of 79.08 index which is the Riau Islands figure in 2022, with an average value of 73.11index and a standard deviation of 2.10 index. The results show that the average human development index in each province of Sumatera Island is relatively small by lookingat the proximity of the mean and minimum values. While the variance of the data is relatively small by looking at the standard deviation value which is smaller than the mean value.
3. The data distribution of the income inequality variable shows a minimum value of 0.194 index which is the number belonging to West Sumatra in 2023, a maximum value of 0.362 index which is the number belonging to Bengkulu in 2018, with an average value of 0.314 index and a standard deviation of 0.030 index. The results show that the average income inequality in each province of Sumatera Island is relatively large by looking at the proximity of the average and maximum values. Meanwhile, the data variance is relatively small by looking at the standard deviation value which is smaller than the average value.
4. The Percentage of Poor Population variable shows a minimum value of 4.45% which is the number belonging to Bangka Belitung Islands in 2022, a maximum value of 15.97% which is the number belonging to Aceh in 2018, with an average value of 9.52%, and a standard deviation of 13.69%. The results show that the average percentage of poor population in each province of Sumatera Island is relatively large by looking at the proximity of the average and maximum values. While the variance of the data is relatively small by looking at the standard deviation value which is smaller than the average value.

4.2 Chow Test

In this study, the approaches used to select the ideal model used for panel data regression between the Common Effect Model (CEM) and Fixed Effect Model (FEM) approaches.The following are the results of the chow test:

Table 3. Chow Test

Effcts Test	**Statistic**	**d. f**	**Prob.**
Cross-section F	4.624015	(9,47)	0.0002
Cross-section Chi-square	38.049984	9	0.0000

Source: Output Eviews 12

Based on table 3, obtained Cross-section F of 0.0002 < 0.05, it means that fixed effect is a better method than common effect.

4.3 Hausmant Test

The approaches used to select the ideal model used for panel data regression between the Fixed Effect Model (FEM) or Random Effect Model (REM) approaches.The results of the hausmant test can be seen as follows:

Table 4. Chow Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d. f	Prob.
Cross-section random	0.455034	3	0.9089

Source: Output Eviews 12

Based on table 4, obtained Cross-section random of 0.9854 > 0.05, it means that random effect is a better method than fixed effect.

4.4 Lagrage Multiplier (LM) Test

The cointegration test is used to see whether or not in each dependent and independent there is cointegration in the long run. The following are the results of the cointegration test with Kao's test:

Table 5. Lagrarage Multiplier (LM) Test

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	18.90118	2.580964	21.48214
	(0.0000)	(0.1082)	(0.0000)

Source: Output Eviews 12

It can be seen that the Breusch-Pagan probabiIity value is 0.0000 and the value is smaller than the significance level α = 5% (0.0000 <0.05), so the Fixed Effect modeI is rejected. Thus, a good modeI is used, namely the Random Effect Model (REM). Based on the results of the Chow Test, Hausman Test, and LM Test, it can be determined that random effect is the best model in research and a suitable way to conduct regression tests

4.5 Regression Panel Model Estimation Results

Below are the results of testing the Regression Panel for each independent variable on the dependent variable:

Table 6. Regression Panel Test

Variable	coefficient	Std. Error	t-Statistic	Prob.
C	-1.275473	1.215454	-1.049380	0.2985
IPM	0.018141	0.014447	1.255679	0.2144
KP	-1.169657	0.943303	-1.239959	0.2202
PPM	0.192319	0.013711	14.02634	0.0000
Effect Spesification				
			S.D	Rho
Cross-section random			0.138078	0.4919
Idiosyncratic random			0.140338	0.5081
Weighted Statistics				
R-squared	0.799317	Mean dependent var		0.580428
Adjusted R-squared	0.788566	S.D. dependent var		0.298437
S.E. of regression	0.137227	Sum squared resid		1.054554
F-statistic	74.34901	Durbin-Watson stat		1.820009
Prob(F-statistic)	0.000000			

Source: Output Eviews 12

Based on table 5 the general form of the estimation model obtained is as follows:

$$POVERTY_{it} = \beta_0 + \beta_1 HDI_{it} + \beta_2 INEQ_{it} + \beta_3 PPP_{it} + e_{it}$$

By entering the parameter coefficient of each variable contained in Table 4.4, the ARDL (1,1,1,1) estimation model is as follows:

$$POVERTY_{10,6} = -1.27547310893 + 0.0181408330742*HDI_{10.6} - 1.16965697138*INEQ_{10.6} + 0.19231924732*PPP_{10.6}$$

Based on the table above:

1. If the independent variable (free) is considered constant, the value of the coefficient c in the 10 provinces of the island of Sumatra is -1.27547310893. Is the value of the dependent variable (IKK) when not influenced by other variables. This means that the Poverty gap index will decrease by 1.27 indices if the HDI, KP, and PPM variables are 0.
2. The coefficient value on the HDI variable is 0.0181408330742. This shows that if the HDI value increases by 1 index, it will increase the depth of poverty by 0.018 index, assuming other variables are held constant. Because the relationship between Poverty gap index and HDI is positive, when HDI increases, Poverty gap index will increase. Conversely, if the value of other variables is constant and the HDI variable decreases by 1 index, the Poverty gap index variable will decrease by 0.018 index.
3. The coefficient value for the INEQ variable is -1.16965697138. This shows that if the value of INEQ increases by 1 index, it will decrease the depth of Poverty gap index by 1.169 indexes, assuming other variables are held constant. Because the relationship between INEQ and INEQ is negative, when INEQ increases, INEQ will decrease. Likewise, if the value of other variables is constant and the KP variable decreases by 1 index, the Poverty gap index variable will increase by 1,169 indexes.
4. The coefficient value for the PPP variable is 0.19231924732. This shows that if the PPM value increases by 1%, it will increase the depth of poverty by 0.19%, assuming other variables are held constant. Because the relationship between Poverty gap index and PPP is positive, when PPP increases, Poverty gap index will increase. Conversely, if the value of other variables is constant and the PPP variable decreases by 1%, the Poverty gap index variable will decrease by 0.19%.

4.6 T-Statistic Test

The t-statistic regression panel is as follows:

Table 7. T Test Regression Panel Output

Variable	coefficient	Std. Error	t-Statistic	Prob.
C	-1.275473	1.215454	-1.049380	0.2985
HDI	0.018141	0.014447	1.255679	0.2144
INEQ	-1.169657	0.943303	-1.239959	0.2202
PPP	0.192319	0.013711	14.02634	0.0000

Source: Output Eviews 12

From table 7 above, it can be explained that the effect of the independent variable on the dependent variable partially is as follows:

1. T-Statistic test results of HDI variable obtained t count of 1.255679 < t table 2.26216 and the probability value is 0.2144 > 0.05, meaning that HDI has no influence on Poverty gap index in 10 provinces of Sumatra Island.
2. The results of the T-Statistic test of the income equality variable obtained a t count of -1.239959 < t table 2.26216 and a probability value of 0.2202 > 0.05, meaning that income equality has no influence on Poverty gap index in 10 provinces of Sumatra Island.
3. The results of the T-Statistic test of the PPP variable obtained a t count of 14.02634> t table 2.26216 and a probability value of 0.0000 <0.05, meaning that PPP has a significant effect on Poverty gap index in 10 provinces of Sumatra Island.

Table 8. F Test Regression Panel Output

F-statistic	74.34901
Prob(F-statistic)	0.000000

Source: Output Eviews 12

The results of the F test analysis obtained the F value of 74.349011> F table of 2.09 and the probability value of 0.000000 <0.05, which means that the HDI variable (X1), income inequality (X2), and the percentage of population (X3), have a significant effect simultaneously on poverty in 10 Sumatra Island provinces.

Table 9. R-squared Test Regression Panel Output

R-squared	0.799317
Adjusted R-squared	0.788566

Source: Output Eviews 12

R-squared Test Regression Panel results shows a value of 0.799317. The coefficient of determination shows that the independent variables consisting of the Human Development Index, Income Inequality, and the Percentage of Poor People have the ability to explain the dependent variable, namely the Poverty Depth Index in the 10 Provinces of Sumatra Island by 79.93 percent. The remaining 20.07 percent is influenced by other factors.

Table 10. R-squared Test in 10 Sumatran Provinces

No	Province	R-Squared	Adjusted R-Squared
1	Aceh	0,450721	-0,373196
2	North Sumatra	0,746957	0,367393
3	West Sumatra	0,471118	-0,322205
4	Riau	0,103609	-1,240977
5	Jambi	0,791865	0,479663
6	South Sumatra	0,975207	0,938016
7	Bengkulu	0,673378	0,183446
8	Lampung	0,695844	0,239611
9	Bangka Belitung Islands	0,238969	-0,902677
10	Riau Islands	0,746957	0,367393

Source: Output Eviews 12

Based on table 10, Aceh province has an R2 value of 0.45072. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in Aceh province by 45.07% and the remaining 54.93% is influenced by other factors.

In North Sumatra province, the R2 value is 0.746957. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in North Sumatra Province by 74.69% and the remaining 25.31% is influenced by other factors.

In West Sumatra province, the R2 value is 0.471118. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in West Sumatra Province by 47.11% and the remaining 52.89% is influenced by other factors.

In Riau province, the R2 value is 0.103609. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in Riau Province, by 10.36% and the remaining 89.64% is influenced by other factors.

In Jambi province, the R2 value is 0.791865. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in Jambi Province by 79.18% and the remaining 20.82% is influenced by other factors.

In South Sumatra province, the R2 value is 0.975207. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in South Sumatra province by 97.52% and the remaining 2.48% is influenced by other factors.

In Bengkulu province, the R2 value is 0.673378. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in Bengkulu province, by 67.33% and the remaining 32.67% is influenced by other factors.

In Lampung province, the R2 value is 0.695844. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in Lampung province, by 69.58% and the remaining 30.42% is influenced by other factors.

In Bangka Belitung Islands province, the R2 value is 0.238969. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in Bangka Belitung province, by 23.89% and the remaining 76.11% is influenced by other factors.

In the Riau Islands province, the R2 value is 0.746957. The coefficient of determination shows that the independent variables consisting of the human development index, income inequality, and the percentage of poor people have the ability to explain the dependent variable, namely the poverty gap index in the Riau Islands province by 74.69% and the remaining 25.31% is influenced by other factors.

4.7 Discussion

1. The effect of Human Development Index (HDI) on Poverty Gap Index

The Human Development Index (HDI) plays a very important role in reducing poverty. This index is also an indicator that can be used to measure the quality of human development, both in terms of its impact on the physical condition of the community (health and welfare) and in terms of its non-material condition. Affecting the physical condition of humans, it is expressed in longevity and purchasing power, while in non-material conditions it is reflected in community education. Therefore, it is expected that a region with a high HDI will also provide a high quality of life for its people, or in other words, if the HDI is high, the poverty rate will certainly be weak [19].

The discussion in Chapter II states that the Human Development Index (HDI) can have a negative effect on the poverty depth index which, in turn, increases economic growth, promotes equality and reduces poverty. Human capital theory explains that when the education level of a population increases, the ability, knowledge and skills of individuals will also increase. This will have a positive impact on various aspects of life, such as improved health, participation in economic activities, and the ability to contribute to community development [20]. However, in the results of this study, HDI has a positive and not insignificant relationship direction with Poverty Gap Index.

The results of the t test for the Human Development Index (HDI) variable in the 10 provinces of Sumatra Island, it was found that the calculated t value was 1.255679, the value proved to be smaller than the t table value of 2.26216 and the coefficient value was 0.018140 and the probability was 0.2144 > 0.05, meaning that HDI had no effect on Poverty Gap Index, and rejected the hypothesis put forward at the beginning of the study. The absence of a direct relationship between HDI and Poverty Gap Index is because provinces with high HDI have good access to education and income distribution, but not followed by good access to health.We can see this in appendix 1 and 2, showing that the Riau Islands province has a high HDI, but in terms of health, Lampung province, which has a low HDI, has better access to health. The results of this study are in line with research conducted by [21]. Which states that poverty has no significant effect on HDI. This is different from previous research, according to research by [22], [23], and [24] HDI has a significant influence on the poverty gap index.

2. The Effect of Income Inequality (IE) on Poverty Gap Index

In the discussion in Chapter II, it was explained that income inequality can have a positive effect on the poverty depth index. However, in this study, income inequality has a negative effect on the poverty depth index [22]. Although, according to Kuznets' theory in [25] in the early stages of development, income distribution and welfare tend to worsen. But after that, the income distribution will improve as per capita income increases. Different levels of poverty gap index between regions indicate differences in expenditure between regions. The Gini Index or Gini Ratio is an indicator to measure the level of inequality in population distribution [26]. Research results from Oishi and Kesebir (2015) in [27] reveal that high economic growth in a region cannot improve the welfare of the people in the area due to income inequality.

The results of the t test for the Income Inequality variable in the 10 Provinces of Sumatra Island, it was found that the t value was -1.239959, the value proved to be smaller than the t table value of 2.26216 and the coefficient value was-1.16965 and the probability was 0.2202> 0.05, meaning that Income Inequality had no effect on the poverty gap index, and rejected the hypothesis put forward at the beginning of the study with the assumption that there was no direct relationship between Income Inequality and poverty gap index. This is because although the Gini index measures income inequality, changes in this index are not always directly reflected in the depth of poverty. In some areas, inequality may be high but the poorest groups still have access to basic needs, so the impact on the poverty gap index is not always significant. This can be seen in appendix 1, which shows that Bengkulu province in 2018 had a high gini index of 3.68 but in the same year had a better poverty gap index than Aceh province.

In line with the research of [28] in their research revealed that Income Inequality has no influence on the Poverty Gap Index. Their research revealed that Income Inequality has no influence on the Poverty gap Index. This is contrary to research conducted by [29] which states that Income Inequality has a positive influence on Poverty.

3. The Effect of the Percentage of Poor Population on the Poverty Gap Index

The results of the t test for the variable Percentage of Poor Population in 10 Provinces of Sumatra Island, it was found that the t value was 14.02634 > t table 2.26216 and the probability value was 0.0000 <0.05, meaning that PPM has a significant influence

on Poverty Gap Index in 10 Provinces of Sumatra Island. This is in accordance with the hypothesis put forward at the beginning of the study.

In the discussion in Chapter II, it was explained that the percentage of poor people has a positive and significant influence on the poverty depth index. The percentage of poor people (Headcount Index/P0) is the percentage of poor people who are below the poverty line. A high percentage of poor people indicates that the poverty rate in an area is also high [30].

This is in line with the research conducted by [31] entitled "Modeling the Poverty Gap Index in Districts / Cities of Yogyakarta Province in 2017-2022 with Panel Data Regression" The results of this research explain that there is a positive relationship between the percentage of poor people and the poverty gap index, if the percentage of poor people rises, the poverty gap index will increase, and vice versa, if the percentage of poor people then the poverty gap index falls.

Meanwhile, the percentage of poor people has a strong influence on the depth of poverty in a region. For this reason, special attention is needed so that the percentage of poor people can decrease so that the depth of poverty can also decrease. Simultaneous Effect of Human Development Index (HDI), Income Inequality (IE), and Percentage of Poor People (PPP) Analysis on Poverty Gap Index

4. Simultaneuous Effect Of Human Development Index (HDI), Income Inequality (IE), and Percentage of Poor People on Poverty Depth Index

From the test results that have been analyzed, the results of the F test for the Human Development Index, Income Inequality and Percentage of Poor People variables in the period 2018 to 2023 simultaneously (simultaneously) have a significant influence on the Poverty Gap Index. This is evidenced by the calculated F value of 73.35271> F table of 2.09 and the probability value is 0.000000 <0.05. This means that all independent variables (HDI (X1), income inequality (X2), and population percentage (X3)) simultaneously have an influence on the dependent variable (poverty gap index) in the 10 provinces of Sumatra Island. With this, the hypothesis put forward at the beginning of this study is accepted.

5. Conclusions

Poverty is an important problem in developing countries like Indonesia, especially in the 10 provinces of Sumatra Island. Therefore, it is important to be researched appropriately for efforts to overcome it. Based on the results of research on the effect of human development index, income inequality, and the percentage of poor people on the gap of poverty in the 10 provinces of Sumatra Island using a random effect model. Thus, based on the chosen model, the human development index and income inequality are not proven to have a significant influence on the depth of poverty. In contrast, the percentage of poor people has a significant and positive influence on the gap of poverty in the 10 provinces of Sumatra Island. Simultaneously, the human development index, income inequality, and the percentage of poor people have a significant influence on the depth of poverty in the 10 provinces of Sumatra Island.

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