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Poverty in the Palu Koro Fault Hazard Area, Central Sulawesi and its Influencing Factors.

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ABSTRACT

Disaster areas are important to study, especially the level of poverty and the factors that influence it, especially the Gross Regional Domestic Product factor, Income Inequality of people including the Population and the Length people took the study in the school within a period of 10 years, namely from 2014-2023. Poverty has always been a benchmark for the success of development in a region which is always associated with and has implications for low levels of education, health, physical security and reduces the quality of life of community. Government efforts continue to be made to reduce poverty levels, Of course studies from various institutions are needed as input for policy makers in the Region. The use of quantitative research methods was chosen by the author to analyze the problems in this study using multiple regression with time series data from three regions, namely Donggala Regency, Palu City and Sigi Regency. The data used in this study are secondary data from 2014-2023 obtained from the official publication of the Central Statistics Agency (BPS). The results of the study show that the Gross Regional Domestic Product (GRDP) in the Palu Koro fault disaster area does not have a significant effect on Poverty, while Income Inequality has a negative and significant effect on Poverty, as well as the Population has a negative and significant effect on Poverty while the variable of the Length people took the study in the school the area has a significant and positive effect on the increase in the Number of Poverty from 2018 to 2023.

Keywords: Gini Ratio; GRDP;Population and Length of Schooling; Poverty

INTRODUCTION

A global issue that has always been at the centre of government and non-government studies is the issue of economic growth (GDP). The United Nations organisation through the Sustainable Development Goals (SDGs) programme has an agenda in achieving economic growth goals. The UN designed the SDGs by involving all development observers from government, non-government, academics and civil organisations. According to Iskandar 2013, economic growth is the continuous increase in national income and per capita income within a certain time. Meanwhile, according to A. Raharjo, 2013, economic growth can also be interpreted as an event where the amount of production and output increases as measured by Gross Domestic Product (GDP) or Gross Domestic Regional Production (GRDP) in a particular region.

The economic growth of a country always gets obstacles. Poverty is one of these obstacles and is a factor that influences economic growth. Usually the amount of poverty and economic growth has an inverse relationship where if a country's GDP increases, it will reduce its poverty rate.

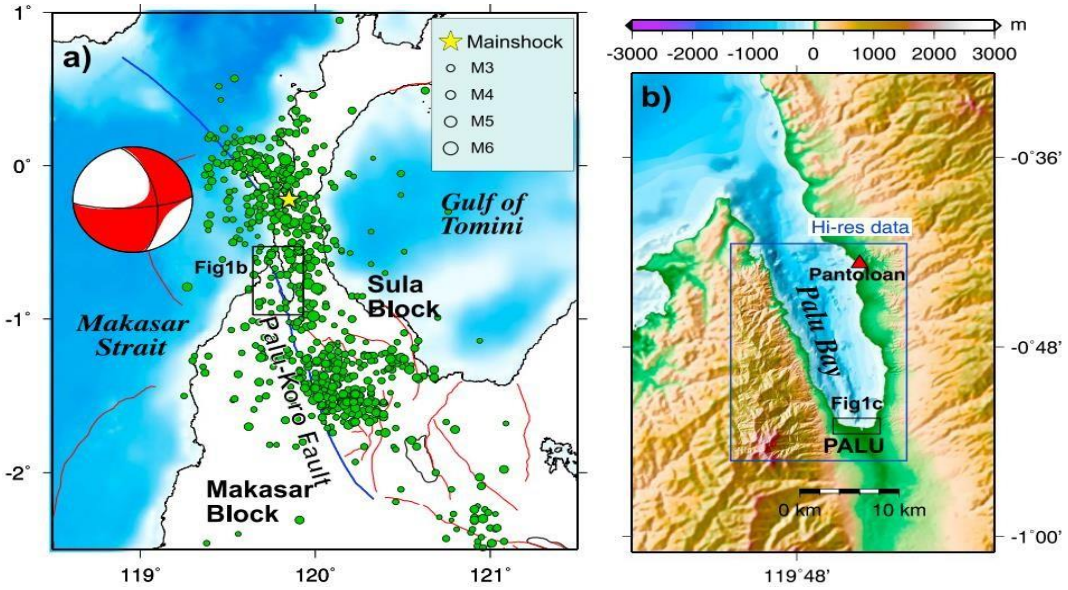
According to BPS (2023), a person is said to be poor if their income is below the poverty line. BPS measures poverty using the concept of the community's ability to fulfil basic needs (basic needs approach). According to this method, poverty is defined as the economic inability of the community to fulfil basic food needs rather than food consumption measured in terms of expenditure. One of the regions on the island of Sulawesi, namely the Central Sulawesi Province, is also plagued by poverty problems and is still relatively high in poverty because it is in second place with a poor population of 388.36 thousand people in 2022. In 2021, the percentage of the poverty rate in Central Sulawesi Province was 12.33 per cent. Previously there was a decrease from 13.00 per cent. Despite the decline in the poverty rate, the province is still higher than the national poverty rate of 9.36 per cent. Poverty is a complex problem for all provinces and is still difficult to solve in almost every region in Indonesia. Many alleviation policies have been carried out by the government but are still constrained until now.

Central Sulawesi Province with 13 (thirteen) districts and 1 (one) city. 2 (two) districts, namely Donggala Regency and 1 (one) city, are areas that have a high level of seismicity in Indonesia related to active fault activity. According to Daryono 2011, Palu City and its surrounding area is one of the seismically active areas in Indonesia. The high level of seismic activity in this region cannot be separated from its location in the collision zone of the world's three main tectonic plates, namely Indo-Australia, Eurasia and the Pacific. The convergence of these three plates and their relative collision has made the Central Sulawesi region and its surroundings prone to natural disasters.

Furthermore, the earthquake also generated a large tsunami along the coast of Palu Bay, a narrow bay ~30 km long and ~7 km wide (Figure 1.b). According to Gusman et al. 2019 that Indonesia's National Disaster Management Agency (BNPB) has reported that 4,340 people have been killed and 10,679 injured by a combination of tsunamis, landslides, liquefaction, and collapsed buildings following the earthquake, and as many as 667 people are missing.

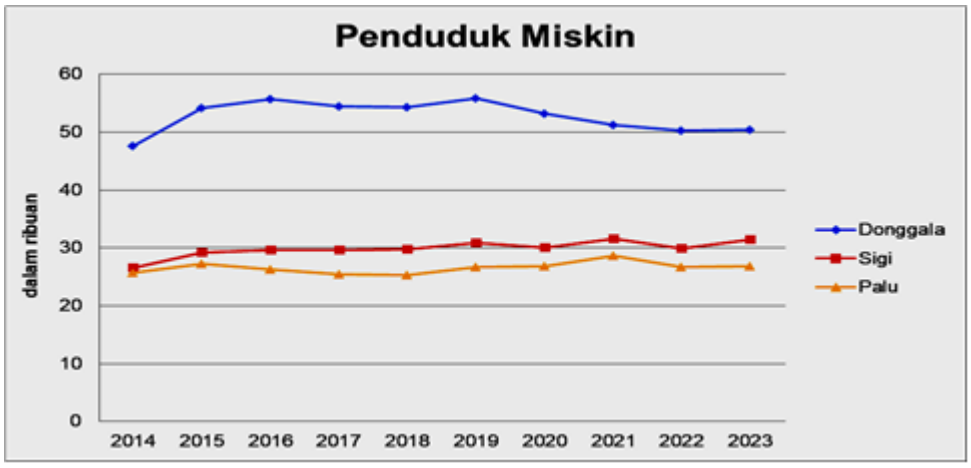
This active seismic area is important to conduct a poverty study so that its development can be monitored, especially looking at the variables that influence it, including the number of people, education factors, the amount of Gross Regional Domestic Product and community income inequality in 3 (three) regions, namely Donggala Regency, Sigi Regency and Palu City. The following is a description of the poverty rate in the period 2014 to 2023 in 3 (three) regions.

Map of the mainshock and aftershock locations and topography of the bathymetry grid used in the tsunami numerical simulation



Source: Gusman et al. (2019)

Comparison Chart of Poverty Levels in Donggala Kab, Sigi Regency and Palu City



Source: BPS data of Central Sulawesi Province in 2024, reprocessed

If you look at the table below, the poverty rate of Donggala Regency is higher than that of Sigi Regency and Palu City, which is 55.83 million people in 2019 while the lowest poverty rate in 2019 of 25.26 million people occurred in Palu City and even overall showed an upward trend over the last 10 (ten) years so that in this study it is necessary to examine the factors that influence the poverty rate in disaster-prone areas in these 3 (three) regions.

Based on the background description above, the purpose of this study is to analyse the extent to which the influence of Gross Regional Domestic Product (GRDP), community income inequality, population and years of schooling have an impact on poverty in Central Sulawesi Province in 2018-2022, especially in the Palu Koro Fault disaster-prone area.

METODE

This research adopts a quantitative approach, emphasizing the description of statistical calculations derived from data analysis. Quantitative research is instrumental in characterizing and examining social phenomena, particularly in disaster-prone areas. In this study, the focus is on assessing the impact of Gross Regional Domestic Product (GRDP), income inequality, population, and years of schooling on poverty levels in Central Sulawesi Province, with a specific emphasis on the Palu Koro Fault Hazard Area. The data collection process employs the documentation method, utilizing time series data obtained online through the Central Sulawesi Statistics Agency (BPS) website and processed to align with the research objectives.

The analysis employs a quantitative methodology for time series data, with SPSS for Windows Release 27.0 serving as the primary tool for evaluating how the independent variables influence the dependent variable. The analytical process begins with three classical assumption tests: normality, heteroscedasticity, and autocorrelation. Following these, hypothesis testing is conducted using the T test, F test, and Coefficient of

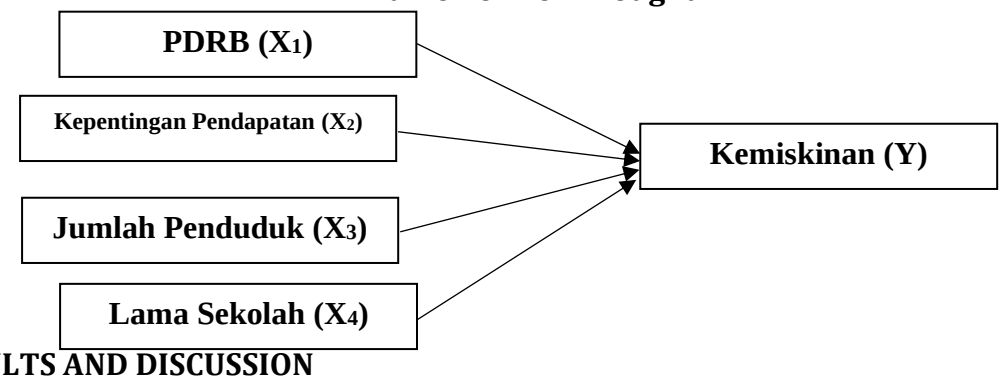
Determination test. These steps ensure the reliability and validity of the multiple linear regression models used in this study.

Hypothesis Conceptual Framework

There are several hypotheses that are set in this study as follows:

1. Ho: GRDP in disaster-prone areas has no significant effect on poverty.
   Ha: GRDP in disaster-prone areas has a significant effect on poverty
2. Ho : Income inequality in disaster-prone areas does not have a significant effect on poverty.
   Ha : Income inequality in disaster-prone areas has a significant effect on poverty.
3. Ho : The population of disaster-prone areas has no significant effect on poverty.
   Ha : The population of disaster-prone areas has a significant effect on poverty.
4. Ho : Years of schooling does not have a significant effect on poverty.
   Ha : Years of schooling has a significant effect on poverty.

Framework of Thought



RESULTS AND DISCUSSION

Descriptive Statistics Testing

Descriptive statistical analysis is intended to describe the research variables by looking at the amount of data, maximum value, minimum value, average value, and standard deviation.

Table 3. Descriptive Statistics Test Results

Statistics

		Y	X4	X3	X2	X1
N	Valid	30	30	30	30	30
	Missing	0	0	0	0	0
Mean		36.3580	308.0197	9.0783	.3124	9760976.963
Std. Deviation		11.96422	56.80796	1.53951	.04197	4177576.031
Minimum		25.26	226.88	7.80	.24	4859733.80
Maximum		55.83	392.51	11.74	.43	17941401.10

Source: Data Processing Results (2024)

Based on the data above, it can be seen that the variable Poverty in Natural Disaster Areas (Y) has a mean of 36.3580, a standard deviation of 11.96422, a minimum value of 25.26 and a maximum value of 55.83. The GRDP variable (X1) has a mean of 9760976.963, a standard deviation of 4177576.031, a minimum value of 4859733.80 and a maximum value of 17941401.10. The Income Inequality variable (X2) has a mean of 0.3124, a standard deviation of 0.04197, a minimum value of 0.24 and a maximum value of 0.43. The Total Population variable (X3) has a mean of 9.0783, a standard deviation of 1.53951, a minimum value of 7.80 and a maximum value of 11.74. The Length of Schooling

Variable (X4) has a mean of 308.0197, a standard deviation of 56.80796, a minimum value of 226.88 and a maximum value of 392.51.

Classical Assumption Testing

Asumsi Normalitas

Table 4. Normalisation Test Results

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			30
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		6.15204089
Most Extreme Differences	Absolute		.095
	Positive		.095
	Negative		-.086
Test Statistic			.095
Asymp. Sig. (2-tailed)[c]			.200[d]
Monte Carlo Sig. (2-tailed)[e]	Sig.		.686
	99% Confidence Interval	Lower Bound	.674
		Upper Bound	.698

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

e. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

Source: Data Processing Results (2024)

The normality test is carried out to test the residual variable whether it is normally distributed or not if it is used in the regression model (Ghozali, 2016). In this study, the normality test used the Kolmogorov-Smirnov (K-S) test. In the Kolmogorov Smirnov (K-S) test, residuals are said to be normally distributed if the significance of the variable is greater than 0.05. The results of this normality test are presented in table 4.

Based on the normality test results above, the Asymp. Sig (2-tailed) value obtained from the Kolmogorov Smirnov (K-S) test is 0.200. This shows that the level of significance obtained in this test is greater than 0.05 (0.200>0.05) so it can be concluded that the residuals are normally distributed.

Asumsi Heteroskedastisitas

The use of the heteroscedasticity test to test whether the regression model occurs inequality of variance from the residuals of one observation to another. In this study, researchers used the Glejser test to see the significance value. If the significance value is greater than the 5% confidence level, heteroscedasticity can be said not to occur.

Table 5. Heteroscedasticity Test Results

Variabel	Sig	Description
PDRB (X1)	.804	heteroscedasticity does not occur
Income Inequality (X2)	.210	heteroscedasticity does not occur
Total Population (X3)	.124	heteroscedasticity does not occur
Years of Schooling (X4)	.376	heteroscedasticity does not occur

Source: Data Processing Results (2024)

Based on the results of the heteroscedasticity test above, all independent variables are declared not to occur heteroscedasticity because the significance value of all variables is greater than 0.05.

Autocorrelation Assumption

Furthermore, the autocorrelation test is carried out again to determine whether or not there is a deviation from the classic assumption of autocorrelation or correlation that occurs between residuals at the time of other observations in the regression model. In this study, the run-test test as an autocorrelation test tool with the condition that if the significance value is greater than the 5% confidence level, it is concluded that autocorrelation does not occur. The results of this autocorrelation test can be seen in the following table:

Table 6. Autocorrelation Test Results

Runs Test

	Unstandardized Residual
Test Value[a]	-.00464
Cases < Test Value	15
Cases >= Test Value	15
Total Cases	30
Number of Runs	10
Z	-2.044
Asymp. Sig. (2-tailed)	.051

a. Median

Source: Data Processing Results (2024)

The Run-test test results above show an Asymp. Sig (2-tailed) value of 0.051. This shows that the level of significance obtained is greater than 0.05 (0.051>0.05) so it can be concluded that autocorrelation does not occur in this study.

Hypothesis testing

Multiple Linear Regression Testing

The multiple linear regression model is the author's choice to analyse the data used in this study. This analysis is used to determine the effect between two or more independent variables and the dependent variable. Calculations on the multiple linear regression model were carried out using the SPSS for Windows Release 27.0 programme. with the results of the analysis obtained as follows:

Table 7. Regresi Linear Berganda Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	74.630	31.840		2.344	.027
	X1	-2.003E-6	.000	-.699	-1.028	.314
	X2	-145.243	33.818	-.510	-4.295	<,001
	X3	-6.515	2.132	-.838	-3.056	.005
	X4	.279	.106	1.323	2.623	.015

a. Dependent Variable: Y

Source: Data Processing Results (2024)

From the results of the multiple linear regression test, it is continued by making a regression equation, namely:

$$\mathbf{Y = 74.630 - 2.003X1 - 145.243X2 - 6.515X3 + 0.279X4 + e}$$

The formulation of the regression equation above can be used to analyse the effect of each variable of GRDP (X1), Income Inequality (X2), Population (X3) and Years of schooling (X4) on Poverty in Natural Disaster Prone Areas (Y) with the following explanation:

1) 74.630 as a constant value so that it can be concluded if GRDP (X1), Income Inequality (X2), Population (X3) and Years of Schooling (X4) are 0 then Poverty in Natural Disaster Prone Areas (Y) is 76.630.
2) GRDP regression coefficient (X1) with a value of -2.003, this means that if GRDP (X1) increases by one unit, it will reduce the value of Poverty in Natural Disaster Prone Areas (Y) by 2.003, assuming other variables remain constant.
3) The regression coefficient of Income Inequality (X2) with a value of -145.243 indicates that if Income Inequality (X2) increases by one unit, it will reduce the value of Poverty in Natural Disaster Prone Areas (Y) by 145.243, assuming other variables remain constant.
4) The regression coefficient of Total Population (X3) with a value of -6.515, this shows that if Total Population (X3) increases by one unit, it will reduce the value of Poverty in Natural Disaster Prone Areas (Y) by 6.515, assuming other variables remain constant.
5) The regression coefficient of Years of Schooling (X4) is 0.279, this indicates that if Years of Schooling (X4) increases by one unit, it will increase the value of Poverty in Natural Disaster Prone Areas (Y) by 0.279 with the assumption that other variables remain constant.

Partial T Test

The partial T test is usually called an individual significant test. This test illustrates how far the influence of variables individually on the independent variable in other words that the T test is used to determine whether there is an influence of each independent variable (independent) on the dependent variable. The criteria for accepting and rejecting the hypothesis can be seen from the significance level is 0.05. If the significance level is less than 0.05 (<0.05) then the proposed hypothesis can be accepted, while if the significance level is more than 0.05 (>0.05) then the hypothesis is rejected. The following results of the T statistical test can be seen from the table below:

Table 8. T Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	74.630	31.840		2.344	.027
	X1	-2.003E-6	.000	-.699	-1.028	.314
	X2	-145.243	33.818	-.510	-4.295	<,001
	X3	-6.515	2.132	-.838	-3.056	.005
	X4	.279	.106	1.323	2.623	.015

a. Dependent Variable: Y

Source: Data Processing Results (2024)

From the T test table above, it can be explained as follows:

1) Partial test results with a significant value of GRDP (X1) is 0.314 which is greater than 0.05, it is concluded that Ho is accepted, meaning that GRDP (X1) has no significant effect on Poverty in Natural Disaster Prone Areas (Y).
2) Partial test results with a significant value of Income Inequality (X2) is 0.001 which is smaller than 0.05, so Ho is rejected, it can be concluded that the variable Income Inequality (X2) has a negative and significant effect on Poverty in Natural Disaster Prone Areas (Y). This means that the higher the income inequality, the lower the number of poor people in Natural Disaster Prone Areas.
3) Partial test results with a significant value of Population (X3) of 0.005 smaller than 0.05, it can be concluded that Ho is rejected, which means that the variable Population (X3) has a negative and significant effect on Poverty in Natural Disaster Prone Areas (Y). This means that the increasing population will reduce the number of poor people in Natural Disaster Prone Areas.
4) Partial test results with a significant value of Years of Schooling (X4) is 0.015 smaller than 0.05, so Ho is rejected and it can be concluded that the Years of People in School (X4) has a positive and significant effect on Poverty in Natural Disaster Prone Areas (Y). This means that the more the number of people who go to school increases, the more the number of people who go to school increases.

Simultaneous F-testing

The F significance test is a test that shows whether all independent variables (independent) intended in the statistical model simultaneously affect the dependent variable. The F test is used to test whether the four independent variables simultaneously affect the dependent variable. In this study, the method taken is to compare the F-count and F-table values. This means that if the F-count value < F-table, then the independent variable simultaneously has no effect on the dependent variable and the hypothesis is rejected, on the other hand, if the F-count value> F-table, then the independent variable simultaneously affects the dependent variable and the hypothesis is accepted.

Table 8. Simultaneous F-testing Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3053.556	4	763.389	17.388	<,001[b]
	Residual	1097.581	25	43.903		
	Total	4151.137	29			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X2, X3, X1

Source: Data Processing Results (2024)

Based on the table above, the significance value is <0.001 (p < 0.05), indicating that the variables of GRDP (X1), Income Inequality (X2), Population (X3) and Years of Schooling (X4) simultaneously and significantly affect the amount of Poverty in Natural Disaster Prone Areas (Y).

Testing the Coefficient of Determination.

According to Ghozali (2018), the coefficient of determination test is intended to measure how much the model's ability can explain variations in the dependent variable. The coefficient of determination (R^2) is used to determine the contribution of the independent variable (independent) in explaining the dependent variable (dependent). The coefficient of determination is between zero and one ($0 < R^2 < 1$). If the R^2 value is closer to 1, then the independent variables provide almost all the information needed to predict the dependent variable. Conversely, if R^2 is getting smaller and closer to 0, it means that the ability of the independent variables to explain the variation in the dependent variable is increasingly limited. The following are the results of the coefficient of determination (R^2) test which can be seen from the table below:

Table 10. Test Results of the Coefficient of Determination (R^2)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.858[a]	.736	.693	6.62595

a. Predictors: (Constant), X4, X2, X3, X1

b. Dependent Variable: Y

Source: Data Processing Results (2024)

If you look at the table above, it shows the test results of the coefficient of determination (R2) of 0.858 or 85.8%, which means that GRDP (X1), Income Inequality (X2), Population (X3) and Years of Schooling (X4) can explain the variable Poverty in Natural Disaster Prone Areas (Y), while the remaining 14.2% is influenced by other variables.

Research Discussion

GRDP on Poverty. According to the results of the multiple linear regression test, the regression coefficient value of GRDP (X1) is -2.003, meaning that if GRDP (X1) increases

by one unit, it will reduce the value of Poverty in Natural Disaster Prone Areas (Y) by 2.003, assuming other variables remain constant. Therefore, it means that poverty in the Palu Koro Fault Disaster Prone Areas of Central Sulawesi Province is negatively and significantly affected by GRDP. This implies that an increase in GRDP can help reduce the poverty rate. An increase in GRDP indicates an increase in the average income of people living in a district or city of Central Sulawesi Province. People who earn more money have easier access to necessities including food, shelter, healthcare, and education. Due to their increased ability to fulfil their needs, fewer people may live below the poverty line as a result. The findings of this study are consistent with the research findings (Putri et al., 2022) which found a significant and negative relationship between GRDP and poverty. The findings of this study also support Kuznet's theory, which states that there is a strong correlation between growth and poverty. Specifically, during the early phase of development, the poverty rate tends to increase, and as development progresses, the proportion of poor people gradually decreases.

Income Inequality on Poverty. According to the results of the multiple linear regression test, the regression coefficient value of Income Inequality (X2) is -145.243, this indicates that if Income Inequality (X2) increases by one unit, it will reduce the value of Poverty in Natural Disaster Prone Areas (Y) by 145.243, assuming other variables remain constant. This can also be seen in the partial t test results, namely the significant value of Income Inequality (X2) is 0.001 smaller than 0.05, it is concluded that Income Inequality (X2) has a negative and significant effect on Poverty in Natural Disaster Prone Areas (Y). This means that the increase in income inequality will reduce poverty in Natural Disaster Prone Areas. In contrast to the results of empirical research in general that Income Inequality will contribute positively to poverty, the results of research on this income inequality variable if there is limited growth in a certain group of people in the modern sector, little growth is also experienced by the traditional sector. Average income increases with certain types of growth in certain sectors will result in an increase in income inequality without changing the poverty rate (Hesty Aisyah. et al, 2023).

Total Population on Poverty. With the regression coefficient value of Total Population (X3) is -6.515, indicating that if the Total Population (X3) increases by one unit, it will reduce the value of Poverty in Natural Disaster Prone Areas (Y) by 6.515, assuming other variables remain constant. It can also be seen in the partial t test that the significant value of Total Population (X3) is 0.005 smaller than 0.05 that Total Population (X3) has a negative and significant effect on Poverty in Natural Disaster Prone Areas (Y). This means that the increasing population will reduce poverty in Natural Disaster Prone Areas. The results of the study are in line with research conducted by (Yulia Adella Sari, 2021) showing that every hundred thousand population increases, the poverty rate will decrease by 0.0019% if the minimum wage and unemployment rate are constant.

Population years of schooling on Poverty shows the regression coefficient value of the length of the population attending school (X4) is 0.279, this indicates that if the Length of Schooling (X4) increases by one unit, it will increase the value of Poverty in Natural Disaster Prone Areas (Y) by 0.279, assuming other variables remain constant. This is supported by the partial t test with a significant value of Length of Schooling (X4) is 0.015 smaller than 0.05. School Length (X4) is 0.015 smaller than 0.05, it is concluded that School Length (X4) has a positive and significant effect on Poverty in Natural Disaster Prone Areas (Y) by 0.279. significant effect on Poverty in Natural Disaster Prone Areas (Y). This means that the more the number of people who go to school, the more it will increase poverty in the Natural Disaster Prone Areas. poverty in Natural Disaster Prone Areas. This situation is interpreted that Human Resources resulting from schooling do not contribute to poverty reduction and will even become a burden in the burden in the

community due to unemployment or unpreparedness for work. Poverty arises due to differences in the quality of human resources. (The low quality of human resources means low productivity, which in turn will result in low wages. will ultimately result in low wages, which will contribute to an increase in poverty. contribute to an increase in poverty.

CONCLUSIONS

Based on the findings and discussion, the study on the effect of Gross Regional Domestic Product (GRDP), income inequality, population, and years of schooling on poverty in the Palu Koro Fault disaster-prone area of Central Sulawesi yields several conclusions. First, GRDP does not significantly affect poverty levels in the region during the period from 2018 to 2023. Second, income inequality exhibits a negative and significant effect on poverty, indicating that a decrease in income inequality corresponds to a reduction in poverty levels. Third, the total population also shows a negative and significant effect on poverty, suggesting that population changes have a meaningful impact on alleviating poverty. Lastly, years of schooling demonstrate a positive and significant effect on poverty, implying that higher levels of education attainment are associated with increased poverty levels in the context of this study.

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