INFLUENCE OF POPULATION GROWTH RATE, POPULATION DENSITY, SEX RATIO ON THE POOR POPULATION
(Study in 5 Provinces on the Island of Sumatra)

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ABSTRACT

In 2016–2022, this study examines how population growth rate, population density, and sex ratio affect poverty levels in five islands in Sumatra simultaneously and partially. where population density, sex ratio, and population growth rate act as independent variables while poverty functions as the dependent variable. Time series data is used in this study, and panel data analysis conducted with eViews is used to apply quantitative descriptive analysis techniques. The Central Bureau of Statistics (BPS) is the source of information. The findings of this study indicate that: 1) Population growth rate has a significant and positive impact on poverty. 2) Poverty is significantly and negatively affected by population density. 3) The relationship between sex ratio and poverty is quite positive. Keywords: poverty, sex ratio, population density, and population growth rate.

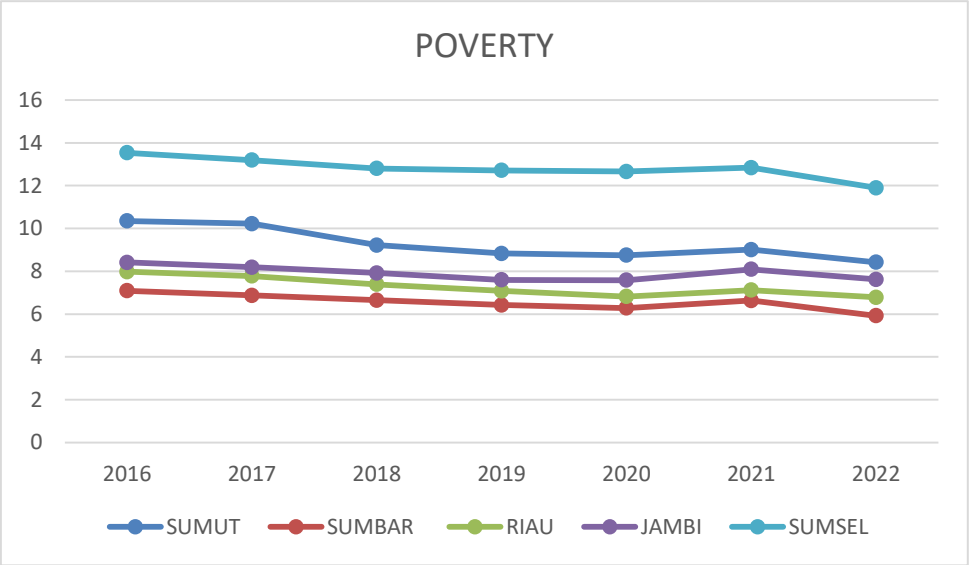
Keywords : Population Growth Rate, Population Density, Sex Ratio, and Poverty

INTRODUCTION

The problem of poverty is a problem that has a global and multidimensional nature. This poverty is a problem that will be felt by all countries in the world or in other words, no country can avoid the threat of poverty problems. Where each country has different solutions and alternatives to solving poverty. This depends on the root cause of poverty in the country, but in overcoming the existence of this poverty problem, in some countries it is still a big challenge because it has a high level of poverty, as is known that the level of poverty in each country has a different level. The difference in poverty levels is not only seen from different countries, even in one country there will also be different levels of poverty in each region. Likewise with Indonesia, where the poverty rate has different levels in the 34 provinces in Indonesia. This relatively high poverty is still one of the crucial problems for the Indonesian economy so that this condition can hinder economic growth, increase unemployment and also cause high crime rates.

The definition of (Maipita & Fitrawaty, 2014) poverty is the inability to obtain all basic needs such as housing, clothing, food and medicine and the definition according to Suparlan (1984), poverty is interpreted as a low standard of living, characterized by material deficiencies experienced by a group of people when compared to the general standard of living that applies in that society.

Figure 1. Poverty 2016-2022



(*Source: Central Bureau of Statistics)*

Judging from the poverty rate conditions of the Provinces of North Sumatra, West Sumatra, Riau, Jambi and South Sumatra on the graph, that poverty in North Sumatra in 2016 was at 10.35, this figure decreased in 2017 by 10.22 and in the following years continued to decline, although the poverty rate tends to be small, but the figure is stable and has decreased until 2020, where in 2020 poverty in North Sumatra was at 8.75. However, in 2021 the poverty rate in North Sumatra touched 9.01, the increase in poverty was based on Covid-19 where at this time economic activities stopped and many people experienced unemployment due to large-scale layoffs (PHK). In 2022 poverty in North Sumatra decreased again.

Poverty in West Sumatra Province in 2016 was 7.09, but this poverty rate did not last long, this can be seen from the graph that from 2017 to 2020 it decreased to 6.28, a slight increase in poverty occurred again in 2021, namely 6.63. The reason for this increase was due to the large number of job closures and in 2022 poverty in West Sumatra decreased again, namely 5.92. The poverty rate in Riau Province in 2016 was 7.98 and continued to decline until 2020, then increased to 7.12 in 2021 and increased again to 6.78 in 2022

Poverty in Jambi in 2016 was 8.41, then this poverty rate decreased to 7.58 in 2020, then increased to 8.09 in 2021. In 2022 it decreased again. Meanwhile, in South Sumatra Province in 2016 poverty was at 13.54, then decreased until 2020, namely at 1.64, the same as the previous province, South Sumatra Province also experienced an increase in poverty of 12.84 in 2021 and decreased again in 2022 to 11.90. So it can be concluded that the average poverty rate of the five provinces increased in 2021 which was caused by Covid-19 which hampered the economy, so that the poverty rate experienced a fluctuating condition. There are several factors that influence poverty, namely, the first is population growth rate, population density and sex ratio.

BKKBN (2012), states that population growth is a result of a moving balance between factors that increase and decrease the population, which is continuously influenced by births (increasing the population) and deaths that occur in all age groups (reducing the

population). The relationship between population growth and poverty is that if a region experiences population growth, it will increase the demand for resources so that resources will be divided more and will cause scarcity that increases competition to be tighter in the job market, the possibility of lower wages due to the demand for labor supply, and difficulty in accessing basic services such as education and health. All of this can contribute to increasing poverty levels in a population. This is supported by the opinion of Nelson and Leibstein (quoted by Sadono Sukirno, 1983), there is a direct relationship between population growth and the level of community welfare. They state that due to the rapid population growth in developing countries, social welfare does not increase significantly and ultimately welfare will decline and the proportion of poor people will increase. So in this case the population growth rate is positive. In line with the research conducted by Cokorda Gede Surya (2019), the population growth variable partially has a positive and significant effect on the poverty rate in the Regency/City of Bali Province for the period 2011-2017. However, this is in contrast to the research conducted by Sanny Feria Juliana, et al. (2023) that the Population Growth Rate (PGR) variable has a negative and insignificant effect on the dependent variable in this case poverty.

Population density according to Sarwono (1992) is a condition where the number of individuals inhabiting a space increases relative to the area of that space. Where a densely populated area will create a gap between the supply and demand of labor. Although there are many jobs available, competition to find these jobs is high, especially for those with limited education or skills. This can lead to an increase in poverty rates because many people are unemployed. The relationship between population density and poverty is positive. Where population density is closely related to the ability of an area to support the lives of its population and the carrying capacity of its environment. Housing, employment, education, food, security, and environmental damage are just some of the problems that cause high population density and uneven areas (Soejani et al., 1987). In line with the research presented by Ine Ratna Dewi (2023) that population density has a positive relationship with poverty. However, it is contrary to the research conducted by Kirana Risparinza, et al. (2024). Where population density has a significant negative effect on the percentage of poverty in West Java in 2022.

Meaning of sex ratio Defined as the proportion of men to women in a population according to Mantra (2000). Where when men and women are treated equally in the work environment, it can help the family economy rather than relying solely on men regarding family income, in line with the theory put forward by the International Labor Organization (2004), one of the main causes of poverty is gender inequality between men and women. This indicates that when there is an imbalance in the sex ratio, Given that men dominate the population, productivity is likely to increase, but it also has the potential to cause social problems such as gender imbalance. Therefore, due to the positive influence of the sex ratio, poverty can increase as the number of men increases compared to women. Meanwhile, gender inequality is a factor that can strengthen the cycle of poverty. So the relationship between the sex ratio and poverty is positive. This theory is in line with the research of Ahmad Ridho (2021) which shows that the gender ratio variable has a positive and significant effect on the percentage of poverty. However, it is contrary to the research of Sukma Direja (2021) which states that gender does not have a significant effect on household poverty in Banten Province.

Therefore, with the differences in the results of several previous studies on the relationship between Population Growth Rate, Population Density and Gender towards

Poverty, this study aims to test and re-analyze how Population Growth Rate, Population Density and Gender affect Poverty in five Provinces of Sumatra Island in 2016-2022.

RESEARCH METHOD

Research Data Sources and Types

This type of research uses a quantitative method consisting of samples and numerical data . (Sutrisno & Haryani, 2017). The purpose of quantitative research is to evaluate theories using numerical measurements of research variables and statistical data analysis (Iskandar, 2020). Data measured on a numerical scale (numbers) is called quantitative data, and can then be classified into interval and ratio data according to Kuncoro (2013). Secondary data sources are used in this study. Data that has been processed, for example literature research findings, is called secondary data because it comes from sources other than the original source, namely intermediary media.

The data used in this study is panel data. Panel data is a combination of time series and cross-section data taken from 5 provinces in Indonesia and obtained from the Central Statistics Agency (BPS). The data collected is the number and percentage of variables used in the study in 2016-2022. The Dependent Variable (Y) in this study is the Poverty Population. The Independent Variable (X) in this study is Population Growth Rate, Population Density, and Sex Ratio.

Data analysis methods

To produce accurate models and estimates, this study uses a panel data regression analysis approach, which will be estimated through several steps. This study uses Eviews 12 software to achieve its objectives and evaluate its hypotheses. Ordinary Least Square (OLS) is the estimation model used in this study. The goodness of regression (R-Square), model feasibility test (F Test), and dependent variable significance test (T Test) are the methods used to evaluate regression.

The panel data regression model of this study is:

$$JPM = \beta 0 + \beta 1\ LPP + \beta 2\ KP + \beta 3\ RJK + \varepsilon it$$

Information:

JPM : Number of Poor Population

LPP : Population Growth Rate

KP : Population Density

RJK : Poor Population Ratio

There are three methods that can be used to estimate regression models using panel data, according to Basuki (2016:276–27):

1. General Effects Model, also known as Pooled Least Square (CEM)

   The Common Effect Model is the simplest panel data approach model, according to Basuki and Prawoto (2017), because it only combines time series and cross-section data and estimates it using the least squares (OLS) method.

2. FEM, or Fixed Effects Model

   This approach, where each individual is an unknown parameter, is said to assume that individual differences can be accommodated from differences in intercepts (Basuki and Prawoto, 2017).

3. Random Effects Model (REM)

   This model will estimate panel data that may have random effects between individuals and related disturbance variables over time. Variation within each firm is allowed based on the error term. Another name for this approach is the Error Component (ECM) approach.

According to Basuki and Prawoto (2016:277), a number of tests were conducted to determine which model is best for managing panel data. These tests include:

1. Chow Check

   The Chow test is a tool used to identify which fixed effects or common effects model is most suitable for panel data estimation.

   - If the probability value is greater than α (0.05), then H0 is considered valid and the Common Effect Model is the most appropriate model to use.
   - The random effects model is most suitable because H0 is rejected if the probability value is greater than α (0.05).

2. Hausman test

   The statistical test to evaluate which fixed and random effects models should be used first is the Hausman Test. The following hypotheses are tested:

   - The random effect model is the most appropriate model to apply if the probability value is greater than α (0.05) which indicates that H0 is accepted.
   - The Fixed Effect Model is the most suitable model to use because H0 is rejected if the probability value is greater than α (0.05).

3. Lagrange Multiplier Test

   Random Effect Model (REM), the model used for the Hausman test, is subjected to the Langrange Multiplier (LM) test. to determine which model is superior, the Common Effect model or the Random Effect model. The hypothesis underlying this test is as follows:

   - The use of the Random Effect Model is most suitable because H0 is accepted if the probability value is greater than α (0.05).
   - The most acceptable model to adopt is the Common Effect Model if the probability value is greater than α (0.05) which means H0 is rejected .

RESULT AND DISCUSSION

The estimation model is selected to determine which model is most suitable for panel data regression analysis. Three methods are used to select this estimation model: Chow test, Hausman test, and LM test. The Chow test is used to determine which of the three models REM, FEM, or CEM is more suitable for this study.

Table 1. Chow Test

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	550.408406	(4,27)	0.0000
Cross-section Chi-square	154.465748	4	0.0000

(Source: Data Processed With Eviews 12)

The table above shows that the cross section prob value is 0.0000 which is smaller than 0.05. This means that FEM is more appropriate to use in estimating panel data than CEM. Furthermore, the Hausman test is used to choose whether the FEM or REM approach is more appropriate for panel data regression.

Table 2. Hausman test

Correlated Random Effects - Hausman Test

Equation: UJI_HAUSMAN

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	27.539485	3	0.0000

(Source: Data Processed With Eviews 12)

As seen in the table above, the probability value is less than 0.05, which is 0.0000. This shows that FEM is a better choice for panel data estimation than REM. FEM is a better choice for estimating panel data regression than CEM and REM, according to the findings of the Chow and Hausman test. Thus, the Lagrange multiplier (LM) test is no longer needed.

Table 3. Fixed Effect Model Test

Dependent Variable: KEMISKINAN
Method: Panel Least Squares
Date: 03/17/24 Time: 22:24
Sample: 2016 2022
Periods included: 7
Cross-sections included: 5
Total panel (balanced) observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.385899	8.742495	0.501676	0.6200
LAJU_PERTUMBUHAN_PENDUDUK	1.010484	0.200406	5.042195	0.0000
KEPADATAN_PENDUDUK	-0.120168	0.016861	-7.126989	0.0000
RASIO_JENIS_KELAMIN	0.161010	0.095877	1.679333	0.1046

Effects Specification

Cross-section fixed (dummy variables)

Root MSE	0.223364	R-squared	0.990217
Mean dependent var	8.761714	Adjusted R-squared	0.987680
S.D. dependent var	2.291227	S.E. of regression	0.254311
Akaike info criterion	0.297114	Sum squared resid	1.746200
Schwarz criterion	0.652622	Log likelihood	2.800511
Hannan-Quinn criter.	0.419835	F-statistic	390.4067
Durbin-Watson stat	1.521153	Prob(F-statistic)	0.000000

(Source: Data Processed With Eviews 12)

Poverty = 4.385899+ 1.010484 (Population Growth Rate) - 0.120168 (Population Density) + 0.161010 (Sex Ratio)

Explanation:

1. The constant value of 4.385899 means that if the independent variables (Economic Growth Rate, Population Density and Sex Ratio) are considered constant, poverty will increase by 4.385899%.
2. The population growth rate coefficient is 1.010484, meaning that a 1% increase in the economic growth rate variable will result in an increase in the poverty variable of 1.010484%.
3. The Population Density coefficient value is -0.120168, which means that if the Population Density variable increases by 1%, the poverty variable will decrease by 0.120168%.
4. The coefficient value of the Sex Ratio is 0.161010, which means that if the Sex Ratio variable increases by 1%, the poverty variable will increase by 0.161010%.

Hypothesis Testing

t-Test (Partial)

1. The results of the panel data regression in the table above show that the population growth rate variable has a probability value of 0.0000 which is smaller than 0.05. So it can be concluded that the population growth rate has a significant effect on poverty .
2. The results of the panel data regression in the table above show that the population density variable has a probability value of 0.0000 which is smaller than 0.05. So it can be concluded that population density has a significant effect on poverty. .
3. The results of the panel data regression in the table above show that the sex ratio variable has a probability value of 0.1046, which is greater than 0.05. So it can be concluded that the sex ratio does not have a significant effect on poverty.

F Test (Simultaneous)

The F-statistic probability value of 0.000000 which is less than 0.05 is shown in the panel data regression findings in Table 3. It can be concluded that the dependent variable (poverty) is significantly influenced by the independent variables (population growth rate, population density, and sex ratio) simultaneously or together.

Coefficient of Determination Test (R2)

The panel data regression findings in the following table show that the R-squared is 0.990217. In summary, the dependent variable (poverty) is influenced by independent factors (population growth rate, population density, and sex ratio) by 99%, and the remaining 1% is determined by other variables not included in the analysis.

The Effect of Population Growth Rate on Poverty

The results of the study indicate that the population growth rate variable has a probability value of 0.0000 which is smaller than 0.05. So it can be concluded that the population growth rate partially has a significant effect on poverty in 5 Provinces on the island of Sumatra. The coefficient value of the Population Growth Rate is 1.010484 which means that if the Population Growth Rate variable increases by 1%, the Poverty variable will increase by 1.010484%.

This study is in accordance with the opinion expressed by Sukirno (2013), where population growth is one of the factors that drives and inhibits development. The results of

this study are also in line with the research conducted by Iqbal & Westi (2023) entitled which states that the rate of population growth has a positive and significant effect on the poverty rate. One of the reasons why this can happen is because of the possibility of an increase in the number of workers and market expansion. The size of the market for goods and services is determined by two main factors, namely community income and population. The number of residents in a regional economy is a fundamental problem, because uncontrolled population growth can hinder the achievement of economic development goals, namely people's welfare and poverty reduction.

The Effect of Population Density on Poverty

The results of the study indicate that the population density variable has a probability value of 0.0000 which is smaller than 0.05. So population density has a significant effect on poverty in 5 provinces on the island of Sumatra. The coefficient value of Population Density is -0.120168 , which means that if the Population Density variable experiences an increase of 1%, the poverty variable will experience a decrease of 0.120168%.

The results of this study are supported by the results of research conducted by Rahmah et al. (2019) and Kirana et al. (2022) which stated that population density has a negative and significant effect on poverty. This means that the higher the population density, the lower the poverty rate. Likewise, if the population density is lower, the poverty rate will increase.

Influence of Sex Ratio against Poverty

The results of the study show that the sex ratio variable has a probability value of 0.1046, which is greater than 0.05. So it can be concluded that the sex ratio does not have a significant effect on poverty. The coefficient value of the Sex Ratio is 0.161010 , which means that if the Sex Ratio variable increases by 1%, the poverty variable will increase by %.0.161010. Gender is one of the factors that influences labor productivity. In terms of size and physical strength, men are more capable of completing heavy work that women usually cannot do. The number of female workers that is equal to the number of male workers will drive economic growth faster. This is because women who have income can support their own lives and their families, as well as increase consumption activities which also have an impact on economic growth (Widodo, 2020).

However, the reason why the sex ratio cannot have a significant effect on poverty can occur because the level of gender inequality in each region is different, both in villages and cities. This was stated in a study conducted by Aprilia and Triani (2022). The results of their study stated that gender inequality did not have a significant effect on poverty, this shows that the difference between the number of men and women does not have a significant impact on the poverty rate. This gender inequality can be caused by factors of access to education and employment opportunities can cause differences in economic capacity between men and women. This can affect poverty, because women who do not have the same access as men in education and employment opportunities tend to have lower incomes and more limited economic capacity.

CONCLUSION

Population growth rate has a positive and significant effect on poverty in 5 Provinces on Sumatra Island. If the population growth rate increases, poverty will also increase. This

happens because uncontrolled population growth can hinder the achievement of economic development goals.

Population density has a negative and significant effect on poverty in 5 Provinces on Sumatra Island. This shows that if population density increases, poverty will decrease. This can happen if the increase in population density is able to encourage economic development. With the increase in population, the workforce will also increase, which in turn can encourage the production sector and increase economic activity. Thus, the problem of poverty can be overcome.

The sex ratio does not have a significant effect on poverty. This can happen because the level of gender inequality in each region may be different, both in cities and villages. This gender inequality can occur due to the existence of several women's rights that cannot be obtained, such as in the aspects of education and employment opportunities.

SUGGESTION

Uncontrolled population growth can cause several significant negative impacts, one of which is poverty, therefore several ways that can be done to suppress population growth include:

1. The government can increase public awareness and participation in family planning programs to reduce population growth rates. Family planning programs can help people have fewer children and raise awareness of the importance of controlling population growth.
2. The community must also be more aware of how important it is to carry out a family planning program, because this program is designed to balance needs and population numbers, as well as create economic welfare.
3. The government can improve the quality of education and training to improve the quality of human resources. Education can increase public awareness of the importance of controlling population growth. In addition, it is expected that someone who takes a longer education will delay marriage, especially among teenagers, so that it can reduce the fertility rate and suppress the population growth rate.

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