

What factors affecting poverty rates in Indonesia? Empirical evidence from West Sumatera

Rendra Hardinata Saputro^{1,*}, Muhammad Arif²
Universitas Muhammadiyah Surakarta, Indonesia^{1,2}
Corresponding e-mail: natanatarendra@gmail.com*

ABSTRACT

Purpose — *This study aims to estimate the impact of four key variables - the average length of schooling, the disaster risk index, the labor force participation rate, and the construction cost index - on the percentage of the population living in poverty.*

Method — *This research is a quantitative study that utilizes secondary data sourced from the Central Statistics Agency (BPS) of West Sumatera and Inariks BNPB. It primarily focuses on the variable of poverty. The analytical approach adopted in this study is panel data analysis, which integrates both cross-sectional and time series data. The cross-sectional aspect of the research encompasses 19 regencies/cities within the West Sumatera Province, and the time series data extends from 2017 to 2022. All data processing and analysis are conducted using Eviews 10 software.*

Result — *The research findings suggest that the Fixed Effects Model (FEM) is the most effective approach for analyzing regression models. The estimated results reveal that both the average length of schooling and the labor force participation rate negatively impact the percentage of the impoverished population. In contrast, the disaster risk index and the construction cost index appear to have no influence on the impoverished population percentage.*

Novelty — *This research introduces a novel dimension to the study of poverty, focusing on disaster risk and construction factors that have not been previously explored in earlier studies.*

Keywords: *poverty, education, labor force participation rate, disaster risk index, construction cost index*

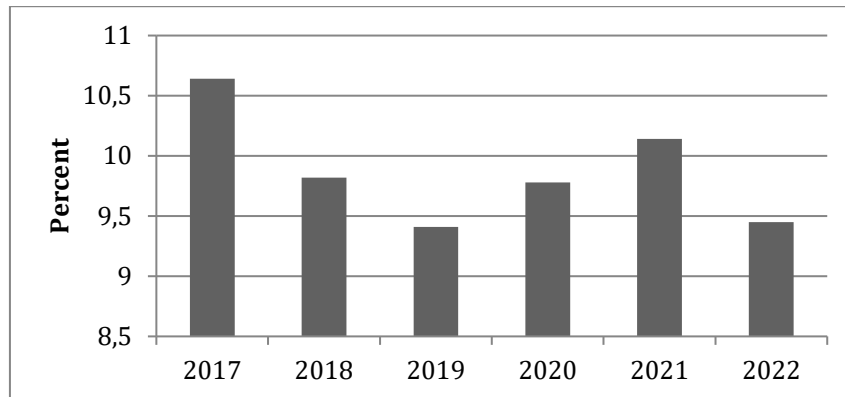
INTRODUCTION

Economic development plays a crucial role in reducing poverty by creating job opportunities, increasing citizens' income, and lowering unemployment rates (Omar & Inaba, 2020). Additionally, recent research by Yangambi (2023) emphasizes the importance of quality infrastructure, such as transportation and education, in enhancing access to markets and education. This, in turn, can improve social mobility and contribute to poverty reduction. Moreover, social and educational development efforts, as indicated by Kyllonen (2018), have the potential to enhance individuals' skills and their capacity to seek better employment, thereby aiding in reducing inequality. Figure 1 presents the percentage of the impoverished population in West Sumatera Province from 2017 to 2022.

Figure 1 shows that the percentage of the impoverished population in Indonesia has experienced fluctuations. The increase in poverty from 2020 to 2021 is attributed to the adverse effects of the Covid-19 pandemic on economic activities and people's incomes. According to data from the Central Statistics Agency (BPS) of West Sumatera, the province contributes to a relatively high average poverty rate of 5.5%. Among its regions, the Mentawai Islands Regency records the highest poverty rate in West Sumatera, reaching 14.45%, while Sawahlunto City has the lowest poverty rate at 2.23%. However, the percentage of the impoverished population in West Sumatera tends to decline.



Figure 1. Percentage of impoverished population in Indonesia during 2017-2022



Source: Central Statistics Agency (BPS)

The poverty situation in West Sumatera Province can be linked to the importance of quality education. Darmawan et al. (2020) emphasize that education provides knowledge and skills, contributes to personal income growth, and supports economic development. Research by Jacobus et al. (2021), Adhitya et al. (2022), and Chairunnisa & Qintharah (2022) found that education has a negative impact on poverty. By providing access to quality education, individuals can enhance their skills and knowledge, opening up job opportunities and improving competitiveness in the job market. Education can also break the cycle of poverty by increasing awareness of health, human rights, and economic opportunities. Therefore, efforts to improve the quality of education in West Sumatera could be crucial for alleviating poverty. Efforts to improve the quality of education in West Sumatera can be a positive step in reducing the poverty rate.

In addition, the Covid-19 pandemic in 2021 had a negative impact on the economy, highlighting the need for intensive efforts in creating high-quality job opportunities. Hornstein et al. (2023) emphasize that a high labor force participation rate can reduce unemployment rates and enhance household income. Further research by Aprilia & Sugiharti (2022) and Supratyoningsih & Yuliarmi (2022) found that the workforce has a negative impact on poverty. A high level of labor force participation can support economic growth and reduce poverty by increasing income and the well-being of the community. Conversely, a low level of labor force participation can lead to poverty as it may decrease individual income and diminish the overall economic contributions of the community. Therefore, enhancing employment opportunities through government programs such as the Kartu Prakerja Program can support poverty reduction in the future.

Regarding other factors that can influence the poverty rate, research by Bah et al. (2018) indicates that high costs in infrastructure development can impede poverty alleviation efforts. This is supported by the research of Fenny (2021), who found that the construction cost index has a positive impact on poverty. High construction cost indices will lead to an increase in building and property construction expenses, potentially resulting in higher rental or property sale prices. This could exert additional pressure on vulnerable communities experiencing economic difficulties or residing in areas with a high cost of living, thereby contributing to poverty issues. The government of West Sumatera needs to consider the construction cost index and ensure efficient resource allocation.

Disaster risk, as disclosed by Hallegatte et al. (2020) and Kim & Shahandashti (2022), is also a crucial factor that can worsen poverty conditions. This is also supported by the findings of Desinta & Sitoru (2021) and Pranandari et al. (2022), where the disaster risk index positively influences poverty. Regions with a high disaster risk index tend to be more vulnerable to the impacts of disasters, directly affecting poverty levels. Natural disasters can damage infrastructure, destroy economic resources, and diminish the purchasing power and livelihoods

of communities. All these factors contribute to an increase in poverty levels in a given area. Therefore, disaster risk mitigation and effective infrastructure development need to be integrated into poverty alleviation efforts in the province.

Several prior studies by Jacobus et al. (2021), Fenny (2021), Adhitya et al. (2022), Pranandari et al. (2022), and Supratiyoningsih & Yuliarmi (2022) have identified factors influencing poverty. A key distinction of this research from earlier studies is its novel contribution by addressing disaster risk factors and constructions not previously explored in relation to poverty. Additionally, this study contributes by providing deeper insights and understanding of the factors influencing poverty in West Sumatera Province.

This research aims to analyze the average length of schooling, labor force participation rate, construction cost index, and disaster risk index concerning the percentage of the impoverished population in West Sumatera Province from 2017 to 2022. This research is crucial as it can serve as a foundation for policy development to enhance the well-being of the community through improving education, workforce participation, disaster risk management, and infrastructure development.

METHOD

This research is a quantitative study utilizing secondary data obtained from the Central Statistics Agency (BPS) of West Sumatera and the Disaster Data and Information Center (Inariks BNPB). This province consists of 19 regencies/cities, each with unique characteristics. This makes West Sumatera a representative sample for analyzing factors influencing poverty. The analytical method employed in this research is panel data analysis, which combines cross-sectional and time series data. In this study, the cross-sectional data encompass 19 regencies/cities in the West Sumatera Province, while the time series data spans from 2017 to 2022. The focus of the research centers on the poverty variable, measured by the percentage of the impoverished population.

The panel data estimation model encompasses the Common Effects Model (CEM), Fixed Effects Model (FEM), and Random Effects Model (REM). To determine the best model, two tests, namely the Chow Test and the Hausman Test, are conducted. This study adopts the main variables identified in previous research. Several independent variables have been found to influence the percentage of the population living in poverty, and this information is accessible nationally (Faritz & Soejoto, 2020; Pranandari et al., 2022; Ashari & Athoillah, 2023; Mandey et al., 2023; Mustaqim & Arif, 2023). The following is the econometric model for estimating the percentage of the population living in poverty in West Sumatera Province: Panel data regression analysis with the econometric model (estimator) as follows:

$$PPM_{it} = \beta_0 + \beta_1 RLS_{it} + \beta_2 IRB_{it} + \beta_3 TPAK_{it} + \beta_4 IKK_{it} + \varepsilon_{it}$$

Where:

PPM = Percentage of Impoverished Population (%)

RLS = Average length of schooling (Year)

IRB = Disaster Risk Index (%)

TPAK = Labor Force Participation Rate (%)

IKK = Construction Cost Index (%)

ε = Error Term

β_0 = Constant

$\beta_1 \dots \beta_4$ = Regression Coefficient of the Independent Variable

it = Panel Data

Hypotheses development

Average length of schooling and percentage of impoverished population

A direct relationship exists between the average duration of education within a region's population and the poverty rate prevalent in that particular area. To put it differently, as the average length of schooling increases, the poverty rate decreases. This phenomenon can be attributed to the fact that higher education empowers individuals with valuable skills and knowledge, thereby improving their prospects in the job market. When individuals possess better skills, communities gain access to higher-paying employment opportunities, leading to more consistent incomes and ultimately lowering the likelihood of experiencing poverty (Schultheiss et al., 2023).

H1: The average length of schooling has a negative impact on the percentage of the impoverished population

Disaster risk index and percentage of impoverished population

A direct relationship is observed between the disaster risk index and poverty. To put it simply, as the disaster risk index increases, so does the poverty rate. Natural disasters, including events like floods, earthquakes, or storms, have the capacity to inflict significant damage on vital infrastructure like residences, transportation networks, and healthcare facilities. Furthermore, disasters frequently lead to job losses and a reduction in economic output. Communities that suffer job losses or a decline in their means of earning a living due to disasters often face heightened economic hardships, which, consequently, can elevate the poverty rate within that specific region (Hallegatte et al., 2020).

H2: The disaster risk index has a positive impact on the percentage of the impoverished population

Labor force participation rate and percentage of impoverished population

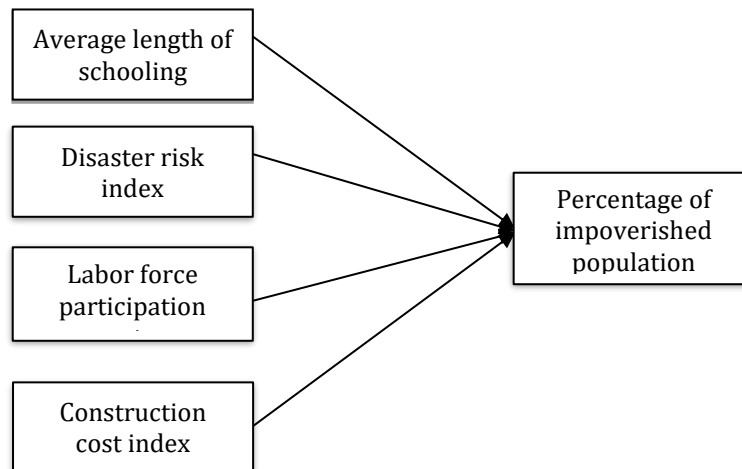
An inverse relationship exists between the degree of workforce participation and poverty. In simpler terms, as the level of workforce participation increases, the poverty rate decreases. When a greater number of individuals participate in economic activities, they have the chance to secure more consistent incomes and enhance their overall quality of life. Additionally, increased economic engagement can lead to the creation of fresh job opportunities, consequently lowering unemployment rates and playing a role in diminishing the poverty rate (Mulok et al., 2012).

H3: The labor force participation rate has a negative impact on the percentage of the impoverished population

Construction cost index and percentage of impoverished population

A direct relationship is evident between the construction cost index and poverty. In simpler terms, as the construction cost index rises, so does the poverty rate. This is primarily due to the escalating construction expenses, which create difficulties for the community in obtaining affordable housing, consequently worsening poverty conditions (Spaan & Abraham, 2023). Factors like increasing material prices and labor costs in construction can contribute to an elevation in the construction cost index, which, in turn, affects certain individuals' ability to afford housing.

H4: The construction cost index has a positive impact on the percentage of impoverished population

Figure 2. Research framework

Source: Developed by the authors (2023)

RESULT AND DISCUSSION

Descriptive statistics

Table 1 presents descriptive statistics, indicating that the minimum value of the variable for the percentage of the impoverished population is 2.01, while the maximum value is 14.84, with a standard deviation of 2.47. The means and medians of all variables fall within their respective ranges, suggesting a normal distribution of the data. The average value for the percentage of the impoverished population is 6.40, while the average values for the length of schooling, disaster risk index, labor force participation rate, and construction cost index are 9.14, 149.10, 69.10, and 95.85, respectively. The total number of observations in this study is 144.

Table 1. Descriptive statistics

	PPM	RLS	IRB	TPAK	IKK
Mean	6.409912	9.141491	149.1085	69.10754	95.85351
Median	6.630000	8.435000	137.2000	68.92500	94.30000
Maximum	14.84000	11.92000	209.2000	83.10000	138.1800
Minimum	2.010000	6.690000	101.0800	61.15000	86.30000
Std. Dev.	2.478729	1.482676	33.97784	4.203123	7.957705
Skewness	1.416723	0.488245	0.336438	0.837976	3.213249
Kurtosis	6.667432	1.700050	1.664053	4.214257	14.66356
Observations	114	114	114	114	114

Source: Eviews 10, processed (2023)

Preliminary analysis

Classical assumption tests are a series of tests used in regression analysis to ensure that the data meets several fundamental assumptions (Williams et al., 2019). In this research, the classical assumption tests involve assessing normality, homoscedasticity, and multicollinearity. These tests play a crucial role in validating the results of regression analysis and ensuring a correct interpretation of the model.

The normality test is a statistical method used to evaluate how closely the data adheres to a normal distribution. In this study, the Jarque-Bera test is employed for assessing normality. Data is considered non-normally distributed if the Jarque-Bera probability is less than the significance level of 0.05 (Thadewald & Büning, 2007). However, our results indicate that the data follows a normal distribution, as the Jarque-Bera probability of 0.544 exceeds the established significance level of 0.05.

The heteroskedasticity test is used to determine whether the variability of errors in the regression model is constant or heterogeneous. In this study, the Glejser method (Im, 2000) is employed for the heteroskedasticity test. Fortunately, there is no evidence of heteroskedasticity, as the probability for all independent variables, namely average years of schooling, disaster risk index, labor force participation rate, and construction cost index, exceeds the significance level of 0.05.

Multicollinearity testing is a statistical analysis used to assess the extent to which variables in a regression model are correlated with each other. In this research, multicollinearity testing involves calculating the correlation between independent variables. The potential issue of multicollinearity may arise if the correlation between independent variables exceeds 0.95 (Daoud, 2017). However, our results indicate that there is no indication of multicollinearity issues, as the correlation values among independent variables are all below 0.95.

Hypotheses testing

Estimations in the panel data regression model are conducted using three approaches: the Common Effects Model (CEM), the Fixed Effects Model (FEM), and the Random Effects Model (REM). The estimation results of the panel data model are presented in Table 2.

After obtaining the regression results for CEM, FEM, and REM, it is essential to conduct tests to determine the best panel data estimation model. Firstly, the Chow Test is performed to identify the superior model between CEM and FEM. Secondly, the Hausman Test is conducted to ascertain the preferable model between REM and FEM. The results of the Chow Test, presented in Table 2, indicate that the cross-sectional F probability is less than α (0.05), consequently selecting the FEM as the preferred model. Similarly, the Hausman Test results in Table 2 reveal that the χ^2 probability value is less than α (0.05), signifying that the FEM is the chosen model.

Table 2. CEM, FEM, and REM regression results

Variable	Regression coefficients		
	CEM	FEM	REM
C	-6,539	18,206	15,593
RLS	-0,739	-1,095	-1,074
IRB	0,017	0,006	0,011
TPAK	0,051	-0,037	-0,028
IKK	0,143	-0,002	0,010
R ²	0,776	0,987	0,468
Prob F-statistic	0,000	0,000	0,000

1. Test Chow

Cross-section F (18, 91) = 84,372; Prob F = 0,000

2. Hausman test

Cross-section random $\chi^2(4)$ = 25,579; Prob χ^2 = 0,000

Source: Eviews 10, processed (2023)

Table 2 indicates that the probability of the F-statistic for the Fixed Effects Model (FEM) is 0.000, which is significantly lower than the alpha level (α) of 0.05. This result suggests that the variables

- average years of schooling, disaster risk index, labor force participation rate, and construction cost index - collectively exert a significant impact on the percentage of the impoverished population.

The R-squared value for the Fixed Effects Model (FEM) is 0.987, implying that 98.7% of the variability in the percentage of the impoverished population can be explained by variations in the average years of schooling, the disaster risk index, the labor force participation rate, and the construction cost index. The remaining 1.3% of the variation is attributable to other factors not included in the regression model.

A t-test is conducted for each independent variable to determine its individual impact on the dependent variable. By comparing the probability of the t-statistic with the alpha level (α) of 0.05, the significance of each independent variable's effect on the dependent variable can be assessed.

Table 3. t-test results

Variable	Coefficient	Prob.	Conclusion
RLS	$\beta_1 = -1,095$	0,000	RLS has a negative effect at $\alpha = 0.05$
IRB	$\beta_2 = 0,006$	0,286	IRB has no effect at $\alpha = 0.05$
TPAK	$\beta_3 = -0,037$	0,000	TPAK has a negative effect at $\alpha = 0.05$
IKK	$\beta_4 = -0,002$	0,859	IKK has no effect at $\alpha = 0.05$

Source: Eviews 10, processed (2023)

Table 3 reveals that the average length of schooling and the labor force participation rate each have a negative impact on the percentage of the impoverished population, which is consistent with the research hypothesis. In contrast, the disaster risk index and the construction cost index do not individually affect the percentage of impoverished population, contradicting the initial hypothesis that anticipated a positive influence of the disaster risk index on poverty levels.

The coefficient for the average length of schooling (RLS) is -1.095. This indicates that an increase of one year in the average length of schooling is associated with a 1.095 percent decrease in the percentage of the impoverished population. This trend suggests that prolonged schooling may enhance individuals' skills and knowledge, which in turn contributes more effectively to economic activities. The coefficient for the labor force participation rate (TPAK) is -0.037, implying that a one percent increase in this rate is expected to reduce the percentage of the impoverished population by 0.037 percent.

Discussion

Influence of average length of schooling on percentage of impoverished population

The research results indicate that education indicators, measured by the average years of schooling, have a negative impact on the percentage of the impoverished population. This finding aligns with the research hypothesis, suggesting that a higher educational level within a population correlates with a lower percentage of people living in poverty. These findings are consistent with studies conducted by Hadi (2019), Faritz & Soejoto (2020), and Zakaria (2020), all of which also found a negative influence of the average years of schooling on poverty. Education plays a crucial role in enhancing workforce productivity. Individuals with higher education levels tend to possess better skills and knowledge, leading to more productive work outcomes. This impact can extend to overall economic productivity. Furthermore, education broadens access to job opportunities, with individuals holding higher educational qualifications more likely to secure better employment. This, in turn, reduces unemployment rates and enhances workforce participation across various sectors (Sisca et al., 2013).

Moreover, a high level of education can contribute to the improvement of a community's income. Generally, individuals with higher education have higher income levels, which can play a role in reducing poverty rates and enhancing overall societal well-being (Jualianto & Utari, 2019). However, recent research by Mandey et al. (2023) found that the average duration of schooling positively influences poverty. An increase in educational duration does not always impact the quality of human resources, especially if the education does not align with job market demands. Additionally, an increase in the duration of education can lead to a rise in the cost of living, due to the demand for high-quality goods and services. Consequently, individuals with low income may face difficulties in meeting their living needs, which can, in turn, result in a status of poverty.

Influence of disaster risk index on percentage of impoverished population

The results of this research indicate that the disaster risk index does not have a significant influence on the percentage of the impoverished population, contradicting the initial research hypothesis. This lack of significant impact may be attributed to the fact that natural disasters do not invariably lead to poverty. Although they can cause damage to infrastructure and result in job losses, natural disasters also offer opportunities for rebuilding and economic recovery. Furthermore, crisis situations often strengthen social solidarity and concern for others, potentially having a significant impact on community well-being (Botzen et al., 2019).

Influence of labor force participation rate on percentage of impoverished population

The results of this research also indicate that the labor force participation rate has a negative impact on the percentage of the impoverished population, as hypothesized. This means that a higher labor force participation rate in a population is associated with a lower percentage of people living in poverty. This finding is in line with research conducted by Fauziah et al. (2021), which also observed a negative impact of the labor force participation rate on poverty. The findings are further supported by recent research from Ashari & Athoillah (2023). A high level of labor force participation reflects a substantial workforce availability in the market, which can lead to increased productivity and overall economic output, potentially enhancing the income of the population significantly. Additionally, a high labor force participation rate indicates more job opportunities for the working-age population. With more jobs available, there is a potential decrease in unemployment rates, which can in turn reduce the number of people living in poverty.

However, recent research by Desmawan et al. (2023) suggests that the labor force participation rate has a positive impact on poverty. This conclusion is attributed to structural aspects indicating that a high labor force participation rate does not necessarily equate to proportional job market growth. Such a scenario can occur when economic growth is not matched by increased investment and productivity, leading to high unemployment rates among the working-age population. Furthermore, a high labor force participation rate does not necessarily reflect an improvement in the quality of human resources. The lack of education and training can result in many workers engaging in low-wage jobs within the informal sector, as noted by Handayani (2015).

Influence of construction cost index on percentage of impoverished population

The research findings reveal that the construction cost index does not significantly affect the percentage of the poor population, thereby contradicting the research hypothesis. This outcome is consistent with a recent study by Mustaqim & Arif (2023), which determined that the construction cost index does not impact poverty significantly, as development costs are not the sole determinant of housing prices. Other factors, such as location, building quality, and the availability of public facilities, also play crucial roles in determining property values. Additionally, the implementation of government policies, such as the subsidized Home

Ownership Credit (KPR) program, has been instrumental in supporting housing access for low-income communities.

In light of these findings, it is recommended that the government focus on improving education levels and labor force participation to reduce the percentage of the population living in poverty. Enhancements in these areas can significantly contribute to lowering the poverty rate in West Sumatera Province. While the disaster risk and construction cost indices have not shown significant influence, continuous monitoring and strategic planning remain essential to mitigate the impacts of disasters and construction costs without exacerbating poverty levels.

CONCLUSION

Poverty is a complex issue with diverse dimensions, making it a primary focus of development efforts, especially in the region of West Sumatera Province. This research aims to estimate the influence of the average length of schooling, disaster risk index, labor force participation rate, and construction cost index on the percentage of the impoverished population in West Sumatera Province during the period 2017-2022. Research findings using the Fixed Effects Model (FEM) indicate that the average length of schooling and labor force participation rate have a negative impact on the percentage of the impoverished population. However, the disaster risk index and construction cost index do not significantly affect the percentage of the impoverished population.

Based on these research findings, the government is advised to concentrate on improving education levels and labor force participation to reduce the percentage of the population living in poverty. Improvement efforts in these aspects can significantly contribute to the reduction of poverty rates in West Sumatera Province. Despite the lack of evidence regarding the impact of the disaster risk index and construction cost index, effective monitoring and planning are still essential to mitigate the risks of disasters and construction costs without increasing the number of impoverished residents.

Suggestions for further research involve a more in-depth analysis of other factors, considering the interaction between variables, comparing regions, evaluating policy programs, incorporating qualitative aspects, and monitoring disaster risks. With this approach, it is anticipated that subsequent research can provide holistic insights and more focused solutions to the issue of poverty in that region.

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