Determinants of Poverty in the Special Region of Yogyakarta: A Panel Data Analysis Approach

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Abstract. The objective of this research is to examine the factors influencing poverty in the Special Region of Yogyakarta Province between 2015 and 2023. The investigation utilises panel data from six administrative areas, comprising Kulon Progo Regency, Bantul Regency, Gunung Kidul Regency, Sleman Regency, and Yogyakarta City. The study considers three primary variables affecting poverty rates: Education Level, Unemployment, and Human Development Index. Employing panel data regression through the Eviews 9 software, the research adopts a Fixed Effect Model (FEM) approach. The findings reveal that Education Level and Human Development Index demonstrate a significant negative correlation with poverty, whilst Unemployment exhibits a significant positive relationship with poverty levels in the Special Region of Yogyakarta.

Keyword. Poverty, Education, Unemployment, HDI, FEM

1 Introduction

One of the persistent challenges faced by humanity is poverty. Individuals grapple with this issue on a daily basis, as they personally experience and endure the hardships associated with living in impoverished conditions [1] . Various interconnected elements, including investment, economic growth, unemployment, education and poverty, have led to poverty becoming a crucial issue in social policy development. The multifaceted nature of poverty presents a complex challenge in developmental efforts. It encompasses numerous aspects, spanning social, economic, cultural and political realms, as well as spatial and temporal dimensions. Poverty is characterised as a state in which individuals or groups, regardless of gender, are unable to fulfil their fundamental rights to sustain and enhance a life of dignity. According to [2] poverty will limit the ability of individuals to stay healthy and develop their skills.

According to BPS D.I. Yogyakarta Province [3] poverty remains a persistent issue. From an economic perspective, the root causes of poverty include limited resources and poor quality of life among the impoverished, disparities in human resource quality, and unequal access to capital. The low quality of human resources results in reduced productivity, which in turn affects wage levels. Despite these challenges, Indonesia has made considerable strides

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in reducing poverty over the last ten years. The Indonesian government recognises that economic development is crucial in its efforts to achieve a fair and prosperous society [4]. Consistent with these aims, numerous developmental initiatives are also focused on promoting regional growth, particularly in less developed areas.

A key measure of successful national development is the extent to which poverty is reduced. All nations grapple with poverty, particularly developing countries such as Indonesia. The complexity of poverty stems from its multidimensional nature, reflecting the diverse needs of humans. This concept incorporates fundamental elements, such as shortages in resources, sociopolitical structures, expertise, and capabilities, alongside secondary factors including limited social connections, monetary means, and access to information. Poverty also has a spatial dimension, manifesting in various forms such as malnutrition, lack of clean water, substandard housing, insufficient healthcare, and low educational attainment. Consequently, changes in one aspect of poverty can have ripple effects across other dimensions.

Table 1. Poverty in D.I. Yogyakarta Province

Year/Regency	2015	2016	2017	2018	2019	2020	2021	2022	2023
Kulon Progo	21,4	20,3	20,3	18,3	17,39	18,01	18,38	16,39	15,64
Bantul	16,33	14,55	14,07	13,43	12,93	12,05	14,04	12,27	11,95
Gunungkidul	21,73	19,34	18,65	17,12	16,61	17,07	17,69	15,86	15,6
Sleman	9,46	8,21	8,13	7,65	7,41	8,12	8,64	7,74	7,52
Kota Yogyakarta	8,75	7,7	7,64	6,98	6,84	7,68	11,91	6,62	6,49

Source : Central Bureau of Statistics of D.I.Yogyakarta Province

According to Table 1, Kulonprogo Regency exhibits the highest poverty rate within the Special Region of Yogyakarta Province, whilst Yogyakarta City demonstrates the lowest. This highlights an ongoing poverty issue that requires immediate attention from both central and local authorities. Nurkse (1953) proposed that poverty stems from multiple interconnected factors, creating a self-perpetuating cycle. Poor human capital quality, potentially resulting from inadequate education, misfortune, prejudice, or genetic factors, can also contribute to poverty. The Central Statistics Agency's 2024 data reveals that only Yogyakarta City has achieved an average of 12.11 years of schooling in Yogyakarta Province, with other areas falling short of this figure. This disparity in educational attainment indicates a substantial gap between regions in Yogyakarta Province. Such an imbalance may reinforce the poverty cycle, as individuals with limited education often struggle to access suitable employment and opportunities for improving their living standards.

Yogyakarta Province is grappling with an upward trend in unemployment, presenting a formidable challenge for regional authorities. A key metric of developmental success lies in the capacity to mitigate poverty and markedly decrease joblessness. The advent of globalisation has further intensified labour market competition, particularly as free trade agreements facilitate the entry of more skilled international workers.

Population dynamics play a twofold role in economic development, functioning as both consumers and producers. Consequently, a swiftly expanding population need not impede economic progress if it possesses robust productive capabilities and can absorb the resultant output. This suggests that substantial population growth should be matched by commensurate income levels. A burgeoning population coupled with low earnings contributes minimally to economic advancement. As defined by [5] unemployment typically encompasses individuals within the workforce who are actively seeking employment at a particular wage level but are

unable to secure their desired position. Furthermore [6] research indicates that unemployment influences poverty levels, as elevated joblessness can impede growth rates, potentially exacerbating poverty conditions.

The Human Development Index (HDI) plays a significant role in influencing poverty levels. A low HDI score suggests that the population experiences a poor quality of life, with limited access to education, healthcare, and an adequate standard of living. This situation often leads to a self-perpetuating cycle of poverty that is challenging to overcome. The HDI is a measure that quantifies human development through indicators of health, education, and per capita expenditure or purchasing power within a specific timeframe, typically one year. Additionally, the HDI encompasses the health status of both the workforce and individuals engaged in education and training. Enhanced nutrition and health contribute to increased labour productivity, and when a population's health improves, the nation's income tends to rise. In essence, health can be viewed as an investment in human capital. The government plays a crucial role in improving and enhancing the health sector, particularly in terms of providing necessary funding for a region. Consequently, this research aims to examine the factors determining poverty in the Special Region of Yogyakarta Province from 2015 to 2023.

2 Literature review

Education and Poverty

Poverty reduction is significantly influenced by education. Individuals with higher educational qualifications are more likely to secure better employment opportunities and earn higher salaries. Research conducted in Bangladesh has shown that consistently elevated household earnings are strongly correlated with superior educational accomplishments [7]. Moreover, Education is identified as a significant contributor to multidimensional poverty. [8] reports that education accounts for 37.80% of multidimensional poverty, making it the primary contributor among the dimensions studied. There appears to be a two-way connection between education and poverty. Insufficient educational attainment can lead to poverty, whilst living in poverty can hinder access to educational opportunities. In strategies aimed at alleviating poverty, education is regarded as a crucial element. A study by [9] examining poverty reduction in Bhutan incorporates education as one of the metrics linked to valuable functionings. The research identified notable decreases in educational deprivations, alongside other factors, which contributed to an overall decline in poverty levels. To summarise, although the papers do not offer extensive information on the direct impact of education on poverty, they indicate that education is a vital component in multidimensional poverty measurements and initiatives aimed at poverty alleviation. Enhancing educational accessibility and outcomes appears to be a key approach in tackling poverty.

Unemployment and Poverty

Research has demonstrated that joblessness, including both unemployment and withdrawal from the labour force, can negatively affect an individual's mental health and sense of self-worth. This may result in a vicious cycle where poor psychological well-being impedes job search efforts and employment retention. Moreover, the loss of income due to unemployment directly contributes to financial hardship [10]. In Yogyakarta Province, unemployment plays a significant role in determining poverty rates. Various studies have established an inverse

relationship between unemployment and poverty across different regions. For instance, research conducted in Central Java Province revealed that factors such as economic growth, the Human Development Index (HDI), and school enrolment rates have a substantial negative impact on unemployment rates [11]. This suggests that enhancing human capital through educational initiatives and fostering economic development can lead to reduced unemployment, subsequently lowering poverty levels. However, it is important to note that the link between unemployment and poverty is not always straightforward. A study in Jiangxi Province, China, uncovered regional disparities in the effectiveness of poverty alleviation through tourism, despite an overall improvement in efficiency [12] This finding underscores the importance of considering local characteristics and potential when devising poverty reduction strategies. In the context of Yogyakarta Province, it is essential to incorporate unemployment reduction measures into comprehensive poverty alleviation programmes. Such initiatives may include improving workforce skills, developing key economic sectors, and promoting regional growth. This holistic approach is anticipated to effectively reduce both unemployment and poverty levels in Yogyakarta Province.

HDI and Poverty

The connection between the Human Development Index (HDI) and poverty can be characterised as follows, based on the given information: There exists a positive link between HDI and the reduction of poverty, as well as improvements in welfare. HDI demonstrates a favourable association with economic growth and poverty alleviation. Research has identified a two-way relationship between GDP (an HDI component) and HDI across various time and frequency domains [13]. Generally, higher HDI scores correlate with lower poverty levels and enhanced living standards. For instance, a study on ASEAN and SAARC economies revealed a strong, positive correlation between foreign direct investment inflows and poverty reduction, as measured by HDI increases [14]. This implies that as HDI rises, poverty tends to decline. This implies that as HDI rises, poverty tends to decline. Nevertheless, there are some intriguing contradictions and subtleties in this relationship. Whilst a higher HDI typically corresponds to improved socioeconomic outcomes, it does not invariably lead to better environmental or health conditions. The interplay between HDI and poverty is intricate and multidimensional, influenced by aspects such as environmental sustainability, healthcare spending, and specific socioeconomic circumstances in different regions. To gain a more comprehensive understanding of development and poverty reduction, it may be necessary to consider additional indices that incorporate ecological and sustainability factors alongside the traditional HDI components.

3 Research methods

This research utilises panel data regression analysis, a technique that integrates cross-sectional and time-series data into a single equation. This method was devised to tackle various challenges encountered when conducting regression analysis on cross-sectional or time-series data independently [15]. All data processing and analysis were performed using Eviews 9. In panel data regression analysis, three distinct modelling approaches are considered: the common effect model (CEM), the fixed effect model (FEM), and the random effect model (REM). These approaches undergo evaluation to ascertain which one is most suitable and optimal for the study at hand. The research employs the following regression model:

$$Poverty_{it} = \alpha + \beta 1\ Educ_{it} + \beta 2\ Unemployment_{it} + \beta 3\ HDI_{it} + \varepsilon \ldots \ldots \ldots (1)$$

Explanation: Poverty refers to the poverty rate, Educ refers to the Education Level, Unemployment refers to the open unemployment rate, and HDI refers to Human Development Index. The data is a panel data from 2015 to 2023. α represents the constant, $\beta_1, \ldots, \beta_4$ represent the regression coefficients, and ε represents the error terms.

This study employs secondary data obtained from the Central Statistics Agency of the Special Region of Yogyakarta Province. The investigation explores factors such as poverty rate, education level, open unemployment rate, and Human Development Index from 2015 to 2023. Utilising Eviews 9 software, the researchers conducted panel data regression analysis using the Fixed Effects Model (FEM).

4 Result and discussion

1. Chow Test

   In statistical analysis, the Chow test serves as a tool for selecting between the Common Effect Model (CEM) and the Fixed Effect Model (FEM). This test establishes a null hypothesis (H0) that favours the CEM, whilst proposing an alternative hypothesis (H1) that supports the FEM. The decision-making process relies on the probability value: should it be below the 0.05 significance level, H0 is rejected and H1 is accepted, suggesting the FEM as the optimal choice. In contrast, if the probability value surpasses 0.05, H0 is accepted and H1 is rejected, leading to the adoption of the CEM as the preferred model.

   Table 2. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	29.343298	(4,36)	0.0000
Cross-section Chi-square	58.050051	4	0.0000

   Source : Data Analysis

   The Chow test conducted in this research revealed a probability value of 0.0000, which is below the 0.05 significance level. As a result, we reject the null hypothesis (H0) and accept the alternative hypothesis (H1). The outcome of the Chow test suggests that the Fixed Effect Model (FEM) is the most appropriate analytical framework for this particular investigation.

2. Hausman Test

   In research studies, the Hausman test serves as a crucial tool for assessing whether the Fixed Effects Model (FEM) or the Random Effects Model (REM) is more appropriate. The test's decision-making process hinges on a specific criterion: if the probability value is found to be below the 0.05 significance level, researchers reject the null hypothesis (H0) and accept the alternative hypothesis (H1), thereby indicating that the Fixed Effects Model (FEM) is the optimal choice. Conversely, when the probability value surpasses 0.05, H0 is accepted and H1 is rejected, leading to the selection of the Random Effects Model (REM) as the preferred approach.

Table 3. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.017069	3	0.0296

Source : Data Analys

In this study, the Hausman test produced a p-value of 0.0296, which is less than the 0.05 significance level. This result necessitates the rejection of the null hypothesis (H0) and the acceptance of the alternative hypothesis (H1). Consequently, the Hausman test suggests that the Fixed Effects Model (FEM) is the most appropriate method for this particular investigation.

3. Hypothesis Test

Based on the results of both the Chow test and the Hausman test, the Fixed Effects Model is determined to be the most suitable model. The results are presented in the table below.

Table 4. Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Educ	-1.203862	0.988532	-2.217828	0.0231
Unemployment	0.266365	0.205390	2.296877	0.0209
HDI	-0.802688	0.243143	-3.301302	0.0026
C	85.97403	11.41032	7.534762	0.0000
R-squared	0.975295	Mean dependent var		14.45222
Adjusted R-squared	0.970184	S.D. dependent var		4.443149
S.E. of regression	0.767217	Akaike info criterion		2.480572
Sum squared resid	17.07004	Schwarz criterion		2.788478
Log likelihood	-37.65029	Hannan-Quinn criter.		2.588039
F-statistic	190.8087	Durbin-Watson stat		1.569828
Prob(F-statistic)	0.000000			

Source : Data Analysis

From the regression equation above, the following interpretations can be made:

a. The Constant value of 85.97403 implies that if the Education Level, Unemployment Rate, and Human Development Index are all zero, the Poverty would be 85.97403 point.

b. The regression coefficient for the Education Level variable is -1.203862, meaning that a 1 point increase in the Education Level would lead to a decrease of 1.203862 point in Poverty, assuming all other variables remain constant (ceteris paribus).

c. The regression coefficient for the Unemployment variable is 0.266365, meaning that a 1 point increase in Unemployment would lead to an increase of 0.266365 in Poverty, assuming all other variables remain constant (ceteris paribus).

d. The regression coefficient for the HDI variable is -0.802688 , meaning that a 1 point increase in the Human Development Index would lead to a decrease of 0.802688 in Poverty, assuming all other variables remain constant (ceteris paribus).

4. Coefficient of Determination (R-Squared)

   The estimation in Figure 3 yields a coefficient of determination (R-squared) of 0.975295, suggesting that 97.53% of the variance in the dependent variable is accounted for by the independent variables. A value closer to 100% indicates a more robust model. Consequently, additional factors influencing poverty in the Special Region of Yogyakarta, which are not incorporated in this regression, contribute to the remaining 2.47% of the variance.

5. F-Statistics Test

   The simultaneous significance test, also known as the F-test, is employed to assess the collective impact of the independent variables (Education, Unemployment, and HDI) on the variation in the dependent variable (Poverty).

   The fixed-effects panel data regression results presented in Figure 3 reveal an F-statistic of 190.8087 with a probability of 0.000000 (below 0.05). This outcome suggests that Education, Unemployment, and HDI, when considered together, exert a substantial and concurrent influence on the Poverty variable.

5 Conclusion and implication

Based on the research findings, the following conclusions can be drawn:

1. Education has a negative and significant impact on poverty in the Special Region of Yogyakarta. This implies that education is capable of reducing poverty in the Special Region of Yogyakarta.
2. Unemployment has a positive and significant impact on poverty in the Special Region of Yogyakarta. This means that unemployment is a major cause of poverty in the Special Region of Yogyakarta.
3. The Human Development Index has a negative and significant impact on poverty in the Special Region of Yogyakarta. This indicates that a high Human Development Index can reduce poverty in the Special Region of Yogyakarta.

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