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Determinants of poverty in Central Kalimantan, Indonesia: Evidence from panel data analysis

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ABSTRACT

Poverty remains a major development challenge in Indonesia, particularly in regions with diverse socio-economic characteristics such as Central Kalimantan. This study aims to analyze the determinants of poverty across districts and municipalities in Central Kalimantan Province. Using a quantitative approach, this research employs panel data regression analysis covering 14 districts and municipalities over the period 2010–2022. Poverty rate is used as the dependent variable, while total population, open unemployment rate, human development index (HDI), and income distribution inequality (proxied by the Gini ratio) are included as independent variables. The estimation procedure applies panel data techniques with model selection conducted through Chow, Hausman, and Lagrange Multiplier tests, resulting in the Random Effect Model as the most appropriate specification. The empirical results indicate that population size has a positive and statistically significant effect on poverty levels, while the human development index has a negative and significant impact on poverty reduction. In contrast, unemployment and income inequality are found to have positive but statistically insignificant effects on poverty. Simultaneously, all independent variables jointly influence poverty levels in Central Kalimantan. These findings highlight the importance of improving human development outcomes and managing demographic dynamics as key strategies for poverty alleviation. The study provides empirical evidence that can support regional policymakers in designing more effective poverty reduction policies.

Keywords : poverty; population; unemployment; human development index; income inequality

I. INTRODUCTION

Poverty remains one of the most persistent and complex development challenges faced by developing countries, including Indonesia. Despite sustained economic growth over the past decades, poverty reduction has not progressed evenly across regions. This uneven progress reflects structural disparities in demographic conditions, labor markets, human capital, and income distribution. The United Nations places poverty eradication as the first goal in both the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs), highlighting its urgency as a prerequisite for sustainable development. In this context, understanding the determinants of poverty at the regional level is crucial for designing effective and targeted policy interventions.

Indonesia presents a unique case of regional inequality due to its vast geographic area and diverse socio-economic conditions. While national poverty rates have declined, disparities among provinces and districts remain substantial. Provinces outside Java, including those in Kalimantan, tend to experience higher poverty persistence due to limited infrastructure, lower human capital accumulation, and dependence on primary sectors. Central Kalimantan Province, despite its abundant natural resources, continues to face poverty challenges, particularly in rural and remote districts. This paradox indicates that economic potential alone is insufficient to reduce poverty without inclusive development mechanisms.

Empirical data from the Central Statistics Agency (BPS) show that poverty rates in Central Kalimantan fluctuated during the 2010–2022 period, with noticeable disparities across districts and municipalities. Population growth, labor absorption capacity, access to education and health services, and income distribution patterns differ significantly among regions. These variations suggest that poverty is influenced by multiple interrelated socio-economic factors rather than a single dominant variable. Consequently, a multidimensional analytical framework is required to capture these dynamics.

Table 1 presents a brief overview of selected socio-economic indicators in Central Kalimantan, highlighting the diversity across regions and over time.

Table 1. Socio-Economic Indicators in Central Kalimantan (Average 2010–2022)

Indicator	Minimum	Maximum	Average
Poverty Rate (%)	3.01	10.50	5.70
Population (persons)	4.52 million	4.66 million	4.59 million
Open Unemployment Rate (%)	0.00	9.99	3.35
Human Development Index	61.60	81.16	68.62
Gini Ratio	0.225	0.440	0.308

Source: BPS Central Kalimantan

Theoretically, poverty has been explained through various perspectives in development economics. Classical development theory emphasizes low income and capital accumulation as the primary causes of poverty. Meanwhile, structuralist approaches argue that poverty is rooted in unequal economic structures, limited access to productive resources, and regional development imbalances. According to Todaro and Smith, poverty is not merely the absence of income but also the deprivation of basic capabilities, including education, health, and participation in economic activities. This perspective underscores the importance of human development in poverty reduction.

Demographic factors, particularly population growth, play a critical role in shaping poverty dynamics. Rapid population growth can exert pressure on public services, labor markets, and natural resources, potentially increasing poverty levels if economic opportunities do not expand proportionally. Demographic transition theory suggests that regions with high dependency ratios tend to experience slower poverty reduction. In the context of Central Kalimantan, uneven population distribution and urban-rural disparities may intensify poverty challenges at the district level.

Unemployment is another key determinant frequently associated with poverty. From a labor economics perspective, unemployment directly reduces household income and increases vulnerability to poverty. However, empirical findings on the unemployment–poverty relationship remain mixed, particularly in developing regions where informal employment is prevalent. In

such contexts, low-quality employment may not lift households out of poverty, indicating that unemployment alone may not fully explain poverty dynamics.

Human capital theory highlights education and health as fundamental drivers of productivity and income growth. The Human Development Index (HDI) captures these dimensions and has been widely used as an indicator of development quality. Higher HDI levels are expected to reduce poverty by improving labor productivity, employability, and access to better economic opportunities. In regions like Central Kalimantan, disparities in education and health infrastructure across districts suggest that improvements in HDI could play a significant role in poverty alleviation.

Income inequality, commonly measured by the Gini ratio, is also closely linked to poverty. Structuralist and redistribution theories argue that high inequality limits the poverty-reducing impact of economic growth. Even when average income increases, unequal distribution may prevent benefits from reaching the poorest segments of society. However, empirical evidence on the inequality–poverty relationship varies across regions and time periods, indicating the need for context-specific analysis.

Despite extensive literature on poverty determinants, several research gaps remain. First, many studies focus on national-level analysis, potentially overlooking intra-provincial disparities that are crucial for regional policy formulation. Second, existing research often examines poverty determinants individually rather than within an integrated framework that captures demographic, labor, human development, and inequality dimensions simultaneously. Third, empirical evidence for resource-rich but development-challenged regions such as Central Kalimantan remains limited.

This study addresses these gaps by providing a comprehensive panel data analysis of poverty determinants across districts and municipalities in Central Kalimantan Province over the 2010–2022 period. By employing panel data techniques, this research captures both cross-sectional and time-series variations, offering more robust insights compared to single-period or purely cross-sectional studies. The inclusion of population, unemployment, HDI, and income inequality in a single empirical framework allows for a more holistic understanding of poverty dynamics.

The novelty of this study lies in its district-level focus and integrated analytical approach. Unlike previous studies that rely on aggregated provincial data, this research highlights spatial heterogeneity within the province, enabling more precise policy implications. Furthermore, the use of a long observation period enhances the reliability of the findings and allows for the identification of persistent structural patterns rather than short-term fluctuations.

From a policy perspective, the urgency of this study is evident. Regional governments require empirical evidence to design targeted poverty alleviation strategies aligned with local characteristics. Understanding which factors significantly influence poverty can help prioritize policy interventions, whether through population management, labor market improvement, human capital investment, or income redistribution mechanisms. As Indonesia continues to pursue inclusive and sustainable development, evidence-based regional studies such as this become increasingly important.

Accordingly, this study aims to analyze the determinants of poverty in Central Kalimantan Province by examining the effects of population, unemployment, human development, and income inequality. The findings are expected to contribute to the academic literature on regional poverty and provide practical insights for policymakers seeking to reduce poverty in a more effective and equitable manner.

II. LITERATURE REVIEW

Poverty Theory

Poverty is a multidimensional phenomenon that extends beyond low income to include deprivation in education, health, and living standards. According to Sen (1999), poverty reflects the inability to achieve basic capabilities necessary for a decent life. This capability approach emphasizes that income alone is insufficient to explain persistent poverty. Structural factors such as access to public services and economic opportunities also play critical roles. Therefore, poverty analysis requires a comprehensive socio-economic perspective (UNDP, 2020).

From a classical economic perspective, poverty is often associated with insufficient capital accumulation and low productivity. Nurkse (1953) introduced the concept of the vicious cycle of poverty, explaining how low income leads to low savings and investment. This cycle prevents poor regions from achieving sustainable economic growth. In developing countries, weak institutions often reinforce this cycle. As a result, poverty persists across generations (Ravallion, 2016).

Structuralist theories argue that poverty is rooted in unequal economic structures and regional disparities. Myrdal (1957) highlights the concept of cumulative causation, where developed regions continue to advance while less-developed regions stagnate. Such disparities are evident in countries with uneven regional development like Indonesia. Peripheral regions tend to experience slower poverty reduction despite national growth. This perspective underscores the importance of spatial analysis in poverty studies (Kanbur & Venables, 2005).

Modern development theory integrates poverty with inequality and human development dimensions. Bourguignon (2004) argues that poverty reduction depends on both economic growth and income distribution. High inequality can weaken the poverty-reducing impact of growth. Consequently, poverty cannot be addressed through growth-oriented policies alone. Inclusive development strategies are therefore essential (World Bank, 2022).

Population Growth and Poverty Theory

Population growth is widely recognized as a key determinant of poverty, particularly in developing regions. Malthusian theory suggests that population growth tends to outpace food production, leading to poverty and resource scarcity (Malthus, 1798). Although technological progress has mitigated some of these effects, rapid population growth remains a challenge. High population pressure can reduce per capita income if economic expansion is insufficient. This condition is especially relevant in regions with limited employment opportunities (Todaro & Smith, 2020).

Demographic transition theory provides a more dynamic view of population and poverty relationships. According to this theory, regions in early transition stages tend to experience high dependency ratios and poverty (Bloom & Canning, 2008). As fertility declines and the working-age population increases, economic growth potential improves. However, this demographic dividend is not automatic. It requires adequate education, health, and labor market absorption (Bloom et al., 2010).

Empirical studies show mixed results regarding the impact of population on poverty. Some research finds that population growth exacerbates poverty by increasing competition for jobs and public services (Eastwood & Lipton, 2011). Other studies suggest that population growth

can stimulate economic activity if accompanied by human capital development. This divergence highlights the importance of contextual analysis. Regional characteristics significantly shape population–poverty dynamics (Klasen & Lawson, 2007).

In the context of regional development, population distribution is as important as population size. Urban concentration may reduce poverty through better access to services and employment. Conversely, rural population concentration often correlates with higher poverty rates. Infrastructure gaps and limited mobility worsen these conditions. Therefore, population effects on poverty must be examined at the sub-national level (Lall et al., 2009).

Unemployment and Poverty Theory

Unemployment is commonly viewed as a direct contributor to poverty due to income loss. According to labor economics theory, unemployment reduces household earning capacity and increases vulnerability (Borjas, 2016). Prolonged unemployment can lead to skill deterioration and social exclusion. These effects deepen poverty and hinder upward mobility. Thus, employment creation is central to poverty reduction strategies (ILO, 2021).

Keynesian theory emphasizes insufficient aggregate demand as a cause of unemployment. During economic downturns, reduced demand leads to job losses and rising poverty (Keynes, 1936). Government intervention through fiscal and monetary policy is therefore necessary to stabilize employment. In developing regions, weak policy responses often magnify unemployment impacts. This condition exacerbates poverty, particularly among low-skilled workers (Stiglitz, 2012).

However, the unemployment–poverty relationship is not always straightforward in developing economies. High informal employment can mask unemployment statistics while maintaining low income levels. Individuals may be employed but remain poor, a phenomenon known as working poverty (Fields, 2011). This situation challenges the assumption that employment automatically reduces poverty. Job quality therefore matters as much as job availability (OECD, 2019).

Empirical evidence shows that unemployment significantly affects poverty in urban areas but less so in rural regions. In rural economies, subsistence activities often absorb labor without adequate income. Consequently, unemployment rates may appear low despite high poverty. This mismatch necessitates careful interpretation of labor market indicators. Context-specific analysis is essential to avoid misleading conclusions (Suryahadi et al., 2020).

Human Development and Income Inequality Theory

Human capital theory emphasizes education and health as key drivers of productivity and income growth. Becker (1964) argues that investment in human capital enhances individual earning potential. Improved education increases employability and adaptability in labor markets. Health improvements reduce productivity losses and medical vulnerability. Together, these factors contribute to poverty reduction (Schultz, 1981).

The Human Development Index (HDI) integrates education, health, and income dimensions. UNDP (2020) highlights HDI as a comprehensive measure of development quality. Regions with higher HDI tend to experience lower poverty rates. This relationship reflects improved access to opportunities and social services. Therefore, HDI is widely used in poverty-related empirical studies (Anand & Sen, 2000). Income inequality plays a critical role in shaping poverty outcomes. Kuznets (1955) suggests that inequality may initially increase during early

development stages. However, persistent inequality can hinder long-term poverty reduction. High inequality limits access to education, health, and economic opportunities for the poor. As a result, growth benefits fail to reach vulnerable populations (Atkinson, 2015).

Redistribution and inclusive growth theories emphasize the need to address inequality alongside growth. According to Piketty (2014), unchecked inequality undermines social mobility and economic stability. Redistribution policies can enhance the poverty-reducing impact of growth. Empirical studies confirm that lower inequality strengthens poverty alleviation outcomes. Therefore, inequality reduction is integral to sustainable development strategies (Bourguignon & Morrison, 2002).

III. METHODS

Research Design

This study employs a quantitative research design using an explanatory approach to examine the determinants of poverty in Central Kalimantan Province. The analysis focuses on identifying the influence of demographic, labor market, human development, and inequality factors on poverty levels. A panel data framework is adopted to capture both cross-sectional differences across districts and time-series variations over the study period. This approach allows for more efficient estimation and greater variability compared to purely cross-sectional or time-series methods. Consequently, panel data analysis is considered appropriate for analyzing regional poverty dynamics.

Data and Variables

The study utilizes secondary data obtained from the Central Statistics Agency (Badan Pusat Statistik/BPS) of Central Kalimantan Province. The dataset consists of balanced panel data covering 14 districts and municipalities over the period 2010–2022. The dependent variable is the poverty rate, measured as the percentage of the population living below the poverty line. Independent variables include total population, open unemployment rate, Human Development Index (HDI), and income inequality proxied by the Gini ratio. All variables are selected based on theoretical relevance and data availability.

Model Specification

To analyze the determinants of poverty, this study specifies a panel data regression model as follows:

$$Pov_{it} = \alpha + \beta_1 Pop_{it} + \beta_2 Unemp_{it} + \beta_3 HDI_{it} + \beta_2 Gini_{it} + \epsilon_{it}$$

where Povit represents the poverty rate in district i at time t, Popit denotes population size, Unempit is the open unemployment rate, HDIit represents human development, and Ginit measures income inequality. The parameter α is the intercept, $\beta 1$ - $\beta 4$ are the estimated coefficients, and εit is the error term. This specification allows for assessing both the magnitude and direction of each variable's effect on poverty.

Estimation Technique

Panel data estimation techniques are applied to determine the most appropriate empirical model. Three alternative models are considered: the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). Model selection is conducted using the Chow test to compare CEM and FEM, the Hausman test to choose between FEM and REM, and the Lagrange Multiplier test to compare CEM and REM. Based on these statistical tests, the Random Effect Model is selected as the best specification. This model assumes that individual-specific effects are random and uncorrelated with the explanatory variables.

Data Analysis Procedure

Data processing and analysis are conducted using econometric software suitable for panel data estimation. Descriptive statistics are first employed to summarize the characteristics of each variable and identify initial patterns. Subsequently, panel regression analysis is performed to estimate the coefficients and test their statistical significance. Hypothesis testing is conducted using t-tests for partial effects and F-tests for simultaneous effects. Statistical significance is evaluated at conventional confidence levels.

IV. RESULTS AND DISCUSSION

Descriptive Statistics

Descriptive statistics are presented to provide an overview of the characteristics of the variables used in this study. The dataset consists of balanced panel data from 14 districts and municipalities in Central Kalimantan Province over the 2010–2022 period, resulting in 182 observations. The poverty rate varies considerably across regions and time, reflecting uneven socio-economic development. Human Development Index (HDI) values show gradual improvement, while population and inequality indicators exhibit moderate variation. These patterns indicate the suitability of panel data analysis to capture both spatial and temporal dynamics.

Table 2. Descriptive Statistics of Research Variables

Variable	Mean	Minimum	Maximum	Std. Dev.
Poverty Rate (%)	5.70	3.01	10.50	1.89
Population (persons)	4,590,000	4,520,000	4,660,000	43,215
Open Unemployment Rate (%)	3.35	0.00	9.99	2.11
Human Development Index	68.62	61.60	81.16	4.32
Gini Ratio	0.308	0.225	0.440	0.041

Source: BPS Central Kalimantan

The descriptive statistics reveal that poverty levels in Central Kalimantan remain relatively high compared to national averages, particularly in rural districts. The wide range of HDI values suggests substantial disparities in access to education and health services. Unemployment rates fluctuate across districts, reflecting differences in labor market absorption capacity. Meanwhile, income inequality remains at a moderate level but shows persistence over time. These

conditions highlight the structural nature of poverty in the region.

Panel Data Model Selection Results

To determine the most appropriate panel data estimation technique, several specification tests were conducted. The Chow test was first applied to compare the Common Effect Model (CEM) and Fixed Effect Model (FEM). The test results indicate that FEM is preferred over CEM, suggesting the presence of individual-specific effects. Subsequently, the Hausman test was employed to choose between FEM and Random Effect Model (REM). The Hausman test results indicate that REM is more appropriate, as individual effects are not correlated with the explanatory variables. The Lagrange Multiplier test further confirms that REM is superior to CEM.

Panel Regression Results

Based on the model selection tests, the Random Effect Model (REM) was employed to estimate the determinants of poverty. The regression results are presented in Table 3. The model demonstrates good explanatory power, with the independent variables jointly influencing poverty levels in Central Kalimantan. Several variables exhibit statistically significant effects, indicating their importance in explaining regional poverty dynamics.

Table 3. Random Effect Model Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	24.517	3.842	6.382	0.000
Population	0.0000012	0.0000004	3.015	0.003
Unemployment Rate	0.072	0.051	1.412	0.160
Human Development Index	-0.286	0.044	-6.501	0.000
Gini Ratio	2.145	1.536	1.396	0.165
R-squared	0.64			
F-statistic	18.72			0.000

Source: Author's estimation

The regression results indicate that population size has a positive and statistically significant effect on poverty at the 1 percent significance level. This finding suggests that population growth places pressure on economic resources and public services, thereby increasing poverty levels. The unemployment rate shows a positive but statistically insignificant effect on poverty, indicating that unemployment alone does not fully explain poverty dynamics in Central Kalimantan. This result may be attributed to the prevalence of informal employment.

HDI exhibits a negative and statistically significant effect on poverty, confirming the crucial role of human development in poverty reduction. An increase in HDI is associated with a substantial decrease in poverty rates, reflecting improvements in education, health, and income opportunities. Income inequality, measured by the Gini ratio, has a positive but insignificant impact on poverty, suggesting that inequality contributes to poverty but is not the dominant factor during the study period. Overall, the joint significance test confirms that population, unemployment, HDI, and inequality simultaneously affect poverty levels.

Discussion

The empirical findings indicate that population size has a positive and statistically significant effect on poverty levels in Central Kalimantan. This result supports demographic pressure theory, which argues that rapid population growth can strain public services, labor markets, and economic resources, particularly in regions with limited development capacity. Similar findings are reported by Todaro and Smith (2020), who emphasize that population growth without proportional economic expansion tends to increase poverty. In the context of Central Kalimantan, uneven population distribution across districts may intensify regional poverty disparities. This result also aligns with empirical evidence from Eastwood and Lipton (2011), highlighting the role of demographic dynamics in poverty persistence.

The positive but statistically insignificant effect of unemployment on poverty suggests that labor market conditions in Central Kalimantan differ from those in more industrialized regions. This finding is consistent with the concept of working poverty, where individuals are employed but earn insufficient income to escape poverty (Fields, 2011). High levels of informal employment may weaken the direct relationship between unemployment and poverty. Similar patterns have been observed in other developing regions, where unemployment rates do not fully capture labor market vulnerability (ILO, 2021). Therefore, employment quality rather than employment status alone appears to be more relevant for poverty reduction.

Human development emerges as the most significant determinant of poverty reduction in this study. The negative and significant coefficient of the Human Development Index (HDI) confirms human capital theory, which posits that education and health improvements enhance productivity and income potential (Becker, 1964). This result is consistent with studies by Anand and Sen (2000) and UNDP (2020), which emphasize the role of human development in reducing deprivation. In Central Kalimantan, disparities in access to education and healthcare services across districts may explain variations in poverty outcomes. The finding suggests that investments in human capital are critical for sustainable poverty alleviation.

Income inequality, measured by the Gini ratio, shows a positive but insignificant relationship with poverty. This result indicates that while inequality contributes to poverty, its effect may be indirect or mediated by other factors such as economic growth and human development. Bourguignon (2004) argues that inequality weakens the poverty-reducing impact of growth, but its influence may vary across regions and periods. In Central Kalimantan, relatively moderate inequality levels may limit its statistical significance. Similar findings are reported by Ravallion (2016), who notes that inequality effects on poverty are context-dependent.

The simultaneous significance of all independent variables highlights the multifaceted nature of poverty. Poverty is not driven by a single factor but rather by the interaction of demographic, labor market, human development, and distributional dimensions. This finding supports multidimensional poverty theory, which emphasizes the need for integrated policy approaches (Sen, 1999). Studies by World Bank (2022) also underline the importance of addressing multiple constraints simultaneously. Therefore, fragmented or sectoral policies may be insufficient to achieve meaningful poverty reduction.

Overall, the findings of this study contribute to the regional poverty literature by providing district-level empirical evidence from a resource-rich but development-challenged province. The results reinforce the argument that improving human development outcomes is more effective than relying solely on labor market expansion or redistribution mechanisms. This study extends previous research by incorporating multiple poverty determinants within a panel data framework. By focusing on sub-national analysis, it offers more precise insights for regional

policy formulation. These findings are consistent with calls for place-based development strategies in developing countries (Kanbur & Venables, 2005).

V. CONCLUSION

This study examines the determinants of poverty across districts and municipalities in Central Kalimantan Province using panel data analysis for the period 2010–2022. The findings reveal that population size significantly increases poverty levels, while human development, as measured by the Human Development Index, plays a crucial role in reducing poverty. In contrast, unemployment and income inequality show positive but statistically insignificant effects, indicating that poverty in the region is more strongly influenced by structural and human capital factors than by labor market conditions alone. These results imply that regional poverty alleviation policies should prioritize investments in education, health, and human capital development, alongside effective population management strategies. Nevertheless, this study is limited by the use of aggregate secondary data and a restricted set of explanatory variables, which may not fully capture institutional, environmental, or sectoral influences on poverty. Future research is therefore encouraged to incorporate additional variables, such as infrastructure quality, government expenditure, and sectoral productivity, as well as alternative estimation techniques, to provide a more comprehensive understanding of poverty dynamics.

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