

Why Does Poverty Persist in Madura, Indonesia? Evidence from Human Development and Educational Empowerment Perspectives

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Received: May 2, 2026; **Revised:** May 29, 2026; **Accepted:** June 27, 2026

Abstract: Why does poverty remain persistently high in Madura, Indonesia, despite ongoing improvements in socio-economic development and educational access? This study investigates the determinants of poverty from human development and educational empowerment perspectives by examining the roles of the Human Development Index (HDI), unemployment, household consumption, and regional income. The findings reveal that improvements in human development significantly reduce poverty, highlighting the importance of educational attainment, health conditions, and human capability enhancement in promoting welfare. Household consumption also exhibits a significant relationship with poverty, suggesting that household welfare and purchasing capacity remain important determinants of poverty outcomes. In contrast, unemployment and regional income do not have statistically significant effects on poverty, indicating that labor market status and aggregate economic growth alone are insufficient to explain poverty persistence in Madura. These findings suggest that poverty reduction depends not only on economic expansion but also on the capacity of individuals and communities to convert available opportunities into sustainable welfare improvements. The study contributes to the literature on poverty, human development, and educational empowerment by demonstrating the central role of human capability formation in addressing persistent poverty. The findings further highlight the importance of strengthening educational empowerment, human capital development, and community capability as key policy priorities for achieving inclusive and sustainable poverty reduction in peripheral regions.

Keywords: Educational Empowerment, Human Development, Poverty, Regional Inequality

How to Cite: Ulfa, K. P., Wijayati, W. D. T., Seno, A. T., Syamsul, A., & Muhlisin, M. (2026). Why Does Poverty Persist in Madura, Indonesia? Evidence from Human Development and Educational Empowerment Perspectives. *Journal of Economic Education and Entrepreneurship Studies*, 7(3), 327-346. <https://doi.org/10.62794/je3s.v7i3.215>

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INTRODUCTION

Economic growth is widely expected to generate spillover effects that reduce poverty in surrounding regions. Classical growth pole theory argues that development originating in core areas diffuses outward through investment linkages, labor mobility, and market

integration(Perroux, 1950). Similarly, the new economic geography literature suggests that proximity to dynamic economic centers should enhance productivity and income opportunities in adjacent regions(Krugman, 1991). Under these frameworks, regions located near growth hubs are expected to benefit from agglomeration effects and economic expansion. However, empirical evidence increasingly shows that spatial proximity does not automatically translate into welfare improvements, and regional disparities may persist due to structural constraints, unequal human capital distribution, and limited absorptive capacity(Rodríguez-Pose, 2018). These contrasting development outcomes raise a broader question of why poverty remains persistent in certain regions despite improvements in economic development, infrastructure connectivity, and access to public services.

Indonesia provides an interesting phenomenon to examine this spatial paradox. Despite sustained economic growth over the past decades, regional inequality remains a persistent challenge across provinces and districts(Asra, 2000; Hill, 2021; Miranti et al., 2013). East Java is one of the country's main economic engines with Surabaya serving as a major growth hub characterized by industrial concentration, infrastructure development and high urban productivity. However, Madura Island located geographically close to this economic hub continues to experience chronically high poverty rates compared to other districts in the province. Madura's resilience to poverty, despite its proximity to a dynamic growth hub, suggests that economic expansion in the core region does not automatically spill over to the economies of the peripheral islands. This makes Madura a particularly relevant case for investigating whether proximity to growth hubs effectively translates into measurable poverty reduction.

Poverty is not merely the outcome of low income but reflects structural deprivation in human capabilities and economic participation. Sen (1976) conceptualizes poverty as a deprivation of basic capabilities the freedom to achieve valuable functionings such as education, health, and productive employment. In this regard, the Human Development Index (HDI) which captures achievements in education, health and living standards, provides an important lens through which poverty dynamics can be understood(Ranis et al., 2006). At the same time, labor market conditions and household consumption capacity play a central role in shaping welfare outcomes. High unemployment may limit income generation opportunities, while consumption expenditure reflects purchasing power and immediate living standards(Meyer & Sullivan, 2009). However, in peripheral regions characterized by informal employment structures and limited industrial absorption, income indicators alone may not fully capture economic vulnerability(Nattrass & Seekings, 2018). These considerations suggest that poverty persistence near growth centers may be rooted in structural constraints related to human development, labor market dynamics and household consumption capacity rather than spatial proximity alone.

The relationship between geographic proximity and poverty reduction is not automatically linear because the benefits of regional economic growth depend on the capacity of local communities to absorb and transform economic opportunities into sustainable welfare improvements(Rodríguez-Pose, 2013; Rodríguez-Pose & Tselios, 2009). In peripheral regions with limited educational readiness, weak human capital formation, and low absorptive capacity, economic spillovers from nearby growth centers may remain concentrated among specific sectors or external actors without substantially improving local living conditions(Rodríguez-Pose & Tselios, 2009). Consequently, spatial closeness alone may fail to generate inclusive development when communities lack the educational capability, productive skills, and institutional readiness required to participate effectively in expanding regional economic activities. This perspective suggests that human development and educational empowerment function as critical enabling

mechanisms that determine whether regional growth can be translated into poverty reduction in peripheral economies, consistent with the capability approach emphasizing human freedom and capacity expansion in development processes (Sen, 1976).

From a human capital and educational empowerment perspective, the persistence of poverty in peripheral regions may also reflect limited educational capacity and unequal access to quality learning opportunities. Human Capital Theory emphasizes that education enhances productivity, adaptive skills, and individual economic capability, enabling communities to better absorb the benefits of regional economic growth (Becker, 1992; Schultz, 1961). In regions characterized by limited educational attainment and weak labor market integration, proximity to economic growth centers may not automatically generate welfare improvements because local communities lack sufficient absorptive capacity to participate in expanding economic activities. Educational empowerment therefore becomes essential in strengthening human capability, improving labor readiness, and supporting sustainable poverty reduction in structurally disadvantaged regions.

Poverty is one of the structural problems that is still a major challenge in development in Indonesia (Hatta & Sarkawi, 2011; Hill, 2021; Swastika & Supriyatna, 2008). Although the national poverty rate tends to decline, disparities between regions still show significant inequality (Asra, 2000; Islam & Khan, 1986; Miranti et al., 2013). Poverty is still one of the fundamental problems in various regions of Indonesia, including Madura Island (Joesoef et al., 2024; Kamalia et al., 2024; Susilowati et al., 2019). This island consists of four districts, namely Bangkalan, Sampang, Pamekasan, and Sumenep, which are geographically close to the center of economic growth in East Java, but socially and economically still lag behind the surrounding areas.

The phenomenon of poverty in Madura is not only indicated by the high percentage of poor people, but also by the low quality of life of the community in general. The low achievement of the Human Development Index (HDI), the high level of open unemployment, low per capita consumption, and limited household income are indicators that are interrelated and strengthen the cycle of poverty (Ajakaiye & Adeyeye, 2001; Dahliah & Nur, 2021; Danaan, 2018). HDI is an indicator that reflects three important dimensions in human development, namely education, health, and a decent standard of living (Ranis et al., 2006). If the HDI is low, it indicates that the Madurese population still faces limited access to basic services. On the other hand, unemployment is a challenge in itself because it reduces people's productivity and purchasing power (Bean & Pissarides, 1993; Nattrass & Seekings, 2018). Low levels of consumption and income also reflect limited economic activity that can increase poverty (Lee, 2003; Levin & Bigsten, 2000; Meyer & Sullivan, 2012). These four variables do not stand alone, but are interrelated and form a cycle of poverty that is difficult to break without targeted intervention. This problem cannot be seen separately, because these factors influence each other and collectively have an impact on the high poverty rate. Therefore, a comprehensive empirical study is needed to dissect the determinants of poverty in Madura.

Studies on Indonesia have documented persistent regional disparities following decentralization, yet they rarely embed peripheral regions within a spatial growth framework that explicitly tests whether proximity to economic hubs translates into poverty reduction (Hill, 2021; Miranti et al., 2013). Moreover, empirical evidence on island or semi-peripheral economies remains limited, particularly in examining how human development, labor market conditions, consumption, and income interact within a localized panel setting. By focusing on Madura as a peripheral island economy with persistent poverty challenges, this study contributes to the poverty and regional development literature by examining how human development,

unemployment, household consumption and income shape poverty dynamics. The study places particular emphasis on educational empowerment and human capability formation as mechanisms that may explain the persistence of poverty in a localized regional. Existing studies tend to focus primarily on macroeconomic indicators while paying less attention to the role of educational capacity and human capital readiness in enabling local communities to absorb regional growth spillovers.

This study offers several contributions to the poverty and human development literature. First, unlike many studies that focus on poverty incidence or short-run determinants, this research addresses poverty persistence, a phenomenon widely discussed in the poverty-trap literature, which shows that households and regions can remain poor when initial disadvantages, low assets, and weak capabilities are reinforced over time (Alkire, 2005; Carter & Barrett, 2006; Jalan & Ravallion, 2002). Second, the study moves beyond conventional income-based interpretations by drawing on the human development approach, which conceptualizes poverty as deprivation of capabilities rather than income alone (Alkire, 2005; Sen, 1976) and by incorporating educational empowerment as a pathway through which human capital formation can improve long-term welfare outcomes (Becker, 1993; Hanushek et al., 2012; Schultz, 1961). While poverty research in Indonesia has often emphasized growth, employment, and household income dynamics, the role of education as a capability-enhancing mechanism remains comparatively underexplored in explaining persistent poverty (Suryahadi et al., 2009). Third, by providing evidence from Madura as a peripheral island economy, this study contributes to the regional inequality literature, which shows that geographically disadvantaged regions often face structural constraints that limit the translation of development gains into inclusive welfare improvements (Barca et al., 2012; Rodríguez-Pose, 2018). By integrating poverty persistence, human capability formation, and educational empowerment within a single analytical framework, this study offers a more comprehensive explanation of the structural conditions associated with long-term poverty reduction. The novelty of this study lies not merely in testing the effects of HDI, unemployment, consumption, and income on poverty, but in interpreting these relationships through the lens of human capability and educational empowerment. This perspective enables a deeper understanding of why improvements in aggregate economic conditions do not always translate into sustainable poverty reduction when educational readiness, human capital formation, and individual capabilities remain limited.

This study contributes theoretically to the poverty and human development literature by arguing that persistent poverty cannot be adequately explained through aggregate economic indicators alone. Drawing on human development and educational empowerment perspectives, this study demonstrates that improvements in welfare depend not only on economic conditions but also on the development of human capabilities, educational readiness, and access to opportunities that enable individuals to participate productively in society. The findings suggest that communities may remain trapped in persistent poverty when limitations in educational attainment, human capital formation, and capability development restrict their ability to improve long-term welfare outcomes. Therefore, this study extends existing poverty research by highlighting the role of educational empowerment and human development as critical mechanisms for strengthening human capability and supporting sustainable poverty reduction in peripheral regional economies.

Empirical data further reinforce this paradox. According to Statistics Indonesia (BPS Jatim, 2023), the four regencies of Madura namely Bangkalan, Sampang, Pamekasan, and Sumenep consistently rank among the districts with the highest poverty rates in East Java. In several recent

years, three of these regencies have occupied the top positions in provincial poverty rankings, despite East Java's relatively stable economic growth performance. This pattern suggests that provincial-level growth has not been evenly transmitted to peripheral island districts. The persistence of high poverty rates in Madura indicates that spatial proximity to a growth center does not necessarily ensure effective welfare transmission, thereby strengthening the relevance of examining structural determinants beyond mere geographic closeness. From this perspective, poverty persistence in Madura reflects not merely a problem of spatial disadvantage, but also structural limitations in educational empowerment and human capability formation.

This study aims to examine why poverty persists in Madura, Indonesia, by empirically testing the roles of human development, unemployment, household consumption, and income from human development and educational empowerment perspectives. The study focuses on understanding how human capability formation, educational empowerment, labor market conditions, and household welfare dynamics contribute to poverty persistence. The findings are expected to enrich the literature on poverty, human development, and educational empowerment by providing empirical evidence on the factors associated with persistent poverty and offering insights for more effective and inclusive poverty reduction strategies.

METHOD

Data and Variables

This study employs balanced panel data covering four regencies in Madura are Bangkalan, Sampang, Pamekasan, and Sumenep over the period 2015–2024. The dataset is compiled from Statistics Indonesia (*Badan Pusat Statistik Provinsi Jawa Timur, 2023*) which provides consistent regional socioeconomic indicators at the district level. The dataset consists of a balanced panel of four regencies observed over a ten-year period (2015–2024), resulting in 40 observations. Although the cross-sectional dimension is limited, panel-data methods remain appropriate because they exploit both temporal and regional variation while controlling for unobserved time-invariant heterogeneity across units (Baltagi, 2021; Cameron & Trivedi, 2009; Hsiao, 2014). In applied regional economics and poverty research, panel estimation is commonly used even when the number of administrative units is small, provided that the objective is to examine context-specific dynamics rather than to make broad national generalizations. Accordingly, for a localized study of poverty dynamics in Madura, the balanced panel structure provides an analytically defensible basis for estimating the relationships among the selected variables, while the results should be interpreted as evidence for this specific regional context rather than as universally generalizable estimates.

The dependent variable is the poverty rate, measured as the percentage of the population living below the official poverty line in each regency. Poverty rate is commonly used in regional development studies as an indicator of welfare deprivation and income insufficiency. The key independent variables include: (1) Human Development Index (HDI), capturing achievements in education, health, and living standards, is employed as a proxy for human capability and educational development. Within the human development framework, HDI reflects the extent to which educational attainment and human capital formation contribute to poverty reduction and regional absorptive capacity; (2) the open unemployment rate, reflecting labor market exclusion; (3) household consumption expenditure, representing purchasing power and realized welfare; and (4) regional income, proxied by Gross Regional Domestic Product (GRDP) per capita at constant prices. All monetary variables are expressed in real terms to avoid inflation bias. The selection of these variables is grounded in the theoretical framework emphasizing human

development, educational empowerment, absorptive capacity, labor market transmission, and income elasticity of poverty.

Model Specification

To examine the determinants of poverty persistence in Madura, this study estimates the following panel-data model:

$$Poverty_{it} = \alpha + \beta_1 HDI_{it} + \beta_2 Unemployment_{it} + \beta_3 Consumption_{it} + \beta_4 Income_{it} + \mu_i + \varepsilon_{it}$$

Where Poverty represents the poverty rate in regency *i* during year *t*. HDI denotes the Human Development Index, which serves as a proxy for human capability development, including educational attainment, health conditions, and living standards. Unemployment represents the open unemployment rate, reflecting labor-market conditions. Consumption refers to per capita household expenditure, which captures household purchasing power and welfare conditions. Income represents Gross Regional Domestic Product (GRDP) per capita as an indicator of regional economic performance. μ_i captures unobserved time-invariant district-specific characteristics, while ε_{it} represents the idiosyncratic error term.

Household consumption expenditure and GRDP per capita were entered into the model using their original monetary values rather than logarithmic transformations. This specification was chosen for three reasons. First, the study aims to preserve the original scale of regional economic indicators reported by the Central Bureau of Statistics (BPS), thereby facilitating interpretation within the context of regional poverty analysis. Second, the dataset consists of a relatively small balanced panel of four regencies observed over ten years, where maintaining the original units helps preserve the substantive meaning of variations in consumption and regional income across districts. Third, the primary objective of the study is to identify the direction and significance of the relationships between human development, unemployment, consumption, income, and poverty rather than to estimate elasticities. The use of level variables in panel-data models remains common in regional development and poverty studies when the variables are measured consistently across units and over time. Moreover, panel estimation itself helps account for unobserved heterogeneity and improves the efficiency of parameter estimation by exploiting both cross-sectional and temporal variation in the data (Baltagi, 2021; Hsiao, 2014).

The expected relationship between HDI and poverty is negative because improvements in education, health, and living standards enhance individual capabilities and reduce vulnerability to poverty (Sen, 1976). Unemployment is expected to be positively associated with poverty due to reduced income-generating opportunities. Household consumption and regional income are expected to have negative relationships with poverty because higher purchasing power and stronger economic performance generally contribute to improved welfare outcomes. The model is grounded in the human development and educational empowerment perspective, which views poverty not solely as a lack of income but also as a deprivation of capabilities and opportunities. Accordingly, HDI serves as the primary explanatory variable representing the capacity of individuals to convert economic resources into sustainable welfare improvements.

Estimation Strategy

Given the panel structure of the dataset, model selection was conducted using the Chow, Hausman, and Breusch–Pagan Lagrange Multiplier (LM) tests. Although the dataset consists of four regencies observed over ten years (40 observations), panel estimation remains appropriate because it exploits both cross-sectional and temporal variation while accounting for unobserved

heterogeneity among districts(Baltagi, 2021; Beck, 2001; Cameron & Trivedi, 2009; Hsiao, 2014; Judson & Owen, 1999).

RESULTS AND DISCUSSION

Research Results

Descriptive Statistics

The poverty rate across the four regencies shows persistent variation over the study period, with some districts consistently exhibiting higher levels of poverty compared to the provincial average. The Human Development Index (HDI) displays moderate variation, reflecting gradual improvements in education and health outcomes, although disparities remain evident among districts. Unemployment rates fluctuate over time, indicating unstable labor market absorption in the region. Meanwhile, household consumption and income levels show upward trends, suggesting nominal economic progress. However, the coexistence of rising income and persistent poverty signals that economic gains may not be evenly transmitted across the population. This descriptive evidence reinforces the central research question regarding the effectiveness of growth transmission mechanisms in peripheral regions.

Panel Model Selection Tests

Before estimating the determinants of poverty, model selection procedures were conducted to ensure that the empirical specification was appropriate for the panel structure of the dataset. Given the balanced panel consisting of four regencies observed over a ten-year period, the selection of the estimation model is particularly important to obtain reliable and efficient parameter estimates. Therefore, the Chow Test, Hausman Test, and Breusch–Pagan Lagrange Multiplier (LM) Test were employed to determine whether the pooled Ordinary Least Squares (OLS), Fixed Effects Model (FEM), or Random Effects Model (REM) was the most suitable specification(Baltagi, 2021; Cameron & Trivedi, 2009; Hsiao, 2014). The results of these model selection procedures are reported in the following figures.

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	34.202679	(3,32)	0.0000
Cross-section Chi-square	57.465249	3	0.0000

Figure 1. Chow Test Result

The Chow test on Figure 1 was performed to determine whether panel estimation was preferable to pooled OLS. The probability value of 0.0000 indicates rejection of the null hypothesis, suggesting that the pooled model is inappropriate and that panel estimation should be employed.

Correlated Random Effects - Hausman Test
 Equation: Untitled
 Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.293088	4	0.9903

Figure 2. Hausman Test Result

The Hausman test on Figure 2 was subsequently conducted to determine whether the Fixed Effects Model or Random Effects Model was more appropriate. Since the probability value exceeds 0.05, the null hypothesis cannot be rejected, indicating that the Random Effects specification is preferred.

Table 1. Legrange Multiplier (LM) Result

Test	Statistic	Prob.
Breusch-Pagan LM	65.50445	0.0000

Table 2. Summary of Panel Model Selection

Test	Result	Decision
Chow Test	p = 0.0000	Panel model preferred
Hausman Test	p = 0.9903	REM preferred
LM Test	p = 0.0000	REM preferred
Final Model		Random Effects Model

Based on the results of the Chow, Hausman, and LM tests, the Random Effects Model was selected as the most appropriate specification for the empirical analysis. Based on these model selection procedures, the Random Effects specification was adopted for the final estimation (Baltagi, 2021; Cameron & Trivedi, 2009; Hsiao, 2014).

Random Effects Regression Results

To empirically examine the structural determinants of poverty persistence in Madura, the study estimates the panel data model using the Random Effects approach, as justified in the methodology section. This estimation allows for the inclusion of both cross-sectional and time-series variations while accounting for unobserved district-level heterogeneity. Figure 3 reports the baseline regression results, presenting the estimated coefficients, standard errors, and significance levels for each explanatory variable. The findings provide insight into the relative importance of human development, educational capacity, unemployment, consumption, and income in shaping poverty dynamics in a peripheral island economy.

Dependent Variable: Y
 Method: Panel EGLS (Cross-section random effects)
 Date: 04/07/25 Time: 11:53
 Sample: 2014 2023
 Periods included: 10
 Cross-sections included: 4
 Total panel (balanced) observations: 40
 Wallace and Husain estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	44.36730	13.67686	3.243967	0.0026
X1	-0.521513	0.081357	-6.410186	0.0000
X2	0.225758	0.120639	1.871355	0.0697
X3	0.000205	8.77E-05	2.339388	0.0251
X4	-9.63E-05	0.000151	-0.636041	0.5289

Effects Specification		S.D.	Rho
Cross-section random		2.695199	0.9299
Idiosyncratic random		0.740061	0.0701

Weighted Statistics			
R-squared	0.605484	Mean dependent var	1.708966
Adjusted R-squared	0.560396	S.D. dependent var	1.348584
S.E. of regression	0.894147	Sum squared resid	27.98245
F-statistic	13.42905	Durbin-Watson stat	1.372833
Prob(F-statistic)	0.000001		

Unweighted Statistics			
R-squared	0.413580	Mean dependent var	19.75550
Sum squared resid	222.6415	Durbin-Watson stat	0.172543

Figure 3. Random Effects Regression Results

Figure 3 presents the results of the Random Effects Model estimation. The overall model is statistically significant, as indicated by the F-statistic of 13.42905 with a probability value of 0.000001. The adjusted R-squared value of 0.5604 indicates that approximately 56.04% of the variation in poverty across regencies and years can be explained by human development, unemployment, household consumption and regional income.

Table 3. Summary of Empirical Findings

Variable	p-value	Decision ($\alpha = 0,05$)
Human Development Index (HDI)	0.0000	Has a significant impact on poverty
Unemployment	0.0697	No significant impact on poverty
Household Consumption	0.0251	Has a significant impact on poverty
Regional Income	0.5289	No significant impact on poverty

These table 3 results suggest that the model provides a reasonably strong explanation of poverty dynamics in Madura. Based on the Random Effects estimation, the Human Development Index (HDI) has a negative and statistically significant effect on poverty ($p = 0.0000$). This finding indicates that improvements in human development contribute significantly to poverty reduction in Madura. Household consumption also exhibits a statistically significant relationship with poverty ($p = 0.0251$), suggesting that variations in household expenditure are closely associated with poverty dynamics. In contrast, unemployment ($p = 0.0697$) and regional income ($p = 0.5289$) do not have statistically significant effects on poverty at the 5% significance level. These findings imply that human development and household consumption play more important roles in explaining poverty variation than labor market conditions and aggregate regional income during the study period.

Figure 3 and Table 3 reports the results of the Random Effects estimation. The Hausman test confirms the appropriateness of the Random Effects specification, indicating that unobserved

district-specific effects are not systematically correlated with the explanatory variables. The results reveal that the Human Development Index (HDI) has a statistically significant negative effect on poverty. This finding suggests that improvements in educational attainment, health conditions, and living standards strengthen human capability and increase the capacity of local communities to participate in regional economic activities. From an educational empowerment perspective, human development plays an essential role in enhancing productivity, labor readiness, and long-term economic resilience in peripheral regions. This finding supports the hypothesis that improvements in education, health, and living standards enhance absorptive capacity and reduce structural deprivation. In peripheral regions, human capital appears to be a critical mechanism for translating economic activity into welfare improvements. Unemployment showed no significant effect on poverty, indicating that variations in unemployment are insufficient to explain poverty dynamics in Madura. This finding suggests that poverty in peripheral areas may be more influenced by job quality than unemployment status itself. Many individuals remain economically active in the informal and low-productivity sectors, thus poverty persists despite relatively low open unemployment rates. Household consumption showed a significant relationship with poverty, implying that changes in household purchasing power are closely linked to welfare conditions. Higher household consumption may reflect greater household access to education, health services, and other essential resources that support long-term welfare improvements. In contrast, regional income (GDP per capita) did not show a statistically significant effect on poverty reduction. The insignificant effect of income suggests that aggregate economic gains alone may not automatically improve welfare conditions when economic benefits are distributed unequally and when human capital and educational capabilities remain limited. This finding suggests that economic growth without adequate educational empowerment and human development may fail to produce inclusive poverty reduction in peripheral economies.

Overall, the findings indicate that structural human development factors particularly those related to educational capability and human empowerment are more influential than geographic proximity alone in explaining poverty persistence in Madura. The results imply that the effectiveness of regional growth spillovers depends heavily on the quality of local human capital and the capacity of peripheral communities to absorb economic opportunities.

Discussion

The Influence of Human Development on Poverty in Madura

The results of the hypothesis test show that the Human Development Index (HDI) has a significant effect on the poverty rate in Madura. This finding is in line with research (Fahrika et al., 2020; Hasan, 2021; Ipmawan et al., 2022). However, the results of this study differ from the results of research (Dahliah & Nur, 2021) which state that the HDI has a negative but insignificant effect on poverty. The Human Development Index (HDI) has been shown to have a significant effect on poverty levels in Madura, as shown by various research results. Sampang Regency is recorded as having the lowest HDI compared to other regencies on Madura Island (Susilowati et al., 2019). This finding confirms that increasing the HDI which includes the dimensions of education, health, and a decent standard of living plays an important role in reducing poverty. The HDI reflects the quality of human resources that affect the ability of individuals and communities to escape poverty. The low quality of human resources as a result of poverty is a global development challenge (Reynaldo et al., 2023). Research also shows that increasing access to education and health services can significantly reduce poverty levels in the area. Education, in particular, is key to breaking the chain of poverty between generations (Kamalia et al., 2020). Therefore, policies

that focus on increasing the HDI in Madura have great potential to encourage sustainable poverty reduction by strengthening the quality of human development at the local level.

These findings can also be interpreted through the lens of Human Capital Theory, which argues that education is a productive investment that improves individual skills, productivity, and economic adaptability (Becker, 1993; Schultz, 1961). In peripheral economies such as Madura, educational empowerment becomes increasingly important because communities require adequate knowledge and competencies to participate in regional economic activities and absorb development spillovers from nearby growth centers. Limited educational quality and unequal access to learning opportunities may weaken labor competitiveness and restrict upward economic mobility, thereby contributing to persistent structural poverty.

The findings of this study indicate that the Human Development Index (HDI) has a significant impact on poverty levels in Madura, thus emphasizing the importance of sustainable investment in education, health, and improving the quality of life. Improving access to and quality of education can provide people with skills that are in line with the needs of the labor market, which in turn can reduce poverty systemically. On the other hand, improving health services will have an impact on increasing individual productivity, while adequate fulfillment of basic needs will help people escape the poverty trap. Therefore, the local government in Madura together with stakeholders need to prioritize budget allocation to support the improvement of the HDI in order to create long-term positive changes in people's standard of living. Strategically, this study emphasizes the importance of cross-development program collaboration to improve the Human Development Index (HDI) as a real effort to reduce poverty. An integrated policy approach such as community-based job training, equitable development of education and health infrastructure, and women's empowerment can accelerate improvements in the quality of life of the community. In addition, the involvement of the private sector and community organizations can provide additional support that is important to maintain the sustainability of these programs. By prioritizing the increase in HDI, the government is not only tackling poverty, but also strengthening the foundation of social and economic development in the Madura region as a whole.

Educational empowerment can be understood not only as an improvement in formal educational attainment, but also as a process of strengthening human capability, economic adaptability, and productive participation in society (Tikly, 2011). In peripheral economies, education plays a transformative role by improving individual skills, expanding employment opportunities, and increasing the capacity of communities to respond to economic change (Hanushek et al., 2012). Consequently, poverty reduction is more likely to occur when educational development enables local populations to access productive sectors, improve labor competitiveness, and participate more effectively in regional economic activities (Schultz, 1961; Tilak, 2018).

From this perspective, educational empowerment functions as a critical mechanism linking human development and poverty reduction. Communities with stronger educational capability tend to possess greater absorptive capacity, allowing them to benefit more effectively from regional growth spillovers (Sen, 1976). Conversely, limited educational quality and unequal access to learning opportunities may trap peripheral populations in low-productivity employment and intergenerational poverty. This finding supports the argument that sustainable poverty reduction requires not only economic growth, but also the strengthening of educational capability and human capital formation to ensure inclusive welfare transformation (Lustig et al., 2013).

The Influence of the Unemployment on Poverty in Madura

The results of the hypothesis test show that the unemployment rate does not have a significant effect on poverty in Madura. This finding is in line with the results of research (Eren et al., 2014; Susilowati et al., 2019). However, it is different from research (Dahliah & Nur, 2021; Fahrika et al., 2020) which states that unemployment has a positive impact on increasing poverty. This study shows that the unemployment rate does not have a significant effect on poverty in Madura. This may be due to the existence of alternative sources of income, such as the informal sector or subsistence agriculture, which allows people to continue to meet basic needs even though they do not work formally. In addition, the socio-economic characteristics of the Madurese community such as strong community solidarity and the role of the extended family can also reduce the negative impact of unemployment on household economic conditions. These factors have the potential to reduce the direct influence of unemployment on poverty in the Madura area.

The research findings showing that unemployment does not have a significant effect on poverty in Madura suggest that there are other factors that play a greater role in determining the level of poverty in the area. This condition opens up space to explore other socio-economic aspects, such as the quality of human resources, access to education, availability of basic infrastructure, and community consumption habits. In addition, it is likely that the majority of the Madurese population works in the informal sector, which is often not included in official unemployment data. Therefore, government policies should not only be oriented towards reducing unemployment rates, but also include developing the informal sector and strengthening the social protection system to support vulnerable groups in society. In addition, this finding shows the importance of further studying the characteristics of the labor market in Madura and its relationship to the level of community welfare. Although statistically unemployment does not show a significant effect, local government efforts to create quality jobs remain crucial in driving local economic growth. This step can be focused on potential sectors such as tourism, fisheries, and local craft industries, in order to increase community income sustainably and strengthen the regional economic structure.

These findings also emphasize the importance of improving the quality of jobs in Madura, not just increasing their number. Providing decent and sustainable jobs in potential sectors such as agriculture, fisheries, and local tourism can help people earn more stable incomes and meet their living needs. On the other hand, local governments need to implement an inclusive approach, taking into account local cultural values and traditions, so that the development programs implemented are truly in accordance with community conditions and effective in their implementation. Therefore, although unemployment has not been proven to have a direct impact on poverty, a comprehensive economic development strategy is still needed to improve the quality of life of the Madurese people.

The Influence of Household Consumption on Poverty in Madura

Based on the results of the hypothesis test, it shows that consumption has a significant effect on poverty in Madura. This is in accordance with (Latif, 2002; Lee, 2003; Meyer & Sullivan, 2012). However, in the study Rahman & Alamsyah (2019) consumption has no effect on the poverty rate. This finding strengthens Keynes' idea that increasing consumption spending (both by households and through government fiscal stimulus) can drive economic growth and reduce poverty in the aggregate (Cwik & Wieland, 2011; Dutt, 2013). The results of this study indicate that increasing household consumption has the potential to reduce poverty levels in the Madura region. In other words, households that are able to increase their consumption expenditure tend to have a better quality of life, so that the possibility of being below the poverty line becomes

smaller. Theoretically, these results are in line with the welfare economics approach (Anand & Harris, 1994; Slesnick, 1988) where consumption is considered as one of the important indicators in measuring the level of individual or household welfare. Adequate consumption reflects the ability of households to meet basic needs, such as food, education, health, and housing. When consumption increases, it means that people's purchasing power also increases, which is a positive signal for their economic capabilities.

Madura as a region with unique socio-economic characteristics, shows that consumption has a central role in reducing poverty. This can be explained by several factors, including the community's consumption patterns that tend to be for basic needs, as well as limited access to other sources of income outside the informal sector or agriculture. Therefore, increased consumption can reflect an increase in income, which in turn has an impact on reducing poverty rates. Furthermore, the findings of this study provide important policy implications for local governments and other stakeholders. Poverty alleviation programs that focus on increasing people's purchasing power, such as direct cash assistance, basic needs subsidies, or support for micro, small, and medium enterprises (MSMEs) can be effective strategies for reducing poverty in Madura. In addition, increasing access to education and skills training is also important to encourage sustainable income, which ultimately increases people's consumption capacity. Overall, the results of this study emphasize the importance of consumption as one of the main determinants in poverty alleviation efforts. Therefore, policy interventions aimed at increasing people's consumption capacity need to be a priority in the socio-economic development agenda in Madura.

The Influence of Regional Income on Poverty in Madura

Based on the results of the hypothesis test, it shows that income does not have a significant effect on poverty in Madura. This is in accordance with research conducted by (Abda & Cahyono, 2022; Adriani & Wahyudi, 2017). However, on the contrary, income has a positive effect on poverty levels (Chattopadhyay et al., 2010). This finding may initially seem contradictory to classical economic theories that state that increasing income will directly reduce poverty levels. However, in the local context of Madura, there are a number of possibilities that can explain this phenomenon. First, the level of income received by the community does not necessarily reflect actual welfare, especially if the income is irregular, seasonal, or comes from the unstable informal sector. In such conditions, even if someone has income, the uncertainty and unsustainability of income can keep them vulnerable to poverty. Second, the community's consumption patterns may better reflect the economic conditions of the household than its income. This means that households that are able to meet basic needs through social assistance may not be classified as poor even though their income is low in nominal terms. This explains why income is not always the main predictor in determining poverty status. Third, the high cost of living or the burden of certain expenses (such as education, health, or debt) can erode the impact of increased income. In such cases, even though income increases, the burden of expenses also increases proportionally or even more, so that there is no real improvement in the economic conditions of the household. Fourth, these results can also indicate inaccuracy in the distribution of income or economic inequality. If income increases are only enjoyed by a handful of groups, then the impact on reducing poverty in the aggregate will be minimal or insignificant.

This finding becomes relevant when viewed through the lens of Amartya Sen's Capability theory, which emphasizes that poverty is not merely a matter of low income, but rather the limited ability (capability) of individuals to live a life that they value. According to Sen (1976) a person's well-being is not only determined by what they have financially (means to ends), but more on

what they can do or achieve (functionings) such as having a decent education, living a healthy life, and participating in social life. In other words, income is only a tool, not an end in itself. If the income received is unable to increase a person's real ability to live a meaningful life, then the increase in income will not automatically reduce poverty. When associated with the Madura Region, the results of this study indicate that an increase in income may not be followed by an increase in capability. This can happen if, for example:

1. Income is not fixed or vulnerable.
2. The cost of living is high, so that income is used up for basic needs without any left over for welfare investment (education, health).
3. Access to public services is still limited, making income insufficient to improve quality of life.
4. There is inequality in the distribution of resources or opportunities.

Therefore, based on Sen's theory, the focus of poverty alleviation policies should not only be directed at increasing income, but also at increasing basic individual capabilities, such as access to education, health, clean water, and a safe environment (Altman, 2012). This means that empowerment and improving the quality of life need to be the main priority so that the population is truly free from poverty functionally. Thus, the findings of this study provide an important signal that poverty alleviation efforts in Madura cannot only focus on increasing income. A more comprehensive approach is needed, including strengthening access to basic services, increasing household economic stability, and targeted social protection programs. In addition, welfare indicators need to consider non-economic aspects, such as access to education, health, and decent housing.

Understanding Poverty Persistence in Madura: Human Development, Educational Empowerment, and Policy Implications

The overall findings suggest that poverty persistence in Madura is fundamentally a capability-related issue rather than merely an economic one. While human development and household consumption are found to significantly influence poverty reduction, unemployment and regional income do not demonstrate significant direct effects. This pattern indicates that improvements in aggregate economic conditions alone are insufficient to reduce poverty when individuals and households lack the capabilities required to access, utilize, and benefit from available opportunities. This finding is consistent with the capability approach, which conceptualizes poverty as a deprivation of substantive freedoms and opportunities rather than solely a lack of income (Alkire & Santos, 2013; Sen, 1976). Furthermore, previous studies have shown that human development contributes more effectively to long-term poverty reduction when economic growth is accompanied by improvements in education, health, and human capabilities (Ranis et al., 2000). Therefore, the persistence of poverty in Madura appears to be closely associated with disparities in human development and welfare attainment rather than with economic growth alone, highlighting the importance of capability enhancement as a foundation for sustainable poverty reduction (Ravallion, 2012; Rodríguez-Pose, 2018) (Ravallion, 2016; Rodríguez-Pose, 2018).

The persistence of poverty in Madura can be understood as the outcome of a structural mismatch between economic potential and human capability development. Although economic resources and development initiatives may be available, their poverty-reducing effects remain limited when improvements in education, skills, and human development are not sufficiently inclusive. Unequal capability formation constrains individuals' ability to access productive employment, adopt new economic opportunities, and improve their living standards. Consequently, economic growth does not automatically generate broad-based welfare

improvements, particularly in regions where educational readiness and human capital development remain uneven. This finding is consistent with the human development literature, which argues that sustainable poverty reduction requires not only economic expansion but also the strengthening of capabilities that enable individuals to participate meaningfully in development processes (Ranis et al., 2006; Sen, 1976; Stewart, 2013).

Educational empowerment emerges as a crucial mechanism through which human development contributes to poverty reduction. From a human capital perspective, education enhances individuals' knowledge, skills, and competencies, thereby increasing their productivity and earning potential (Angrist et al., 2021; Becker, 1993; Schultz, 1961). Beyond its economic returns, education also strengthens human capabilities by expanding individuals' ability to make informed choices, access opportunities and participate effectively in social and economic life (Nussbaum, 2009; Sen, 1976). In Madura, the significant effect of human development on poverty suggests that educational empowerment may play a fundamental role in enabling households to improve their welfare conditions and escape persistent poverty. Education not only facilitates access to employment and income-generating activities but also enhances adaptability to changing economic conditions, technological developments, and labor market demands. Previous studies have shown that improvements in educational attainment and learning outcomes contribute substantially to long-term economic growth, productivity enhancement, and poverty reduction by strengthening human capital formation and social mobility (Hanushek et al., 2012; Psacharopoulos & Patrinos, 2018). Therefore, educational empowerment should be viewed not merely as a social policy objective but as a strategic instrument for strengthening capabilities and fostering sustainable poverty reduction.

It is important to acknowledge that educational empowerment is not directly measured in this study through specific educational indicators such as years of schooling, literacy rates, or school participation. Rather, the educational perspective is inferred from the education dimension embedded within the Human Development Index (HDI), which also incorporates health and living-standard components. Therefore, the findings should not be interpreted as direct evidence of the independent effect of education on poverty. Instead, they suggest that educational development, as an integral component of broader human development, contributes to capability formation and may support long-term poverty reduction. This interpretation is consistent with the human development approach, which views education as one of the fundamental dimensions of human capability enhancement (Sen, 1976).

The findings generate several important policy implications for poverty reduction in Madura and other regions facing similar development challenges. Since human development emerges as the most significant determinant of poverty reduction, policy interventions should prioritize long-term investments in education, health, and human capital formation, which have been consistently identified as fundamental drivers of sustainable welfare improvement and poverty reduction (Ranis et al., 2000). Educational policies should focus not only on expanding access but also on improving learning quality, skill acquisition, and educational outcomes that enhance individuals' productive capabilities and long-term socioeconomic mobility (Angrist et al., 2021; Hanushek et al., 2012). In addition, vocational education and training programs should be strengthened to equip local communities with labor-market-relevant skills and improve their adaptability to changing economic conditions (McGrath et al., 2022). Such interventions are particularly important in peripheral regions where economic opportunities often require specialized competencies, technological adaptation, and continuous skill upgrading to ensure inclusive participation in regional development processes (Rodríguez-Pose, 2018). Beyond formal

education, community empowerment programs that promote entrepreneurship, financial literacy, and lifelong learning can further strengthen local capabilities and improve households' resilience against poverty and economic vulnerability (Psacharopoulos & Patrinos, 2018). These findings support the growing consensus that sustainable poverty reduction requires integrated investments in human capital and capability development rather than reliance on economic growth alone (Sen, 1976; Stewart, 2013). Therefore, poverty alleviation strategies in Madura should place educational empowerment and human development at the center of regional development planning to ensure that economic progress translates into broad-based and sustainable welfare improvements.

Taken together, these findings contribute to the growing literature on poverty persistence by demonstrating that the effectiveness of poverty reduction strategies depends not only on economic resources but also on the capabilities that enable individuals to utilize those resources effectively. The evidence from Madura highlights the importance of integrating human development and educational empowerment perspectives into poverty analysis, suggesting that sustainable welfare improvements are more likely to emerge when investments in education, skills, and human capabilities accompany broader economic development efforts. Therefore, understanding poverty persistence requires moving beyond conventional income-based explanations toward a more comprehensive capability-oriented approach to development.

CONCLUSIONS

This study examined the determinants of poverty in Madura, Indonesia, from a human development perspective using panel data from four regencies during ten years. The findings reveal that the Human Development Index (HDI) and household consumption significantly influence poverty levels, while unemployment and regional income do not exhibit statistically significant effects. These results indicate that improvements in human development and household welfare are more closely associated with poverty reduction than labor-market conditions or aggregate regional income alone.

The findings suggest that persistent poverty in Madura may be explained by structural differences in human development and capability formation rather than by economic growth indicators alone. Although this study does not directly measure spatial spillovers or regional growth transmission mechanisms, the results indicate that strengthening human capabilities remains an important factor in understanding why poverty continues to persist despite ongoing development efforts. In particular, the significant role of HDI highlights the importance of education, health, and living-standard improvements as interconnected dimensions of human development that contribute to long-term welfare enhancement.

Several policy implications emerge from these findings. First, local governments should strengthen vocational education and workforce training programs that are aligned with the economic characteristics and labor-market needs of Madura. Second, should support productive micro, small, and medium enterprises (MSMEs) through entrepreneurship development, financial literacy programs, and policies improved access to financing. Third, efforts to improve labor productivity and economic participation should be accompanied by initiatives that enhance inter-regional labor mobility and access to employment opportunities. Finally, continued investment in education and health services, particularly in poorer districts, remains essential for strengthening human capabilities and promoting sustainable poverty reduction. By placing human development at the center of regional development strategies, policymakers can improve the effectiveness of poverty alleviation efforts and foster more inclusive welfare outcomes in Madura.

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