The Influence of Dependency Ratio, Per Capita Income, Informal Agricultural Sector Labor, and the Percentage of Sick Population on Poverty Levels in Eastern Indonesia

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Abstract

Poverty is one of the main development challenges still faced by many regions in Indonesia, including Eastern Indonesia, which has a higher poverty rate compared to other regions. Understanding the factors influencing poverty in this area is crucial for formulating effective poverty alleviation strategies. This research aims to analyze the influence of the dependency ratio, per capita expenditure, informal labor in the agricultural sector, and the percentage of the sick population on poverty levels in Eastern Indonesia. Using dynamic panel data analysis techniques and the Arellano-Bond System Generalized Method of Moments (Sys-GMM), this study found that among the variables examined, only the percentage of the sick population did not significantly affect poverty levels, either in the short or long term. Meanwhile, the dependency ratio, per capita income, and the percentage of informal labor in the agricultural sector showed a significant influence on poverty levels in Eastern Indonesia. These findings highlight the importance of focusing on the dependency ratio in efforts to alleviate poverty in the region.

Keywords: Poverty, Dependency Ratio, Eastern Indonesia.

Introduction

Poverty in Indonesia remains a critical and complex issue. The complexity of poverty in Indonesia is influenced by various factors, including economic, social, and regional disparities (Aba et al., 2015). Indonesia has made progress in reducing poverty, with poverty rates declining over the past few decades. However, regional disparities remain significant, with poverty rates varying widely across provinces and districts (Sumarto et al., 2014). The complexity of poverty in Indonesia is further exacerbated by the prevalence of chronic and transient poverty.

Studies show that chronic poverty constitutes a significant portion of total poverty in Indonesia, highlighting the need for targeted interventions to address long-term poverty (Sugiharti et al., 2023). Additionally, factors related to employment, such as low wages and precarious working conditions, contribute significantly to worker poverty. Increasing labor income through productivity growth and skill enhancement is a critical strategy for combating this issue (Faharuddin & Endrawati, 2022). Regional heterogeneity also affects poverty dynamics, with economic growth and decentralization playing key roles in poverty reduction (Siburian, 2022). Regions with higher per capita GDP, better educational attainment, and effective governance tend to experience more significant poverty reduction (Sumarto et al., 2014).

The diverse nature of poverty in Indonesia necessitates a comprehensive examination of various contributing factors (Lumbantoruan et al., 2023). Among these factors, several key indicators have emerged as crucial in understanding and addressing poverty, such as the dependency ratio, per capita

expenditure, informal labor in the agricultural sector, and the percentage of the sick population. These factors are interconnected and play a significant role in shaping the poverty landscape across the country. The dependency ratio, which measures the proportion of non-working-age individuals to those of working age, has been shown to have a significant impact on poverty levels. Research indicates that a higher dependency ratio is associated with increased poverty rates, as it places a greater economic burden on the working-age population (Hadley et al., 2011). Similarly, per capita expenditure serves as an important indicator of economic well-being and has been linked to poverty reduction, particularly when non-food expenditures increase (Sumarto et al., 2014). The informal agricultural sector, which employs a large portion of the rural population, contributes to sustaining livelihoods while perpetuating poverty due to the lack of social protection and economic security (Harasty & Ostermeier, 2020). Finally, the percentage of the sick population has been identified as both a cause and consequence of poverty, creating a complex cycle that affects household resources and economic opportunities (Jayathilaka et al., 2020).

The dependency ratio, which measures the proportion of non-working-age individuals (dependents) to those of working age in a population, significantly influences poverty levels (Irfan et al., 2023). A higher dependency ratio implies a greater burden on the working-age population to support dependents, which can exacerbate poverty (Seran & Hallan, 2020). This demographic pressure can lead to increased poverty rates, particularly in regions with inadequate social support systems (Janz et al., 2023). Consequently, understanding and addressing the implications of the dependency ratio is crucial for formulating effective poverty alleviation strategies and ensuring sustainable economic development (Tang et al., 2021).

Per capita expenditure plays an important role in influencing poverty levels, as it reflects the average amount of money spent by individuals in a population (Roosyidah et al., 2024). An increase in per capita expenditure often indicates improving economic conditions and can lead to a decrease in poverty levels. This is because higher per capita expenditure generally correlates with greater access to goods and services, thereby improving living standards and reducing poverty rates (Febriandika et al., 2022).

The prevalence of informal workers in the agricultural sector significantly impacts poverty, particularly in rural areas where agriculture is the primary source of livelihood (Setyanti, 2020). Informal employment in the agricultural sector is widespread, with over 80% of self-employed workers in this sector working informally. This high level of informality is associated with an increased risk of poverty, as informal workers typically lack access to social protection, stable income, and benefits provided by formal employment (Statistics Indonesia & Asian Development Bank, 2011). As a result, the informal nature of agricultural work often leads to precarious living conditions and limited economic security for workers, contributing to persistent poverty in rural communities (Sari & Sugiarto, 2024).

The percentage of the population that is ill significantly influences poverty levels, creating a complex and often cyclical relationship between health and economic well-being (Habibov et al., 2019). Poor health is both a cause and consequence of poverty, with ill health leading to reduced productivity, increased healthcare costs, and diminished earning capacity (O'Donnell, 2024). This relationship can persist throughout a person's life and even across generations, creating a poverty cycle that is difficult to break.

Conducting research on poverty in Indonesia, especially in Eastern Indonesia, is essential given the unique socio-economic challenges in the region and the interaction of various economic variables. Understanding poverty dynamics in this context is crucial for developing effective policies that address the root causes of poverty. Factors such as the dependency ratio, per capita expenditure, the prevalence of informal labor in agriculture, and the health status of the population are critical in shaping poverty outcomes. For instance, a high dependency ratio can strain resources for working-age individuals, while low per capita expenditure often correlates with inadequate access to essential services, perpetuating the poverty cycle. Research shows that in regions like Eastern Indonesia, where economic conditions are less favorable, these variables can significantly hinder poverty alleviation efforts (Modjo, 2017). Additionally, the informal agricultural sector, which employs a large portion of the population, often lacks the protections and benefits associated with formal employment, further exacerbating poverty. The health status of the population, particularly the percentage of individuals who are ill, can compound these issues by reducing productivity and

increasing healthcare costs, pushing families deeper into poverty. Therefore, comprehensive research that integrates these economic variables can provide valuable insights for policymakers. Such research can help identify targeted interventions that not only address immediate poverty alleviation but also promote long-term economic resilience and social equity. By focusing on the specific challenges faced in Eastern Indonesia, this research can contribute to more inclusive economic development strategies that uplift vulnerable populations and reduce poverty effectively.

Literature Review

First, the dependency ratio, which measures the proportion of dependents (children and the elderly) to the working-age population, has been extensively studied in the context of its impact on poverty. Economic theory suggests that a high dependency ratio can significantly contribute to poverty levels. This is because a larger proportion of dependents places a greater burden on the working-age population, potentially reducing the amount of resources available for savings, investment, and consumption (Harasty & Ostermeier, 2020). Increased pressure on the workforce can lead to reduced productivity and lower economic growth, which in turn exacerbates poverty (Bavaro & Raitano, 2024). For example, research has shown that a high dependency ratio can lead to increased poverty by reducing savings and increasing financial pressure on households (Maryam, 2024). Additionally, the demographic dependency ratio, which includes both young and elderly dependents, underscores the importance of age-based employment rates and their determinants in addressing the economic burden of an aging population (Bidisha et al., 2020).

Second, per capita income is one of the main indicators for measuring the economic well-being of a region or country. In general, an increase in per capita income tends to inversely correlate with poverty levels, where rising per capita income reflects economic improvement that can reduce the number of poor people (Caron et al., 2020). When per capita income increases, purchasing power also rises, allowing for better access to basic needs such as food, healthcare, and education (Kundu et al., 2024). This can reduce vulnerability to poverty. However, even as per capita income rises, unequal income distribution can result in economic disparities, meaning poverty reduction is uneven across different social strata (Koiry et al., 2024). Therefore, increasing per capita income needs to be accompanied by fair redistribution policies to have a more significant impact on poverty alleviation (Karki, 2024). These findings suggest that increasing per capita income through targeted economic policies can be an effective strategy for poverty alleviation.

Third, informal labor in the agricultural sector has been extensively studied in the context of its impact on poverty, particularly in developing countries. Economic theory suggests that informal labor in the agricultural sector is closely related to poverty due to several factors (Ibale et al., 2024). The informal nature of agricultural labor often results in low productivity and fluctuating incomes, which exacerbates poverty (Shi & Huang, 2023). Workers in the informal agricultural sector tend to have low human capital, with around 66 percent of informal agricultural workers having only completed elementary school, and only 3 percent holding a diploma or degree (Statistics Indonesia & Asian Development Bank, 2011). This low level of education contributes to low productivity and high vulnerability to poverty (Gómez-Méndez & Amornbunchornvej, 2024). The lack of formal arrangements and social protection in the informal sector makes workers highly vulnerable to economic shocks, further exacerbating poverty (International Labor Office, 2015). Additionally, the rural context in which much of the informal agricultural labor takes place also contributes to the persistence of poverty. Rural areas often lack access to essential services such as healthcare and education, which are crucial for improving human capital and reducing poverty (Li et al., 2023). The concentration of poverty in rural areas and the importance of agriculture in sustaining rural livelihoods highlight the need for policies that address the specific challenges faced by informal agricultural workers (Abedullah et al., 2023). Such policies should aim to improve working conditions, increase social protection, and encourage formalization to reduce the vulnerability of informal agricultural workers and alleviate poverty (Qiu et al., 2024).

Fourth, the relationship between the percentage of sick people and poverty is a key area of study in economic theory. Research consistently shows that health issues can significantly contribute to poverty, both directly and indirectly (Zhou et al., 2020). One of the main economic theories is Becker's human capital

concept from 1964, which states that the health and well-being of the workforce are important drivers of economic growth (Tan, 2014). When a large portion of the population is sick, it can lead to decreased labor productivity and efficiency, negatively impacting economic growth and exacerbating poverty (Keane & Thakur, 2018). Moreover, the economic burden of healthcare costs can further deepen poverty (Witrick et al., 2023). Research has shown that households with members suffering from chronic illness often face higher healthcare expenses, which can reduce disposable income and increase financial stress (Habibov et al., 2019). This financial burden may force households to make difficult choices between healthcare costs and essential living expenses, increasing the likelihood of falling into poverty (Adena & Myck, 2014). Furthermore, the indirect impact of a sick population on poverty should not be overlooked. Poor health can limit a person's ability to participate in the labor market, which is a critical factor in escaping poverty (Tonn et al., 2021).

Method

Based on the background outlined above, this research uses several independent variables, namely the Dependency Ratio (DR), Per Capita Income (PCI), Percentage of Informal Agricultural Labor (ILA), and Percentage of Sick Population (PSP). The definitions or measurements of these variables, according to the Central Bureau of Statistics, are as follows: first, the dependency ratio, which is the ratio of the non-productive population to the productive population. In other words, the dependency ratio is a demographic indicator that measures the proportion of workers to non-workers in a region. Second, per capita income or national per capita income, which is a measure of the amount of money earned per person in a country or region. BPS calculates national per capita income by dividing the gross national income by the total population. Third, the percentage of informal labor in the agricultural sector, which consists of a group of laborers whose activities are carried out by individuals, families, or a few people working together. This is commonly found in the agricultural sector, where it serves as the economic base for rural populations in Indonesia. Fourth, the percentage of the sick population is defined as the percentage of the population experiencing health complaints within a certain period. The measurement of the percentage of the sick population is done by comparing the number of people with health complaints to the total population in a region.

The literature review above on the dependency ratio highlights the significant role of the dependency ratio in understanding and addressing poverty, particularly in areas with high population growth and aging populations. Next, regarding per capita expenditure, the World Bank and other international organizations use monetary poverty measures, including per capita expenditure, to assess the economic well-being of the population. These measures help understand how changes in household income and spending patterns affect poverty levels (World Bank). Third, informal labor can also affect poverty because the informal nature often leads to low productivity and uncertain incomes. Informal workers in the agricultural sector are also dominated by low-competitive human resources. Furthermore, the agricultural sector is mostly located in rural areas, where not all have good access to basic services and infrastructure, posing challenges in reducing poverty. Lastly, the impact of the percentage of the sick population on poverty, where poor health and economic instability can perpetuate poverty because individuals with health problems struggle to acquire the skills and knowledge necessary for higher-paying jobs.

In this study, to determine the influence of several observed independent variables on the dependent variable, the following model is used:

$$POV_{it} = \beta_0 + \beta_1 POV_{i(t-1)} + \beta_2 DR_{it} + \beta_3 PCI_{it} + \beta_4 ILA_{it} + \beta_5 PSP_{it} + u_{i,t} \ldots\ldots\ldots\ldots(1)$$

This research focuses on several provinces in Eastern Indonesia with the highest poverty rates in the country, namely Papua, West Papua, Maluku, Gorontalo, and East Nusa Tenggara. The data used are secondary data from the Central Bureau of Statistics from 2015-2022. The analysis technique employed in this study is dynamic panel analysis to determine the short-term and long-term effects of the dependency ratio (DR), per capita income (PCI), informal labor in the agricultural sector (ILA), and percentage of sick population (PSP) on poverty levels (POV) using the Generalized Method of Moments (GMM), calculated using STATA.

RESULT

FD-GMM Validity Test

Table 1. Validity Test

Sargan test value	P-value
16.91294	0.5958

Based on Table 1, the Sargan test is used as a validity test or a test that identifies the validity of all instrument variables. The P-value is 0.5958, which is above 0.05, meaning the null hypothesis (Ho) is accepted. This indicates that the instrument variables meet the 'valid' criteria, meaning the instrument variables are not correlated with the error term.

FD-GMM Consistency Test

Table 2. Consistency Test

Order	Arellano-Bond test values	P-value
1	-1.8123	0.0699
2	-0.33658	0.7354

In Table 2, the consistency test is conducted using the Arellano-Bond test. At the second order or AR(2), the test value is -0.33658, which falls within the range of $Z\alpha/2$ values, and the P-value is 0.7354, indicating it is not significant at the α level. Therefore, the null hypothesis (Ho) is accepted, meaning the estimation is consistent and there is no autocorrelation.

FD-GMM Unbiasedness Test

In the unbiasedness test for the FD-GMM model, the lag coefficient of the dependent variable is compared to the results from the Fixed Effect Model (FEM) and Pooled Least Squares (PLS). The FD-GMM model is considered to meet the assumption of unbiasedness if the lag coefficient of the dependent variable falls between the coefficients from the Fixed Effect Model and Pooled Least Squares.

Table 3. Unbiasedness Test

Variables	FD-GMM	FEM	PLS
POV(-1)	0.71874541	0.71487991	0.85660244

Based on Table 3, the lag coefficient of the dependent variable in the FD-GMM model is slightly above the coefficient in the Fixed Effect Model (FEM), but only marginally so. Therefore, it may be necessary to consider using the System-GMM (SYS-GMM) model to avoid potential bias.

Validity Test for Sys-GMM

Table 4. Validity Test

Sargan test value	P-value
18.96838	0.7986

Based on Table 4, the validity test using the Sargan test shows a P-value of 0.7986, which is above 0.05. Therefore, the null hypothesis (Ho) can be accepted, indicating that the instrumental variables meet the 'valid' criteria or that the instrumental variables are not correlated with the error term.

Consistency Test for Sys-GMM

Table 5. Consistency Test

Order	Arellano-Bond test values	P-value
1	-1.6795	0.0931
2	0.7283	0.4664

In Table 5, the consistency test at the second order (AR(2)) yields a test value of 0.7283, which falls between the $Z\alpha/2$ values of -1.96 and 1.96, with a P-value of 0.4664, which is not significant at α. Therefore, the null hypothesis (Ho) can be accepted, indicating that the estimations are consistent and there is no autocorrelation.

Unbiasedness Test for Sys-GMM

Similar to the FD-GMM model, the Sys-GMM model is said to meet the assumption of unbiasedness if the lag coefficient of the dependent variable is between those of the Fixed Effect Model (FEM) and Pooled Least Squares (PLS).

Table 6. Unbiasedness Test

Variables	FD-GMM	Sys-GMM	FEM	PLS
POV(-1)	0.71874541	0.76281717	0.71487991	0.85660244

Based on Table 6, the lag coefficient of the dependent variable in the Sys-GMM model is between the lag coefficients of the Fixed Effect Model (FEM) and Pooled Least Squares (PLS). Thus, the Sys-GMM model meets the unbiasedness assumption and can be considered the best modeling option.

Parameter Significance Test

After identifying the best model among the two, the next step is to test the relationships in the selected model, both simultaneously and partially.

Table 7. Simultaneous Test

Wald-test statistical value	P-value
163.23	0.0000

In Table 7, the simultaneous parameter significance test is conducted using the Wald test. The result shows a statistical value of 163.23 with a P-value of 0.0000, which is significant at α, indicating that there is at least one significant coefficient.

Table 8. Partial Test

Variables	Coefficient	Standard Error	Z-test value	P-value
POV(-1)	0.7628172	0.0455735	16.74	0.000
DR	0.1466556	0.044232	3.32	0.001
PCI	-0.0937358	0.0286433	3.27	0.001
ILA	0.6812952	0.3270344	2.08	0.037
PSP	-0.0193947	0.0483259	-0.40	0.688

Based on Table 8, it is evident that the percentage of sick population (PSP) does not significantly affect poverty. Meanwhile, the dependency ratio (DR), per capita income (PCI), and informal agricultural labor (ILA) significantly impact poverty reduction. After conducting various tests, the poverty alleviation model in Eastern Indonesia is obtained through the following equation.

$POV_{it} = 0{,}1466556 DR_{it} - 0{,}0937358 PCI_{it} + 0{,}6812952 ILA_{it} + 0{,}9389119 POV_{(it-1)} + v_{it}$

Short-Term and Long-Term Effects

Table 9. Short-Term and Long-Term Effects in the Model

Predictors	Short term		Long term	
	Coefficient	P-value	Coefficient	P-value
POV(-1)	0.7628172	0.000		
DR	0.1466556	0.001	0.6183232	0.034
PCI	-0.0937358	0.001	-0.3952048	0.019
ILA	0.6812952	0.037	2.872447	0.006
PSP	-0.0193947	0.688	-0.081771	0.695

Based on Table 9, there are both short-term and long-term effects from each variable. In the short term, the dependency ratio (DR), per capita income (PCI), and the percentage of informal labor in the agricultural sector (ILA) have significant effects on poverty. The dependency ratio has a positive coefficient, indicating that a 1% increase in the dependency ratio can increase the poverty level by 0.15%. The per capita income (PCI) has a negative coefficient, meaning that a 1% decrease in per capita income will increase the poverty level by 0.09%. Furthermore, the percentage of informal labor in the agricultural sector also has a positive coefficient, indicating that each increase in the number or percentage of informal labor in this sector will increase poverty levels by 0.68%. In the long term, the dependency ratio (DR), per capita income (PCI), and the percentage of informal labor in the agricultural sector (ILA) continue to have significant effects on poverty. The dependency ratio has a positive coefficient, indicating that each 1% increase in the dependency ratio can raise poverty levels by 0.61% in the long term. The per capita income (PCI) has a negative coefficient, meaning that a 1% decrease in per capita income will increase the poverty level by 0.39% in the long term. Additionally, the percentage of informal labor in the agricultural sector has a positive coefficient, indicating that each increase in the number or percentage of informal labor in this sector can increase poverty levels by 2.87% in the long term.

Discussion

The Impact of Dependency Ratio on Poverty Levels

The research findings indicate that the dependency ratio significantly affects poverty levels in Eastern Indonesia. This suggests that the high economic burden on the working-age population to support non-working individuals (children and the elderly) is a primary factor in determining poverty levels in the region. This situation may arise due to the high number of dependents, which increases the economic pressure on the working-age population, consequently reducing their ability to invest in education, health, and other productive ventures that could enhance income (Cruz & Ahmed, 2018). A high dependency ratio can be linked to relatively low fertility rates and an aging population in the region, which increases the burden on working individuals to support non-working family members (Ginting et al., 2020). This strain on the workforce can lead to reduced economic productivity and increased financial burdens, ultimately contributing to high poverty rates (Jouan et al., 2022). Thus, this study aligns with the research conducted by Vijayakumar (2013), which found that the dependency ratio has a significant impact on poverty in several developing countries, where the high economic burden on the working-age population contributes to increasing poverty levels. These findings underscore the importance of policy strategies focusing on reducing the dependency ratio through family planning programs and improving access to education and productive employment to mitigate poverty levels in Eastern Indonesia.

The Impact of Per Capita Income on Poverty Levels

The research results indicate that per capita income significantly affects poverty levels in Eastern Indonesia. This suggests that the poverty experienced by communities in Eastern Indonesia is due to insufficient income to meet their daily living needs. The relationship between per capita income and

poverty levels is an important aspect of socio-economic research, revealing significant implications for policy-making and economic development (Zhang & Dai, 2023). Higher per capita income is usually correlated with increased economic opportunities, enhanced access to education, and improved healthcare services, all contributing to a reduction in poverty levels (Benedetti & Crescenzi, 2023). Conversely, when per capita income declines, it often leads to greater economic hardships, limiting individuals' ability to meet basic needs and perpetuating the cycle of poverty (Ullah et al., 2024). Therefore, addressing income inequality and fostering sustainable economic growth are vital strategies for effectively combating poverty and nurturing a more equitable society (Pinilla-Roncancio et al., 2024).

The Impact of the Percentage of Informal Labor in the Agricultural Sector on Poverty Levels

Based on the research findings, the percentage of informal labor in the agricultural sector has been identified as a significant factor affecting poverty levels, both in the short and long term. Informal labor, characterized by a lack of formal work contracts, social protection, and fair wages, often results in precarious working conditions and limited economic security for agricultural workers (International Labour Organization, 2018). In the short term, a high percentage of informal labor can exacerbate poverty by reducing workers' incomes and increasing their vulnerability to economic shocks (Torres, 2020). In the long term, continued reliance on informal labor can perpetuate poverty by limiting opportunities for skill development and mobility (Araújo et al., 2024). Moreover, informal labor often hinders agricultural productivity and efficiency, as workers may lack the resources and incentives to invest in better agricultural practices (Sari & Sugiarto, 2024).

Conclusion

The impact of the dependency ratio on poverty in Eastern Indonesia can be understood through the region's economic structure and development challenges. Eastern Indonesia is characterized by limited economic opportunities and underdeveloped infrastructure, which exacerbates the effects of a high dependency ratio. The region's reliance on agriculture, which is often informal and labor-intensive, struggles to absorb the additional burden of supporting a larger non-working population. Understanding the influence of the dependency ratio on poverty in Eastern Indonesia is crucial for designing effective poverty alleviation strategies. Policies aimed at reducing the dependency ratio can help alleviate the economic burden on the working-age population. Furthermore, investments in education and healthcare can enhance the quality of life for both the working individuals and their dependents, thereby reducing poverty. However, these interventions must be tailored to address the unique challenges faced by Eastern Indonesia, including limited economic resources and underdeveloped infrastructure.

Acknowledgment

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