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## Public Spending on Basic Services and Poverty Alleviation: Empirical Evidence from Eastern Indonesia

### Abstract

This study examines the impact of government spending on basic services—education, health, and social protection—along with infrastructure and economic growth on poverty in Eastern Indonesia, focusing on NTT, Maluku, and Papua. Using district-level panel data from 2008–2023, the study applies the Fixed Effects Model (FEM) and Feasible Generalized Least Squares (FGLS) to address heteroskedasticity and autocorrelation. The results show that education spending, economic growth, and access to infrastructure (electricity and clean water) significantly reduce poverty. In contrast, health and social protection expenditures do not have a significant effect, indicating structural constraints, targeting inefficiencies, and time-lag effects. This study highlights the importance of integrated, place-based fiscal policies that prioritize human capital development and infrastructure expansion in disadvantaged regions.

**Keywords:** Poverty, Public Spending, Infrastructure, Economic Growth, Eastern Indonesia, FGLS

### Abstrak

Penelitian ini menganalisis pengaruh belanja pemerintah pada layanan dasar—pendidikan, kesehatan, dan perlindungan sosial—serta infrastruktur dan pertumbuhan ekonomi terhadap kemiskinan di Indonesia Timur, khususnya di Nusa Tenggara Timur (NTT), Maluku, dan Papua. Penelitian ini menggunakan data panel tingkat kabupaten/kota periode 2008–2023 dengan pendekatan Fixed Effects Model (FEM) dan Feasible Generalized Least Squares (FGLS) untuk mengatasi permasalahan heteroskedastisitas dan autokorelasi. Hasil penelitian menunjukkan bahwa belanja pendidikan, pertumbuhan ekonomi, serta akses infrastruktur (listrik dan air bersih) berpengaruh negatif dan signifikan terhadap tingkat kemiskinan. Sementara itu, belanja kesehatan dan perlindungan sosial tidak menunjukkan pengaruh yang signifikan, yang mengindikasikan adanya kendala struktural, ketidaktepatan sasaran program, serta efek keterlambatan dalam implementasi kebijakan. Temuan ini menegaskan pentingnya kebijakan fiskal yang terintegrasi dan berbasis wilayah (place-based policy) dengan fokus pada pengembangan modal manusia dan perluasan infrastruktur di daerah yang memiliki keterbatasan struktural. Penelitian ini juga memberikan kontribusi dengan mengintegrasikan variabel fiskal, infrastruktur, dan heterogenitas wilayah dalam analisis kemiskinan berbasis data panel.

**Kata Kunci:** Kemiskinan, Belanja Publik, Infrastruktur, Pertumbuhan Ekonomi, Indonesia Timur, FGLS

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## 1. Introduction

Regional inequality remains a persistent structural issue in Indonesia, particularly in Eastern regions such as NTT, Maluku, and Papua, where poverty rates consistently exceed the national average (Badan Pusat Statistik, 2024). Poverty in these regions is not merely income-related but is closely associated with limited access to basic services and

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infrastructure, which constrains human capital development and perpetuates structural poverty (World Bank, 2020; Khoiruddin et al., 2025).

From a theoretical perspective, this condition reflects the poverty trap concept, where low income leads to low savings, limited investment, and ultimately low productivity, creating a self-reinforcing cycle of poverty (Nurkse, 1953). In Eastern Indonesia, geographical challenges such as remoteness, archipelagic structures, and mountainous terrain further exacerbate these constraints by increasing distribution costs and limiting service accessibility (Asian Development Bank, 2021; Kalalo et al., 2024).

Government spending on education, health, and social protection plays a strategic role in addressing poverty by enhancing human capital and providing social safety nets. However, fiscal effectiveness often varies across regions due to disparities in implementation capacity and accessibility (Kementerian Keuangan Republik Indonesia, 2023; Haemmerli et al., 2021).

Recent studies highlight that financial inclusion, infrastructure, and education inequality are critical determinants of poverty reduction, particularly in Eastern Indonesia (Kadir et al., 2025; Muchtar et al., 2025). However, most empirical studies focus on aggregate national data and fail to capture regional heterogeneity and infrastructure constraints simultaneously.

This study addresses these gaps by focusing on Eastern Indonesia, integrating fiscal and infrastructure variables, and employing district-level panel data to capture regional disparities. To further illustrate regional disparities, Table 1 presents poverty trends in NTT, Maluku, and Papua during 2019–2023.

**Table 1.** Poverty Rates in NTT, Maluku, and Papua (2019–2023)

Year	NTT (%)	Maluku (%)	Papua (%)
2019	21,09	17,69	27,53
2020	21,21	17,99	26,64
2021	20,44	17,87	27,38
2022	20,05	16,42	26,80
2023	19,96	15,78	26,03

Source: Statistics Indonesia (BPS), 2024

Based on Table 1, the poverty rates in the provinces of East Nusa Tenggara (NTT), Maluku, and Papua over the 2019–2023 period exhibit differing trends across regions. Papua consistently records a very high poverty rate, remaining within the range of 26–27 percent. Although there was a decline in 2023 to 26.03 percent, this figure still reflects serious inequality, indicating that economic growth has not been inclusive, income distribution remains uneven, and access to basic services is still limited.

NTT experienced a very slow decline, from 21.09 percent in 2019 to 19.96 percent in 2023. While a reduction is evident, it tends to be stagnant, suggesting that existing policies have not been sufficiently strong to accelerate poverty reduction. Maluku shows relatively better performance, with a decrease from 17.69 percent to 15.78 percent, indicating more effective policies and a more consistent reduction compared to NTT and Papua.

Overall, the development of poverty rates in NTT, Maluku, and Papua during 2019–2023 indicates a downward trend; however, the reduction remains insignificant when compared to national targets. Papua remains the region with the highest poverty rate, followed by NTT and Maluku. When compared to the government’s target of achieving single-digit poverty rates, all three regions are still far above the target. This condition suggests that poverty alleviation policies have not been fully effective in Eastern

Indonesia, primarily due to structural constraints such as limited infrastructure, restricted access to basic services, and complex geographical conditions.

The Government of Indonesia, through its national development planning documents, targets the national poverty rate to be within the range of approximately 6.5–7.5 percent in the medium term (Ministry of National Development Planning/Bappenas, 2020). In addition, within the framework of the Sustainable Development Goals (SDGs), Indonesia is committed to significantly reducing poverty to near zero by 2030. This overview can be seen in the comparison between national targets and actual poverty levels in the following table:

**Table 2.** National Targets and Poverty Levels in NTT, Maluku, and Papua, 2023

Region	Poverty Rate 2023	National Target	Gap
NTT	19,96%	~7%	Very High
Maluku	15,78%	~7%	High
Papua	26,03%	~7%	Extremely high

Source: Bappenas, 2020; Statistics Indonesia (BPS), 2024

Based on Table 2, the 2023 data reveal a stark contrast between on-the-ground realities and national development ambitions. The disparities shown in the table indicate that NTT, Maluku, and Papua are not merely facing ordinary economic challenges, but are instead trapped in complex structural conditions. The central government has set a poverty target of approximately 7 percent as a benchmark for national welfare. However, the conditions in NTT, Maluku, and Papua far exceed this threshold. Papua records the highest poverty rate at 26.03 percent, creating an extremely wide gap—more than three times the national target.

East Nusa Tenggara (NTT), with a poverty rate of 19.96 percent, represents a clear manifestation of the Poverty Trap theory proposed by Ragnar Nurkse. Although Maluku demonstrates the best performance among the three regions, with a rate of 15.78 percent, it still faces substantial challenges, as its poverty level remains more than double the national target.

These disparities underline that poverty alleviation policies encounter unique structural barriers in Eastern Indonesia, including geographical constraints and unequal access to basic services. Low income levels in these regions result in limited saving capacity, which in turn restricts local investment and hampers productivity. This cycle is further exacerbated by inadequate access to public services, making it difficult for communities to break free from poverty independently without substantial external intervention, as illustrated in the table above.

This study contributes to the literature by integrating public spending, infrastructure, and economic growth within a district-level panel data framework focusing on Eastern Indonesia. Unlike previous studies that rely on national aggregates, this study captures regional heterogeneity and applies FGLS estimation to address heteroskedasticity and autocorrelation, providing more robust empirical evidence.

## 2. Literature review

### 2.1 Poverty and Poverty Trap

Poverty is increasingly recognized as a multidimensional phenomenon that extends beyond income deprivation to include limited access to education, healthcare, and basic

infrastructure (Sen, 1999; Alkire & Foster, 2011). In developing regions, poverty is often persistent due to structural constraints such as geographical isolation and unequal access to public services.

The poverty trap theory explains that low income leads to low savings, which limits investment and results in low productivity, creating a self-reinforcing cycle of poverty (Nurkse, 1953). This condition is particularly relevant in Eastern Indonesia, where structural and geographical barriers hinder economic mobility.

## *2.2 Public spending and poverty reduction*

Government spending on education, health, and social protection is a key instrument in poverty reduction. According to human capital theory, investment in education and health improves labor productivity and income levels (Becker, 1993). Recent empirical studies show that education spending significantly reduces poverty by improving skills and employment opportunities (Mughtar et al., 2025; Fatmawati et al., 2025). However, the impact of health expenditure is often mixed due to disparities in service quality and accessibility (Haemmerli et al., 2021). Social protection programs, while effective in the short term, often face challenges related to targeting accuracy and sustainability (Cahyadi et al., 2020).

## *2.3 Infrastructure and economic growth*

Infrastructure plays a critical role in economic development by improving market access and reducing transaction costs. Access to electricity and clean water has been shown to significantly enhance productivity and welfare (Simanjuntak & Solihin, 2025; Maulana & Nuraini, 2024). Economic growth is also an important determinant of poverty reduction. However, growth that is not inclusive—particularly in regions dominated by extractive industries—may fail to significantly reduce poverty (Todaro & Smith, 2020).

## *2.3 Research gap*

Although numerous studies have examined the relationship between public spending and poverty, most rely on aggregate national data and do not account for regional heterogeneity. Furthermore, limited studies integrate fiscal variables, infrastructure, and economic growth within a single empirical framework at the district level. Therefore, this study fills the gap by using district-level panel data, focusing on Eastern Indonesia, integrating fiscal and infrastructure variables, and applying FGLS estimation.

## **3. Methodology**

This study employs a quantitative approach using panel data (pooled data), which integrates time series and cross-sectional data. This data structure is selected for its ability to accommodate dynamic changes over time while simultaneously capturing the heterogeneity of unique characteristics across the regions of NTT, Maluku, and Papua (Gujarati & Porter, 2009). By utilizing panel data, the analysis can produce more efficient estimates and minimize potential bias arising from unobserved variables within each province (Baltagi, 2021).

The data used in this study are entirely secondary, obtained from authoritative institutions in Indonesia. Poverty indicators (such as the Poverty Gap Index (P1) and Poverty Severity Index (P2)), as well as variables related to access to basic infrastructure

(electricity and clean water), are sourced from publications of Statistics Indonesia (BPS). Meanwhile, data on the realization of government expenditures in the functions of education, health, and social assistance are obtained from regional government financial reports compiled by the Directorate General of Fiscal Balance (DJPB) of the Ministry of Finance (Badan Pusat Statistik, 2024; Mangkoesebroto, 2017). The use of these official data sources ensures the validity and consistency required for econometric modeling.

### *3.1 Data analysis method*

This study uses panel data combining cross-sectional (district-level) and time-series data from 2008–2023. Data sources include BPS and the Ministry of Finance, ensuring consistency and reliability (BPS, 2024). The use of panel data enables the capture of unobserved region-specific characteristics, such as the extreme geographical conditions in Papua or the archipelagic structure of Maluku and NTT, which may influence policy effectiveness (Gujarati & Porter, 2009). Although formal model selection procedures (Chow and Hausman tests) indicate the use of the Fixed Effects Model, further examination reveals violations of classical assumptions, namely heteroskedasticity and serial correlation.

To ensure the reliability of the estimated parameters, this study adopts the Feasible Generalized Least Squares (FGLS) approach. This method is chosen for its ability to correct for non-constant variance structures and address autocorrelation disturbances, thereby producing estimators that satisfy the Best Linear Unbiased Estimator (BLUE) properties (Baltagi, 2021; Wooldridge, 2010).

### *3.2 Model specification*

The econometric model is specified as follows:

$$\text{Poverty}_{it} = \beta_0 + \beta_1 \text{Edu}_{it} + \beta_2 \text{Health}_{it} + \beta_3 \text{Social}_{it} + \beta_4 \text{GDP}_{it} + \beta_5 \text{Electricity}_{it} + \beta_6 \text{Water}_{it} + \varepsilon_{it}$$

Where:

Poverty <sub>it</sub>	= poverty rate
Edu <sub>it</sub>	= education expenditure
Health <sub>it</sub>	= health expenditure
Social <sub>it</sub>	= social protection expenditure
GDP <sub>it</sub>	= regional economic output
Electricity <sub>it</sub>	= electricity access
Water <sub>it</sub>	= clean water access
ε <sub>it</sub>	= error term

### *3.3 Estimation method*

Model selection using Chow and Hausman tests indicates FEM as the preferred model. However, heteroskedasticity and autocorrelation are detected, leading to the use of FGLS. FGLS is chosen because it explicitly models the variance-covariance structure, making it more efficient for panels with large cross-sections and moderate time dimensions compared to alternatives such as Driscoll-Kraay or PCSE (Baltagi, 2021; Wooldridge, 2010).

## 4. Results

The NTT–Maluku–Papua region represents the most underdeveloped area, with an average poverty rate of 24.922 percent and a standard deviation of 11.02 percent. Average education expenditure amounts to IDR 148,022.98 million with a standard deviation of IDR 101,514.41 million; health expenditure averages IDR 103,054.76 million with a standard deviation of IDR 78,524.723 million; and social protection expenditure averages IDR 15,323.726 million with a standard deviation of IDR 11,754.51 million.

**Table 3.** Descriptive Statistics of the NTT–Maluku–Papua Region

Variable	Obs	Mean	Std. dev.	Min	Max
poverty	1,360	24.92207	11.01995	2.67	51.91
educ_exp	1,360	148023	101514.4	5825.828	856477.6
health_exp	1,360	103054.8	78524.72	1821.777	687223.2
soc_exp	1,360	15323.73	11754.51	38	83225.58
gdp	1,360	3537412	7889301	75996.09	8.99e+07
electricity	1,360	69.09486	29.30132	.28	100
water	1,360	43.29183	25.05156	.2547398	100

Source: STATA 17.0 data processing results

Gross Regional Domestic Product (GRDP) records an average of only IDR 3,537,411.7 million with a standard deviation of IDR 7,889,301.3 million. Meanwhile, access to electricity has an average of 69.095 percent with a standard deviation of 29.301 percent, and access to clean water averages 43.292 percent with a standard deviation of 25.052 percent.

The estimation results indicate that all variables have a statistically significant effect on the poverty rate at the 1 percent significance level (p-value < 0.01). Government expenditure in the education sector, GRDP, access to electricity, and access to clean water exhibit significant negative effects, while health expenditure and social protection expenditure show significant positive effects. Meanwhile, in the Fixed Effects Model (FEM) and Random Effects Model (REM), almost all variables demonstrate significant negative effects at the 1 percent significance level (p-value < 0.01), except for health sector expenditure, which does not have a statistically significant effect (p-value > 0.1).

**Table 4.** Estimation Results for the NTT, Maluku, and Papua Regions

Variables	(1) PLS	(2) FEM	(3) REM
lneduc_exp	-1.9729*** (0.455)	-0.4617** (0.195)	-0.5316*** (0.197)
lnhealth_exp	2.3945*** (0.456)	0.1829 (0.219)	0.3216 (0.218)

Variables	(1) PLS	(2) FEM	(3) REM
lnsoc_exp	0.9854*** (0.285)	-0.7805*** (0.125)	-0.7288*** (0.126)
Lngdp	-1.3985*** (0.285)	-3.5540*** (0.373)	-3.4720*** (0.350)
Electricity	-0.1553*** (0.011)	-0.0465*** (0.006)	-0.0513*** (0.006)
water	-0.1064*** (0.013)	-0.0191*** (0.007)	-0.0253*** (0.007)
Constant	47.2456*** (4.035)	90.6440*** (4.690)	88.8415*** (4.500)
Observations	1,360	1,360	1,360
Number of kab_kota	85	85	85

Source: STATA 17.0 data processing results

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5.** FGLS Estimation Results for NTT-Maluku-Papua

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: common AR(1) coefficient for all panels (0.8555)

Estimated covariances	=	85	Number of obs	=	1,360
Estimated autocorrelations	=	1	Number of groups	=	85
Estimated coefficients	=	7	Time periods	=	16
			Wald chi2(6)	=	829.48
			Prob > chi2	=	0.0000

poverty	Coefficient	Std. err.	z	P> z	[95% conf. interval]
lneduc_exp	-.6716741	.1017936	-6.60	0.000	-.8711859 - .4721624
lnhealth_exp	.202631	.140781	1.44	0.150	-.0732947 .4785568
lnsoc_exp	.1333637	.0890615	1.50	0.134	-.0411937 .3079211
lngdp	-4.632732	.2500042	-18.53	0.000	-5.122731 -4.142732
electricity	-.0538646	.0057079	-9.44	0.000	-.0650519 -.0426773
water	-.009633	.0055402	-1.74	0.082	-.0204916 .0012256
_cons	100.2098	3.455074	29.00	0.000	93.43803 106.9817

Source: STATA 17.0 data processing results

Notes: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.10

Based on the estimation results presented, the effects of each variable can be identified. Government expenditure in the education sector has a statistically significant negative effect (p-value < 0.05). This implies that a 1 percent increase in government

spending on education reduces the poverty rate in the NTT–Maluku–Papua region by 0.6717 percent, holding other variables constant.

The estimation results show that education spending significantly reduces poverty, which is consistent with previous empirical findings on the role of fiscal policy and infrastructure in poverty alleviation (Simanjuntak & Solihin, 2025; Maulana & Nuraini, 2024).

The significant negative coefficient of education spending indicates that increased investment in education reduces poverty by improving human capital and labor productivity. Similarly, economic growth contributes to poverty reduction, although its effectiveness depends on inclusivity. Infrastructure variables, particularly electricity and clean water, have strong negative effects on poverty, highlighting their role as enabling factors for economic activities.

## 5. Discussion

The findings of this study provide strong empirical evidence on the role of fiscal policy and infrastructure in poverty reduction in Eastern Indonesia. First, the significant negative effect of education spending confirms the relevance of Human Capital Theory (Becker, 1993). Increased investment in education enhances labor productivity, improves employment opportunities, and ultimately reduces poverty. This finding is consistent with previous studies (Mughtar et al., 2025; Fatmawati et al., 2025), reinforcing the argument that education is a long-term driver of poverty alleviation. Second, the insignificant effect of health expenditure suggests the presence of structural challenges, particularly unequal access to healthcare services in remote areas. This result aligns with Haemmerli et al. (2021), who highlight disparities in healthcare quality in Indonesia. It indicates that increasing spending alone is insufficient without improving service delivery and accessibility. Third, the limited impact of social protection spending indicates potential targeting inefficiencies and the presence of reverse causality. In many cases, higher spending is directed toward poorer regions, which may obscure its immediate impact on poverty reduction (Cahyadi et al., 2020). This suggests that policy effectiveness depends not only on the size of spending but also on its allocation and implementation. Fourth, infrastructure variables—particularly electricity and clean water—show a strong negative effect on poverty. This confirms that infrastructure acts as an enabling factor that facilitates economic activities, improves access to services, and enhances overall welfare. These findings are consistent with Simanjuntak & Solihin (2025). Finally, economic growth significantly reduces poverty; however, its effectiveness depends on inclusivity. In regions with limited economic diversification, growth may not fully translate into poverty reduction.

## 6. Conclusion

This study finds that education spending, economic growth, and infrastructure significantly reduce poverty in Eastern Indonesia. In contrast, health and social protection expenditures do not show immediate effects due to structural and institutional constraints. The findings reinforce the importance of human capital and infrastructure in poverty reduction and highlight the need for place-based fiscal policies. These findings also

provide important policy insights for reducing regional inequality and achieving inclusive development in Indonesia.

## 7. Policy implications

Policy interventions should be designed in a comprehensive and targeted manner to address the structural challenges faced by regions such as Nusa Tenggara Timur (NTT), Maluku, and Papua. First, the government should prioritize investment in education and infrastructure, as these sectors are fundamental to improving human capital and expanding economic opportunities. Strengthening education systems and expanding basic infrastructure—such as roads, electricity, and clean water—can significantly enhance productivity and reduce long-term poverty. Second, improving the targeting accuracy of social protection programs is essential. Better identification of beneficiaries and more effective program design can ensure that assistance reaches the most vulnerable populations and increases the overall effectiveness of poverty reduction policies. Third, enhancing public service delivery in remote and underdeveloped areas is crucial. Given the geographical constraints in Eastern Indonesia, improving the accessibility, quality, and efficiency of services—particularly in health, education, and social protection—is necessary to reduce regional disparities. Finally, the implementation of place-based development strategies is highly recommended. Such approaches acknowledge regional heterogeneity and allow policies to be tailored to local conditions, thereby improving policy effectiveness and ensuring more inclusive and sustainable development outcomes.

## 8. Limitations and future research

Future research should incorporate spatial econometric approaches and institutional variables to better capture regional disparities (Martinez & Cooray, 2025).

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