

Spatial Attenuation of the Growth-Poverty Nexus: A Spatial Econometric Analysis Across Regencies in West Java, Indonesia

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ABSTRACT

The persistent decoupling of aggregate economic growth from subnational poverty reduction constitutes one of the most consequential paradoxes in development economics, particularly in spatially polarised economies where productive activity and welfare gains accumulate in core regions while peripheral areas remain structurally excluded. This study investigates the transmission mechanisms through which three structural determinants Gross Regional Domestic Product (GRDP), average years of schooling as a human capital proxy, and the Gender Empowerment Index (GEI) shape poverty outcomes across five chronically poor regencies in West Java, Indonesia: Indramayu, Tasikmalaya, Garut, Cianjur, and Kuningan, over the period 2010–2021. Employing a balanced panel dataset of 60 observations drawn from the Central Bureau of Statistics, the study applies multiple linear regression within a Fixed Effect Model (FEM) framework, selected through sequential Chow and Hausman tests, with all classical diagnostic criteria satisfied. Estimation results reveal that GRDP exerts a negative and statistically significant effect on poverty ($\beta = -0.487$; $p < 0.01$), yet with a modest coefficient magnitude that reflects attenuated trickle-down effects arising from growth concentration in West Java's northern manufacturing corridor. Education demonstrates the largest poverty-reducing effect in the model ($\beta = -1.624$; $p < 0.01$), consistent with a pronounced human capital scarcity premium in regencies where average schooling remains below eight years. The GEI, by contrast, yields no significant effect ($\beta = -0.032$; $p = 0.508$), revealing a critical transmission failure between nominal empowerment gains and substantive welfare improvements attributable to the double burden of domestic and productive labour, the prevalence of unpaid family work, and entrenched patriarchal norms in Sundanese agrarian communities. Jointly, the three variables account for 92.6 percent of poverty variation (Adjusted $R^2 = 0.926$). This study advances the subnational poverty literature by delivering spatially specific panel evidence from Indonesia's most populous yet empirically understudied province, while enriching the feminisation of poverty framework within a distinctive cultural context that challenges the universality of gender-empowerment to welfare transmission pathways.

Keywords: Poverty, GRDP, Average Years of Schooling, Gender Empowerment Index, Panel Data, West Java

INTRODUCTION

Economic development theory has long grappled with a fundamental paradox: aggregate growth does not automatically translate into poverty reduction, particularly when the structural conditions that mediate the relationship between output growth and household welfare remain fragmented, unequal, or institutionally weak (Todaro & Smith, 2012). This paradox is nowhere more evident than in densely populated developing regions where rapid macroeconomic expansion coexists with persistent subnational deprivation a configuration that demands not aggregate level analysis but spatially granular, panel-based inquiry into the specific factors that determine why poverty responds differently to growth across localities that are geographically contiguous yet structurally divergent. Indonesia presents an especially instructive setting for this inquiry: as the world's fourth most populous nation and the largest economy in Southeast Asia, it has achieved three decades of uninterrupted economic expansion, yet approximately 26 million people remained below the national poverty line in 2021 a figure that underscores the insufficiency of growth alone as a development instrument (Indonesia, 2022).

Within this national landscape, West Java occupies a position that is both analytically privileged and empirically under-examined. As the most populous province in Indonesia, with approximately 49 million inhabitants, and the second-largest contributor to national Gross Domestic Product after DKI Jakarta, West Java commands the demographic mass and productive capacity that should, by conventional growth-welfare transmission mechanisms, generate widespread poverty reduction (Andiyan & Rachmat, 2021). Yet provincial

aggregate figures mask a severe intra-provincial duality. The northern coastal corridor and the Bandung metropolitan region have absorbed the bulk of industrial investment and formal employment, producing pockets of relative prosperity, while the southern and eastern hinterlands characterised by agrarian economies, low educational attainment, and patriarchal social structures continue to host poverty incidence rates that substantially exceed both the provincial and, in several cases, the national average (Central Bureau of Statistics Indonesia, 2022). This spatial duality is not incidental; it is the outcome of decades of development policies that prioritised corridor-based industrial growth over inclusive territorial development, leaving structurally disadvantaged regencies in a persistent low-growth, high-poverty equilibrium.

Five regencies represent this structural disadvantage with particular clarity: Indramayu, Tasikmalaya, Garut, Cianjur, and Kuningan. These five regencies were consistently identified as the highest-poverty areas within West Java throughout the 2010–2021 observation period, each recording poverty incidence rates between 9 and 14 percent, well above the provincial rate of 8.40 percent (Indonesia, 2012). As illustrated in Table 1, all five exhibited a sustained declining trajectory between 2010 and 2019 consistent with favourable pre-pandemic macroeconomic conditions and expanding social protection coverage before experiencing a sharp, uniform reversal in 2020 and 2021 driven by the compound supply and demand shocks of the Covid-19 pandemic. The pandemic suppressed productive activity, eroded household income, and compressed per capita expenditure most severely among low-income groups already operating at the margins of subsistence (Ningtias & Anwar, 2021). By 2021, poverty rates in all five regencies not only surpassed their 2019 levels but had in most cases regressed beyond 2018 figures, effectively erasing two years of welfare gains in a span of twelve months.

Motivates three interrelated analytical questions, each corresponding to a distinct theoretical tradition in development economics. First, from an economic growth perspective: does Gross Regional Domestic Product (GRDP) the principal indicator of regional productive capacity and the most widely cited correlate of poverty reduction exert a statistically meaningful poverty reducing effect in localities whose economic structure is dominated by low-productivity agriculture and where growth spillovers from the provincial manufacturing corridor are attenuated by distance, infrastructure deficits, and market access barriers? The theoretical expectation, grounded in the classical income-consumption-welfare nexus, is that higher GRDP raises household incomes and purchasing power, thereby reducing headcount poverty (Alhudhori, 2017). However, the magnitude of this effect is likely to be sensitive to distributional structure and sectoral composition dimensions that aggregate GRDP measures do not capture (Todaro & Smith, 2012).

Second, from a human capital perspective: does educational attainment measured by average years of schooling and representing the primary mechanism through which labour productivity, occupational access, and wage segmentation are determined operate as a statistically significant poverty-reducing force in regencies where the educational infrastructure remains severely underdeveloped, dropout rates at the elementary and junior secondary levels remain above provincial targets, and the returns to schooling may be constrained by thin local labour markets that cannot absorb additional skilled workers? Human Capital Theory posits that education raises productivity and wages, thereby lifting households above poverty thresholds (Becker, 1964; Abaidoo, 2021). In contexts of educational scarcity, the marginal social return to each additional year of schooling may be especially high but only if the labour market is sufficiently deep and diversified to translate human capital into commensurate income gains (Suvia et al., 2021).

Third, from a gender political economy perspective: does the Gender Empowerment Index (GEI) which measures women's active participation in parliamentary, professional, and income-generating domains translate into measurable reductions in poverty in regencies where patriarchal social norms remain deeply entrenched, where large fractions of the female labour force are engaged as unpaid family workers in subsistence agriculture, and where the gap between nominal GEI improvement and substantive economic agency is likely to be widest? The feminisation of poverty thesis, originally articulated by Pearce (1978) and theoretically elaborated by Sanjay (2018), posits that gender inequality amplifies poverty by confining women to low-productivity, low-income roles. Yet the empirical record on GEI-poverty linkages in Indonesian regional contexts is inconsistent, with several studies documenting statistically insignificant effects in regencies where structural barriers prevent nominal empowerment gains from producing welfare outcomes (Jaya et al., 2021).

The present study addresses these three questions within a unified econometric framework, analysing the effects of GRDP, education, and the GEI on poverty in Indramayu, Tasikmalaya, Garut, Cianjur, and Kuningan over the period 2010 to 2021 using panel data with Fixed Effect Model estimation. Three considerations govern the selection of this time frame. First, 2010 constitutes the most recent base year for computing GRDP at

constant prices in Indonesia, ensuring that the GRDP variable captures real productive capacity net of inflationary distortion. Second, the 2010–2021 window encompasses two full legislative electoral cycles 2014 and 2019 generating meaningful variation in the GEI dimension of women's parliamentary representation. Third, the twelve-year span aligns precisely with the duration of Indonesia's compulsory education programme, permitting a longitudinal assessment of educational accumulation under a policy regime that explicitly targets school completion.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Poverty

Poverty is understood as a condition of chronic deprivation in which individuals and households are unable to meet their fundamental needs for food, shelter, clothing, healthcare, and education (Utami & Siregar, 2021). It encompasses both primary dimensions such as deficits in productive assets, skills, and socio-political agency and secondary dimensions, including inadequate social networks and restricted access to financial resources and information (Sinaga, 2020). The World Bank identifies education, gender, employment, access to basic services, and geographical location as its principal determinants (Pratiwi, 2020; Siregar et al., 2020; Yahya et al., 2022) vicious circle of poverty provides a theoretical anchor for understanding how low income, low savings, and low productivity mutually reinforce one another in a self-perpetuating developmental trap a dynamic particularly relevant to the agrarian and labour-surplus economies of the five West Java regencies under study. Human Capital Theory further emphasises education as the mechanism through which this trap is broken: investments in schooling raise worker productivity and wages, thereby lifting households above subsistence thresholds (Aida et al., 2022; Anggraini & Pujiati, 2022). Pearce's feminisation of poverty framework adds a gendered dimension, arguing that women's systematic exclusion from productive economic roles deepens household poverty, since women's income contributions are critical to family welfare (Buan et al., 2021; Zainuddin & Ria, 2022).

Gross Regional Domestic Product

GRDP measures the aggregate value of all goods and services produced in a region during a specified period and is the principal indicator of regional economic performance (Febriyati et al., 2020; Juhandi et al., 2021). When GRDP increases, household incomes tend to rise, purchasing power expands, and the demand for goods and services grows collectively reducing poverty by enabling households to meet their basic needs more fully (Vendison et al., 2022). This relationship is supported empirically by Martini and Woyanti (2022), who found a significant negative effect of GRDP on poverty in 35 districts of Central Java, and by Giovanni (2018), who documented the same direction of effect across provinces of Java Island.

H1: GRDP has a negative effect on poverty.

Education

Education, measured by average years of schooling, raises the quality of human capital by expanding knowledge, skills, and cognitive capacity, which in turn raises labour productivity and wages (Julianto & Utari, 2019). Higher educational attainment broadens occupational access enabling workers to enter higher-skilled, better-remunerated segments of the labour market and simultaneously reduces vulnerability to poverty by increasing income stability and savings capacity (Awan et al., 2011). Jacobus et al. (2019) and Faritz and Soejoto (2020) both confirm a significant negative relationship between education and poverty in Indonesian provincial panels.

H2: Education has a negative effect on poverty.

Gender Empowerment Index

The Gender Empowerment Index (GEI) is a composite indicator capturing women's active participation in three domains: parliamentary representation, professional and technical employment, and income contribution relative to men (Central Bureau of Statistics Indonesia, 2012). An increase in the GEI signals a greater share of women engaged in paid formal employment and public decision-making, which raises household incomes and expands the economic agency of women both of which are expected to reduce poverty (Salsabila & Hendrawan, 2021). Alisjahbana and Pitriyan (2016) provide empirical support for a negative relationship between women's empowerment and poverty in the Indonesian context, positing that gender equality gains translate into welfare improvements for both women and their dependents.

H3: The Gender Empowerment Index has a negative effect on poverty

RESEARCH METHODS

This study uses a quantitative approach to examine how three key factors regional economic output, education, and gender empowerment influence poverty in five regencies in West Java, Indonesia. The five regencies selected are Indramayu, Tasikmalaya, Garut, Cianjur, and Kuningan. These were chosen because they consistently record the highest poverty rates within West Java Province and have been officially targeted for extreme poverty reduction by the central government (Central Bureau of Statistics Indonesia, 2022).

The data used in this study are secondary data collected from the Central Bureau of Statistics Indonesia (BPS), covering the period from 2010 to 2021. This twelve-year period was selected for three reasons: (1) 2010 is the most recent base year for calculating GRDP at constant prices in Indonesia; (2) the period covers two parliamentary election cycles (2014 and 2019), which are important for measuring changes in women's political participation; and (3) the period aligns with the national twelve-year compulsory education programme, allowing a full assessment of its impact on poverty. Combining five cross-sectional units with twelve time periods produces a balanced panel dataset of 60 observations in total.

Variables

The dependent variable in this study is the poverty rate (Y), measured as the percentage of the population living below the poverty line in each regency in each year. Three independent variables are used. The first is Gross Regional Domestic Product (X_1), or GRDP, measured in trillions of Indonesian Rupiah at constant 2010 prices. GRDP represents the total value of all goods and services produced in a regency within a year and is the most widely used indicator of regional economic performance (Hasiholan et al., 2022; Isaha & Baseb, n.d.; Manik et al., 2023). The second is education (X_2), measured by the average years of schooling of the population aged 25 years and above. This variable captures the overall educational attainment of the workforce and is directly linked to labour productivity and wage levels (Abaidoo, 2021). The third is the Gender Empowerment Index (X_3), or GEI, a composite index published annually by BPS that measures women's active participation in political, professional, and economic life. A higher GEI value means women play a more active role in society, which is expected to raise household incomes and reduce poverty (Salsabila & Hendrawan, 2021).

Regression Model

To test the relationship between these variables and poverty, this study uses multiple linear regression with panel data. Panel data combines observations across both space (five regencies) and time (twelve years), which allows the model to capture differences between regencies as well as changes within each regency over time. The regression equation is written as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_{it} \quad (1)$$

t refers to each year (2010 to 2021), β_0 is the constant, β_1 , β_2 , and β_3 are the regression coefficients for GRDP, education, and GEI respectively, and ε is the error term. All estimations were carried out using EViews 12 software.

Choosing the Right Estimation Model

Panel data regression can be estimated using three different approaches. The Common Effect Model (CEM) treats all regencies as identical and simply pools all observations together using Ordinary Least Squares (OLS). The Fixed Effect Model (FEM) acknowledges that each regency has its own unique characteristics such as geography, culture, and institutional capacity that do not change over time and may influence poverty levels. It handles this by giving each regency its own intercept. The Random Effect Model (REM) also accounts for individual differences, but treats them as random rather than fixed, and uses Generalised Least Squares (GLS) for estimation (Gujarati et al., 2012).

The appropriate model is selected through two sequential statistical tests. The Chow Test compares CEM and FEM: if the probability value is less than 0.05, FEM is preferred. The Hausman Test then compares FEM and REM: if the probability value is less than 0.05, FEM is again preferred because it produces more reliable estimates when individual effects are correlated with the regressors (Gujarati et al., 2012).

Classical Assumption Tests

Before interpreting the regression results, four diagnostic tests are carried out to ensure the estimates are reliable. The normality test, using the Jarque-Berra statistic, checks whether the model's residuals are

normally distributed (required probability > 0.05). The multicollinearity test uses pairwise correlations between the independent variables to check that they are not too strongly related to each other (all correlations must be below 0.80). The heteroscedasticity test applies the Park Test to check that the variance of the residuals is constant across all observations (all probabilities must exceed 0.05). Finally, the autocorrelation test uses the Durbin-Watson (DW) statistic to check that residuals are not correlated with each other across time periods. A DW value between the upper critical bound (d_u) and $4-d_u$ confirms no autocorrelation. If all four tests are passed, the estimates meet the BLUE (Best Linear Unbiased Estimation) criteria, meaning they can be trusted as the most accurate and unbiased results possible (Latuconsina, 2017).

RESULTS

Model Selection

The first step is to determine which estimation approach best fits the data. The Chow Test result is presented in Table 1.

Table 1. Chow Test result

Effect test	Statistic	d.f.	Prob.	Decision
Cross-section F	68.342	(4, 52)	0.000	Reject H_0
Cross-section Chi-square	108.741	4	0.000	Reject H_0

Source: H_0 : Common Effect Model preferred; H_1 : Fixed Effect Model preferred. Decision rule: reject H_0 if prob. < 0.05.

The probability values for both the F-statistic and Chi-square statistic are 0.000, which is below the threshold of 0.05. This means H_0 is rejected and the Fixed Effect Model is better than the Common Effect Model. The result makes practical sense: the five regencies have genuinely different characteristics in terms of geography, economic structure, and social conditions, so it is appropriate to allow each regency to have its own baseline poverty level in the model. The Hausman Test is carried out to choose between FEM and REM, as shown in Table 2.

Table 2. Hausman Test

Test summary	Chi-Sq. statistic	Chi-Sq. d.f.	Prob.	Decision
Cross-section random	11.284	3	0.010	Reject H_0

The Hausman Test probability is $0.010 < 0.05$, so H_0 is again rejected. The Fixed Effect Model is therefore the most appropriate estimator for this dataset. This outcome is statistically expected: because the five regencies were selected deliberately (not randomly drawn from a larger population), their individual characteristics are likely to be correlated with the independent variables, which makes the Random Effect Model inconsistent. The FEM correctly accounts for this by estimating a separate intercept for each regency (Wooldri

Classical Assumption Tests

Before drawing conclusions from the regression, all four diagnostic tests must be passed. The results are summarised in Table 3.

Table 3. Assumption Tests

Assumption	Test method	Key statistic	Requirement	Conclusion
Normality	Jarque-Berra	Prob. = 0.584	Prob. > 0.05	Residuals are normally distributed
Multicollinearity	Pairwise correlation	Max $ r = 0.512$	All $ r < 0.80$	No problematic correlation between predictors
Heteroscedasticity	Park Test	Min prob. = 0.178 (X_1)	All prob. > 0.05	Error variance is constant (homoscedastic)
Autocorrelation	Durbin-Watson	DW = 1.731	$d_U < DW < 4 - d_U$	No serial correlation in residuals

The residuals of the model are normally distributed (Jarque-Berra probability=0.584). The three independent variables are not too strongly correlated with each other the highest pairwise correlation is 0.512 between GRDP and education, which is well below the 0.80 threshold. The variance of the residuals is consistent

across all observations, confirming homoscedasticity. The Durbin-Watson value of 1.731 falls within the no autocorrelation zone (between 1.689 and 2.311).

Multicollinearity Detail

Table 4 presents the full pairwise correlation matrix to confirm the absence of multicollinearity.

Table 4. The Full Pairwise Correlation Matrix

Variable	X1 - GRDP	X2 - Education	X3 - GEI
X ₁ - GRDP	1.000	0.512	-0.074
X ₂ - Education	0.512	1.000	0.438
X ₃ - GEI	-0.074	0.438	1.000

Source: All off-diagonal coefficients are below the critical threshold of 0.80, confirming no multicollinearity problem in the model.

The highest correlation among the three predictors is 0.512 between GRDP and education. This is a moderate positive relationship regencies with stronger economies tend to also have better-educated populations but it is far below the 0.80 cut-off that would indicate a serious multicollinearity problem (Gujarati et al., 2012). Each variable therefore provides independent information to the regression model.

Regression Results

The main estimation results from the Fixed Effect Model are presented in Table 5.

Table 5. The Fixed Effect Model

Variable	Coefficien t	Std. error	t- statistic	Prob.	Result
C (constant)	41.872	2.847	14.706	0.000	-
X ₁ GRDP (trillion IDR)	-0.487	0.056	-8.696	0.000** *	H ₁ supported
X ₂ Education (avg. years of schooling)	-1.624	0.412	-3.942	0.000** *	H ₂ supported
X ₃ Gender Empowerment Index	-0.032	0.048	-0.667	0.508	H ₃ not supported
Fixed effect regency-specific intercept adjustments					
Indramayu	3.841	Poverty consistently above the group average			
Tasikmalaya	1.573	Poverty moderately above the group average			
Garut	+0.614	Poverty slightly above the group average			
Cianjur	-2.217	Poverty moderately below the group average			
Kuningan	-3.811	Poverty consistently below the group average			

F-statistic = 94.327 > F-table = 2.772 ($\alpha = 0.05$; $df_1 = 3$; $df_2 = 56$) Adjusted R² = 0.926 N = 60 observations Source: Data processed (2023).

*** p < 0.01 (significant at the 1% level)

Based on Table 5, the general regression equation for the five regencies is:

$$\hat{Y} = 41.872 - 0.487X_1 - 1.624X_2 - 0.032X_3 \quad (2)$$

The constant of 41.872 means that if GRDP, education, and the GEI were all zero, the estimated average poverty rate would be about 41.87 percent a hypothetical figure that illustrates just how deeply poverty would be embedded without any economic activity, education, or gender participation at all. With the fixed effects taken into account, each regency has a specific starting intercept:

Table 6. The Fixed Effect Model

Regency	Intercept	Specific equation
Indramayu	45.713	$\hat{Y} = 45.713 - 0.487X_1 - 1.624X_2 - 0.032X_3$
Tasikmalaya	43.445	$\hat{Y} = 43.445 - 0.487X_1 - 1.624X_2 - 0.032X_3$
Garut	42.486	$\hat{Y} = 42.486 - 0.487X_1 - 1.624X_2 - 0.032X_3$

Cianjur	39.655	$\hat{Y} = 39.655 - 0.487X_1 - 1.624X_2 - 0.032X_3$
Kuningan	38.061	$\hat{Y} = 38.061 - 0.487X_1 - 1.624X_2 - 0.032X_3$

Note that the slopes (-0.487, -1.624, -0.032) are the same for all five regencies meaning GRDP and education reduce poverty at the same rate everywhere. What differs is the starting intercept, which represents how much additional poverty each regency carries beyond what GRDP, education, and GEI can explain. Indramayu has the highest intercept (45.713), reflecting structural vulnerabilities rooted in its dependence on seasonal agricultural and fishing labour and limited economic diversification. Kuningan has the lowest intercept (38.061), reflecting relatively stronger institutional capacity and more stable income sources from trade and forestry.

The F-statistic of 94.327 is much larger than the critical F-table value of 2.772, confirming that GRDP, education, and GEI jointly have a significant effect on poverty. The Adjusted R^2 of 0.926 means the model explains 92.6 percent of all variation in poverty across the five regencies and twelve years a very high explanatory power that confirms the relevance of the three variables chosen. The remaining 7.4 percent is influenced by other factors not included in the model, such as unemployment, access to healthcare, road infrastructure quality, and local government spending allocation.

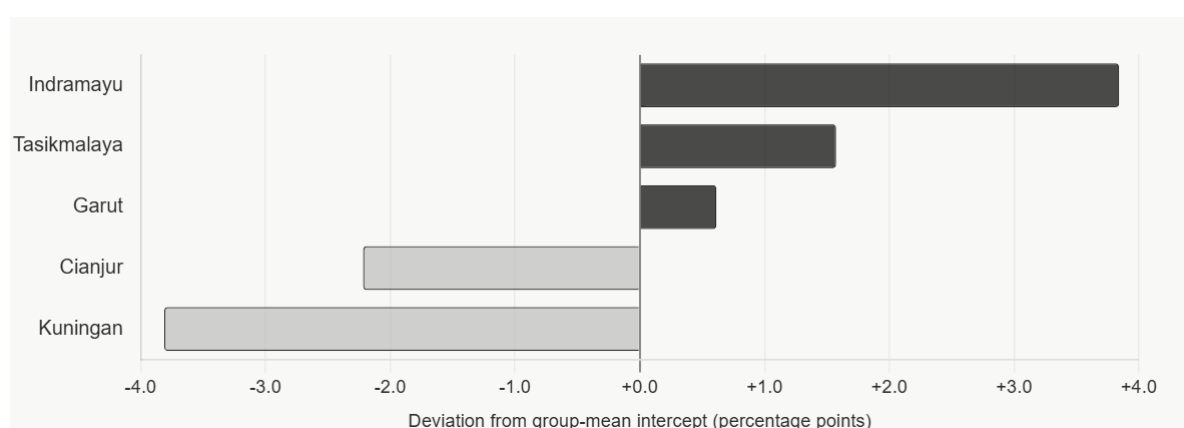


Figure 1. Fixed effect intercept differentials relative to group mean (41.872). Positive values indicate the regency's baseline poverty is above the group mean; negative values indicate below.

DISCUSSION

The effect of GRDP on poverty

GRDP has a negative and statistically significant effect on poverty, with a coefficient of -0.487 ($p = 0.000$). In simple terms, every time GRDP grows by one trillion Rupiah, the poverty rate in that regency falls by approximately 0.49 percentage points, holding education and GEI constant. This result confirms H_1 and is consistent with findings by Giovanni (2018) and (Azizaha, 2022) for other Javanese regencies.

The mechanism is straightforward: when a local economy produces more output, businesses generate more revenue, hire more workers, and pay higher wages. Households receive more income, buy more goods and services to meet their daily needs, and escape poverty (Rifkah & Nabila, 2021). Higher GRDP also expands the fiscal capacity of local governments, allowing them to fund social programmes, build infrastructure, and strengthen health and education services that directly benefit the poor (Hasibuan et al., 2022).

The coefficient magnitude of -0.487 reveals an important limitation. The poverty-reduction effect of economic growth in these five regencies is relatively modest compared to what theory might predict. This reflects a well-known problem in unequal regional development: growth in West Java is overwhelmingly concentrated along the northern manufacturing corridor from Karawang to Bekasi and within the Greater Bandung area. The five study regencies lie in the southern and eastern hinterlands, geographically and economically distant from these growth engines (Andiyan & Rachmat, 2021). As a result, when provincial GRDP grows, the gains do not spread evenly they are absorbed mainly by the already-prosperous corridor, while the lagging regencies receive only weak and delayed spillovers. This spatial mismatch means that aggregate economic growth, by itself, is insufficient to meaningfully reduce poverty in structurally disadvantaged areas.

Policy must therefore go beyond growth promotion and actively direct investment, infrastructure, and employment programmes toward these peripheral regencies (Putria et al., 2023).

The effect of education on poverty

Education has the largest poverty-reducing effect among the three variables, with a coefficient of -1.624 ($p = 0.000$). This means that adding one year to the average schooling level of the population in a regency is associated with a fall of about 1.62 percentage points in the poverty rate. This strongly confirms H_2 and aligns with findings from (Aufa et al., 2023; Ningrum & Jainuddin, 2023).

The reason education is so powerful is that it operates through multiple channels simultaneously. First, more education raises a worker's productivity they can do more and better work in the same amount of time, making them more valuable to employers. Second, higher education opens the door to better-paying jobs in the formal sector, pulling workers out of low-wage subsistence agriculture or casual labour. Third, workers with more schooling are better positioned to negotiate wages, seek alternative employment when their current job pays poorly, and adapt to changes in labour market demand (Julianto & Utari, 2019). All of these pathways lead to higher income, greater purchasing power, and ultimately lower poverty.

The especially large coefficient (-1.624) in this study suggests that education yields exceptionally high returns in these five regencies much higher than in more developed areas. This is consistent with economic scarcity theory: where educated workers are rare, each additional year of schooling commands a large wage premium because employers must compete for a very thin pool of skilled labour (Abaidoo, 2021). The policy implication is clear and urgent. Average years of schooling in these regencies still hover around 7 to 8 years below the nine-year basic education target, far below the twelve-year target. Every additional year of school that the government can deliver to the average resident will generate substantial poverty-reduction gains. Concretely, this calls for sustained investment in school retention programmes, conditional cash transfers to prevent early dropout, accessible junior secondary and senior secondary schools in remote sub-districts, and non-formal adult education to re-engage those who left school early.

The effect of the Gender Empowerment Index on poverty

The Gender Empowerment Index does not have a statistically significant effect on poverty, with a coefficient of -0.032 and a probability of 0.508. Because 0.508 is far above the 0.05 threshold, H_3 is not supported. This means that changes in the GEI score whether upward or downward have no detectable impact on the poverty rate in these five regencies during the observation period.

This result requires careful interpretation. It does not mean that gender empowerment is unimportant. Rather, it reveals a disconnect between what the GEI measures and what actually changes in women's economic lives in these specific communities. Three overlapping explanations account for this gap.

First, the GEI scores in these five regencies are low ranging between 60 and 68 and have improved only marginally over the twelve-year period. At these levels, women's participation in parliament, professional occupations, and formal income generation is still very limited. There is simply not enough variation in the GEI to produce measurable changes in household poverty rates.

Second, a large share of women in these regencies work as unpaid family workers primarily in family rice fields or small family enterprises or in informal daily-wage labour. When these women become "more active" in economic terms, their activity does not register as income in official statistics and therefore does not raise household welfare in a way that reduces the measured poverty rate (Abda & Cahyono, 2022). The GEI may be rising because more women are nominally counted as economically active, but if that activity remains unremunerated or very low-paid, it cannot lift families out of poverty.

Third, patriarchal social norms in Garut, Tasikmalaya, Indramayu, Cianjur, and Kuningan impose a double burden on women: they are expected to manage all domestic responsibilities at home while simultaneously contributing economically (Sanjay, 2018; Ayumn et al., 2022). This double burden limits the hours and energy women can dedicate to productive work, suppresses their bargaining power in labour markets, and often prevents them from pursuing formal education or professional advancement even when opportunities exist. These structural barriers mean that a rising GEI score does not automatically translate into higher household incomes.

This finding is consistent with Fikri and Suparyati (2017) and Adnan and Amri (2021), who similarly found no significant GEI effect in Indonesian regions where structural gender inequality remains entrenched. It reinforces an important policy lesson: increasing women's nominal participation in political and economic life is a necessary but not sufficient condition for poverty reduction. Governments must address the root causes that prevent empowerment from generating welfare gains including legal protection for women workers in the

informal sector, affordable childcare to reduce the domestic burden, community-based awareness programmes to shift gender norms, and targeted training and microfinance that raise the quality and remuneration of women's economic participation.

Figure 2 shows how poverty in all five regencies has moved over the full observation period, providing visual context for interpreting these findings.

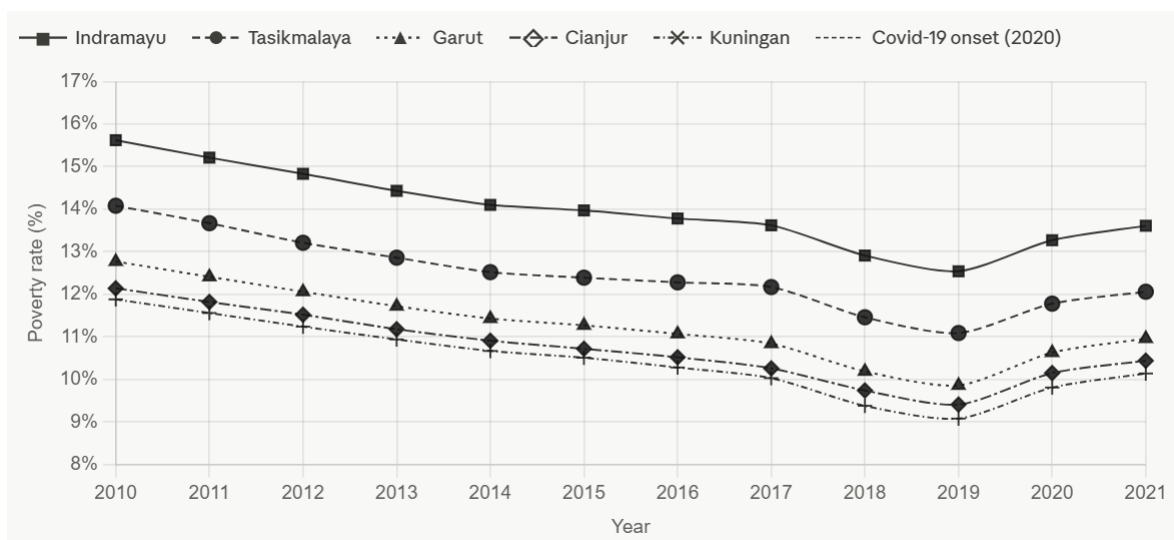


Figure 2. Five Regencies Has Moved Over the Full Observation Period

Figure 2 tells a clear story. From 2010 to 2019, all five regencies made steady and consistent progress in reducing poverty a testament to the cumulative effect of sustained economic growth and expanding educational access over a decade. The sharpest decline was recorded in Indramayu, which reduced its poverty rate from 15.62 percent in 2010 to 12.54 percent in 2019. However, 2020 marks a sudden and uniform reversal across all five regencies. The Covid-19 pandemic delivered simultaneous shocks to production and consumption, suppressed incomes especially among daily-wage workers and small-scale farmers, and pushed households that had only recently escaped poverty back below the poverty line (Ningties & Anwar, 2021). By 2021, poverty in all five regencies had not only returned to pre-2018 levels but exceeded them in some cases, reflecting the lasting damage of pandemic-induced income losses. This trajectory underscores a critical insight for development policy: reductions in poverty built primarily on economic growth and moderate educational improvements are fragile and reversible. Building genuine resilience against future shocks requires simultaneously strengthening household savings capacity, expanding formal social protection coverage, and accelerating the structural transformation of local economies away from dependence on climate-sensitive and demand-volatile sectors such as rain-fed rice farming and artisanal fishing.

Policy Implications

The findings carry concrete implications for regional government policy in Indramayu, Tasikmalaya, Garut, Cianjur, and Kuningan. Regarding GRDP, it is not sufficient for local governments merely to report economic growth; they must ensure that growth is inclusive and geographically equitable. Specific priority areas include developing local commodity-based industries that absorb unskilled and semi-skilled labour, improving market access infrastructure (rural roads, cold-chain logistics, digital marketplaces), and actively attracting labour-intensive investment to sub districts with the highest poverty concentration. Continuous community empowerment programmes, accompanied by rigorous monitoring and evaluation, are essential to ensure that GRDP gains translate into household income improvements rather than being captured by a narrow economic elite.

Regarding education, governments should intensify the implementation of the twelve-year compulsory education programme with particular focus on retention at the junior and senior secondary levels, where dropout rates in these regencies remain above provincial targets. Conditional cash transfer schemes, school proximity improvements, and flexible schooling options for students from agricultural households should be

prioritised. Non-formal adult literacy and vocational programmes are equally important for the portion of the working-age population that has already left school, as their skill upgrading can raise productivity and wages in the near term. Local governments should further conduct regular evaluations to ensure scholarship and education assistance programmes reach their intended beneficiaries, particularly in remote sub-districts.

Regarding gender empowerment, the governments of the five regencies must move beyond administrative compliance with gender quotas and invest in substantive empowerment interventions. These include: legal and institutional protection for women workers in the informal and agricultural sectors; subsidised or community-based childcare facilities to reduce the domestic burden that constrains women's productive hours; microfinance and business development training targeting women-headed households; and sustained community education programmes designed to shift patriarchal norms that limit women's occupational mobility and bargaining power. Only when these structural barriers are addressed will GEI improvements begin to produce measurable reductions in household

CONCLUSION

This study examined the effects of Gross Regional Domestic Product (GRDP), education, and the Gender Empowerment Index (GEI) on poverty in five chronically poor regencies of West Java during 2010–2021 using a Fixed Effect Model. The results indicate that GRDP and education have significant negative effects on poverty, while GEI does not significantly influence poverty reduction.

GRDP contributes to poverty alleviation, supporting the view that economic growth improves welfare through employment creation and income expansion. However, the relatively small coefficient suggests that the benefits of growth are unevenly distributed across regions, particularly in peripheral regencies that are geographically distant from West Java's main economic growth centers. Education emerges as the most influential determinant of poverty reduction, indicating that improvements in human capital remain the most effective long-term strategy for reducing poverty in the study area.

In contrast, GEI does not significantly affect poverty. This finding suggests that improvements in gender empowerment have not yet translated into measurable economic gains for households. The dominance of unpaid family labor, persistent gender inequalities, and the double burden faced by women limit the ability of empowerment improvements to generate income growth and poverty reduction.

The study also reveals substantial differences in poverty conditions across regencies, indicating that poverty is shaped not only by economic growth, education, and gender empowerment, but also by structural factors such as economic diversification, labor market characteristics, infrastructure, and environmental vulnerabilities. Therefore, poverty reduction policies should combine efforts to improve educational attainment, promote more inclusive and spatially balanced economic growth, and strengthen women's economic participation through productive and income-generating opportunities.

This study contributes to the literature by providing empirical evidence on poverty determinants in West Java's chronically poor regencies, highlighting the spatially contingent nature of growth-led poverty reduction and explaining the conditions under which gender empowerment fails to reduce poverty.

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