

The Role of Education and Unemployment in Poverty in Indonesia: A Provincial Panel Data Analysis, 2020–2025

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Abstract: Poverty remains a structural challenge in Indonesia's economic development, even as the direction of post-pandemic recovery has become fairly clear in recent years. This study is motivated by the concern that improving national poverty figures often mask sharp disparities across regions, and that the relationship among education, unemployment, and poverty cannot be fully understood from aggregate data alone. Drawing on official Statistics Indonesia (BPS) data for 2020–2025, the study explores how education and open unemployment shape poverty patterns in Indonesia, while testing whether a region's structural characteristics also influence the strength of that relationship. Rather than presenting a full-scale provincial panel covering all 34 provinces, the study transparently takes a more limited approach combining the national trend with case studies of several provinces whose data could be fully and officially traced as a consequence of open-data access constraints encountered during preparation. This approach was deliberately chosen to ensure that every figure used is genuinely drawn from official releases rather than unfounded estimates. The findings show that open unemployment plays an important role in driving poverty, and this effect becomes far more apparent once differences in regional characteristics are taken into account – an indication that local structural factors cannot be ignored in poverty analysis. The level of education also appears to move together with declining poverty, although limited variation in the national data makes its pure effect difficult to separate from that of unemployment. The cross-provincial comparison reinforces this picture: regions with lagging human development consistently record far higher poverty than advanced metropolitan regions, and that gap narrows only very slowly over time. The study concludes with a recommendation that future research expand data coverage to all 34 provinces using BPS microdata (Susenas and Sakernas), and calls for a policy strategy that combines expanded access to upper-secondary education with formal job creation in provinces with lagging Human Development Index (HDI) scores.

Keywords: Poverty; unemployment; education; panel data; province; Indonesia.

1. Introduction

Poverty is a multidimensional issue that remains a top priority on both Indonesia's national development agenda and the first goal of the global Sustainable Development Goals (SDGs). Data from Statistics Indonesia (BPS) show that the national poverty rate spiked during the COVID-19 pandemic, rising from 9.78 percent in March 2020 to 10.14 percent in March 2021, before gradually declining to 9.03 percent in March 2024 and 8.47 percent in March 2025 (BPS, 2025). This decline runs parallel to a sharp improvement in the national Open Unemployment Rate (TPT), which fell from 7.07 percent (August 2020) to 4.91 percent (August 2024), alongside an increase in the mean

years of schooling (MYS) of the population aged 25 and above, from 8.48 years (2020) to 8.85 years (2024) (BPS, 2024).

Theoretically, the relationship between education, unemployment, and poverty is explained through two main frameworks. First, human capital theory (Becker, 1964) views education as an investment that raises individual productivity, thereby indirectly lowering the risk of falling into poverty. Second, structural unemployment theory explains that a mismatch between workers' skills and labour-market demand generates unemployment, which in turn reduces household income and increases the likelihood of poverty. These two pathways are interlinked, since

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educational attainment also determines an individual's competitiveness in the labour market.

Although the national trend has improved, disparities across regions remain a major challenge. Provinces such as Papua and East Nusa Tenggara consistently record poverty rates above 19 percent, far exceeding DKI Jakarta, which stands below 4.5 percent (BPS, various provincial releases 2021–2025). This indicates that the determinants of poverty cannot be adequately understood through national aggregate data alone, and require cross-regional analysis that accounts for structural heterogeneity across provinces.

This study aims to analyse the role of education and unemployment in poverty in Indonesia over the 2020–2025 period using official BPS data. It should be stated transparently that constructing a full provincial database (34 provinces × years) encountered technical constraints in automated open-data access at the time this research was prepared. Consequently, this study employs a reduced-panel design—a combination of a complete national time series with a multi-province case study for provinces whose data could be fully or partially verified through official sources. This approach was chosen to preserve the integrity of real data rather than relying on simulated or unfounded estimates, in line with the principle of methodological caution in quantitative research.

2. Literature Review and Theoretical Framework

2.1 Human Capital Theory and Poverty

Becker (1964) argued that education is a form of human capital investment that raises workers' marginal productivity, thereby increasing wages and income. Todaro and Smith (2020) affirmed that unequal access to education is one of the main causes of income inequality and poverty in developing countries, including Indonesia. The relevance of human capital theory in the Indonesian context is further confirmed by Dwita, Elliyaana, and Surapto (2022), who found that human capital and entrepreneurial orientation significantly affect individual performance among university lecturers in Indonesia indicating that the accumulation of human capital through formal and informal education is consistently associated with productivity and economic well-being, in line with the human capital proposition that underlies this study's framework.

The human capital dimension is also reflected in financial literacy as a form of applied knowledge. Elliyaana, Widyastuti, and Buchdadi (2024) found that debt management literacy significantly affects the ability of Small and Medium Enterprises (SMEs) to repay their loan obligations, indicating that literacy gaps—as a derivative of education gaps—can heighten the economic vulnerability of poor and near-poor households to debt traps.

2.2 Structural Unemployment and Poverty

The Open Unemployment Rate (TPT) reflects the proportion of the labour force not absorbed by the labour market. As unemployment rises, households lose their main source of income, increasing the likelihood of falling below the poverty line. Research by Bahriyah and Primandhana (2022) published in the *Journal of Regional Economics*, examining the effects of unemployment, inflation, and investment on HDI and poverty in South Sulawesi, found significant relationships among these three variables, although the direction and magnitude of the effects varied across regions. At the household level, Elliyaana, Widyastuti, Buchdadi, and Rabia (2024) identified the determinants of loan self-control among customers of the People's Business Credit (Kredit Usaha Rakyat/KUR) programme in Indonesia, finding that behavioural, cognitive, and decisional control over borrowing is strongly influenced by households' economic capacity and income—a finding relevant to understanding how unemployment pressure and low income can drive uncontrolled borrowing behaviour and deepen vulnerability to poverty.

2.3 Prior Empirical Studies

A study on the contribution of socioeconomic factors to poverty on the island of Java (2020–2022) found that rising HDI was consistently accompanied by declining TPT across the six provinces of Java, yet significant gaps between provinces persisted—DKI Jakarta recorded the highest HDI while other provinces lagged considerably behind (JERPS journal, 2023). Another study on the effect of the number of poor people, mean years of schooling, and labour force participation rate on TPT in Maluku Province (2017–2023), using a fixed-effect panel data approach, found that mean years of schooling actually had a significant positive effect on TPT—indicating a frictional unemployment phenomenon among highly educated workers who are more selective in choosing jobs (Jurnal Moneter, 2024). A further study on the effects of economic growth, TPT, inflation, and investment on HDI and poverty also confirmed that relationships among these variables are not always linear or uniform across regions (JPEK, 2025). These findings collectively confirm the need for a panel data approach that accounts for cross-provincial heterogeneity, rather than mere national-level generalisation.

2.4 Conceptual Framework

Based on the review above, this study proposes a conceptual framework in which poverty (Y) is influenced by the open unemployment rate (X1) and the level of education, proxied by mean years of schooling/HDI (X2), while accounting for region-specific (unit) effects that capture each province's unobserved structural characteristics.

3. Research Methodology

3.1 Data Type and Sources

This study uses official secondary data sourced from Statistics Indonesia (BPS), comprising: (1) the percentage of the poor population from the National Socioeconomic Survey (Susenas), March round; (2) the Open Unemployment Rate (TPT) from the National Labour Force Survey (Sakernas), August round; and (3) mean years of schooling (MYS) of the population aged 25 and above, as well as the Human Development Index (HDI), used as proxies for the level of education/human development. All figures used are drawn from official BPS Central and Provincial statistical news releases (Berita Resmi Statistik) that are publicly traceable, as listed in the References.

3.2 Data Coverage and Limitations

It should be disclosed openly that the initial design of this study targeted a full 34-province panel for the 2020–2024 period. However, automated extraction of BPS dynamic tables (which are rendered via JavaScript) and the official BPS API (which requires access-key registration) could not be fully carried out during the preparation of this article. Consequently, this study uses two layers of data, all sourced from verifiable official BPS releases:

- A complete national time series (2020–2024) for three variables: poverty, TPT, and MYS.
- Multi-province case-study data for provinces whose year coverage could be fully or partially verified: Central Java (poverty and TPT, complete 2020–2024), East Java (poverty, 2022–2024), East Nusa Tenggara (poverty, 2021–2024; HDI 2022–2024), and DKI Jakarta (poverty, 2023–2024).

This study is therefore exploratory in nature and presented as a reduced panel/pilot study, not a definitive estimation covering all 34 provinces. For publication in a reputable journal (Sinta 2/Scopus Q3), the author recommends strengthening the database through direct downloads of BPS dynamic tables (.xlsx format) or a formal request for Susenas–Sakernas microdata, as discussed in the Limitations and Recommendations section.

3.3 Analytical Model

For the National–Central Java panel data ($n = 10$; 2 units $\times$ 5 years), a Least Squares Dummy Variable (LSDV) model is used as a simple fixed-effects approach:

$$Poverty_{it} = \beta_0 + \beta_1 \cdot TPT_{it} + \beta_2 \cdot D_CentralJava_i + \varepsilon_{it}$$

where $D_CentralJava$ is a unit dummy variable (1 = Central Java, 0 = National) capturing region-specific fixed effects. For the national time series ($n = 5$), Pearson correlation analysis is used to examine the relationships among poverty, TPT, and MYS, given the very limited degrees of freedom for a stable multiple regression. All calculations were

performed using Python (NumPy) with Ordinary Least Squares estimation.

4. Results and Discussion

4.1 National Trends, 2020–2025

Table 1 presents the national trend in poverty, TPT, and MYS for 2020–2024/2025.

Year	Poverty, March (%)	TPT, August (%)	MYS, 25+ (years)
2020	9.78	7.07	8.48
2021	10.14	6.49	8.54
2022	9.54	5.86	8.69
2023	9.36	5.32	8.77
2024	9.03	4.91	8.85
2025*	8.47		

* 2025 data were available only for March 2025 poverty at the time this article was prepared; TPT and MYS for 2025 had not yet been fully released.

Source: BPS (2020–2025), compiled from official statistical news releases on Poverty, Employment, and the Human Development Index.

The trend shows a consistent post-pandemic recovery pattern: national poverty peaked in March 2021 (10.14%) as a lagged effect of the COVID-19 pandemic, then declined steadily to reach its lowest point in a decade in March 2024 (9.03%), continuing to 8.47 percent in March 2025. A similar pattern is observed for TPT, which fell sharply from 7.07 percent (2020) to 4.91 percent (2024), moving in tandem with MYS rising from 8.48 to 8.85 years.

Pearson correlation results for the national data ($n = 5$) show that poverty is strongly positively correlated with TPT ($r = 0.85$) and strongly negatively correlated with MYS ($r = -0.90$). However, the correlation between TPT and MYS over this period is also extremely high ($r = -0.99$), indicating serious multicollinearity if both variables were entered jointly into a single multiple regression model using national data. This is methodologically expected, since both variables followed a similar linear post-pandemic recovery trend over a short five-year period, making it difficult to separate each variable's unique effect from national time-series data at annual resolution alone. This finding in fact reinforces the urgency of a provincial panel data approach—cross-sectional variation across regions is needed to more validly separate the effect of education from that of unemployment.

4.2 National–Central Java Panel: The Effect of TPT on Poverty

Table 2 presents the data used in the LSDV panel estimation.

Unit	Year	Poverty, March (%)	TPT, August (%)
National	2020	9.78	7.07
National	2021	10.14	6.49
National	2022	9.54	5.86
National	2023	9.36	5.32
National	2024	9.03	4.91
Central Java	2020	11.41	6.48
Central Java	2021	11.79	5.95
Central Java	2022	10.93	5.57
Central Java	2023	10.77	5.13
Central Java	2024	10.47	4.78

Source: BPS Central and BPS Central Java Province, official statistical news releases on Poverty and Employment, 2020–2024.

The LSDV estimation results ($n = 10$) are summarised in Table 3.

Variable	Coefficient (β)	Std. Error	t-statistic	Significance
Constant	6.582	0.792	8.31	$p < 0.01$
TPT (%)	0.504	0.132	3.82	$p < 0.01$
D_Central Java	1.679	0.189	8.90	$p < 0.01$

$R^2 = 0.922$; Adjusted $R^2 = 0.899$; $n = 10$; degrees of freedom = 7.

The regression results show that a 1 percentage-point increase in TPT is associated with a 0.504 percentage-point increase in poverty, significant at the 1 percent level. The positive and significant Central Java dummy coefficient ($\beta = 1.679$) confirms the presence of a region-specific fixed effect at the same level of TPT, Central Java structurally exhibits poverty about 1.68 percentage points higher than the national average, plausibly reflecting structural characteristics such as the dominance of the informal sector and subsistence agriculture in the province. An R^2 of 0.922 indicates that the model explains a high proportion of variation, although with limited degrees of freedom ($n = 10$),

so these results should be interpreted as an initial indication rather than a definitive generalisation.

Notably, the simple Pearson correlation between poverty and TPT on the pooled data without controlling for unit effects (no dummy) is only 0.18 far weaker than the result from the regression with the regional dummy. This sharp contrast concretely illustrates why a fixed-effects panel data approach is so important: without controlling for cross-regional heterogeneity, a genuinely strong TPT–poverty relationship can be masked by structural level differences between units.

4.3 Cross-Provincial Disparity: A Case Study

To complement the spatial picture, Table 4 presents poverty data for four provinces with contrasting characteristics.

Province	2021	2022	2023	2024
DKI Jakarta			4.44	4.30
Central Java	11.79	10.93	10.77	10.47
East Java		10.38	10.35	9.79
East Nusa Tenggara	20.99	20.05	19.96	19.48
National	10.14	9.54	9.36	9.03

Poverty, March, in percent. A dash (' ') indicates data that could not be verified at the time this article was prepared. Source: BPS Central and relevant BPS Provincial offices, 2021–2024.

The data reveal sharp and persistent structural disparity. East Nusa Tenggara consistently recorded poverty more than double the national average throughout 2021–2024, while DKI Jakarta consistently remained far below the national average. East Nusa Tenggara's HDI, which rose from 65.90 (2022) to 68.40 (2023) and 69.14 (2024) reflecting improvements in the education and health dimensions moved in tandem with the province's declining poverty rate, from 20.05 percent (2022) to 19.48 percent (2024), although this decline was far slower than the national pace. This pattern is consistent with the findings of Bahriyah and Primandhana (2022) and the Java-island study (JERPS, 2023) that HDI/education improvements are associated with declining poverty, although the speed of regional convergence is highly uneven.

4.4 Discussion

Overall, the findings of this study support two central propositions within the human capital and structural unemployment frameworks: (1) open unemployment has a significant positive effect on poverty, both at the national level and when controlling for regional effects; and (2) education (proxied by MYS/HDI) is negatively correlated with poverty, although limited temporal variation in the

national data makes it difficult to isolate education's pure effect from that of unemployment. The significant regional fixed effect (Table 3) and the sharp cross-provincial disparity (Table 4) reinforce this study's central argument: poverty in Indonesia cannot be adequately understood without accounting for structural heterogeneity across regions a finding that methodologically justifies the need for a full-scale provincial panel data approach in future research.

5. Conclusion and Recommendations

5.1 Conclusion

This study concludes that: (1) national trends in poverty, unemployment, and education in Indonesia over 2020–2025 show a consistent and interrelated post-pandemic recovery pattern; (2) open unemployment has a significant positive effect on poverty, with the effect becoming more clearly identifiable after controlling for regional heterogeneity through a fixed-effects approach; (3) the level of education (MYS/HDI) is negatively associated with poverty, although measuring education's pure effect requires panel data with broader cross-sectional variation; and (4) cross-provincial poverty disparity remains very sharp, with East Nusa Tenggara recording poverty more than four times that of DKI Jakarta.

5.2 Limitations and Recommendations

The main limitation of this study is its reduced panel coverage (2 regional units for the TPT–poverty model, and unbalanced data for the four-province case study), as a consequence of technical constraints in automated access to BPS dynamic tables and APIs at the time this manuscript was prepared. To develop this into a reputable Sinta 2/Scopus Q3 journal article, the author recommends the following further steps:

- 1) Directly downloading BPS dynamic tables (Percentage of Poor Population by Province; TPT by Province; Mean Years of Schooling by Province) in .xlsx format from www.bps.go.id/statistics-table to obtain a complete and balanced 34-province × year panel.
- 2) Submitting a request for Susenas and Sakernas microdata through BPS's Integrated Statistical Service (PST) for analysis at a more granular (district/city) level.
- 3) Applying panel model specification tests (Chow test, Hausman test, Lagrange Multiplier test) to determine the most appropriate approach Common Effect, Fixed Effect, or Random Effect on the full panel data.
- 4) Adding other relevant control variables such as regional economic growth (GRDP), the Gini ratio, and local government social-protection spending, given that prior research (JPEK, 2025) shows that

relationships among macroeconomic variables and poverty are not always linear.

From a policy perspective, this study's preliminary results nonetheless carry relevant implications: poverty-reduction strategies in low-HDI provinces such as East Nusa Tenggara need to integrate expanded access to upper-secondary education with the creation of formal employment, given that the significant regional effect in the model indicates that local structural factors not TPT alone also determine a region's poverty level.

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