

Determinants of human development index in West Kalimantan regencies / cities: Panel regression analysis (2023-2025)

Authors :

Reza Rico Ardiansyah
Riska Chairunnisa Siregar
Sumin Sumin
Refor Diansyah

Affiliations :

Islamic Economics/ Faculty of
Islamic Economics and
Business/State Islamic Institute
(IAIN) Pontianak/ Indonesia

Corresponding email:

rezaricoardiansyah552@gmail.com

Article History :

Received : July 9th, 2026

Revised : August 19th, 2026

Accepted : September 5th, 2026

Keywords:

regional disparity; poverty; gross
regional domestic product; panel
data regression; West Kalimantan

Abstract

Regional disparities in human development remain a significant challenge in West Kalimantan despite improvements in provincial development indicators. This study examines the effects of poverty, population growth, population density, and Gross Regional Domestic Product (GRDP) per capita on the Human Development Index (HDI) across 14 regencies and cities during 2023-2025. Using a quantitative approach, 42 balanced panel observations were analyzed through fixed effects regression using R software. The results indicate that the independent variables are jointly significant, explaining 94.13% of HDI variation. GRDP per capita exhibits a significant negative association with HDI, whereas population growth demonstrates a significant positive association. Conversely, poverty and population density show no statistically significant relationships. These unexpected findings challenge conventional theoretical expectations and may reflect common temporal trends within the limited observation period. This study contributes regional empirical evidence by integrating economic and demographic determinants within a panel regression framework. Policymakers should interpret these findings cautiously when formulating inclusive human development strategies. Future research should employ longer observation periods and alternative model specifications to improve the robustness of the findings.

INTRODUCTION

Human development is a key indicator for assessing the success of regional development, as it emphasizes not only economic growth but also the overall quality of life of the population. This concept refers to the Human Development Index framework, which was first developed to measure three basic dimensions: health, knowledge, and a decent standard of living Programme (2023). Data from the Statistics Indonesia (BPS) of West Kalimantan Province show that HDI tends to increase every year at the provincial level Statistics Indonesia of West Kalimantan Province (2026), yet disparities among regencies/cities remain an unresolved structural challenge.

West Kalimantan Province still faces challenges in equalizing the quality of human development at the regency/city level. Variation in HDI across regions is thought to be influenced by differing economic, demographic, and social conditions, as found in a study of HDI determinants in a neighboring province showing that poverty and the dependency ratio have a negative effect on HDI, while GRDP per capita is the variable with the largest influence ("Factors Affecting the Human Development Index in Central Kalimantan Province," 2019). Another study covering 14 regencies/cities in Central Kalimantan for 2010-

2015 also confirmed a significant spatial variation pattern of HDI across regions Rita Sari et al. (2026).

Previous studies in Indonesia generally show that GRDP per capita is positively correlated with HDI. A study on regencies/cities in Central Java Province, for example, found that an increase in GRDP per capita contributes significantly to an increase in HDI ("Determinants of the Human Development Index in Regencies/Cities of Central Java Province," 2023). Another study examining the relationship between HDI and poverty in Belu Regency also supports a negative relationship between poverty and HDI (Kiha, Seran, and Lau 2021), while a study in Central Java Province for 2011-2019 found that HDI, GRDP, and unemployment jointly explain variation in poverty Susanti (2013).

However, findings regarding the effect of demographic variables on HDI are not always consistent across studies. A study in Lampung Province shows that high population density needs to be balanced with equitable distribution of basic service facilities so as not to suppress the quality of human development ("Population Density and the Human Development Index in Lampung Province," 2023), while a study on population growth and welfare indicators in Pematang Siantar City shows that population size

is related to local fiscal capacity in a pattern that is not always linear Purba and Manurung (2023). This inconsistency indicates that the relationships among variables are contextual and need to be re-examined in specific regional settings, including at the regency/city level across the island of Kalimantan ("Analysis of the Determinants of the Human Development Index in the Provinces of Kalimantan Island, 2015-2024," 2025).

To the authors' knowledge, studies specifically analyzing the determinants of HDI at the regency/city level in West Kalimantan Province using the most recent panel data (2023-2025) remain limited. This gap is practical, empirical, and methodological in nature, given that many prior studies—including a study of HDI determinants based on provincial panel data in Indonesia for 2013-2017 ("Determinant Factors of the Human Development Index," 2019)—used a different time range or regional coverage than the West Kalimantan context. A panel data regression approach was chosen because it combines the time and individual dimensions, yielding more efficient estimates than a single time-series or cross-sectional dataset Wooldridge (2010).

This study aims to analyze the effects of poverty, population growth rate, population density, and GRDP per capita on HDI in 14 regencies/cities of West Kalimantan Province during 2023-2025. The novelty of this study lies in its use of the most recent region-based data and the simultaneous integration of economic and demographic variables into a single analytical model, following the panel model specification framework recommended by Gujarati and Porter (2010); Baltagi (2005), so that it is expected to enrich the empirical literature and serve as a basis for more inclusive human development policy recommendations in West Kalimantan.

LITERATURE REVIEW

Human Development Index: Concept and Measurement

The Human Development Index (HDI) is a composite indicator introduced by the United Nations Development Programme to measure development outcomes beyond income alone. The index is built on three basic dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living, each represented by specific indicators and aggregated into a single index ranging from 0 to 100 Programme (2023). This multidimensional

framework positions HDI as a more comprehensive proxy for welfare than gross domestic product per capita alone, and it underlies the variable selection used in most regional HDI determinant studies in Indonesia, including the present study.

Panel Data Regression: Theoretical Framework

Panel data regression combines the cross-sectional and time-series dimensions of observation, allowing researchers to control for unobserved heterogeneity across entities while exploiting variation both between and within entities over time Gujarati and Porter (2010); Baltagi (2005). Three canonical estimators are commonly compared in applied panel studies: the Common Effect Model (CEM), which pools all observations and ignores individual heterogeneity; the Fixed Effect Model (FEM), which allows each entity to have its own intercept and is estimated using the within or Least Squares Dummy Variable approach; and the Random Effect Model (REM), which treats individual effects as random and uncorrelated with the regressors (Wooldridge 2010). The choice among these estimators is typically guided by a sequence of specification tests: the Chow test, the Hausman test, and the Lagrange Multiplier test as elaborated further in the Method section.

Poverty and HDI

Poverty is theoretically expected to reduce HDI because it limits households' access to health services, education, and adequate living standards the same dimensions HDI is designed to capture. Empirical studies generally support this negative relationship: a study in Belu Regency found that poverty significantly reduces HDI Kiha et al. (2021), while a study in Central Java for 2011-2019 showed that HDI, GRDP, and unemployment jointly explain variation in poverty, reflecting the reciprocal nature of the poverty-human development relationship Susanti (2013). A study of HDI determinants in a neighboring province similarly found that poverty and the dependency ratio negatively affect HDI ("Factors Affecting the Human Development Index in Central Kalimantan Province," 2019).

GRDP per Capita and HDI

Gross Regional Domestic Product (GRDP) per capita is widely used as a proxy for regional economic capacity and is theoretically expected

to be positively associated with HDI, since higher regional income expands the resources available for health, education, and public services. This positive relationship is supported by a study of regencies/cities in Central Java, which found that rising GRDP per capita significantly contributes to higher HDI ("Determinants of the Human Development Index in Regencies/Cities of Central Java Province," 2023), and by an earlier study in the same province linking GRDP per capita, HDI, and unemployment to poverty reduction Sukmaraga and Hayati (2011). In the earlier-cited neighboring-province study, GRDP per capita was also identified as the variable with the largest influence on HDI among the determinants tested ("Factors Affecting the Human Development Index in Central Kalimantan Province," 2019).

Population Density and HDI

The relationship between population density and HDI is less theoretically settled than that of poverty or GRDP per capita. High population density can either support human development through agglomeration economies and easier access to services, or undermine it when infrastructure and public services fail to keep pace with population concentration. A study in Lampung Province found that high population density needs to be balanced with equitable distribution of basic service facilities so as not to suppress the quality of human development ("Population Density and the Human Development Index in Lampung Province," 2023), suggesting that the direction and strength of this relationship is contingent on local infrastructure capacity rather than population density alone.

Population Growth Rate and HDI

Population growth rate is commonly assumed to exert downward pressure on human development, as rapid population growth can outpace the expansion of public services and strain fiscal capacity. However, empirical evidence on this relationship is mixed. A study on population growth and fiscal indicators in Pematang Siantar City found that population size relates to local fiscal capacity in a pattern that is not always linear (Purba and Manurung 2023), while a broader study spanning 14 regencies/cities in Central Kalimantan for 2010–2015 confirmed a significant spatial variation pattern in HDI without a uniform demographic direction across entities Rita Sari et al. (2026). These mixed findings, together with the

inconsistencies noted for population density, indicate that the effects of demographic variables on HDI are contextual and warrant re-examination in specific regional settings, including at the regency/city level across the island of Kalimantan ("Analysis of the Determinants of the Human Development Index in the Provinces of Kalimantan Island, 2015–2024," 2025).

Research Hypotheses

Based on the theoretical review and literature discussed above, this study formulates the following hypotheses:

H1: Poverty is hypothesized to have a significant negative effect on the Human Development Index (HDI) in the regencies/cities of West Kalimantan Province.

H2: GRDP per capita is hypothesized to have a significant positive effect on HDI in the regencies/cities of West Kalimantan Province.

H3: Population density is hypothesized to have a significant effect on HDI in the regencies/cities of West Kalimantan Province.

H4: Population growth rate is hypothesized to have a significant negative effect on HDI in the regencies/cities of West Kalimantan Province.

H5: Poverty, GRDP per capita, population density, and population growth rate are hypothesized to jointly have a significant effect on HDI in the regencies/cities of West Kalimantan Province.

METHODS

This study uses a quantitative approach with a panel data regression method, which combines time-series and cross-sectional data structures, allowing for more efficient parameter estimation than using either data structure alone Gujarati and Porter (2010); Baltagi (2005). The data used are secondary data sourced from Statistics Indonesia (BPS) of West Kalimantan Province (Statistics Indonesia of West Kalimantan Province, 2026), covering 14 regencies/cities over the period 2023–2025, forming 42 balanced panel observations.

All data processing and panel data regression estimation in this study were carried out using the R statistical software through the RStudio interface. Estimation of the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) was performed using the plm package, while model specification tests (the Chow test, the Hausman test, and the Lagrange Multiplier test) and classical assumption tests (normality, multicollinearity, heteroskedasticity,

autocorrelation, and cross-sectional dependence) were carried out using supporting packages such as *lmtest*, *car*, and *sandwich* available in RStudio. RStudio was chosen for its comprehensive capability in handling panel data estimation and the availability of thorough diagnostic tools for classical assumption testing.

The dependent variable is the Human Development Index (HDI, on an index scale of 0–100), which refers to the three basic dimensions of human development Programme (2023). The independent variables include poverty (percentage of poor population), population growth rate (percent per year), population density (people/km²), and GRDP per capita (million rupiah/year), selected based on the pattern of HDI determinants commonly tested in regional studies in Indonesia ("Factors Affecting the Human Development Index in Central Kalimantan Province," 2019; Sukmaraga and Hayati (2011). The panel data regression model estimated is formulated as follows:

$$HDI_{it} = \alpha_i + \beta_1 POVERTY_{it} + \beta_2 GRDP_PC_{it} + \beta_3 DENSITY_{it} + \beta_4 PGR_{it} + \varepsilon_{it}$$

where *i* denotes the regency/city entity (*i* = 1, 2, ..., 14) and *t* denotes the year (*t* = 2023, 2024, 2025).

The selection of the best estimation model among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) was carried out through three specification tests: the Chow test to compare CEM and FEM, the Hausman test Hausman (1978) to compare FEM and REM, and the Lagrange Multiplier test (Breusch & Pagan, 1980) to compare CEM and REM. This staged procedure is consistent with the standard panel model specification stages Baltagi (2005).

The selected model was then tested using classical assumption tests, including normality using the Shapiro-Wilk test Shapiro and Wilk (1965), multicollinearity using the Variance Inflation Factor (Gujarati and Porter 2010), heteroskedasticity using the Breusch-Pagan test Breusch and Pagan (1980), autocorrelation using the Breusch-Godfrey test Godfrey (1978), and cross-sectional dependence using the Pesaran CD test Pesaran (2004), to ensure the validity and reliability of the estimation. to be replicated by other researchers.

Table 2. Model Selection Test Results

Test	Statistic	P-value	Decision
Chow test (CEM vs FEM)	206.36	0.000	H0 rejected → FEM more appropriate than CEM

RESULT

Descriptive Statistics

A summary of the descriptive statistics for the 42 panel observations is presented in Table 1. The range of HDI values in this sample (63.97–81.10) is consistent with the general HDI achievements of West Kalimantan Province (Statistics Indonesia of West Kalimantan Province, 2026), and illustrates the regional disparities also found in HDI determinant studies in other provinces of Kalimantan Island ("Analysis of the Determinants of the Human Development Index in the Provinces of Kalimantan Island, 2015–2024," 2025).

Table 1. Descriptive Statistics of Research

Variable	Mean	Std. Dev.	Min.	Max.
HDI (index)	68.61	3.95	63.97	81.10
Poverty (%)	6.71	2.13	3.99	11.12
PGR (%)	1.39	0.24	0.80	1.77
Density (people/km ²)	489.33	1,483.50	8	5,803
GRDP PC (million IDR)	102.73	20.69	79.81	167.25

The data distribution shows considerable heterogeneity across regions, particularly in the population density variable—Kota Pontianak, as an urban area, has a population density more than 700 times greater than Kapuas Hulu, which is characterized by rural/forested land, a pattern similar to the density disparities across regions reported in a study in Lampung Province ("Population Density and the Human Development Index in Lampung Province," 2023). Another interesting pattern identified in the data is a tendency for HDI values to decline from 2023 to 2025 in almost all entities in the sample (e.g., Kota Pontianak fell from 81.10 to 80.10; Sambas fell from 69.88 to 68.97), which warrants attention given that the within estimator in FEM relies heavily on this cross-time variation Baltagi (2005).

Model Selection

The results of the model specification tests are presented in Table 2, following the standard Chow-Hausman-LM staged procedure commonly used in panel data estimation Gujarati and Porter (2010); Baltagi (2005).

Hausman test (REM vs FEM)	6.05	0.200	H0 accepted → REM more appropriate than FEM
LM/Breusch-Pagan test (CEM vs REM)	0.89	0.340	H0 accepted → CEM more appropriate than REM

Following standard procedure, the Chow test rejects CEM, indicating that FEM is more appropriate than CEM, while the Hausman test (Hausman 1978) result, which is not significant ($p = 0.200 > 0.05$), statistically indicates that REM is a more efficient model than FEM. Nevertheless, this study deliberately retains the Fixed Effect Model on theoretical grounds, considering that the characteristics across regions in West Kalimantan are highly heterogeneous, which could give rise

to correlation between unobserved individual effects and the independent variables, as cautioned in the panel model specification literature (Baltagi 2005; Wooldridge 2010). This choice is a methodological decision that needs to be transparently disclosed as a limitation of the study, and future researchers are advised to consider REM estimation as a robustness check.

Fixed Effect Model (FEM) Estimation Results

Table 3. Partial Significance (t-test) Results – Fixed Effect Model

Variable	oefficient	Std. Error	t-stat	P-value	Significance
POVERTY	0.19672	0.14305	1.375	0.182	Not significant
GRDP_PC	-0.09739	0.01261	-7.726	0.000	Significant ($\alpha=1\%$)
DENSITY	0.00265	0.00253	1.051	0.304	Not significant
PGR	2.36706	0.66484	3.560	0.002	Significant ($\alpha=1\%$)

The F-test produced an F-statistic of 96.158 with a p-value = 0.000, so H0 is rejected at $\alpha = 5\%$, proving that the four independent variables jointly have a significant effect on HDI, in line with the criteria for the simultaneous test in panel data regression (2010). The coefficient of determination (R^2) of the model is 0.9413, comparable to the high level of model fit found in other panel-data-based HDI determinant studies in Indonesia ("Determinant Factors of the Human Development Index," 2019), meaning that 94.13% of the variation in HDI across regencies/cities in West Kalimantan can be explained by the four variables in the model.

The estimated equation (excluding the

individual effect and error components) is as follows:

$$HDI_{it} = \alpha_i + 0.1967 POVERTY_{it} - 0.0974 GRDP_PC_{it} + 0.0027 DENSITY_{it} + 2.3671 PGR_{it}$$

Because it uses FEM, the model does not have a single intercept value; each entity has its own specific intercept through the Least Squares Dummy Variable approach (Baltagi 2005), representing the unique, time-invariant characteristics of each regency/city, consistent with the explanation of fixed effects in panel data models (Wooldridge 2010).

Classical Assumption Tests

Table 4. Classical Assumption Test Results

Test	Statistic	P-value	Conclusion
Normality (Shapiro-Wilk)	0.96	0.191	Residuals are normally distributed
Multicollinearity (max VIF)	4.22	–	Free of multicollinearity
Heteroskedasticity (Breusch-Pagan)	6.69	0.153	Homoskedasticity satisfied
Autocorrelation (Breusch-Godfrey)	7.34	0.062	No autocorrelation at $\alpha=5\%$
Cross-Section Dependence (Pesaran CD)	-0.62	0.533	No cross-entity dependence

All individual VIF values are far below the threshold of 10 as recommended in the criteria set out by Gujarati and Porter (2010), so the model is free of serious multicollinearity problems. The Breusch-Godfrey test Godfrey (1978) yielded a p-value = 0.062, which is strictly above $\alpha = 5\%$ but quite close to that threshold; the Pesaran CD test

Pesaran (2004) also shows no cross-entity dependence ($p = 0.533$), so overall this FEM model can be considered valid for further interpretation, although future researchers are advised to still use standard errors that are robust to potential autocorrelation as a precautionary measure (Baltagi 2005).

Discussion

Poverty. The estimation results show a POVERTY coefficient of 0.197 with a p-value = 0.182, meaning this variable is not proven to have a significant effect on HDI at $\alpha = 5\%$. This finding differs from most of the literature, which generally finds a negative and significant relationship between poverty and HDI, such as in the study in Belu Regency (Kiha et al. 2021) and the study of the relationship between GRDP, unemployment, and HDI with poverty in Central Java (Susanti 2013). This lack of significance is likely due to the short observation period, which results in relatively small within-entity variation in the poverty variable, consistent with the limitations of the within estimator described by Baltagi (2005).

GRDP per Capita. The GRDP_PC variable shows a negative and significant coefficient ($\beta = -0.097$; $p = 0.000$), meaning that in this model, an increase in GRDP per capita is associated with a decrease in HDI. This direction of effect runs counter to theoretical expectations and to the majority of prior findings in Indonesia, which generally show a positive relationship between GRDP per capita and HDI, such as in the study of regencies/cities in Central Java ("Determinants of the Human Development Index in Regencies/Cities of Central Java Province," 2023) and the 2011 study in Central Java Province (Sukmaraga and Hayati 2011). The most plausible explanation for this anomalous direction lies in the characteristics of the data: FEM estimates a relationship purely from within-entity variation over the three years Wooldridge (2010), and in this sample almost all regencies/cities show a pattern of declining HDI occurring simultaneously with continuously rising GRDP per capita over the same period. Thus, the observed negative coefficient most likely captures a common time trend rather than a structural causal relationship, and needs to be further tested by adding year fixed effects, as suggested within the two-way panel model framework (Baltagi 2005).

Population Density. The DENSITY coefficient of 0.0027 with a p-value = 0.304 indicates that this variable has no significant effect on HDI. This result is in line with the view that the effect of population density on the quality of human development is contextual and highly dependent on regional infrastructure capacity ("Population Density and the Human Development Index in Lampung Province," 2023), and is consistent with the finding that the relationship between

population density and fiscal or welfare indicators is not always statistically significant across all regional contexts (Purba & Manurung, 2023). The range of population density in this sample is very wide (8 to 5,803 people/km²), but because FEM has controlled for fixed effects across entities (Baltagi 2005), most of this extreme cross-region variation is absorbed into the individual intercepts, leaving only the within-entity variation in density from year to year to be estimated.

Population Growth Rate (PGR). The PGR variable shows a positive and significant coefficient ($\beta = 2.367$; $p = 0.002$). In this model, a decline in the population growth rate is associated with a decline in HDI, which differs from the common assumption that high population growth suppresses the quality of human development, as argued in the study of HDI determinants in Central Kalimantan ("Factors Affecting the Human Development Index in Central Kalimantan Province," 2019). As explained in the discussion of GRDP per capita, this result is most likely also a reflection of a common time trend in the sample: PGR in almost all entities tends to decline from 2023 to 2025, alongside the decline in HDI over the same period, thereby producing a positive correlation within the FEM within-estimator framework Baltagi (2005); Wooldridge (2010). Other studies have also noted that the relationship between population growth and welfare indicators is not always consistent in direction across regions and study periods Purba and Manurung (2023).

Overall, this FEM model has very high explanatory power ($R^2 = 94.13\%$) and passes all the main classical assumption tests (Breusch and Pagan 1980; Shapiro and Wilk 1965), making it statistically valid for use. Nevertheless, the direction of the effects of GRDP per capita and population growth rate, which runs counter to general theoretical expectations, is a finding that needs to be interpreted with caution, given the limited panel time span of only three years of observation (Baltagi 2005). This finding should be regarded as a preliminary hypothesis that needs to be retested with a longer data period, as suggested in other regional HDI determinant studies in Indonesia ("Analysis of the Determinants of the Human Development Index in the Provinces of Kalimantan Island, 2015-2024," 2025), before it is used as a basis for generalized policy recommendations.

CONCLUSION

Based on the Fixed Effect Model estimation

results for 42 panel observations of regencies/cities in West Kalimantan Province during 2023-2025, it can be concluded that poverty, GRDP per capita, population density, and population growth rate jointly have a significant effect on HDI ($F = 96.158$; $p = 0.000$) with $R^2 = 94.13\%$, following the model feasibility criteria commonly used in panel data regression (Gujarati & Porter, 2010; Baltagi, 2005). Partially, only GRDP per ca

pita (negative effect) and population growth rate (positive effect) are proven significant at $\alpha = 5\%$, while poverty and population density are not proven significant, differing from some of the patterns found in HDI determinant studies in Belu Regency Kiha, Seran, & Lau, (2021) and Central Kalimantan ("Factors Affecting the Human Development Index in Central Kalimantan Province," 2019). Consequently, H2, H3, and H4 as formulated are not supported by the estimation results, while H1 (poverty) and H3 (density) are not statistically confirmed, and H5 regarding the joint effect is supported.

Methodologically, this study notes that the Hausman test result (Hausman, 1978) ($p = 0.200$) actually recommends the Random Effect Model, but FEM was retained based on theoretical considerations to control for the very large heterogeneity across regions, in line with the discussion of the consequences of model selection in samples with large N and small T (Baltagi, 2005; Wooldridge, 2010). The main limitations of this study are the short data time span (three years) and the limited number of entities (14 regencies/cities), which limit the model's ability to separate common time trends from structural relationships among variables.

Future research is recommended to extend the data period, add year fixed effects, and compare the FEM results with REM estimation as a robustness check, following the methodological recommendations in the panel data literature (Baltagi, 2005; Gujarati & Porter, 2010). Local governments are also advised to consider similar studies in other provinces on Kalimantan Island as a policy comparison ("Analysis of the Determinants of the Human Development Index in the Provinces of Kalimantan Island, 2015-2024," 2025) before using the results of this study as a definitive basis for human development policy recommendations in West Kalimantan Province.

REFERENCE

Baltagi, B. H. 2005. *Econometric Analysis of Panel Data*. 3rd ed. John Wiley & Sons.

Barat, Badan Pusat Statistik Provinsi Kalimantan. 2026. *Indeks Pembangunan Manusia Provinsi Kalimantan Barat 2025*. Badan Pusat Statistik Provinsi Kalimantan Barat.

Breusch, T. S., and A. R. Pagan. 1980. "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics." *Review of Economic Studies* 47(1):239-53.

Godfrey, L. G. 1978. "Testing against General Autoregressive and Moving Average Error Models When the Regressors Include Lagged Dependent Variables." *Econometrica* 46(6):1293-1301.

Gujarati, D. N., and D. C. Porter. 2010. *Basic Econometrics*. 5th ed. McGraw-Hill.

Hausman, J. A. 1978. "Specification Tests in Econometrics." *Econometrica* 46(6):1251-71.

Kiha, E. K., S. Seran, and H. T. Lau. 2021. "Pengaruh Jumlah Penduduk, Pengangguran, Dan Kemiskinan Terhadap Indeks Pembangunan Manusia (IPM) Di Kabupaten Belu." *Jurnal Ekonomi, Sosial & Humaniora* 2(7):60-84.

Pesaran, M. H. 2004. *General Diagnostic Tests for Cross-Section Dependence in Panels*. University of Cambridge.

Programme, United Nations Development. 2023. *Human Development Report 2023/2024*. UNDP.

Purba, E., and E. Manurung. 2023. "Pengaruh Jumlah Penduduk Dan Pertumbuhan Ekonomi Terhadap Pendapatan Asli Daerah Kota Pematang Siantar." *Jurnal Ekuilnomi* 5(1):1-8.

Rita Sari, D., D. Perwira Ompusunggu, E. Ermawati, K. Kardo, M. Adelina Br Ginting, M. Himart, P. Naysila Rahayu, and S. Maya Dewi. 2026. "Analisis Determinan Indeks Pembangunan Manusia Kabupaten/Kota Di Provinsi Kalimantan Tengah." *Jurnal Ilmiah Wahana Pendidikan* 12(6.D):214-23.

Shapiro, S. S., and M. B. Wilk. 1965. "An Analysis of Variance Test for Normality (Complete Samples)." *Biometrika* 52(3/4):591-611.

Sukmaraga, P., and B. Hayati. 2011. "Analisis Pengaruh Indeks Pembangunan Manusia, PDRB per Kapita, Dan Jumlah Pengangguran Terhadap Jumlah Penduduk Miskin Di Provinsi Jawa Tengah." Universitas Diponegoro.

Susanti, S. 2013. "Pengaruh Produk Domestik Regional Bruto, Pengangguran, Dan Indeks Pembangunan Manusia Terhadap Tingkat Kemiskinan." Universitas Diponegoro.

Wooldridge, J. M. 2010. *Econometric Analysis of Cross Section and Panel Data*. 2nd ed. MIT Press.