



## **Bridging Inequality: How Macroeconomic Factors, Social Assistance, and Zakat Shape Urban and Rural Poverty in Indonesia**

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### **ABSTRACT**

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*poverty, economic growth, inflation, unemployment, social assistance, zakat, urban and rural, Village Fund*

This study analyses the impact of macroeconomic variables, economic growth, inflation, and unemployment, together with social assistance and zakat, on poverty in both urban and rural Indonesia. Separate models are calculated for urban and rural areas using panel data consisting of 770 observational units. The urban model encompasses paved road length, whereas the rural model integrates the Village Fund. The findings demonstrate that economic expansion markedly alleviates poverty in urban locales, although it exhibits no substantial impact in rural places. Economic expansion markedly diminishes poverty in urban regions, although its impact in rural areas lacks statistical significance. Inflation markedly exacerbates poverty in rural regions, although it exhibits no statistically significant impact in metropolitan areas. Unemployment lacks a statistically meaningful effect in urban settings but markedly exacerbates poverty in rural regions. Social aid lacks statistical significance in the urban model, suggesting minimal efficacy in alleviating urban poverty. Zakat substantially alleviates poverty in both urban and rural regions. The extent of paved roadways infrastructure markedly alleviates urban poverty, but the Village Fund substantially mitigates rural poverty. The findings indicate that economic mechanisms are more effective in urban regions, whereas redistributive tools are more effective in rural environments, emphasizing the need for region-specific poverty alleviation measures.

## **1. INTRODUCTION**

Despite a reduction in poverty rates in Indonesia over recent decades, poverty continues to pose a multifaceted structural problem, particularly in rural regions [1, 2]. The variation in poverty levels between urban and rural areas, as well as within provinces, underscores the substantial developmental disparities that persist [3]. Macroeconomic variables, including inflation, unemployment, and economic growth, along with infrastructural deficiencies, particularly in asphalt roads in urban areas, and delays in village development through the Village Fund, exacerbate this situation. Furthermore, the implementation of social assistance policies and financial mechanisms, such as zakat, has not been fully integrated and optimised for sustainable poverty alleviation [4]. A multifaceted strategy and integrated policies encompassing infrastructure development, fiscal management, and local economic empowerment are essential for successful and fair poverty eradication throughout Indonesia [5].

Poverty is a state in which individuals or communities are unable to fulfil their fundamental requirements, such as sustenance, access to clean water, education, healthcare, and adequate shelter. Poverty is characterised by the absence of income and access to essential resources required for sustaining a basic quality of life [6]. Specific literature delineates poverty, including definitions provided by the

World Bank. Poverty is an individual's incapacity to secure a defined minimum standard of well-being, encompassing access to essential goods and services [7]. An individual is deemed impoverished if their income falls below the international poverty threshold, defined as a per capita income of less than \$2.15 per day [8]. According to the United Nations (UN), poverty encompasses more than mere financial deprivation. Poverty includes deficiencies in access to fundamental services, including education, healthcare, clean water, sanitation, social security, and other rights [9]. The determinants of poverty in both urban and rural regions of Indonesia can be elucidated by several factors, including economic structure, access to resources, infrastructure, and socio-demographic characteristics. This differentiation is crucial as they possess divergent settings regarding development, resource allocation, and financial prospects, necessitating the formulation of distinct poverty reduction methods and policies [10, 11].

Poverty alleviation in Indonesia involves various factors, including macroeconomic variables, social assistance policies, zakat, and infrastructure and public budget allocation. In this context, infrastructure, particularly the length of paved roads in urban areas, plays a crucial role in influencing poverty levels. Well-developed roads enhance community mobility, facilitate access to workplaces, schools, healthcare services, and other economic centres. Meanwhile, in rural areas, the

Village Fund, launched by the government in 2015, has become an essential instrument for rural development, particularly in reducing poverty. This study aims to enhance the effectiveness of future poverty alleviation strategies and policies.

This research introduces a novel Integrated Approach that integrates the three primary methodologies of macroeconomic factors, social assistance, and zakat into a singular model for poverty analysis. This practice has been infrequently undertaken in prior studies in Indonesia. Comparative Analysis of Regions. This study clearly differentiates the impact of variables on poverty in urban vs rural locations, offering a more profound spatial understanding of poverty dynamics [12–14]. This study employs multi-dimensional panel data that amalgamates macroeconomic variables, social assistance, and zakat collection and distribution data to analyse, longitudinally and regionally, the interrelations among these variables. It empirically investigates the potential of zakat as an alternative or complementary instrument in public policy within the national poverty alleviation program, a topic that remains underexplored in academic discourse [6, 15]. This research contributes to the development of a comprehensive poverty analysis model by incorporating macroeconomic factors, social assistance, and zakat, and provides policy recommendations for poverty alleviation in both urban and rural areas of Indonesia.

## 2. MATERIALS AND METHODS

### 2.1 Research design

This study employs a quantitative explanatory research design to empirically investigate the impact of macroeconomic factors (economic growth, inflation, and unemployment), social assistance, and zakat on poverty in both urban and rural regions of Indonesia. The explanatory approach enables the identification of causal relationships among variables. At the same time, the panel data regression method provides a more dynamic and comprehensive analysis by combining cross-sectional and time-series data. Separate models were developed for urban and rural contexts to account for structural and contextual differences between these two spatial domains. This study falls under the genre of quantitative research employing an explanatory methodology. This study examines the correlation between macroeconomic factors (including GDP, inflation, and the unemployment rate), social assistance, zakat, and poverty rates, utilising relevant statistical data. Panel data integrates cross-sectional data from diverse places, such as urban and rural areas, with time series data within a specified temporal range, yielding a more dynamically robust analysis [16]. The research design employs a panel-data regression methodology to examine the relationships among the research variables. This methodology enables the authors to account for regional and temporal heterogeneity, hence enhancing the accuracy and comprehensiveness of the analysis results. This study utilises secondary data sourced from official entities, including the Central Statistics Agency, relevant ministries, and the National Amil Zakat Institute.

### 2.2 Population and sample

This study employs annual panel data covering the period from 2013 to 2023. Although the initial research design aimed to include data up to 2024, the latest full-year macroeconomic

indicators, such as poverty and unemployment, were not yet fully available or validated at the time of data collection. Therefore, the observation period was adjusted to 2013–2023 to ensure data consistency, comparability, and empirical reliability across all variables and regions. This study aims to provide a thorough and dynamic investigation of the drivers of poverty in Indonesia through the panel data approach [16].

To ensure the quality and consistency of the dataset, a data screening process was conducted before the panel data analysis. The screening procedure involved identifying incomplete observations and determining the final sample used in this study. The results of the data screening process are presented in Table 1.

**Table 1.** Data screening process and sample size

| Description of Analysis Unit                                                                  | Sum                  |
|-----------------------------------------------------------------------------------------------|----------------------|
| Number of provinces analysed in the study                                                     | 38                   |
| Addition of one aggregate entity on a national scale                                          | 1                    |
| regional units by urban and rural categories (2 categories × 39 Region Entities)              | $2 \times 39 = 78$   |
| Total number of observations based on annual data over 12 years (2013–2023)                   | $78 \times 12 = 936$ |
| Number of observations that did not meet the completeness of the data during the study period | 88                   |
| Number of observations worth analysing after the data screening process                       | 770                  |
| Total final observations used in the panel data analysis model                                | <b>770</b>           |

The variables employed in this study consist of dependent and independent variables. The dependent variable is the poverty rate, measured as the percentage of people living below the poverty line established by the Central Statistics Agency. Meanwhile, the independent variables include several macroeconomic, social, and infrastructure factors. The Gross Regional Domestic Product (GRDP) serves as an indicator of economic growth, inflation acts as a proxy for price stability, and the unemployment rate reflects the condition of the labour market. In addition, social assistance and zakat are included to represent social interventions from both government and religious institutions aimed at reducing the burden of poverty. To measure the infrastructure aspect, the length of paved roads is utilised as an indicator of accessibility and interregional connectivity. At the same time, the Village Fund represents fiscal transfers from the central government intended for rural development and community empowerment.

### 2.3 Hypothesis testing and analytical procedure

Regression model for urban poverty

$$KMK_{it} = \alpha + \beta_1 PDRB_{it} + \beta_2 INF_{it} + \beta_3 PE_{it} + \beta_4 BS_{it} + \beta_5 ZA_{it} + \beta_7 JA_{it} + \mu_i + \varepsilon_{it}$$

Regression model for rural poverty

$$KMD_{it} = \alpha + \beta_1 PDRB_{it} + \beta_2 INF_{it} + \beta_3 PE_{it} + \beta_4 BS_{it} + \beta_5 ZA_{it} + \beta_7 DD_{it} + \mu_i + \varepsilon_{it}$$

Approaches used in panel data models

$$KMK_{it} = \alpha_{it} + \beta_1 PDRB_{it} + \beta_2 INF_{it} \\ + \beta_3 PE_{it} + \beta_4 BS_{it} + \beta_5 ZA_{it} \\ + \beta_7 JA_{it} + \mu_i + \varepsilon_{it}$$

$$KMD_{it} = \alpha_{it} + \beta_1 PDRB_{it} + \beta_2 INF_{it} \\ + \beta_3 PE_{it} + \beta_4 BS_{it} + \beta_5 ZA_{it} \\ + \beta_7 DD_{it} + \mu_i + \varepsilon_{it}$$

In this model,  $\alpha_{it}$  is a different intercept for each region

$$KMK_{it} = \alpha + \beta_1 PDRB_{it} + \beta_2 INF_{it} \\ + \beta_3 PE_{it} + \beta_4 BS_{it} + \beta_5 ZA_{it} \\ + \beta_7 JA_{it} + \mu_{it} + \varepsilon_{it}$$

$$KMD_{it} = \alpha + \beta_1 PDRB_{it} + \beta_2 INF_{it} \\ + \beta_3 PE_{it} + \beta_4 BS_{it} + \beta_5 ZA_{it} \\ + \beta_7 DD_{it} + \mu_{it} + \varepsilon_{it}$$

where,  $\mu_{it}$  is a random region-specific error term.

### 3. RESULTS AND DISCUSSION

This section presents the results of the panel data analysis, assessing the influence of macroeconomic variables, social assistance, zakat, asphalt road length, and Village Funds on poverty levels in urban and rural areas in Indonesia. The analysis employs a panel data approach, which combines cross-sectional and time series data, providing a comprehensive perspective on the dynamics of poverty across these regions [17].

Before determining the most appropriate estimation model, a series of model selection tests was conducted to ensure the validity and unbiasedness of the results. In this study, three primary models were considered: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM). Each model assumes different characteristics regarding variation across regions and over time, making the selection of the appropriate model crucial for producing consistent estimates [18].

Model selection was performed using three main tests: the Chow Test, the Hausman test, and the Lagrange Multiplier (LM) Test. The Chow test assesses whether the Fixed Effects Model provides a better fit than the Common Effects Model. If the test results are significant, the FEM is considered more appropriate. The Hausman test then determines whether the Fixed Effects or Random Effects model is more suitable given the characteristics of the data. If the Chow test suggests that the CEM is preferable, the analysis continues with the Lagrange Multiplier Test to compare the Common Effect and Random Effect models [19].

Before executing panel regression and model selection tests, panel unit root tests were conducted to assess the stationarity characteristics of the data. This step is crucial to prevent the analysis from yielding false regression outcomes due to non-stationary series. Two prevalent panel unit root tests were employed: the Levin-Lin-Chu (LLC) test and the Im-Pesaran-Shin (IPS) test. The LLC test presumes a uniform unit root process among cross-sectional units, whereas the IPS test accommodates distinct unit root processes across panels. The LLC test findings indicate that the Village Panel Data has a test statistic of -4.286 and a p-value of 0.0000, while the City Panel Data has a test statistic of -3.914 and a p-value of 0.0000. The results demonstrate statistical significance at the

1% level, indicating that both variables are stationary in levels. The IPS test findings corroborate the stationarity of the data. The Village Panel Data exhibits a test statistic of -3.572 with a p-value of 0.0002, whereas the City Panel Data shows a test statistic of -2.914 with a p-value of 0.0018. Both outcomes are statistically significant at the 1% level, resulting in the rejection of the null hypothesis of a unit root.

The results of the Chow test for the city panel data indicate that both the Cross-section F statistic (1.7675,  $p = 0.0129$ ) and the Cross-section Chi-square statistic (51.892,  $p = 0.0039$ ) are statistically significant at the 5% level. Since the probability values are below the conventional significance threshold ( $\alpha = 0.05$ ), the null hypothesis, which assumes that the standard effect model is more appropriate, must be rejected. This implies that the fixed-effects model provides a better specification for panel data than the pooled ordinary least squares (OLS) model. Therefore, the analysis suggests that unobserved heterogeneity across cross-sectional units is present and must be controlled for, reinforcing the use of the FEM as the most suitable approach for this study.

The Chow test results for the village panel data reveal that the Cross-section F statistic (1.054,  $p = 0.3974$ ) and the Cross-section Chi-square statistic (32.167,  $p = 0.2677$ ) are both statistically insignificant, as their probability values exceed the 5% significance threshold ( $\alpha = 0.05$ ). Consequently, the null hypothesis, which assumes that the standard effect model is more appropriate than the FEM, cannot be rejected. This finding suggests that the fixed-effects model does not provide a significant improvement in explaining variation across cross-sectional units. Therefore, the standard effect model (pooled OLS) is deemed more suitable for the village panel data in this study.

The results of the Hausman test for the city panel data report a Chi-square statistic of 13.847 with 7 degrees of freedom and a p-value of 0.054. This probability is slightly above the conventional 5% significance level ( $\alpha = 0.05$ ), indicating that the null hypothesis, which assumes that the random effects model is consistent and efficient, cannot be rejected at the 5% level. However, the result is relatively close to the threshold, suggesting a borderline case. In practical terms, this implies that the random effects model may be preferred over the fixed effects model for the city panel data. Still, researchers should exercise caution due to the marginal significance level. Depending on the study's context, adopting a more conservative threshold (such as 10%) could justify the use of the fixed effects model instead.

The Chow test for the rural panel yields a statistically insignificant result, indicating that the null hypothesis is not rejected. The null hypothesis of the Chow test posits that the pooled OLS model is superior to the fixed effects model. Consequently, the statistical evidence suggests that the pooled OLS specification is the optimal model for the rural panel. The previous version of the paper may have created uncertainty about the null hypothesis regarding the model selection decision. An inconsequential Chow test result indicates a lack of robust statistical evidence for large individual effects among rural units, suggesting that the pooled OLS model is adequate for the rural panel. To ensure robustness and prevent model misspecification, more model diagnostics and comparisons with alternative specifications were performed. The uniformity of principal coefficient estimates across models corroborates the legitimacy of the pooled OLS methodology for the rural panel.

The Hausman test results for the village panel data show a

Chi-square statistic of 8.594 with 7 degrees of freedom and a probability value of 0.2831. Since the probability value is substantially higher than the 5% significance threshold ( $\alpha = 0.05$ ), the null hypothesis that supports the consistency of the random effects estimator cannot be rejected. This outcome indicates that the random-effects model is more appropriate than the fixed-effects model for analysing the village panel data. In contrast to the city panel data, where the Hausman test results were close to the significance threshold, the findings for the village data provide stronger statistical support for the adoption of the random effects specification, as the higher p-value indicates no evidence of correlation between the individual effects and the regressors.

The Hausman test for the city panel yields a p-value of 0.054, which is marginally above the conventional 5% significance level. Statistically, this result suggests that the random-effects model may be appropriate. However, given that the p-value is very close to the threshold, the evidence for the random-effects model is not definitive. Moreover, theoretical considerations suggest that unobserved heterogeneity across cities may be correlated with the explanatory variables, thereby violating the assumptions underlying the random-effects estimator. In such cases, the fixed effects model provides a more consistent estimation by controlling for time-invariant unobserved characteristics. To ensure robustness, the study compared the estimation results from both fixed-effects and random-effects models. The comparison reveals that the direction and significance of key coefficients remain largely consistent across both specifications. This consistency supports the reliability of the findings and justifies the selection of the fixed effects model as the primary specification, while the random effects results serve as a robustness check.

The Lagrange Multiplier (LM) test was conducted to determine whether the random-effects model provides a better specification than the pooled ordinary least squares (OLS) model for the city panel data. The Breusch Pagan statistic reports values of 0.009194 (cross-section), 2.249014 (time), and 2.258208 (both). These results suggest that the joint test ("both") provides mild evidence in favour of the random effects specification compared to the pooled OLS. However, the Honda and King-Wu statistics yield negative or insignificant values across all dimensions (cross-section, time, and both), indicating limited support for random effects. The standardised versions of these tests similarly fail to provide robust statistical evidence, as their values do not meet conventional significance thresholds.

Taken together, while the Breusch–Pagan test suggests the presence of random effects, the lack of consistent confirmation from the Honda, King-Wu, and standardised versions weakens the overall conclusion. Therefore, although random effects cannot be entirely ruled out, the statistical evidence from the city panel data appears inconclusive, and model selection should rely more heavily on the Chow and Hausman tests for robustness.

The results of the Lagrange Multiplier (LM) test for the village panel data evaluate whether random effects are more appropriate than the pooled ordinary least squares (OLS) model. The Breusch–Pagan statistics yield positive values for the cross-section (3.441822), time (1.919394), and joint test (5.361217), indicating evidence of random effects, particularly when both dimensions are considered simultaneously. Similarly, the Honda and King-Wu tests produce positive values in the cross-sectional dimension,

further supporting the presence of random effects. However, the time dimension results remain negative and insignificant. The standardised versions of Honda and King-Wu, however, yield mixed results: cross-sectional values indicate significance, whereas the combined dimension yields negative results. Overall, the LM test results suggest that the random-effects model is preferable to the pooled OLS model for the village panel data, particularly given the strong Breusch–Pagan and cross-sectional Honda/King-Wu results. Despite some inconsistencies across test variants, the weight of evidence suggests that random effects are the more suitable specification, aligning with the conclusions drawn from the Hausman test, which also favoured random effects.

**Table 2.** Results of panel data for urban and rural areas

| Fixed Effect Model                               |             |                         |             |        |
|--------------------------------------------------|-------------|-------------------------|-------------|--------|
| Dependent Variable: Poverty_City_Y               |             |                         |             |        |
| Method: Panel Least Squares (Fixed Effect Model) |             |                         |             |        |
| Variable                                         | Coefficient | Std. Error              | t-Statistic | Prob.  |
| C                                                | 2.145       | 0.512                   | 4.19        | 0.0001 |
| Economic Growth                                  | -0.085      | 0.032                   | -2.66       | 0.0081 |
| Inflation                                        | 0.041       | 0.027                   | 1.52        | 0.1300 |
| Unemployment                                     | 0.063       | 0.052                   | 1.21        | 0.2280 |
| Social Assistance                                | -0.028      | 0.037                   | -0.76       | 0.4480 |
| Zakat                                            | -0.112      | 0.045                   | -2.49       | 0.0135 |
| Length of paved roads                            | -0.067      | 0.029                   | -2.31       | 0.0215 |
| Effects Specification                            |             |                         |             |        |
| R-squared                                        | 0.640       | Mean dependent var      |             | 3.215  |
| Adjusted R-squared                               | 0.612       | S.D. dependent var      |             | 0.462  |
| S.E. of regression                               | 0.287       | Akaike info criterion   |             | 0.845  |
| Sum squared resid                                | 58.34       | Schwarz criterion       |             | 0.912  |
| Log likelihood                                   | -312.45     | Hannan-Quinn criterion. |             | 0.870  |
| F-statistic                                      | 22.18       | Durbin-Watson stat      |             | 1.98   |
| Prob(F-statistic)                                | 0.0000      |                         |             |        |

The regression outcomes for the urban model are displayed in Table 2. The model has a commendable degree of explanatory power, evidenced by an R-squared value of 0.640 and an adjusted R-squared of 0.612, signifying that roughly 61.2% of the variance in urban poverty is elucidated by the independent variables used. The model demonstrates statistical significance, evidenced by an F-statistic of 22.18 and a p-value of 0.0000.

Among the explanatory factors, economic growth demonstrates a negative and statistically significant impact on urban poverty ( $\beta = -0.085$ ,  $p < 0.01$ ), indicating that increased economic growth facilitates poverty alleviation in urban regions. Zakat has a negative and significant correlation ( $\beta = -0.112$ ,  $p < 0.05$ ), suggesting its efficacy as a tool for poverty alleviation. The extent of paved roads exerts a considerable adverse impact ( $\beta = -0.067$ ,  $p < 0.05$ ), indicating that enhanced infrastructure aids in diminishing poverty levels.

Conversely, inflation did not exert a statistically significant influence on urban poverty ( $\beta = 0.041$ ,  $p > 0.10$ ), suggesting that price variations may not directly correlate with alterations in poverty levels during the examined timeframe. Similarly,

unemployment ( $\beta = 0.063$ ,  $p > 0.10$ ) and social assistance ( $\beta = -0.028$ ,  $p > 0.10$ ) lack statistical significance, indicating that their impacts are not substantial in the urban context. The Durbin–Watson value of 1.98 suggests the absence of significant autocorrelation in the residuals from a diagnostic standpoint. Moreover, the Akaike, Schwarz, and Hannan–Quinn information criteria validate that the model is appropriately described.

The findings indicate that structural economic causes and infrastructural development consistently contribute to the reduction of urban poverty, in contrast to short-term macroeconomic volatility and redistributive policies. The insignificance of social aid indicates possible inefficiencies in targeting or distribution methods, necessitating additional examination.

The findings of the random-effects model for the rural panel demonstrate that several macroeconomic and fiscal variables have statistically significant effects on rural poverty. Inflation demonstrates a positive and statistically significant correlation with poverty ( $\beta = 0.151$ ;  $t = 2.32$ ;  $p = 0.020$ ), indicating that rises in the overall price level tend to worsen poverty conditions in rural regions. This research indicates that inflationary pressures disproportionately impact low-income people in rural areas, whose purchasing power is typically more limited. Unemployment exerts a positive and significant influence on poverty ( $\beta = 0.225$ ;  $t = 2.74$ ;  $p = 0.006$ ), suggesting that elevated unemployment rates are associated with higher poverty levels. This outcome highlights the significance of labour market conditions in influencing economic welfare in rural areas. Conversely, zakat has a negative and statistically significant impact on poverty ( $\beta = -0.038$ ;  $t = -2.53$ ;  $p = 0.013$ ), suggesting that higher zakat distribution is associated with lower poverty levels. This indicates that zakat serves as an efficient social transfer mechanism that aids in poverty alleviation in rural regions. Moreover, the Village Fund has a negative and statistically significant correlation with poverty ( $\beta = -0.047$ ;  $t = -3.13$ ;  $p = 0.002$ ). This research demonstrates that the enhanced distribution of village-level fiscal resources helps alleviate poverty, underscoring the significance of targeted public investment in fostering rural development.

The estimation results of the random effects model for the rural panel are presented in Table 3. These results provide empirical evidence regarding the effects of macroeconomic variables, zakat, and the Village Fund on rural poverty in Indonesia.

**Table 3.** Random effects – rural panel

| Variable     | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------|-------------|------------|-------------|-------|
| Inflation    | 0.151       | 0.065      | 2.32        | 0.020 |
| Unemployment | 0.225       | 0.082      | 2.74        | 0.006 |
| Zakat        | -0.038      | 0.015      | -2.53       | 0.013 |
| Village Fund | -0.047      | 0.015      | -3.13       | 0.002 |

Comparatively, the estimation results suggest that urban poverty is more sensitive to macroeconomic variables, such as inflation and unemployment. In contrast, rural redistributive instruments, including zakat and the Village Fund, have a greater influence on rural poverty. This highlights the necessity of an integrated, contextual policy approach emphasising inflation control and job creation in urban areas,

alongside the optimisation of Village Fund utilisation and the strengthening of zakat institutions in rural regions. Accordingly, poverty alleviation policies in Indonesia should be spatially designed and anchored in local economic characteristics to ensure greater effectiveness and Sustainability [20].

### 3.1 Macroeconomics (economic growth) on poverty levels in urban and rural areas in Indonesia

This suggests that urban economic expansion, driven by the industrial and service sectors, generates more employment and income opportunities than a predominantly agricultural rural economy. The findings align with Liu et al. [14] and Chen et al. [21], who argue that growth-led poverty reduction occurs mainly where structural transformation supports labour absorption and productivity gains. In rural Indonesia, economic growth remains constrained by low agricultural productivity, limited infrastructure, and restricted market access [2, 22]. Therefore, while urban poverty reduction depends on sustained industrial diversification and job creation, rural development policies should prioritise agricultural modernisation, infrastructure improvement, and support for small enterprises. A spatially inclusive growth strategy is essential to ensure equitable poverty reduction across regions [14].

### 3.2 Macroeconomics (inflation) on poverty rates in urban and rural areas in Indonesia

This suggests that rising prices disproportionately harm low-income households, whose consumption patterns are heavily concentrated on necessities such as food, housing, and transportation. As the cost of living increases, the real purchasing power of the poor declines, reducing access to essential goods and services. In urban regions, inflationary pressures are often concentrated in housing, transportation, and service costs, which directly affect the living standards of wage-dependent households. Conversely, in rural areas, inflation is often driven by volatile food prices, reflecting the dependency of rural livelihoods on agricultural output and market fluctuations. People with low incomes in these regions are particularly vulnerable, as they face the dual burden of higher prices and limited opportunities for income diversification [23].

These findings are consistent with previous studies [24, 25], which found that inflation acts as a regressive tax, eroding the real value of income and exacerbating poverty, especially when wages do not keep pace with price increases. Moreover, previous studies [26, 27] emphasise that sustained inflation can distort investment decisions, slow economic growth, and exacerbate inequality, thereby further entrenching structural poverty. Therefore, macroeconomic stability, particularly the control of inflation, remains a key pillar of poverty reduction policy in Indonesia. Effective policy measures include strengthening food price stabilisation mechanisms, enhancing agricultural productivity, and improving logistics to reduce supply chain bottlenecks. Additionally, targeted subsidies and social protection programs are necessary to cushion people experiencing poverty from the short-term shocks of inflation, particularly in rural regions where the elasticity of income to price changes remains low [24].

### **3.3 Macroeconomics (unemployment) on poverty rates in urban and rural areas in Indonesia**

This finding indicates that rising unemployment rates exacerbate poverty levels, underscoring the crucial link between labour market performance and welfare outcomes. When individuals lose their jobs or fail to secure stable employment, their household income declines, leading to lower consumption capacity and increased vulnerability to poverty [28].

In urban areas, unemployment is often structural, stemming from a mismatch between labour skills and market demands, particularly as the economy transitions toward technology-driven and service-oriented sectors. This mismatch leaves a segment of the workforce, especially low-skilled labour, unable to access productive employment opportunities. In rural areas, unemployment is more seasonal and closely tied to the volatility of agricultural activities, where labour absorption depends on planting and harvesting cycles and is limited by access to non-farm employment opportunities [29]. The results align with Mensah [30], who argue that persistent unemployment can create a poverty trap, as joblessness not only reduces income but also limits access to education, healthcare, and social mobility. Moreover, Soliman and Beram [31] noted that high unemployment weakens aggregate demand, dampens economic growth, and intensifies inequality. Hence, reducing unemployment is not merely a labour market issue but a strategic component of poverty reduction policy. Policy implications from this finding emphasise the importance of inclusive labour market policies, such as vocational training, job creation in labour-intensive industries, and support for micro, small, and medium enterprises (MSMEs). Additionally, expanding social safety nets for the unemployed and encouraging entrepreneurship, especially in rural regions, can help absorb surplus labour and sustain household income [32].

### **3.4 The role of social assistance in reducing poverty rates in urban and rural areas in Indonesia**

This suggests that government social protection initiatives are more effectively implemented in urban settings, where targeting accuracy, administrative capacity, and accessibility of beneficiaries are relatively higher. In contrast, in rural areas, logistical challenges, limited data accuracy, and weaker institutional capacity often reduce program efficiency and coverage [33].

Social assistance programs are designed to mitigate short-term income shocks and prevent the poor from falling deeper into poverty [34]. In urban areas, such transfers directly enhance purchasing power and support access to basic needs such as food, education, and healthcare, thus reducing vulnerability to poverty. However, the insignificant rural impact suggests that cash and food-based transfers alone are insufficient to address structural poverty, which is heavily tied to low agricultural productivity and limited non-farm opportunities [35]. This result aligns with Suyatna and Yuda [36], who found that the effectiveness of social assistance in Indonesia depends on institutional coordination, accurate targeting, and integration with empowerment-based programs. Hence, enhancing the synergy between social assistance and productive economic initiatives such as cash-for-work, microcredit, and village enterprise development is essential to transform assistance from a consumptive aid into a sustainable

poverty reduction mechanism [37].

### **3.5 Contribution of zakat in reducing poverty levels in urban and rural areas in Indonesia**

These results affirm that zakat, when effectively managed and properly distributed, contributes to income redistribution and enhances the socio-economic well-being of people experiencing poverty [38-40]. In urban areas, zakat plays an important complementary role to formal fiscal policies by filling gaps left by government social assistance, particularly among informal-sector workers who are often excluded from public welfare schemes. In rural regions, zakat serves not only as direct financial relief but also as a productive capital mechanism, supporting small-scale businesses, agricultural inputs, and local entrepreneurship [41]. This dual function enables zakat to foster self-sufficiency and long-term poverty reduction, aligning with Islamic economic principles of equitable wealth distribution and social justice [42]. The significance of zakat's impact across both spatial contexts implies that integrating zakat management into the national poverty reduction framework could enhance policy coherence and sustainability. This integration requires robust institutional governance, transparent distribution mechanisms, and alignment between Badan Amil Zakat Nasional (BAZNAS) and government poverty alleviation programs [15]. Furthermore, the potential of zakat as a counter-cyclical fiscal stabiliser during economic downturns highlights its relevance not only as a religious obligation but also as a macroeconomic instrument for inclusive development [40].

### **3.6 Difference in the influence of these variables on poverty in urban and rural areas in Indonesia**

The disparity in the impact of macroeconomic variables, social aid, and zakat on poverty between urban and rural areas can be explained by the concept of economic dualism, which posits a structural divide between the two regions. In urban regions, macroeconomic variables such as economic growth, inflation, and unemployment have a significant impact on poverty rates. This is due to the significant reliance on the industrial and service sectors, which are vulnerable to economic fluctuations and high unemployment rates. Conversely, in rural regions, social and economic traits that are heavily reliant on the agricultural sector result in a more constrained macroeconomic impact, hence amplifying the significance of social assistance and zakat in aiding the impoverished [39].

The H6a hypothesis, positing a disparity in the impact of macroeconomic variables, social aid, and zakat on the poverty rate between urban and rural areas, is supported by the analytical results. This study demonstrated that in metropolitan areas, macroeconomic variables such as unemployment and inflation have a significant impact on poverty. Conversely, in rural regions, social assistance and zakat had a more pronounced impact on poverty reduction. The management of zakat and the allocation of social assistance are more efficacious in alleviating poverty in rural regions. In contrast, macroeconomic factors exert a greater influence on the well-being of the impoverished in urban areas [6]. Prior research has corroborated these findings, indicating that in urban settings, economic policies, such as monetary and fiscal measures, have a greater impact on poverty. In contrast, in rural contexts, wealth distribution through zakat and social

assistance plays a more crucial role in aiding disadvantaged communities [42]. Consequently, the H6a hypothesis is validated, and government policies and zakat institutions must take these disparities into account when formulating more effective poverty-alleviation initiatives in each region.

### **3.7 Effect of asphalt road length in urban areas on economic accessibility and poverty alleviation in Indonesia**

The extent of asphalt roads in metropolitan regions significantly impacts economic accessibility and poverty reduction, as indicated by the H7a hypothesis. Proper asphalt road infrastructure in metropolitan areas is crucial for enabling the movement of individuals and the distribution of products and services, thereby enhancing efficiency in economic activity. Elevated mobility enables the workforce to access a broader array of employment options and facilitates trade and investment activities that underpin economic growth in metropolitan regions. Within the framework of infrastructure development theory, the calibre and extent of the road network serve as the primary basis for facilitating connections across urban regions and between cities and other economic hubs. The presence of high-quality asphalt roads reduces logistics costs and shortens travel time, thereby enhancing the region's productivity and competitiveness.

The development and expansion of asphalt roads in urban regions enhance access for individuals, particularly those from lower socio-economic backgrounds, to essential services such as education, healthcare, and other public amenities that are crucial to improving quality of life. Ultimately, this enhanced accessibility promotes greater economic participation and generates business opportunities in low-income areas. Research by Lan et al. [37] establishes a direct positive correlation between investment in road infrastructure and a decrease in poverty rates, particularly in regions characterised by vigorous economic activity, such as urban areas. Consequently, the H7a hypothesis is valid, as the length of asphalt roads has a significant positive effect on economic access and poverty alleviation in urban regions of Indonesia. Road infrastructure support is essential for promoting fair and inclusive development in metropolitan regions, serving as a valuable tool for structural and sustained poverty alleviation.

The estimation findings indicate that the coefficient for the length of paved roads in metropolitan areas is positive and statistically significant. This conclusion indicates that, over the period under investigation, improvements in road infrastructure are associated with higher poverty rates in metropolitan areas. Although this outcome may seem paradoxical, it does not inherently imply that infrastructure development increases poverty. Several viable theories may elucidate this fact. The positive correlation may indicate a time-lag effect, in which the economic advantages of infrastructure investment do not promptly translate into poverty alleviation. Extensive infrastructure investments typically necessitate multiple years to yield quantifiable economic benefits via enhanced market access, job creation, and productivity improvements. Secondly, the outcome may indicate reverse causality, in which road development is prioritised in economically disadvantaged metropolitan areas as part of government initiatives. In such instances, elevated poverty levels may draw increased infrastructure investment, rather than infrastructure exacerbating poverty. Third, the positive correlation may result from omitted variable bias, in which unobserved factors such as urban migration, land

market dynamics, informal sector expansion, or institutional capacity concurrently affect both infrastructure development and poverty outcomes.

Consequently, the positive and substantial coefficient should not be construed as evidence that infrastructure intensifies poverty. This suggests that infrastructure investment alone is inadequate for poverty reduction without supplementary measures in human capital development, labour market integration, and spatial planning. Future research may mitigate potential endogeneity issues by employing instrumental variables, dynamic panel models, or quasi-experimental methodologies to more precisely ascertain causal effects.

### **3.8 Village Funds contribute to reducing poverty levels through infrastructure development in rural areas in Indonesia**

Village grants significantly contribute to alleviating poverty in rural regions by facilitating the development of essential infrastructure that enhances the quality of life for rural communities. The theory of fiscal decentralisation posits that empowering village administrations with authority and direct funding can enhance the efficiency of public services and expedite local development [43]. Since 2015, the Village Fund has been allocated for the construction of village roads, irrigation systems, clean water facilities, and educational and health institutions that were previously inaccessible to the village community. This infrastructure enhances community mobility and agricultural product distribution while expediting the integration of rural communities into the regional and national economic framework. This enhanced connectivity facilitates rural people's access to markets, education, and healthcare facilities, hence contributing to a sustainable reduction in poverty rates.

A study by Liu and Liu [44] demonstrates that the enhancement of village infrastructure, funded by the Village Fund, directly influences the increase in household income in rural regions, particularly through job creation and increased agricultural productivity. The findings of this study indicate that the Village Fund (X7) has a substantial negative impact on village poverty (Y). Consequently, the H7b theory is deemed acceptable. The findings confirm that the Village Fund is an effective policy tool for poverty alleviation in rural regions. Nonetheless, its efficacy remains contingent upon transparent, participatory, and accountable stewardship of funds. By strengthening the capacity of village apparatus and community participation in planning and supervising the use of Village Funds, village development can be more targeted and have a direct impact on community welfare.

## **4. CONCLUSION**

In metropolitan areas, economic expansion significantly alleviates poverty, suggesting that greater economic development reduces poverty. Nonetheless, this effect is not statistically significant in rural areas, indicating that economic growth in these areas does not necessarily reduce poverty. Inflation has a minimal impact on urban poverty but demonstrates a positive and statistically significant effect on rural poverty, suggesting that increasing prices impose a heavier burden on rural households. In metropolitan regions, economic expansion and infrastructure development markedly

alleviate poverty, whereas inflation, unemployment, and social assistance exhibit no statistically significant impact. This suggests that urban poverty is more intimately associated with structural economic problems than with transient macroeconomic variations or redistributive initiatives. Conversely, rural poverty is profoundly affected by inflation and unemployment, underscoring the susceptibility of rural communities to macroeconomic volatility. Furthermore, redistributive mechanisms like zakat and the Village Fund are crucial in alleviating rural poverty.

This discovery demonstrates that zakat significantly aids in poverty alleviation in both urban and rural contexts. The prior assertion that zakat had no substantial effect on urban poverty has been amended. The results additionally indicate structural disparities between urban and rural areas. Macroeconomic determinants, such as economic growth, exert a greater influence in urban regions, whereas redistributive methods, such as zakat and the Village Fund, are more effective in alleviating poverty in rural areas. Moreover, infrastructure development, especially the enhancement of paved roadways, facilitates poverty alleviation in metropolitan regions by augmenting accessibility and economic interconnectivity. The Village Fund significantly contributes to poverty eradication in rural regions by facilitating local development and community empowerment.

This study possesses multiple shortcomings that warrant acknowledgement. The analysis depends on aggregated provincial and village-level data, which may inadequately reflect micro-level differences at the household or individual level. The study emphasises macroeconomic variables, social assistance, and zakat, while omitting other significant predictors, such as education, health outcomes, and governance quality, from the analysis. The study inadequately accounts for variation across geographical typologies, including coastal, mountainous, and disadvantaged locations, which may affect policy efficacy. Future studies should employ a more detailed methodology by integrating household-level data and broadening the array of explanatory variables, such as educational attainment, the Human Development Index, economic inequality, and institutional quality. Longitudinal analyses and mixed-methods approaches may yield profound insights into the enduring impacts of redistributive policies and regional development initiatives.

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