Analysis of HDI, Minimum Wage, and Unemployment on Poverty Levels in East Nusa Tenggara: Implications for Zakat's Role in Economic Resilience

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| Article Info	Abstract
	This study aims to analyze the effects of the Human Development Index (HDI), Provincial Minimum Wage (PMW), and unemployment rate on poverty levels across 21 districts and cities in East Nusa Tenggara (NTT) during the 2013–2023 period, as well as their implications for optimizing zakat as an instrument of economic resilience. The study employs the System Generalized Method of Moments (System-GMM) on panel data to capture the dynamic nature of poverty and address potential endogeneity among variables. The estimation results show that HDI has a negative and significant effect on poverty, indicating that improvements in human capital effectively reduce poverty. In contrast, PMW has a positive and significant effect, suggesting that wage increases have not yet translated into poverty reduction, while unemployment has a positive but insignificant effect. Simultaneously, all three variables significantly influence poverty levels. The novelty of this study lies in integrating regional macroeconomic analysis with the perspective of zakat as a complementary social policy instrument. The findings imply the importance of synergy between human development, productivity-based wage policies, and strengthening the role of zakat to enhance economic resilience and poverty alleviation in underdeveloped regions. *Penelitian ini bertujuan menganalisis pengaruh Indeks Pembangunan Manusia (IPM), Upah Minimum Provinsi (UMP), dan tingkat pengangguran terhadap tingkat kemiskinan pada 21 kabupaten/kota di Provinsi Nusa Tenggara Timur (NTT) periode 2013–2023 serta implikasinya bagi optimalisasi zakat sebagai instrumen ketahanan ekonomi. Metode yang digunakan adalah System Generalized Method of Moments (System-GMM) pada data panel untuk menangkap dinamika kemiskinan dan mengatasi potensi endogenitas antarvariabel. Hasil estimasi menunjukkan bahwa IPM berpengaruh negatif dan signifikan terhadap kemiskinan, yang berarti peningkatan kualitas sumber daya manusia secara efektif menurunkan kemiskinan. Sebaliknya, UMP berpengaruh positif dan signifikan, mengindikasikan bahwa kenaikan upah belum sepenuhnya berdampak pada penurunan kemiskinan, sementara pengangguran berpengaruh positif namun tidak signifikan. Secara simultan ketiga variabel berpengaruh signifikan terhadap kemiskinan. Kebaruan penelitian ini terletak pada integrasi analisis ekonomi makro daerah dengan perspektif zakat sebagai instrumen pelengkap kebijakan sosial. Implikasi penelitian menegaskan pentingnya sinergi pembangunan manusia, kebijakan upah berbasis produktivitas, dan penguatan peran zakat untuk memperkuat ketahanan ekonomi dan pengentasan kemiskinan di daerah tertinggal.*

A. INTRODUCTION

Poverty remains a multidimensional issue encompassing economic, social, educational, and health aspects (Maharani, Ningrum, Fatmawati, & Fadilla, 2024). In Indonesia, poverty reduction continues to be a central objective of national development agendas, as reflected in the Rencana Pembangunan Jangka Menengah Nasional (RPJMN) or National Medium-Term Development Plan, which emphasizes a multidimensional approach to poverty alleviation and improving quality of life (Riyanto, 2025). Despite nationwide efforts, progress has been uneven, particularly in eastern regions such as East Nusa Tenggara (NTT).

This national commitment is closely aligned with the Sustainable Development Goals (SDGs), particularly Goal 1: *No Poverty*, which seeks to end poverty in all its forms everywhere by 2030. The SDGs framework emphasizes not only the eradication of extreme poverty but also the reduction of multidimensional deprivation through expanded social protection systems, equal access to basic services, and inclusive economic growth (United Nations, 2015). Within this global agenda, poverty alleviation is understood as a cross-cutting objective interconnected with education (Goal 4), decent work and economic growth (Goal 8), and reduced inequalities (Goal 10). Therefore, examining poverty in regions such as NTT is not only relevant to Indonesia's national development priorities but also contributes to evaluating progress toward global sustainable development commitments.

NTT exhibits unique demographic and socioeconomic characteristics compared to other provinces, comprising 22 districts and cities distributed across multiple islands (Bunga & Haryanto, 2024). The province faces geographic constraints, limited infrastructure, and ethnic-cultural diversity that influence its development trajectory. According to Statistics Indonesia (BPS), the poverty rate in NTT in March 2024 was 19.48%, a modest decline from 19.96% in March 2023 and 20.05% in March 2022. These figures place NTT among the provinces with the highest poverty levels in Indonesia, highlighting the persistent disparities in growth and welfare distribution. Figure 1 illustrates the slow but steady decline in poverty from 2015 to 2024.
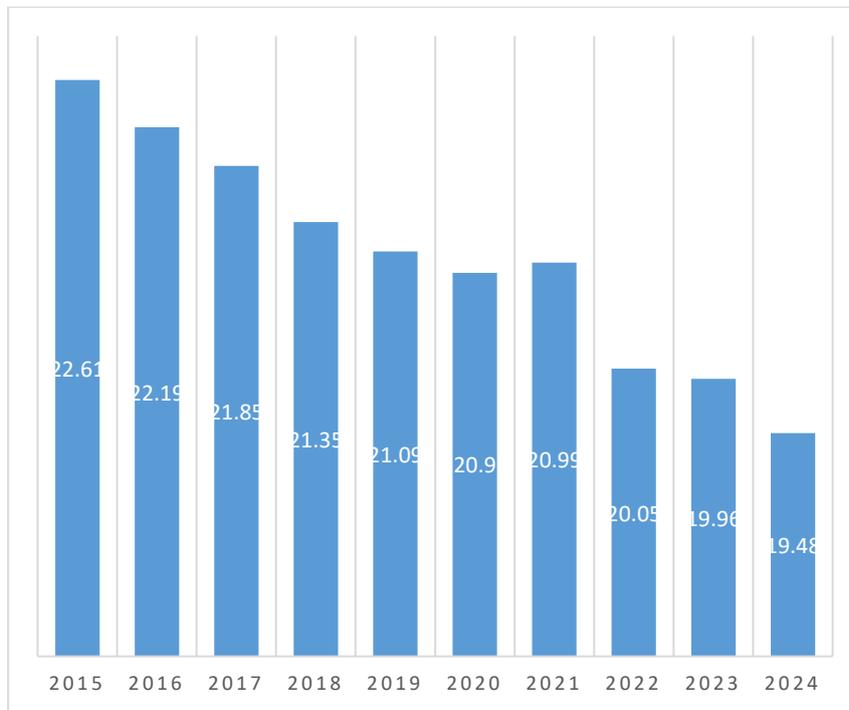
Figure 1. Percentage of Poor Population in East Nusa Tenggara, 2015–2024

Source: Statistics Indonesia (BPS), National Socio-Economic Survey (Susenas), 2024

Poverty in NTT cannot be fully understood without examining three critical determinants of human welfare: the Human Development Index (HDI), Provincial Minimum Wage (PMW), and unemployment rate. These variables collectively shape the well-being of communities and serve as essential indicators for assessing socioeconomic progress (Febrianti, 2022). The HDI reflects achievements in three fundamental dimensions, health, education, and standard of living, providing a comprehensive measure of human development (Utami, 2020). While the HDI in NTT has shown gradual improvements over the past decade, these gains have not yet translated into substantial poverty reduction. Figure 2 depicts the upward trend in HDI from 2015 to 2024, indicating incremental progress in human development within the province.
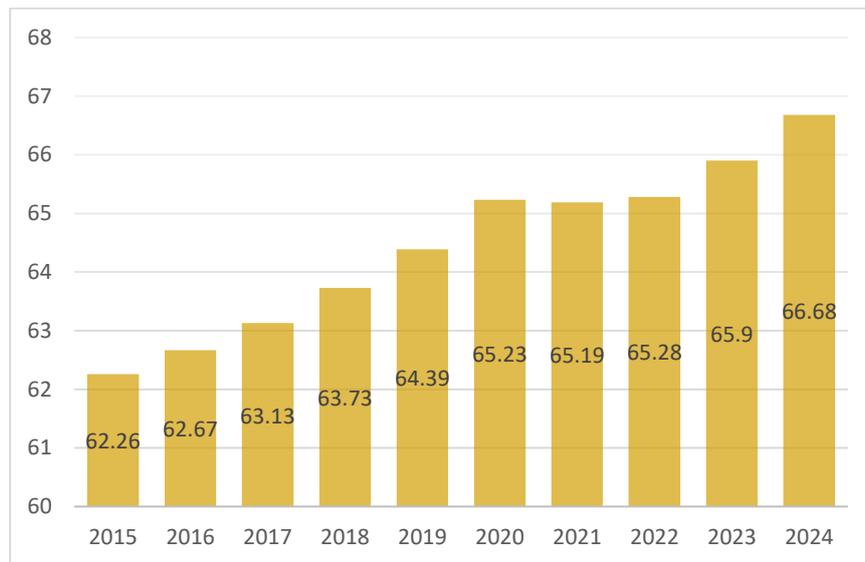
Figure 2. Human Development Index (New Method) in East Nusa Tenggara, 2015–2024

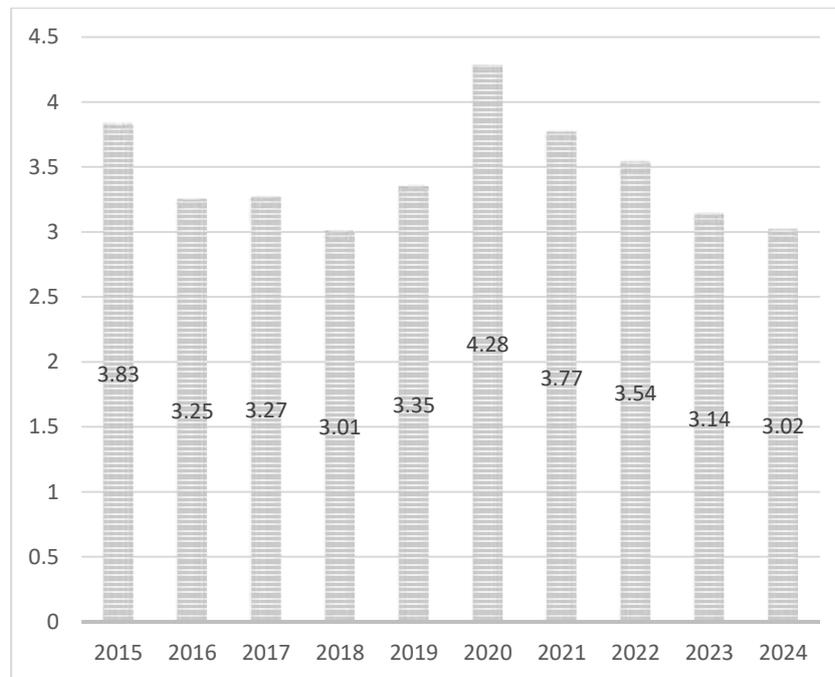Source: Statistics Indonesia (BPS), National Socio-Economic Survey (Susenas), 2024

The Provincial Minimum Wage (PMW) is another key factor influencing household welfare, particularly for workers in informal and low-productivity sectors (Kasih & Yefriza, 2025). Despite gradual increases in PMW in NTT, the wage level remains among the lowest nationally, IDR 2,186,826 in 2024. Low wages, combined with relatively high prices of basic goods in island areas, limit household purchasing power and constrain poverty reduction. Figure 3 shows the evolution of PMW from 2015 to 2024, highlighting gradual increases that have yet to result in significant improvements in living standards.

Figure 3. Provincial Minimum Wage (Rupiah) in East Nusa Tenggara, 2015–2024

Source: Department of Cooperatives, Manpower, and Transmigration of NTT, 2024

Unemployment further affects poverty by influencing household income and economic security (Andini & Samsuddin, 2025). The open unemployment rate in NTT was 3.02% in February 2024, below the national average of 4.82%, but this statistic does not fully capture labor market vulnerabilities. A large portion of NTT's workforce is engaged in informal, low-productivity, and low-wage employment, highlighting that low unemployment does not necessarily equate to economic security. Figure 4 illustrates the unemployment trend in NTT over the past decade.

Figure 4. Open Unemployment Rate in East Nusa Tenggara, 2015–2024

Source: Statistics Indonesia (BPS), National Labor Force Survey (Sakernas), 2024

Empirical studies have consistently highlighted the complex relationships between these variables and poverty. For instance, Suryanto and Suryani (2020) found that increases in HDI correlate significantly with reductions in poverty levels in eastern Indonesia, suggesting that improvements in education and health enhance labor productivity and household income. Similarly, Utami (2020) shows that human development indicators play a crucial role in reducing poverty through improvements in educational attainment and life expectancy, which subsequently stimulate economic growth. Regarding labor market dynamics, Kolibu, Rumate, and Engka (2019) demonstrate that unemployment significantly contributes to higher poverty levels, particularly in regions characterized by limited industrial diversification. In addition, Putri and Putri (2021) reveal that the effectiveness of minimum wage policies in alleviating poverty depends on regional labor market conditions and government

expenditure support. Widodo and Siregar (2022) further argue that the impact of PMW on poverty is conditional upon labor productivity, sectoral employment patterns, and local economic structures. Collectively, these findings underscore the importance of examining how HDI, PMW, and unemployment interact simultaneously to influence poverty levels in NTT, particularly within structurally disadvantaged regions.

Given the persistent poverty disparities in NTT, this study aims to analyze the effect of HDI, PMW, and unemployment on poverty levels across 21 districts using panel data from 2013 to 2023. Beyond conventional economic analysis, the study also explores the potential role of zakat as an instrument of Islamic social finance in strengthening economic resilience and supporting poverty alleviation. Zakat is a mandatory wealth redistribution mechanism in Islam designed to transfer resources from surplus units to eligible beneficiaries (asnaf), thereby reducing income inequality and enhancing social welfare. Unlike voluntary charity, zakat has a structured institutional framework and clear distribution criteria, enabling it to function as a systematic poverty alleviation tool. Contemporary studies argue that zakat can contribute to economic empowerment when managed productively, for instance through microfinance, entrepreneurship support, and human capital development programs (Beik & Arsyianti, 2015; Shaikh, 2016). Empirical evidence further suggests that well-governed zakat institutions can complement state fiscal policies by strengthening social protection systems and improving household resilience against economic shocks (Ismail & Possumah, 2014). Therefore, optimizing zakat as a complementary instrument may provide targeted assistance for vulnerable populations and promote inclusive economic growth in underdeveloped regions such as NTT.

B. RESEARCH METHODOLOGY

This study employs a quantitative research design using panel data to analyze the effects of the Human Development Index (HDI), Provincial Minimum Wage (PMW), and unemployment rate on poverty levels across 21 districts/cities in East Nusa Tenggara (NTT) during the 2013–2023 period. The poverty rate is specified as the dependent variable, while HDI, PMW, and unemployment rate serve as independent variables.

To account for the dynamic nature of poverty, the model includes a lagged dependent variable, recognizing that current poverty conditions are influenced by previous levels. Therefore, this study applies a dynamic panel data model estimated using the System Generalized Method of Moments (System-GMM) approach developed by Blundell and Bond (1998).

The System-GMM method is selected because it effectively addresses common econometric issues in panel data analysis, including endogeneity, unobserved heterogeneity, heteroskedasticity, and autocorrelation. This approach is particularly suitable for panel datasets with relatively small time dimensions and larger cross-sectional units.

The estimation results are interpreted to assess the role of human development, wage policy, and labor market conditions in influencing poverty, as well as their implications for optimizing zakat as a complementary instrument for strengthening economic resilience and poverty alleviation.

1. Data Description

The study utilizes secondary panel data covering 21 districts and cities in East Nusa Tenggara (NTT) over the period 2013–2023. The dependent variable in this analysis is the poverty rate, measured as the percentage of the population living below the poverty line in each district. The key independent variables include the Human Development Index (HDI), the Provincial Minimum Wage (PMW), and the unemployment rate. The HDI serves as a comprehensive indicator of human development, capturing progress in education, health, and overall living standards, which are crucial for assessing the capacity of individuals and communities to improve their well-being. The PMW reflects regional wage policies and the welfare of workers, providing insight into the economic conditions affecting low-income households. Meanwhile, the unemployment rate indicates labor market conditions and the degree of workforce utilization, which can directly influence household income and economic security.

Data for this study were obtained from multiple reputable sources, including Badan Pusat Statistik (BPS), regional labor offices, and provincial economic development agencies. The panel dataset allows for an examination of both temporal trends—observing how poverty and its determinants have evolved over time, and cross-sectional variations, highlighting differences among districts with varying socioeconomic conditions. By integrating these data sources, the study provides a

robust framework for understanding the dynamics of poverty in NTT and the relative importance of human development, wage policy, and employment in shaping socioeconomic outcomes across the province.

2. Model Specification

The study specifies a dynamic panel model as follows:

$$Poverty_{it} = \alpha + \beta_1 HDI_{it} + \beta_2 PMW_{it} + \beta_3 Unemployment_{it} + \mu_i + v_t + \varepsilon_{it}$$

Where:

- i denotes the cross, sectional unit (district/city in NTT),
- t denotes the time period (year),
- μ_i represents individual, specific effects,
- v_t represents time effects, and
- ε_{it} is the stochastic error term.

The first, difference GMM estimator is applied to remove unobserved individual effects (μ_i) and reduce potential bias arising from correlations between explanatory variables and the error term. Lagged values of the independent variables serve as instruments to address endogeneity concerns.

3. Estimation Procedure and Diagnostic Tests

The System, GMM estimation is conducted using STATA software, following Baltagi (1975) and Arellano & Bond (1991). Several diagnostic tests are performed to ensure model robustness and validity:

- Hansen J, test: Assesses the validity of the instruments.
- Breusch–Godfrey LM test: Detects serial correlation in residuals.
- Levin, Lin & Chu (LLC) test: Tests for panel data stationarity.

All results are interpreted considering their statistical significance, economic meaning, and consistency with previous empirical findings. This rigorous approach ensures reliable insights for policy recommendations.

4. Relevance to Zakat and Economic Resilience

The use of System, GMM also allows the study to provide evidence, based insights on how structural socioeconomic factors, HDI, PMW, and unemployment, affect poverty. These findings can inform strategies to optimize zakat distribution as a complementary social instrument, targeting vulnerable populations and

underdeveloped districts in NTT. For example, areas with low HDI or high unemployment can be prioritized for zakat, funded programs in education, health, and income generation, thereby enhancing community resilience and poverty alleviation.

C. RESULTS AND DISCUSSION

This chapter presents the estimation results and interprets the findings regarding the effects of Human Development Index (HDI), Provincial Minimum Wage (PMW), and unemployment on poverty levels in East Nusa Tenggara (NTT). The analysis uses the Two, Step System Generalized Method of Moments (System, GMM) for a dynamic panel of 21 districts/cities over 2013–2023.

1. System, GMM Estimation Results

The results of the two, step System, GMM estimation are presented in Table 1. As shown in Table 1, the lagged poverty variable (Poverty L1) has a positive and significant coefficient, indicating persistence in poverty levels. The Human Development Index (HDI) exhibits a negative and statistically significant effect on poverty, while the Provincial Minimum Wage (Ln(PMW)) shows a positive and significant effect. The unemployment rate has a positive coefficient but is not statistically significant.

Table 1. Two, Step System GMM Estimations

Variabel	Coef.	P>|z|
PENDUDUKMISKIN L1.	.7444227	0.000
IPM	, .296936	0.009
PENGANGGURAN	.1313358	0.089
LnUMP	1.782441	0.016

Lagged poverty (Poverty L1): The positive and significant coefficient (0.744, p=0.000) indicates a persistence effect, meaning that higher poverty in the previous year leads to higher current poverty.

- HDI: Shows a negative and significant effect on poverty (coefficient = , 0.297, p=0.009), confirming that improvements in education, health, and living standards

contribute to poverty reduction. This supports hypothesis H1 and aligns with previous findings (Handayani, 2022).

- PMW: Contrary to expectations, PMW has a positive and significant effect on poverty (coefficient = 1.782, p=0.016). This suggests that wage increases alone may not reduce poverty immediately due to inflationary pressures, low labor absorption, and informal sector dominance (Putri et al., 2021).

- Unemployment: The coefficient is positive (0.131) but not statistically significant (p=0.089), indicating that unemployment does not have a significant direct effect on poverty in NTT. This aligns with prior studies (Kolibu, 2017; Suripto, 2020), highlighting the mitigating role of informal employment and multi, income households.

2. Model Validity and Diagnostic Tests

The validity and robustness of the System, GMM estimation were assessed using diagnostic tests. The Sargan test for instrument validity yielded a chi, square value of 0.23 with a p, value of 0.893, indicating that the instruments used in the model are valid. Additionally, the Arellano, Bond test for autocorrelation showed that the first, order autocorrelation (AR(1)) was significant with a z, value of , 3.76 and a p, value of 0.000, which is expected in a first, differenced model. The second, order autocorrelation (AR(2)) was not significant, with a z, value of 1.37 and a p, value of 0.170, suggesting the absence of second, order autocorrelation. Overall, these results confirm the robustness and reliability of the System, GMM estimates.

3. Simultaneous Effects

The joint effect of HDI, Provincial Minimum Wage (PMW), and unemployment on poverty levels was examined using an F, test. The results show an F, statistic of 10,188.85 with a p, value of 0.0000, indicating that all three variables collectively have a significant impact on poverty. These findings support hypothesis H4, confirming that HDI, PMW, and unemployment simultaneously influence poverty levels in East Nusa Tenggara.

Discussion

HDI and Poverty: The empirical finding that HDI has a negative and significant effect on poverty confirms that improvements in human capital are central to long-term poverty reduction. This result is consistent with Sen's (1999) capability approach, which argues that poverty should be understood as deprivation of

capabilities rather than merely low income. Higher HDI reflects improvements in education, health, and living standards, which enhance individual productivity and expand access to economic opportunities. Empirical studies in Indonesia also support this relationship. Suryanto and Suryani (2020) find that improvements in HDI significantly reduce poverty in eastern Indonesia, while Utami (2020) shows that better human development outcomes stimulate regional economic growth and indirectly reduce poverty levels. Similarly, Bastianingrum (2023) demonstrates that HDI contributes to economic performance and welfare improvements at the district level.

In the context of NTT, where geographic isolation and limited infrastructure constrain economic diversification, improvements in education and health services likely play a compensatory role by strengthening labor adaptability and resilience. Thus, the negative coefficient of HDI in this study reflects not only improved welfare indicators but also structural enhancement of economic capacity in disadvantaged regions.

PMW and Poverty: The positive and significant relationship between PMW and poverty suggests that minimum wage increases in NTT have not translated into effective poverty reduction. This finding indicates the presence of structural rigidities in the local labor market. While wage theory posits that higher minimum wages can increase worker income and reduce poverty, empirical evidence shows that the outcome depends on labor market conditions, productivity levels, and sectoral composition (Widodo & Siregar, 2022; Putri & Putri, 2021).

In regions dominated by informal employment, such as NTT, minimum wage policies may have limited coverage, as many workers are not formally protected. Moreover, wage increases can trigger cost adjustments by firms, potentially reducing labor demand or increasing prices, which may erode real purchasing power. Kolibu, Rumate, and Engka (2019) highlight that labor market distortions and limited industrialization often weaken the poverty-reducing impact of wage policies. Therefore, the positive coefficient found in this study may reflect a mismatch between wage policy and regional economic structure. This implies that minimum wage policy must be accompanied by productivity enhancement, skills development, and formal sector expansion to generate inclusive outcomes.

Unemployment and Poverty: The non-significant effect of unemployment on poverty suggests that open unemployment rates alone do not fully capture labor

market vulnerability in NTT. Although the unemployment rate appears relatively moderate, a substantial proportion of the workforce is engaged in informal, low-productivity, and vulnerable employment. This phenomenon aligns with the findings of Maulana As'ad Humam and Azfar Faqih (2022), who argue that underemployment and informal sector dominance often obscure the true relationship between unemployment and poverty.

Additionally, Utami (2020) emphasizes that poverty dynamics are more strongly influenced by human development and structural economic conditions than by unemployment rates alone. In structurally underdeveloped regions, households often adopt survival strategies such as subsistence agriculture or informal trade, which reduce open unemployment but do not necessarily lift households out of poverty. Thus, the insignificant coefficient in this study reflects the complexity of poverty dynamics in NTT, where structural constraints, low HDI, and limited economic diversification play more decisive roles than measured unemployment levels.

Implications for Zakat and Economic Resilience: The empirical results indicate that poverty in NTT is strongly influenced by human development factors, while wage policy and unemployment dynamics exhibit structural limitations. In this context, zakat can function as a complementary redistributive instrument, particularly in districts characterized by low HDI and persistent poverty. However, the effectiveness of zakat depends not only on its normative potential but also on the scale of its collection and the quality of its distribution mechanisms.

Data from regional zakat authorities (BAZNAS NTT) show that zakat collection in the province has increased gradually in recent years, yet the overall volume remains relatively small compared to the magnitude of poverty and the size of the Muslim population. Moreover, a significant portion of zakat distribution is still consumptive in nature (short-term assistance), while productive zakat programs—such as microenterprise financing, vocational training, and education scholarships—are comparatively limited. This structure suggests that zakat has not yet reached its optimal potential as a driver of structural poverty reduction.

Linking these conditions to the empirical findings, the negative and significant effect of HDI on poverty implies that zakat programs should prioritize investments in education and health to enhance human capital formation. Productive zakat allocation for scholarships, school infrastructure support, health access subsidies, and skills development would directly contribute to improving HDI components. Furthermore,

given the positive relationship between PMW and poverty—indicating structural labor market constraints—zakat-based micro-entrepreneurship programs could help households diversify income sources beyond low-wage informal employment. This approach aligns with Islamic social finance models that emphasize empowerment rather than short-term relief (Beik & Arsyianti, 2015; Shaikh, 2016).

Additionally, the insignificant effect of unemployment suggests that poverty in NTT is less about open joblessness and more about vulnerable employment and low productivity. Therefore, zakat can strengthen economic resilience by functioning as a localized social safety net, protecting near-poor households from falling into deeper poverty due to income shocks, seasonal instability, or price volatility. When integrated with regional development planning, zakat could complement government social protection programs and enhance inclusive growth.

Overall, the study confirms that HDI, PMW, and unemployment jointly influence poverty dynamics in NTT. The findings further imply that strengthening human development remains the most effective structural pathway for poverty reduction, while optimizing zakat—through improved collection capacity, better governance, and a shift toward productive distribution—can serve as a strategic instrument to reinforce economic resilience in underdeveloped regions.

D. CONCLUSION

This study analyzes the effects of the Human Development Index (HDI), Provincial Minimum Wage (PMW), and unemployment on poverty levels across 21 districts in East Nusa Tenggara (NTT) from 2013 to 2023, while exploring the potential role of zakat in enhancing economic resilience. The findings can be summarized as follows:

HDI has a significant negative effect on poverty, indicating that improvements in education, health, and living standards contribute to poverty reduction. This underscores the importance of human development policies in promoting sustainable welfare.

PMW has a positive and significant effect on poverty, suggesting that wage increases alone are not sufficient to reduce poverty in NTT. Structural issues such as low labor absorption, inflationary pressures, and informal sector dominance limit the effectiveness of wage policies.

Unemployment has a positive but statistically insignificant effect on poverty, highlighting that informal employment, multi, income households, and low HDI levels play a more dominant role in shaping poverty outcomes in the region.

HDI, PMW, and unemployment jointly affect poverty, confirming that a comprehensive approach is needed to address multidimensional poverty.

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