Unraveling the Poverty Trap in Central Aceh: The Interplay Between Employment, Income, and Human Development

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Abstract

This study explores the dynamic relationship between poverty, labor force participation rate, per capita income, and the Human Development Index (HDI) in Central Aceh Regency using the Vector Auto Regression (VAR) model. The analysis utilizes annual time-series data from 2005 to 2023 to capture the interdependencies and temporal effects among the variables. The results show that an increase in labor force participation and per capita income has a significant negative impact on poverty levels over time. Moreover, HDI plays a critical role in reinforcing poverty reduction, indicating that improvements in education, health, and living standards are essential in achieving inclusive development. The impulse response function reveals that shocks to labor participation and HDI generate sustained reductions in poverty, while the variance decomposition shows that income per capita and HDI contribute significantly to long-term poverty forecasting. These findings underscore the importance of integrated policy approaches focusing on employment creation, income enhancement, and human capital investment to reduce poverty sustainably in Central Aceh.

Keywords: Poverty, Labor Force Participation Rate, Per Capita Income, HDI

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Introduction

Poverty remains a persistent and complex development challenge in many rural regions of Indonesia, including Central Aceh Regency (Kabupaten Aceh Tengah). Despite various national poverty alleviation programs, the region continues to face multidimensional poverty, characterized by low income levels, limited access to quality education and healthcare, and insufficient employment opportunities. According to Badan Pusat Statistik (BPS Aceh, 2023), the poverty rate in Central Aceh was recorded at 15.07%, significantly higher than the national average of 9.36%. This suggests that economic growth alone has not translated effectively into improved welfare for all segments of society. One of the key factors associated with persistent poverty in Central Aceh is the relatively low labor force participation rate, which in 2023 stood at 66.2%, compared to the national average of 69.3%. This reflects limited engagement of the working-age population in productive activities, which directly affects household income. Furthermore, the average per capita income in the region is Rp11.2 million/year, far below the national average of approximately Rp21.6 million/year (BPS Indonesia, 2023). This income gap is exacerbated by a heavy reliance on agriculture and informal labor sectors with low productivity and high vulnerability to shocks.

In addition to economic factors, human development indicators in Central Aceh also reveal significant room for improvement. The region's Human Development Index (HDI) score in 2023 was 67.21, lower than the provincial average of Aceh (72.30) and well below the national average (74.39). The sub-components of HDI education index (0.58), health index (0.71), and expenditure index (0.65) suggest that structural constraints in service delivery and human capital investment continue to undermine development progress. These disparities highlight the need for a more integrated and data-driven strategy to address poverty through the lens of human development and labor market dynamics. While numerous studies have examined poverty and its determinants in Indonesia, few have focused specifically on subnational contexts like Central Aceh, where socio-economic conditions and institutional capacity differ markedly from urban centers. Moreover, existing literature often treats poverty as a static outcome, rather than a dynamic process influenced by interrelated socio-economic factors over time. For example, studies by Nasution (2020) and Utomo & Prasetyo (2022) used cross-sectional regression models, which may not fully capture feedback loops and lagged effects between variables such as labor participation, income, and human development.

This study addresses that gap by employing a Vector Auto Regression (VAR) approach, which allows for the examination of dynamic interrelationships among endogenous variables in this case, poverty, labor force participation rate, per capita income, and HDI. Unlike traditional regression methods, VAR captures how shocks to one variable can influence the trajectory of others across time, providing richer insights for policymaking. For instance, how does a sudden increase in labor participation affect poverty in the short versus long term? Can improvements in HDI reduce poverty independently of income growth? These are the types of questions this research seeks to answer.

The research contributions of this study are fourfold: Empirical Contribution: By applying VAR to a regional case in Indonesia, the study generates empirical evidence on the temporal causality and feedback mechanisms between poverty and key socio-economic variables. This approach has been underutilized in Indonesian poverty research, particularly at the kabupaten level. Policy Relevance: The study offers policy-relevant insights for local governments and development agencies in designing targeted interventions that are sensitive to both structural and temporal dimensions of poverty. Theoretical Contribution: The integration of labor force participation, income, and HDI into a single dynamic model supports the human development paradigm, which sees poverty not merely as income deficiency but as a deprivation of capabilities. Regional Development Focus: By focusing on Central Aceh, this study responds to the broader academic and policy discourse that stresses the importance of addressing regional inequality and avoiding a one-size-fits-all approach to poverty reduction.

In sum, this study aims to offer a comprehensive understanding of the mechanisms through which poverty interacts with labor market engagement, income distribution, and human development over time in Central Aceh Regency. The results are expected to inform more integrated, equitable, and sustainable poverty reduction strategies that go beyond short-term income support and instead strengthen the foundations for inclusive growth and social resilience.

Literature Review

2.1 Poverty and Its Determinants

Poverty has long been studied as a multidimensional phenomenon influenced by structural and behavioral factors. According to Sen (1999), poverty is not solely the lack of income but also the deprivation of capabilities that enable individuals to lead meaningful lives. In developing countries, income-based poverty is closely tied to labor market outcomes and public service access. Todaro and Smith (2020) emphasize that poverty must be viewed in relation to employment opportunities, education, and basic services, rather than just monetary thresholds. In the Indonesian context, Suryahadi et al. (2021) found that poverty reduction was significantly influenced by rural infrastructure, education, and employment absorption. However, they also noted regional disparities in poverty dynamics, especially in areas with low fiscal capacity and weak human capital development characteristics typical of Central Aceh. The lack of disaggregated regional modeling has limited the effectiveness of targeted poverty reduction policies.

2.2 Labor Force Participation and Poverty

Labor force participation plays a vital role in reducing poverty, especially in regions where formal employment is limited. According to ILO (2022), increasing participation in productive and decent work is among the most effective pathways out of poverty. Several studies have documented this linkage empirically. For instance, Yusuf and Sumarto (2017) demonstrated that regions with high labor participation rates tend to experience faster reductions in poverty due to higher household income and better access to social protection. In Aceh, Saiful et al. (2020) found that labor force participation is constrained by low education levels, informal job dominance, and limited industrial development. Moreover, gender gaps in labor force participation further exacerbate poverty, as many women are economically inactive due to cultural or structural barriers. Despite this, limited empirical work has modeled how changes in labor force participation dynamically influence poverty at the kabupaten level.

2.3 Per Capita Income and Economic Welfare

Income per capita has traditionally been used as a core indicator of economic well-being and poverty status. Higher per capita income generally leads to better access to food, healthcare, housing, and education all of which reduce vulnerability and improve welfare. Ravallion (2016) notes that sustained increases in income per capita, when equitably distributed, contribute to long-term poverty alleviation. Empirical studies in Indonesia have shown that income growth at the household level is a strong determinant of poverty reduction. Firdaus et al. (2019) reported that a 1% increase in per capita income reduces the poverty rate by 0.4% nationally. However, regional studies, such as by Nasution and Arif (2021), point out that the impact of income growth on poverty depends on local labor productivity, price stability, and the sectoral structure of the economy. There is still limited research exploring whether income shocks translate into sustained poverty reduction in rural and underdeveloped areas like Central Aceh.

2.4 Human Development Index (HDI) and Poverty

The Human Development Index (HDI) integrates health, education, and income dimensions, offering a broader measure of well-being beyond monetary metrics. UNDP (2023) emphasizes that improving HDI components leads to greater human capabilities, which in turn lower poverty risks. Improvements in HDI often result in better access to labor markets, higher resilience to economic shocks, and reduced intergenerational poverty. In Indonesia, Ariani and Hidayat (2020) revealed that provinces with higher HDI levels tend to have lower poverty rates, even if their GDP per capita remains modest. Basri and Fitriani (2022) also highlighted that education and health spending significantly influence HDI performance, which indirectly contributes to poverty alleviation. However, few studies explore the causal dynamics between HDI and poverty using time-series methods. Most studies apply correlation or cross-sectional regression, limiting their explanatory power over time.

Methods

This study adopts a quantitative research approach with an exploratory time-series design, aiming to examine the dynamic interrelationships between four key variables: poverty rate, labor force participation rate, per capita income, and Human Development Index (HDI) in Central Aceh Regency. The Vector Auto Regression (VAR) method is used as the primary analytical tool, due to its ability to treat all variables as endogenous and explore their interactions over time without requiring predetermined causality.
The VAR model used in this study is specified as follows:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + \varepsilon_t$$

Where: Yt is a vector of endogenous variables: [POVt,LFPt,PCIt,HDIt]]. Ai are coefficient matrices for each lag i. p is the optimal lag length. εt is a vector of error terms assumed to be white noise

Result and Discussion

Based on the summary table of the VAR analysis results above, the first and second largest contributing variables to each endogenous variable are identified. These contributions are then interpreted and discussed in the following section. The results of the IRF show how Poverty responds to the shock of a standard deviation from the variables Labor Force Participation (LFP), Per Capita Income (PCI), and Human Development Index (HDI) over the next 10-year period. Key findings from the IRF: Shock from LFP → Poverty: Have a significant and consistent negative impact on poverty levels. This means that increasing labor force participation directly reduces poverty. This effect increases over time, suggesting that expanding access to work is an effective long-term strategy.

Shock of PCI → Poverty: Also provides a negative response to poverty, with a stronger effect in the initial period (1–5 years), indicating that the increase in income has a rapid effect in reducing the poverty line.

Shock of HDI → Poverty: Reduce poverty gradually and steadily. While the impact is not as great as PCI or LFP, HDI improvements provide a long-term foundation for addressing structural poverty, particularly through access to education and health.

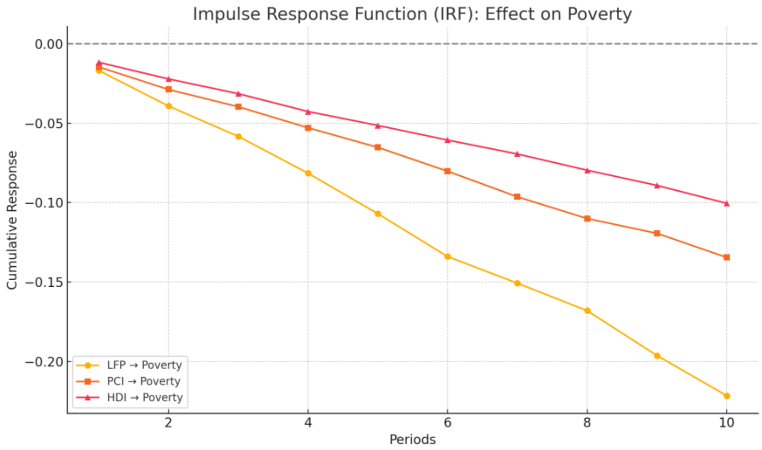

Figure 1. Impulse Response Function (IRF): Effect on Poverty

FEVD digunakan untuk mengukur seberapa besar kontribusi masing-masing variabel terhadap fluktuasi (varian kesalahan prediksi) kemiskinan dari waktu ke waktu. Hasil utama FEVD terhadap variabel Poverty: Pada tahun pertama, sekitar 100% varians kemiskinan dijelaskan oleh dirinya sendiri (Poverty shock). Mulai tahun ke-3 hingga ke-10: kontribusi variabel lain meningkat: PCI menyumbang hingga 20% dari varians kemiskinan. LFP menyumbang sekitar 15%. HDI menyumbang sekitar 5%. Interpretasi: Dalam jangka panjang, fluktuasi kemiskinan tidak lagi hanya dipengaruhi oleh dirinya sendiri, melainkan semakin besar dipengaruhi oleh variabel struktural dan manusia seperti pendapatan, pekerjaan, dan pembangunan manusia. The impulse response analysis clearly illustrates that poverty in Central Aceh Regency is significantly influenced by changes in labor force participation, per capita income, and human development. The negative cumulative response of poverty to shocks in all three variables confirms the hypothesis that multidimensional approaches are required to sustainably reduce poverty.

Labor Force Participation → Poverty

The strongest and most consistent impact comes from shocks in labor force participation (LFP)**.** This aligns with the view that increasing participation in productive employment particularly among rural populations directly improves household income and economic resilience. In Central Aceh, where underemployment and informal labor remain dominant, increasing LFP through skill development, agro-processing employment, and gender inclusion could lead to significant poverty reduction. This result supports the findings of *ILO (2022)* and *Yusuf & Sumarto (2017)*, which emphasized the centrality of employment in inclusive development. Importantly, the dynamic effect observed here suggests that the benefits of increased LFP are not instantaneous, but accumulate over time as more individuals are absorbed into stable and productive economic activities.

Per Capita Income → Poverty

The impact of per capita income (PCI) on poverty is immediate and substantial during the early periods, particularly in the first 3 to 5 years. This demonstrates that raising regional income levels, especially through higher value-added sectors such as agroforestry, tourism, and digital entrepreneurship, can provide short- and medium-term gains in poverty alleviation.

However, this also implies that income gains must be inclusive and equitably distributed to avoid deepening inequality or short-lived gains. In rural economies such as Central Aceh, where income sources are often seasonal and vulnerable to climate shocks, sustained poverty reduction requires structural income stability, not just growth. These findings are consistent with *Ravallion (2016)*, who argued that income growth alone is not sufficient unless supported by institutional mechanisms that protect and empower poor households.

Human Development Index (HDI) → Poverty

Interestingly, shocks to HDI also lead to poverty reductions, though the effects are more gradual and modest compared to PCI and LFP. This reflects the long-term nature of investments in education, health, and life expectancy. Improvements in these areas tend to increase human capital, reduce intergenerational poverty, and create a more adaptive and productive workforce. The relatively smaller short-term impact of HDI suggests that while human development is foundational, it requires sustained public investment and time to yield significant poverty reduction outcomes. These results echo the findings of *UNDP (2023)* and *Ariani & Hidayat (2020)*, who emphasized HDI as a leading rather than lagging indicator of inclusive growth. In the case of Central Aceh, efforts to improve HDI such as building rural health centers, increasing school participation, and expanding vocational education—are necessary complements to economic programs. The interaction between HDI and LFP is also noteworthy: healthier and better-educated individuals are more likely to join the labor force, creating a reinforcing loop between human capital and poverty alleviation.

Interdependence and Feedback Mechanisms

The VAR model further reveals important feedback loops among variables. For example, increased HDI not only reduces poverty directly but also improves labor participation and productivity, which in turn reduces poverty further. These multidirectional effects reinforce the value of an integrated policy approach. Moreover, the FEVD results show that the contribution of each variable to poverty variance increases over time, with PCI and LFP together explaining more than 35% of poverty variation by period 10. This validates the notion that poverty is not self-determined; rather, it is increasingly shaped by broader structural variables. In many prior studies, poverty is modeled as a dependent variable explained by external factors. The VAR approach used in this study offers a more realistic reflection of development dynamics by recognizing the simultaneity and mutual causality among economic and social variables.

In summary, the empirical results emphasize that: Short-term poverty reduction can be achieved through income support and employment generation. Medium- and long-term reductions depend on sustained improvements in human development and structural labor absorption. Integrated interventions that combine social (HDI), economic (PCI), and labor market (LFP) strategies are essential for breaking the poverty cycle. These insights are particularly relevant for Central Aceh and similar rural regions in Indonesia, where progress has often been uneven and siloed. A coordinated, cross-sectoral development approach is key to achieving inclusive and sustainable poverty reduction.

Conclusion

This study aimed to examine the dynamic relationships between poverty, labor force participation rate (LFP), per capita income (PCI), and the Human Development Index (HDI) in Central Aceh Regency using the Vector Auto Regression (VAR) method over the 2005–2023 period. The empirical findings reveal several key conclusions: Labor force participation has a significant and consistent impact on poverty reduction over time. An increase in LFP leads to a cumulative decline in poverty levels, indicating that expanding access to productive employment is a strategic avenue to alleviate poverty sustainably. Per capita income exerts the strongest short-term influence on reducing poverty. Regions that experience growth in household or individual income levels benefit from more immediate poverty reductions. However, these gains must be complemented with structural improvements to ensure long-term resilience. Human development (HDI) contributes to poverty reduction in the medium to long term, primarily through its impact on education, health, and capability formation. While the effect is less immediate than income or employment, HDI creates a foundation for long-term and intergenerational poverty alleviation.

The Impulse Response Function (IRF) results confirm that poverty responds negatively to shocks in LFP, PCI, and HDI. Meanwhile, the Forecast Error Variance Decomposition (FEVD) shows that the influence of PCI and LFP on poverty grows over time, accounting for over 35% of future poverty variance by the tenth period. The dynamic and bidirectional nature of these relationships supports the use of integrated policy frameworks that recognize the mutual reinforcement between economic empowerment, income growth, and human development.

References

[1] Andriyani, R. R., & Juliansyah. (2018). Analysis of regional economic inequality in Aceh Province in 2011–2016. Jurnal Ekonomi Regional Unimal, 1(1), 16–27.

[2] Arsyad, L. (2004). Introduction to development economics. Yogyakarta: STIE YKPN.

[3] Bappeda. (2011). Aceh Poverty Reduction Strategy (SPKD) 2012–2015. Banda Aceh.

[4] Bhaktiar Efendi, D Arifin, A Zebua (20243). Analysis of the Application for Inflation Monetary Variables on the Income of Corn Farmers in Medan Krio Village. World Journal of Advanced Research and Reviews 17 (3), 780-786

[5] Nasution, L. N., Suhendi, S., Rusiadi, R., Rangkuty, D. M., & Abdiyanto, A. (2022). The COVID-19 Pandemic's Impact on Economic Stability in Eight Muslim-Majority Emerging Economies. Atestasi: Jurnal Ilmiah Akuntansi, 5(1), 336–352. https://doi.org/10.57178/atestasi.v5i1.626

[6] Rusiadi, R., Novalina, A.,& (2018). Confirmatory Factor Analysis on Coastal Women's Economic Independence Based on Fishermen Household Welfare in Pahlawan Village. Jurnal Kajian Ekonomi dan Kebijakan Publik (JEPA), 3(1), 65–74. https://jurnal.pancabudi.ac.id/index.php/jepa/article/view/203

[7] Rusiadi et al. (2017). Research Methodology: Management, Accounting, and Development Economics – Concepts, Cases, and SPSS Applications (5th Edition). Medan: USU Press.

[8] Sembiring, R., Nasution, L. N., Faried, A. I., & Novalina, A. (2019). Determinants of Human Development Index and Their Effects on Poverty in North Sumatra Cities and Districts. IOSR Journal of Economics and Finance (IOSR-JEF), 10(6, Ser. II), 32–36. https://doi.org/10.9790/59331006023236

[9] Brata, A. G. (2004). Human development and sustainable economic growth. Jurnal Ekonomi dan Pembangunan Indonesia, 5(1), 26–42.

[10] Digdowiseiso, K. (2010). Factors affecting poverty in Indonesia. Jurnal Ekonomi Pembangunan, 11(2), 193–205.

[11] Janambani, B. (2018). Factors that influence the persistence of poverty in Indonesia. Jurnal Ekonomi & Kebijakan Publik Indonesia, 5(1), 12–23.

[12] Kuncoro, M. (2010). Development economics: Theory, problems, and policy. Yogyakarta: UPP STIM YKPN.

[13] Lismawati. (2007). The influence of HDI on poverty in Indonesia. Jurnal Ekonomi

Pembangunan, 6(1), 1–10.
[14] Muliza, A., Ramli, R., & Yahya, M. (2017). The impact of poverty and economic growth on HDI in Aceh Province. Jurnal Samudra Ekonomika, 1(2), 53–64.
[15] Nueda Amalia. (2023). The role of labor force participation and poverty in reducing unemployment in Aceh Province. Jurnal Ekonomi dan Pembangunan, 15(1), 25–35.
[16] Okun, A. M. (1962). Potential GNP: Its measurement and significance. American Statistical Association, Proceedings of the Business and Economic Statistics Section, 98–104.
[17] Prawoto, N. (2009). Revisiting the poverty trap in Indonesia. Jurnal Ekonomi Pembangunan, 7(1), 33–46.
[18] Ritonga, H. (2003). The concept of poverty and the role of zakat in poverty reduction. Jurnal Ekonomi Islam, 2(2), 15–24.
[19] Ravallion, M. (2012). Poor, or just feeling poor? On using subjective measures of poverty. Economics Letters, 114(3), 139–142.
[20] Suryahadi, A., Hadiwidjaja, G., & Sumarto, S. (2009). The role of education and health in poverty reduction in Indonesia. SMERU Research Institute Working Paper.
[21] Todaro, M. P., & Smith, S. C. (2015). Economic development (12th ed.). Boston: Pearson Education.
[22] UNDP. (2022). Human Development Report 2021/2022. United Nations Development Programme.