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# Criminality, Poverty, and Unemployment in Aceh Province: Evidence from Granger Causality

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***Abstract***

Criminality is one of the negative activities that emerge in social circles. The presence of criminality poses a challenge for policymakers because it disrupts public security and impacts economic stability. Forms of criminal activities include robbery, theft, gambling, murder, and corruption. The criminal cases in Aceh Province are quite serious. This study aims to analyze the relationship between criminality, poverty, and unemployment in Aceh Province. The research data was collected from 2010 to 2023. The research analysis method uses the Granger causality approach. The results of the study found that poverty has a one-way influence on criminality, criminality has a one-way influence on unemployment, and there is a two-way relationship between poverty and unemployment. Based on these findings, criminality, poverty, and unemployment need special attention. Policymakers need to provide support such as education, health, and welfare for the poor. In addition, there should also be available job opportunities in the informal sector to reduce unemployment rates.

**Key words :** Criminality, Poverty, Unemployment

## INTRODUCTION

According to the 2024 report by the Indonesian Central Bureau of Statistics, Aceh Province is currently the poorest province in Sumatra. The number of poor people in Aceh Province was 861,000 in 2010 and significantly increased to 909,000 in 2012 (see Figure 1). At the same time, the unemployment rate in Aceh Province was ranked 3rd in Sumatra. In 2010, the unemployment rate was 8.37% and increased to 10.12% in 2013. The average unemployment rate in Aceh Province remains above 6%. Despite various efforts to address these issues, the status has not changed. This condition has negative impacts on both the economy and society (Ikhsan & Amri, 2023).

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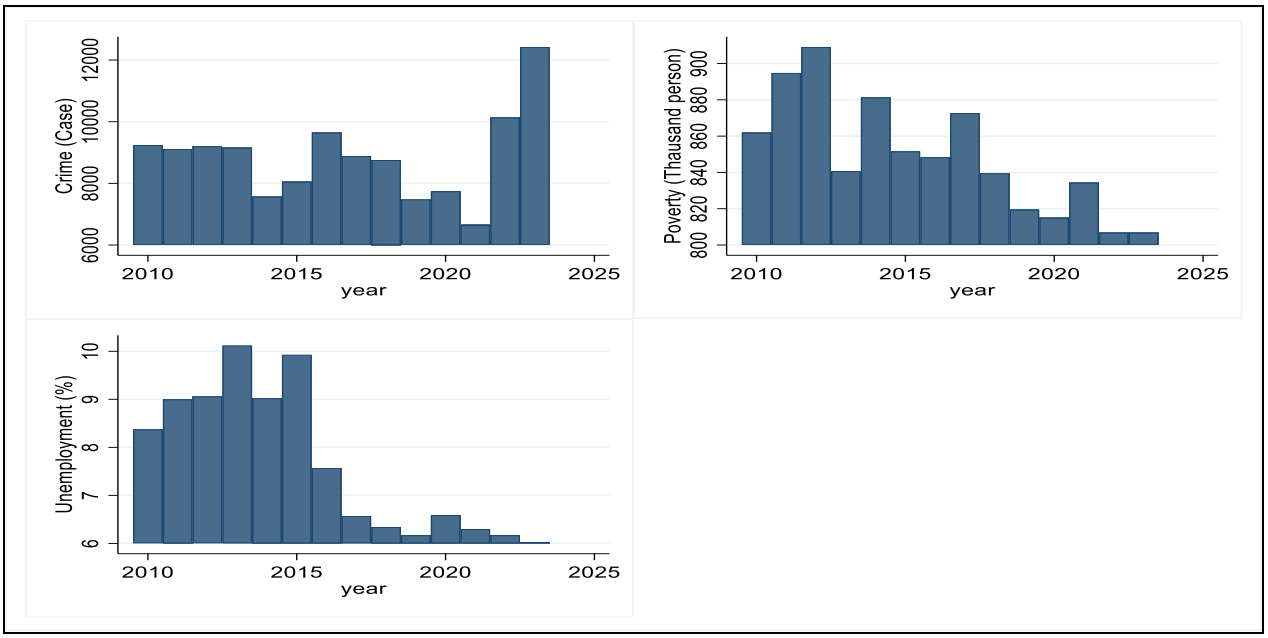



**Figure 1.** Crime, poverty, and unemployment data in Aceh Province during 2010-2023. Source: Author works, data from BPS-Statistics Indonesia (2024).

Criminality is one of the negative activities that emerge in social circles. Ahad (2016) explains that criminality is a form of deviation from law and order in a country. The emergence of criminality poses a challenge for policymakers because it disrupts public security and economic stability (Karpavicius et al., 2024). Forms of criminal activities include robbery, theft, gambling, murder, and corruption. The criminal cases in Aceh Province are quite serious. Figure 1 shows that the average number of criminal cases reaches 8,000 cases per year. Criminal cases decreased in 2021 due to COVID-19, but as the economy recovered, criminality increased significantly.

Crime and poverty have a strong connection, intertwining as a complex social challenge. Neither is a newly occurring issue, and their roots often run deep within the fabric of society. Poverty is defined as a condition where one's life falls below the standard of welfare. This standard is not limited to financial security alone but also encompasses access to basic needs, such as education, healthcare, and opportunities to secure decent employment. When individuals or communities lack these essentials, they are often trapped in a seemingly unbreakable vicious cycle.

This cycle perpetuates not only material deprivation but also a sense of hopelessness and marginalization. The limited access to education hinders skill development and employability, leading to further economic struggles. Similarly, poor healthcare access exacerbates physical and mental health challenges, reducing productivity and opportunities. These compounded difficulties make it increasingly hard for individuals to break free from the grasp of poverty. In desperate attempts to escape this situation, some may resort to unlawful actions, either as a survival mechanism or as a means to seek a better life. This leads them into the realm of crime, whether minor offenses or more serious illegal activities. Often, the decision to break the law is driven by a lack of options rather than an inherent desire to commit crimes. It reflects the failure of societal systems to provide sufficient safety nets and opportunities.

Unemployment is a significant contributor to criminal activity. It refers to individuals actively seeking jobs during a certain period but unable to secure one. When individuals are unemployed, their income becomes restricted, forcing them to rely on savings or earnings from previous jobs to survive. Prolonged unemployment, however, may lead to a complete loss of income, pushing individuals into poverty (Armin & Idris, 2019). Like poverty, unemployment leaves individuals struggling to meet their basic needs. Despite their educational qualifications, they face fierce competition in the job market, which, compounded by economic uncertainties, drives some to resort to criminal acts as an alternative means of survival.

The unemployed often find themselves caught in a precarious situation where limited income and a lack of opportunities amplify their vulnerabilities (Gillani et al., 2011). While they may possess sufficient education, they struggle to secure jobs due to oversaturation in the job market and a mismatch of skills (Rahman & Prasetyo, 2018). This mismatch can lead to frustration and desperation, propelling individuals toward criminal activities, which, although illegal, may seem like a viable solution given the potential for higher income compared to lawful work. Economic instability worsens this dynamic. During times of financial crisis or economic downturn, job opportunities shrink even further, leading to higher unemployment rates. Communities with limited government support and insufficient interventions leave individuals without adequate safety nets, increasing their propensity to engage in illegal activities (Hasanah, 2021).

We are motivated to study the issue of criminality by linking it to poverty and unemployment in Aceh Province based on the aforementioned factors. The high levels of poverty and unemployment are likely to trigger criminality. Several studies mention that criminality and poverty have a close relationship. At the international level, studies such as Negin et al. (2010), Ahad (2016), and Imran et al. (2018) support this view. Similarly, criminality and unemployment are related, as noted by Narayan & Smyth (2007), Chen (2009), and Torroam & Abur (2014). However, studies in Indonesia are still limited, such as those by Sari & Azhar (2019) and Hasanah (2021). Nevertheless, these studies have found inconsistent results. Therefore, we pose the question: what is the relationship between criminality, poverty, and unemployment in Aceh Province?

We structure the study as follows: Section 2 is an outline of the research method, section 3 explains the results and discussion. Finally, section 4 is the conclusion.

## RESEARCH METHODS

The research data uses annual data from 2010 to 2023 in Aceh Province based on data availability. Criminality data uses the approach of the number of criminal cases reported by the Regional Police (POLDA) in case units. Poverty data uses the number of poor people in thousands, and unemployment data uses the open unemployment rate in percentage units. All research data is sourced from the Indonesian Central Bureau of Statistics and can be accessed online. To answer the research problem that has been determined, criminality, poverty, and unemployment can be formulated as functions as follows:

$$Crime = f(poverty, unem) \quad (1)$$

In equation (1), criminality and poverty are transformed into natural logarithms to reduce issues of multicollinearity (Fachrurrozi et al., 2021; Fachrurrozi et al., 2022) and heteroskedasticity (Ikhsan et al., 2022; Effendi et al., 2024; Ariani et al., 2024). The relationship between these three variables can be analyzed using the Granger causality approach. This method examines the relationship based on the influence of past values on the present, but not vice versa (Gujarati & Porter, 2009). The variables are placed as endogenous variables, where all three may

influence each other. The causality model can be in the form of bivariate or multivariate in Vector Autoregressive (VAR). This study uses three variables, so the equation can be formulated as follows:

$$crime_t = \sum_{i=1}^{m} \gamma_i \, crime_{t-i} + \sum_{i=1}^{m} \beta_j \, poverty_{t-i} + \sum_{i=1}^{m} \delta_k \, unem_{t-i} + u_{1t} \quad (2)$$

$$poverty_t = \sum_{i=1}^{m} \pi_i \, crime_{t-i} + \sum_{i=1}^{m} \rho_j \, poverty_{t-i} + \sum_{i=1}^{m} \mu_k \, unem_{t-i} + u_{2t} \quad (3)$$

$$unem_t = \sum_{i=1}^{m} \theta_i \, crime_{t-i} + \sum_{i=1}^{m} \varphi_j \, poverty_{t-i} + \sum_{i=1}^{m} \omega_k \, unem_{t-i} + u_{3t} \quad (4)$$

Where $i$ is the number of lags determined by the Akaike Information Criterion (AIC) approach, $t$ represents the time series (2010-2023), and $u_{1\text{-}3}$ are the residuals of the regression equations and are assumed to be uncorrelated. Each equation has lagged variables in the multivariate VAR system. The null hypothesis is that there is no relationship if the probability is greater than the significance level, and the alternative hypothesis is that there is a significant relationship if the probability is less than the significance level. Given that the testing is conducted in reverse, there are four possible causality hypotheses:

1. Unidirectional causality from X to Y occurs if the statistical value is not equal to zero.
2. Unidirectional causality from Y to X occurs if the statistical value is not equal to zero.
3. Bidirectional causality between X and Y occurs when both variables have statistical values not equal to zero.
4. Independence occurs if the relationship between X and Y is found to be zero for both.

Testing for stationarity in data is conducted to determine whether the time series data being used exhibits a stable pattern (stationary) or an unstable one (non-stationary) across each variable. Time series models require data to be stationary for accurate analysis. Stationarity tests are especially crucial since time series data is used. In many cases, time series data tends to be non-stationary, meaning it contains a unit root and has a mean and variance that change over time. If non-stationary data or data with a unit root is used in regression equations, it can result in spurious regression—producing misleading results. Consequently, the estimated coefficients derived from such data may be inaccurate. The most commonly used method for stationarity testing is the Augmented Dickey-Fuller approach, as highlighted by studies like those of Abbasi et al. (2021) and Karaaslan & Çamkaya (2022).

Determining the optimal lag length is crucial when testing the stationarity of time-series models. If the chosen lag length is too long, it reduces the degrees of freedom, leading to a lack of necessary information. Conversely, if the lag length is too short, the model may become misspecified, as indicated by a high standard error. Various criteria can be used to select the appropriate lag order, including the Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ). In this study, the optimal lag length was determined using the Akaike Information Criterion (AIC). The smallest AIC value was selected to minimize the residual sum of squares (RSS) or maximize the R-squared ($R^2$) value, ensuring the model achieves the lowest possible error rate. The steps of the analysis study are illustrated in Figure 2.

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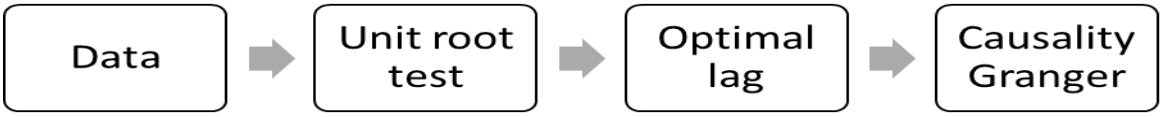



**Figure 2.** The analysis flowchart.

## RESULTS AND DISCUSSION

Table 1 provides a summary of the statistics for each variable. In the research sample, the average number of criminal cases in Aceh was 8,860, with poverty affecting 848,000 people, and an unemployment rate of 7.66%. Criminality in Aceh fluctuated significantly, with a standard deviation of 1,405.75. The standard deviation for poverty was 32,165 and for unemployment was 1.527. The lowest number of criminal cases recorded was 6,651, and the highest was 12,420. The distribution of all three data sets, as assessed by Jarque-Bera (JB), Kurtosis, and Skewness, indicates that the data is normally distributed.

**Table 1**. Descriptive statistics

| Variables | Crime | Poverty | Unem |
|---|---|---|---|
| Mean | 8860.71 | 848.71 | 7.66 |
| Min | 6651 | 806.75 | 6.03 |
| Max | 12420 | 909.04 | 10.12 |
| Std. Dev | 1405.75 | 32.165 | 1.527 |
| JB | 2.545 | 0.754 | 1.588 |
| Kurtosis | 4.15 | 2.129 | 1.52 |
| Skewness | 0.870 | 0.365 | 0.365 |

Source: Author's work.

A correlation matrix provides an overview of the relationships within the data being analyzed. Figure 3 illustrates that the correlations between poverty and crime, as well as unemployment and crime, show inconsistent patterns. The relationship between poverty and crime is 17%, while the relationship between unemployment and crime is 21%. Meanwhile, the correlation between poverty and unemployment exhibits a positive trend (81%).

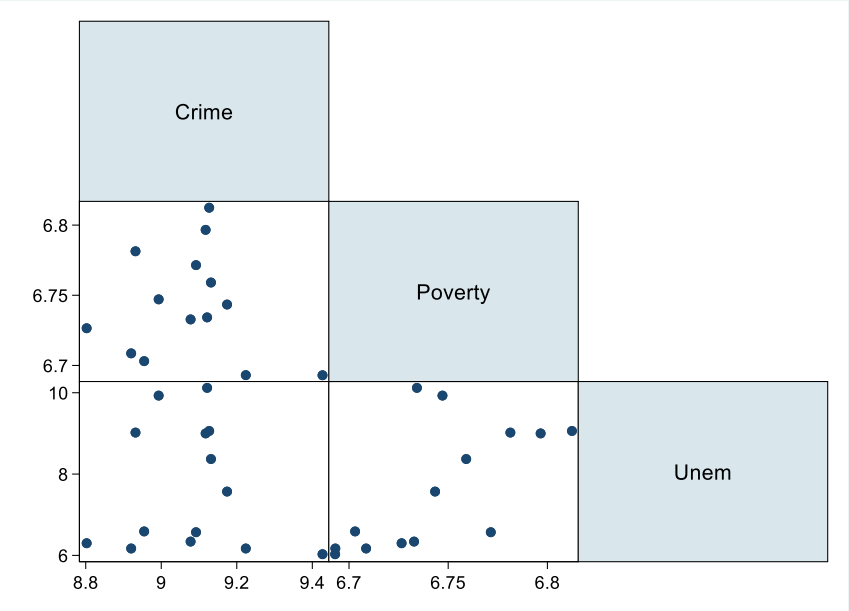


**Figure 3.** Correlation Matrix Plot.

Before proceeding to causality analysis, an important step in time series analysis is stationarity testing. Stationarity in this study uses the Augmented Dickey-Fuller approach. Table 2 shows the results of the tests in the form of levels and first differences. Crime, poverty, and unemployment were found to be non-stationary at the level, so testing at the first difference level was necessary. The crime test results showed a statistical value of -3.028 with a significance of 5%. This indicates that criminality rejects the null hypothesis. The poverty test results showed a statistical value of -5.851 with a significance of 1%. This indicates that poverty rejects the null hypothesis. The unemployment test results showed a statistical value of -4.130 with a significance of 1%. This indicates that unemployment rejects the null hypothesis. Based on these findings, criminality, poverty, and unemployment have integration at the first difference.

**Table 2.** Unit root test

| Variables | Level I(0) | First Difference I(1) |
|---|---|---|
| Crime | -1.609 | -3.028** |
| Poverty | -1.519 | -5.851*** |
| Unem | -0.796 | -4.130*** |

Source: Author's work. *** and ** indicate the significance level at 1% and 5%

The causality model uses lags to observe the influence of past values on the present. Determining the appropriate lag can be done by examining the smallest value. Table 3 shows the results of optimal lag determination from the Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ). AIC and HQ found that a lag of 2 is suitable for use in the VAR model, while SC found a lag of 1. Therefore, the researcher determined the use of 2 lags in the model.

**Table 3.** Optimal Lag

| Lag | LogL | AIC | SC | HQ |
|---|---|---|---|---|
| 1 | 23.856 | -1.976 | -1.491* | -2.155 |
| 2 | 34.231 | -2.205* | -1.356 | -2.519* |

Source: Author's work.

Table 4 shows the results of the Granger causality tests. The results indicate that the relationship between poverty and criminality is found to be unidirectional from poverty to criminality, with the null hypothesis rejected at the 10% significance level. This finding is consistent with Hasanah (2023), but differs from Sari & Azhar (2019). Poverty is defined as a condition where an individual is unable to meet the basic needs for themselves and their family due to low levels of education and health. To survive, in the midst of difficulty in obtaining jobs due to low education and productivity, they resort to criminal activities as an acceptable solution.

**Table 4.** Granger causality

| Granger Cause | Statistics | Prob. | Conclusion |
|---|---|---|---|
| Poverty → crime | 6.925* | 0.074 | Reject H0 |
| Unem → crime | 0.615 | 0.893 | Accept H0 |
| Crime → poverty | 4.04 | 0.257 | Accept H0 |
| Unem → poverty | 9.934** | 0.019 | Reject H0 |
| Crime → unem | 16.415*** | 0.001 | Reject H0 |

| | | | |
|---|---|---|---|
| Poverty → unem | 65.712*** | 0.000 | Reject H0 |

Source: Author's work. ***, **, and * indicate the significance level at 1%, 5% and 10%.

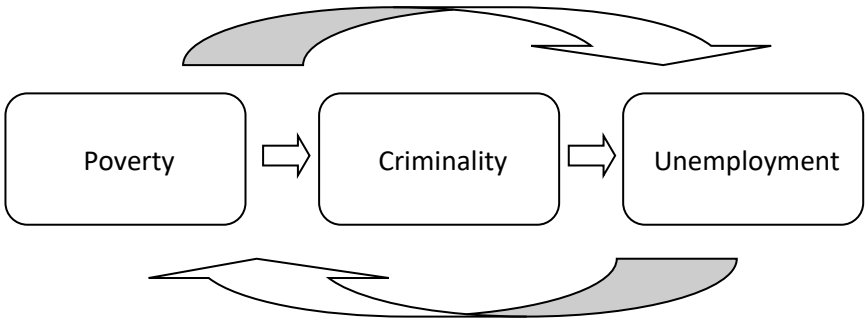



**Figure 4.** Causality result

The connection between criminality and unemployment reflects a unidirectional, with criminality significantly contributing to unemployment. This is supported by the null hypothesis being rejected at the 1% significance level. This finding aligns with the studies by Gillani et al. (2011), Torruam & Abur (2014), and Veysel et al. (2018), yet contrasts with the conclusions of Chen (2009). Criminal acts often mirror legitimate work activities, with the main difference being their illegality. Consequently, the unemployed often become the labor force for such unlawful practices. A key reason for this is the higher income often associated with illegal activities compared to legal employment. Additionally, in regions where unemployment is high, social and environmental factors can push individuals to seek quick and easy solutions, including engaging in criminal acts.

On the other hand, the relationship between poverty and unemployment is shown to be reciprocal, with the null hypothesis also rejected at the 1% significance level. This finding is consistent with Karo Karo & Yusnida (2024) but diverges from the conclusions drawn in the works of Hasiholan et al. (2022), Idawati B. et al. (2024), and Elvina et al. (2024). Poverty and unemployment are intricately connected, with unemployment referring to individuals actively seeking work to earn a living, while poverty reflects the lack of resources and welfare necessary to meet basic needs. According to Karo Karo & Yusnida (2024), the main causes of poverty and unemployment lie in the mismatch between job opportunities and individual qualifications. Specifically, those with low educational levels struggle to secure employment, especially when available positions demand specialized skills, thus exacerbating unemployment and poverty.

Figure 4 summarizes these causative relationships and highlights their intricate dynamics. These intertwined issues are magnified in areas where economic opportunities are scarce or policy interventions are inadequate. Structural challenges, such as a lack of investment in education, healthcare, and infrastructure, further deepen the cycle of poverty, unemployment, and criminality. Tackling these issues requires a strategic and sustainable approach, including tailored skill development programs and the creation of suitable job opportunities that align with the needs of the workforce. Such efforts can address the disconnect between labor market demands and workforce capabilities, ultimately reducing the risks of unemployment, poverty, and crime.

## CONCLUSION

This study aims to examine the causal relationship between criminality, poverty, and unemployment in Aceh Province from 2010 to 2023. The study found that poverty has a one-way relationship with criminality, criminality has a one-way relationship with unemployment, and there is a two-way relationship between poverty and unemployment. It can be concluded that poverty drives criminality, criminality is associated with unemployment, and there is a trade-off between poverty and unemployment.

Based on these findings, policymakers must prioritize the development of community-focused programs to tackle the root causes of criminal behavior. Initiatives such as mentorship opportunities, community centers, and support groups can provide a safe and nurturing space for vulnerable individuals. These programs not only help foster positive social connections but also encourage constructive behavior, reducing the likelihood of involvement in unlawful activities. By collaborating with local communities, governments can create targeted strategies that cater to the unique needs of each region. Additionally, partnerships with private sectors can significantly enhance efforts to combat poverty and its associated challenges. Businesses have the potential to contribute to job creation, especially in areas struggling with high unemployment rates. Collaborative efforts between governments and private companies can lead to the establishment of vocational training, apprenticeships, and skill-building programs. These initiatives equip individuals with employable skills, improving their chances of finding stable jobs and relieving economic pressures that may push them toward illegal actions. Finally, addressing the intersection of poverty and crime requires a sustainable, long-term approach. This involves consistently evaluating and refining policies to ensure their effectiveness. Governments should dedicate resources to research and data collection to better understand the changing needs of underprivileged communities. Transparent policy implementation and inclusive decision-making processes ensure that the voices of marginalized populations are considered. Through continuous efforts and cooperation, society can dismantle the cycle of poverty and criminality, creating a fairer and safer future for all.

In conducting this study, the researcher eliminated several potential errors, such as limitations in the sample size and only considering poverty and unemployment. Therefore, future researchers can analyze criminality using panel data and spatial analysis. Furthermore, other economic factors such as inequality, economic growth, and security should be added to produce more comprehensive analysis.

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