Exploring the Relationship between Tertiary Education and Child Maltreatment: An ARDL Analysis

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Abstract

This study aims to investigate the correlation between child abuse and tertiary education as a potential determining factor, in addition to established variables such as unemployment, inflation, and economic growth. The data spanning from 1989 to 2020 is analyzed using the Autoregressive Distributed Lag (ARDL) technique. Our findings reveal that inflation can have both short-term and long-term effects on child abuse, while unemployment primarily has a long-term impact on child abuse. However, an interesting discovery emerges as tertiary education demonstrates a protective effect, effectively reducing child abuse in the long run. These findings emphasize the significance of formulating strategies to mitigate the child abuse rate. Policymakers should consider allocating increased resources to enhance tertiary education, recognizing its potential role in preventing child abuse. By focusing on education and addressing the other identified determinants, the government can develop a comprehensive approach to safeguarding children and promoting their well-being. The novelty of this study lies in highlighting the importance of tertiary education and its potential for reducing child abuse, providing valuable insights for policymakers, researchers, and advocates in their efforts to protect vulnerable children.

Keywords: ARDL; Education; Child Abuse; Unemployment; Inflation; Autoregressive Distributed Lag (ARDL) Models.

1. Introduction

Child abuse is a global issue with significant and enduring consequences. It adversely affects the emotional development of children, leading to decreased self-esteem and social withdrawal. Sadly, some abuse victims may even contemplate or commit suicide and are at a higher risk of dropping out of school. The rise in reported child abuse cases has raised serious concerns and sparked widespread discussions. A study has revealed that almost 75% of children aged

2 to 4 have experienced physical and psychological abuse from their parents or caregivers worldwide. This distressing statistic highlights the pervasive nature of child abuse. Furthermore, it has been observed that children who have suffered abuse are more likely to become abusers themselves when they reach adulthood, perpetuating a cycle of harm and violence. Therefore, addressing the issue of child abuse is essential for safeguarding the well-being and happiness of all individuals, especially children. This entails implementing preventive measures, providing support and resources for victims, and promoting awareness and education on the importance of nurturing and non-violent parenting practices. By breaking the cycle of abuse and creating a safe and supportive environment for children, we can foster their healthy development and contribute to a brighter future for them and society.

Conducting a thorough examination of the determinants of child abuse is crucial to developing relevant policies to reduce child abuse cases. Previous studies have identified several macroeconomic indicators associated with child abuse, such as inflation, unemployment, and women's participation in the labor force. Inflation can create economic stress for parents, increasing the likelihood of domestic violence and negatively impacting children.

The increasing cost of living poses significant challenges for families. Multiple studies conducted by Shaari et al. [1-4] have provided evidence of a positive correlation between inflation and child abuse in Malaysia. Furthermore, Rambeli et al. [5] have also supported the connection between inflation and child abuse. Another crucial factor contributing to child abuse is unemployment. Research conducted by Rambeli et al. [5] and Shaari et al. [1-4] has demonstrated a positive relationship between unemployment and child abuse. However, the relationship varies based on the geographical context, with a positive association observed in non-metropolitan areas and a negative association in metropolitan areas [6]. The empirical study by Brown and De Cao [7] has also highlighted the association between unemployment and physical abuse. However, there is an important gap in the literature concerning the potential impact of tertiary education on child abuse. To address this gap, we propose conducting an empirical study that specifically investigates the influence of tertiary education on child abuse in Malaysia. By conducting this study, we can critically compare previous studies' findings and fill the literature gap. The primary goal of our research is to provide valuable insights into the role of higher education in mitigating child abuse. We aim to examine the association between the number of individuals in the labor force with tertiary education and child abuse cases in Malaysia. Understanding this relationship is crucial for developing relevant policies and interventions that reduce child abuse cases. One of the key objectives of our research is to examine the impact of tertiary education on child abuse. We seek to assess whether a higher presence of individuals with tertiary education in the labor force is associated with lower rates of child abuse. By exploring this relationship, we aim to shed light on the potential protective effect of higher education in preventing child abuse and promoting healthier environments for children.

Additionally, we intend to compare our findings with previous studies focusing on the relationships between inflation, unemployment, and child abuse. This comparative analysis will provide a more comprehensive understanding of the multiple factors influencing child abuse. By identifying the unique role of tertiary education in this context, we can gain a deeper understanding of its potential impact on child abuse rates. Furthermore, our research endeavors to provide valuable insights for policy development and practical applications. By recognizing the potential impact of higher education, stakeholders can develop evidence-based strategies and interventions that effectively promote child protection and well-being. By explicitly stating these goals and highlighting the research gap, we aim to convey the significance of our study more clearly. We believe that our research can contribute to the existing literature on child abuse. It can also enhance the comprehension of the mechanisms by which tertiary education can impact child abuse rates, thereby providing valuable insights for efforts aimed at protecting and supporting vulnerable children in Malaysia. The findings of this study offer valuable insights for policymakers and advocates engaged in efforts to protect and promote the well-being of vulnerable children. By recognizing the importance of tertiary education in the context of preventing child abuse, the findings of our study can contribute to the development of effective strategies. Our research can shed light on the potential influence of tertiary education and its role in safeguarding children, enabling the adoption of more comprehensive approaches to child protection and well-being.

2. An Overview of Child Abuse and the Number of People with Tertiary Education in the Labor Force in Malaysia

The Department of Social Welfare recorded 1,055 child abuse cases in Malaysia from January to June 2022. Among these cases, physical abuse accounted for the highest proportion, with 578 cases (54.8% of the total), followed by sexual abuse with 417 cases (39.6%), and emotional abuse with 60 cases (5.6%). Females were involved in 706 cases, constituting 68% of the total cases, while males were involved in 349 cases, representing 33%. Figure 1 illustrates the trend of child abuse cases over time, showing a consistent increase in reported cases, except for 1994, 2000, and 2020. The highest number of child abuse cases was recorded in 2019, reaching 6,061, while the lowest number was reported in 2000, with 804 cases. However, in 2020, there was a decrease in reported cases, likely influenced by the COVID-19 pandemic.
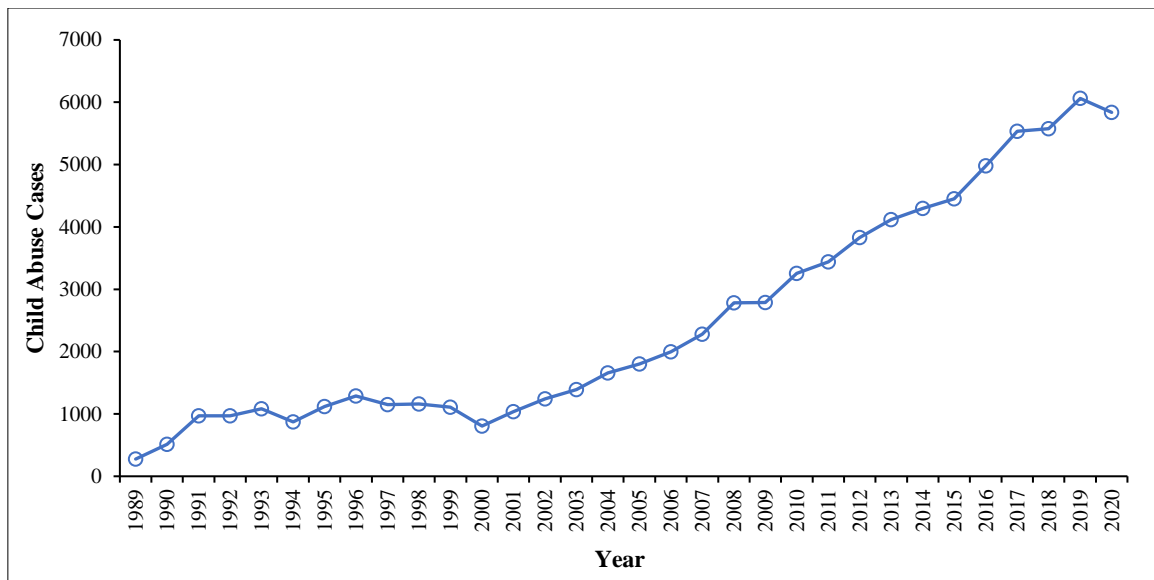
Figure 1. Child abuse cases in Malaysia from 1989 to 2020

The number of people with tertiary education in the labor force has consistently increased over the past 32 years, reaching its highest point in 2020 with 5,014,400 people (see Figure 2). This upward trend can be attributed to various factors, including the growing enrollment of students in universities and other higher education institutions. Interestingly, even during the economic recession in 2020, the number continued to rise, suggesting that it remained unaffected by the prevailing economic conditions. The steady increase highlights the growing emphasis placed on higher education and the recognition of its value in today's competitive job market. It signifies the efforts to promote educational attainment and prepare individuals for professional opportunities.
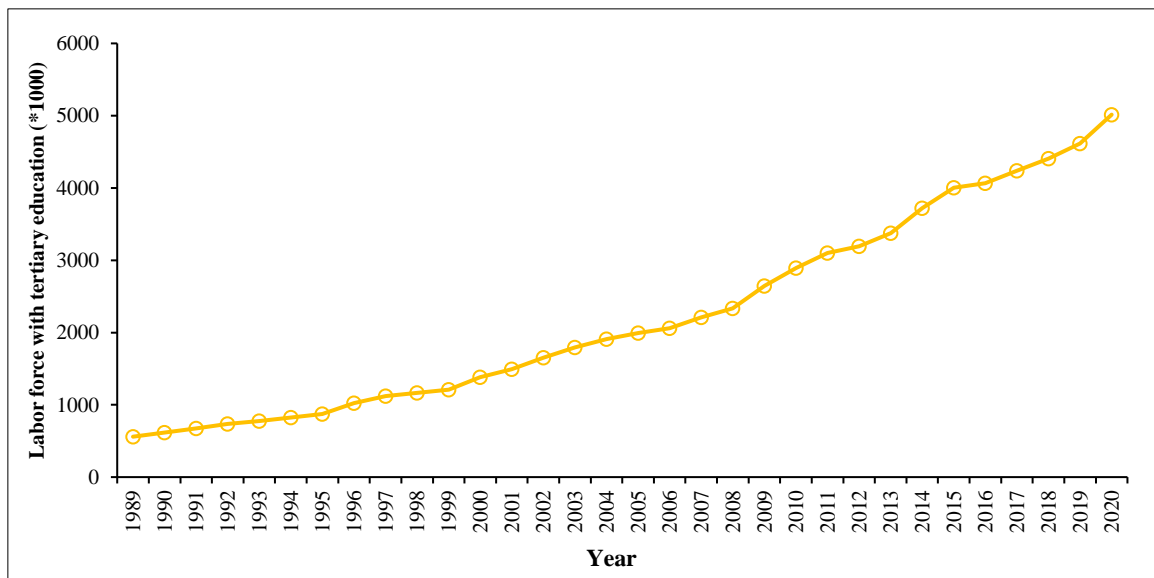

Figure 2. People with tertiary education in the labor force in Malaysia from 1989 to 2020

3. Literature Review

Diana Baumrind's family stress theory suggests that child abuse arises when parents face significant stress and insufficient coping skills and social support. According to this theory, parents who encounter high levels of stress in various aspects of their lives, such as financial challenges, work-related pressures, or personal difficulties, may struggle to manage their stress effectively. Consequently, they may resort to abusive behavior to release their frustrations. Additionally, parents who lack adequate social support are more vulnerable to engaging in abusive actions. Without the assistance of friends, family, or community services, parents may feel overwhelmed and isolated, leading to further stress and an increased likelihood of abusive behavior. Empirical research has consistently supported the family stress theory, revealing a link between parental stress and child abuse. For instance, a study conducted by Jonson-Reid et al. [8] found that parental stress was a significant predictor of child abuse, even after controlling for other risk factors like poverty and maternal depression. Similarly, research by Widom et al. [9] demonstrated that child abuse was more

prevalent in families where parents had experienced severe stressors like unemployment, financial problems, and relationship difficulties. The family stress theory posits that child abuse emerges from parental stress, a lack of coping skills, and insufficient social support. Multiple studies have confirmed this theory by establishing a strong association between parental stress and child abuse. Furthermore, parents who lack adequate social support are at an elevated risk of engaging in abusive behavior.

Meadow [10] classified child abuse into four distinct types. The initial type is physical abuse, characterized by the infliction of bruises, bite marks, or injuries to the child's skin, eyes, or hearing through actions such as shaking, burning, or hitting. The second type is neglect, which involves failing to provide love, care, protection, and a safe and healthy environment for children to thrive. Sexual abuse is the third type, referring to the coercion of children into engaging in sexual activities. Lastly, emotional abuse encompasses acts that cause significant psychological harm to children.

Emotional abuse encompasses intentional acts that harm a child's ability to form secure attachments, develop healthy self-esteem, and engage in typical social interactions, as defined by Finkelhor & Korbin [11]. Various macroeconomic factors, including unemployment, inflation, and low education levels, influence the occurrence of child abuse. Brown and De Cao [7] conducted a study in the United States and found a strong correlation between unemployment and physical abuse. They observed that higher unemployment rates were associated with a 15% increase in overall child abuse cases, with a particular emphasis on physical abuse. Similarly, Shaari et al. [1] utilized a vector error correction model and discovered a link between rising unemployment rates and increased child maltreatment. However, a subsequent study conducted by Shaari et al. [3] in Malaysia yielded different results. They did not find substantial evidence to support the significant impact of the unemployment rate on child abuse in the long term. Nevertheless, they acknowledged that in the short term, child abuse cases may increase in Malaysia due to a high unemployment rate. Parents experiencing income loss and financial stress are more likely to engage in abusive behavior. Shaari et al. [4] also conducted a related study focusing on the short-term effects of unemployment on child maltreatment in Malaysia. Their findings aligned with the previous study, indicating a potential increase in child abuse cases due to a high unemployment rate. Roskam et al. [12] also explored the relationship between low socioeconomic status (SES) and child maltreatment, proposing a double mediation model. Their research emphasized that low SES creates an imbalance between risk and resource factors in parents. This imbalance, in turn, leads to parental burnout, which is associated with increased instances of parental neglect and violence. The study highlighted the mediating role of the imbalance between risk and resource factors and parental burnout in explaining the connection between low SES and child maltreatment.

Hunter & Flores [13] and Skinner et al. [14] both conducted reviews on the relationship between social determinants of health (SDH) and child maltreatment. Hunter & Flores [13] examined various SDH factors and found that poverty, parental education, housing instability, and food insecurity were significantly associated with child maltreatment. They emphasized the need for further research on transportation and healthcare, as they lacked studies in those areas. On the other hand, Skinner et al. [14] focused specifically on the relationship between poverty and child abuse and neglect. They found consistent and strong associations between poverty and maltreatment, with different economic insecurities predicting future maltreatment. They highlighted the importance of considering different measures, definitions, and abuse types in future research to better understand and prevent child abuse and neglect. These studies collectively emphasize the significant impact of social determinants, particularly poverty, on child maltreatment and the need for comprehensive approaches to address these issues.

An increase in the cost of living, which reduces purchasing power, can have implications for child abuse. Rambeli et al. [5] found a positive association between inflation rates and child maltreatment in Malaysia. Specifically, a 1% rise in inflation rates corresponds to a 2.622% increase in child maltreatment cases. However, Shaari et al. [1] discovered that inflation rates and child abuse rates do not have a direct causal relationship. The connection between child maltreatment and other relevant variables, such as the cost of living or poverty, may explain this discrepancy. Consequently, an increase in inflation does not necessarily lead to a higher rate of child maltreatment in Malaysia. Nevertheless, Shaari et al. [4] conducted a subsequent investigation using the autoregressive distributed lag (ARDL) technique to analyze data from 1988 to 2017. They found that inflation does have a short-term relationship with child abuse in Malaysia. Parents may experience increased stress due to a decline in their purchasing power, leading to instances of child maltreatment. This could be attributed to their financial difficulties and the higher cost of necessities resulting from inflation.

Education plays a significant role in influencing cases of child abuse. It is widely believed that with proper education, parenting attitudes improve, reducing incidents of child abuse. Khosravan et al. [15] investigated the relationship between educational intervention programs, parental attitudes, and the prevalence of child abuse among abusive mothers and their three- to six-year-old children. The research findings indicated that these intervention programs, which specifically addressed the needs of children's growth and development, significantly impacted parents' attitudes and were associated with a lower prevalence of child abuse. Furthermore, Ha et al. [16] conducted a study in Vietnam and found that education is crucial in enhancing individuals' capacity to combat child abuse. Additionally, parental education itself has an impact on child abuse. Children whose parents are married and have higher levels of education tend to have

better preventive measures in place. The findings of Daro & Donelly [17] support the notion that increasing parents' knowledge through public education and awareness campaigns can effectively address child abuse. By informing the public about child abuse, these approaches encourage action and promote prevention. With adequate knowledge and improved awareness, parents and caregivers will find it more challenging to mistreat children.

Ma et al. [18] and Kang et al. [19] both investigated the impact of the COVID-19 pandemic on child abuse but focused on different aspects and populations. Ma et al. [18] examined the association between household unemployment and child abuse among older children in the United States. They found job loss during the pandemic was associated with higher emotional or physical abuse odds. In contrast, Kang et al. [19] explored the determinants of violent discipline among parents in Asia Pacific countries during the pandemic. They identified multiple factors, including economic hardships, mental health status, and contextual factors, such as curfews and education materials, associated with an increased likelihood of violent discipline. These studies highlight the importance of considering socioeconomic and psychosocial factors in understanding and addressing child abuse during times of crisis.

Previous studies have primarily concentrated on educating parents to prevent child abuse, neglecting to explore the potential influence of tertiary education among individuals in the labor force on reducing such cases. This study examines the relationship between these two factors to address the gap.

4. Research Methodology

Several key parameters are considered in the context of the research on the influence of tertiary education on child abuse in Malaysia. The first parameter is the number of individuals in the labor force with tertiary education. This parameter reflects the presence and proportion of individuals who have obtained a tertiary education among the overall labor force. It can be measured as a percentage or a raw count, indicating the educational attainment level within the workforce. Another crucial parameter is the number of reported child abuse cases in Malaysia. Child abuse cases encompass various forms of abuse, including physical, emotional, sexual, or neglect. Tracking the incidence of child abuse is vital for understanding the extent and nature of the problem in the country.

Socioeconomic indicators serve as important parameters in this research. Variables such as inflation and unemployment are included to control for other socioeconomic factors that may confound the relationship between tertiary education and child abuse. For instance, higher inflation or unemployment rates could potentially increase stress levels and economic strain on families, indirectly contributing to child abuse. These parameters are selected based on existing literature, theoretical frameworks, and data availability. It is essential to align the choice of parameters with the study's specific research objectives and hypotheses. The sensitivity of these parameters on the results would depend on the specific analysis and statistical methods employed. The definition and measurement of child abuse, the operationalization of tertiary education, and the inclusion of other control variables can influence the magnitude and significance of the association between tertiary education and child abuse. Conducting diagnostic and stability tests can help assess research findings' stability and reliability across different parameter settings. Diagnostic tests can help identify potential issues or anomalies in the data, such as outliers or violations of statistical assumptions. By conducting these tests, researchers can ensure the integrity and quality of their data. Stability tests, on the other hand, examine the robustness of the findings by assessing how they hold up under different conditions or variations in the parameters. This can involve conducting sensitivity analyses where the researchers systematically vary the parameter settings or control variables to evaluate the impact on the results. By doing so, researchers can determine how much specific parameter choices or assumptions influence their findings.

This study uses annual data on child abuse cases (CA), consumer price index (CPI), the number of individuals in the labor force with tertiary education (EDU), and the total number of unemployed individuals (U) in Malaysia from 1989 to 2020. Data on child abuse cases were obtained from the Department of Social Welfare Malaysia, while other data were collected from the Department of Statistics Malaysia. Tang and Lean [20] stressed using seasonally adjusted data when working with annual data to eliminate the impact of seasonal fluctuations and guarantee more accurate and impartial findings in the analysis. The analysis employs the Autoregressive Distributed Lag (ARDL) bound testing approach to investigate the impact of higher education on child abuse in Malaysia, as introduced by Pesaran et al. [21]. This approach offers advantages over the Johansen co-integration method, as it can be applied to data with different orders of integration (purely $I(0)$, purely $I(1)$, and mixed orders), excluding $I(2)$. In contrast, the Johansen co-integration approach requires the non-stationarity of all variables at the level. Furthermore, the ARDL approach remains suitable even with a small sample size, eliminating the need for an extensive dataset. Additionally, it allows for simultaneous estimation of the long and short-run relationships between dependent and independent variables without encountering endogeneity problems. In this study, two controllable variables are considered: unemployment and inflation. Natural logarithms are applied to all variables. Consequently, the following model specification is estimated:

$$\ln CA_t = \alpha + \beta_1 \ln EDU_t + \beta_2 \ln CPI_t + \beta_3 \ln U_t + \varepsilon_t \qquad (1)$$

where $\ln CA_t$ is Natural logarithm of child abuse cases, α is Intercept or constant term in the regression equation, β_1 is Coefficient representing the effect of the natural logarithm of the total labor force with tertiary education ($\ln EDU_t$) on $\ln CA_t$ (child abuse cases), $\ln EDU_t$ is Natural logarithm of the total labor force with tertiary education, β_2 is Coefficient representing the effect of the natural logarithm of consumer price index ($\ln CPI_t$) on $\ln CA_t$ (child abuse cases), $\ln CPI_t$ is Natural logarithm of consumer price index (CPI), β_3 is Coefficient representing the effect of the natural logarithm of the total number of unemployed people ($\ln U_t$) on $\ln CA_t$ (child abuse cases), $\ln U_t$ is Natural logarithm of the total number of unemployed people, and ε_t is Error term, capturing the unexplained variation in child abuse cases not accounted for by the independent variables. The complete information of each variable is shown in Table 1:

Table 1. Summary of data and proxy

Variable name	Proxy	Symbol	Unit measurement
Child Abuse	The number of child abuse cases	CA	Number of cases
Tertiary Education	The number of people with tertiary education in the labor force	EDU	Number of people
Inflation	Consumer Price Index	CPI	Index
Unemployment	The number of unemployed people	U	Number of people

Before proceeding with Pesaran et al. [21] technique, it is essential to verify that all variables in equation (1) are stationary at either I(0) or I(1), excluding I(2). To assess the stationary level, we employ the Augmented Dickey-Fuller (ADF) unit root test, originally developed by Dickey and Fuller [22]. The model for conducting the ADF test is expressed as follows:

$$\Delta y_t = \beta_1 + \beta_{2t} + \delta y_{t-1} + \alpha_i \sum \Delta y_{t-1} + \varepsilon_t \tag{2}$$

where Δy_t is First difference of the variable y_t., β_1 is Constant term in the regression equation, β_2 is Coefficient representing the effect of time (t) on Δy_t, δ is Parameter representing the coefficient of lagged dependent variable y_{t-1}, α_i is Parameters representing the coefficients of the lagged first differences of y_t ($\sum \Delta y_{t-1}$), $\sum \Delta y_{t-1}$ is Sum of the lagged first differences of y_t, and ε_t is Error term, capturing the unexplained variation in Δy_t not accounted for by the independent variables.

The hypothesis for the unit root test can be stated as follows:

Null Hypothesis (H_0): $\delta = 0$ (3)

Alternative Hypothesis (H_1): $\delta \neq 0$ (4)

The null hypothesis assumes the presence of a unit root, indicating non-stationarity in the data. The alternative hypothesis suggests the absence of a unit root, indicating stationarity in the data.

Suppose the results of the unit root test indicate acceptance of the null hypothesis (H_0) or insignificance of δ. In that case, it suggests that the data possess a unit root and are non-stationary. Conversely, if the findings indicate significance ($\delta \neq 0$) in favor of the alternative hypothesis (H_1), it suggests stationarity of the data or the absence of a unit root. In the subsequent step, we will employ a bound test to examine the presence of co-integration among the variables. If the F-statistic value surpasses the upper bound, it indicates a significant co-integrating relationship among the variables. Consequently, we can reject the null hypothesis and proceed to estimate a long-run relationship. This estimation is only conducted if the results demonstrate a co-integrating relationship among the variables: unemployment, inflation, child abuse, and tertiary education. Understanding the long-term correlations between these variables is crucial as it enables us to determine whether factors such as unemployment, inflation, and higher education, individually or collectively, have a lasting impact on child abuse. The lag order selection in this study is based on the Akaike Information Criteria (AIC). The long-run ARDL estimation for this study is as follows:

$$\Delta \ln CA_t = \beta_0 + \beta_1 \ln CA_{t-1} + \beta_2 \ln EDU_{t-1} + \beta_3 \ln CPI_{t-1} + \beta_4 \ln U_{t-1} + \beta_{5,i} \sum_{i=1}^{q1} CA$$
$$+ \beta_{6,i} \sum_{i=1}^{q2} \Delta \ln CPI_{t-1} + \beta_{7,i} \sum_{i=1}^{q2} \Delta \ln CPI_{t-1} + \beta_{8,i} \sum_{i=1}^{q3} \Delta \ln U_{t-1} + \mu_t \tag{5}$$

The symbol Δ represents the first difference operator, and t-1 indicates lag 1. The term $\sum_{(i=1)}$ represents the sum of the lagged values of $\ln CA_t$. The parameters q_1 to q_3 represent the optimal lags. The symbol μ_t represents the error term, capturing the unexplained variation in the dependent variable ($\Delta \ln CA_t$) not accounted for by the independent variables.

Additionally, it is crucial to understand the short-run relationship between the independent variables and child abuse. To assess the short-term impact of these determinants on child abuse, we will employ an error correction model (ECM) test. The following equation expresses the ECM model:

$$\Delta \ln CA_t = \mu + \sum_{i=1}^{p} \delta_1 \Delta \ln CA_{t-i} + \sum_{i=1}^{q1} \delta_2 \Delta \ln EDU_{t-1} + \sum_{i=1}^{q2} \delta_3 \Delta \ln CPI_{t-i} + \sum_{i=1}^{q3} \delta_4 \Delta \ln U_{t-i} + \theta_1 ECT_{t-i} + \varepsilon_t \tag{6}$$

In the specified equation, δ_1 to δ_4 represent the short-term dynamic coefficients, while θ_1 represents the speed of adjustment to the long-run equilibrium. ECT_{t-i} represents the error correction term lagged by i periods.

To ensure the accuracy and appropriateness of the model described in Equation 1, various diagnostic tests are conducted. The diagnostic tests employed include the Normality Test, Breusch-Godfrey Serial Correlation LM Test, Breusch-Pagan-Godfrey Heteroskedasticity Test, and Ramsey RESET Test. These tests are performed in the final stage to verify that the model meets the necessary criteria. Furthermore, the stability of the model is assessed using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of the square of recursive residuals (CUSUMSQ). The CUSUM and CUSUMSQ lines are examined to determine if they fall within the 5% significance line. If the lines remain within this range, the model is considered stable.
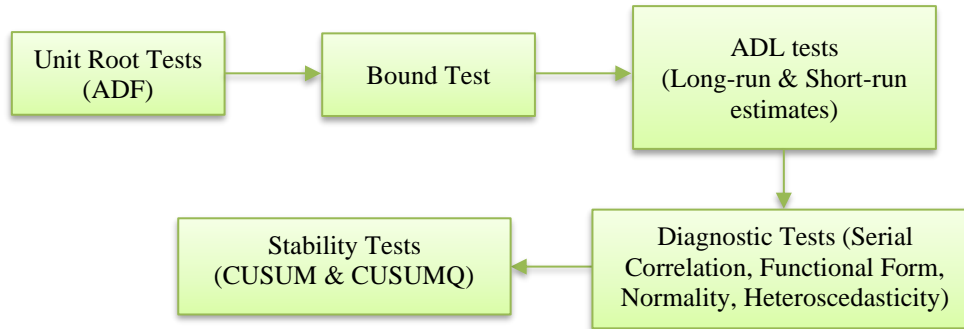

Figure 3. Methodology Flowchart

5. Findings

Table 2 provides descriptive statistics for the 32 observations in the dataset. It summarizes various statistical measures for the variables LNCA, LNCPI, LNDU, and LNU. The maximum values for these variables are 8.710, 4.800, 8.520, and 6.567, respectively, indicating the highest observed values in the dataset. Furthermore, the skewness values for all variables fall between -1 and +1. Skewness measures the asymmetry of a distribution, and values within this range suggest that the data is relatively symmetric and lacks significant skewness. This implies that the observations are fairly evenly distributed around the mean, without any pronounced skewness towards either end of the distribution. In addition, the Jarque-Bera values for all variables are close to zero. The Jarque-Bera test assesses whether the data follows a normal distribution based on its skewness and kurtosis. The closer the Jarque-Bera value is to zero, the more likely it is that the data approximates a normal distribution. Therefore, the results indicate that the variables, particularly LNCA, LNCPI, LNDU, and LNU, follow a normal distribution. These descriptive statistics provide valuable insights into the distributional characteristics of the variables in the dataset, indicating their maximum values, symmetry, and adherence to a normal distribution.

Table 2. Descriptive statistics results

	LNCA	LNCPI	LNEDU	LNU
Mean	7.546	4.463	7.513	5.888
Median	7.454	4.460	7.576	5.906
Maximum	8.710	4.800	8.520	6.567
Minimum	5.620	4.014	6.327	5.370
Std. Dev.	0.787	0.238	0.671	0.260
Skewness	-0.221	-0.264	-0.178	0.161
Kurtosis	2.383	1.981	1.783	3.248
Jarque-Bera	0.768	1.756	2.144	0.221
Probability	0.681	0.416	0.342	0.895
Sum	241.471	142.832	240.418	188.427
Sum Sq. Dev.	19.192	1.755	13.940	2.096
Observations	32	32	32	32

Table 3 provides the results of the unit root test conducted to examine the stationarity properties of the variables. The test is conducted with different specifications, including intercept-only and intercept-with-trend models. The findings reveal that, except for LNCPI, all variables do not exhibit stationarity at the level when the model includes only an intercept term and no trend. This suggests that these variables are non-stationary in their original form. However, when taking the first difference of the variables, they exhibit stationarity, indicating that they are integrated of mixed orders I(0) and I(1). This means that the variables contain a combination of both non-stationary and stationary components.

Furthermore, the results obtained with the inclusion of an intercept and trend in the model demonstrate that the variables remain non-stationary at the level but become stationary when differenced once. This indicates that the variables are integrated of order I(0), meaning they possess only stationary components. Importantly, the results indicate that none of the variables are integrated to order I(2), implying that they do not require higher order differencing to achieve stationarity. This finding is significant as it supports the suitability of utilizing the Autoregressive Distributed Lag (ARDL) method for the analysis. Therefore, Table 3 provides comprehensive insights into the stationarity properties of the variables, indicating their behavior at the level and when differenced. The results support the integration of mixed orders I(0) and I(1) and validate the use of the ARDL approach in the analysis.

Table 3. Unit root test results

	Intercept		Intercept & Trend	
	Level	1st difference	Level	1st difference
LNCA	-2.437	-5.014**	-3.158	-4.887**
LNCPI	-3.340*	-3.355*	-1.044	-4.624**
LNEDU	-1.966	-4.522**	-1.433	-5.087**
LNU	0.179	-4.535**	-3.080	-4.904**

Note: ** and * indicate the 1% and 5% significance levels, respectively.

Following the unit root test and establishing the order of integration for the variables, the next step involves conducting a bound test to assess the presence of co-integration among the variables. The test results obtained using the ARDL technique are presented in Table 4. The bound test involves comparing the F-statistic value with the critical bounds. In this case, the upper bound is set at 5.61. The F-statistic value obtained from the test is 6.85, which exceeds the upper bound. As a result, the null hypothesis, which assumes the absence of co-integration, can be rejected. This indicates that there is evidence of co-integration among the variables. Conversely, if the F-statistic value falls below the lower bound, it suggests no co-integration, leading to dismissing the alternative hypothesis. When the F-statistic value lies between the upper and lower bounds, the results are inconclusive, and a definitive conclusion regarding co-integration cannot be drawn. In this case, the F-statistic value surpasses the upper bound, providing strong evidence of co-integration among the variables. This suggests a long-term relationship and mutual influence among the variables studied. Table 4 displays the bound test results using the ARDL technique, with the F-statistic value exceeding the upper bound, indicating the presence of co-integration. This finding supports the notion that the variables are interrelated in the long run and have a meaningful connection.

Table 4. Bound test results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.865**	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61

Note: ** indicates the 1% significance level.

The long-term effects of inflation, unemployment, and tertiary education on child maltreatment are presented in Table 5. The analysis reveals a significant positive relationship between inflation and child abuse. Specifically, a 1% increase in inflation is associated with a 6.217% increase in child abuse cases. This finding suggests that as the overall price level in the economy rises, parents may experience heightened financial stress, making it more difficult for them to meet their family's basic needs. When financial pressures become overwhelming, parents may become more susceptible to engaging in abusive behaviors toward their children. This result aligns with previous research conducted by Lefebvre et al. [23], which also found a connection between financial difficulties and an increased likelihood of parental abuse toward children. The financial strain caused by inflation can exacerbate parental stress and frustration, potentially leading to a higher risk of child abuse. Families struggling to cope with rising living expenses and economic pressures can create an environment conducive to abusive behaviors. Considering the underlying mechanisms and factors contributing to this relationship is important. The link between inflation and child abuse is multifaceted and influenced by various socioeconomic factors. Financial difficulties and increased stress levels can strain family dynamics and reduce the availability of resources needed to provide a safe and nurturing environment for children. Additionally, inflation may also indirectly impact child abuse through its influence on employment opportunities, income levels, and access to support services. The positive relationship between inflation and child abuse highlights the significance of addressing the economic well-being of families and implementing strategies to alleviate financial stress. By providing families with adequate support and resources, policymakers and social organizations can help mitigate inflation risk factors and reduce child abuse.

Table 5. Long-run ARDL model estimation

Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEDU	-1.340*	0.732*	-1.830*	0.089
LNCPI	6.217**	1.930**	3.221**	0.006
LNU	1.902**	0.411**	4.623**	0.000

Note: ** and * indicate the 1% and 10% significance levels, respectively.

The analysis reveals a significant link between unemployment and child abuse. Specifically, a 1% increase in long-term unemployment is associated with a 1.902% increase in child abuse cases. This finding suggests that as the unemployment rate rises, there is an elevated risk of child abuse within the affected population. This result aligns with previous research conducted by Shaari et al. [4] in Malaysia and a study conducted by Oxford University, which found similar associations between economic downturns, higher unemployment rates, and increased incidences of child neglect in the United States. During economic instability and job insecurity, individuals and families may face heightened stress, financial strain, and a lack of available resources. These circumstances can create an environment where parents may be more susceptible to engaging in abusive behaviors toward their children. Unemployment can lead to frustration, hopelessness, and a loss of self-esteem, which may significantly impact parenting abilities and increase the risk of child abuse. The financial pressures associated with job loss can disrupt family dynamics, increase interpersonal conflict, and limit access to support networks and services. Moreover, unemployment can contribute to a sense of social isolation and an overall decline in well-being, exacerbating the risk of abusive behaviors. The consistent findings across multiple studies underscore the importance of recognizing the relationship between unemployment and child abuse and the need for targeted interventions during periods of economic downturn. Efforts to support individuals and families affected by unemployment should include job creation and reemployment initiatives and comprehensive social support systems that address the psychological, emotional, and financial challenges associated with job loss. Providing assistance and resources to vulnerable families can mitigate the adverse effects of unemployment on child well-being and reduce child abuse incidents.

The analysis also reveals a significant negative effect of tertiary education on child abuse cases. For every 1% increase in the number of individuals with tertiary education in the labor force, there is a corresponding decrease of 2.50% in child abuse cases. This finding suggests that individuals with higher levels of education are less likely to engage in mistreatment of children. The negative relationship between tertiary education and child abuse can be attributed to several factors. First, individuals with higher levels of education often better understand the consequences of child abuse and the importance of positive parenting practices. They may possess greater knowledge of child development, effective discipline strategies, and methods of providing emotional support to their children. This increased awareness and knowledge contribute to a decreased likelihood of engaging in abusive behaviors. Furthermore, educated parents are more likely to have access to higher-paying jobs and economic stability, which can alleviate financial stress and reduce the risk of child abuse. Economic factors, such as poverty and financial hardship, have been consistently identified as risk factors for child abuse. Educated individuals are more likely to have the resources and financial means to provide for their children's basic needs and engage in activities that promote their well-being. Research by Shoukat et al. [24] supports the positive influence of education on parenting practices and child outcomes. Educated parents tend to be more involved in their children's education, provide a nurturing and stimulating home environment, and foster a supportive and positive parent-child relationship. These factors contribute to improved academic success and the overall well-being of children. The findings highlight the importance of promoting and increasing access to tertiary education, as it has individual benefits and societal implications for reducing child abuse cases. Policies and initiatives aimed at improving educational opportunities and attainment can significantly impact creating a safer and more nurturing environment for children. Investing in education and supporting parents in their educational pursuits can enhance child protection and contribute to the overall well-being of families and communities.

The results of the short-run ARDL model estimation are presented in Table 6. The negative and significant coefficient (-0.812) of the Error Correction Term (ECT) confirms the existence of long-term relationships between inflation, unemployment, tertiary education, and child abuse. Furthermore, the findings indicate that inflation has a short-term impact on child abuse. A 1% increase in inflation in Malaysia is associated with a 5.051% increase in child abuse cases. However, in the long run, there is no significant relationship between unemployment, a higher rate of tertiary education in the labor force, and an increase in child abuse incidents. These results suggest that while inflation can immediately affect child abuse, unemployment, and tertiary education do not contribute significantly to child abuse cases. It highlights the need to address inflation-related stressors and improve short-term preventive measures to mitigate child abuse incidents.

In order to ensure the accuracy and reliability of the model used in this study, several stability and diagnostic tests were performed. These tests are crucial in assessing the appropriateness of the model and detecting any potential statistical issues that may affect the validity of the results. The stability tests conducted in this investigation include

serial correlation, functional form, normality, and heteroscedasticity tests. The serial correlation test assesses whether there is a correlation between the error terms of the model, indicating potential misspecification. Functional form test examines whether the functional relationship between the variables is correctly specified. The normality test evaluates if the error terms of the model follow a normal distribution. The heteroscedasticity test investigates if there is a systematic pattern in the variability of the error terms. The results of these stability and diagnostic tests, presented in Table 7, provide evidence that the model used in this study is robust and reliable. The absence of statistical issues such as serial correlation, abnormal distribution, functional form misspecification, and heteroscedasticity suggests that the model accurately captures the relationships between the variables under investigation. These findings have significant implications for the validity and interpretation of the study's results. We can have greater confidence in the estimated coefficients and their corresponding significance levels by ensuring the absence of statistical issues. It indicates that the model adequately represents the data and allows for reliable inferences and conclusions to be drawn. Overall, the inclusion of stability and diagnostic tests in this investigation enhances the rigor and reliability of the research. It assures that the model is appropriate for analyzing the relationships between the variables of interest and strengthens the validity of the study's findings.

**Table 6. Short-run ARDL model estimation**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT	-0.812**	0.162**	-5.004**	0.000
LNCPI	5.051*	1.807*	2.795*	0.014
LNEDU	1.319	0.916	1.440	0.172
LNU	-0.361	0.218	-1.659	0.119
C	-17.721**	5.125**	-3.458**	0.004

Note: ** and * indicate the 1% and 5% significance levels, respectively.

Table 7. Diagnostic tests results

Diagnostic test	F-statistic	Prob.
Normality test	0.899	0.638
Breusch-Godfrey Serial Correlation LM Test	1.668	0.229
Heteroskedasticity Test: Breusch-Pagan-Godfrey	2.062	0.096
Ramsey RESET Test	1.970	0.071

In order to assess the stability of the model, the CUSUM test is conducted. The CUSUM graph, depicted in Figure 4, is examined in relation to the critical boundaries. The null hypothesis is accepted if the graph falls outside the critical boundaries, indicating instability at a significance level of 5%. Conversely, if the graph remains within the critical range, it signifies stability in both the long-run and short-run estimations. Based on the CUSUM graph displayed within the critical boundaries, it can be concluded that the model is stable. This implies that the estimated relationships between the variables remain consistent and reliable over the analyzed period.
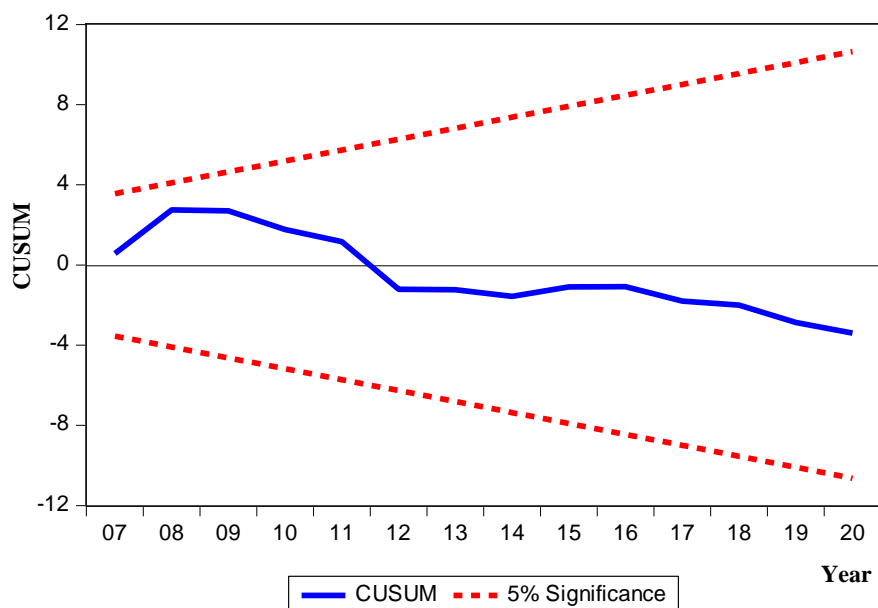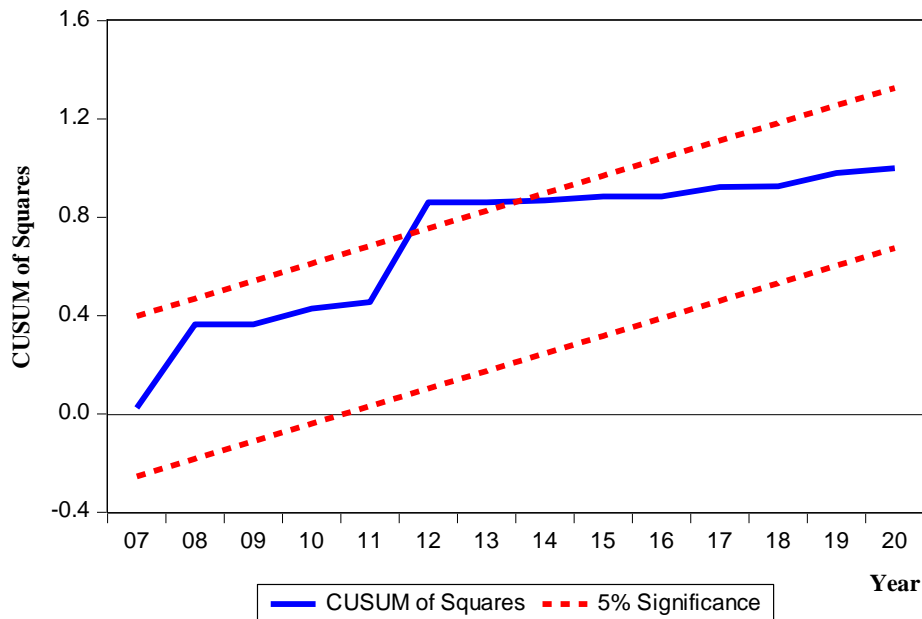
Figure 4. CUSUM and CUSUM SQ results

6. Conclusion

This study examines the relationship between higher education and child abuse cases in Malaysia from 1989 to 2020. The ARDL technique is employed to analyze data on child abuse cases, tertiary education, unemployment, and the consumer price index. The unit root test confirms that all variables are stationary at the first difference, indicating their suitability for analysis. The bound test results indicate co-integration among the variables. The ARDL estimation of this study provides valuable insights into the relationship between unemployment, inflation, and child maltreatment in Malaysia. These findings align with previous research conducted by Shaari et al. [4], which examined data from 1988 to 2018. However, our study updates the data period to include information up to the year 2020. We find that economic pressures from increasing living expenses and unemployment can lead individuals to direct their stress towards children, contributing to child maltreatment. Interestingly, our findings also indicate that more educated individuals in the labor force are associated with decreased child abuse cases. This suggests that increasing the number of educated citizens in Malaysia could be an effective strategy to reduce incidents of child abuse. These results are consistent with the findings of Ha et al. [16], who emphasized the importance of education in empowering individuals to combat child abuse. It is worth noting that Ha et al. [16] did not employ the ARDL approach, which we utilized in our study to capture both the short-term and long-term impacts of the variable on child abuse. Furthermore, our findings align with those of Khosravan et al. [15], although their focus was on educational intervention programs that address children's growth and development. Such programs can directly impact parents' attitudes and are inversely related to the prevalence of child abuse.

These findings have important implications for developing strategies to address child abuse rates. Measures such as managing interest rates by the central bank can help mitigate inflation, while public awareness campaigns can promote informed consumer choices and reduce inflation rates. Additionally, the government can focus on creating more employment opportunities to reduce the unemployment rate. Exploring new industries and increasing investments in tertiary education can also be beneficial, ensuring that more students have access to higher education and fostering a better understanding of the consequences of child maltreatment. Moreover, higher levels of education among parents can positively influence their children's academic success.

7. Declarations

7.1. Author Contributions

Conceptualization, M.S.S. and N.M.N.; methodology, M.S.S., N.H.H., and F.M.; software, M.S.S.; validation, M.S.S., A.R.R., and N.M.N.; formal analysis, M.S.S.; investigation, N.H.H.; resources, A.R.R.; data curation, M.S.S.; writing—original draft preparation, M.S.S., N.H.H., and F.M.; writing—review and editing, A.R.R.; visualization, A.R.R.; supervision, A.R.R. and M.S.S.; project administration, N.H.H.; funding acquisition, A.R.R. All authors have read and agreed to the published version of the manuscript.

7.2. Data Availability Statement

Publicly available datasets were analyzed in this study. This data can be found here: [https://www.dosm.gov.my/portal-main/time-series and https://www.data.gov.my/data/en_US/dataset/statistik-kesalahan-penderaan-kanak-kanak].

7.4. Institutional Review Board Statement

Not applicable.

7.5. Informed Consent Statement

Not applicable.

7.6. Declaration of Competing Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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