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## **Income Inequality and Violent Crime in Nigeria: A Panel Corrected Standard Error Approach**

*Adenuga Fabian Adekoya*

### **Abstract**

*Inequality persists at high rate across and within Nigeria. The inequality caused the government to embark on social programmes to cushion it. In spite this effort, millions of Nigerians still live below the poverty line because of wide gap in income distribution. To unravel the effect of wide gap in income distribution, this study examines the link between income inequality and violent crime in Nigeria using a panel data of 36 States and Federal Capital Territory from 2008-2010. This panel data was estimated through the Panel Corrected Standard Error Approach. It was found that income inequality causes violent crime at 5% level of significance. Also, education and imprisonment show reducing-effect on violent crime significantly. The results suggested that investing in education of citizens including inmates improves their skills and provides good access to better job. Furthermore, appropriate policies are suggested to reduce violent crime in the country.*

**Keywords:** Income inequality, Violent crime, Panel Corrected Standard Error.

## Introduction

Violent crime remained a major contending problem in every part of the country. This is because occurrence became worse. The rate of physical assault in the country increased from 3% in 2011 to 77% in 2013 (Alemika, 2013). As the fear of crime on murder, assault, armed robbery, burglary and domestic violence remains at 70.2%, 56.7%, 71.4, 65.0% and 57.8%. Also, land and mineral resources disputes increased killings and physical attacks on individuals.

Between 2006 and 2011, political violence caused the death of 1,265 and many more (Niger Watch, 2016). The Nigeria Police records showed that assault and felonious wounding are rampant. For instance in Figure 1, violent crime rate stood above 20 per 100,000 population. As types of violent crime rate per 100,000 population increased. Felonious wounding from 5.81 to 5.86, assault from 11.77 to 12.58 and armed robbery from 1.73 to 1.84.

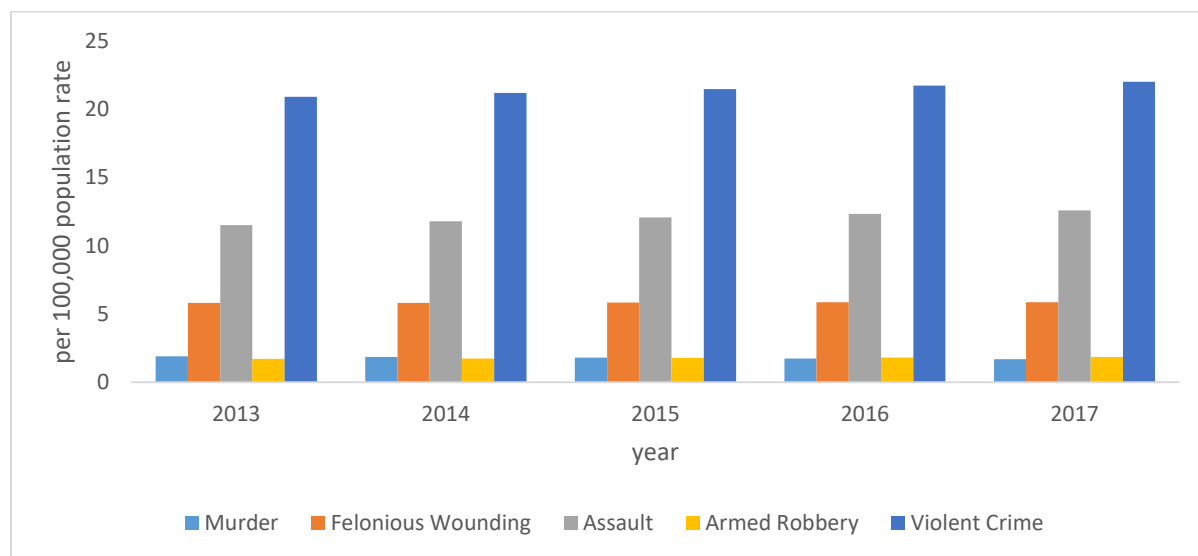


Figure 1: Violent crime in Nigeria from 2013 to 2017.

Source: Author Compilation based on Nigeria Bureau of Statistics.

Violent crime in Nigeria has some consequences as described in available literature. For instance, the violence and conflict in the Niger Delta affect the trade of oil. This serves as threat to the stability of the country (Katsouris and Sayne, 2013). In the North Central part of the country, insurgency led to killings as many left their homes. Others lost their means of income due to properties destruction. However, in trying to fight violent crime “the police in the country

become excessively repressive on innocent and law abiding citizens, leaving Nigerians with two kinds of fear - the fear of violent crime and the fear of unlawful police violence” (Network on Police Reform in Nigeria, 2010: page38). Moreover, political violence has caused proliferation of arms and ammunition in the hands of political thugs during and after election (Nigeria Watch, 2011). But, to reduce violent crime in the country; the Government

took some steps. The steps are the legislation of Nigeria Civil Services and Defense Corps in the early 2000s and the Police reform of 2006. Besides, the Government equipped the military with equipment to combat the insurgency.

Among the determinants of violent crime, is income inequality (Fajnzylber, Lederman, & Loayza, 2002; Poveda, 2011). Badiora et al. (2014) observe that a high number of crimes recorded in Ile-Ife, Nigeria. Such crime he said has linked with income disadvantage and poor environment quality. Consequently, Badiora et al. (2014) note income as a factor that encouraged young adults to commit crime in the area. Obasa (2015) reports that poor income among workers encouraged them to collect bribes and steal materials from work place. In contrast, Omotor (2010) reports that income is not significant to crime in Nigeria. But income inequality causes militancy and terrorism in Nigeria (Evans & Kelikume, 2019). The situation of income distribution in Nigeria as measured by Gini coefficient shows that income inequality has persisted at high levels based on its trend in the country (Nigeria Bureau of Statistics NBS, 2012). This inequality at a high level of 48.8% aggregate is a reflection of high varied inequality that exists among the six geopolitical zones with a range of 37.1% in Northwest to 50.7% in the South-South region in 2004. Statistically, most states in Nigeria have a wide level of income disparity above the aggregate level of 48.8% (NBS, 2012). Also, the survey study by

NBS (2011) showed that income inequality in Nigeria increased from 41% in 1992 to 44.7% in 2010. This indicates a higher income inequality for this period.

The role of income inequality may cause devastation in the Nigeria. For instance, high inequality in terms of income and asset distribution creates unequal access to basic infrastructure and services like education and health in Nigeria (Holmes, Akinrimisi, Morgan, & Rhiannon, 2012). In addition, it is a major contributing factor to poverty in the country (Akinbobola & Saibu, 2004). But, existing inequality of opportunity in the country expose an individual's susceptibility to being organised by criminal gangs (The Economist, 2014). This is because dissatisfied people are eager to enhance their material conditions through criminal means such as demanding ransom, fraud and looting (The Economist, 2014). Thus, there is need to find out how income inequality affects violent crime in Nigeria. Since the link between income inequality and violent crime is not documented in Nigeria based on available literature (Omotor, 2010; Badiora, Okunola, & Ojewale 2014; Obasa, 2015; Evans & Kelikume, 2019).

To achieve the need of the study, a question is raised to test the link between income inequality and violent crime. That is to what extent would income inequality affects violent crime in Nigeria? Hence, this study consists of five sections, the first section is the introduction. Section two considered literature

review and section three discussed the methodological part. Also, section four is the results of the estimation while section five is the conclusion.

### Literature Review and Theoretical Framework

Theoretically, the work of Becker (1968) comes up with economic analysis (rational choice theory) which used to develop optimal public and private policies to combat illegal behaviour. This illegal behaviour based on individual rationality on the choice of damages and gains of various activities either to partake or not. Thus, the theoretical design is that a rise in the probability and/or severity of punishment will reduce the potential criminal's involvement in illegitimate activities. Further, he contended that punishing the offenders increase the public and private expenditure on security in the society; and as such, it increases welfare of the society. By so doing, limited resources available to the society may not be enough to provide social welfare programmes. However, Ehrlich in 1973 extended the frontier of the theory to property crime model by an exploration of opportunities on both illegitimate and legal businesses. He showed that the level of crime is positively associated with determined relative gains and also negatively, to the costs related with criminal activity; and that inequality is positively associated with crime. The extent of this theory, therefore, is to study the effect of income inequality on violent crime in Nigeria.

Various studies considered Becker-Ehrlich proposition to explain income inequality and violent crime. They provided support to the Becker-Ehrlich proposition. That is income inequality is positive to determine violent crime. These studies include Fajnzylber, Lederman and Loayza (2002), Poveda (2011), Ouimet (2012), Enamorado, López-Calva, Rodríguez-Castelán and Winkler (2016). Demombynes and Ozler (2005) note that districts with more violent crimes has high inequality in South Africa, but their result indicate an inversely relationship between violent crime and inequality of mean expenditure. Similarly, Baharom and Habibullah (2009) contend that income inequality has no significant affinity for violent crime in Malaysia and neither did violent crime affect income inequality in any way. Besides, in a cross country studies Fajnzylber, Lederman and Loayza (2002) demonstrate a causality existence of these two variables and found that violent crime and income inequality causally affect each other. Thus, these evidences are mixture of findings and thus, still made the relationship between these two variables a matter of inconclusiveness.

In the related studies in Nigeria, Badiora et al. (2014) studied the spatial crime behaviour among young adult in Ile-Ife, Nigeria. The study area focus on low-income associated with poor quality environment. Data obtained from the Nigeria Police from the period January 2006 to December 2010. The data estimated using spatial analysis approach. As findings showed

poverty motivating young adults to commit crime. Also, poor job opportunities and income causes crime against property and persons. Evans and Kelikume (2019) examined economic factors and violence in Nigeria. The study measured violence with terrorism, militancy and heads men attacks. But in economic factors consist of inequality, unemployment and poverty. Annual data from 1980 to 2017 tested using fully modified OLS. Their findings showed inequality, poverty and unemployment causes terrorism in the country. Also, economic factors motivates the act of militancy and heads men attack in Nigeria. The results indicated that unpleasant economic challenges serve as treat to people survival. However, Omotor (2010) considered unemployment and illegal income in his study and found unemployment and income reducing crime in panel study in Nigeria. These

studies in Nigeria have not demonstrated the empirical link between income inequality and violent crime. Thus, this provides the opportunity for this study to test the link between the income inequality and violent crime in Nigeria.

## Methodology

### Data

To examine the link between income inequality and violent crime in Nigeria. This paper used panel data from 2008 and 2010 in the 36 states and Federal Capita Territory in Nigeria. In all, there are 37 cross sections. The shortcomings about data available was on income inequality as there is no long span of years for it. The data for 2009 for income inequality based on average of 2008 and 2010. Table 1 shows the definition of variables and their sources.

**Table 1: Definition of variables**

Variables	Definition	Source
Violent Crime (VCR)	Violent crime per 100,000 population ( this includes attempted murder, felonious wounding, assault and armed robbery)	The Nigeria Police and Nigeria Bureau of Statistics.
Income Inequality (INEQ)	Income inequality (Gini- coefficient in rate)	UNDP Nigeria Report and Nigeria Bureau of Statistics
Unemployment (UNE)	Unemployment rate in the country	Nigeria Bureau of Statistics.
Education (EDU)	Number of teachers in primary education	Nigeria Bureau of Statistics.
Imprisonment (IPR)	Number of prison admission in various states in the country.	Nigeria Bureau of Statistics.

### Justification of variables

Violent Crime: this variable is an extension of crime in Becker (1968) and it is studied in (Fajnzylber *et al.* 2002; Saridakis, 2011 and

Enamorado *et al.*, 2016), thus, violent crime is operationalised as the dependent variable.

Income Inequality: various studies in violent crime have considered different types of

inequality. Income Inequality: various studies in violent crime have considered different types of inequality. This study used Gini- coefficient (%) to measure income inequality. As found in Fajnzylber et al (2002), Neumayer (2005), Cheong and Wu (2015). Income inequality is the main independent variable. This study used Gini- coefficient (%) to measure income inequality. As found in Fajnzylber *et al.*(2002), Neumayer (2005), Cheong and Wu(2015). Income inequality is the main independent variable.

Other variables are control variables and it includes unemployment, imprisonment and education. Unemployment creates the gap in income among various groups in society. It is a

$$vcr_{i,t} = \beta ineq_{it} + \delta.X_{it} + \varepsilon_{i,t}$$

Where  $i$  indexes a state in census year  $t$ ,  $vcr_{it}$  is the logged of violent crime rate indicator per 100.000 population,  $ineq_{it}$  is the income inequality being the Gini coefficient at various State, and the coefficient  $\beta$  shows the estimated effect of income inequality on violent crime rate.  $X$  contains a set of time-varying state characteristics, such as the rate of unemployment (%), logged of number of prison inmates, and logged of number of teachers in primary education. The term  $\varepsilon_{it}$  captures the unobserved determinant of violent crime rate, which depends on a permanent component  $\mu_i$  and a transitory component  $\omega_{it}$ .

In estimating the equation above, Pool OLS was tested but it may not control for cross

main variable in Becker (1968) and further studied in Saridakis (2011). Imprisonment measured as deterrence to crime in Becker (1968). As it is also, found in the studied by Saridakis (2011). Education included in the violent crime model as a control measure (Fajnzylber et al. 2002 and Cheong &Wu, 2015).

### Estimation strategy

This study followed the model in Enamorado *et al.* (2016) because it is a standardised model in the literature that captures the relationship between income inequality and violent crime, this is presented in equation below.

$$where \varepsilon_{it} = \mu_i + \omega_{it}$$

sectional, individual, panel-specific, heterogeneity. To avoid this problem, Random Effect and Fixed Effect were tested. Between the Pool OLS and Random Effect, the Breusch and Pagan LM test for random effects choose the Random Effect. At this point, it is important to know if the error are randomly distributed or fixed. The Hausman test choose Fixed Effect model, which signifies the error is not randomly distributed. In the post test estimation, there is no problem of multicollinearity as  $vif$  is within the acceptable limit of 10. Likewise, autocorrelation did not exist using the Wooldridge test for autocorrelation in panel data. Nevertheless, there is problem of heteroscedasticity, therefore, the result in the

Fixed Effect is not acceptable. To correct this problem, the robust test Fixed Effect was done using heteroskedastic panels corrected standard errors (PCSE). Also, the use of the PCSE help to minimise the problem of endogeneity that exist between income inequality and violent crime (Fajnzylber et al. 2002 and Enamorado *et al.*, 2016).

### Results

Table 2 presents the descriptive statistics for the variables, means of the all the variables lies between the minimum and maximum values. This signifies that data used in the analysis are reliable. Also Table 3 shows the correlation matrix, the positive correlational value between income inequality and violent crime is significant at the 5% level of significance even if the value is low. This means that there is endogeneity problem between income inequality and violent crime. As it is observed in the literature that violent crime involved killing and destruction of property, using this channel to cause damages to means of income, social and human capital thereby creating wider gap in income, and victim would become poor or live below the poverty line. At the same time, people at the low income group find it difficult to meet their basic needs because of the poor income they received, they commit crime due to frustration to meet up their needs. Thus, the endogeneity problem is not a problem any more

in this study for two reasons; first, the result indicated that there is no autocorrelation and two, the estimated result interpreted is robust based on the PCSE.

In the PCSE result, it is found that income inequality is positive ( $\beta = 0.0346, \rho < .050$ ) to increase violent crime in Nigeria. This is consistent with Fajnzylber et al. (2002) Enamorado *et al.*, (2016). Among the control variables, it is found that unemployment is not significant with violent crime in the model. Moreover, education ( $\delta_2 = -0.0874, \rho < .010$ ) shows the ability to reduce violent crime caused by income inequality. Similar result is found by Cheong and Wu (2015). This result implies that an increase in educated people in the country will result in low rates of violent. The number of teachers being the proxy for education played two roles. First, it is possible to earn good income which would reduce the income distribution. Second, educated people would find it difficult to engage in violent crime. Similarly, Enamorado *et al.*, (2016) report that literate population reduces violent crime. Focusing on the deterrence variable, imprisonment ( $\delta_3 = -0.1150, \rho < .050$ ) is effective in combating violent crime. This signifies that people would keep away from committing violent crime because of the high risk involved. Besides, the consistent effects are quite well in line with Virén, (2001).

**Table 2: Descriptive Statistics**

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Violent Crime	111	2.5985	0.7847	1.2218	4.7635
Income Inequality	111	43.7005	5.5501	32.53	64.29
Unemployment	111	17.6549	10.0517	2.7	67.4
Education	111	13.0492	0.6405	10.5052	14.5269
Imprisonment	111	10.0225	1.1333	8.0333	13.0957

**Table 3: Correlation Matrix**

Variables	Violent Crime	Income Inequality	Unemployment	Education	Imprisonment
Violent Crime	1.0000				
Income Inequality	0.2724*	1.0000			
Unemployment	0.1268	-0.0328	1.0000		
Education	-0.1373	0.0143	-0.0798	1.0000	
Imprisonment	-0.2674*	0.0703	-0.2102*	-0.0273	1.0000

N = 111

\*p &lt; .05.

**Table 4: Estimated result between income inequality and violent crime using PCSE**

Violent Crime (VCR) as the dependent variable	Pooled OLS	Random Effect	Fixed Effect	Estimation of Panel Corrected Standard Error
Income Inequality	0.4185*** (3.36)	0.0189 (1.70)	0.0018 (0.15)	0.0346** (2.43)
Unemployment	0.0052 (0.75)	0.0074 (1.32)	0.0077 (1.32)	0.0086 (1.52)
Education	-0.0961 (-1.58)	-0.0880 (-1.96)	-0.07852 (-1.73)	-0.0874* (-1.78)
Imprisonment	0.1429*** (-3.06)	-0.0443 (-0.895)	0.08155 (1.21)	0.1150** (-1.96)
Constant	3.7323	3.1720	1.9742	3.4871
Breusch-Pagan LM test	chibar2(01) = 30.73 Prob> chibar2 = 0.000			
Hausman test		chi2(6) = 12.95 Prob>chi2 = 0.0115		
Observations	111	111	111	111
R-squared	0.1819	0.1499	0.0024	0.3185
F-test (Wald chi square)	5.89	7.88	1.38	17.31
F-test (prob>chi square)	0.0003	0.0962	0.2494	0.0017
Multicollinearity vif)			1.03	
Heteroskedasticity ( $\chi^2 - stat$ )	-	-	chi2 (15) = 130000 Prob>chi2 = 0.0000	-
Serial Correlation ( $F^2 - stat$ )	-	-	F( 1, 36) = 1.041 Prob> F = 0.3145	-



T-statistics are in parentheses, \*, \*\* and \*\*\* denotes 10%, 5% and 1% respectively. Result in column is based on heteroskedastic panels corrected standard errors

### Conclusion and Recommendations

The link between income inequality and violent crime is discussed in the literature. The need to address mixed results became necessary and besides, most of these studies focus on developed nations and outside the country. Moreover, violent crime is rampant and has engulfed every part of the country. These crime includes armed robbery, murder and kidnapping which involves killing and destruction of lives and properties. To this is the wide income inequality between the rich and poor, regions and sexes. Considering these development matters, this paper examine the link between income inequality and violent crime in Nigeria. To explore this link, panel data from 2008-2010 were tested using the PCSE approach. From the empirical test, it is found that income inequality causes violent crime; education and imprisonment reduces violent crime.

For policy implication, this paper recommends that the wide gap in the income distribution must be addressed through education if violent crime must be reduced. That is, policy makers should invest more in all levels of education especially education that guarantee various types employment in the country after school completion. Through education, school leavers' earnings would increase thereby closing the gap

in income distribution. Moreover, the imprisonment of criminals should be intensified as it discourages violent crime. It is good to point out that Prisons or what is known as Correctional Services Centres should be well equipped with educational facilities and materials to train inmates in different skills that can beengaged in after their release from prison. In facilitating this moves, policy makers should adequately monitor and evaluate the state of education given in these prisons to justify the money expended.

Hence, this paper became relevant because of its contributions. First, it points out that violent crime and income inequality are not desirable if the human welfare must be improved. The high risks impose on human welfare need to be curtailed. Secondly, the need to educate the citizens cannot be jeopardized because of its immense usefulness to human welfare. Third, it points to the policy makers that improving the social programmes in the country is most desirable for human welfare and development. Lastly, reducing violent crime and its related matter have immense benefit to mankind.

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