

Exploring the Relationship Between Socio-Economic Factors and The Spatial Distribution of Crime in Nigeria

¹E. E. Adeniyi, ²B. E. Daukere, ²I. K. Yahaya, ²J. A. Adetutu & ²A. C.

Ogbonnaya

¹Department of Geography and Environmental Management, University of Ilorin, Nigeria

²Department of Geography and Environmental Management, Nigerian Army College of Education, Ilorin, Nigeria

Corresponding Author's email: adeniyi.ee@unilorin.edu.ng

Abstract

Crime poses a major threat to human survival, causing both physical harm and property loss, while also increasing victims' feelings of vulnerability and insecurity. This research investigates the spatial distribution of crimes across Nigeria and examines how socio-economic characteristics influence crime rates. Using data from the National Bureau of Statistics (2017, 2018, 2020), Ordinary Least Squares linear regression was conducted within the ArcGIS 10.5 environment to assess how socio-economic variables of different states impact crime rates. Findings revealed that Lagos and Abia states recorded the highest rates of crimes against persons, at 247.12 and 148.76 per 100,000 persons, respectively. Findings also highlighted that states such as Kebbi, Anambra, Bauchi, Kogi, Zamfara, Kaduna, Jigawa, Rivers, Osun, Benue, and Katsina recorded significantly lower rates, ranging between 1.94 and 7.43 per 100,000 persons. Property offenses were highest in the Federal Capital Territory and Lagos, ranging from 91.72 to 211.91 per 100,000 persons, while the lowest rates were recorded in Kebbi, Kogi, Bauchi, Jigawa, and Zamfara states. Lagos also had the highest offenses against lawful authority, with 55.49 offenses per 100,000 persons. The findings further revealed a significant correlation between population density, educational index, and rates of crimes against persons and property. Notably, offenses against lawful authority yielded the best model performance with the lowest Akaike's Information Criterion (225.32) and the highest adjusted R-squared value (0.79). To mitigate crime, the study recommends that the Federal Government expand social and economic activities and services, while increasing state security personnel in response to rising population density.

Keywords: Criminal Offences, Socio-economic factors, Ordinary Least Squares, Population density, Spatial Distribution

Introduction

Crime poses a serious threat to human existence because it not only causes harm and property loss but also heightens victimization fears and feelings of insecurity in societal structure as a whole (Adegbami, 2013; Adegbami & Uche, 2016; Lymperopoulou & Bannister, 2022). Crimes are now widely regarded as being common in Nigeria (Nwankwo & James, 2016; Popoola *et al.*, 2018; Agri & Agri, 2020; Onyeneke & Karam, 2022). Thus, they have a substantial negative impact on the victims themselves and a detrimental overall impact on both rural and urban life. Furthermore, crimes also limit investment motivation at both local and foreign levels (Jelilov *et al.*, 2018). Crimes such as theft/stealing, armed robbery, house-breaking, among others tend to occur more

frequently than other sorts of offenses such as murder, suicide, etc. (John & Mohammed, 2007; Wang *et al.*, 2019; Tavares & Costa, 2021). Property crimes like burglaries, which frequently have a lasting psychological impact on victims, stigma for neighborhoods and districts, and repercussions for planning and design, are reportedly the most intrusive crimes in Africa, especially Nigeria (Kunst & Hoek, 2024). Social vices such as cybercrime, ritual killings, armed robbery, and kidnapping, among others, pose a substantial security concern, especially in developing countries (Usman, 2015; Reuben & Nnam, 2018; Oloyede & Dare, 2021; Tersoo & Terseer, 2021). Offenses against property, defined as crimes targeting human belongings or assets, made up the highest of all cases reported in Nigeria, with 68,579

reported in 2017 (National Bureau of Statistics, 2018).

Crimes have been linked to factors such as population density, poverty, unemployment, inequality, and a lack of resources (Ajide & Ajisafe, 2017; Joab-peterside et al., 2021; Sun et al., 2022). Numerous studies (Lobont et al., 2017; Sugiharti et al., 2022) have discovered links between crime and socio-economic hardship. However, there may be different connections between socio-economic disadvantage and crime (Silva et al., 2022). Findings from various research works raise the question of whether or not impoverished neighborhoods always have higher crime rates and the relationship between crime and population density (Cabrera-Barona et al., 2019). The uneven neighbourhood characteristics that occur in both rural and urban areas could explain this. Due to the absence of worthwhile goals in poor areas, poverty and a high unemployment rate may both strengthen the desire to commit crimes while also encouraging them (Abul et al., 2016; Adegami & Uche, 2016; Cabrera-Barona et al., 2019). Some studies have noted that the concept of poverty is connected to a lack of opportunities and services. Poverty can also be understood as a relative concept, defined in comparison to the living standards of others. From this perspective, poverty may arise from high unemployment rates and the inability to exercise fundamental human rights, including access to essential services. Crime can be linked to the interaction of high population density with high unemployment rates (Cabrera-Barona *et al.*, 2019).

The likelihood of committing crimes against property and persons is neither evenly nor randomly distributed over time and space. Consequently, exploring spatial crime patterns enhances the theoretical understanding of the roles geography and opportunity play in criminality and supports the development of tailored, location-specific crime prevention strategies. This focus marks the advent of a new era in spatial

criminology, emphasizing place as a crucial factor in understanding crime dynamics. With this approach, policymakers gain the ability to comprehend not only variations in crime rates but also how these differences are linked to the evolving physical and social characteristics of specific locations, thereby enabling more effective and targeted interventions. As a result, this paper is motivated to spatially understand the patterns of crime distribution in order to aid targeted prevention, emphasizing crime mapping as a crucial geographic information systems (GIS) tool for analyzing criminal activity. In light of this, the introduction and reason for the geographical analysis of offenses against property, persons, and lawful authority in Nigeria are examined in this paper. Hence, the study aims to investigate the geographic distribution of crime in Nigeria and examines how socio-economic characteristics influence crime rates. In order to achieve this, the study objective is to examine how crimes against persons, property, and lawful authority are distributed spatially as well as to assess the impacts of socio-economic factors on these offence types in Nigeria.

Although no consensus exists on the definition of crime, the Nigerian Police Force classifies it into offenses against persons, property, lawful authority, and local acts (National Bureau of Statistics, 2017). Offenses against persons include crimes directly targeting individuals, such as murder, manslaughter, infanticide, concealing a child's birth, rape, and other physical abuses. Offenses against property involve crimes committed against possessions, including theft, receiving stolen goods, obtaining items under pretenses, robbery, and burglary. Offenses against lawful authority cover violations such as failure to pay taxes or other acts undermining legal governance. These classifications help

structure crime analysis and prevention efforts in Nigeria.

Numerous studies have explored the relationship between the geographic distribution of crime and socio-economic hardship, with foundational work by Shaw & McKay (1942). This work linked urbanization to delinquency patterns. Building on this, researchers such as Carlin (2002) and Kubrin (2009) have used geospatial techniques to map how environmental and social factors like social disorganization, opportunity structures, and neighborhood conditions drive crime clustering. Such spatial understanding highlights the importance of context in studying crime distribution and prevention strategies (Gladfelter & Matthews, 2014). Social disorganization theory further posits that weakened community structures in urban slums foster delinquency, a dynamic evidenced by rising crime amid social decay. Recent studies, such as the comparative study by Lymperopoulou & Bannister (2022), demonstrate how different policies interact to shape the evolving morphology of crime, segregation, and poverty in Glasgow and Birmingham.

In light of the cultural, urban, and socioeconomic contexts, De Nadai *et al.* (2020) investigated criminal activities in Boston, Chicago, Los Angeles, and Bogotá (Colombia), concluding that combining socio-economic factors, mobility data, and neighbourhood physical characteristics enhances the explanation of crime emergence. Their findings also reveal that the socio-ecological characteristics of neighborhoods influence crime differently depending on the city. Similarly, Tavares & Costa (2021) examined the geographic distribution of property crimes across mainland Portugal and found that socio-economic and demographic variables are linked to local crime rates. Complementing these studies, Jonathan *et al.* (2021) explored

crime's broader effects on socio-economic development, identifying a range of criminal activities such as banditry, kidnapping, rape, theft, and murder. The authors concluded that crime fosters corruption and impedes societal growth, warning that without strong governmental action against criminals, terrorists, and bandits worldwide, criminal activity will continue to hinder socio-economic progress. Their body of research demonstrates the complex interplay between crime, socio-economic factors, and policy responses across diverse geographic and cultural environments, emphasizing the necessity of context-specific strategies to address crime effectively.

Using GIS, Bowers (1999) investigated the relationships between crime and the distribution of various low-income, middle-income, and affluent residential neighborhoods in north-west England. The correlation between crime and underprivileged regions was shown to vary significantly amongst towns. Further research revealed that Southport's assault hotspots majorly revolve around local bars and clubs. Similarly, Lobonț *et al.* (2017) noted that a significant link between the socioeconomic class of the neighbourhood and the frequency of crimes. In support of this, Brantingham & Brantingham (1984) demonstrated an inverse relationship between the rate of homicide and assault, and socioeconomic positions. This is supported by more studies, including those of Bonjar (2017), Kamalipour *et al.* (2014), and Pallangyo & Imori (2017).

According to other studies, inequality and crime rates are closely associated (Goh *et al.*, 2018; Lodge *et al.*, 2021; Sugiharti *et al.*, 2022). For instance, Blau & Blau (1982) examined racial socio-economic inequalities as a primary source of criminal violence in their study of metropolitan structure and violent crime. Their research showed that socio-economic disparity between blacks and

whites had a direct positive correlation to violence and that socio-economic disparity within and between races is positively connected to high rates of violent crime in small census areas. Using the co-integration methodology test, Kutlar *et al.* (2012) studied the correlation between crime against property and real minimum wage, unemployment, subsistence index, and per capita income levels in Turkey from 1971 to 2005. Their results showed a causal connection between property crime and the real minimum wage.

In Nigeria, Onyeneke & Karam (2022) applied the urban social structural theory of social disorganization in a cross-sectional qualitative study of Borokiri, Rivers State. Findings revealed how socio-economic disparities, poverty, demographic factors, and physical traits drive criminal behaviour and embed crime within urban fabrics. Their findings underscore that standardizing residents' economic conditions, through regulated informal sector opportunities and community programmes to monitor youth behaviour, remains essential for safety. Complementing this, Adegbami & Uche (2016) linked poverty and crime to poor governance indicators, demonstrating a clear correlation with unemployment that pushes Nigerian youth into criminality as a means of survival. Together, these studies highlight the urgent need for targeted economic and governance reforms to disrupt the poverty-crime cycle.

Ucha (2010) identified key poverty drivers in Nigeria, such as unemployment, corruption, a non-diversified economy, economic inequality, laziness, and a subpar education system, that elevate crime rates. Similarly, in Nigeria's Gboko Metropolis, Tersoo & Terseer (2021) examined how violent crimes undermine socioeconomic growth, attributing them primarily to poverty, unemployment, and political instability. They highlighted armed robbery as the most

prevalent form, where perpetrators use weapons like guns, knives, axes, and broken bottles, often resulting in victim deaths, physical deformities, national instability, and broader underdevelopment. These studies collectively underscore the poverty-crime nexus in Nigeria, urging multifaceted interventions to break the cycle. Most studies, such as those on Nigeria described above, focused on one or a few specific crime types. Few studies have thoroughly investigated the link between socioeconomic conditions and crimes against persons, property, and legitimate authorities in a comprehensive manner.

The Study Area

The study area is Nigeria. It is located between latitudes 3°15' to 13°30'N and longitudes 2°59' to 15°00'E (Figure 1). The area spans approximately 923,768 km² with a mean elevation of 380 m above mean sea level and a 2006 population of 140,431,790 at a density of 226 persons per km² (National Bureau of Statistics, 2011; Eludoyin & Adelekan, 2012). The country is blessed with abundant ground and surface water resources, ranks among Africa's leading agricultural and ranching nations, yet it grapples with rising terrorism and crime rates amid wide seasonal variations in temperature and precipitation (Isukuru *et al.*, 2024). Several studies have observed that geographic features exacerbate crime in certain states in Nigeria more than others. For instance, Oyinloye *et al.* (2023), who mapped violent crime hotspots in southwestern Nigeria, found that high-density urban hubs like Lagos and Ogun foster armed robbery, assassination, and cultism due to commercial activity. While border proximity in northern states like Zamfara, Katsina, and Sokoto sees rampant banditry and kidnapping linked to porous borders and rural poverty (Abdullahi, 2024). In the northcentral states like Benue, Plateau, and Nasarawa, farmer-herdsmen clashes and kidnappings are fueled by land

disputes and population pressures. To counter these threats, the Nigerian government allocated substantial funds, including over ₦9.87 trillion to defence and security sector in the 2025 budget (Nigerian Institute of Social and Economic Research,

2025), alongside initiatives like Operation *Hadin Kai* targeted at Boko Haram, community policing programmes, and infrastructure investments in crime hotspots, though challenges persist in implementation and coordination.

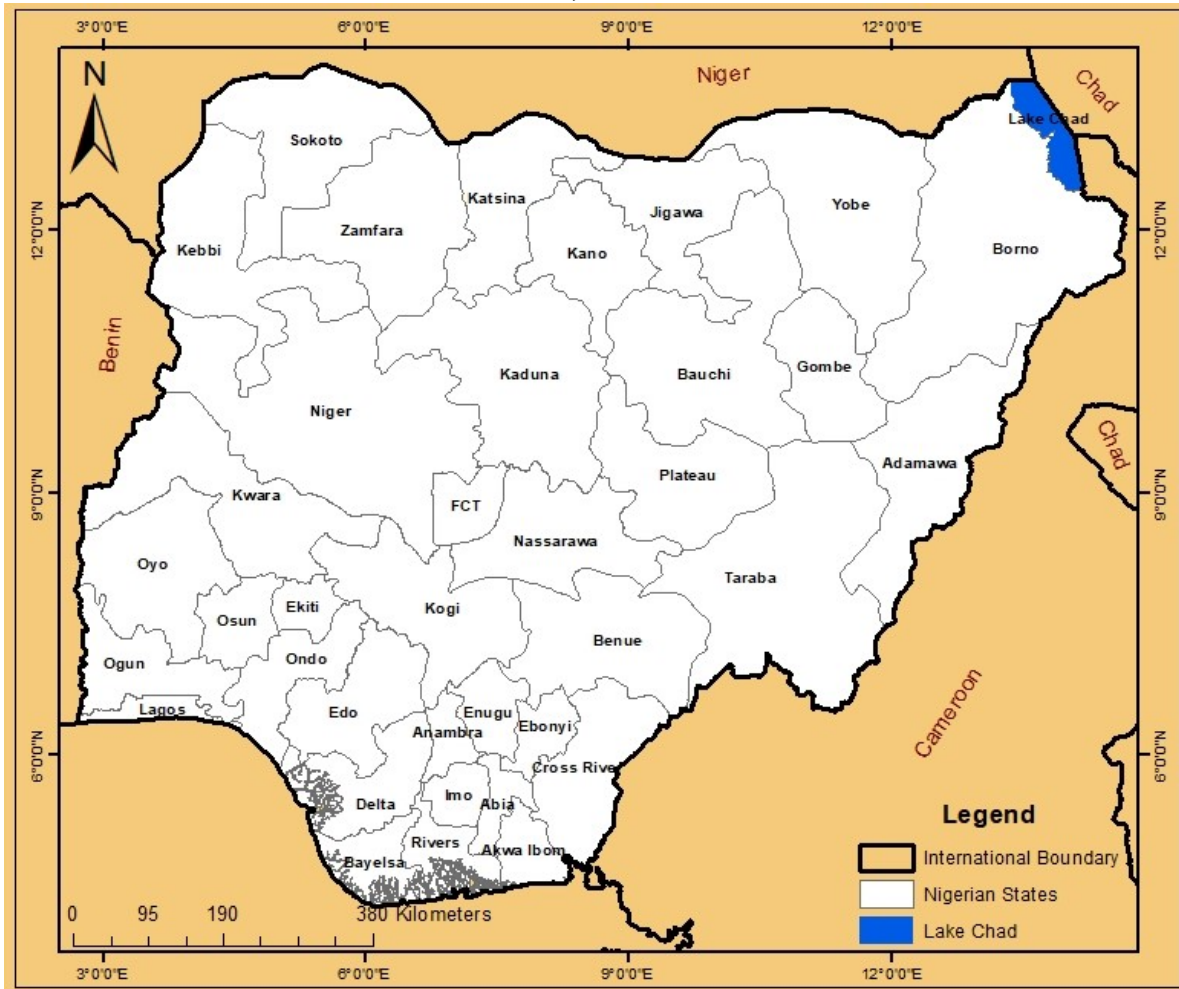


Figure 1: Nigeria showing 36 States and the Federal Capital Territory

Source: GIS Laboratory, Nigerian Army College of Education, Ilorin, Nigeria

Materials and Methods

The study employed secondary data obtained from the Internet and officially published National Bureau of Statistics documents. The National Bureau of Statistics (NBS) is the government department charged with gathering, compiling, analyzing, interpreting, publishing, and disseminating statistical data

relating to Nigeria's socio-economic life. The official crime data used in this paper were gotten from the records of the NBS (2018). The data on overall count of offenses against persons, property, and lawful authority was normalized by the total population of states at a rate of 100,000 in order to measure the spatial pattern of crime in Nigeria. Without reporting disproportionate values, this approach has been utilized in the literature to

analyze crime distribution throughout neighborhoods, cities, and states (Kunnuji, 2016). It also makes it possible to compare crime categories' distributions across a state to assess socio-economic disparities.

In this study, the dependent variables are the offenses against persons, property, lawful authority, and the total offences types. The population data from the 2006 census that were projected through 2017 were utilized to calculate the state-level crime rates. The year 2017 was purposively selected because the police received crime data in the said year.

The independent variables used include the educational index, sex ratio, population density, headcount rate of poverty and unemployment rate. The sex ratio was defined as the percent of male to female in the population. All the variables were measured at the state level. Based on the aggregate regionally adjusted per capita consumption expenditures for all Nigerian households, the national poverty line was established. The headcount ratio was therefore included, indicative of the percentage of the population residing in households, with total consumption expenditures per capita below or equal to the poverty line (National Bureau of Statistics, 2020). Borno State was excluded from the 2018 survey and subsequent analysis due to a lack of data, primarily attributed to the ongoing Boko Haram insurgency that has severely disrupted data collection.

After characterizing the data on the dependent and independent variables using maps, an Ordinary Least Squares (OLS) multiple regression model in the ArcGIS 10.5 environment was used to examine their connections or relationships. This model, as noted by Brunson *et al.* (1996), was chosen because it is a widely used and effective method for spatial analysis in geographical studies. At the state levels, separate models for crimes against persons, property, and lawful authority, as well as the total crime

offenses, were developed. These models were developed in the ArcGIS environment because it is a useful tool for examining the relationship between state characteristics and crime rates (ESRI, 2019). The OLS formula is given thus:

$$y_i = \beta_0 + x_i\beta + \varepsilon_i \quad (1)$$

Where: y_i stands for the dependent variables, which are the offenses against persons, property, lawful authority, and the overall offenses at the i th location (state). β_0 is the estimated intercept, representing the value of y when x is equal to 0, x_i signifies the vector of selected explanatory variables, β indicates the vector of regression coefficients, and ε_i is a random error term.

The outcomes include diagnostic statistics on residual multicollinearity and spatial independence. The OLS model produced adjusted R^2 and Akaike Information Criterion (AICc) scores as measures of prediction accuracy. AICc was included because it is also a measure of model fit/performance (Kalai *et al.*, 2014). These parameters' estimates spatial fluctuation provide insight into how crime rates relate to processes that change spatially and are represented by various individual and local contexts. The findings are depicted on a map to demonstrate the spatial variance in both crime and socio-economic disadvantage rates. This approach was used to investigate the association between state attributes and crime rates. The results contain diagnostic data on spatial independence and residual multicollinearity. Consequently, the study ensured all variables were less than 7.5 using the variance inflation factor (VIF). Variable redundancy (multicollinearity) is present when the VIF for an independent variable exceeds 7.5 (Kianfar & Mesgari, 2022). VIF is denoted thus:

$$VIF_i = \frac{1}{1 - R_i^2} \quad (2)$$

Where: R_i^2 shows the coefficient of determination when the i th explanatory

variable is regressed against other variables. Multicollinearity was assessed by comparing the VIF values used by Wang *et al.* (2019), which typically indicate redundancy among explanatory variables with values >7.5 . This approach was utilized by Kianfar & Mesgari (2022) to analyze and model COVID-19 incidence rates in Europe using GIS.

Results and Discussion

Spatial Distribution of Socio-economic Variables

The depiction of the spatial distribution of the features of the Nigerian states is required to provide a better understanding of the socio-economic variable included in the OLS models. The Education Index results for the 36 states and the FCT are shown in Figure 2(a). With a score of 1.01, Lagos State tops the list for human development, followed by Bayelsa (0.93), Rivers (0.92), and Anambra (0.92). The south-south, south-east, and south-west were the top-performing regions. In general, the northern region performed poorly, with Yobe (0.33), Sokoto (0.33), Kebbi (0.40), Bauchi (0.41), and Zamfara (0.42) ranking in the bottom 5. In fact, Kogi, the top-ranked northern state, was listed at position 13. The high unemployment rate is one of Nigeria's major challenges, and regional disparities in employment are currently a crucial national concern. The patterns of subnational (states) discrepancies in the unemployment rate are shown in Figure 2(b). According to the data, Rivers (41.8%), Bayelsa (36.6%), and Akwa Ibom (30.4%) states have the highest unemployment rates. The state with the lowest unemployment rate was Katsina, at 3.2%, followed by Osun with 5.2%.

Figure 2(c) displays the poverty headcount rate, which was calculated using the average household consumption across all states and the FCT. Since it is an indicator of the percentage of the population living below or at par with the poverty line, this statistic is particularly noteworthy and useful for policymaking. The findings of the study revealed that between 66% and 88% of the population in Sokoto, Taraba, Jigawa, Ebonyi, Adamawa, Zamfara, Yobe, and Niger states live at or below the poverty level. On the other hand, states like Lagos, Delta, Osun, Ogun, Oyo, Edo, Ondo, and Anambra had the lowest percentages of the population living below the poverty line, ranging from 4.5 to 14.78. Findings demonstrate that Lagos had the lowest percentage of its population living below the poverty line at 4.5%, while Sokoto had the highest at 87.73%. Insurgency activities in Borno State prevented data collection, resulting in the state recording a score of 0. Sex ratio in this study is the proportion of live male births to every 100,000 live female births. The sex ratio distribution among Nigeria's 36 states, including the FCT, is depicted in Figure 2(d). Kano had the highest sex ratio of 111.11, while Enugu State had the lowest at 95.45. These findings align with the works of Odia & Iyamu (2016), Animashaun & Emediegwu (2025) and Okoliko & Adebayo (2025), who linked education declines to persistent unemployment and resource curse, revealing limited Northern gains versus Southern leads alongside oil-rich South-South joblessness and Northern agricultural strengths.

a

b

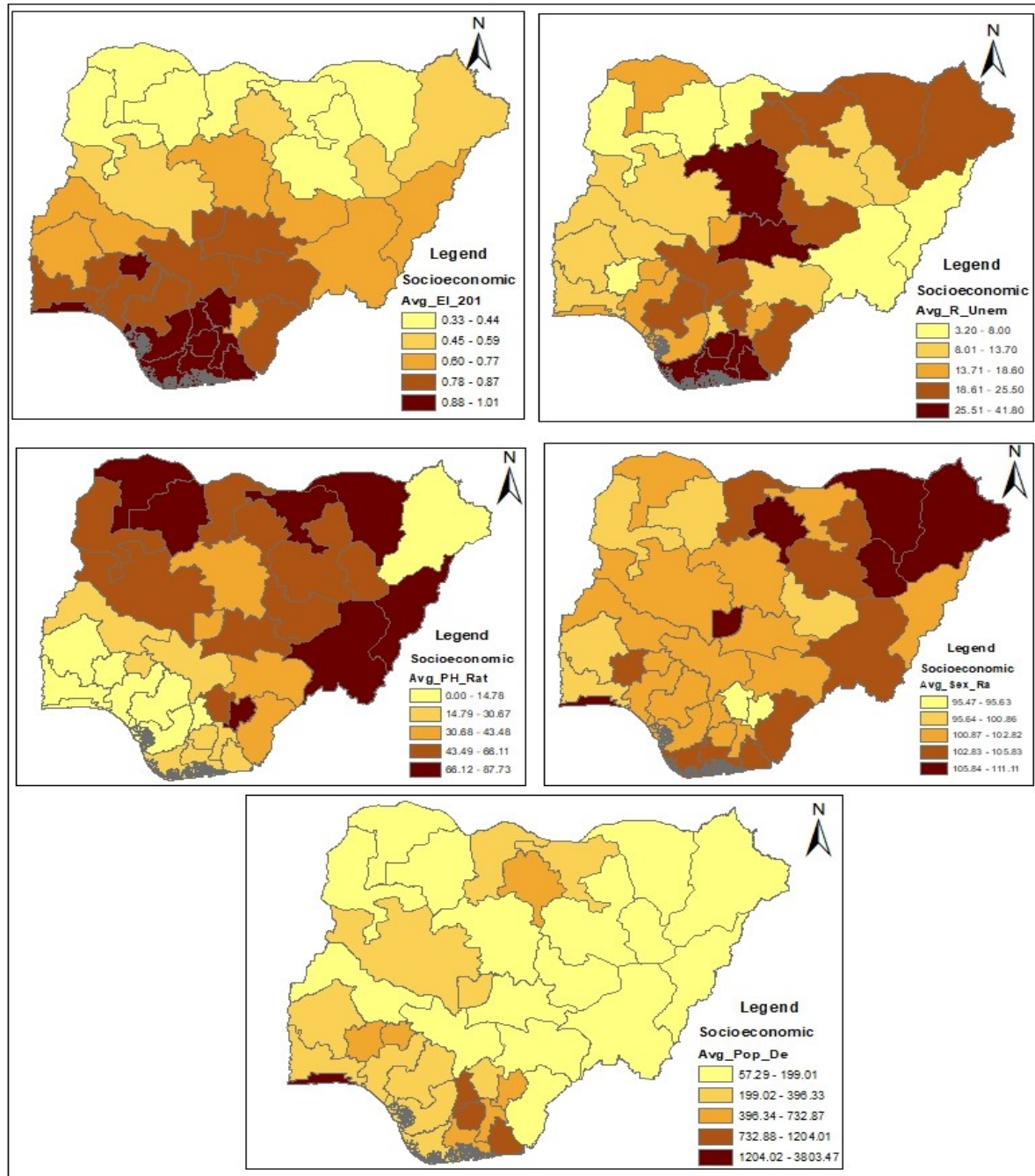


Figure 2: (a). Education index (b). Unemployment rate (c). Poverty headcount rate (d). Sex ratio (e). Population density

Source: Authors' Analysis (2022)

In terms of population density, Figure 2(e) demonstrates that Nigeria's population density ranges from 57 to 3,803 people per square kilometer. It shows that southern Nigeria generally has higher population density than the north. However, Kano, a North-Western state, ranks seventh among the top 10 most densely-populated states. With over 3,803 people per square kilometer, Lagos had the highest density, followed by Anambra (1204), Imo (1010), Akwa Ibom (880), Abia (732), Rivers (655), Kano (634), Ebonyi (550), Ekiti (527), and Osun (466), in that order. Taraba, with a population density of 57 people per square kilometer, had the lowest population density in the entire country, followed by Yobe (72), Plateau (77), Borno (82), Kwara (88), Nasarawa (96), Bauchi (101), Kebbi (108), Zamfara (115), and Adamawa (120). This research supports that of Kunnuji (2016), who found that Taraba, with 41 people per square kilometer, had the lowest population density in the country, and Lagos, with 2483 people, had the highest.

Spatial Distribution of the Rate of Criminal Offences in Nigeria

The spatial distribution of the rate of crimes committed against persons, property, lawful authority, and all the offenses combined is shown in Figure 3. Findings in Figure 3(a) show that Lagos and Abia had the highest crime rates, with 247.12 and 148.76 offenses against persons per 100,000 persons, respectively. The FCT, Delta, and Ebonyi follow them at 60.26, 57.66, and 41.95 crimes against persons per 100,000 persons, respectively. The states of Kebbi, Anambra, Bauchi, Kogi, Zamfara, Kaduna, Jigawa, Rivers, Osun, Benue, and Katsina had the lowest rates of crimes against persons, with rates ranging from 1.94 to 7.43 per 100,000 residents. According to data in Figure 3(b), the FCT and Lagos had high rates of property offenses, ranging from 91.72 to 211.91 per

100,000 persons. The reason for this could be that residents of these states have higher earnings and can afford more real estate than residents of the neighbouring states. This supports the theoretical claim of Kubrin (2009) that expected returns are higher in affluent neighborhoods, and criminality there is more profitable. Findings further revealed that states with green colours in Figure 3(b) (Kebbi, Kogi, Bauchi, Jigawa, and Zamfara) had the lowest rates of property crimes, ranging from 2.33 to 8.13 per 100,000 people. These findings imply that urban affluence drives property crimes due to higher returns, while crimes against persons correlate with density and inequality, urging targeted policing in southern hubs like Lagos. This echoes Kunnuji (2016) on population density and armed robbery across Nigerian states, and Blau & Blau (1982) on metropolitan inequality fueling violence. Policymakers should integrate spatial analysis for resource allocation, as noted by Bowers (1999), to mitigate non-stationary crime patterns.

Further, Lagos State had the highest rate of offenses against lawful authority, with 55.49 rates per 100,000 persons, according to Figure 3(c). This may be due to Lagos' status as the country's commercial center, with a dense population that includes affluent individuals. Of the 20 southern states, Imo, Rivers, Osun, and Cross River had the lowest rates of offenses against lawful authority, and are shown in green, ranging from 0.00 to 1.39 per 100,000 persons. The yellow-colored states of Akwa Ibom, Abia, Ondo, Nasarawa, and Ebonyi had a moderate rate of crimes against lawful authority per 100,000 persons. The spatial distribution of all offenses, which include offenses against persons, property, and lawful authority, is shown in Figure 3(d). According to the results in Figure 3(d), Lagos and Abia states, and the FCT had the highest rates of total crime, which ranged from 138.67 to 400.67 offenders per 100,000

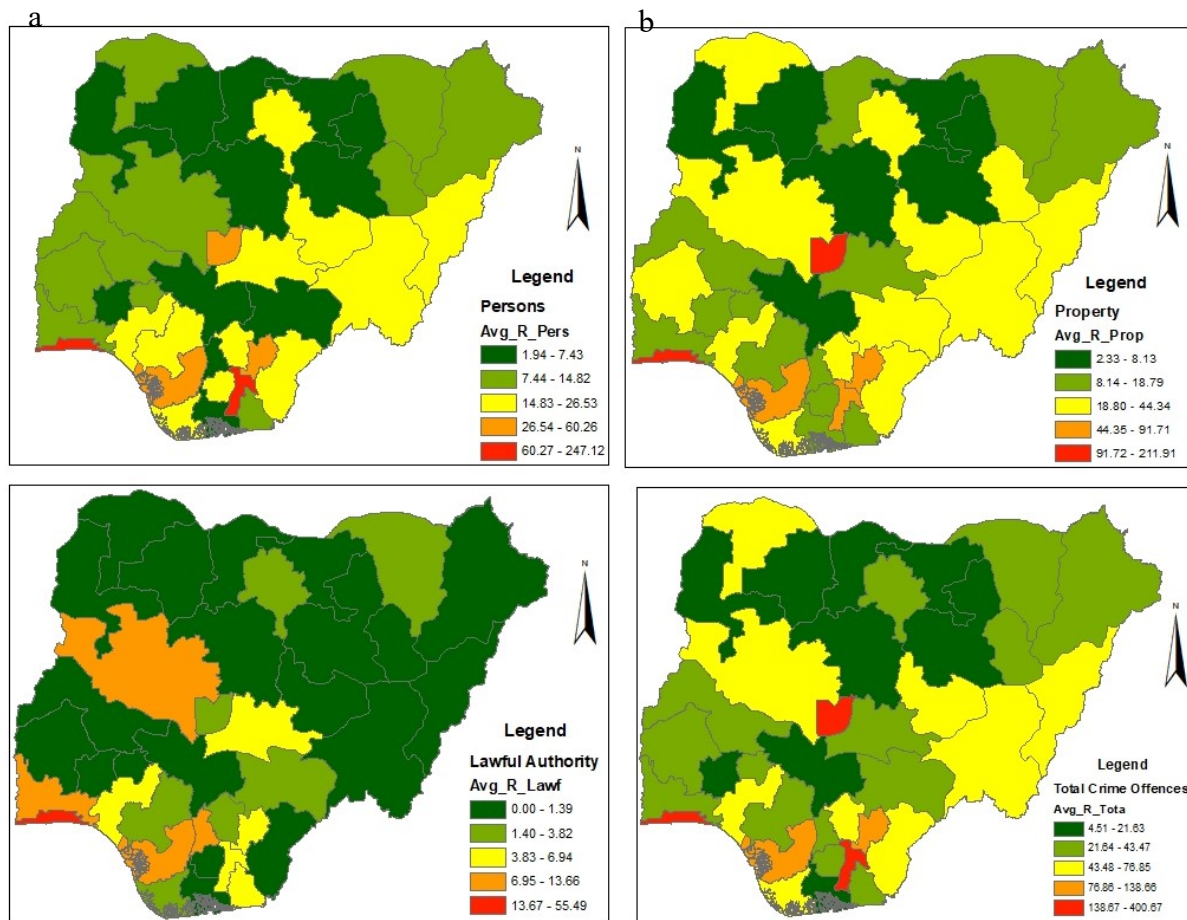


Figure 3: a. Rate of offences against persons per 100,000, b. Rate of offences against property per 100,000, c. Rate of offences against lawful authority per 100,000 and d. Rate of total crime offences per 100,000

Source: Authors' Analysis (2022)

persons. Delta and Ebonyi states follow with 124.54 and 138.66 per 100,000 persons, respectively. With the exception of the FCT, each of these states is situated in southern Nigeria. Kebbi (4.51), Bauchi (5.94), Kogi (6.1), Zamfara (11.34), Kaduna (12.69), Jigawa (12.96), Osun (18.57), Katsina (19.29), and Rivers (21.63) are the states with the lowest overall offense rates between 4.51 and 21.63. Osun and Rivers states the only two in southern Nigeria with low total offense rates

According to the spatial distribution of the rates of each type of offense and the total number of crimes committed, crime tends to

be more common in the southern than the northern regions of the country, which include states like Lagos, Anambra, Imo, Akwa Ibom, Abia, and Rivers. These are renowned for their dense populations and growing economic activities. The distribution of the population, the presence of influential people and politicians, the rate of industrial expansion, and the accessibility of liquor stores and markets in the southern region than the north may all be factors contributing to the variances in the incidence of crimes between the two areas. This result supports those of Kunnuji (2016), who found that armed robbery rates were more concentrated in the southern states than its northern states.

In addition, this finding is consistent with the findings of Ewetan & Urhie (2014), who found that crimes such as cybercrime, bank robbery, abduction, auto hijacking, and bunkering, among other things, are more common in the southern region than in the north, whereas the north is now associated with more sophisticated crimes such as terrorism, cattle rustling, banditry, and insurgency.

Effects of Socio-economic Variables on Criminal Offences

This section discusses the empirical relationships between the socioeconomic variables and the crime rates. OLS regression was used to investigate the statistical relationship between the rates of the three forms of offenses, including total criminal offenses, and the independent variables. Due to of data availability, the regression analysis was conducted at the state level. The results of OLS regression are shown in Table 1. Furthermore, the VIF values shown in Table 1 are all less than 7.5, showing that there is no multicollinearity or variable redundancy with the OLS estimation.

Table 1 demonstrates the effects of prediction models on the categories of offenses per 100,000 population. Findings revealed that population density and educational index significantly influence both crimes against persons and property crimes. Specifically, for offenses against persons, population density ($b = 0.03$, $p < 0.05$) and educational index ($b = 36.28$, $p < 0.05$) indicate that a 1% increase in density yields a 0.3% rise in rates, while a 1% increase in educational index drives a 36.28% increase. Similarly, for property crimes, population density and educational level show $b = 0.03$ and 102.00 ($p < 0.05$), respectively, implying that 0.3% and 102% rate increases per 1% change. However, the lack of substantial correlations between unemployment rate, poverty headcount rate, and sex ratio with either crime type is

particularly surprising given prior studies. For instance, Adegbami & Uche (2016) link poverty directly to crimes in Nigeria as governance failure indicators, while Kunnuji (2016) found that population density significantly predicted armed robbery variation across states. This contrast suggests local contextual factors, data limitations, or spatial heterogeneity may confound expected relationships, which aligns with spatial dynamics studies of Blau & Blau (1982), who emphasized integrated socio-economic variables over universal predictors. Thus, these findings suggest geographically weighted approaches to capture non-stationary crime drivers.

The spatial lag model in Table 1 further highlights the significance of population density in predicting crime rates. Specifically, the model reveals that a 1% increase in population density corresponds to a 0.1% increase in crimes against lawful authority and a 0.8% rise in the overall rate of offenses committed. Notably, there is no significant correlation between unemployment or poverty headcount rates and the overall crime rates in this model. This underscores population density as the most relevant predictor across all four crime models examined. Additionally, the Educational Index emerges as another critical factor, exerting a considerable positive effect on three (3) offense categories, particularly offenses against persons and property. These findings align with those of Adeyemi *et al.* (2025), who emphasize the importance of spatial heterogeneity and socio-economic variables in crime prediction. Thus, incorporating population density and education levels into crime prevention strategies can enhance the targeting of high-risk areas more effectively than solely relying on traditional socio-economic indicators such as unemployment and poverty.

Table 1: Relationship between Socio-Economic Variables and Crime Offences (n=37)

Variable	Coefficient	StdError	t-Statistic	Probability	Robust_SE	Robust_t	Robust_Pr	VIF
Rate of Offences Against Persons								
Intercept	-2.43	247.10	-0.01	0.99	149.22	-0.02	0.99	-
Educational Index	36.28	54.31	0.67	0.51**	17.94	2.02	0.05**	2.46
Unemployment Rate	0.42	0.84	0.49	0.63	0.85	0.49	0.63	1.23
Poverty Headcount Rate	0.13	0.35	0.38	0.71	0.09	1.53	0.14	1.84
Sex Ratio	-0.24	2.22	-0.11	0.91	1.46	-0.17	0.87	1.23
Population Density	0.03	0.01	2.61	0.01*	0.01	5.87	0.00*	1.31
Rate of Offences Against Property								
Intercept	-445.97	219.22	-2.03	0.05	379.53	-1.18	0.25	-
Educational Index	102.00	48.18	2.12	0.04**	61.64	1.65	0.11**	2.46
Unemployment Rate	-0.96	0.75	-1.28	0.21	0.70	-1.37	0.18	1.23
Poverty Headcount Rate	0.53	0.31	1.69	0.10	0.29	1.85	0.07	1.84
Sex Ratio	3.77	1.97	1.91	0.06	3.41	1.11	0.28	1.23
Population Density	0.03	0.01	2.91	0.01*	0.01	2.80	0.01*	1.31
Rate of Offences Against Lawful Authority								
Intercept	8.71	26.03	0.33	0.74	15.59	0.56	0.58	-
Educational Index	-0.44	5.72	-0.08	0.94	3.03	-0.14	0.89	2.46
Unemployment Rate	-0.13	0.09	-1.50	0.14	0.08	-1.68	0.10	1.23
Poverty Headcount Rate	-0.01	0.04	-0.32	0.75	0.03	-0.47	0.64	1.84
Sex Ratio	-0.07	0.23	-0.29	0.78	0.14	-0.47	0.64	1.23
Population Density	0.01	0.00	10.30	0.00*	0.00	9.25	0.00*	1.31
Rate of Total Offences								
Intercept	-439.70	402.28	-1.09	0.28	488.72	-0.90	0.38	-
Educational Index	137.86	88.42	1.56	0.13	77.31	1.78	0.08	2.46
Unemployment Rate	-0.68	1.37	-0.49	0.63	1.37	-0.49	0.63	1.23
Poverty Headcount Rate	0.65	0.57	1.14	0.26	0.35	1.88	0.07	1.84
Sex Ratio	3.46	3.61	0.96	0.35	4.43	0.78	0.44	1.23
Population Density	0.08	0.02	3.85	0.00*	0.02	4.69	0.00*	1.31

Source: Authors' Analysis (2022)

*Variable significant at 1% Critical values **Variables significant at 5% Critical values

The regional distribution of the standard deviation of the dependent variables is depicted in Figure 4. Despite the fact that the OLS ignores geography, Figure 4 displays

the standard residuals of the states as generated by the OLS models. For instance, values in states with deeper colours are higher than the predicted values.

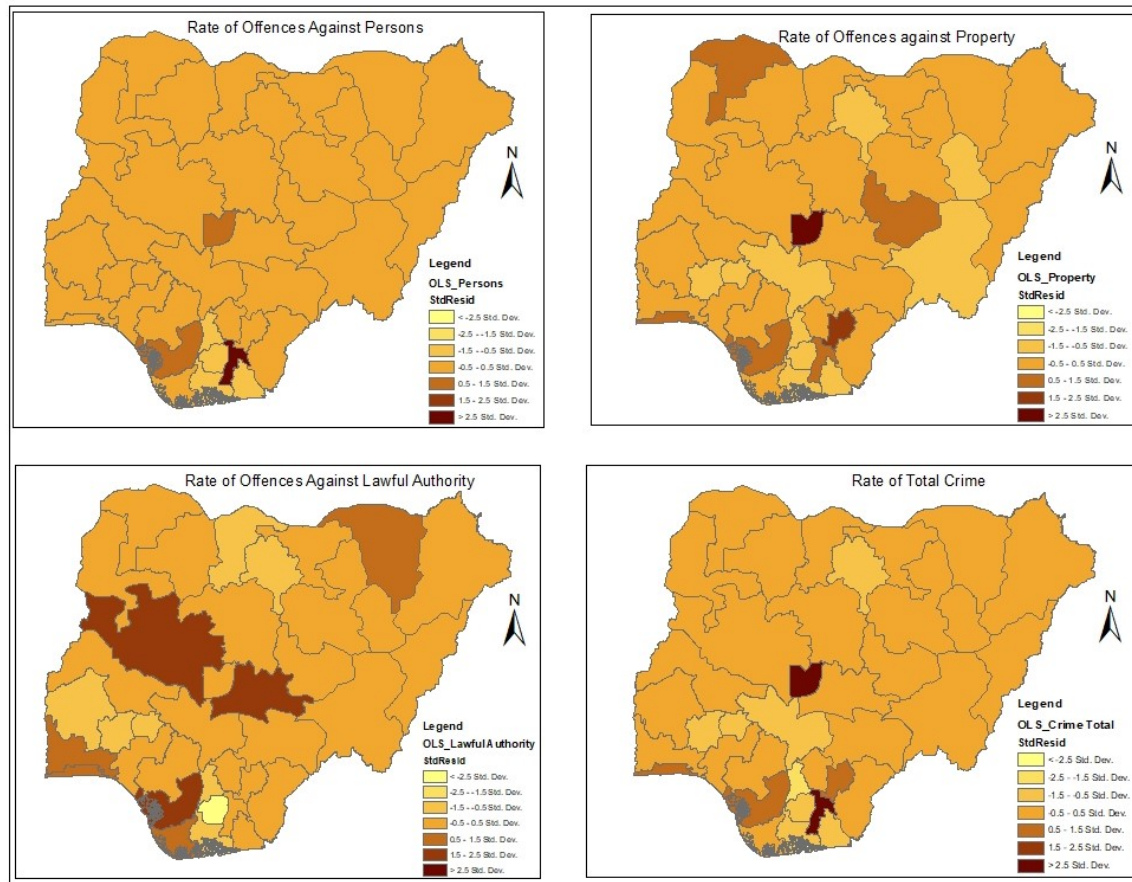


Figure 4: OLS Standard Deviation
Source: Authors' Analysis (2022)

OLS Model Summary of Socio-economic Variables and Crime Offences

Table 2 summarizes the OLS diagnostics for crime offenses, showing varied explanatory power of socio-economic variables across offense types. Offenses against lawful authority have the highest coefficient of determination ($R^2 = 0.82$) and adjusted R^2 (0.79), indicating that the socio-economic factors explain 82% of the variance in these offenses, with a low Akaike's Information Criterion (AICc) of 225.32, signifying a strong, well-fitting model. Offenses against property exhibit a moderate fit ($R^2 = 0.43$, adjusted $R^2 = 0.34$), showing a fairly strong correlation with socio-economic variables, while offenses against persons have a weaker association ($R^2 = 0.28$, adjusted $R^2 = 0.17$),

suggesting that other factors play a larger role in this offence type. The total offense rate has an intermediate value ($R^2 = 0.47$, adjusted $R^2 = 0.39$) with the highest AICc at 427.91, reflecting a less optimal model fit. These findings corroborate those of Masron *et al.* (2025), who used OLS regression on urban property crime in Kuala Lumpur and Putrajaya (2015–2020), reporting moderate R^2 values (e.g., 0.42 for total population) linking demographic factors like population density and male populations to crime variability while noting fluctuating model fits across years. Overall, the OLS results in Table 2 highlight that socio-economic variables are most predictive of offenses against lawful authority and property crimes than crimes against persons, underscoring the importance of addressing socio-economic conditions to mitigate certain crime types effectively.

Table 2: OLS Diagnostics Summary

Offences Type	N	Coefficient of Determination (R^2)	Coefficient of Determination (Adjusted R^2)	Akaike's Information Criterion (AICc)
Offences Against Persons	37	0.28	0.17	391.85
Offences Against Property	37	0.43	0.34	382.99
Offences Against Lawful Authority	37	0.82	0.79	225.32
Rate of Total Offences	37	0.47	0.39	427.91

Source: Authors' Analysis 2022

Conclusion and Recommendations

The study highlights that socio-economic factors such as population density, unemployment, and poverty significantly contribute to crime rates in Nigeria. Findings revealed that southern states experience higher offense levels due to greater urbanization and economic disparities. While population density strongly predicts offenses across all crime categories, education index showed limited influence on overall crime rates, indicating that lack of opportunities and exposure to higher living standards without equitable resource access in less cosmopolitan states exacerbate crime. This highlights that poverty, unemployment, and low income compel individuals toward criminal activities as means of survival, while urban population pressures amplify social strain conducive to crime. Therefore, improving income levels, expanding employment opportunities, and implementing poverty alleviation programmes are essential to curbing crime in Nigeria. Additionally, the unequal socio-economic development between cosmopolitan and neighbouring states fuels criminal behaviour occasioned by frustration and perceived relative deprivation. Sustainable crime reduction in Nigeria requires addressing these underlying socio-

economic inequalities, emphasizing job creation, social support, and inclusive development to effectively mitigate drivers of criminality.

Based on the study's findings, the following recommendations were made. First, given the correlation between population density and crime rates across all categories, the federal government should establish local police units through the Nigeria Police Force's Operations and Community Relations departments to enhance indigenous participation while upholding strict judicial control and deployment of innovative security technologies. Secondly, to address anonymity issues, the Nigeria Police Force's Criminal Investigation Department should collaborate with the Nigerian Immigration Service and the National Identity Management Commission to develop a comprehensive national socio-demographic and biometric database that supports forensic investigations to reduce crime. Thirdly, as population density increases, the federal government, through the Ministries of Interior, Labour and Employment, and Industry, Trade and Investment, should expand social and economic activities, increase security personnel, and revitalize the manufacturing sector to boost job creation and economic absorptive capacity. Strengthening these agencies through

enhanced training, technology adoption, data management, and inter-agency coordination is vital for implementing integrated crime reduction strategies aligned with national

policing reforms and socio-economic development frameworks, for sustainable public safety improvements.

References

- Abdullahi, I. I. (2024). Armed Banditry and Statehood Challenges in North-Western Nigeria. *Kashere Journal of Politics and International Relations*, 2(2), 49–62.
- Abul, U. F., Nkpoyen, F., & Eteng, B. G. (2016). Socio-Economic Status of Youth and Involvement in Criminal Activities in Calabar Metropolis of Cross River State, Nigeria. *International Journal of Humanities, Social Sciences and Education*, 3(1), 79–83.
- Adegbam, A. (2013). Insecurity : A Threat to Human Existence and Economic Development in Nigeria. *Public Policy and Administration Research ISSN*, 3(6), 8–14.
- Adegbam, A., & Uche, C. I. N. (2016). Poverty and Crimes in Nigeria : Indices of Governance Failure. *Public Administration Research*, 5(1), 37–44. <https://doi.org/10.5539/par.v5n1p37>
- Adeyemi, R. A., Olumoh, J. S., & Brahim, A. (2025). Spatial Heterogeneity Modeling of the Neighborhood Effects and Socio-economic Factors on Burglary Crimes in Nigeria. *International Journal Of Computer Applications*, 186(60), 1–11.
- Agri, G. E., & Agri, E. M. (2020). Insecurity conflict and socio-economic development in Nigeria. *Social Science Journal*, 8, 1–19.
- Ajide, F. M., & Ajisafe, R. A. (2017). Crime Rate and Firm Entry in Nigeria. *Amity Business Review*, 18(1), 1–11.
- Animashaun, J., & Emediegwu, L. E. (2025). Is there a subnational resource curse? Evidence from households in the Niger Delta region of Nigeria. *Resources Policy*, 101(January), 105464.
- Blau, J. R., & Blau, P. M. (1982). The Cost of Inequality: Metropolitan Structure and Violent Crime. *American Sociological Review*, 47, 114–129.
- Bonjar, A. B. (2017). Investigate the relationship between socio-economic class and tendency to delinquency among students of Rey city in Tehran. *International Journal of Environmental & Science Education*, 12(4), 851–864.
- Bowers, K. (1999). Exploring links between crime and disadvantage in north-west England : an analysis using geographical information systems. *International Journal of Geographical Information Science*, 13(2), 159–184.
- Brantingham, P. J., & Brantingham, P. L. (1984). *Patterns in Crime*. MacMillan, New York.
- Brunsdon, C. A., Fotheringham, S., & Charlton, M. E. (1996). Geographically Weighted Regression: A Method for Exploring Spatial Nonstationarity. *Geographical Analysis*, 28(4), 281–298.
- Cabrera-barona, P., Jimenez, G., & Melo, P. (2019). *Types of Crime , Poverty ,*

- Population Density and Presence of Police in the Types of Crime , Poverty , Population Density and Presence of Police in the Metropolitan District of Quito. December.*
- Carlin, W. (2002). Clifford R. Shaw and Henry D. McKay, The Social Disorganization Theory. *Center for Spatially Integrated Social Sciences Classics.*
- De Nadai, M., Xu, Y., Letouzé, E., González, M. C., & Lepri, B. (2020). Socio-economic, built environment, and mobility conditions associated with crime: a study of multiple cities. *Scientific Reports*, 10(1), 1–12.
- Eludoyin, O. M., & Adelekan, I. O. (2012). The physiologic climate of Nigeria. *International Journal of Biometeorology*, 57(2), 241–264.
- ESRI. (2019). Spatial Analysis with ArcGIS® Pro. In *Esri. United States of America.*
- Ewetan, O. O., & Urhie, E. (2014). Insecurity and socio-economic development in Nigeria. *Journal of Sustainable Development Studies*, 5(1), 40–63.
- Gladfelter, A. S., & Matthews, S. A. (2014). Urban Poverty and Neighborhood Effects on Crime: Incorporating Spatial and Network Perspectives. *Sociol Compass.*, 8(9), 1140–1155.
- Goh, L. I. M. T., Ra, S., Kaliappan, N. J., & Ishak, S. (2018). Income Inequality and Crime : Evidence from a Dynamic Panel Data Approach. *International Journal of Economics and Management*, 12(2), 479–490.
- Isukuru, E. J., Opha, J. O., Isaiah, O. W., Orovwighose, B., & Emmanuel, S. S. (2024). Nigeria's water crisis: Abundant water, polluted reality. *Cleaner Water*, 2(May), 100026.
- Jelilov, G., Ozden, K., & Briggs, S. O. (2018). Impact of Insecurity on Investment in Nigeria. *Journal of Management, Economics, and Industrial Organization*, 41–61.
- Joab-peterside, S., Nyiayaana, K., & Jack, J. T. C. B. (2021). Insecurity in Rivers State: The Issues, Actors and Solutions. In T. M. Ebiede, C. O. Bassey, & J. B. Asuni (Eds.), *Insecurity in the Niger Delta: A Report on Emerging Threats in Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States* (pp. 349–417). Adonis & Abbey Publishers Ltd; London.
- John, I. M. E. A., & Mohammed, A. Z. (2007). *Gun Violence in Nigeria : A Focus on Ethno-Religious Conflict in Kano.* 420–431.
- Jonathan, O. E., Olusola, A. J., Bernadin, T. C. A., & Inoussa, T. M. (2021). Impacts of Crime on Socio-Economic Development. *Mediterranean Journal of Social Sciences*, 12(5), 71.
- Kalai S. J., Vidhya, R., & Manonmani, R. (2014). *Comparison of Ordinary Least Square Regression and Geographically Weighted Regression for Estimating and Modeling the Electricity Distribution Using Geographical Information System (GIS)/ Remote Sensing (RS).* 1–9.
- Kamalipour, H., Memarian, G., & Faizi, M. (2014). Urban Crime and Pattern Conceptions : Departuring from

- Spatiality. *Open Journal of Social Sciences*, 2, 441–450.
- Kianfar, N., & Mesgari, M. S. (2022). GIS-based spatio-temporal analysis and modeling of COVID-19 incidence rates in Europe. *Spatial and Spatio-Temporal Epidemiology*, 41, 1–16.
- Kubrin, C. E. (2009). Social Disorganization Theory: Then, Now, and in the Future. In M. D. Krohn, A. J. Lizotte, & G. P. Hall (Eds.), *Handbooks of Sociology and Social Research* (pp. 225–236). Springer; London, New York.
- Kunnuji, M. O. N. (2016). Population density and armed robbery in Nigeria: an analysis of variation across states. *African Journal of Criminology and Justice Studies*, 9(1), 62–73.
- Kunst, M., & Hoek, D. (2024). Psychological Distress Among Domestic Burglary Victims: A Systematic Review of Possible Risk and Protective Factors. *Tauma, Violence, & Abuse*, 25(1), 430–447.
- Kutlar, A., Bilen, M., & Sarikaya, M. (2012). The Relationship between Property Crime and Social-economic Indicators in Turkey. *African Journal of Business Management*, 6(23), 7053–7065.
- Lobont, O., Nicolescu, A., & Moldovan, N. (2017). The effect of socioeconomic factors on crime rates in Romania: a macro-level analysis. *Economic Research-Ekonomska Istraživanja*, 30(1), 91–111.
- Lodge, E. K., Hoyo, C., Gutierrez, C. M., Rappazzo, K. M., Emch, M. E., & Martin, C. L. (2021). Estimating exposure to neighborhood crime by race and ethnicity for public health research. *BMC Public Health*, 21(1), 1–13.
- Lymperopoulou, K., & Bannister, J. (2022). The spatial reordering of poverty and crime: A study of Glasgow and Birmingham (United Kingdom), 2001 / 2 to 2015 / 16. *Cities*, 130(July), 103874.
- Masron, T., Ahmad, A., Abdillah, K. K., Syakinah, A., Ali, M., Junaini, S. N., & Kimura, Y. (2025). Deciphering Property Crime Through OLS Regression: A Demographic Study. *International Social Science*, 75(256), 395–412.
- National Bureau of Statistics. (2011). *National Bureau of Statistics: Annual Abstract of Statistics, 2011. Federal Republic of Nigeria*.
- National Bureau of Statistics. (2017). *Labor Force Statistics: Unemployment and Underemployment Report* (Vol. 1, Issue December).
- National Bureau of Statistics. (2018). *Crime Statistics: Reported Offences by Type and State* (Issue June).
- National Bureau of Statistics. (2020). 2019 Poverty and Inequality in Nigeria: Executive Summary. *National Bureau of Statistics (NBS)*, May, 1–27.
- Nigerian Institute of Social and Economic Research. (2025). *Analysis of 2025 Federal Government Budget*.
- Nwankwo, U. V., & James, O.-O. (2016). Prevalence of Lethal and Non-lethal Crimes in Nigeria. *J. Adv. Res. Humani. Social Sci.*, 3(1), 10–24.

- Odia, A. A., & Iyamu, E. O. S. (2016). Education and Unemployment in Nigeria: A Critical Analysis. *Benin Journal of Educational Studies*, 24(1 & 2), 99–110.
- Okoliko, M. G., & Adebayo, A. (2025). Education Policy and its Impact on Socioeconomic Outcomes in Northern Nigeria: A Sustainable Development Perspective. *Mediterranean Journal of Social Sciences*, 16(1), 80–91.
- Oloyede, O. I., & Dare, O. (2021). Dimensions of human security and socio-economic development in Ilorin metropolis, Kwara State, Nigeria. *Ghana Journal of Geography*, 13(3), 42–65.
- Onyeneke, C. C., & Karam, A. H. (2022). An Exploratory Study of Crime : Examining Lived Experiences of Crime through Socioeconomic , Demographic , and Physical Characteristics. *Urban Science*, 6(43), 1–17.
- Oyinloye, M. A., Adegboyega, S. A., Akinluyi, F. O., Komolafe, A. A., Akinyede, J. O., Aladejana, O. O., & Akande, S. O. (2023). Detection and Mapping of Violent Crime Hotspots in Southwestern Nigeria. *Journal of Geographic Information System*, 15, 334–365.
- Pallangyo, W. A., & Imori, J. M. (2017). Linking crime incidences with demographic and socio-economic factors in Kinondoni police region , Dar es Salaam. *International Journal of Development and Sustainability*, 6(6), 239–259.
- Popoola, A., Alabi, M., Ojo, A., & Adeleye, M. (2018). Household and Neighbourhood Responses to House Burglary in Ibadan. *Journal of African Real Estate Research*, 3(2), 150–178.
- Reuben, E. G., & Nnam, M. U. (2018). Predictors and Risk Factors of Armed Robbery Victimization in Nigeria: An Integrated Theoretical Perspective. *European Scientific Journal, ESJ*, 14(29), 1.
- Shaw, C. R., & McKay, H. D. (1942). *Juvenile delinquency and urban areas*. Chicago: University of Chicago Press.
- Silva, C. F. A. da, Melo, S. N. de, Vaughan, A. D., Santos, A. M. dos, & Junior, and P. M. de A. (2022). *The Influence of Racial Minorities and Ethnic Heterogeneity in the Estimation of Homicide Rates in the Northeast Region of Brazil: Implications for Social Disorganization Theory in the Global South*.
- Sugiharti, L., Esquivias, M. A., Shaari, M. S., Agustin, L., & Rohmawati, H. (2022). Criminality and Income Inequality in Indonesia. *Social Sciences*, 11(3), 1–19.
- Sun, L., Zhang, G., Zhao, D., Ji, L., Gu, H., Sun, L., & Li, X. (2022). *Explore the Correlation between Environmental Factors and the Spatial Distribution of Property Crime*.
- Tavares, J. P., & Costa, A. C. (2021). *Spatial Modeling and Analysis of the Determinants of Property Crime in Portugal*.
- Tersoo, A., & Terseer, A. (2021). The Effects of Violent Crime on Socio-Economic Development in Gboko Metropolis. *IOSR Journal of Humanities And Social Science (IOSR-JHSS)*, 26(3), 51–59.

- Ucha, C. (2010). Poverty in Nigeria : Some Dimensions and Contributing Factors. *Global Majority E-Journal*, 1(1), 46–56.
- Usman, U. S. (2015). The Socio-economic Causes and Effects of Armed Robbery in Contemporary Nigerian Society. *International Journal of Economics, Commerce and Management United Kingdom*, III(5), 886–897.
- Wang, L., Lee, G., & Williams, I. (2019). The spatial and social patterning of property and violent crime in Toronto neighbourhoods: A spatial-quantitative approach. *ISPRS International Journal of Geo-Information*, 8(1), 1–18.