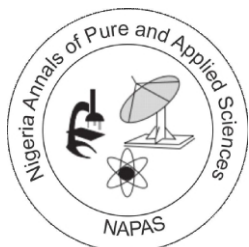


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Statistical Analysis of Crime and its Causation in Ogun State, Nigeria

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Abstract

The Crime rate in Nigeria is at an epic stage and this has resulted in insecurity and mistrust among the ethnic groups. The aim of the study is to determine if crimes committed in Ogun State are ethnical inclination or not. The crime data is a secondary datasets obtained from the Ogun State Police Headquarters, Elewe-Eran, Ogun State from January, 2018 to December, 2023. The methods used to analyse the crime data are descriptive statistics, chi-square test and logistic regression models. From the descriptive statistics results, violent crime committed is at 68.9% and this includes murder, kidnap, armed robbery and cultism. The age group that commits the most crime is 18-40 years, 69.8% were males and 49.8% were from the Yoruba extraction, 25.0%, and 25.2% were from the Hausa and Igbo ethnic groups respectively. The chi-square test results signified a significant dependence among crime, age, gender and ethnicity in Ogun state at a 5% level of significance. The multiple logistic regression model signified a significant association between age, gender, ethnicity and crime. An increase in age may limit crime and a relationship between crime gender and ethnicity indicating most individuals that commit crime are men and Yorubas based on the odds ratio values. Conclusively, there exists dependence between age, gender, ethnicity and crime causation in Ogun state, Nigeria and the general notion that a particular ethnic group commit most crimes in Ogun state and Nigeria in general should not be a yardstick for castigating and pointing accusing finger at any ethnic group within Nigeria.

Keywords: Crime, Age, Gender, Ethnicity, Chi-square test, Logistic regression model

Introduction

Nigeria as a nation is critically ill and this can be attributed to the multi-facet factors (Osimen *et al.*, 2016; Orhero, 2019). The economy of the country is in bad shape, and this is caused by the mismanagement of funds, lack of proper policies that will stimulate the economy and over-reliance on foreign products (Okibe and Eneasato, 2020). The country is infested currently with many socio-economic problems such as an increase in crime rate, prison congestion, insurgency, nepotism, unemployment, drug abuse, poverty and many more (Abdulkarim, 2012; Oguntunde *et.al*, 2018; Ebobo and Alero, 2022). Nigeria is one of the countries in Africa with the most disturbing crime rates (Saleh, 2021). The incident of violent and nonviolent crimes is on the increase in the country (Adisa *et.al.*, 2022).

As if this is not enough, political instability has led to ethnic division, religious conflict, and distrust among the six geo-political zones. In return, the country has experienced a high level of uneven distribution of political, economic, and social rights over the years (Fawole and Bello, 2011; Chidi, 2022). These multi-faceted factors have created a big monster, and this has to do with crime rate levels around the country. The kinds of crimes committed range from terrorism, cyberbullying, bank robbery, looting of public government treasury, kidnapping and ransom demand, these crimes are so rampant, and the populace is feeling unprotected (Osolase, 2014; Okwuwada, 2023). They believe the government at all levels is not

doing enough and the ill-equipped and unprofessional police forces are not helping matters at all due to lack of patriotism and dedication (Oghuvbu and Chidozie, 2018; Ugwuoke *et al.*, 2023). Afterwards, some regions are known to be well educated while some are known to be less enlightened in Nigerian multi-ethnic societies, the saga of societal stigma is inevitable and there is the possibility that crimes committed are distributed as well as prevalent along this line of distinction and there is a likelihood that crime is committed for several reasons (Onyibor, 2016; Nsereka, 2019).

Since crime is perpetuated on the premise of motives by an individual or a group of people, then, there is the need to study the motive if crime is to be understood. If it is committed by a group of people, the motive must emanate from someone or somewhere. Therefore, for others to be involved, it must be communicated effectively to them, and they must buy in. For there to be effective communication, there must be an acquaintance- a basis for dissemination, acceptance and trust (Dave *et al.*, 2008). Hence, if the crime is committed by a group of people, they must have had some form of relationship which brings among them trust, and singularity of purpose (Isiaka and Okaphor, 2018).

Several works on crime analysis in Nigeria that includes the works of Oguntunde *et al.* (2018) signified a significant relationship between crime types in Nigeria, particularly murder, armed robbery, kidnapping, and rape, with Southern Nigeria experiencing more armed robbery attacks than Northern Nigeria. Oyelade (2019) analysed

crime determinants in Nigeria from economic and socioeconomic perspectives. Their results signified that GDP per capita, female unemployment rate, and higher education negatively affect crime rates, while urban and rural populations, male unemployment rates, and poverty rates have positive effects. Arisukwu *et al.* (2020) stated that youths are the primary suspects in any crime and unemployment, poverty, and lack of social infrastructure exacerbated crime while low community interactions hindered crime prevention and control. Adekoya and Razak (2020) suggested that ethnic diversity can be crucial for reducing the crime rate nationally. Topeet *al.* (2021) revealed that in Nigeria, a high percentage of unemployment induced a high rate of crime, with a 1% rise in unemployment resulting in a 0.0830 increase in crime rate in Nigeria. Agbabiaka, *et al.* (2022) found that there may not be a significant variation in crime occurrence across communities, but high occurrences of robbery, assault, pocket-picking, theft, burglary, and morality crimes were prevalent in low- and middle-income areas. Achebe and Onyemaechi (2023) discovered that a larger percentage of youth apprehended for violence in Lagos state by the Nigeria Police Force were significantly predisposed to violent activities based on factors such as gender, family background, and marital status. As well, Ogunmefunet *al.* (2024) used their study to find a positive correlation

H_0 : crimes committed in Ogun State are ethnically inclined

vs

H_1 : crimes committed in Ogun State are not ethnically inclined

between moral disengagement and a tendency to commit crime among male adolescents in Anambra State. Their findings suggested that the Government at all levels needs to reorientate the youth on the danger and effects of crime.

A clear indication from the literature about crime analysis in Nigeria signified that much has not been done on crime and ethnic inclination. To this end, the general belief that most crimes are committed by a particular tribe or ethnicity, especially in Southwest Nigeria will be analysed using crimes secondary data obtained from the National Bureau of Statistics and Ogun State Police Force Headquarters, Elewe- Eran, Ogun State on armed robbery, kidnapping, cultism and rape cases concerning age and ethnic inclination. The specific null hypothesis is to test if crimes committed in Ogun State are ethnical inclination. Therefore, this study intends to establish if the crime is ethnically inclined based in Ogun state, Nigeria. The methods that will be used are descriptive statistics, the Chi-square test and the Logistic regression model.

Materials and Methods

Research Hypothesis

This specific aim of the research is test whether crimes committed in Ogun State are ethnical inclination or not. The research hypothesis used is;

Dataset

The crime datasets used in this study is secondary in nature and obtained from the Ogun State Police Headquarters, Elewe-Eran, Ogun State from January, 2018 to December, 2023. The datasets is cross-sectional since several characteristics about crime committed in Ogun state were obtained over a particular period. The datasets is made available for researchers who applied for the usage as an empirical research tool. The main characteristics collected are crime types, age group, gender and ethnicity of offenders. The potential bias attributed to Nigerian police is put into consideration and this was taken care of in the research analysis.

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

it has a (n-k) degree of freedom, n is the number of observations, k is the number of parameters, O_i and E_i are the observed and expected values. The chi-square assumptions used are categorization and independence of observation, and mutual exclusive cells

Contingency table test

Two categorical variables will be arranged in r rows and c columns of an $r \times c$ contingency table, with

$$E_{ij} = \frac{\text{Row total}}{\text{sample size}} \times \frac{\text{Column total}}{\text{sample size}} \times \text{Grand Total} \quad (2)$$

The chi-square (χ^2) given in (1) is distributed χ^2 with $(r - 1)(c - 1)$ degrees of freedom.

Logistic Regression

The dependent variable in logistic regression is a logistic transformation of the odds or logit.

Descriptive Statistics

This is the process of using quantitative statistics to describe or analyse a set of data in a meaningful way. The descriptive statistics used are frequency distribution, measures of central tendency and dispersion, Charts and Graphs.

The Chi-square (χ^2) test

A unique test of significance called the chi-square (χ^2) is utilized to determine whether the theory and the facts agree (or whether observed and expected values agree). It is expressed as

the observed frequencies for each variable totalling n, the sample size. The sum of the frequencies is represented by the row and column totals. The sample size is indicated by the sum of the row and column totals while the degree of freedom, $(df) = (r - 1)(c - 1)$.

Each cell in the contingency table's row i and column j correspond to an observed frequency. The expected value (E_{ij}) is determined as

$$\log(\text{odds}) = \text{logit}(p) = \ln\left(\frac{p}{1-p}\right) \quad (3)$$

The logistic regression is created by taking the dependent variable in the log(odds) and adding

a regression equation for the independent variables. That is

$$\log(p) = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k \quad (4)$$

The relationship that exists between the logit(p) and X is taken to be linear, just like in least-squares regression. Consequently,

$$p = \frac{\exp(a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k)}{1 + \exp(a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k)} \quad (5)$$

where a is constant, b is predictor variables, exp is the exponential function and p is the likelihood that a case falls into a given category. The assumptions considered are independence, linearity, binary variable and sufficient sample size.

Results and Discussion

Descriptive Statistics

The data used in this study was obtained from the Ogun State Police Headquarters, Elewe-Eran, Ogun State with the following characteristics: crime, age, gender and ethnicity. Table 1 shows the crime categories frequency distribution, and this signified violent crime is at 68.9% and non-violent crime at about 31.1%. These violent crimes include murder, kidnap, armed robbery and cultism.

Table 2 is utilised to present the frequency distribution of age of offenders, and this signified that 40.5% of crimes were committed by offenders in the age bracket of 18 – 25 years, 36.2% are by ages 26 – 40 while only 23.5% are committed by age 41 years and above. The frequency distribution of gender of offenders given in Table 3 indicated that 69.8% of the offenders are male while 30.2% are female and this implies crimes are often committed by male folks in Ogun State. Table 4 is utilised to present the frequency distribution of the various ethnic groups of offenders in Ogun State where 49.8% were Yoruba extraction, 25.0% and 25.2% were Hausa and Igbo ethnic groups. This signified majority of crimes committed in Ogun state are committed by the Yorubas.

Table 1: Distribution of crime categories in Ogun state

	Frequency	Percent	Valid Percent	Cumulative Percent
Nonviolent	879	31.1	31.1	31.1
Violent	1948	68.9	68.9	100
Total	2827	100.0	100.0	

+Table 2: Frequency distribution of age of offenders

	Frequency	Percent	Valid Percent	Cumulative Percent
18-25 years	1139	40.3	40.3	40.3
26-40 years	1024	36.2	36.2	76.5
Above 41 years	664	23.5	23.5	100
Total	2827	100.0	100.0	

Table 3: Distribution of gender of offenders

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	1973	69.8	69.8	69.8
Female	854	30.2	30.2	100.0
Total	2827	100.0	100.0	

Table 4: Distribution of crime committed on ethnicity

	Frequency	Percent	Valid Percent	Cumulative Percent
Yoruba	1406	49.8	49.8	49.8
Hausa	708	25.0	25.0	74.8
Igbo	713	25.2	25.2	100.0
Total	2827	100.0	100.0	

Contingency table test results

Setting an hypothesis for independence of crime and age as

H_0 : crime was not dependent on age vs H_1 : crime dependent on age.

H_0 : crime was not dependent on gender vs H_1 : crime dependent on gender.

The chi-square value of 252.218 with a corresponding p-value = 0.000 is displayed in Table 6. This indicated the rejection of the null hypothesis and there is statistical evidence of dependence

H_0 : crime was not dependent on ethnicity vs H_1 : crime dependent on ethnicity.

From Table 7, the test gives a chi-square value of 139.178 with a corresponding p-value = 0.000 which is less than 0.005, therefore indicates that we reject the null hypothesis – H_0 (crime is not dependent on ethnicity) and accept alternative

Table 5 indicated a chi-square test value of 76.722 with a corresponding p-value of 0.000. This signified statistical evidence of dependence (relationship) between crime and age. In the same vein, by setting a hypothesis for independence of crime and gender as

between crime and gender. Constructing a hypothesis for independence of crime and ethnicity as

hypothesis - H_1 (crime is dependent on ethnicity). From the Pearson Chi-square value of 139.178 and p-value of 0.000, it is concluded that there is statistical evidence of dependence between crime and ethnicity.

Table 5: Chi-Square Tests for Independence of Crime and Age

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	76.722 ^a	2	0.000
Likelihood Ratio	75.319	2	0.000
Linear-by-Linear Association	74.334	1	0.000
N of Valid Cases	2827		

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 206.46.

Table 6: Chi-Square Tests for Independence of Crime and Gender

	Value	Df	Asymptotic (2-sided)	Significance	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	252.218 ^a	1	0.000			
Continuity Correction	250.815	1	0.000			
Likelihood Ratio	243.188	1	0.000			
Fisher's Exact Test					0.000	0.000
Linear-by-Linear Association	252.129	1	0.000			
N of Valid Cases	2827					

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 265.53.

b. Computed only for a 2x2 table

Table 7: Chi-Square Tests for Independence of Crime and Ethnicity

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	139.178 ^a	2	.000
Likelihood Ratio	141.261	2	.000
Linear-by-Linear Association	114.257	1	.000
N of Valid Cases	2827		

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 220.14.

Logistic regression analysis results

The datasets utilised contain three predictor variables, that is age, gender, and ethnicity. While the response variable is crime. The multiple logistic

regression model was formulated making Y_i the binary outcome of crime, (violent/nonviolent) for i . $Y_i \sim \text{Bernoulli}(\pi_i)$. The model representation is given as

$$\text{Logit}(P(Y = 1|x)) = \beta_0 + \beta_1 \text{age} + \beta_2 \text{gender} + \beta_3 \text{ethnicity} + e_t \quad (6)$$

The fitted multiple logistic regression model result is displayed in Table 8 and the model with the estimated parameters is given in Equation (7).

$$\text{Logit}(P(Y = 1|x)) = 3.613 - 0.302 * \text{age} - 1.175 * \text{gender} - 0.365 * \text{ethnicity} \quad (7)$$

Table 8 displays the odds ratio and the estimates of all the predictor variables. The odds ratio estimates for all the predictors are precisely the values given in the Exp(B) column. The 95% Wald Confidence

Limit showed the confidence interval (CI) for the odds ratio given the other predictors in the model. For a given predictor with a level of 95% confidence, there is 95% confidence that the true

population odds ratio lies between the lower and upper limit of the interval. Hence, age, gender and ethnicity are all significant predictors. The fitted model further showed a negative association between age, gender, ethnicity and crime. This is because the p-value of age (0.000) is far below the chosen significant level of 0.05. This result showed that an increase in age decreases the tendency to commit crimes. The odds ratio also shows that the

multiplicative effect of a year increase in age on the odds of committing crimes is 0.739. There is also an established relationship between crime, gender and ethnicity. The odds ratio showed that individuals who are men and Yorubas are most likely to commit crimes in Ogun State. The likelihood ratio and Score test with p-values of 0.000 in Table 9 signified the significance of the regression coefficients in the model.

Table 8: Multiple logistic regression analysis result

Step 1 ^a	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Step 1 ^a Age	-.302	0.055	29.643	1	0.000	0.739	0.663	0.824
Gender	-1.175	0.090	170.448	1	0.000	0.309	0.259	0.368
Ethnicity	-.365	0.052	48.699	1	0.000	0.694	0.627	0.769

Table 9: Test of hypothesis for coefficients

Test	Chi-square	DF	Pr>ChiSq
Likelihood Ratio	145.7632	4	<0.000
Score	106.1841	4	<0.000

Conclusion

The datasets employed in this study were obtained from the Ogun State Police Headquarters, Elewe-Eran, Ogun State, Nigeria with particular interest in crime, age, gender and ethnicity. The frequency distribution analysis signified violent crime is 68.9% and this includes murder, kidnap, armed robbery and cultism. There is an indication that crime was mostly committed by offenders in the age bracket of 18-40 years. The frequency distribution of gender of offenders signified that 69.8% were males and 49.8% of offenders in Ogun State were from the Yoruba extraction, 25.0% and

25.2% were from the Hausa and Igbo ethnic groups respectively. The chi-square test results signified a significant dependence among crime, age, gender and ethnicity in Ogun state at a 5% level of significance. The multiple logistic regression model signified a significant association between age, gender, ethnicity and crime. That is, an increase in age may decrease the tendency of committing crimes and an established relationship between crime gender and ethnicity with an indication based on the odds ratio that most individuals that commit crime in Ogun state are men and Yorubas. Conclusively, there exists a

dependence between age, gender, ethnicity and crime causation in Ogun state, Nigeria. As well, the general notion that a particular ethnic group commit most crimes in Ogun state and Nigeria, in general, should not be a yardstick for castigating and pointing accusing at any ethnic within Nigeria.

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