SPATIO-TEMPORAL ANALYSIS OF CRIME OCCURRENCE IN OKENE TOWN, KOGI STATE NIGERIA

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ABSTRACT

Crime is one of the security problems confronting humanity across the world and Okene Township in particular. This study focused on the spatio-temporal analysis of crime occurrences in Okene Town of Kogi State, Nigeria. The specific objectives include mapping the types of crimes and examining the spatio-temporal pattern of crimes in the study area. Map of the study area was obtained from the urban planning section of the Ministry of Land and Survey. Due to availability of data from Police Headquarter crime data for a period of five years (2014-2018) were acquired from the Nigerian Police Okene Divisional Headquarters, Kogi State. Nearest Neighbor Analysis (NNA) in ArcGIS 10.5 software was used to determine the pattern of crime occurrence in the area. The result reveals that theft/stealing (22%), armed robbery (14%), home breaking/burglary (13%), and kidnapping (12%) were the most frequently reported crimes. The trend analysis of crime from 2014 to 2018 however, shows that 2015 had the highest (31%) rate of reported crime while 2018 had the lowest (14) incident of reported crime during the period of study. The spatial pattern of crime on the other hand, revealed a clustered point at 0.01% significance level with the Nearest Neighbour Ratio (NNR) of 0.7007 as neighbourhood like Bariki, Ogaminana Central, Anyoke 1 and 2, Idoyi, OkeneEba and ObeibaIhima had high incidents of reported crime. The study thus recommends that community policing committees should be established in Bariki, Ogaminana Central, Okene Eba neighbourhoods and other affected towns and villages bedeviled by criminal activities in the Town.

Key words: Armed robbery, Crime, Nearest Neighbour Analysis, Spatial pattern, Theft/Stealing

INTRODUCTION

The existence of crime is as old as the creation of man itself and man has always looked for ways to combat and reduce it as much as possible. Criminal activities have continued to be a major concern to contemporary society. Its occurrence in the form of kidnapping, thefts, robbery, assaults, homicide, etc. is something that takes place every day in almost all parts of our world (Fajemirokun et al., 2006). Most nations in the world are faced with unacceptable levels of delinquency and crime (Ackerman & Murray, 2004) which is very pathetic, pervasive, persistent, vulnerable, disastrous and tragic to the progress of development in any country (Ibrahim & Kuta, 2015). A society with a high rate of criminal events is less attractive to both local and foreign investment and this is the present situation that prevails in most parts of Nigeria (Ejemeyovwi, 2015).

There is no universal definition of crime due to changes in social, political, psychological and economic conditions, as the perceptions of crime also are not determined by any objective indicator of the degree of injury or damage but by cultural values and power relations (Goldsmith, 1999). An act may be a crime in one society, but not in another (Dambazau, 2007). For example, prostitution, adultery and homosexuality between consenting adults have been wholly or partially removed from the criminal laws in United States America (USA) (Feldman, 1997) but are considered as crimes in Muslim communities such as Saudi Arabia. The constant changes in time also change the perception of society on crime. For instance, it is becoming a crime to pollute the air and water. Therefore, the perception of an "act" to be a crime varies with time and space (Femi et al., 2015).

In a strict sense, Galvin (2002) defined crime as deviant behavior that violates prevailing norms, which may be cultural, social, political, psychological and economic conditions. Crime is also defined as any breach of an established rule, regulation, or law committed by person(s) for whom a punishment may ultimately be prescribed by a law enforcement body (Crews, 2009). The nature of these crimes includes armed robbery, murder, rape, car theft, burglary, fraud, bribery and corruption, food and drug adulteration, gambling, smuggling, human trafficking, kidnapping, drug trafficking, money laundering, internet scam, advanced fee fraud and other illegal activities (Egwu, 2003; Kunnuji, 2016). This definition of crime is adopted for this study.

Crime according to Nigeria's criminal code are categorized into: Crime of aggression, crime against morality and custom, crime of acquisition and crime against public order. Crime of aggression include murder, ritual killing, wounding, kidnapping, criminal activities such as assault or rape usually occur in the course of robbery and are excluded from the general categories. Crime against morality and custom involves sexual offense and other forms of sexual assault, deviance, prostitution, vagrancy, gambling and other behavior thought to be disorderly, and non-productive or otherwise offensive to prevailing standards of public conduct (Dambazau, 2007). Crime of acquisition includes all illegal means of acquiring wealth such as fraud and embezzlement. Crime against public order is any crime, which involves acts that interfere with the operation of society and the ability of people to function efficiently, it can be said to be behavior that has been labeled criminal because it is contrary to shared norms, social values and customs (Okechukwu, 2011).

Nigeria has one of the highest crime rates in the world (Adebayo, 2013) as there is no disagreement from both macro and micro level studies that the rate of crime in Nigeria has reached an unacceptable level (Independent Corrupt Practice Commission, 1999). The fact file on losses in Nigeria between June 1999 and October 2001 estimated properties cost is in billions of naira, while a total of 3680 people lost their lives (Osawe, 2015). In many urban centres of Nigeria today, criminal activities and violence are assuming dangerous tendencies as they threaten lives and properties, the national sense of well-being and coherence, peace, social order and security, thus reducing the citizen quality of life (Femi et al., 2015).

Kogi State is one of the most tempestuous and conflict-prone states in Nigeria (Sampson, 2012). According to the author, the cases of the use of illegal arm and political thuggery are rampant in the State. Also common are incidences of communal and religious violence with the motivation behind violent acts including political and electoral contestations, religious and ethnic rivalry, and resource-based violence. Religious violence is a common occurrence in Kogi State especially in Okene town. In August 2012 for instance, gunmen killed at least 19 people at a Christian worship

center in Okene Town, prompting the government to impose a curfew and 24-hours surveillance in some parts of the State (Michael, 2012). Statistics shows that over 50 persons might have lost their lives in armed robberies in the state with Okene Town accounting for the death of 15 people in a wave of violent robberies of four banks between 2010 and 2012 (Bitrus, 2012).

Like other towns in Kogi state, Okene has had its own share of arson, kidnapping, armed robbery, assault, murder, thuggery, rape, terrorism and car hijacking just to mention a few. It is therefore pertinent to know that the community with high criminal activities is unattractive to both local and foreign investment. This is a problem that prevail in Okene town as it has been observed that crime has serious consequences for the town's ability to promote development as crimes degrade quality of life; aggravate social dislocation and social tension; inhibit access to possible employment and discourage accumulation of assets (Forefront, 2019). Aside from the human and sociological effect of crime, there is a significant cultural and economic cost to the society (Adewuyi et al., 2017).

Okene has also experienced a surge in criminal activities as the town is currently caught in the web of criminal dilemma, but the most alarming and terrifying is the present escalation of violent crimes and the barbaric and traumatic acts the perpetrators unleash on the unlucky citizenry across the length and breadth of the town. Notable in this regard, are the rising incidents of armed robbery attacks, assassinations and ransom-driven kidnappings, and other crimes which have led to loss of lives and property (Forefront, 2019). The above-mentioned crimes have led to the under-development of the town and the act has not only led to material and immaterial costs for those who have been victimized, but it has forced indigenes and governments of Okene to spend millions on the prevention of crime, the detection, prosecution and punishment of criminals (Ismail et al., 2017). This necessitated the spatio-temporal analysis of crime occurrences in Okene town. The specific objectives are to identify and map crime types, determine the spatio-temporal distribution of crime in the study area.

THE STUDY AREA

Okene town, which is the administrative headquarters of Okene Local Government Area of Kogi State lies within the north-central geopolitical zone of Nigeria known as middle belt region (Ismail et al., 2017). It is located between Latitudes 7°34'03" N and 7°40'29" N and Longitudes 6°12'09" E and 6°15'11" E (Fig. 1). It covers an area of 328 km sq and shares boundaries with Oyi town to the north, Lokoja to the northeast, Ajaokuta to the east, Akoko-Edo in Edo state to the south and west, and Ijumu to the northwest. The town and its neighbouring environs fall within the tropical savannah climate or tropical wet and dry climate. The temperature is above 18°C throughout the year and the annual rainfall is usually between 1,100mm and 1,300mm (Clement et al., 2019)
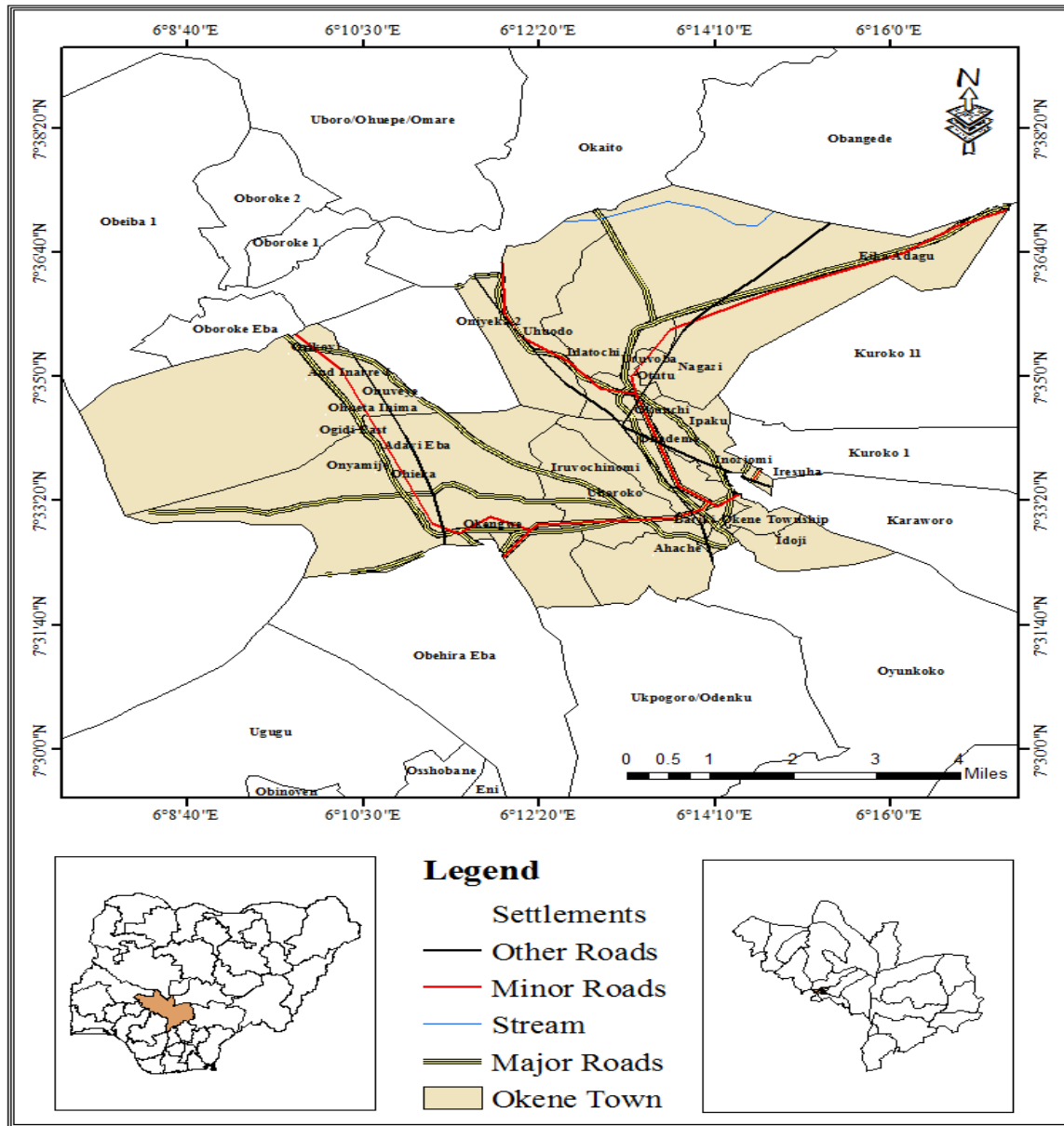
Figure 1: Okene Township
Source: Modified from Administrative Map of Kogi State (2014)

The relief of Okene town like other parts of the middle belt could be classified into, stable land surface and erosional. The stable land surface consists of level or undulating plateau surface at over 1,200 feet. These surfaces are characterized by smooth round inselbergs at Okene and Upogoro areas; flat-topped hills and bold ridges dominate other parts of the area with example at Okene and Okengwen districts, which often serve as hideout for criminals (Ishaku et al., 2016). The vegetation of Okene is the Tropical Guinea savannah type with tall grasses and some sparse trees. The vegetation is prominently made up of sparsely distributed trees, herbs, shrubs, and tall grasses. These are green in the rainy season with fresh leaves and tall grasses but the land is open during the dry season, showing charred trees and remains of burnt grasses (Otupuru, 2014). The

1991 National Population Census, put the population at 317,953 people with a population growth rate of 3.04% (National Population Commission, 1991). Using the Newman (2001) formula, this was projected to 695,681 in 2018. The major ethnic group is Ebira and Islam is the predominant religion. The town is composed of two main clans: Okovi and Agada. Okovi is further subdivided into Asuwe, Omavi, Ehebe, Eyire, Omoye, Adobe and onyi-Onwa clans while Agada is also subdivided into Akuta, Avi, Ogu, Ede Ohi-Monoko,and Esusu clans (Ismail et al., 2017).

MATERIALS AND METHODS

The data used for this study were obtained from both primary (geographic coordinates of crime) and secondary sources (administrative map, crime types and their location). The geographical coordinates of the crime scenes were collected using a Garmin eTrex R 20x handheld Global Positioning System with an accuracy of approximately 5 metres. The administrative map of the study area (1:50,000) was acquired from the Ministry of Land and Survey, Kogi State and used as the base map for the study. The data on crime, types and their places of occurrence from 2014-2018 were obtained from the crime records of the Divisional Police Headquarters, Okene. The period 2014-2018 was considered for the study due to the availability of crime data. Non-participatory observation was also used to identify the condition of the policing facilities of various administrative wards in the study area.

The crime data was imported to Microsoft excel as a CSV (comma delimited) file which is recognizable and acceptable to the ArcCatalog extension of ArcGIS. The map was scanned and for geo-referenced using of six Ground Control Points (GCPs) to bring a relationship between the scanned maps and actual representation on the ground, thereby allowing overlay analysis to be carried out (Figure 2). Shapefiles was created in Arc-Catalog environment with same coordinate system (WGS 84) as the map. The shape files were imported into ArcMap environment where on-screen digitizing was carried out on images of the study area. Subsequently, roads, towns, crime spot and ward boundary themes were generated and used for result presentations.

The geographic coordinates of crime scenes were overlaid on the geo-referenced and digitized map of the study area in order to map the distribution of the various crime types. Simple descriptive statistics was used to identify reported crime in the study area while Nearest Neighbour Analysis (NNA) an inferential statistical tool in ArcGIS10.5 was employed to determine the spatial pattern in the data. This tool automatically calculates for the average nearest neighbor ratio by dividing the observed average distance by the expected average distance. NNA is the method of exploring pattern in the location data by comparing mean distance of a phenomenon to the same expected mean distance usually under random distribution (Getis & Ord 1996). A negative z-score indicates clustering, while a positive z-score means disperse or evenness. Moreover, the z-score usually returns a range of values between -2.58 to 2.58. Therefore, a negative z-score less than -2.58 indicates a significant clustering at 0.01 probability level while a positive z-score greater than 2.58 indicates a significant regularity or dispersal at 0.01 probability level (Getis & Ord 1996). In addition, the result does not take the form of a map, but rather statistical output and if the ratio is less than 1, the data is said to exhibits a clustered pattern, whereas a value greater than 1 indicates a dispersed pattern (Pimpler, 2017)

RESULTS AND DISCUSSION

Forms of Crime in Okene Town

There were nine (9) forms of crime recorded in the crime data from the police division in the area between 2014 and 2018. These were Armed Robbery, Murder/Homicide, Theft/Stealing, Assault, Rape, Burglary/Home Breaking, False Pretense and Cheating, Hurting/Fighting and Kidnapping (Table 1).

Table 1: Forms of Crime in Okene Town

Forms of Crime	Frequency	%
Armed Robbery	25	14.0
Murder/Homicide	18	10.0
Theft/Stealing	40	22.0
Assault	19	11.0
Rape	9	4.0
Burglary/Home Breaking	24	13.0
False Pretense and Cheating	11	6.0
Hurting/Fighting	14	8.0
Kidnapping	21	12.0
Total	**181**	**100.0**

Source: Field Survey, 2020

Table 1 reveals that theft/stealing was the most prominent forms of crime in the area with 22% followed by armed robbery (14%) while rape and false pretense were low with 4% and 6% respectively. This result revealed that theft/stealing is the most common type of crime in the study area. The findings of the study are similar to that of Bala et al. (2015) in Katsina state, Ayuba et al. (2016) in Kaduna State and that identified in Benin City by Balogun et al. (2014). These exposed the high rates of theft/stealing in the respective areas. Therefore, the above analysis of the responses has shown that theft/stealing, armed robbery and home breaking/ burglary are the main social maladies confronting residents of Okene town.

The forms of crime identified in Table 1 were mapped to provide a pictorial representation of the crime types in Okene Town. The result is presented in Figure 2.
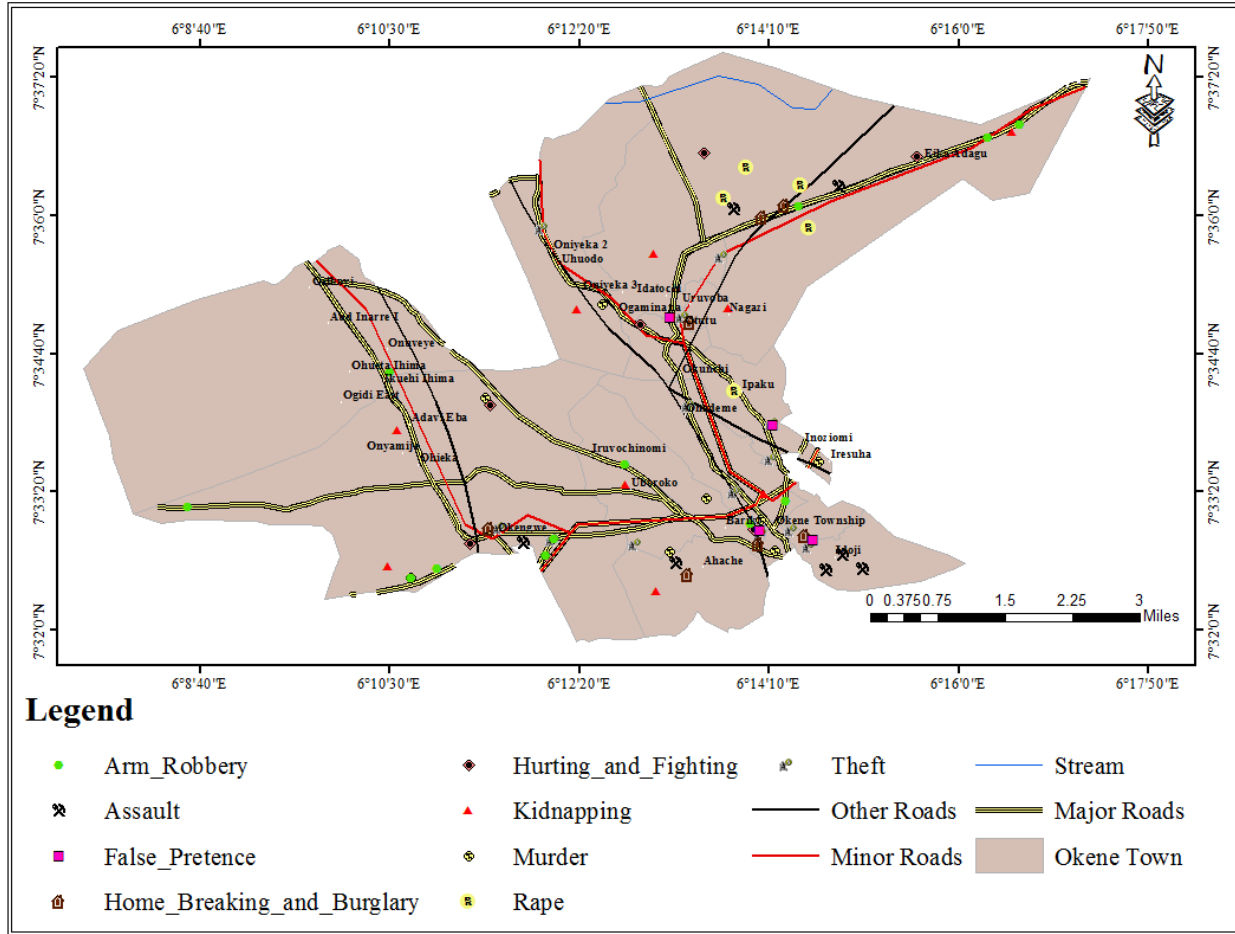
Figure 2: Crime Forms in Okene Town

From Figure 2, it is obvious that most of the crime occurred around Bariki, Ogaminana Central, Anyoke 1 and 2, Idoyi, OkeneEba and ObeibaIhima neighborhoods. This is due to the fact that, these neighbourhoods are the commercial hubs of the town and are characterized with high concentration of human population and economic activities. This agrees with the theory posited by Brantingham and Brantingham (1981) that the presence of certain land use is theoretically predictive of crime levels in a particular neighbourhood.

The Spatial Pattern of Crime in Okene Town

The result in Figure 3 revealed that the observed mean distance between the crime incidents is 447.5 meters as opposed to the expected mean distance of 638.6 meters as analyzed using Nearest Neighbour Analysis tool in ArcGIS 10.5 software. The NNA rule states that a negative Z-score indicates clustering while a positive z-score indicates dispersed pattern of crime. The result of NNA revealed that the spatial pattern of the crime events in the study area is clustered around the densely populated areas of Bariki, Ogaminana Central, Anyoke 1 and 2, Idoyi, OkeneEba and ObeibaIhima with Z-scores of -4.8, that is, there is less than 1% probability that this clustered pattern of crime incidents could be because of random chance. The clustered pattern of the reported crime events is a result of high population with increased economic activities at specific

areas. The inequality in the population distribution and public socials facilities and services (police stations, hospitals, schools, banks, filling stations) in the town is the main cause of the clustered pattern of crime in the study area.

Furthermore, the densely populated areas happen to be the commercial hub of the town, housing institutional and business establishment as well as enormous economic activities.
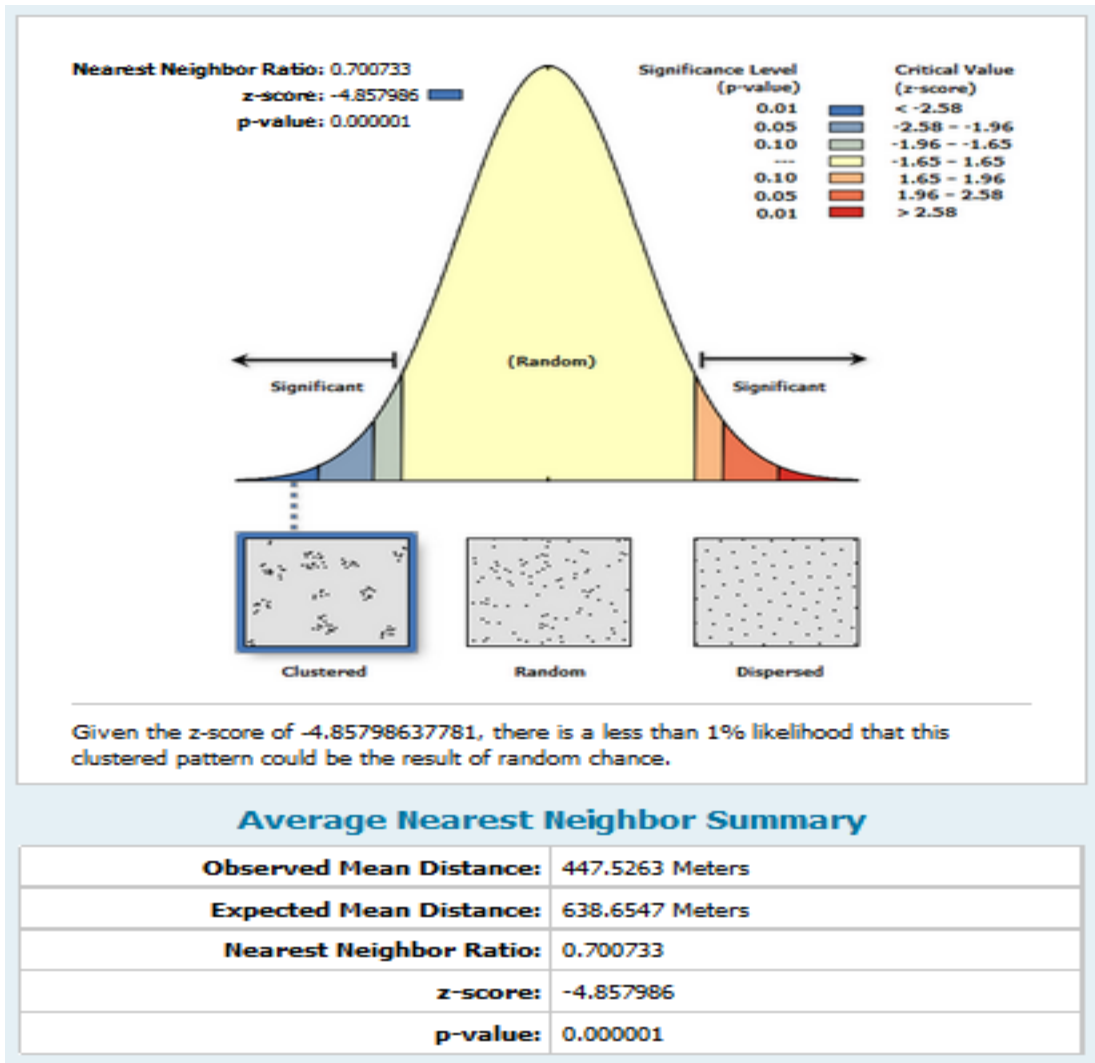

Figure 3: Spatial Pattern of Crime in Okene Town

It also harbours A2 highway and major motor parks in the town and dominated by residences of high and influential politicians. The findings of this study also corroborate that of Daukere et al. (2020) which revealed a clustered pattern of crime in Bayelsa West Senatorial district and that of Badru et al. (2019), which revealed a clustered distributional pattern of crime events in University of Lagos, Nigeria, as more of the criminal incidences appear to gather around same point such as where there are no security posts.

The Temporal Pattern of Crime in Okene Town

The temporal distribution of individual crime in Okene Town from the 2014-2018 was analyzed using descriptive statistics and the result is presented in Figure 4.
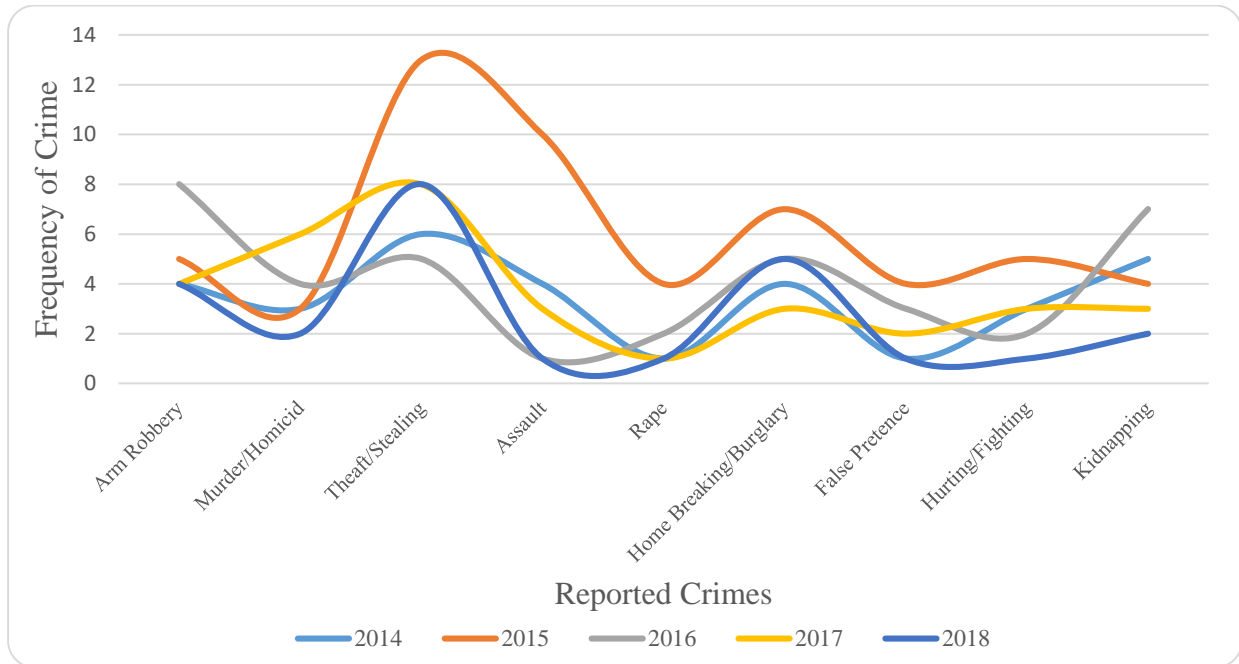
Figure 4: Temporal distribution of reported crime in Okene Town

Figure 4 obviously shows that the highest crime incidences (31%) during the period under study were reported in 2015. Subsequently, there was a drop in reported crime to 37 (20%) in 2016 and this further reduced to 33 (18%) in 2017 and to 25 (14%) in 2018. The high incidence of crime in 2015 may be attributed to the 2015 presidential elections and primaries for Kogi State gubernatorial election which was characterized by youth restiveness, fear and tension. The decline in crime over the period of the study can be attributed to the stringent measures put in place by the state government and security agencies in the area. This result disagrees with the findings of Daukere et al. (2020), which revealed an increasing rate of crime in Bayelsa West Senatorial District.

CONCLUSION

A criminal incidence has negative cost in terms of loss, death, psychological and physical pains and many others on the victims. High crime events raise significant public policy questions concerning how to perceive, detect, control and prevent criminal activities in an area. The identification of types of crimes committed in an area can help focus attention on specific locations that need more support and constant patrol to curb the menace of crime. The capability of GIS to map crime types, understand the spatiotemporal distribution of crime events and its potential in crime prevention and control cannot be overemphasized. This study identified and mapped nine (9) types of crimes in Okene Town and conclude that amidst the nine types of crime, theft/stealing, armed robbery and home breaking and burglary were the most prominent. Findings of the study likewise showed that crime occurrence was clustered while temporal crime analysis indicated a declining trend in the study area. The study has shown how GIS as a tool can be used effectively

to analyze crime and display crime maps for adequate planning and the efficient management of resources and personnel to hotspots areas in order to reduce crime in the study area.

In line with the findings of this study, it is recommended that there should be installation of surveillance cameras like the Closed-Circuit Television (CCTV) at busy and solitary places within the town. This will make the criminals to have the consciousness that they are being watched and monitored. Security operatives in like manner will find it easy to identify and trace the perpetrators of crimes. Also, high risk areas like Bariki, Ogaminana Central, Anyoke 1 and 2, Idoyi, OkeneEba and ObeibaIhima should be specifically treated. More security personnel (especially police officers) and resources should be deployed to such areas with more patrol by the police authorities.

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