ANALYSIS OF CRIMES OCCURRENCES IN OKENE TOWNSHIP OF KOGI STATE, NIGERIA

BY

Friday Imaji IGBAH

(P17PSGS8041)

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA.

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF SCIENCES (M.SC.) DEGREE IN GEOGRAPHY INFORMATION SYSTEM (GIS) AND REMOTE SENSING

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL MANAGEMENT, FACULTY OF PHYSICAL SCIENCES, AHMADU BELLO UNIVERSITY, ZARIA.

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DECLARATION

I hereby declare that this dissertation titled **Analysis of Crimes Occurrences in Okene Township of Kogi State, Nigeria** was written by me. It has not been accepted in any previous application for a degree, and all quotation have been distinguished by quotation mark and sources of information have been acknowledged in the text and cited in the list of references.

IGBAH Friday Imaji _____ _____

Signature **Date**

CERTIFICATION

This Dissertation **Analysis of Crimes Occurrences in Okene Township of Kogi State, Nigeria** by Friday Imaji, IGABH meet the regulation governing the award of Master of Science (M.Sc) in Remote Sensing and Geography Information System (GIS), Department of Geography and Environmental Management, Faculty of Physical Science, Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

Dr. B. Akpu Chairman Supervisory Committee	_____ Signature	_____ Date
Dr. A. Jibrin Member, Supervisory Committee	_____ Signature	_____ Date
Dr. S. Abbass Head of Department	_____ Signature	_____ Date
Prof. A. A. Sani Dean, School of Postgraduate Studies	_____ Signature	_____ Date

DEDICATION

This project is dedicated to God Almighty and to my parents, Mr. and Mrs. Igbah for their unending love, patience and support towards me throughout the period of this work.

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I wish to express my profound gratitude to my supervisory team Dr. B. Akpu and Dr. Akpu Jibril for their guidance, motivation, encouragement and tireless efforts to make this project a successful reality. I am forever grateful and may the good Lord reward you for your efforts. To the entire staff of Geography Department, Ahmadu Bello University, Zaria especially Prof. M. Mamman, Prof R.O. Yusuf, Dr. M. Isma'il, Dr. Y. Arigbede a big thank you for taking out time to make constructive criticisms during the course of this work.

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ABSTRACT

Crime is one of the human security problems confronting humanity across the world and towns in Nigeria, Okene Township to be specific is no exception. This study thus analyzed the occurrence of crime in Okene Township of Kogi State, Nigeria. The specific objectives include to: identify and map the types of crime, determine the spatio-temporal pattern of crimes, determine crime hotspots and determine the causes and effects of crime in the study area. The map of the study area was acquired from the urban planning section of the Ministry of Land and Survey Kogi State and crime data for a period of five years (2014-2018) was acquired from the Nigerian Police Okene Divisional Headquarters, Kogi State. The data on causes and effects of crime was obtained through questionnaire surveys and in-depth interview which were conducted with some key informants from Okene Divisional Headquarters and Area Command. Systematic random sampling technique was used to select 400 respondents for the questionnaire administration. Simple descriptive statistics was used to identify crime types and determine the temporal distribution of crime. Kernel Density Estimation (KDE) and Nearest Neighborhood Analysis (NNA) in ArcGIS 10.5 software was used to determine individual crime hotspots in the 14 neighborhoods and the spatial pattern of crime distribution in the study area respectively.

The study reveals that theft/stealing, armed robbery, home breaking/burglary, assault, kidnapping, hurting and fighting, murder/homicide, rape and cheating/false pretense were the crime reported in the study area out of which theft/stealing (22%), armed robbery (14%), home breaking/burglary (13%), and kidnapping (12%) were the most frequently reported crimes. The study also revealed that Okene-Eba, Bariki, Obehira Uvete, Idoji, Ogaminana Central, Otutu and Orietesu neighborhoods were the major hotspot for criminal activities in the Town. The trend analysis of crime from 2014 to 2018 shows a declining inclination while the NNA result of the spatial pattern

of crime produced a clustered point at 0.01% significance level with the Nearest Neighbour Ratio (NNR) of 0.700733. It was also discovered that the social causes of crime were attributed to moral decay (1st) and drug addiction (2nd), whereas the economic causes of crime were unemployment (1st) and poverty/economic hardship (2nd). The environmental causes of crime were attributed to increasing urbanization (1st) and lack of adequate urban design and planning (2nd). The major effects of crime were discovered to be tarnishing of the town's reputation (1st) and loss of property (2nd). The study thus recommends that more police facilities should be deployed to neighborhoods designated as hotspots for crime while sensitization on the dangers associated with crime should be carried out regularly. Vocational studies are also recommended in order to address the problem of unemployment, economic hardship, poverty, illiteracy and moral decay which has been seen as the predisposing factors to criminal acts in Okene Township.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Criminality is a part and parcel of human nature and society. However, it has been observed that the entire world is experiencing high criminal rates as confirmed by the International Crime Victim Survey (ICVS). The report which was conducted on six major regions of the world includes Africa, Asia, central and eastern Europe, Latin America, and Western Europe for the 1989-1996 period has shown that more than half of the urban population reported being victims at least once regardless of what part of the world they inhabit (United Nations, 1995). Crime is a major social problem from which no known society is immune to. There is no universal definition of crime due to changes in social, political, psychological and economic conditions. This is because the perceptions of crime 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 USA (Feldman, 1997) but are considered as crimes in Muslim communities such as Saudi Arabia. The constant changes in time also changes the perception of a society on crime. For instance, it is becoming a crime to pollute the air and water because of environmental laws. Therefore, the perception of an "act" to be a crime varies with time and space (Femi, Adeyemi, & Jabaru, 2015).

In a strict sense, Galvin (2002) defined crime as a deviant behavior that violates prevailing norms, which may be cultural, social, political, psychological and economic conditions. Crime is also an act that violates the law of the society or a serious offence against

the law of the society for which there is a severe punishment by law (Carvell & Swinfen, 1970). Crime as described here simply refers to the breaking of prohibitory laws, to which legitimate punishments are attached or an offence which goes beyond the personal and into the public sphere. Therefore, breaking prohibitory rules or laws, to which legitimate punishments or sanctions are attached, and which requires the intervention of a public authority. The nature of these crimes include: 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). Egwu, (2003) and Kunnuji, (2016)'s definition of crime will be adopted for this study.

Crime according to Nigeria's criminal code are categorized into: Crime of aggression, crime against mortality and custom, crime of acquisition and crime against public order. Crime of aggression include murder, ritual killing, wounding, kidnapping, criminal activities like assault or rape usually occur in the cause of robbery and are excluded from the general categories. Crime against mortality 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). This category of criminal activities is so diverse and they are also considered and treated separately. Crime of acquisition includes all illegal means of acquiring wealth such as fraud and embezzlement are analyzed separate from common theft, in increasing order of seriousness, they include house breaking, store breaking among others a number of less common property offences such as counterfeiting and receiving stolen goods are included in aggregated measures of crime of acquisition and the ability of people to

function efficiently. It can be said to be a behavior that has been labeled criminal because it is contrary to the shared norms, social value and customs of the society. Crime against public order is any criminal activity which involves acts that interfere with the operation of society and the ability of people to function efficiently, because it can be said to be a behavior that has been labeled criminal because it is contrary to the shared norms, social value and customs (Okechukwu, 2011).

Crime hotspot is generally defined as an area containing dense clusters of criminal activities (Brantingham, 2001). This simple approach may be good enough to analyze data over a short period of time, but to analyze data over a year or longer time, crime hotspots should be determined not only by the geometrical aspects, of event but also by their time characteristics (Ratcliffe, 2004). According to the author, crime hot spot can also be seen as an area on a map that has high criminal intensity as they are usually developed by researchers and crime analysts to examine geographic areas in relation to crimes. Developing maps that contain hotspots are becoming a critical and influential tool for policing and analysing crime, which help develop knowledge and understanding of different areas in a city or settlement and possibly why crimes occur there (Chainey & Ratchiffe, 2005).

The differences in geographical areas in terms of location characteristics have rendered crime rates unevenly distributed globally. Africa has been on the forefront on global statistics on crimes. South Africa and Nigeria have recorded high incidents of crimes in recent times (Africa Check, 2013). The latter is currently caught in the web of crime dilemmas, manifesting in the convulsive upsurge of both violent and non-violent crimes (Dambazau, 2007). Notable in this regard are the rising incidents of armed robbery, assassinations and ransom-driven kidnappings, which are now ravaging the polity like a tsunami and spreading a climate of fears

and anxieties about public safety (Ukoji & Okolie, 2016). The upsurge of crime has been ongoing as Nigeria has been on the global crime map since the 1980s. These throes of crimes for decades are traceable to poverty, poor parental upbringing, and greed amongst the youth; get rich quick mentality, inadequate crime control model of national security among others (Balogun, Okeke, & Chukwukere, 2014).

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 in the state are rampant and accompanied with political thuggery. Also top on the list 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, gunmen killed at least 19 worshipers 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 (Okolie, 2012). Other acts of armed violence include indiscriminate attacks on security agent in the state. Between 2010 and 2012, at least 16 policemen were killed in Okene town while 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 (Daniel, 2012).

The traditional and age-old system of intelligence and criminal record maintenance has failed to live up to the requirements of the existing crime scenarios in Okene Town. Manual processes neither provide accurate, reliable and comprehensive data around the clock nor does it help in trend prediction and decision support. It also results in lower productivity and

ineffective utilization of manpower. The solution to this ever-increasing problem lies in the effective use of information technology (Ackerman & Murray, 2004).

Geography Information System (GIS) has played and is still playing an important role in crime mapping and analysis. Response capabilities often rely on a variety of data from multiple agencies and sources. The ability to access and process information quickly while displaying it in a spatial and visual medium allows agencies to allocate resources quickly and more effectively (Devan, 2014). In the 'mission-critical' nature of law enforcement, information about the location of a crime, incident, suspect, or victim is often crucial to determine the manner and size of the response (Johnson, 2000). GIS helps crime officers determine potential crime sites by examining complex seemingly unrelated criteria and displaying them all in a graphical, layered, spatial interface or map (Ahmed, Muhammed, Mohammed, & Idris, 2013). The main thrust of the study therefore is to carry out a geospatial analysis of crime in Okene town Kogi State, Nigeria.

1.2 Statement of the Research Problem

Crime rate is increasing considerably on a daily basis (United Nation, 2014). Crime is one of the security problems confronting humanity across the world. Nations have grappled to contain the rising incidence of homicide, armed robbery, kidnaping, drug trafficking, sex trafficking, illegal gun running and a host of other illegal activities. For instance, United Nations Office on Drugs and Crime in 2015, reported that crimes globally were estimated at 768,000 and more than one third (36%) was estimated to have occurred in Africa (United Nation, 2014).

Nigeria has one of the highest (16th) 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, Adeyemi, & Jabaru, 2015).

Like other towns in Kogi State, Okene has had its own share of arson, kidnapping, armed robbery, assault, murder, thugery, rape, terrorism and car hijacking just to mention a few. It is therefore pertinent to understand that the community with high criminal activities is unattractive to both local and foreign investment. This are the problems that prevail in Okene town as it has been observed that crime has serious consequences for the town's ability to promote development. This is because 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 crimes, there is a significant cultural and economic cost to the society (Adewuyi, Eneji, Baduku, & Olofin, 2017).

Okene town has witnessed remarkable expansion, growth and development as well as criminal events since the creation of Kogi State in 1991. 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 have not only led to material and immaterial lost 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, Eleojo, & Adebayor, 2017).

There are a lot of studies conducted in different parts of the world on the use of GIS in crime mapping and analysis. For instance, Balogun, Okeke and Chukwukere (2014) Mapped Crime in Benin City Using GIS. They developed crime hotspots, areas deficient of security outfit, areas of overlap and areas requiring constant police patrol using buffering analysis. Their study further shows that crime is on the rise and the police are handicapped in managing it because of the obsolete methods and insufficient resources at their disposal. While the multiple buffering shows that as one moves further away from hotspots, vulnerability to crime reduces especially at the north eastern part of the study area. The study also shows that robbery (29%) and burglary (22%) were the most common crime types committed in the area. Although this study mapped out crime hotspots, identified areas with deficient security outfit and highlighted areas requiring constant police patrols, but it failed to identify the causes and consequences of crime in the study area.

Ejemeyovwi (2015), conducted a study on Crime Mapping and Attendant Management in Enhancement of Tight Security in Asaba, Delta State, Nigeria. The study employed GIS to analyze crime rates in the study area. According to the research, the most important reasons

for high crime rate in the area were unemployment (55%) and low level of education of the people (27.5%). The study revealed that armed robbery (29%) was the major crime type in the area. The study also revealed that cable/traffic light area had the highest crime record among the five zones from the year 2000 to 2006. The study further indicated that crimes were perpetuated mostly in slums and squatter settlements and rapists usually operate at night (usually between 8pm and 5am) around Cable Point area, Ogbuosi area, and the Niger Bridge. This study was more emphatic on the spatio-temporal distribution of crime, identifying the most prominent crime type and it causes but failed to examine the consequences of crime in the study area.

Shamsudeen (2017), mapped crime hot spot on Fagge LGA, of Kano State, Nigeria using Kernel Density Estimation in ArcGIS 10.1. The technique provided an estimate of the proportion of the total crime that can be expected to occur in any given map location of the study area from coordinates of crime site. The study identified 10 crime types (assault, rape, forgery, cheating, burglary, grievous harm, drugs, theft, bribery and manslaughter). The study also found out that from the year 2014-2016; crime increased from 23.4% to 40.5% with theft having a value of 33.01% of the total crime, followed by use of drugs with 20.8%. Although the study attempted to map crime hotspots, identify prominent crime types and it rate of increment within 2014 – 2016, it did not make any emphasis on the causes and consequences of crime.

Furthermore, Ayuba (2015), analyzed Urban Violent Crimes in Kaduna Metropolis. The study, using descriptive statistics, for analysis revealed that the main social cause of violent crimes includes ethno-religious intolerance, political conflict, moral decay and illiteracy. The economic causes were attributed to poverty, economic hardship and unemployment while

environmental cause were blamed on increasing urbanization, poor urban planning, growth of urban slums and infrastructural decay. The study also revealed that the main perpetrators of violent crimes are youths, and that half of the people are victims of violent crimes and choose not to report to the police. Although the study was detailed in identifying the causes of violent crimes and the perpetrators of those crimes, it failed to map out the spatial distribution of crime, identify crime hotspots and examine the consequences of crimes in the study area.

A lot of literatures have analyzed crime hotspots, spatio-temporal distribution of crimes alongside their causes but none consulted by the researcher has attempted to examine them in the study area. It is this gap in knowledge that this study intends to fill. In view of this, the study attempts to answer the following research questions:

1. What are the types of crime in the study area?
2. What is the spatio-temporal pattern of crime in the study area?
3. Where are the crime hotspots in the study area?
4. What are the causes of crime in the study area?
5. What are the effects of crime in the study area?

1.3 Aim and Objectives

The aim of this research is to analyze the geospatial occurrence of crimes in Okene township of Kogi State, Nigeria.

In order to achieve the above aim, the objectives being pursued are to:

i. identify and map crimes in Okene township;
ii. establish the spatio-temporal pattern of crime in Okene township;
iii. determine the crime hotspots in Okene township;

iv. determine the causes of crime in Okene township;

v. determine the effects of crime in Okene township.

1.4 Scope of the Study

The spatial scope of this study covers the whole extent of Okene town. Specifically, the study will be undertaken around Okene-Eba, Idoji, Otutu, Orietesu, Lafia Obessa, Bariki, Obehira Uvete, Abuga Ozuga, Adavi-Eba, Uhucheba, Ogaminana Central, Idanuchi/Anyoke, Inoziomi and Okunchi neighborhoods of Okene town. The study involved the identification and mapping of crimes, examination of the spatio-temporal pattern of crime, determine the crime hotspots as well as examining consequences and factors responsible for crime in the study area. Crime occurrence between the years 2014 – 2018 was considered. The choice of 5 years is made because of the availability of data from the security agencies.

1.5 Significance of the Study

GIS can greatly enhance the capabilities of the police department and other law enforcement agencies' ability to monitor and prevent future crimes. Crime analysts use crime mapping and analysis to help law enforcement management (e.g. the police chief) to make better decisions, target resources, and formulate strategies, as well as for tactical analysis (e.g. crime forecasting, geographic profiling). The findings from crime mapping can be used to understand patterns, help target resources and programs, and evaluate crime prevention or crime reduction programs and further understanding of causes of crime.

Balogun, Okeke, and Chukwukere, (2014) stated that crime is on the rise and that the police are handicapped in managing it because of the obsolete methods and resources at their disposal. In essence, availability and quick access to timely and up-to-date spatial information about crime-prone areas, to the law enforcement agencies, will in no small way contribute to effective policing

of the entire Local Government Area. Mapping crime can help law enforcement protect citizens more effectively. Simple maps that display the locations where crimes or concentrations of crimes have occurred can be used to help direct patrols to places they are most needed. Once hotspots are identified, it enables security agents and other law enforcement agencies to strategically deploy their scarce resources effectively, in an attempt to monitor and track perpetrators so as to prevent or mitigate future crime growth. Policymakers can use more complex maps to observe trends in criminal activity; such maps can prove invaluable in solving criminal cases. Policing methods in Nigeria are still manual and un-automated. The old filing system of record-keeping is still in use. This limits the force from having the technological edge over the ever increasing technology sophistication of the criminals.

The study will be a template for the evaluation of the prevention initiatives. In furtherance of this, the study will help the government, urban planners, police, policy makers, decision makers, and other security agencies to understand the pattern of crimes in their areas of jurisdiction and identify areas that contain cluster of events (i.e. hotspots of crimes) which usually demand special police attention. The result of the spatial patterns of crime can be used to generate a model that will predict potential crime hotspots. The study will also help city dwellers to have adequate knowledge about patterns of crime in their neighborhood in order to adopt precautionary and safety measures like the use of vigilante groups through community policing (Ratcliffe, 2004).

The study will help the government see the need to properly equip the security agencies and personnel, for instance, through seminars/workshops, regular in-service training, regular promotions and payment of salaries. The study will also add to the body of knowledge on trends and pattern of crimes in urban areas and will serve as a guide to other researchers who may have interest in crime study.

CHAPTER TWO

CONCEPTUAL ISSUES, THOERETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 CONCEPTUAL ISSUES

2.1.1 Crime

The word "crime" originated from the Latin word *crimen –inis* and has two categories of meanings: 1) an accusation or charge 2) the fault, guilt, offense a person is charged with (Simpson, 2009). The Greek expression of the word "crime" is *krimos* and is synonymous to the Sanskrit word *krama* which means "social order". In common parlance, the word crime is applied to those acts that go against social order and are worthy of serious condemnation (Nirmala & Zegeye, 2012). The term crime is relative as what constitute a crime in one place and time, culture, or location may not be considered as a criminal act in another time, culture, or even across the street (Henry & Lanier, 2001). Expressing the same view, White and Haines (200) posits that there are many diverse conceptions of crime, each of which reflects a different scientific and ideological viewpoint.

Crime as an act punishable by law as forbidden by statute or injurious to public welfare, while Oxford Advanced Learners Dictionary of Current English defines crime as an offence for which one may be punished by law (Cowie, 2009). There is no doubt that to define a crime as an act injurious to public welfare is very wide: For in the present-day complex society, it would include many things like misleading adverts and selling adulterated food or unclean sachet water (Dambazau, 2007).

Crime is a multifaceted concept that can be defined in a legal and non-legal sense. From a legal point of view, it refers to breaches of the criminal law that govern particular areas

(jurisdictions) and are aimed at protecting the lives, property and rights of citizens within those jurisdictions (Iwarimie, 2003). Non-legal point of view refers to crimes as acts that violate socially accepted rules of human ethical or moral behaviour (Alemika, Criminal Violence and Insecurity in Lagos State. African Peace Review, 1997). However, on a general term, Fayeye, (1995) defined crime as any act of deviation from the social order and rules agreed to be respected by all members of the society and upon which the rest of the society sanctions upon those guilty of the violation. Crime is also viewed as an intentional act in violation of criminal law committed without defence or excuse, and is penalized by the state as a felony or misdemeanor (Brown, Esbensen, & Geis, 1998).

2.1.1.1 Classification of Crime

The classification of crime differs from one country to another. In the United States, the Federal Bureau of Investigation (FBI) tabulates the annual crime data as Uniform Crime Reports (UCR). In Nigeria, the Police classification of crime also depends on the prescribed law. In Nigeria Police Abstract of Statistics (NPACS), offences are categorized into four main categories:

i. Offences against persons includes: manslaughter, murder and attempted murder, assault, rape, kidnapping, grievous hurt and wounding, etc.
ii. Offences against property includes: armed robbery, house and store breakings, forgery, theft/stealing, etc.
iii. Offences against lawful authority include: forgery of current notes, gambling, breach of peace, bribery and corruption, etc.
iv. Offences against local act include: traffic offences, liquor offences, etc.

2.1.2 Crime Mapping

Mapping involves the manipulation and processing of spatially referenced crime data in order to display visually an output that is informative to the particular user (Alex & Kate , 2001). It provides information concerning the location of hotspots or high level of crime reported. Mapping is used by analysts in law enforcement agencies to map, visualize and analyse the pattern of incidents. It allows crime analysts to identify crime hotspots, along with other trends patterns (Polat, 2007).

Crime mapping has incorporated spatial data analysis techniques that add statistical rigour and address inherent limitations of spatial data, including spatial autocorrelation and spatial heterogeneity. Computer-based crime mapping started in 1985, When the National Institute of Justice (NIJ) funded a project in the Chicago Police department to explore crime mapping as an adjunct to community policing. This later led to the spread of crime mapping throughout the United States and everywhere else (Brantingham, Environmental Criminology, 2001).

Sequel to this, crime mapping has led to some powerful investigative techniques such as "geographical profiling" which helps to track violent serial offenders and understand the movement patterns of offenders through the locations of a connected series of crimes (Polat, 2007; Iwarimie, 2003). Thus, geographic profiling deals with "where" as against the psychological profiling which deals with "who" (Brown, Esbensen, & Geis, 1998).

2.1.3 Spatial Crime Analysis

Spatial crime analysis is defined as a set of systematic, analytical and investigative process that provides relevant information relative to crime and social disorder patterns and trends to assist the operational and administrative personnel in planning the deployment of resources for the prevention and suppression of criminal activities (Osborne & Wernicke, 2003). Spatial crime

analysis employs the application of geo-science and social science data collection; endures, data mining, geo-statistical analysis, critical thinking, charting, mapping and solid understanding of criminal behaviour (Johnson, 2000)

Crime analysts employ both qualitative and quantitative data and methods. Crime analysts use qualitative methods when they examine the non-numerical data for the purpose of discovering underlying meanings and patterns of relationships that is field research such as observing the characteristics of locations and content analysis which allow for the design of policy and programme initiatives that incorporate the participation of the affected population, communities and institutions (Boba, 2005). Conversely, crime analysts use quantitative data and methods when they conduct statistical analysis of numerical or categorical data. This involves the use of geostatistical tools to study the social disorder that varies in space and time (Ahmadi, 2003). Quantitative data analysis of crime thus, involves the collection of numerical techniques that deal with the characterization of spatial attributes and spatial data (Chainey, 2005).

According to Ahmadi (2003), the main objectives of spatial crime analysis include to:

i. Extract crime patterns through the analysis of available crime and criminal data.
ii. Predict crimes based on the spatial distribution of existing data and anticipation of crime rates using different data mining techniques.
iii. Detect criminal activities.

Brantingham, (2001) suggested that crime analysis is dependent on four dimensions that constitute a criminal event and these include: "the law which defines the act to be criminal; the motivated offender; the victim or the target; and the coming together of all the three at a geographical convergence".

Thus, for the analysis of crime to be considered geographical, the 'six wh-questions' must be answered and these include: Where did the crime take place? When did it take place? What is the wrath of the crime? Who perpetrated the crime? Why was the crime committed? Who the crime was perpetrated against? (Brantingham, 2001; Ahmadi, 2003).

2.1.3.1 Types Of Crime Analysis

There are different types of crime analysis and each contains the characteristics of the general analysis of crime but each is specific in the type of data and analysis used as well as in its purpose (Ahmadi, 2003). According to Johnson (2000), Boba, (2001), Ahmadi (2003) and Lin, (2008) crime analysis may be classified into the following compartments:

2.1.3.1.1 Tactical Crime Analysis

This involves an analytical process that provides information on identifying specific and immediate crime patterns, trends, series and hotspots in a certain jurisdiction. Tactical crime analysis also focuses on specific information about each crime such as modus operandi (method of operation by criminals), method of entry, point of entry, ‘suspects’ action, types of victims, types of weapons used, date, time and location of crimes (Johnson, 2000; Boba, 2001; Ahmadi, 2003; Lin, 2008). The tactical crime analysis technique was adopted for this study and this was because it perfect in identifying specific and immediate crime patterns, trend, series and hotspots which the thrust for this study.

2.1.3.1.2 Strategic Crime Analysis

This is concerned with long-range problems and projections of long-term increase or decrease in crime. This type of analysis is integrated with socio-demographic and spatial factors in order to determine long term patterns of activity, to assist in problem solving as well as to evaluate responses and procedures. Strategic crime analysis is used for forecasting potential crime events/concentration (Johnson, 2000; Boba, 2001; Ahmadi, 2003; Lin, 2008).

2.1.3.1.3 Administrative Crime Analysis

This focuses on the provision of economic, geographic and social data that relate to criminal activities. The reports or statistical summaries of administrative crime analysis are used for grant funding and assessment of policy implications beyond law enforcement agency (Johnson, 2000; Boba, 2001; Ahmadi, 2003; Lin, 2008).

2.1.3.1.4 Operational Analysis

This type of analysis evaluates the policing practices in relation to patrol and resource allocation. The results of this analysis helps to make changes that use resources more efficiently and generates projections for deployment (Johnson, 2000; Boba, 2001; Ahmadi, 2003; Lin, 2008).

2.1.3.1.5 Intelligence Analysis

This involves the study of criminal organizations and enterprises, how they are linked and who the key players are. It helps investigation and prosecution units within the police. The purpose of intelligence analysis is to assist personnel in the identification of networks and apprehension of individuals to subsequently prevent criminal activities (Johnson, 2000; Boba, 2001; Ahmadi, 2003; Lin, 2008).

2.1.3.1.6 Investigative Crime Analysis

Investigative crime analysis considers the crime scene, psychological and forensic reports to catch serial killers, arsonists and similar offenders. The main purpose of investigative crime analysis is to develop patterns of serial crimes crossing across cities, states, and even national boundaries by linking behaviours and evidences within and among incidents in order to catch the offender or clear cases (Johnson, 2000; Boba, 2001; Ahmadi, 2003; Lin, 2008).

2.1.3.2 Methods for Automating the Spatial Analysis of Crime Incident Data

There are two ways of automating the geographical analysis of crime locations. These are the Geographic Analysis Machine and the Geographic Explanations Machine. These methods of analysis allow the use of intelligent data mining and data fusion techniques which are necessary for crime analysts to keep up the pace with their information processing requirements. The two methods consider the way in which crime analysis can be automated (Alex & Kate , 2001). These systems allow crime analysts to perform geographically sound and rigorous analysis of their data.

2.1.3.1 The Geographic Analysis Machine

The Geographic Analysis Machine was an early attempt at automating exploratory spatial data analysis that was easy to understand (Openshaw, 1994). With geographically referenced database, Geographic Analysis Machine enables crime analysts to discover crime hotspots or locations of clusters, allowing the deployment of security personnel to those areas. It offers a solution to researchers and users of GIS who want to perform a fast explanatory geographical analysis of their crime data with minimum effort. It is an automated procedure that is designed to yield safe results are largely self-evident (Alex and Kate, 2001). The Geographic Analysis Machine shows where there are crime clusters or hotspots in their data. Almost all law enforcement agencies collect crime reports with a form of geocode attached. In the United Kingdom, this is usually the post code of the building nearest by incident. By making use of these locational data, it is possible to discover crime hotspots using the Geographic Analysis Machine (Ahmadi, 2003).

2.1.3.2 The Geographic Explanation Machine

The Geographic Explanation Machine points to geographical datasets that may explain the cluster found by Geographic Analysis Machine. Unlike the Geographic Analysis Machine which is purely a pattern detector (evidence of clustering in crime data), the Geographic Explanation

Machine searches for explanation using a GIS to reduce multiple spatial queries to find out what appears to be geographically associated with the clusters (Ahmadi, 2003). With Geographic Explanation Machine, crime variables could be well related to individual behaviour, others to geographical location, and some to both (Alex and Kate, 2001). Thus, the Geographic Explanation Machine allows GIS to use crime data in order to look for explanatory geographic variables that may assist security personnel to deal with the hotspot found. A few of the most extensively used standard analysis in Geographic Explanation Machine are automated pin mapping, hotspot analysis and radial analysis. In essence, while Geographic Analysis Machine looks for evidence of clustering in crime data, the Geographic Explanation Machine goes a step further and investigates information by taking other variables into consideration (Ahmadi, 2003).

2.1.3.3 Tools for the Spatial Analysis of Crime

Spatial analysis is in many ways the crux of GIS because it includes all of the transformations, manipulations and methods that can be applied to geographic data in order to add value to them and reveal patterns that are not immediately obvious (Shahab, 2008). It is therefore the process by which raw data are turned into useful information. It reveals things that might otherwise be invisible and makes what is implicit to be explicit (Longley & Goodchild, Geographical Information and Science, 2005). The statistical mapping techniques that are useful for the spatial analysis of crime include; block aggregation, Kernel smoothing, Voronoi diagrams or Theissen Polygons and spatial autocorrelation.

2.1.3.3.1 Block aggregation

This tool is used for aggregating social disorder, and crime incidents into geographical areas and generating a choropleth map in which those areal units are colour-coded or shaded based on the number of crime incidents within them. The acquired criminal data are usually classified

prior to mapping and symbolized using a colour scheme for quantitative data (Ahmadi. 2003; Kang-Tsung, 2009). The block aggregation enables the user to determine the areas that have a high incidence of crimes and allows the crime analyst to focus on those areas and perform further analysis. It is also useful for creating tables that show the number of crime, in areas and change in crime incidence over time (Ahmadi, 2003).

2.1.3.3.2 Kernel Density Estimation

Kernel density estimation is a type of non-parametric density estimation which uses all the data points to create an estimate (Kang-tsung, 2009). It is a statistical method for determining, visualizing and analyzing crime events and crime patterns at different locations (Bailey & Getrell, 1995). The method is used to generate a continuous crime density surface from crime point data. The crime analyst begins with a dot map (which uses uniform point symbols to depict crime data, with each symbol representing a unit value) of crime events.

Kernel Density Estimation is a good method for visualizing crime data because it estimates how density of events vary over the study area. It produces a smooth map in which the density at every location reflects the number of points in the surrounding area. Kernel smoothing results in [continuous map that shows geographic variation in the density or intensity of crimes. Peaks on map represent areas of high crime (crime hotspots) while valleys represent areas of low crime (crime coldspot).

Kernel estimation technique was adopted for hotspot analysis because the method produces an aesthetically pleasing image from which users identify hotspots based on density of contours. Since hotspots are not static and densities do not remain the same over time, kernel estimation is able to efficiently analyse this change.

2.1.3.3.3 Theissen Polygons

This method is also known as Voronoi diagrams. The method does not use an interpolator but requires initial triangulation for connecting known points (Theissen polygons involve drawing lines connecting points that are nearest neighbors. It then bisects each line and subsequently connects the bisectors and assigns the enclosed point value to the polygon). The same method for constructing a Triangulated Irregular Networks (TIN) is often used in preparing theissen polygons (Kang-tsung, 2009). Theissen polygons divide a mapped area into a number of polygons. According to Ahmadi (2003), the relationship between the percentage of incidents and percentage of area are dependent on two factors:

i. Each voronoi polygon is associated with only one crime incident,
ii. The voronoi polygons are associated with clustered crime incidents.

Given this, we can create a voronoi diagram that shows the trade-off between the number of crime incidents and the total area that lies within the Voronoi polygons associated with those incidents (Ahmadi, 2003).

2.1.3.3.4 Spatial Autocorrelation

Spatial autocorrelation is a tool employed to measure the spatial distribution of occurrence of criminal events in a neighboring area unit (Chainey and Ratcliffe, 2005). This technique assumes criminal events that occur at different locations (yet in close proximity) are related (Eck, 2005). Positive spatial autocorrelation recommends that areas with high crime rates are clustered together (with positive values that is +1) while areas with low crime rates reflect negative dispersion (-1). Indices of spatial autocorrelation include Moran, Geary and Joint Count Analysis techniques (Kang-Tsung, 2009).

2.1.4 Crime Hotspot

Crime hotspot is widely referred to as areas of cluster concentration of criminal activities usually ascertained from the analysis of crime data in a GIS (Adepoju, *et al*., 2014). It is also defined as a geographic area representing a small percentage of the study area which contains a high percentage of criminal events or social disorders (Boba, 2001). Crime hotspots are generally presented in graphic forms, that is, maps. Thus, a crime hotspot map represents the high -crime density area and the result of a typical hotspot analysis helps the law enforcement authorities, the police, and other relevant professionals such as town planners and city management officials to identify high-crime areas, types of crime being committed and the best way to respond (Chainey, 2005; Adepoju, *et al.*, 2014).

The crime hotspot has been classified into three categories based on the three main GIS topological feature classes, that is, point, line and polygon (Rindlisbacher, 2014).

2.1.4.1 Place hotspot

This type of hotspot deals with the question of why criminal events occur at specific locations e.g., at what places are burglaries occurring and at what places are they not occurring? Crime phenomena at this level are visualized and represented as points (0- dimension). This method is regarded as the most intuitive of hotspot analysis which involves the number of incidents occurring at different locations. Kernel density estimation, theissen polygons and nearest neighbor analysis techniques are often used for place hotspot crime analysis (Rindlisbacher, 2014)

2.1.4.2 Street hotspot

In this type of hotspots, the units of crime analysis can be street segments, paths and sections of highways which could be represented on maps as straight, bent, or curved lines (1-

dimension), for example on which streets are car snatchers found? Concentrated police patrolling are required at this level (Rindlisbacher, 2014).

2.1.4.3 Neighborhood hotspot

This type of hotspot is used to explain crime differences or crime patterns between neighbourhoods. This is higher than place or street hotspot. It deals with large areas. Here, crime analysts are interested in questions such as: what areas are claimed by armed robberies and what areas are not? Two dimensional shapes such as ellipses, rectangles, and other polygons are used on maps to represent crime phenomena at this level. At this level, police need concentrated efforts for effective patrolling since the area is typically large. For neighborhood hotspot analysis, the study area is classified into different neighbourhoods so that the spatial relationships between polygons can be determined. This is made possible through features of similar or dissimilar values. Areas with positive Z-scores indicate crime hotspots (high crime zones) while areas with negative Z-scores indicate coldspots (low crime zones). The Moran's and Geti's techniques of spatial autocorrelation have been extensively used for the analysis of neighborhood crime hotspot (Rindlisbacher, 2014).

2.2 THEORETICAL FRAMEWORK

Interest in crime has a long history and has led to the formulation of a lot of theories. Although, there appears to be a consensus among criminologists and social geographers that no one form of crime is best accounted for by a single model, there is a general agreement that a particular criminal act is best explained by one model than another. Thus, an integrated theory approach, which merges different explanatory perspectives and concepts, is being employed to address the determinants of urban crimes.

2.2.1 Economic Theory of Crime

The proponent of this theory was William Bonger (Omololu, 2009). The theory attributes crime to unfavorable economic situations such as unemployment, poverty and economic recession. It is believed that these factors predispose one to engage in a variety of criminal activities (Iwarimie, 2003). This implies that the poor and the unemployed are more susceptible to crime than the rich and the employed. It is often said that "an idle mind is the devil's workshop", thus, if the devil catches a man idling, he will set him to work, find him tools, and before long pay him wages - wages of criminalities (Fayeye, 1994). In terms of crime control, it is believed that poverty reduction and creation of employment opportunities would help to reduce the motivation to go into crimes (Iwarimie, 2013). In his inaugural lecture, Omololu (2009), corroborated this theory when he observed that the core causal factors that are associated with the crime problem in Nigeria are unemployment, poverty and the get-rich quick syndrome.

2.2.2 Social Disorganization Theory

This perspective views society as being organized by a set of rules or expectations. Social disorganization results when these expectations fail (Fayeye, 1995). Social disorganization refers tothe inability of a community structure to mobilize the common values of its residents to maintain effective social control (Kornhauser, 2010).

Disorganization can be referred to as a lack of solidarity and cohesion, and the absence of a shared sense of community and mutual commitment between which residents allows crimes and criminalities to flourish because the community's capacity for informal social control is inhibited (Curtis, 2012). The disintegration of particular institutions (i.e. churches, families and schools) denies some people the opportunity to learn conventional norms and values. The result of this decay is that certain groups are more likely to use 'criminal violence' in their day-to-day

encounters, and crime is eventually seen as an acceptable means of solving disputes/problems (Fayeye, 1995; Curtis, 2012).

Meagan (2004), carried out an intra-urban study of crime in the cities of Nashville, Portland and Tucson (U.S.A) and the findings revealed that the high incidence of crimes in the three cities were attributed to illegitimate opportunity structures and dysfunctional lifestyles which were primarily caused by social disorganization factors. According to Elliot & Merrill, (2011), the following exogenous structural components have been identified as the main sources of social disorganization:

i. Low socio-economic status (poverty)

This leads residents to become disengaged in the community, it further weakens social ties and informal networks. Neighborhood poverty causes increasing isolation of residents from social mainstreams, furthering the inability to control the acceptance of deviant forms of behaviour.

ii. High ethnic heterogeneity

This attributes to social disorganization because it generates diversity in cultural values and norms. All these can impede communication and the level of consensus achieved within the neighborhood about appropriate goals and standards of behaviour.

iii. High residential mobility

A mobile population, where residents are continuously moving in and out, is a barrier to the development of extensive friendship networks, kinship bonds, and local associational ties. This decreases the level of control the residents can exert on their neighborhood.

iv. Family disruption

The control theory suggests that family disruption will affect the ability of adults to form local networks, thereby decreasing local levels of social control. Formal social controls may be

decreased “since communities with high family dissolution tend to suffer low rates of participation in formal voluntary organizations and local affairs.” Children of divorced parents are more likely to be delinquent because the social control of youths is a group process that is impeded when family structures break down.

v. Urbanization and density

It is a known fact that crime clusters in the most urbanized areas of cities which are generally at the centre of an urban area. The population size can also affect the level of crime in an area by increasing the level of anonymity among the residents of the area.

2.2.3 The Theory of Anomie

This theory has its origin in the works of Emile Durkheim, but was elaborated upon and made popular by Robert Merton. Anomie, refers to a situation in which individuals act without regard for law and order (Omololu, 2009). It was equally described as a condition of lawlessness or normlessness and also a situation when the legal structure is unable to control the transactions between various social groups (Egwu, 2003).

Robert Merton attributes deviance to the social structure which is a result of disjuncture between culturally defined goals and culturally prescribed means of achieving them. According to this theory, the society usually sets certain goals for people (e.g. achievement or success), and at the same time, the society prescribes means of achieving the goals (e.g. honesty, hardwork, and education). Balanced societies place equal emphasis on the goals and the means of achieving them, but unbalanced societies place more emphasis on the goal and less on the means (Omololu, 2009).

Nigeria can be said to belong to the unbalanced society group where more emphasis is placed on people's wealth and less emphasis is placed on the means of their wealth. However, legitimate opportunities of achieving the goals are not equally available to all because the social

structure denies some people the legitimate opportunities of realizing the societal goal *(Ibid).* When this happens, some individuals affected may respond to the frustration by devising illegal or legitimate means of achieving the societal goal of achievement/success (Iwarimie, 2013). An inference that can be drawn from this theory is that the desperate less privilege are more likely to commit crime than the rich. The implication of this theory for crime control is the need to remove the structural obstacle to legitimate opportunities for achieving the societal goals (Omololu, 2009).

2.2.4 Ecological Theory

The Chicago school was used to explain crime and delinquency as a final product of social change that takes place when there is an environmental change. The ecological studies, according to Iwarimie (2013), have established that:

i. Areas of high incidence of crime and delinquency are places that are highly and physically disorganized and that social disorganization is the prime cause of crime and delinquency.
ii. Absence of social control makes criminality to flourish.
iii. Crime and delinquency thrive where there is social approval by parents and neighbors and where many opportunities are available for criminal behaviours.
iv. Crimes tend to increase where there is little or no opportunities for skill acquisition training and legitimate employments.
v. There is no difference between criminals and non-criminal in terms of their personality traits, physiological conditions, characteristics and intelligence.
vi. Certain areas called the "transition zone" within the concentric circle are heavily populated primarily by low-income people and thus, attract criminals (Shaw & Mckay, 1972; Iwarimie, 2013). The transition zone theory affirms that crime activities occur more

frequently in zone II (the middle residential area) and zone III (the slums/ghettos) than in zone I (the elitist residential area) and zone IV (the peripheral settlement areas). This is so because the middle class residential and slum areas provide less security for lives and properties against criminals (Iwarimie, 2006)

2.2.5 Broken Window Theory

The broken window theory was introduced in 1982 by James Wilson and George Kelling. The theory signal the effects of urban disorder and vandalism on crimes and anti-social behaviours. An analogy was given: "consider a building with a few broken windows. If the windows are not repaired, the tendency is for vandals to break a few more windows. Later, they may even break into the building, and if it is not occupied, it becomes a haven for squatters. Eventually, people start leaving bags of refuse there" (Knox and Pinch, 2010).

This theory thus puts significant emphasis on the environment and not human behaviour because it is assumed that the landscape communicates to people. A broken window transmits to criminals the message that a neighborhood displays a lack of informal social control and is therefore unable to or unwilling to defend itself against a criminal invasion. The slow deterioration of a neighborhood as a result of broken windows modifies the way people behave when it comes to their communal space which in turn leads to a breakdown of community control. As rowdy teenagers, drunks, panhandlers, drug addicts and prostitutes slowly make their way into a neighborhood, it acts as a sign that the inhabitants of the area are unable to assert informal social controls and they will become scared that worst crimes will happen (Felson & Clarke, 1998).

Crowe (2000), argued that improper landuse can cause disorder, and the larger the public is, the more it becomes susceptible to criminality and violence. Therefore, non-residential spaces such as business centres, may assume the responsibility of informal social control in the form of

surveillance, communication, supervision and intervention. If not properly controlled, it is expected that more strangers will occupy the public land, creating a higher chance for disorder. According to Jeffery (1977), under the broken windows theory, an ordered and clean environment sends the signal that the area is monitored and that criminal behaviour will not be tolerated while a disordered environment (one which is not maintained) sends the signal that the area is not monitored and that one can engage in criminal behaviours with little risk of detection.

2.3 LITERATURE REVIEW

Crime as a social phenomenon takes place in space and it has attracted the attention of many marchers and scholars. Some of these empirical researches are thus reviewed in this section.

2.3.1 Rates and Trend of Crime in Nigeria

Kenechukwu (2012), examined criminal activities in Enugu state from the years 2000-2009. The study adopted the survey research method and collected reported crimes data from the police headquarters, Enugu State command. The researcher employed descriptive statistics to determine the major causes of crime and the most prominent crime in the study area. The findings of the study revealed that the major causes of crime in the study area were found to be complex changes in economic, social and cultural factors whereas the most prevalent crime in the study area happen to be assault, armed robbery, unlawful possession, arson, grievous harm, burglary, house breaking, automobile theft, rape, murder, manslaughter, forgery and kidnapping. The incidence of crime against persons were found to be higher when compared with crime on properties but surprisingly the rate of crime have declined by 2.33 % from 2000 to 2009.

Attoh (2012), assessed crime and violent criminal behaviours in Nigeria. The researcher, collected data on crime from the Nigeria Police Force Headquarter Abuja. The researcher utilized descriptive statistics which revealed an increasing trend of violent criminal activities in Nigeria.

The findings reveals that the case of murder were 1,629 in 1994 but steadily increased to 2,120 in 2001 and further increased steadily to 2,136 in 2003. Such an increase of over 75 percent between 1994 and 2003 is worrisome. In 2002, murder cases rose to 3,889, amounting to over 52 percent increase in less than a decade. When disaggregated by states, the results of the 2013 cases of robbery shows that Kaduna state recorded the highest (43.0%), followed by Akwa-Ibom (42.0%) and Cross River (39.0%). However the lowest robberies cases were recorded in Jigawa (5.0%) and 3.0% in Kano.

Gulumbe, Dikko and Bello (2013), analysed the reported crimes data over a period of three years (2006 - 2008) for Katsina State. The study analyzed the eight major crimes (robbery, auto theft, house and store breaking, theft/stealing, grievous hurt and wounding, murder, rape, and assault) reported utilizing Principal Component Analysis (PCA) and correlation analysis. The method was utilized to explain the correlation between the crimes and to determine the distribution of the crime over the Local Government Areas of the State. The result showed a significant correlation between robbery, theft and vehicle theft. Sandamu and Musawa LGAs have the lowest crime rates (3%), while Katsina LGA have the highest crime rate (26%) in the state. Robberies were more prevalent in Dandume LGA (18%), rape in Jibia LGA (17%) and wounding in Dandume LGA (15%). The PCA has suggested retaining four components that explain about 78.94% of the total variability of the data set.

Usman, Yakubu and Bello (2012) analyzed crime in Sokoto state, Nigeria. The study made used of crime data acquired from Sokoto Police Headquarters and applied Principal Component Analysis (PCA) to analyze the data. The result of the study revealed that major crimes were armed robberies (29%), rape (19%), pick pocket (15%), murder assassinations (4%) and other petty crime put together made up (11%).

Adigun, Adedibu, and Abolade (2016), carried out a predictive modelling of crimes in selected Nigeria cities using linear regression. Using ten years (1999-2008) police records obtained from Oyo, Kaduna and Imo state Police Commands under the jurisdiction of which Ibadan, Zaria and Owerri are respectively located. The crime incidence were taken as a quotient of projected population figure in order to establish predicted prevalence rates. The study predictive models generated include y= -241278 + 123.8x (Ibadan); y=83785.030 – 41.376x (for Zaria); y= -38897.3 + 19.727x (for Owerri) and y = 2003.128 + 0.0000537x (for the three cities as a whole). The study predicted values, also revealed increase in crime trends in Ibadan from 7,001 in 2008 to 12,512 in 2050 and 903 in 2008 to 1,544 in 2050 in Owerri but a decreasing crime trends in Zaria from 802 in 2008 to 5 in 2024. The results further shows a greater increase in Ibadan than the three cities as a whole as between 2008 and 2050, residents of Ibadan will experience 108 to 258 crime incidences per 1000 population while Owerri will experience 85 to 224 crime incidences per 1000 population and Zaria with the lowest will experience -3 to 108 per 1000 population per 1000 population.

2.3.2 Crime Mapping and Analysis using GIS in Nigeria

Daukere, Yelwa, Akpu, and Ajani (2020), analyzed geospatial analysis of crime incidence in Bayelsa West Senatorial District, Bayelsa State, Nigeria. Data of police crime records were obatained from the divisional police headquarters within Bayelsa West Senatorial District. An administrative map of the study area were acquired from the Ministry of Land and Survey. These data were analysed using Nearest Neighbor Analysis (NNA) and Kernel Density Estimation (KDE), to derive the pattern and density of hotspots of crime in the area and descriptive statistics were also used. Findings of the study revealed the existence of nine (9) crime types from the police records. Theft/stealing had the highest incidences rate of 30.6% while hurting/fighting and

kidnapping were the least with 3.55 each. The NNA result of the spatia; pattern of crime produced a clustered point at 0.01% significance level with the Nearest Neighbor Ratio (NNR) of 0.491906. the analysis of the KDE shows that crime concentrates at the communities with high population and higher economic activities with different types of crime showing different spatial patterns.

Badru, Akintuyi, Omoniyegha, and Wunude (2019) mapped the prevalence and distribution of crime within University of Lagos using Geographic Information System (GIS). The data utilized for the study entails spatial and non-spatial data acquired through surveys conducted to identify the location of security post and crime incidents and existing University of Lagos map and database of the Security department of the University. The study used descriptive statistics and NNA to analyze the data. The study revealed that there are 81 security posts and 6 security zones within the University. Depicting a clustered distribution pattern, 66 of these security posts were classified as functional while 15 were classified as non-functional. The study also revealed that a total of 2,012 crime incidents which were categorized into 18 groups were reported to have occurred between 20122015 in the University. While Larceny (1,025) were discovered to be the most prevalent crime, Zone B (601) were discovered to be the zone with the highest crime rate and 2015 (700) the year with highest crime incidents. The factors responsible for the observed crime pattern include high student population, proximity and easy access to neighbouring communities, and remoteness and low human traffic.

Adewuyi, Eneji, Badaku, and Olofin (2017) analyzed spatio-temporal analysis of urban crime pattern and its implication for Abuja Municipal Area Council (AMAC), Nigeria. The methods for data collection involved Geoinformatics through the use of remote sensing and Global Positioning Systems (GPS) for spatial data. Questionnaires were administered for other attribute information required. The analysis carried out in a Geographic Information System (GIS)

environment especially for mapping and the establishment of spatial patterns. The results indicated that the main types of crime committed were theft and house breaking (42.9%), followed by assault (12.4%), mischief (11.3%), forgery (10.5%), car snatching (9.05%), armed robbery (8.5%), trespass (5.2%) and culpable homicide (0.2%). In terms of hot spots the districts recorded the following: Garki (27.62%), Maitama (25.7%), Utako (24.3%), Wuse (20.9%) and Asokoro district (1.4%) respectively with most of the crime committed during the day time. Many attributed the crimes to mainly high rate of unemployment and poverty (79.1%). Consequently to reduce the crime rate, the socio-economic situation of the city must be improved through properly constructed interventions scheme in areas known to quickly generate employment such as agriculture, small and medium scale enterprises, mining and tourism.

Ayuaba, Mugu, Tanko, and Bulus (2016) analyzed the geopsaptial analysis of crime in Kaduna Metropolis. The data were sourced from the police divisional headquarters in Kaduna. An administrative map of the study area were used to delineate the police districts according to the Divisional Police Headquarters Jurisdiction in Kaduna Metropolis. The study identified and mapped a total of 11 crime types in the study area. The coordinates of each crime incidence were obtained from Google Earth Pro 4.2. An overlay analysis was performed and all the acquired coordinates of the crimes were displayed on the composite map. Finally, a GIS database was created where the spatial and attribute data were encoded and query analysis was performed. The study revealed that Theft/Stealing and Hurting/Fight ranks highest with 19.29% and 16.82% respectively. The study also discovered that crime incidence is highest in Tudun Wada with (15.05%), followed by Sabon Tasha and Rigachikun with 10.24% and 10.16% respectively. The study also revealed that Tudunwada, Sabon Tasha, Rigachikun and Rigasa are the major crime hotspots in the metropolis.

Ayuba, (2015) mapped and analyzed crime incidences between 2010 and 2011 in Kaduna Metropolis, Kaduna State, Nigeria using Remote Sensing and GIS techniques. The data were obtained from the 15 police divisional headquarters within the metropolis. Microsoft excel and ArcGIS version 9.3 were used to analyze the data. A total of eleven (11) crime types were identified. The result revealed that theft/stealing had the highest incidence with 19.29%. The general distribution of crime in the metropolis revealed that Tudun Wada had the highest crime with 15.05%. The finding show that armed robbery were highest in Sabon Tasha with 13.64%, murder in Rigachikun (27.36%), assault in Tudun Wada (21.75%), theft/stealing in Tudun Wada (17.2%), rape in Rigachikun (19.1%), forgery in Kabala West (13.23%,) burglary in Tudun Wada (19.2%). Suicide in Rigachikun (26.54%), cheating in Tudun Wada (14.52%), hurting/fighting in Sabon Tasha (17.1%) and kidnapping in Rigachikun (27.3%). The temporal distribution of crime revealed that crimes are committed most in December and January with 26.9% and 22.45% for both 2010 and 2011. The study identified four (4) crime hot spots using the clustering techniques; thus, Tudun Wada, Sabon Tasha, Rigachikun and Rigasa.

Bawa, Bala, Lugga, and Ayayi (2015) analyzed geospatial information system for crime analysis and crime zone identification-case study of Katsina, Nigeria. The study sourced data from Katsina State police headquarter and used ArcGIS 10.3 for classification of the types of crime with respect to the spots of occurrences. Areas of high and low frequency of crime occurrence were also highlighted. The study revealed that there is a marked variation in the distribution of crime between and within the zones. Theft and stealing cases accounted for about 45.17% of the total crime cases between 2004 and 2009. Assault accounted for 8.85%, while armed robbery accounted for 8.71% and rape for 6.57%. Murder had 6.57% while House Breaking and Criminal force had 5.90% and 5.09% respectively. Other crime categories contributed less than 5% each.

Jinadu, Morenikeji, Sanusi, Dukiya, and Owoyele, (2012) utilized GIS approach to examine the spatial pattern of criminal activities in Minna metropolis using Kernel Density Estimation Tool (KDE) in ArcGIS 10.3. The research work relied on criminal data that were collated from the records of the Niger State Police Headquarter over a period of 11 years (2000-2010). The researchers classified the city into 26 neighborhoods. All the collated criminal offences were further compartmentalized into three i.e. against persons, crime against property and crime against public order. The study revealed that Bosso, Barkin Sale, Kpatkungu, and Tunga were identified as hotspots Lima and Maitumbi were medium crime areas. However, neighborhoods identified as low crime areas include GRA, F-Layout, Bosso Estate, Tundun Fulani. Shango, Chanchanga, Fadupe, sen Kura, Makera, Minna Central and Nassarawa respectively. The analysis further indicated that crimes committed against persons and property were predominant (75.6%) with theft, house breaking and assault being the most common crimes (84.7%). The analysis revealed that neighborhoods with high population density, low income, poverty and slummy conditions were areas of crime hotspots.

Adepoju and Halilu (2014) made use of geo-spatial technology to analyse and generate crime hotspots and coldspots maps in Abuja (the FCT) using Kernel Density Estimation method with a bandwidth of 0.10km based on the extent of the study area. The study utilized crime data collated from police headquarter area F and force headquarter FCT, Abuja. An overlay analysis were subsequently carried out to establish the relationship between the crime hotspots and recreational centres as well as the police divisional stations in the various districts. Their findings revealed that areas that were deprived of infrastructural facilities served as potential hideout for criminals while the areas that are close to parks, gardens and green spaces recorded more cases of criminal activities. The crime topology map generated from the crime data revealed that robbery

and theft had the highest proportion (35% and 33% respectively) while rape and drug related crimes had the lowest with percentage (4% and 2% respectively).

Yelwa and Bello (2012) assessed property crimes in Katsina Metropolis. The study utilized crime data from the 36 divisional police headquarters in the state from 2006 to 2008 and used cluster analytical tool in ArcGIS 10.3 to analyze the data. The property crime dataset in the state showed that theft had the highest mean rate while robbery ranked 2nd and car snatching, house/store breaking and unlawful possession of items ranked 3rd, 4th and 5th respectively. The cluster analysis equally revealed that Katsina and Funtua Local Government Areas had the highest concentrations of all the property crimes in the state while Ingawa, Musawa, Kaita, Dutsi, Kuril, Kafur, Kankara, Sandamu, Jibia, Mani, Safana, Sabuwa, Kankia and Matazu Local Government Areas had the lowest concentration of property crimes. The high criminal cases in Katsina metropolis and Funtua were linked to high population density and multiplicity of value systems.

Fajermirokun, Adewale, Oyewusi and Maiyegun (2006) applied GIS to map and analyse crime in Victoria Island, Lagos. The data for the study were collected from police station in Victoria Island, Lagos. The study area were delineated into six crime zones for the analysis and the level of the crimes were mapped using dot density in ArcView 3.1. The study revealed that zone 4 has the largest concentration of residential and business/office areas and has the greatest proportion of the total crime incidences especially crimes that relate to properties. Zone 2 and 4 also have the highest (20%) number of crime incidences against person and zone 1 has the lowest incidence of reported crime in the study area.

Balogun, Okeke and Chukwukere (2014) used GIS to map and assess the crime situation in Benin City. The researcher obtained crime data from police headquarter, Benin City. KDE was used to determine crime hotspot while descriptive statistics was utilized to identify crime types in

the study area. The study revealed that robberies and burglary were the most (29% and 22% respectively) prominent crime while areas like Oba Market, Ogbe Quarters, Eric, Asoro, Oka, Christ Apostolic Road, Uwa Primary School Igbesammwan, Faith Way and Gapiona in GRA, Uselu Market Area, Uwasota, Ugbowo Housing Estate and Ekosodin village near University of Benin are areas highly vulnerable to different types of crime.

Adepoju et al., (2014) studied 'Geospatial technologies for Nigerian Urban security and crime management' which was a study on Abuja crime hotspots mapping and analysis. The study was conducted using proximity analysis to ascertain relationship between crime hotspots, cold spots, police divisional stations, slums settlement as well as various parks and gardens in the study area. The result revealed a significant correlation between slum settlement and crime in the Abuja city. The result also showed significant correlation between parks/gardens and crime.

2.3.3 Causes of Crime in Nigeria

Ackerman (1998) studied the spatial patterns of crime in Lima, Ohio (U.S.A). Principal Axis Factor Analysis with Varimax Rotation was employed to identify underlying constructs. The suits of the analysis were used for the mapping of socio-economic variation of the inhabitants in order to assess the spatial relationship between patterns of crime and socio-economic characteristics of the area. Findings revealed that neighborhoods characterized by poverty, unemployment, high levels of economic marginalization, weak family structure and resultant social disorganization were geographically associated with high crime rates. The 'micro-level kernel density pattern of crime maps revealed that areas mostly affected were the low socio-economic status tracts situated on a north-south axis centred on Main Street and south of the Central Business District. However, the kernel density pattern further showed that the affluent communities had low record of violent criminal activities.

Ellof (2006) analyzed crime occurrences in Tshwane. The researcher obtained data from Tshwane Divisional Police Headquarters. Inferential statistics was used to examine the relationship between planned, unplanned residents and crimes and KDE was utilized to identify crime hotspot. The result revealed a high correlation between unplanned high-density residential landuse and crimes. The analysis showed that car hijacking (at gun point) (23.2%) and rape (27.4%) were the dominant cases of crime in the unplanned residential areas. The findings revealed that areas that had poorly laid out buildings had the highest density (79%) of crimes while the well-planned neighbourhoods showed the lowest density of crimes. The crime topology map further revealed that armed-robbers took the advantage of the poorly planned areas of Brisbane.

Adibe (2012) studied the factors responsible for a failed and a failing state and the incessant crimes in Nigeria using simple statistics. The study attributed crime in Nigeria to chronic unemployment, incapability of the police to control crime, lack of social security, disintegration of social structure and traditional values, replacement of organic social control with inorganic social control, failure of the government in providing public utilities for its citizens, ethno-religious bigotry and political prejudice.

Balogun, Ahamed, Iyekolo, and Ayorinde (2013) assessed lecturers' perception of causes and consequences of sexual assault in tertiary institutions of Kwara State, Nigeria. The population for the study comprised all tertiary institutions owned by Kwara State Government. Researcher purposively sample three tertiary institutions (Kwara State University, Kwara State College of Education Ilorin and Kwara State Polytechnic Ilorin) out of four institutions owned by the state. 300 respondents were randomly selected. Researcher designed questionnaire were used to elicit information from respondents. The data acquired were analyzed using simple descriptive statistics. The finding of the study reveals that inadequate security in the school premises, decline

in the school cultural values and alcohol/drug consumption are the major causes of sexual assault in tertiary institutions. The study also reveals that sexual assault in the tertiary institutions brings about their poor projection image and lack of concentration in the study by the victim.

Joseph (2018) analyzed causes and consequences of intimate partner rape and violence: experiences of victims in Lagos, Nigeria. The qualitative study explored the experiences of 22 purposively selected married women aged, 22 to 40 years from two Save Our Soul (SOS) Shelters for abused women who have been victims of intimate partner rape/violence. Qualitative data on intimate partner rape/violence experiences and associated factors were collected through eight Focus Group Discussions (FGDs). Descriptive analysis was used for the demographic characteristics of the participants. The transcription of the recorded audio cassettes, together with the recorded field notes, provided data for the thematic analysis. The discussions revealed that the principal causes of intimate partner rape/violence were unequal power relations; alcohol and drug dependence and jealousy. Self-reported consequences of Intimate Partner Rape/Violence by victims included amongst others: physical injury (31.87%) constant headaches (27.27%); sleep disturbances (18.18%); excessive fear and anxiety (9.09%); suicidal ideation (9.09%) and hatred for men (4.55%). These findings confirm that intimate partner rape/violence may be playing significant but salient role in the poor state of health of Nigerian women.

2.3.4 Effects of Crime

Effiong (2017) assessed the perception of urban crime on residential property values in Calabar South, Nigeria. The study adopted the survey research design and questionnaire were the main source of data collection which were administered on respondents of the four selected neighbourhoods through random sampling. The data collected were analyzed using of descriptive statistics and multiple regression analysis. The findings from the study reveal that residents of

these neighbourhoods have negative perception living in crime prone areas and crime rate has a negative impact on property values within the study area.

Kerezsi, Kó, and Antal (2018) analyzed the social costs of crime and crime control in Budapest, Hungary. Taking 2009 as a base year, the author's highlighted the crime-related social expenditure accounts in Budapest. The researchers, obtained data from Hungarian Research Institute databases and used descriptive statistics for analysis. The author's findings revealed that social cost caused by crime were about 2.17 billion US dollars in 2009. Furthermore, the sum that were drawn by the offenders as a benefit/profit from committing crime were 1.17 billion which were the net social damage in 2009 in Hungary as 1.63 billion was spent on crime control (For example, law enforcement, judiciary, prison and crime prevention) in the same year. The results further showed that delinquency caused a total of 3.8 billion as damage, or as an expenditure spent by the government in 2009. The cost of crime control was about 500 million higher than the amount of damage caused by crime. The offenders benefit/profit from committing crime which was approximately 1 billion dollars were only 15% less than the damage they caused to the state and to the citizens which stood at about 1.17 billion dollars.

Egbe (2018) studied the impact of urban crime on residential property values in Calabar South, Nigeria. The study focused on four residential neighborhoods namely; Anantigha, Ekpo Abasi, Idang and Nsidung in Calabar South. The researcher adopted the survey research design and questionnaire were the main source of data collection which was administered on respondents of the four selected neighborhoods through random sampling. The data collected were analysed using descriptive statistics and multiple regression analysis. The findings from the study revealed that residents of these neighborhoods (Anantigha, Ekpo Abasi, Idang and Nsidung) have negative

perception living in crime prone areas and crime rate has a negative impact on property values within the study area.

Metu, Kalu, and Maduka (2019) analyzed the effect of crime on economic growth as well as the challenges to effective crime prevention and control in Nigeria. The study sourced data from Nigerian National Bureau of Statistics (NBS) and World Development Indicators (WDI) while using descriptive statistics for analysis. The findings revealed that the rate of crime increased over the study period and increased crime rate has adverse effects on sustainable economic growth in Nigeria by driving away both foreign and domestic investors; low investment eventually increases unemployment and poverty. The challenges to effective crime prevention and control are corruption, poverty, family issues and poor motivation for the Nigerian Police Force.

In conclusion, the relevance of most of the concepts, theories and empirical works reviewed in this chapter cannot be over emphasized. For instance, concepts like classification of crime and spatial autocorrelation technique as a tool for analyzing neighborhood crime have been of tremendous importance to the topic under investigation. Aside this, theories like wirthian, design determinism, broken window, social disorganization and anomic theories have helped to unlock the main determinants of crime. The literature review also helps in shedding light on the trends and patterns of crime in Nigeria. Of great importance to this topic are the different empirical works on the analysis of crime using GIS. Empirical works on the causes of crime have also been of great importance to this research topic.

CHAPTER THREE

STUDY AREA AND METHODOLOGY

3.1 THE STUDY AREA

3.1.1 Location and Size

Okene township is within Okene Local Government Area in Kogi State, Nigeria. The town is located from Latitudes 7°34'03" N - 7°40'29" N and Longitudes 6°12'09" E - 6°15'11" E of the Greenwich meridian (Fig. 3.1). It has an area extent of 328 km sq and elevation of 363metres above sea level. The town shares boundaries with Oyi 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. It is located in the north–central geopolitical zone of Nigeria known as middle belt region (Ismail, Eleojo, & Adebayor, 2017).

3.1.2. Climate

The climate condition of Okene in Kogi state and its neighboring environment fall within the tropical savannah climate or tropical wet and dry climate. This climate, the tropical savannah climate exhibits a well-marked rainy season and dry season with a single peak known as the summer maximum due to its distance from the equator. The rainy season lasts from April to October while the single dry season experienced in this area, begins from late November to March and it is hot and dry with the harmattan wind, a continental tropical (CT) air mass laden with dust from the sahara Desert prevailing throughout this period. The temperature is above 18^0C throughout the year and the annual rainfall is usually between 1,100mm and 1,300mm (Clement, Ezekiel, Agatha, Taiwo, & Blessing, 2019). Increased serotonin levels resulting from high temperature has been known to contribute to increased impulsivity and a higher risk of crimes.

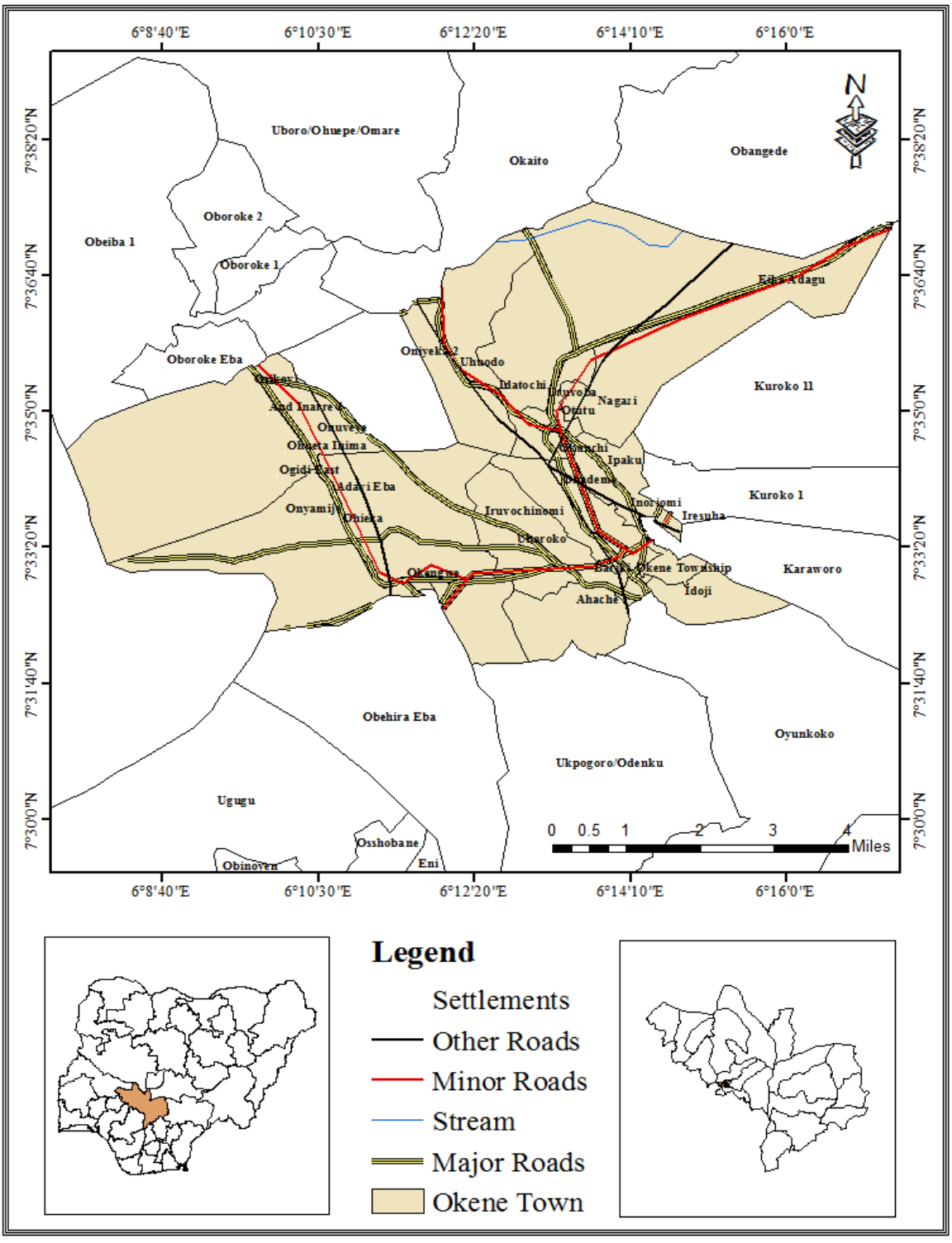


Figure 3.1: Okene Township

Source: Modified from Administrative Map of Kogi State (2014)

This corroborates with the findings of Butke & Sheridan, (2009) which revealed that aggressive crimes generally increase linearly as apparent temperature increases, with nonaggravated assaults and domestic violence assaults having the largest response as the weather becomes hotter.

3.1.3. Relief and Geology

The relief of Okene like other parts of the middle belt can be classified into two; stable land surfaces and erosional land surfaces. The stable land surfaces consist of level or undulating plateau surfaces at over 1.200 feet. The surface is characterized by smooth round inselbergs. At Okene and Upogoro areas, flat-topped hills and bold ridges dominate other parts of the area with examples at Okene and Okengwen districts. All over the stable land surfaces, ironstone is widely spread, occurring as pisolitic gravel, broken block or continuous sheets overlain by clayey materials at depths varying from 3 – 8 inches. The uplands of Okene are underlain by igneous and metamorphic rocks of the basement complex, with outcrop as massive ridges and rocky hills all over the area (Ishaku, Kolawale, Daniel, & Owonipa, 2016). Pirrie, Ruffell and Dawson, (2013) have shown that criminals tend to use elevated areas as hideout where they plan and execute their heinous acts.

3.1.4 Drainage

Okene is well drained by fairly dry stream channels which run in some of the local settlements in the area. The major river, with a lake, in the mapped area is the river locally called the Irivochinomi River which has a lot of tributaries flowing across the mapped region. The direction of flow and pattern of these tributaries are largely controlled by the structural trend of the area. These channels serve as a major source of domestic water supply in parts of this area where pipe-borne water is not available. The drainage pattern of the river and streams in the studied

area is a dendritic form of drainage pattern in which river tributaries flow as branches of a tree (Usman, 2011).

3.1.5. Soil and Vegetation

Soils in Okene are usually stony, although there are patches of reddish clay at the foot of inselbergs. Extensive patches of clay occur at the lower lateritic tablelands, where a marked catena arrangement of laterite clay on the upper slopes and fine-grained to sandy clay at the base is typical. It enables the main areas become fertile farmlands and can easily be identified where they occur as a ring of heavy cultivation around the base of bold rock outcrops. The widespread layers of iron stone found on the stable land surfaces are a product of intense of chemical weathering and this rich ion stone of basement complex represents an African laterite plain developed on sedimentary rocks (Otupuru, 2014).

Okene falls into the tropical Guinea savannah belt with tall grasses and some sparse trees. The vegetation here 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. The trees which grow in cluster are up to six meters tall, interspersed with grasses which grow up to about three meters. The different kinds of vegetation are not in their luxuriant state owing to the careless human use of the forest and the resultant deciduous and savannah vegetation. The vegetation in this area includes both primary and secondary. The secondary vegetation implies that the natural vegetation is being altered and as such agricultural crops such as yams. Cocoa, maize, cassava and some fruit crops are cultivated. The most widely grown crops are yam, cocoa and cassava (Otupuru, 2014). Wolfe and Mennis, (2012) indiates that vegetation abubdance in Philadelphia is significantly associated with low rate of assault, robbery, and burglary but high rate of theft.

3.1.6. Population and People

Okene Local Government Area is characterized by dense population density. The 1991 National Population Census (NPC) asserts that Okene township had a population of 317,953 people with a population density of 3.04% (National Population Commission, 1991), when projected with Newman (2001)'s formular in 2018, stood at 695,681. The Okene metropolis is densely populated, primarily by Ebira people and Islam is the predominant religion. The metropolis 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. Some of the traditional festivals include Ekuechi, Ebe, Eyika, Echane, Unehe (Ichekene and Ikede) and a host of others (Ismail, Eleojo, & Adebayor, 2017).

3.1.7 Economic Activities

The town is a major trade center for yams, cassavas (manioc), corn (maize), sorghum, beans, peanuts (groundnuts), palm oil and kernels, and cotton which are grown in the surrounding areas by the Ebira people. Cotton weaving is a traditional craft, and Okene women are known for their weaving of imported silk. Iron ore from deposits in the area is shipped to the iron and steel complex at Ajaokuta (Clement, Ezekiel, Agatha, Taiwo, & Blessing, 2019). Areas predominant with economic activities tend to attract criminal activities like burglary, home breaking, theft and stealing (Bala, Bawa, Lugga, and Ajayi, 2015)

3.2 METHODOLOGY

3.2.1. Reconnaissance Survey

A reconnaissance survey was carried out in order to have an adequate knowledge of the study area. During this phase, the Divisional Police Officer (DPO) and the Director of the State Security

Service (SSS) and Kogi State Ministry of Lands and Survey were visited. This was embarked upon to pave the way for a detailed field survey. The researcher, during the period was able to get crime data from 2014 to 2018 from the Divisional Headquarters and the administrative map of the study area. The researcher's interaction and discussion with the DPO and the director of the SSS assisted him to gain insight on criminal issues in the study area which helped in designing the research instrument.

3.2.2 Types of Data and Sources

For the conduct of this research, the following types of data were used:

i. Geographic coordinates of crime location were obtained using Garmin eTrex R 20x Handheld GPS Receiver with an accuracy of at least 5 meters.
ii. Administrative map of the study area at a scale of 1:50,000 were obtained from the Urban Planning section in the Ministry of Lands and Survey, Kogi state.
iii. Crime records from January, 2014 to December, 2018 were obtained from the Divisional Police Headquarters in the study area.
iv. Data on factors responsible for crime were gotten through Questionnaire Survey and In-depth interview
v. Data on consequences of crime were gotten through Questionnaire Survey and In-depth interview

3.2.2.1 Primary data source

The primary data used for this study were collected through survey and direct field measurement. The primary data were drawn from residence of Okene town of Kogi State, Nigeria. The questionnaires were administered to dweller of the town. The questionnaire was divided into three (3) sections which are as follows; section A deals with the socio-demographic characteristics of

the respondents, section B was on causes of crime, section C was on examine effects of crime. In addition, Key Informant Interview (KII) was conducted with relevant stakeholders such as, community leaders and security personnels in the study area. The idea is to collect additional information regarding the research problem.

3.2.2.2 Secondary sources of data

The study makes use of documented materials from Kogi State Ministry of Land and Survey Lokoja's office to get the political extent of Okene town. Data was also collected from National Population Commission (NPC) Kogi State office to obtain population figure of the study area for the years under study. Data on the types of crime was obtained from Police Headquarter Okene LGA Division. Relevant information as it relates to the background of the study area was sourced from published works such as journals, textbooks, conference papers and unpublished works such as dissertations and theses.

3.2.3 Sample Size and Sampling Technique

The choice of a fairly representative sample for the study is critical for generating results that reflect characteristics of the entire population. To obtain the sample size, the population census figure of the study area for the year 1991 was used and projected to the year 2018 using the (Newman, 2001) formula with 3.04% growth rate for Kogi State. The formula is given as:

$$P_O = P_n + \left(P_n \times \frac{1+r}{100}\right) n$$

P_O = Population at the future date 2018

P_n = 317,953 (Base year population 1991)

r = growth rate (3.04%)

n = number of intermediary years (1991 – 2018 = 27)

$$P_o = 317{,}953 + \left(317{,}953 \times \frac{3.04}{100}\right) 27$$

= 695,681

Yamane (1967) formula was also used to determine the sample size at 95% confidence level and 5% sampling error assumption.

$n = N/1 + N (e)^2$

n = sample size

N = Population size = 695,681

e = sampling error = 0.05

$$\frac{695,681}{1+695,681\ (0.05)^2}$$

= 399.77

The sample size for this study is approximately 400 which also determines the number of questionnaire administered. To obtain the proportion of questionnaire to be administered to each neighborhood, simple arithmetic formula for proportion determination was used to determine the number of respondents to be selected from each neighborhood;

$$\frac{n \times Q}{N}$$

Where

n = population of each neighborhood

Q = Total number of questionnaire

n = Total population of the study area

The population and samples size for each neighborhood is presented on Table 3.1

A Systematic random sampling technique was used to select the respondents in the various neighborhood of the study area. The procedure involves selecting observations in a regular sequence from an initial purposively determined starting point (Walford, 2011).

Table 3.1: Sample Size by Neighborhood

Neighborhood	1991 Population	2018 Projected	Sample Size
Okene-Eba	197,626	426,029	234
Idoji	735	2,226	2
Otutu	561	1,669	2
Orietesu	616	1,725	2
Lafia Obessa	3,628	11,574	10
Bariki	10,836	20,870	12
Obehira Uvete	850	2,804	3
Abuga Ozuja	442	1,391	1
Adavi eba	21,237	48,698	28
Uhucheba	747	2,662	2
Ogaminana	55,053	118,266	68
Idanuhua	12,192	27,827	16
Okunchi/Anyoke	10,568	20,870	12
Inoziomi	2,862	9,070	8
Total	**317,953**	**695,681**	**400**

Source: NPC, Kogi (2019)/Author's Compilation (2019)

Therefore, the research team purposively selected the first household which was randomly followed by every third house in the area. Where the household head declined access to members of the research team, or is absent, the researcher moved to the next house until the target population sample was reached. This sampling technique was used in order to eliminate or reduce any possible bias and clustered responses for the generalization of the research findings. In addition, the Area Commander and some community leaders were purposively selected for the KII. The KII provides more information on the research problems as the informants were people who deal directly with criminals and victims.

3.2.4 Data Processing

The crime data was imported to Microsoft excel and saved as CSV (comma delimited) format which is recognizable and acceptable to the ArcCatalog extension of ArcGIS.

3.2.4.1 Scanning

The administrative map (1:50,000) of the study area was scanned from analogue form to computer-based format using A4 scanning device. The scanned map was exported to ArcMap environment for geo-referencing. The administrative map of the study area was scanned to produce a digital replication of the map and to enable other geographical analysis like overlay among others.

3.2.4.2 Geo-referencing

Geo-referencing is the process of taking a digital image, it could be air-photo, a scanned geologic map, or a picture of a topographic map, and adding geographic information to the image so that GIS or mapping software can place the image in its appropriate real-world location. The geographic coordinates of six points were collected and used for geo-referencing the scanned administrative map of the study area to bring a relationship between the scanned maps to actual representation on the ground, thereby allowing overlay analysis to be carried out.

3.2.4.3 Digitizing

Shapefiles was created in Arc-Catalog environment with same coordinate system with the map. The shapefiles was imported into the ArcMap environment where an on-screen digitizing were carried out on scanned images of the study area. The following themes were created among others: roads, towns, crime spot and ward boundary, which were also used subsequently for result presentations. This process was undertaken to ensure that all geographic feature needed for analysis are in their original location.

3.2.4.4 Data Preparation

The crime data acquired from the police headquarter were prepared and categorized in Microsoft Excel environment. Furthermore, Statistical Package for Social Science (SPSS 20.1) was employed for the processing of quantitative datasets derived through questionnaires wherein the data were sorted out, categorized and coded. The qualitative data that were generated through the In-depth interview were processed through the use of content analysis. Content analysis is a research methodology that examines words or phrases within a wide range of texts acquired during an exploratory filed survey.

3.2.5 Data Analysis

Objective 1: identifying and mapping the types of crime in the study area

The crime statistics acquired from the Divisional Police Headquarter of Okene Local Government Area was grouped and differentiated into various crime categories and the frequency of the crimes for each category was considered over the five years in the study period (that is 2014-2018). Subsequently, the types of crimes, frequency and year of the crime for the study area were sorted out, classified and presented in tables, charts and percentages using simple descriptive statistics.

Objective II: establishing the spatio-temporal pattern of crimes in the study area

The distribution pattern of crime cases in the area was determined using the locations of the reported crime types on the basemap of the study area. Hence, the Nearest Neighbour Analysis (NNA) inferential statistical tool in ArcGIS10.3 was employed to determine the spatial pattern in the data. The Nearest Neighbor Analysis formular in figure 3.2

$$Rn = 2đ \sqrt{\frac{n}{a}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{Fig. 3.2}$$

Where

Rn= the nearest neighbor index

đ= the mean observed nearest neighbor distance

n= the total number of points

a= the total area

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 the mean distance of a phenomenon to the same expected mean distance usually under random distribution (Getis and 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 and 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 exhibit a clustered pattern, whereas a value greater than 1 indicates a dispersed pattern (Pimpler, 2017). Descriptive statistics tool was utilized to analyze the temporal pattern of crime in the study area.

Objective III: determine the crime hotspots in the study area

There are many techniques available in identifying the location of hotspots which include point mapping, standard deviational spatial ellipses, thematic mapping, grid thematic mapping, spatial autocorrelation and Kernel Density Estimation (KDE). KDE was utilized because the method is the most suitable spatial analysis technique for visualizing crime data (Eck, Chainey, Cameron, & Leitner, 2005). KDE is a type of non-parameter density estimator, which estimates how the density of events vary over the study area (Dick & Dick, 2014). It produces a smooth map

in which the density at every location reflects the number of points in the surrounding area and the method also has the advantage of deriving crime density estimates based on calculations performed at all locations (Levine, 2002); (Harries, 1999); (Chainey & Ratchiffe, GIS and Crime Mapping, 2005). KDE involves laying a fine grid and a circular window of constant bandwidth will be placed on a grid over the study area. The density is calculated within the window. Points closer to the center of the window are given more weight than points further away (Goldsmith, 1999).

A crime hotspot map was produced using the kernel density in ArcGIS10.3 to show the area with high vulnerability to crimes within the period of 2014 to 2018 in the study area. The area with lighter shades represented locations with lower crime density, while darker shades represented locations characterized by the highest crime density (Chainey, Tompson, & Uhlig, 2008).

Objective IV: determining the factors responsible for crimes in the study area

Relative Importance Index (RII) was used to identify the factors responsible for crime in the study area. This revealed the specific factors responsible for crimes in Okene town.

RII=Sum of weights (W_1 + W_2 +W_3 +W_4 +W_5+ W_6 +W_7 +W_8) / A x N

Where W= weights given to each factor which ranges from 1-5.

1= highly insignificant, 2= insignificant, 3= neither, 4= significant and 5= highly significant. A= highest weight in this case 5 and N= total number of the respondents. W_1= Drug addiction, W_2= Moral decay, W_3 = Alcoholism, W_4= Poor parenting, W_5= Family structure, W_6= Political intolerance, W_7= Ethno-religious, W_8= Lack of education.

These were added together that is 5+4+3+2+1=15 and divided by 5 to arrive at 3.0 which is the mean point. Therefore, any mean score $\geq$ 3.0 was regarded as significant while <3.0 were termed insignificant (Akrofi, Antwi, & Gumbo, 2019).

Objective V: determining the consequences of crime in the study area

Relative Importance Index (RII) was used to identify the consequence of crime occurrence in the study area.

RII=Sum of weights (W_1 + W_2 +W_3 +W_4 +W_5+ W_6 +W_7 +W_8) / A x N

Where W= weights given to each effect which ranges from 1-5.

1= highly ineffective, 2= ineffective, 3= neither, 4= effective and 5= highly effective. A= highest weight in this case 5 and N= total number of the respondents. For social causative factors; W_1= poverty/economic hardship, W_2= Unemployment, W_3 = Lack of basic amenities and infrastructure, W_4= Inequality in the distribution of wealth and resources, Environmental causative factors; W_1= Infrastructural decay, W_2 = Poor environmental and unhealthy sanitary condition, W_3= Growth of urban slums and shanty settlements, W_4= Lack of adequate urban design and planning, W_5 = Poor urban housing, W_6 = Increasing urbanization, W_7 = All of the above and for Consequences of crime; W_1= Tarnish the towns reputation, W_2= Loss of employment, W_3 = Loss of lives, W_4= Loss of revenue, W_5= Loss of property, W_6= Under development, W_7 = Permanent disability, W_8= Death of persons. These were added together that is 5+4+3+2+1=15 and divided by 5 to arrive at 3.0 which is the mean point. Therefore, any mean score $\geq$ 3.0 was regarded as significant while <3.0 were termed insignificant (Akrofi, Antwi, & Gumbo, 2019).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter presents the result of the analysis from the data obtained through the questionnaire survey and crime records from Okene Divisional Police Headquarter and Area Command, Kogi State. Out of the 400 copies of questionnaire which were administered to residents of Okene township in the area, 389 (97%) were retrieved and this was used for the analysis. This chapter has thus been classified into six (6) main sections and the findings of the study were subsequently discussed in each sub-section.

4.2 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

This section presents findings on the demographic and socio-economic characteristics of the respondents in the study area. These includes, sex, age, marital status, level of education, income, occupation and duration of stay. It also includes religion and victims of crimes among the respondents.

4.2.1 Demographic Characteristics of Respondents

It is obvious that Table 4.1 presents the demographic characteristics of the respondents. Such characteristics include sex, age and marital status. The result reveals that the respondents constituted 65% males and 35% females. This implies that most household in Okene town are headed by men. This is further corroborated by the findings of the Final Statistics Report (2007) which revealed that 83.5% of household in Nigeria are headed by men while 16.5% are headed by women.

In addition, 43% of the respondent were between 18 and 30 years while 3% were 51 years and above. This reflects a youthful, energetic and vibrant population which is likely to commit crime due to youthful exuberance. So, it is likely that most of the people that are within this age group are not gainfully employed and as such, crime could be attributed to the societies' inability to absorb jobless youth and able-bodied men and women.

Table 4.1: Distribution of Respondents According to Sex, Age Group and Marital Status

Variables	Frequency	Percentage
Sex		
Male	252	65.0
Female	137	35.0
Total	**389**	**100.0**
Age Group		
Less than 18	17	4.1
18-30	167	43.2
31-40	115	30.1
41-50	79	19.5
51 and above	11	3.1
Total	**389**	**100.0**
Marital Status		
Single	121	31.2
Married	253	64.7
Divorced	5	1.0
Widowed	10	3.1
Total	**389**	**100.0**

Source: Field Survey, 2020

The findings are further upheld by the study of Nwachukwu & Bartholomew (2015) which reveals that the population of people whose ages fall within 15-45 years in Owerri metropolis is very high and are thus plagued by acute unemployment, poverty and drug addiction and the consequential effects have been crime.

Furthermore, 64.7% of the respondents were married while 31.2% were single. This implies that they are more married people in the town than singles. This is further corroborated by the Final Statistics Report (2007) which revealed that 65.4% of the people in Nigeria are married

as against 29.2% that are single. To meet up with the financial demand of the family, some married individuals might get involved in crime in order to tackle their domestic needs. This is further upheld by the findings of Onakan, (2016) in Kaduna state who revealed that it is not unforeseen that some married individuals get involved with crime in order to meet up with their domestic necessities.

4.2.2 Social Characteristics of Respondents

It is seen that Table 4.2 presents the social characteristics of the respondents which include the duration of stay in the study area, level of education, religion and victim of crime. The result shows that the respondents who had spent more than 11 years and above in the study area constituted 69.40% while those whose duration of stay was less than 3 years constituted only 2.84%.

Table 4.2: Distribution of The Respondent According to Social Characteristics

Variable	Frequency	Percentage
Duration of stay		
Less than 3 years	11	2.84
3-6 years	92	23.65
7-10 years	16	4.11
11 years and above	270	69.40
Total	**389**	**100.00**
Level of Education		
Primary	11	2.84
Secondary	95	24.42
Tertiary	259	66.58
Others (no modern or Islamic education)	24	6.16
Total	**389**	**100**
Religion		
Christianity	128	32.90
Islam	256	65.85
Others	5	1.30
Total	**389**	**100**

Source: Field Survey, 2020

Hence, it can reasonably be assumed that most of the respondent have good knowledge on the history of crime in their respective places of locale. Also, the analysis reveals that 66.58% of the respondents had tertiary education while only 2.84% had primary education. This could be because of the Federal College of Education (FCE) situated in the town and the permanent site of Kogi State Polytechnic Faculty of Engineering located close to the town. In addition, the statistics shows that 65.80% of the respondents practice Islam while 32.90% practice Christianity whereas 1.28% practice other forms of religion. The religious believe of the people in the study area influences their experiences and attitudes towards crime. Findings have shown that religion tends to have a deterring influence on crime-related attitudes and behaviours (Adamczy, Freilich, & Kim, 2017).

4.2.3 Economic Characteristics of Respondents

It is obvious that Table 4.3 presents the economic characteristics of the respondent which includes occupation, level of income per month. It is obvious from the result that 60.15% of the respondents were civil servants however only 1.54% were into farming.

Table 4.3: Distribution of the respondent according to economic characteristics

Variables	Frequency	Percentage
Occupation		
Civil service	234	60.15
Farming	6	1.54
Trading	22	5.65
Artisan	43	11.07
Others (unemployed)	84	21.59
Total	**389**	**100**
Level of income per month		
Less than N10,000	62	15.93
N10,000-N20,000	99	25.44
N20,100-N30,000	109	28.02
N30,100-N40,000	57	14.68
N40,100-N50,000	56	14.39
N50,100 and above	6	1.54
Total	**389**	**100**

Source: Field Survey, 2020

This means that more than half of the respondents in the area are civil servants. Sadly, the formal and informal sectors in Kogi State have been characterized by uncertainties as some of the gains accruing to the artisans, traders, and farmers are seasonal, while the state and local government civil servants are owned or paid a paltry sum of their salaries. With salaries not forth coming, inflation and poverty soaring, residence might be forced into crimes for survival.

This could influence crimes when it is glaring that their earnings will not make ends meet. This fact cannot be more justifiable when viewed from the fact that only 1.54% of the respondents earn more than N50, 000 per month as 28.02% earn between N20, 000 - N30, 000 which happen to the be State and Federal government minimum wage.

4.3 TYPES OF CRIMES

This section presents the types of crimes identified and mapped in the study area. The crime records collected from police divisional offices were used. The results are presented in Table 4.4 and Figure 4.1

There were nine (9) types of crime recorded in the crime data from the police division in the area between 2014 and 2018. These were armed robberies, murder/homicide, theft/stealing, assault, rape, burglary/home breaking, pretense and cheating, hurting/fighting and kidnapping. Table 4.4 reveals that theft/stealing was the most prominent type of crime in Okene town with 22% followed by armed robbery (14%) while rape and false pretense were low with 4% and 6% respectively. This implies that theft and stealing is the most common type of crimes in the study area.

Table 4.4: Types of Crime in Okene Town (2014-2018)

Crime Type	Frequency	Percentage
Armed Robbery	25	14
Murder/Homicide	18	10
Theft/Stealing	40	22
Assault	19	11
Rape	9	4
Burglary/Home Breaking	24	13
False Pretense and Cheating	11	6
Hurting/Fighting	14	8
Kidnapping	21	12
Total	**181**	**100**

Source: Field Survey, 2020

The finding of the study is similar with the ones identified by Bala *et al* (2015) in Katsina State, Ayuba, Mugu, Tanko, & Bulus, (2016) in Kaduna State and that identified in Benin City by Balogun *et al* (2014), whose findings expose high rate of theft/stealing in their study areas. The in-depth interview with the community leader spoke person substantiated the findings that:

> *Theft/stealing, house breaking and burglary are the most prominent crimes in the town and residents usually have their properties stolen at night, when they go to work, or when they are out of town. He opined that rape is once in a blue moon while false pretense/cheating is not customary to them so therefore it's rare (Community Leader, 2020).*

Therefore, the above analysis of the responses has shown that theft/stealing, arm robberies, home breaking, and burglary are the main social maladies confronting Okene town.

The types of crimes identified in Table 4.4 were mapped to provide a pictorial representation of the crime types in Okene Town from 2014-2018. The result is presented in Figure 4.1

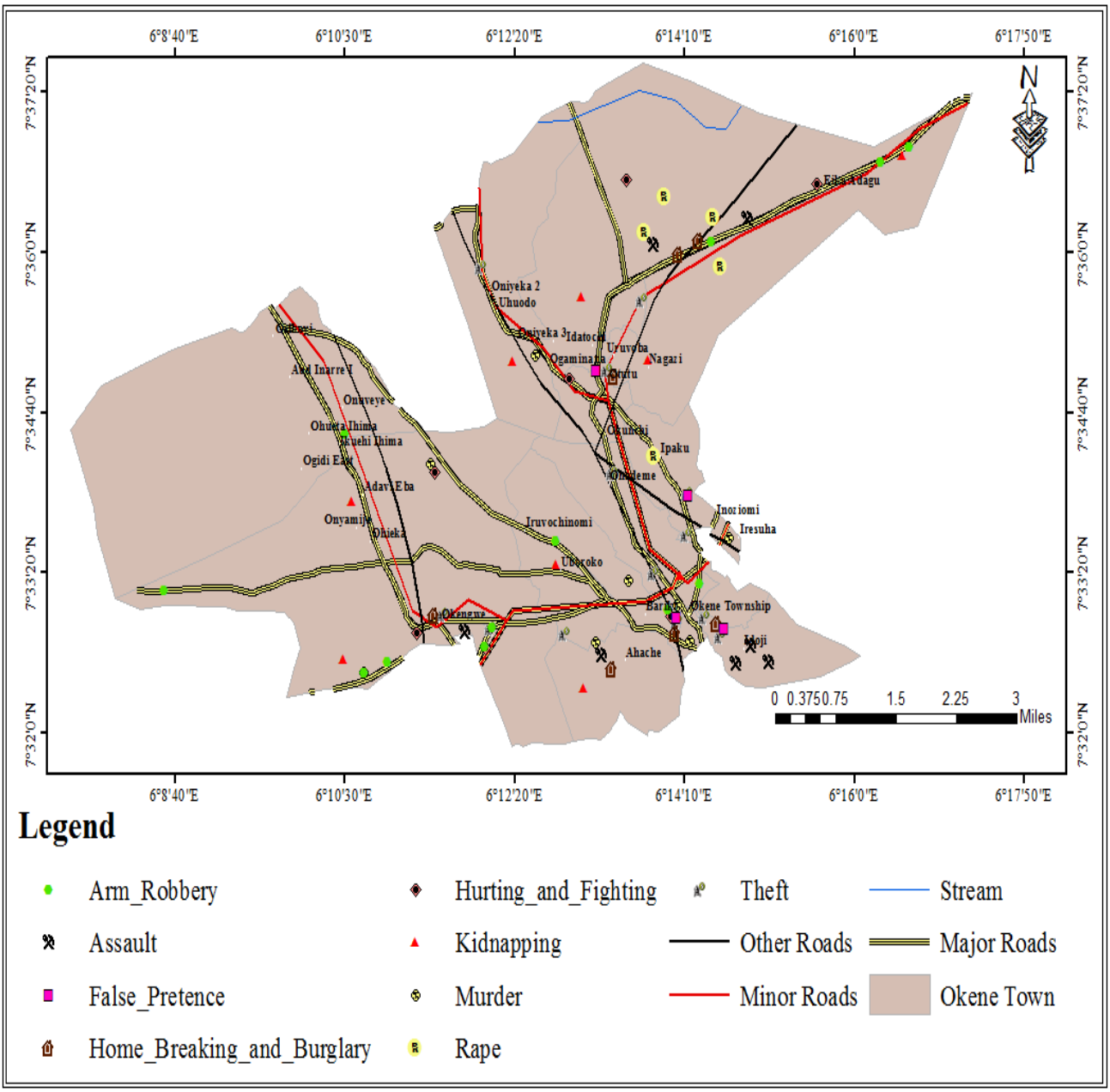


Figure 4.1: Location of Different Types of Crime in Okene Town

Source: GIS Analysis, (2020)

From Figure 4.1, it is obvious that most of the crimes occurred around Bariki, Ogaminana Central, Anyoke 1& 2, Idoyi, Okene Eba and Obeiba Ihima neighborhoods. This is due to the fact that these neighborhoods are the commercial hub of the town and is characterized with a lot of economic activities and high population. It therefore conforms with the theory posited by Brantingham & Brantingham (1981) that the presence of certain land uses are theoretically predictive of crime levels in the neighborhood surrounding them.

4.4 SPATIO-TEMPORAL PATTERN OF CRIME IN OKENE TOWN

The spatial and temporal pattern of crime incidences within the Okene Town were analyzed using descriptive statistics and Nearest Neighbor Analysis (NNA) statistics in ArcGIS 10.5.

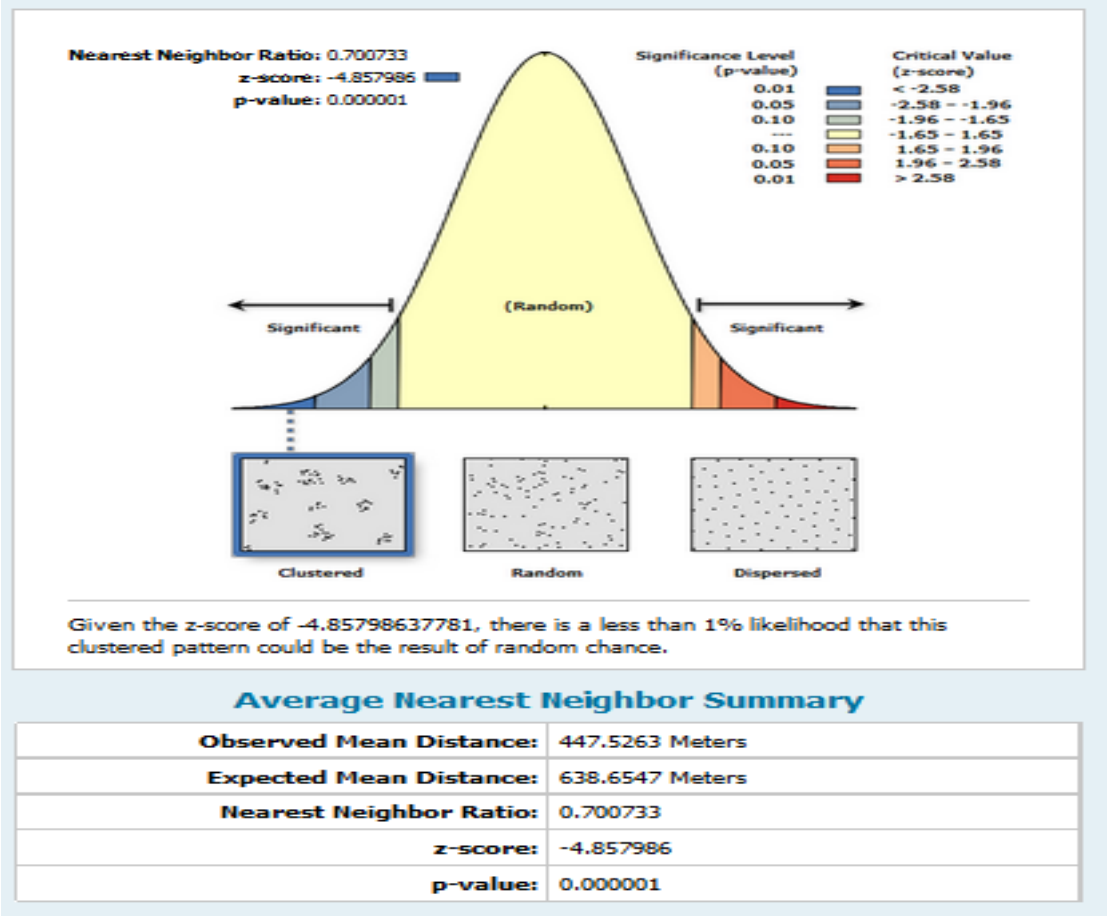
4.4.1 Spatial Pattern of Crime in the Okene Town

The analysis of the spatial pattern of reported crimes in the study area was attempted and the result is presented in Figure 4.2.

The result in Figure 4.2 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 Neighbor Analysis tool in ArcGIS 10.5 software. The NNA rule state that a negative z-score indicates clustering while a positive z-score means disperse or evenness. The result of NNA revealed that the spatial pattern of the crime events in the study area is clustered around densely populated areas of Bariki, Ogaminana Central, Anyoke 1& 2, Idoyi, Okene Eba and Obeiba Ihima 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 of public socials facilities and services (police

stations, hospitals, schools, banks, filling stations) in the town are the main cause of the clustered pattern of crimes in the study area.

Furthermore, the influence of the topography of Okene Town in the spatial pattern of crimes cannot be ignored. Specifically, because the town is surrounded by rocks which consequently has placed the town in a small valley which created congestion at some areas.



Average Nearest Neighbor Summary

Observed Mean Distance:	447.5263 Meters
Expected Mean Distance:	638.6547 Meters
Nearest Neighbor Ratio:	0.700733
z-score:	-4.857986
p-value:	0.000001

Figure 4.2: Nearest Neighborhood Analysis of Crime in Okene Town

Source: Field Survey, (2020)

The congested areas happen to be the commercial hub and the most populated part of the town which are characterized by certain activities and offices of both government and private business establishment. The town also harbors A2 highway and major motor parks and is

dominated by residences of high and influential politicians from the town and non-indigenes. This tends to constellate activities in the town thereby giving room for clustered pattern of crimes. The findings of this study also corroborated with that of Daukere, Yelwa, Akpu, and Ajani (2020), whose study revealed a clustered pattern of crime in Bayelsa West Senatorial district and that of Badru, Akintuyi, Omoniyegha and Wunude (2019) whose study revealed a clustered distributional pattern of crime events in the University of Lagos, Nigeria because more of the criminal incidences appear to gather around same point such as where there are no security posts.

4.4.2 Temporal Pattern of Crimes in Okene Town

The temporal distribution of individual crime in Okene Town from the year 2014-2018 was analyzed using descriptive statistics and the result is presented in Table 4.3.

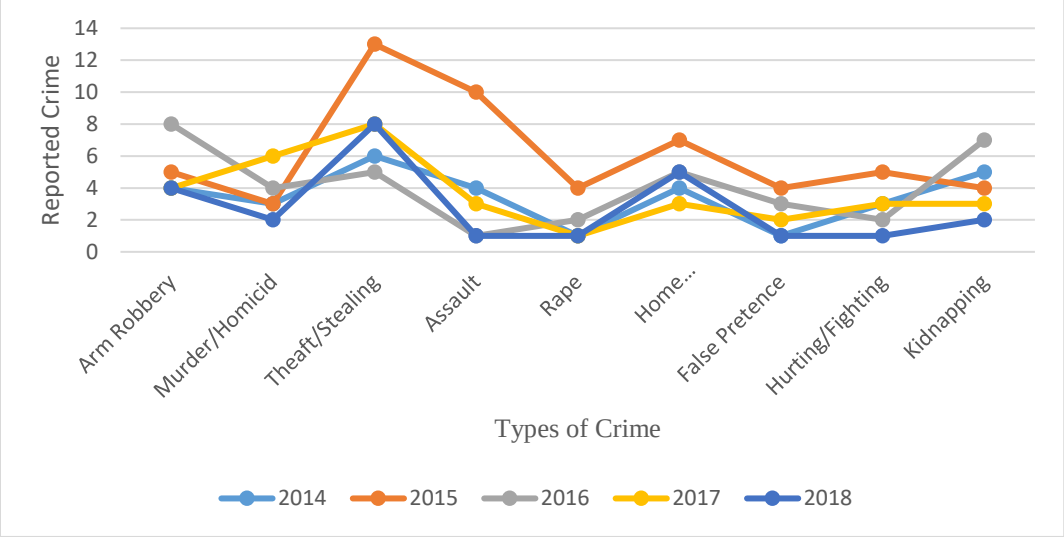


Figure 4.3: Temporal Distribution of Reported Crime in Okene Town

Source: Field Survey, 2020

Figure 4.3 obviously shows that 2015 had the highest rate of reported crime incidences for the period under study. A total of 55 (31%) out of 181 total cases of crimes were reported for the said year. Subsequently there was drop in the cases of reported crimes to 37 (20%) in 2016 and this further reduced to 33 (18%) in 2017 and to 25 (14%) in 2018. The high incidence of crimes 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 crimes over the years of 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 (2020) in Bayelsa West Senatorial District who investigated the temporal pattern of crimes and revealed a gently increasing rate of crime in his study area.

4.5 CRIME HOTSPOTS IN OKENE TOWN

Maps showing the distribution of all and various crime hotspots were produced from geocoded crime data collected from the police divisions in the study area. The kernel density hotspot maps were produced for the year 2014 - 2018 for all and each of the crime types committed in the area. A visual analysis of these maps (see Figure 4.4 - 4.13) suggests that, crime tends to concentrate in particular areas but not in others and different types of crime show different spatial patterns. This concurred with the general existing knowledge about the spatial patterns of crime in an urban setting (Chainey, 2014; Umar, Cheshire, & Johnson, 2015).

The crime incidences of the study area were analyzed and crime hotspot for the entire study area were produced and the result presented in Figure 4.4. The results show that the hotspots of all crimes reported in the study area are generally concentrated in and around Bariki, Anyoke 1& 2, Idoyi, Okene Eba Ogaminana Central and Obeiba Ihima neighborhoods in the study area. These neighborhoods are vulnerable to crimes because they exhibit certain characteristics such as high density residential areas, presence of markets, high population, cluster of basic and social amenities, high institutions such Federal College of Education, high economic activities, poor urban layout, poverty, and unemployment.

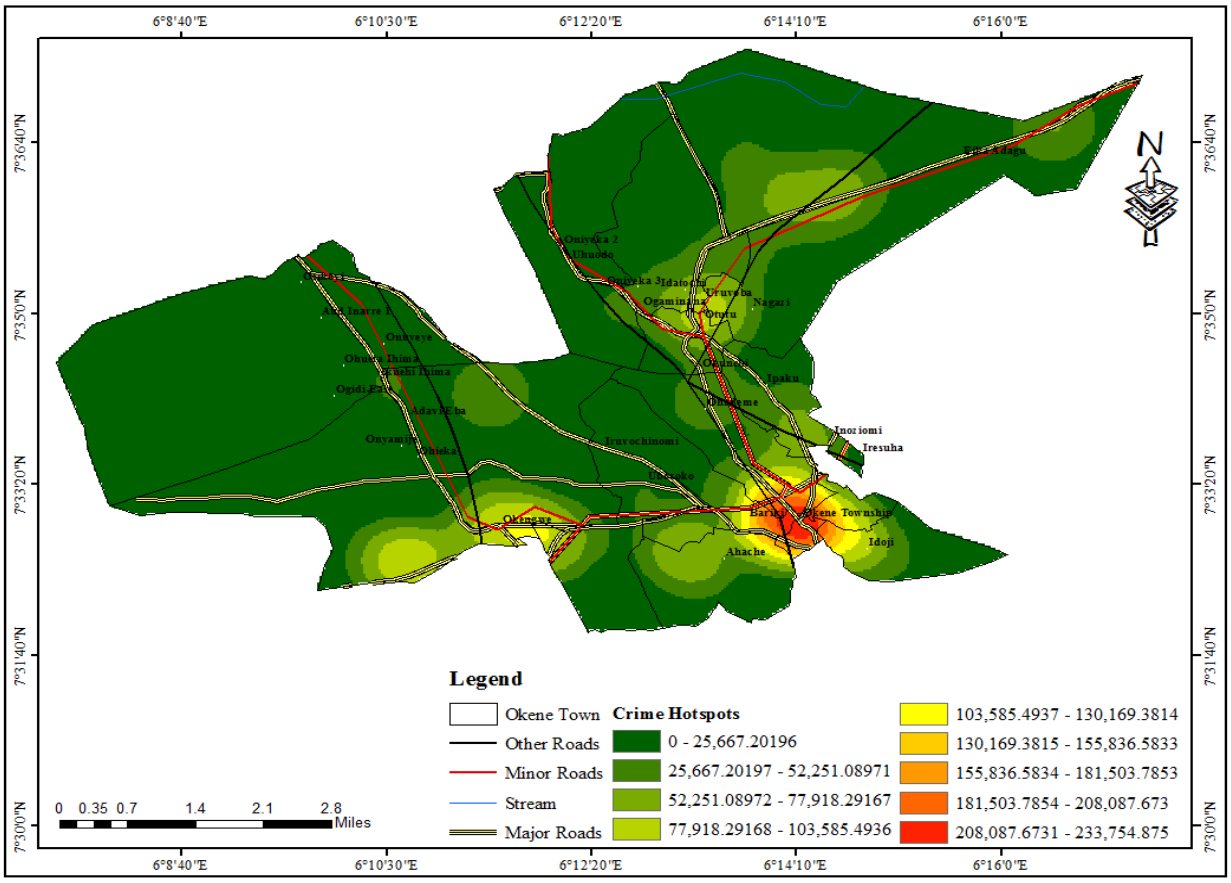


Figure 4.4: Crime Hotspot in Okene Town

Source: Author's analysis, 2020

The study also revealed that Adavi Eba neighborhood did not record any crime. This can be attributed to the presence of the Police Area Command in Adavi Eba and coupled with the fact that the neighborhood is a bit far from the center of the town where all the economic activities are prominent and intense.

4.5.2 Armed Robbery Hotspots

The hotspots map of the incidence of armed robberies in the study area is presented in Figure 4.5. The result shows that armed robbery was predominant in Obehira Uvete, and Eika Adagu neighborhood. The prevalence of robbery in these neighborhoods could be attributed to the fact that they are isolated from the center of the town.

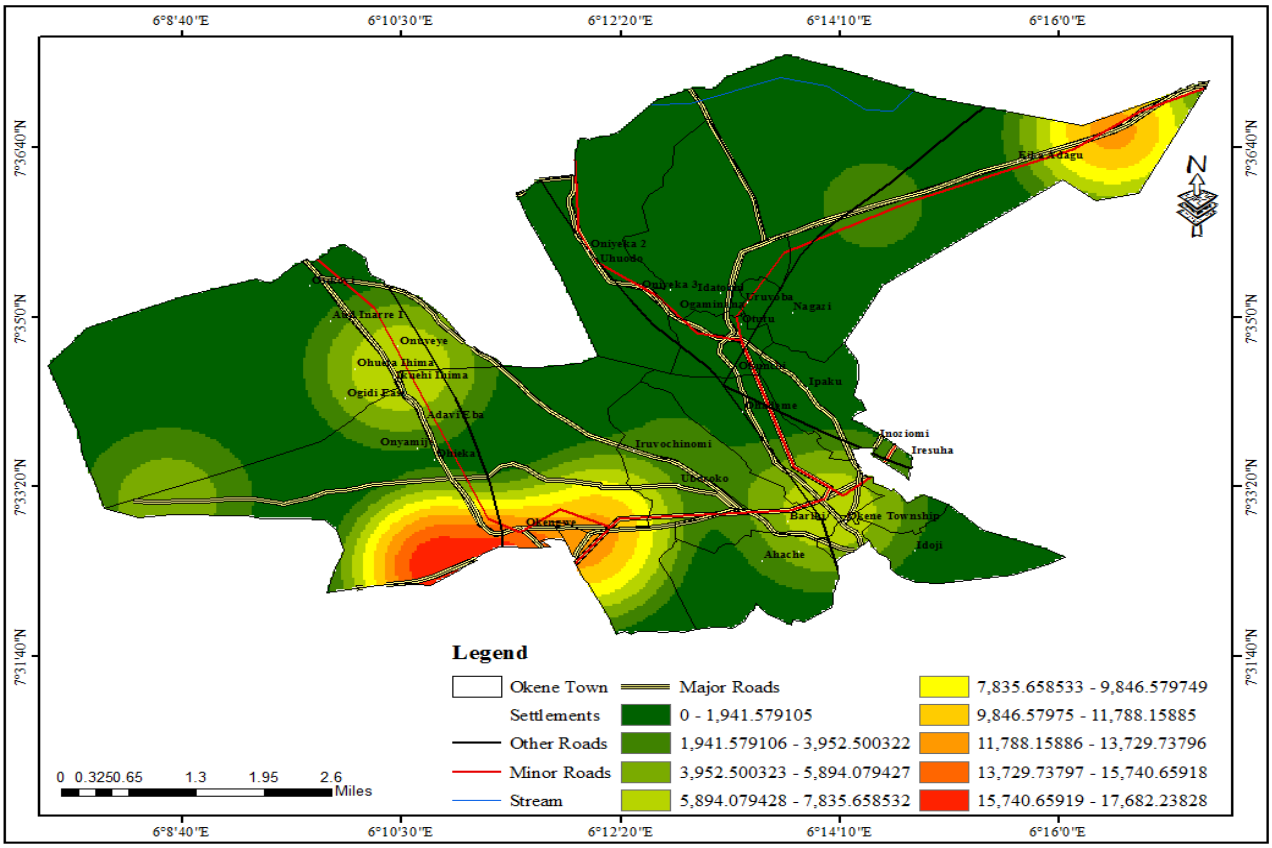


Figure 4.5: Armed Robbery Hotspots in Okene Town

Source: Field Survey, (2020)

Obehira Uvete specifically happen to have the busiest road (A2 highway) which connect Okene town and Kogi State at large to Edo State. Most armed robbery attacks occur on that road because of the distance from the center of town, absence of any police outpost and the rocks surrounding the road provides a perfect cover for criminals to hide, plan and execute their crimes. Furthermore, the prevalence of arm robbery in the neighborhoods can be attributed to the fact that they are characterized mainly by poverty, dilapidated buildings and poor housing conditions. This is further upheld by the findings of Oyinloye, Olamiju, & Otokiti, (2017), who stated that robbery crimes in Oshodi-Isolo area of Akure, Nigeria are concentrated in communities characterized by poor housing condition, poor environmental sanitation, old buildings and poverty. Amazingly,

neighborhoods like Ogaminana central and Okunchi/Anyoke do not have any reported armed robbery cases and this can be because it is a residential neighborhood that is planned with no high way passing through and the absence of mountains limit escape route for armed robbers.

4.5.3 Murder and Homicide Hotspots

The hotspots map of incidences of murder/homicide in Okene Town was produced and the result presented in Figure 4.6. The result shows the hotspots of murder/homicide in the study area. Murder/homicide was predominant in Bariki, Okene Eba/Aggassa, Otutu, Lafia Obessa. The crime rates in these neighborhoods could be attributed to the volume of activities taking place in these areas. These neighborhoods are the major commercial hubs of Okene Township with high concentration of people who visit the area for commercial and allied activities, hence the high rate of crimes such as murder/homicide.

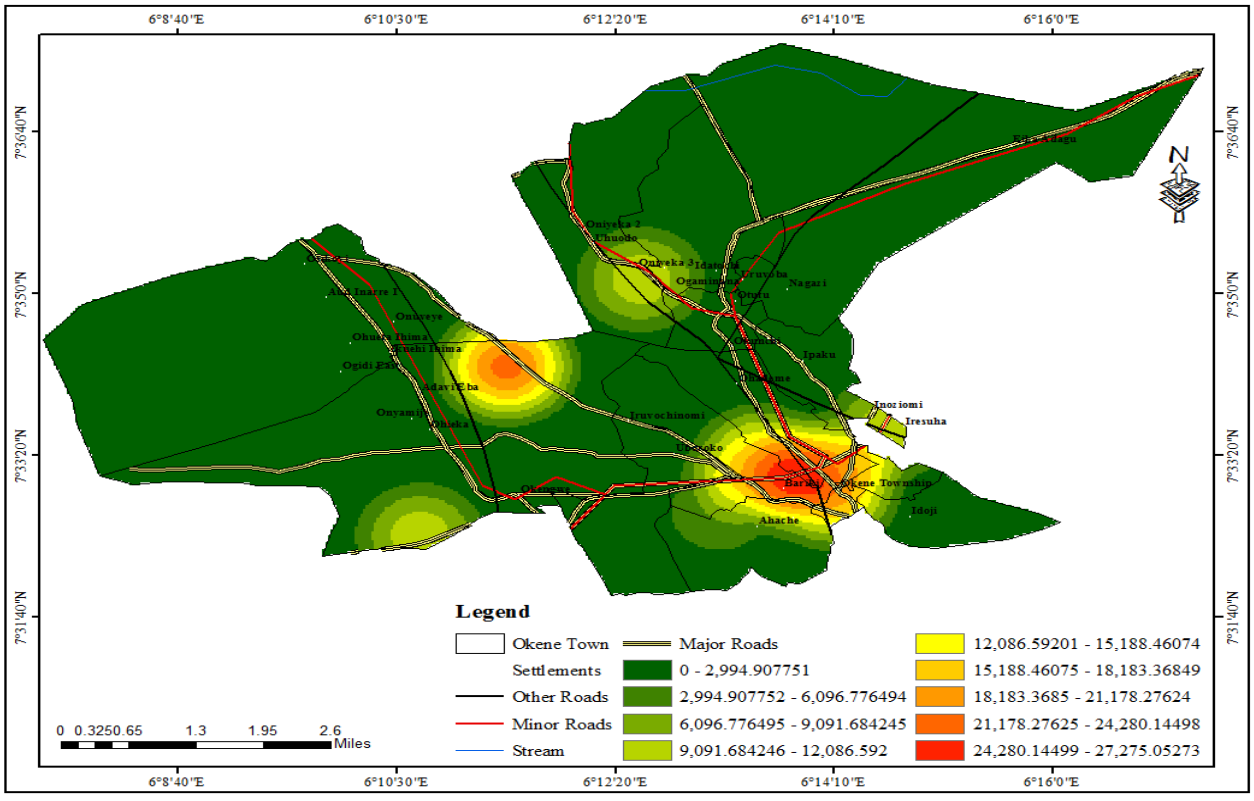


Figure 4.6: Murder/Homicide Hotspots
Source: Field Survey, (2020)

The findings of the study corroborate with Adewuyi, Eneji, Baduku, and Olofi, (2017), in Abuja Municipal where the study revealed that homicide crime depends on the volume of economic activities taking place in the district. This solely clarifies why neighborhoods like Uhucheba and Adavi Eba that are characterized with low economic activities have no reported murder/homicide cases.

4.5.4 Theft/Stealing Hotspots

The records and coordinates of reported theft/stealing were collected and analyzed. The result is presented in Figure 4.7. It is obvious from the result that theft and stealing are predominant in Bariki, Okene-Eba/Aggassa, and Idoji neighborhood. The prevalence of theft/stealing in these areas can be attributed to the concentration of business activities at the markets, motor parks which are majorly in these neighborhoods.

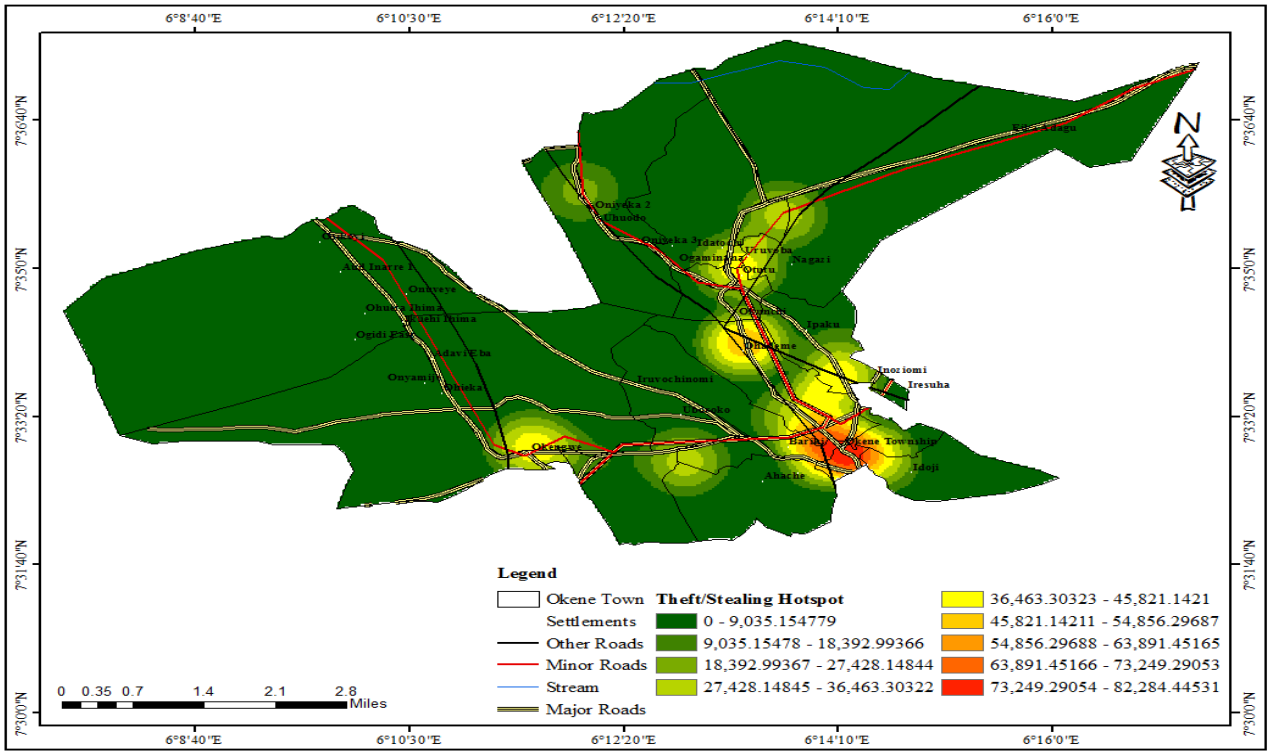


Figure 4.7: Theft/Stealing Hotspots
Source: Field Survey, (2020)

This finding is further substantiated by the result of Bawa, Lugga, Ajayi, & Bala, (2015) who attributed the prevalence of stealing/theft in some neighborhoods in Katsina Metropolis to the situation of markets and parks in those areas. On the other hand, neighborhoods like Adavi-Eba recorded low cases of theft/stealing and this could be because of its absence of any major market and motor parks in the areas.

4.5.5 Assaults Hotspots

The hotspots map of incidences of assault in Okene Town was produced and result presented in Figure 4.8.

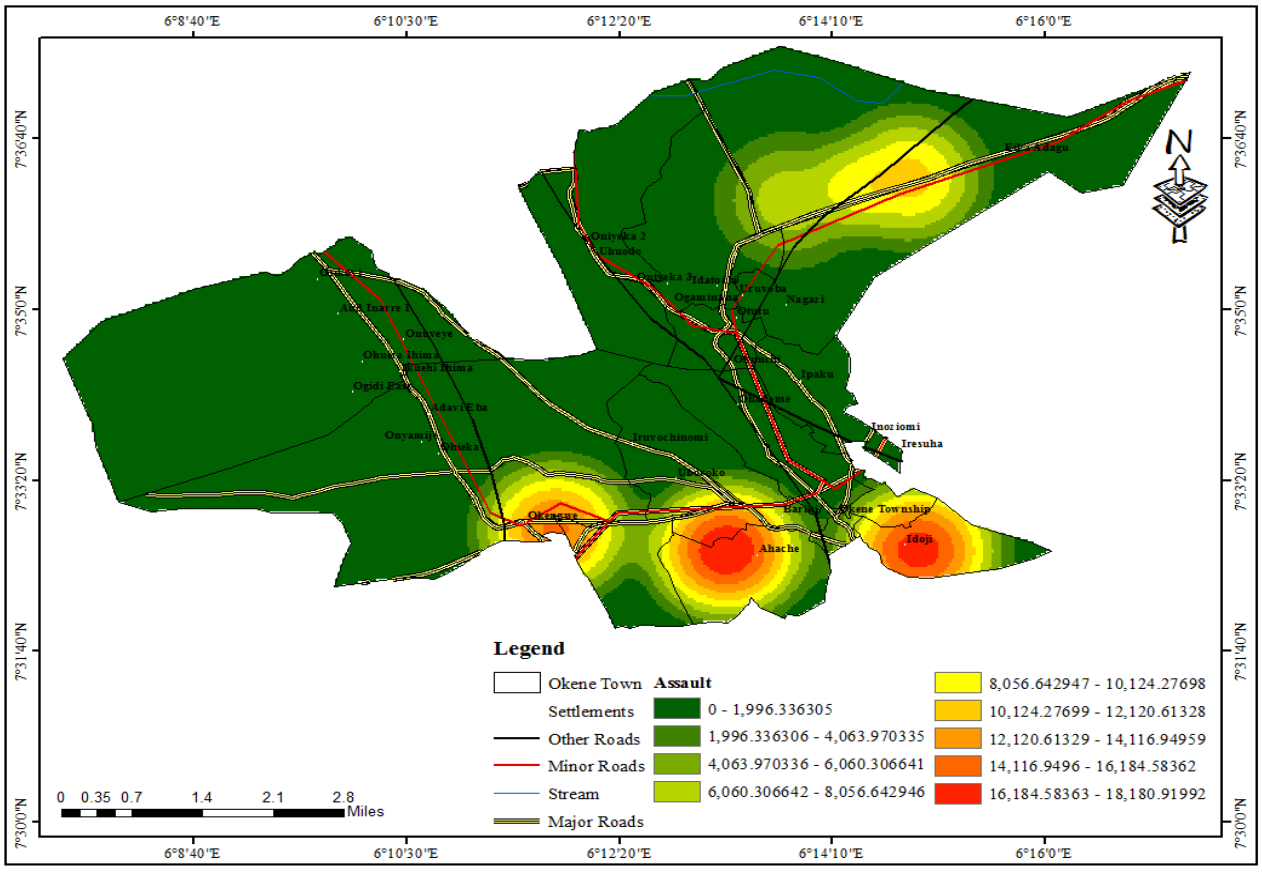


Figure 4.8: Assault Hotspots in Okene Town

Source: Field Survey, (2020)

It is seen from the result that assault is more prevalent in Idoye, Okene-Eba and Obehira Uvete neighborhood of Okene Town. This can be attributed to the motor parks found in these neighborhoods. The motor parks led to overcrowding of small spaces by passengers, drivers, park thugs and National Union of Road Traffic Workers (NURTW) thereby overpopulating the area and crimes especially assault are characterized to areas with high population. This result is further substantiated by the findings of Ayuba, Mugu, Tanko and Bulus (2016) in Tudun Wada, Kaduna state where assaults and other related crimes were concentrated in overcrowded/populated areas like parks and markets. Other neighborhoods like Adavi-Eba, Ogaminana central, and Okunchi/Anyoke did not record any case of assaults. This can still be related to the absence of motor parks and highly crowded markets.

4.5.6 Rape Hotspots

The hotspots map of incidence of rape and attempted rape in the study area is presented in Figure 4.9. The result revealed reported rape cases were prevalent in Uhucheba neighborhood which is at the entrance of Okene Town from Lokoja and also houses the Federal College of Education Okene. The prevalence of rape cases here can be attributed to the presence of tertiary institutions which characterized by poor security, cultism, low social culture, alcoholism drug abuse and illicit dressing. The aforementioned characteristics happen to be the major causes of rape in Nigeria (Daru, *et al*., 2011). This finding is further authenticated by the result of Chiazor, Ozoya, Udume and Egharevba, (2016) which impugned high rate of rape cases around higher institutions to inadequate security which gives undesirable elements like rapist-student and lectures alike a field day to terrorize students on and around the campus. This also corroborates the submission of Agbonna, (2008) who stated that most rape cases in and around higher institutions of learning can be attributed to cultism and the decline of social cultural values in our institutions.

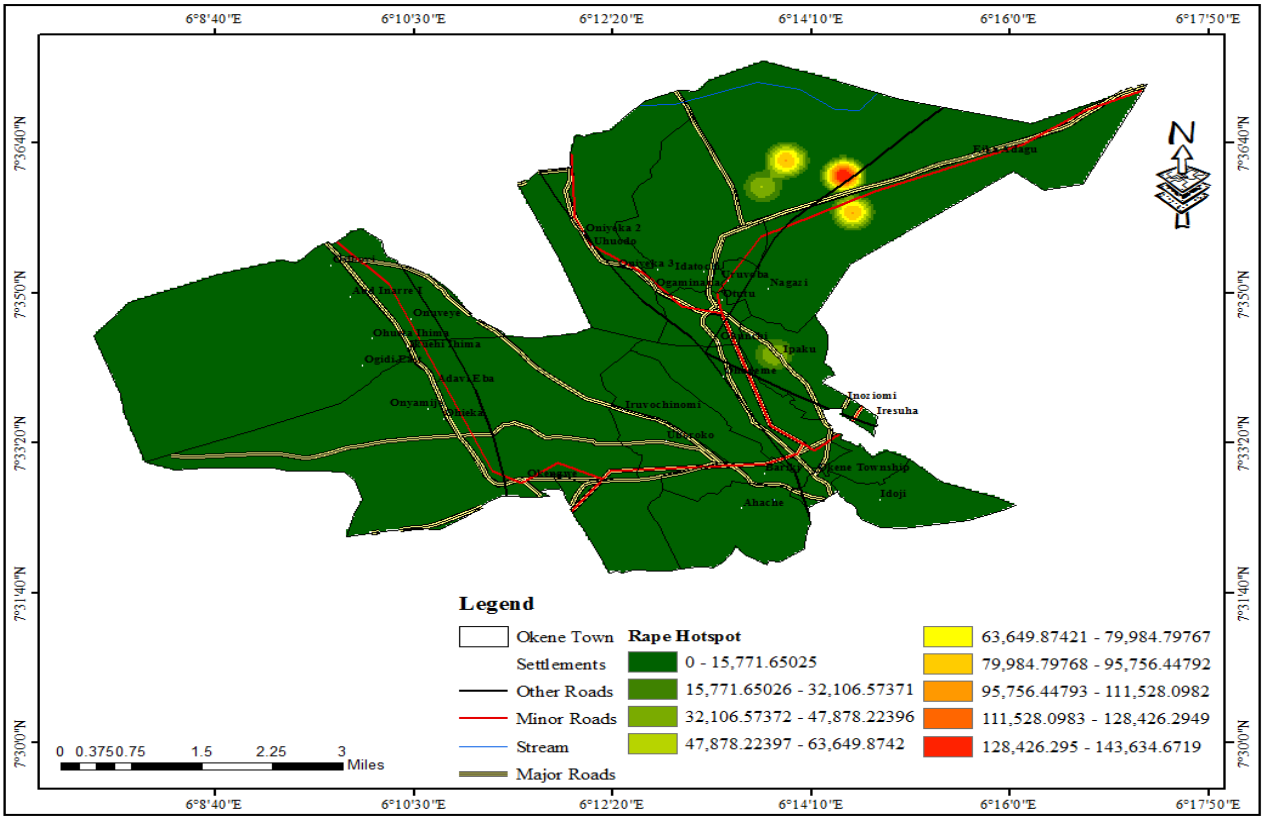


Figure 4.9: Rape Hotspots in Okene Town
Source: Field Survey, (2020)

The role of alcohol and drugs were also highlighted by Balogun, Ahamed, Iyekolo, & Ayorinde, (2013) in kwara state, Nigeria while Joseph (2018), stated that the major causes of rape is illicit dressing among women in Nigeria. In contrast, neighborhoods like Idoji, Okene Eba, Adavi Eba, Ogaminana central, Okunchi/Anyoke, Inoziomi and Obehira Uvete did not record any case of crime and it can be attributed to the absence of any major high institution in these neighborhoods.

4.5.7 Home Breaking and Burglary

The hotspots map of incidence of burglary/home breaking in the study area is presented in Figure 4.10. It is evident from the result that home breaking and burglary are rampant in Okene-

Eba, Bariki, Okene town, Uhucheba, idahuhua and Obehira Uvete neighborhoods. This can be attributed to the high economic and social activities in these neighborhoods because the Town's main markets, retail and wholesale shops, high institutions, banks and other public and private establishments have their offices in this neighborhood which means criminals who are into home breaking and burglary thrive in these neighborhoods.

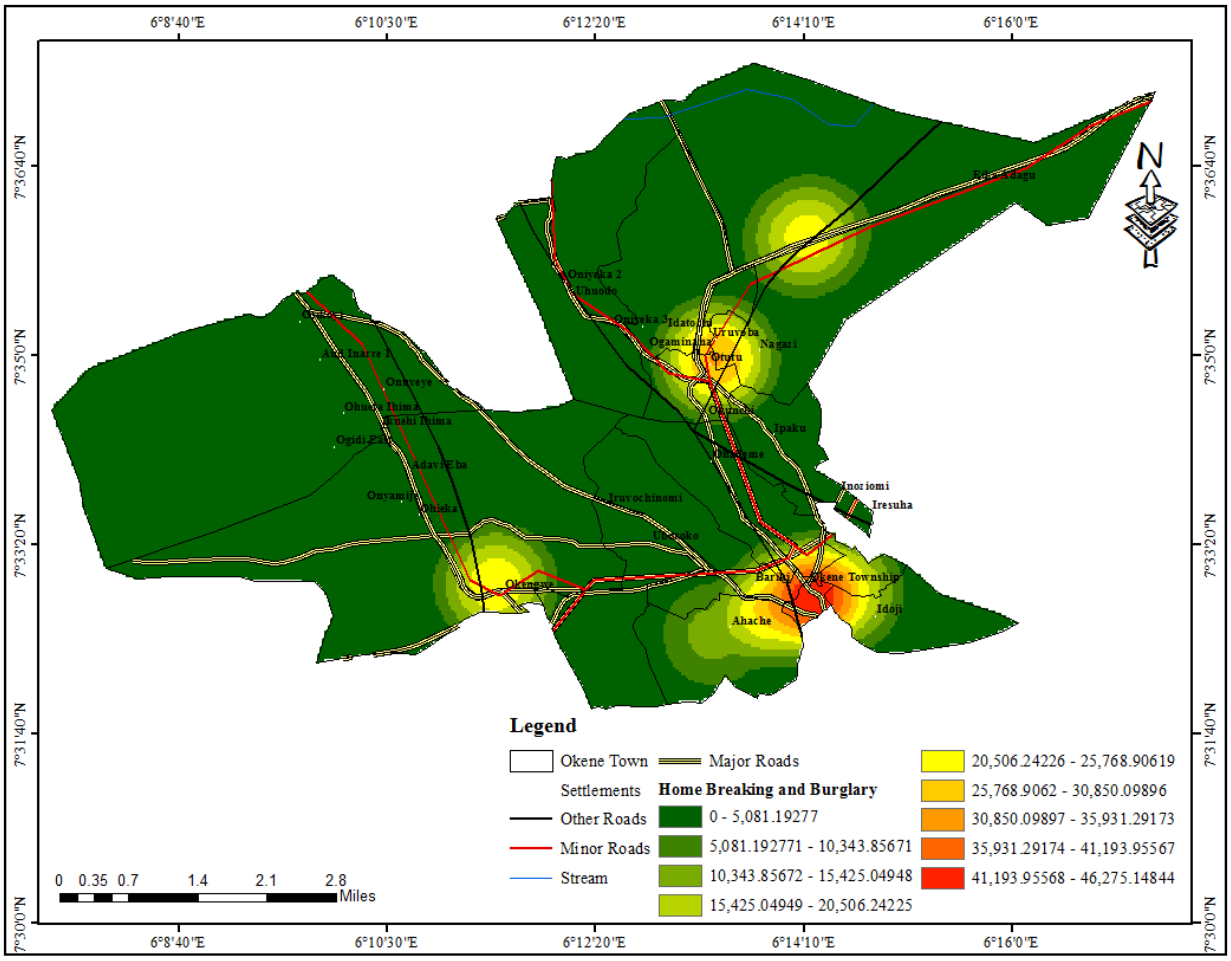


Figure 4.10: Home Breaking and Burglary Hotspots

Source: Field Survey, (2020)

This is further substantiated by Bawa, Lugga, Ajayi, & Bala, (2015), who stated that high rate of crime is usually due to the presence of markets and other major economic activities. Interestingly, neighborhoods like Adavi-Eba and Okunchi/Anyoke did not have any records of

home breaking and burglary and this can be due to the absence or little economic and social activities in these neighborhoods.

4.5.8 Pretense and Cheating

The hotspots map of incidences of pretense and cheating in the study area is presented in Figure 4.11. The result shows that pretense and cheating were predominant in Orietesu and Okene Eba. This are areas of high population and economic activity and it provides a good atmosphere (environment) for the criminals to perpetuate their acts because of low chances of being caught. People cheat or pretend falsely to gain favor or advantage at the expense of their victims.

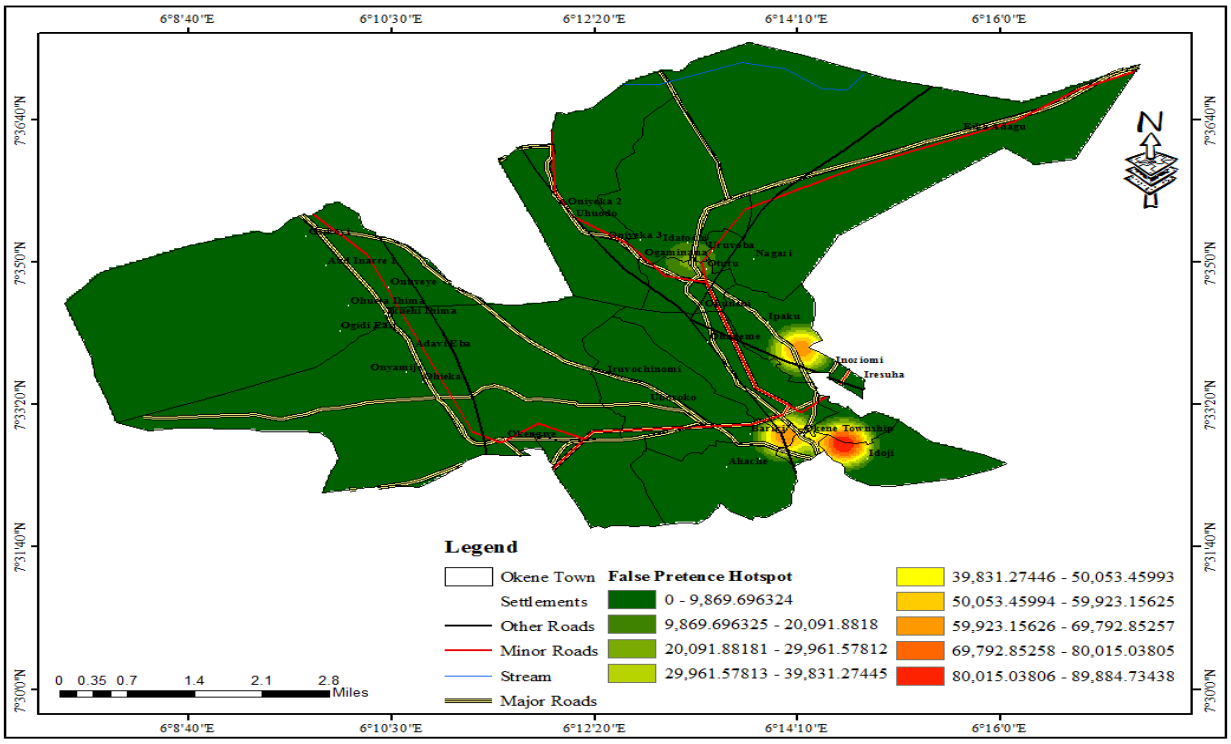


Figure 4.11: Pretense and Cheating Hotspots

Source: Field Survey, (2020)

These neighborhoods are busy areas with large markets for trading or commercial activities which consequently lure criminals of such dubious characters. The findings are similar to the result

of Adewuyi, Eneji, Baduku, & Olofi, (2017) who stated that forgery, cheating and false pretense are predominant in the commercial hub of AMAC. Interestingly, Lafia Obessa, Adavi Eba, Obehira Uvete, Uhucheba, Okunchi/Anyoke and Inoziomi did not have any case of false pretense and cheating. This can be accredited to low economic activities in these neighborhoods.

4.5.9 Hurting and Fighting

The hotspots map of incidence of hurting/fighting in the study area is presented in Figure 4.12. The result clearly revealed that hurting and fighting are rampant in Obehira Uvete, Bariki, Okene town, Otutu, Okene-Eba and Orietesu neighborhoods.

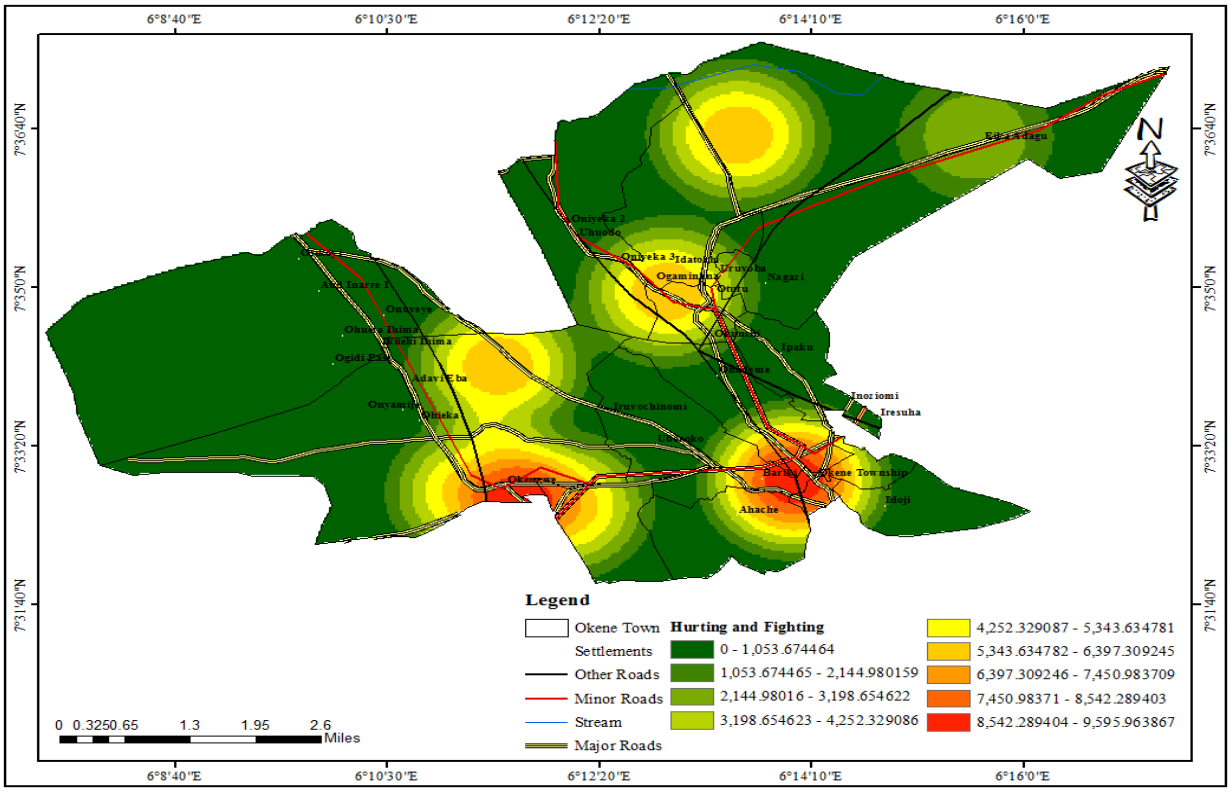


Figure 4.12: Hurting and Fighting Hotspots
Source: Field Survey, (2020)

These neighborhoods are characterized by high population, economic activities and presence of motor parks. Surprisingly, Adavi Eba did not report any case of hurting and fighting

and this can be credited to the presence of the Nigerian Police Area Command office in the neighborhood.

4.5.10 Kidnapping Hotspots

The hotspots map of incidences of kidnapping in the study area is presented in Figure 4.13. It is apparent from the result that kidnapping is common in Obehira Uvete and Ogaminana central neighborhoods. These neighborhoods are characterized by two distinct features namely; Ogaminana central residents are mostly politicians, rich business men and women and individuals of timber caliber who are sadly lures of kidnappers.

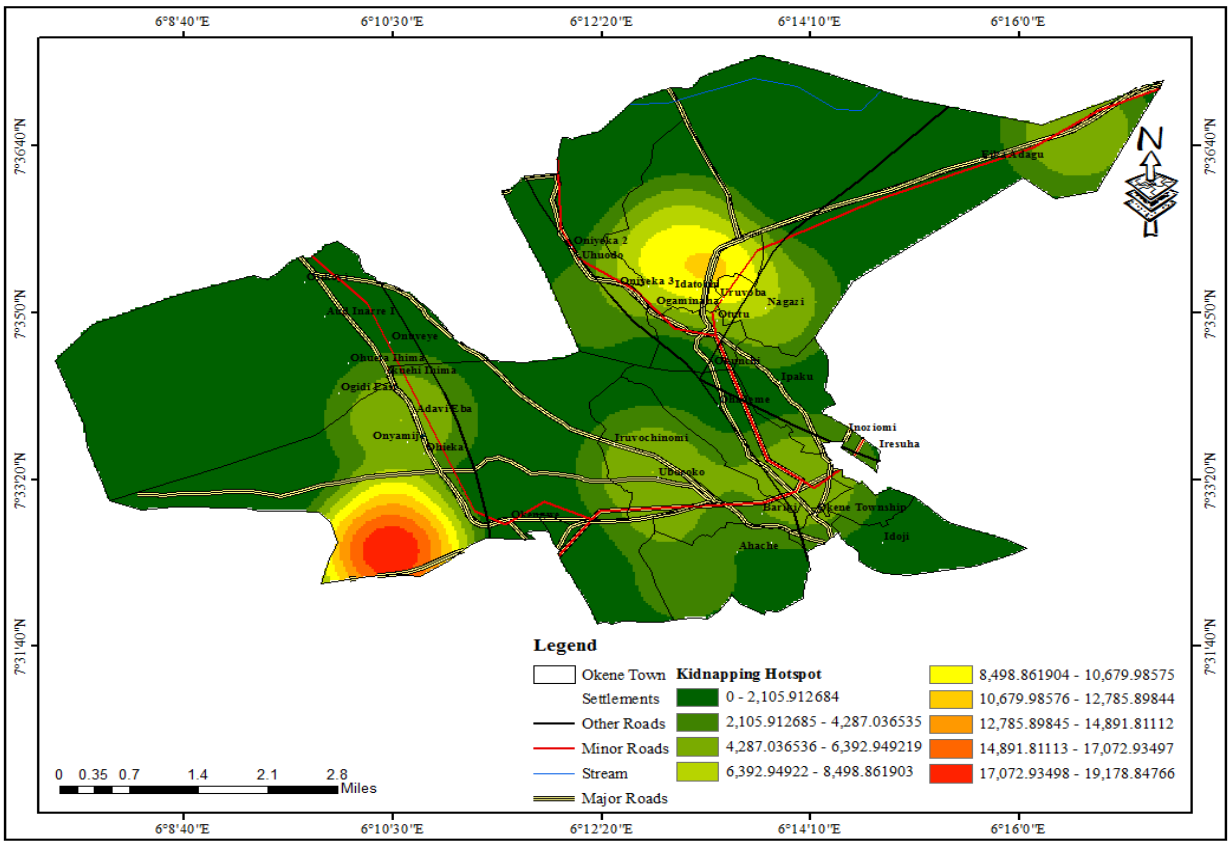


Figure 4.13: Kidnapping Hotspots

Source: Field Survey, (2020)

Obehira Uvete on the other hand links Okene Town to Edo and lies on trunk A2 high way which is shielded with a lot of mountains that kidnappers can use to plan, execute their plans, and easily hide their kidnapped victims. This result disagrees with findings of Ayuba, Mugu, Tanko, & Bulus, (2016) in Kaduna state, Nigeria who stated that the pattern of kidnapping cut across the study area, regardless of where the victims lives.

4.6 CAUSES OF CRIMES IN OKENE TOWN

This section presents the results on the causes of crimes in Okene town. The causative factors of crimes have been compartmentalized into three main factors and these include social, economic and environmental factors.

4.6.1 Social Causative Factors

Table 4.5: Distribution of the Respondents according to Social Causative Factors of Crime

Social Factors	R*II*	RANKING
Moral decay	0.977	1st
Drug addiction	0.964	2nd
Alcoholism	0.963	3rd
Poor parenting	0.942	4th
Family structure	0.934	5th
Political intolerance	0.922	6th
Lack of education	0.903	7th
Ethno-religious	0.830	8th

Source: Field Survey, 2020

As shown in Table 4.5, drug addiction and alcoholism ranked 2nd and 3rd with a RII of 0.964 and 0.963 respectively. Poor parenting ranked 4th with RII of 0.942, family structure ranked 5th with a RII of 0.934, then 6th with RII of 0.922 was political intolerance and 7th was lack of education while ethno-religious intolerance was 8th.

As revealed by the result, moral decay as indicated by a RII value of 0.977 was ranked 1st which implies that it is the most influencing factor leading to crime in the area. This result is similar to the finding of Onakan, (2016) who revealed that moral decay is the major social causative factor of crime in Kaduna Metropolis. These findings are aslo substantiated by the "Social Disorganisation Theory" which argues that the distingregation and erosion of society's moral unity and inability of a community structure to mobilize the common values of its residents to maintain effective social control is a key precusor to crime (Mamman, 2004; Knox & Pinch, 2010). This was also mentioned by Officer in-charge (OC) of crime in Okene area command, that:

> *"The main cause of crime in Okene town can be atrributed to overwhelming paradigm shift wherein there is a gradual depature from a simple communal life to a complex individualism. The family, which is the bedrock of the society, is sick. In the hay days of old, one child belongs to the whole community and could be reprimanded by any member of that community; but now, the reverse is the case. These days, if you try to scold a teenager for a msiconduct, his parents will turn against you."*

Thus, Moral decay, drug addiction, alcoholism, poor parenting and family structure in Okene town are the percieved socail casuses of crimes.

4.6.2 Economic Causative Fcators

Table 4.6 presents the economic factors responsible for crimes in Okene town. The statistics on Table 4.6 indicates that unemployment ranked 1st on the economic causes of crimes with a RII of 0.954 while poverty/economic hardship, inequality in the distribution of wealth and

resources and lack of basic amenities and infrastructure came 2nd, 3rd, and 4th with a RII of 0.929, 0.926 and 0.863 respectively.

Table 4.6: Distribution of Respondents According to Economic Causes of Crime

Economic Factors	R*II*	RANKING
Unemployment	0.954	1st
Poverty/Economic Hardship	0.929	2nd
Inequality in the distribution of wealth and resources	0.926	3rd
Lack of basic amenities and infrastructure	0.863	4th

Source: Field Survey, 2020

This can be attributed to the absence of assortment mainly in employment opportunities in the study area being that majority (60%) of the residents are civil servants and a shocking 22% were unemployed as stated in Table 4.1. though 60% of the residents were employed, only 2% earn more than N50,000 monthly which is fairly above the minimum wage. This finding is similar to that of Singer (1997), in a study of some cities in Brazil where it was observed that Sao Paulo, with 20.9% of its population are unemployed and living below poverty line, is the most unlawful city among the Brazilian cities. This discovery is corroborated by the "Theory of Anomie" which warns that when the structural obstacles to achieving societal goals are not removed, some individuals affected may respond to frustration by devising illegitimate means of achieving their goals (Egwu, 2013).

This finding is further supported by the "Economic Theory" which attributes crimes to unfavorable economic situation such as poverty, economic hardship, unemployment and unequal distribution of wealth (Alemika, Crime and Public Safety in Nigeria, 2014). OC crime Okene Divisional Police Headquarters stated:

> *Crime in Okene town is due to lack of job opportunities, economic recession, lack of access to basic facilities and unequal distribution of the national cake by the state and local government as the economic causes of crimes" (Officer-in-charge of Crime, Okene Divisional Headquarters, 2020)*

In furtherance of this, an in-depth interview was conducted with the community head of Adavi secretariat function and he stated;

> *Even though the seat of government is from Kogi central senatorial zone from 2015, most of our streets are still in a state of disrepair. The state government has not been fair to us. There is poverty everywhere as most of our youths are jobless and that is why our community is bedeviled by youth restiveness. Many places do not have pipe borne water and electric power is epileptic. Some of our streets have been destroyed by erosion and are no longer motorable. The youth of the town have resorted to kidnapping, highway robberies and other forms of heinous crimes to make ends meet" (Adavi junction community chief, 2020)*

Thus, poverty/economic hardship and unemployment in Okene town are the perceived economic causes of crime.

4.6.3 Environmental Causative Factors

Table 4.7 presents the environmental causes of crime in Okene town. The statistics in Table 4.7 obviously shows that increasing urbanization which ranked 1st is the main environmental cause of crime in Okene town. However, lack of adequate urban design and planning ranked 2nd while growth of urban slums and shanty settlements ranked 3rd. 4th in the rank was infrastructural decay while 5th was poor urban housing even though poor environmental and unhealthy sanitary condition had least ranking of 6th respectively. Thus, the incidence of crimes in Okene town can be attributed to uncontrolled urbanization, lack of urban design and planning and the layout of the town which has changed over time.

Table 4.7: Distribution of Respondent According to Environmental Causes Of Crime

Environmental Factors	R*II*	RANKING
Increase in urbanization	0.974	1st
Lack of adequate urban design and planning	0.973	2nd
Growth of urban slums and shanty settlements	0.964	3rd
Infrastructure decay	0.962	4th
Poor urban housing	0.958	5th
Poor environmental and unhealthy sanitary condition	0.955	6th

Source: Field Survey, 2020

These findings are similar to the UN-Habitat Global Report (2007) which credited crime in African cities to poor urban planning and bad urban management. The UN-Habitat report observed that 10-15% of crimes have poor urban environmental design and bad management components. A study by Agboola (2006), identified poor physical planning, bad urban design and infrastructure decay as the main causes of increasing armed-robberies, street fighting, hooliganism, cultism, and drug addiction in some areas in Lagos city. The UNDP Report (2013), observed that residents of sprawling slums and shanty town in Latin America are at risk of crime. The study of urban dilemma in Africa equally attributed the occurrences of crimes to large scale rapid and unregulated urbanization and the inability of government institutions to keep up with such demographic growth (Muggah, 2007).

These results are further upheld by the "Ecological Theory" which inextricably associates high rate of crimes with urban neighborhoods that are poorly planned and physically disorganized (Iwarimie, 2013). The "Broken Window Theory" also affirms that the gradual deterioration of an urban neighborhood leads to an unkempt and dirty environment, improper landuse, and distortion of communal spaces and these invariably prop up criminals (Knox & Pinch, 2010).

4.7 EFFECTS OF CRIME ON OKENE TOWN

As one of the objectives, this section presents the effects of crimes on Okene town of Kogi state, Nigeria and results are presented in Table 4.8 accordingly. The result shows that tarnishing of reputation, loss of properties and under development of the town are the core effects of crimes in the study area with RII indexes of 0.965, 0.940 and 0.927 respectively. This implies that the residents of the town are unhappy about the image the town is depicting as the town is characterize with armed robbery, kidnapping and all sort of ferocious crimes. The result is also an indication that residents of the town still feel wounded about properties they have lost directly or indirectly to members of the underworld and how this monstrous deed has greatly hindered the growth and development of the town.

Table 4.8: Distribution of The Respondents According to Effects Of Crime

Effects of crime	**R*II***	**RANKING**
Tarnish towns reputation	0.965	1st
Loss of property	0.940	2nd
Under development of the town	0.927	3rd
Loss of employment	0.817	4th
Loss of revenue	0.793	5th
Loss of lives	0.696	6th
Permanent disability	0.579	7th

Source: Field Survey, 2020

These findings are similar to Metu,, Kalu, and Maduka (2018) which stated that increased crime rate have adverse effects on sustainable economic growth in Nigeria by driving away both foreign and domestic investors; low investment eventually increases unemployment and poverty. The result is also substantiated by the findings of Effiong, (2017) who claimed that urban crime have great impact on the value of residential properties. As a result of crimes in these

neighbourhoods, property rentals have fallen so low as compared to other neighbourhoods where the rate of crimes are minimal in Calabar South of Nigeria.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

This chapter presents the major findings, conclusions derived from the research and recommendation based on the findings. The study applied geospatial techniques to analyses crimes in Okene Town of Kogi state, Nigeria.

5.2 Summary of Findings

The study analyzed the crime occurrences in Okene Township of Kogi state. Qualitative and geospatial techniques were employed to identify and map types of crime, examined the spatio-temporal pattern of crimes, map crime hotspots, examine causes and effects of crimes in Okene Township of Kogi State, Nigeria.

The study identified nine major types of crimes in the study area which comprises armed robberies, murder/homicide, assaults, theft/stealing, rape, home breaking and burglary, false pretense and cheating, hurting/fighting and kidnapping. The findings reveal that theft/stealing accounted for 22%, followed by armed robberies with 14% while rape and false pretense were the least crime types committed which accounted for 4% and 6% accordingly.

With regards to spatio-temporal pattern of crimes in Okene Township, the Nearest Neighbor Analysis (NNA) produced a clustered point at 0.01% significance level with the Nearest Neighbor Ratio (NNR) of 0.700733. Based on the average nearest neighbor summary result, the mean distance from one crime scene to another is 447.5meters resulting to the clustered distribution of the crime occurrences. The temporal distribution of crime occurrences revealed that

2015 had the highest (30%) rates of crime occurrences while 2018 had only 14% incident of reported crime.

The visual observation of the hotspots maps show that crimes of various types concentrate in particular areas but not in others and different types of crime show different spatial patterns. Firstly, by simply looking at the hotspot maps of all crime types in the center of the town, it is clear that large cluster occurred in Okene Eba, Bariki, Otutu, Orietesu, Lafia Obessa and Obehira neighborhoods. Secondly, the hotspots maps of the various crime types concentrate at most neighborhoods for instance Okene Eba, Bariki, Otutu, Orietesu, Lafia Obessa, Obehira, Bariki, Ogaminana Centrak among others who are characterized by high population, economic and social activities, presence of private and public office establishments. The analysis of the Kernel Density Estimation (KDE) showed individual crime had distinct spatial pattern in the study area.

The study also revealed that the main social causes of crime include moral decay which ranked 1st with drug abuse coming 2nd and alcoholism ranking 3rd. The main economic causes were attributed to unemployment (1st) and poverty/economic hardship (2nd) while environmental causes were blamed on increase in urbanization (1st) and lack of urban design and planning (2nd). The results further showed that the major effects of crimes on the study area is the tarnishing of the town's reputation (1st), loss of property (2nd) and under development of the town (3rd).

5.3 Conclusion

The study has established that of all the nine (9) types of crimes afflicting the inhabitants of Okene Town; theft/stealing, armed robberies and home breaking and burglary were the most prominent. The findings of the field survey have likewise showed that crime occurrences are clustered while temporal variation indicated that crime occurrences are declining in the study area.

The analysis of crime hotspots revealed that Okene-Eba, Bariki, Otutu, Obihera Uvete and Orietesu are the predominant neighborhoods for various types of crime. In addition, the study has proven that the key causal factors of crimes in the study area can be attributed to moral decay, unemployment, increased urbanization whereas the main effects of crime are the tarnishing of the town's reputation and loss of properties.

5.4 Recommendations

In line with the findings of this study, the following recommendation are made;

1. 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.
2. The result of the analysis shows that occurrences of crimes in the town could be linked to lack of moral rectitude and disintegration of cultural values. Thus, as long as crimes occur and prevention involves socio-cultural, ethno-religious and ethical attributes, it is very crucial that much greater attention be shown for moral rejuvenation through moral education by the general populace. This requires general cooperation between the school, parents, teachers and the government. More ethical and moral issues should be integrated into the school's curriculum and be taught at all levels of education. There is need to condemn negative values and emphasize positive moral values. We must struggle to imbibe the ethics of hard-work and genuine living.
3. To address the problem of unemployment, poverty/economic hardship, idleness and hunger, a meaningful programme that builds self-worth and a sense of hope like the 'Youth Resource Center' should be established by the government. The framework is meant to

provide opportunities for every youth in the area to be integrated into the system that will take cognizance of the challenges confronting all young persons. The center is thus expected to have a career counselling section, a vocational and micro-credit section and a functional literacy department that can facilitate the training of out-of-school youths on basic numeracy and literacy.

4. The Local Government Council (LGCs) should establish community policing committees for the affected towns and villages bedeviled by criminal activities. The committees should include representative of the security agencies operating in the area especially the divisional police headquarters, the traditional rulers of such towns/villages, local vigilantes and other stakeholders. This will ensure useful and relevant information and suggestion on crime prevention strategy.

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