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Geospatial Analysis of Kidnapping in Igabi Local Government Area of Kaduna State, Nigeria

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ARTICLE INFORMATION

ABSTRACT

This study applied Geographic Information System (GIS) and remote sensing in analyzing banditry in Igabi LGA, Kaduna State. The data utilized were geographical coordinates of bandit attacks, factors responsible for banditry, and an administrative map of the study area. A total of 400 copies of questionnaire were administered to respondents in the study area. Nearest Neighbor Analysis (NNA), Kernel Density Estimation (KDE), and Relative Importance Index (RII) were used to analyze the data in Arc Pro version 3.2 and Statistical Package for Social Science (SPSS). The results revealed that 2021 had the highest rate of reported kidnapping cases while 2019 had the least. The linear trend line equation (Y= 44.3x + 31) showed that Igabi LGA experienced an increase in kidnapping during the study period and that kidnapping rates in the study area are expected to increase by 44.3x cases per annum. The result of the NNA revealed that the spatial pattern of the kidnapping events was clustered around Rigasa, Kakau, Kwarau, and Turunku districts with Z-scores of -43.917356. This means that there is less than 1% probability that this clustered pattern of kidnapping incidents could be because of random chance. Furthermore, the study also revealed that the main social causes of kidnapping include lack of education, ethno-religious intolerance, and political intolerance ranking 1st, 2nd and 3rd respectively. The main economic causes were attributed to poverty (1st), unemployment (2nd), and economic hardship (3rd). Environmental causes were blamed for the growth of urban slums and shanties (1st) and infrastructural decay (2nd).

1. INTRODUCTION

One of the deep-seated responsibilities of any nation in the world is to guarantee the security of lives and property of its population. The responsibility extends to its sovereignty, territorial integrity, stabilizing the socio-economic and political situations within its geographical space (Obileye & George, 2021). The

protection of this geographical space is being threatened by both local and international insurgency in recent times. Since the return of democracy in Nigeria in 1999, the security structure of the country has been challenged by the rise of insurgency in different parts of the country, so much so that, there was the emergence of numerous rebellious groups in the Niger Delta region and Boko Haram in the North East (Kangyang & Aipe, 2021). Very recent also, there is the emergence of armed banditry with its attendant misconducts (kidnapping, culpable homicide and cattle rustling) in the North West region, an area which used to be the most peaceful part of the nation (Ojo et al., 2023).

Banditry is seen as a form of criminal behavior that has been a part of human society for many centuries and continues to be a significant problem in some parts of the world today. In modern times, the term is often used to describe organized criminal gangs that engage in armed robbery, extortion, and other illegal activities. In Nigeria, banditry is the act of robbery and theft committed by armed groups or individuals who are often travelers and remote rural communities in search of money, cattle or other valuable goods (Eyikomisan et al., 2021).

Banditry has been a persistent problem in Nigeria, particularly in the North-West region (Ahmed, 2018). The region has seen a rise in the number of armed robberies, kidnapping, and cattle rustling incidents in recent years, causing concern among residents and security agencies. The root causes of banditry in the North-West region are complex and include poverty, unemployment, lack of development, and weak law enforcement. The porous borders with neighbouring countries also contribute to the problem, as weapons and criminals cross into Nigeria with ease (Omonijo et al., 2019).

In Kaduna State, banditry has been a growing problem, in recent years. The state has suffered from an upsurge of violent attacks, kidnapping, and armed robbery by criminal gangs known as bandits (Nahuche, 2022). These bandits operate in rural areas and target farmers, traders, and travelers; often using firearms and other weapons to intimidate their victims. The violence has unsettled local communities, causing fear and displacement, and has had a negative impact on the local economy and environment (Olapeju & Peter, 2021). Although, the state and federal government have taken steps to address the issue, including deploying troops and other security forces to the affected areas, and setting up a task force to investigate and prosecute those involved in banditry. However, the problem persists and continues to pose a threat to the safety and security of communities in the region (Obileye & George, 2021).

Advances in the areas of Geographic Information Systems (GIS) and other information technology such as remote sensing (RS) and Global Positioning System (GPS) have opened a new set of opportunities for its use in mapping of insurgency, control and prevention. Geospatial technologies and other related systems can therefore be used for detection, monitoring, tracking, and exploration of bandits in the study area (Ayuba et al., 2016). The technology can also be adopted in determining potential bandit sites by examining complex seemingly unrelated criteria and displaying them in a graphical layered, spatial interface or map for better appreciation (Bala et al., 2015).

GIS has been applied widely in the mapping of insurgency hot spots, security monitoring, and crime scenario predicting. However, Bello et al., (2013) opined that GIS allows security personnel to plan effectively for emergency response, determine mitigation priorities, analyze historical events, and predict future events. GIS can therefore be used by security agencies to provide mapping solutions for bandits and crime analysis, bandits tracking and community policing.

Consequently, over the past two decades, the use of GIS in crime mapping has increased theatrically (Uzoeshi & Kinanee, 2010). This is because previous researchers on various crime dimension have been faced with problem of relevant data, but with the introduction of remote sensing and GIS techniques, data is now available for effective crime mapping at global, regional and local scales. Some axis of Igabi LGA, is gradually becoming the new hub for banditry and this makes the mapping and analysis of bandit activities using Remote Sensing and GIS techniques very necessary for prevention and control of such crime. This is the drive for this study.

2. MATERIALS AND METHODS

2.1. Study Area

Igabi Local Government Area lies within latitudes 10° 25′ 28″ N and 11° 35′ 53″ N and Longitudes 7° 21′ 49″ E and 7° 50′ 00″ E (Figure 1). The area covers approximately 3,727 square kilometers and shares boundaries with Kaduna North, Kaduna South, Zaria, Kajuru, Kauru, Igabi and Birnin-Gwari Local Government Councils. Turunku is the headquarters of Igabi LGA which was the seat of power of the famous Queen Amina of Zazzau. The seat of Queen Amina and many historical evidences are still located on Turunku Hill as well as tomb of Bakwa Turunku the father of Queen Amina and her sister Zaria where Zazzau Emirate derived its name.

The study area has an average annual rainfall of 1250 mm. The rains occur between months of April – October when the South Westerly humid winds bring in rain. The dry seasons last between November and March when the prevailing North Easterly winds Study Area 11 (Harmattan) brings with it dusty, dry and cool air of the Sahara Desert ushering in the dry season. The mean annual rainfall in the study area ranged from 1000 mm to 1500 mm. The month of August-September recording highest rains of 300 mm (Bala, et al., 2015). The rainy season starts between 10th of April to 20th of May and extends to October. The temperature of the study area resembles that of the North Central Zone of the country. Temperature ranges between 25 oC – 35 °C during the dry season. The temperature may rise to about 42 °C in March/April which is the hottest period. The coldest month is December/January. During the harmattan popularly referred to as the West Africa Doctor, temperature sometimes reaches freezing points. (Dangana, 2021).

Figure 1: Igabi LGA showing important towns

2.2. Data Collection

A reconnaissance survey was carried out in order to have a sufficient knowledge of the study area. During this phase, the Divisional Police Office, Department of State Security (DSS) and Kaduna State Ministry of Lands and Survey were visited. This was embarked upon to pave the way for a detailed field survey. During this period, data on kidnapping between 2017 to 2022 from the Divisional Headquarters and the administrative map of the study area were collected. The interaction and discussion with the police office and the DSS assisted towards gaining insight on banditry in the study area which helped in designing the research instrument. Kidnaping records from January, 2017 to December, 2022 were obtained from the security headquarters (police and SSS) in the study area while the coordinates of kidnapping location were obtained using Garmin eTrex R 20x Handheld GPS Receiver with an accuracy of at least 5 meters. Data on factors responsible for kidnaping will be gotten through questionnaire Survey and In-depth interview. 400 copies of questionnaire were administered using a systematic random sampling method

3. RESULTS AND DISCUSSION

3.1. Spatial Distribution of Kidnapping in the Study Area

Most of the kidnapping cases occurred around Rigasa (246 cases), Rigachikun (122 cases) and Igabi district (28 cases) as shown in Figure 2. This could be because these districts are the commercial hub of the LGA and is characterized with a lot of economic activities and high population. This is because high commercial activity can inadvertently create conditions that may facilitate or promote kidnapping in certain contexts (Igbini, 2022). While commercial activity itself is generally positive for economic development, there are situations where specific characteristics associated with bustling commercial centers contribute to an increased risk of kidnapping. For instance, high commercial activity can lead to economic disparities within a region. While some individuals benefit from economic growth, others may be marginalized, leading to resentment and a sense of injustice. Economic disparities can contribute to criminal activities, including kidnapping, as individuals may resort to crime as a means of addressing perceived economic injustices (Ayuba et al, 2016).

Additionally, commercial centers like the Rigasa train station and Kaduna International Airport and the Federal College of Forestry and Mechanization Afaka often attract wealth; thus, criminals perceive individuals plying these areas as more likely to have the financial means to pay ransoms (Ayuba et al, 2019). The concentration of wealth in commercial hubs can attract criminal elements seeking lucrative targets. Also, commercial hubs are characterized by high mobility, with people constantly moving in and out for business purposes. The transient nature of the population can make it easier for criminals to operate discreetly and evade law enforcement.

3.2. Temporal Distribution of Kidnapping in the Study Area

Figure 3 shows that 2021 had the highest rate of reported kidnapping cases for the study period while 2019 had the least. Furthermore, the linear trend line equation ($Y = 44.3x + 31$) is positive, meaning that the study area experienced an increase in kidnapping during the study period. The equation also shows that kidnapping rates in the study area is expected to increase by 44.3x cases per annum. This result disagrees with result of Igbini, (2022) which revealed that crime in Okene Township of Kogi State is declining. This could be attributed to insufficient deterrence which include gaps or weaknesses in the legal system, including lenient penalties for kidnapping or challenges in the prosecution of offenders. Kidnappers are less discouraged because the consequences for kidnapping are not severe. Also, the lengthy legal processes and delays in the judicial system has diminished the deterrent effect of the law. The perpetrators believe they can avoid swift and certain punishment, and it encourages more criminal activities.

In addition, the increased cases of kidnapping in the study area could be attributed to inadequate policing and limited surveillance. This has led to insufficient information about criminal activities which impeded security personnel from preventing and responding to kidnappings (Omonijo et al, 2019). This has created opportunities for kidnappers to operate with reduced fear of being apprehended. Additionally, the increase in kidnapping cases as asserted by Ibrahim, and Mukhtar, (2017) are due to political factors, poverty, lack of legal/available employment opportunity among the youths.
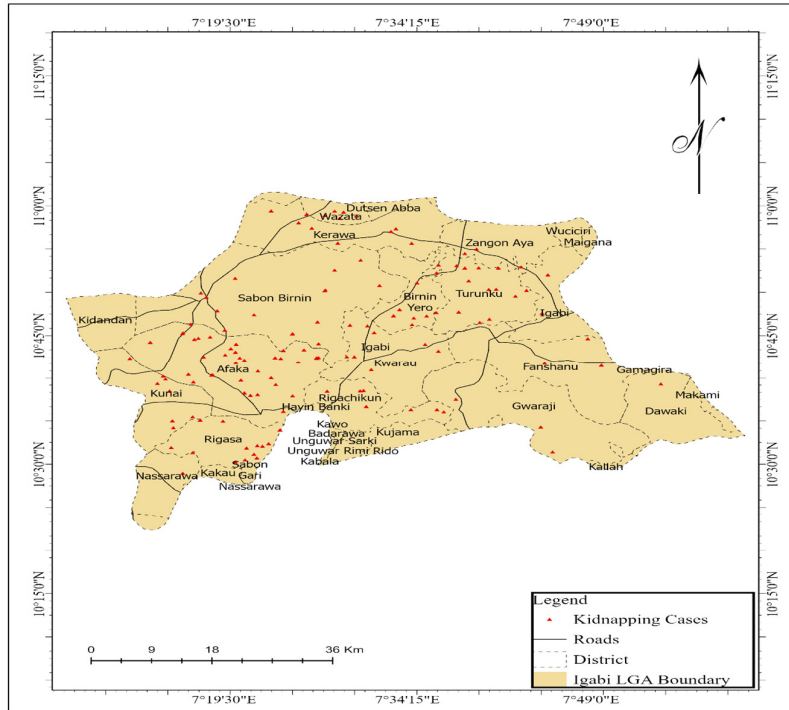
Figure 2: Distribution of kidnapping in the study area
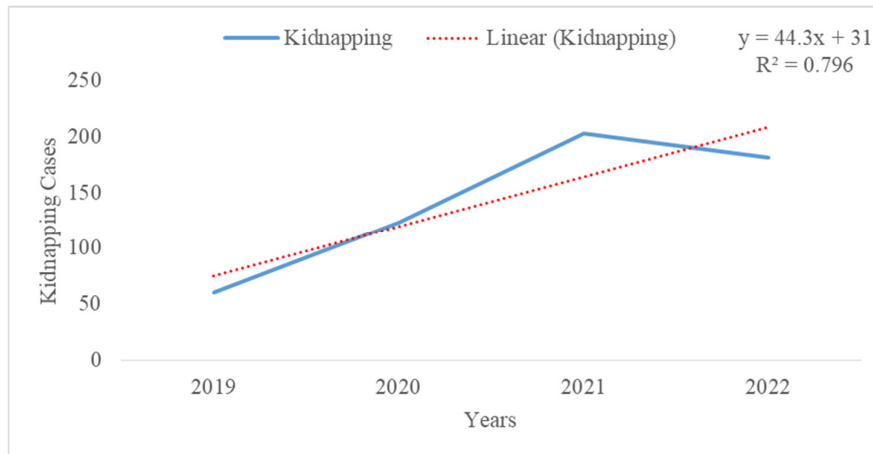
Figure 3: Temporal distribution of kidnapping in the study area

3.3. Spatial Pattern of Kidnapping in the Study Area

Understanding how crime is distributed geographically can provide valuable insights for law enforcement, policymakers, and researchers in developing targeted strategies for crime prevention and intervention; this is shown in Figure 4. Figure 4 reveals that the observed mean distance between the kidnapping incidents is 1416.4680 meters as opposed to the expected mean distance of 638.6 meters as analyzed using Nearest Neighbor Analysis tool in ArcGIS Pro 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 kidnapping events in the study area is clustered around Rigasa, Kakau, Kwarau, and Turunku districts with Z-scores of -43.917356. That is, there is less than 1% probability that this clustered pattern of kidnapping incidents could be because of random chance. This result is similar to the findings of Mustafa, (2022) who analyzed banditry incidence using GIS techniques in Zamfara State Nigeria. He revealed that banditry is concentrated in LGAs of Maru, Gusau, and Zurmi of Zamfara State.
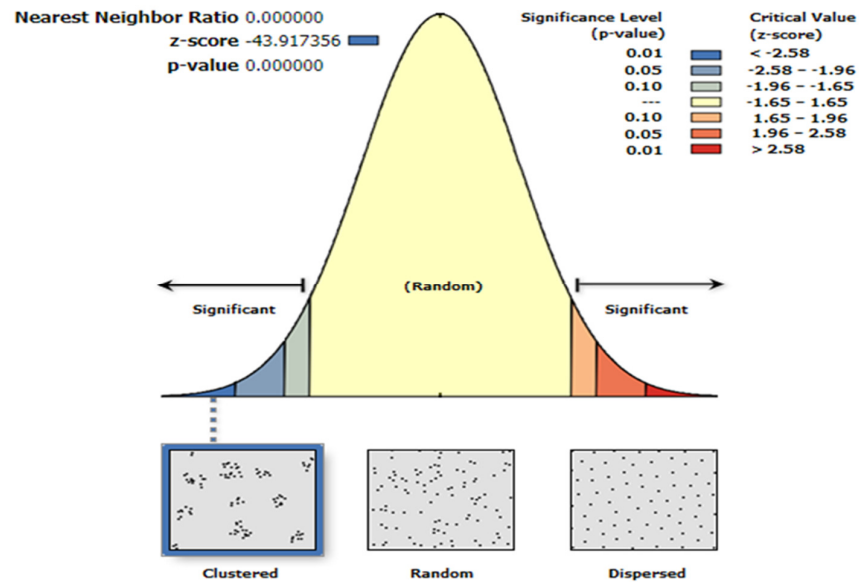

Figure 4: Pattern of kidnapping cases in the study area

The clustered pattern of the reported kidnapping events can be as a result of high population with increased economic activities at specific areas. The inequality in the population distribution of public social facilities and services in the study area may be the cause of the clustered pattern of crimes in the study area. This is because high socio-economic activity and population density can contribute to the clustering of crime in an area through a combination of social, economic, and environmental factors (Ibrahim and Mukhtar, 2017). This is because in areas with high socio-economic activity, there may be significant disparities in wealth. High-value assets, businesses, and affluent neighborhoods can become targets for criminal activities such as theft, burglary, fraud and kidnapping for ransom. The presence of significant wealth disparities can create motivation for criminal elements to concentrate their efforts in areas with the potential for substantial financial gains. In addition, high socio-economic activity often means a bustling commercial environment with numerous businesses, financial institutions, and valuable assets. This abundance of economic opportunities provides a fertile ground for criminal activities. Areas with a high concentration of economic activities may attract criminal enterprises seeking to exploit opportunities for financial gain. Areas with high socio-economic activities are often transportation hubs, with major roads, airports, or ports. These hubs facilitate the movement of goods and people but also provide opportunities for criminal activities such as

drug trafficking, smuggling, and organized crime networks exploiting transportation networks for illicit purposes. This is evident in study area as the roads to Rigasa train station, Kaduna International Airport and Abuja-Kaduna-Zaria highway have become flashpoint for kidnapping in the study area.

3.4. Kidnapping Hotspots in the study area

The term "hotspot" refers to a location where an event or characteristic is more prevalent or intense than the surrounding areas. In the context of crime analysis, hotspot analysis is often used to identify areas with a higher concentration of criminal incidents than would be expected by chance. The result in Figure 5 shows that the hotspots of reported kidnapping cases in the study area are generally concentrated in and around Rigasa, Kakau, Nassarawa, Kwarau, Birnin Yero, Turuku, Zangon Aya and Dusten Abba districts. This result agrees with the findings of Ayuba et al., (2016) who geospatially analyzed crime in Kaduna Metropolis. The study revealed that Tudunwada, Sabon Tasha, Rigachikun and Rigasa are the major crime hotspots in the metropolis. These districts are vulnerable to kidnapping because they exhibit certain characteristics such presence of highway and forest, high institutions such Federal College of Forestry Afaka, poor urban layout and cluster of basic and social amenities. This is because a community located along a highway and near a forest can be more vulnerable to kidnapping due to several factors related to the geographic and environmental characteristics of the area. These districts being located along a highway provides easy accessibility to and from the community. Kidnappers can quickly enter or exit the area, taking advantage of the connectivity provided by the road. In addition, the forested areas near the highway serve as convenient escape routes for kidnappers.
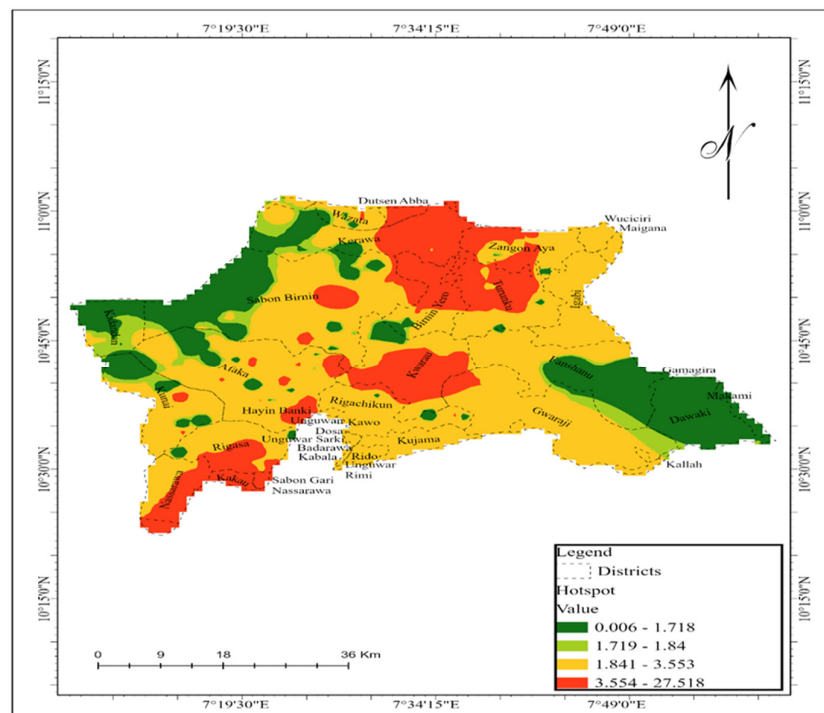

Figure 5: Kidnapping hotspots in the study area

The dense vegetation provide cover and make it challenging for law enforcement to pursue or track kidnappers' activities. Similarly, forested areas are often remote and difficult to monitor. Kidnappers can take advantage of the cover provided by the forest to plan and execute criminal activities, and law

enforcement may face challenges in effectively patrolling such areas. Also, these districts situated along highways in rural or less populated areas may have fewer residents, leading to reduced surveillance and a sense of isolation. Criminals may perceive these areas as less likely to have vigilant community members or law enforcement presence.

3.5. Causes of Crime in the Study Area

3.5.1. Social causes of kidnapping in the study area

Ethno-religious intolerance and political intolerance ranked 2nd and 3rd with a RII of 4.4 and 3.6 respectively as shown in Table 1. Moral decay ranked 4th with RII of 3.1, drug addiction ranked 5th with a RII of 2.9, then 6th with RII of 2.5 was poor parenting and 7th was alcoholism while family structure was 8th. Lack of education as indicated by a RII value of 4.6 was ranked 1st which implies that it is the most influencing factor leading to kidnapping in the study area. This result is dissimilar to the finding of Onakan, (2016) who revealed that moral decay is the major social causative factor of crime in Kaduna Metropolis. The perception that lack of education is a main social cause of crime is rooted in several common assumptions and correlations observed in various studies. This because there is a well-documented correlation between low socioeconomic status and criminal behavior. Individuals with lower levels of education often face limited economic opportunities, leading to higher rates of poverty and unemployment. Economic hardships can contribute to criminal activities as individuals may resort to illegal means to meet basic needs. In addition, lack of education can contribute to a cycle of poverty, where limited access to quality education perpetuates economic disadvantage across generations. Communities facing sustained poverty may experience higher crime rates due to a lack of resources and opportunities for social mobility.

Table 1: Social causes of kidnapping in the study area

Social Factors	Mean	RII
Lack of education	4.6	1st
Ethno-religious intolerance	4.4	2nd
Political intolerance	3.6	3rd
Moral decay	3.1	4th
Drug addiction	2.9	5th
Poor parenting	2.5	6th
Alcoholism	0.9	7th
Family structure	0.8	8th

3.5.2. Economic causes of kidnapping in the study area

Table 2 shows that unemployment and economic hardship ranked 2nd and 3rd with a RII of 3.4 and 2.5 respectively.

Table 2: Economic causes of kidnapping in the study area

Economic factors	Mean	RII
Poverty	4.2	1st
Unemployment	3.4	2nd
Economic hardship	2.5	3rd
Inequality in the distribution of wealth and	2.1	4th
Lack of basic amenities and infrastructure	1.0	5th

Inequality in the distribution of wealth and resources ranked 4th with RII of 2.1, while lack of basic amenities and infrastructure ranked 5th with a RII of 1.0. Poverty as indicated by a RII value of 4.2 was ranked 1st which implies that it is the most influencing economic factor leading to kidnapping in the study area. This finding corroborates the assertion of Alemika, (2014) which attributed crime to unfavorable economic situation such as poverty, economic hardship and unemployment. Poverty can contribute to kidnapping

through a combination of economic, social, and psychological factors. While poverty itself does not justify criminal behavior, individuals facing economic hardships may be more susceptible to engaging in criminal activities as a means of financial survival. This is because individuals experiencing extreme poverty may face a lack of basic necessities such as food, shelter, and healthcare. The desperation to meet these needs can drive some individuals to resort to criminal activities, including kidnapping for ransom, as a way to secure financial resources.

3.5.3. Environmental causes of kidnapping in the study area

Table 3 shows that growth of urban slums and shanty settlements as indicated by a RII value of 4.5 was ranked 1st which implies that it is the most influencing economic factor leading to kidnapping in the study area. Infrastructural decay and Poor environmental and unhealthy sanitary condition ranked 2nd and 3rd with a RII of 3.4 and 2.3 respectively. Lack of adequate urban design and planning ranked 4th with RII of 2.10, poor urban housing with mean value of 1.2 ranked 5th while increased urbanization ranked 6th with a RII of 1.1. 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).

Table 3: Environmental causes of kidnapping in the study area

Environmental factors	Mean	RII
Growth of urban slums and shanty settlements	4.5	1st
Infrastructural decay	3.4	2nd
Poor environmental and unhealthy sanitary condition	2.3	3rd
Lack of adequate urban design and planning	2.0	4th
Poor urban housing	1.2	5th
Increased urbanization	1.1	6th

4. CONCLUSION

Spatial analysis uncovered a clustered pattern of kidnapping incidents, particularly concentrated around Rigasa, Kakau, Kwarau, and Turunku districts. The observed mean distance between incidents exceeded the expected mean distance, as determined by the Nearest Neighbor Analysis (NNA) tool, further supporting the conclusion that the spatial pattern is non-random and clustered. Notably, these areas were characterized by significant features such as highways, forested areas, high population, economic and social activities, as well as the presence of private and public office establishments. Also, identifying the root causes, the study highlighted lack of education as the primary social cause of kidnapping, emphasizing its role in contributing to the prevalence of such criminal activities. Economic causes, including poverty, unemployment, and economic hardship, were also identified as significant contributors. Environmental factors, such as the growth of urban slums and infrastructural decay, further compounded the challenges faced by the community. In terms of the repercussions, the major effects of kidnapping in the study area were the loss of lives, traumatization, and the severe impact on livelihoods. These findings underscore the urgent need for targeted interventions addressing educational disparities, socio-economic conditions, and environmental challenges to effectively mitigate the increasing rates of kidnapping and their adverse effects on the community.

5. CONFLICT OF INTEREST

There is no conflict of interest associated with this work.

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