Locational Analysis of Crime in Gombe Metropolis, Nigeria

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Locational Analysis of Crime in Gombe Metropolis, Nigeria

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Abstract
Worldwide, urban centres do experience concentration of various types of crimes, Gombe is not an exception. The study assesses spatial location of crime in Gombe metropolis, the capital city of Gombe state, Nigeria. It also identifies areas where proposed Police stations should be located in the study area. GIS was used as a spatial tool in not only identifying and mapping the location of Police stations and outposts but also crime spots. Field taking of geographic coordinates was employed using Global Positioning System (GPS) as the methodology of mapping. Accordingly, location-allocation model and buffers were also used for the determination of optimum location of police stations in the study area. Six (6) zones were created for the purpose of the study and it reveals the geospatial classification of the types of crime with respect to the spots of occurrences. Areas of hotspot and lowspot 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 and not all the Police stations are centrally located. Crime cases between period of January and December, 2015 were analysed. It was discovered that ‘belonging to a gang of thieves’ is type of crime with the highest rate committed in Gombe metropolis (42.9%) with the highest record of 60.8% at Pantami Police station, followed by theft and stealing 23.1%, then being in possession of fire arms (8.3%), culpable homicide (6.7%), causing hurt (6.1 %), armed robbery (3.7%), house/store breaking (3.3%), mischief (2.3%), rape (2.1%) and assault (0.5%) as recorded in Gombe metropolis’s police stations over the period under study. Buffer zones of 1 km were created around each Police station, area command, state command and State Motor Police and 0.5 km around each outpost to indicate the maximum limit of their catchment areas.

Key Words: Police Station, Crime, Pattern, Outpost, Hotspot, Lowspot.

Background to the Study
Crime is a phenomenon which is universal in its varying forms in all cultures and societies, at all stages of organization. Criminal activity continues to be a major concern in contemporary society. Most nations are faced with unacceptable levels of delinquency and crime. The dominance of crime in developing countries increases the volatility of the issue, for it pyramids one fear upon others. The concentration of violent crimes in major urban centres worldwide is therefore heralded as an indicator of the breakdown of urban systems; and in several industrialized countries, crime rates recorded by the police are many. The alarming increase in the rate of criminal activities in Nigeria, as reported daily in the local news and media, is perhaps the reflection of the nature of every society where goals are used to measure individuals status in society (Ahmed, 2012; Ackerman & Murray, 2004). The Nigeria Police was established by the virtue of section 214 of the 1999 Constitution of the Federal Republic of Nigeria and entrusted with the power to ensure the internal security of the country. Furthermore, section four of the Police Act 2000 states that police shall be employed for prevention and detection of crime; the preservation of law and order; apprehension and prosecution of offenders; enforcement of all laws; performance of military duties within or outside Nigeria as may be required by them or under the authority of the act or any other act and protection of life and property (FRN, 1999; Police Act, 2004).

The Nigeria Police is not equipped with modern automated information system. This is one of the basic problems militating against the effective prevention, detection and control of crime (Rilwani and Eguabor, 2000; Musa, 2005). Even though there are so many police stations and their outposts distributed around, Musa...
(2005) explained that Police cannot perform their noble roles effectively and efficiently except when provided with adequate funding, equipment, infrastructural facilities, social amenities, and manpower. The level of effectiveness of the Police in any country depends largely on the manpower and equipment provided. It is therefore reported by Luivei Times Kenya in September, 2010 that the standard of population ratio of the Police according to United Nations should be 1:450. However, Dan Bazau (1994 and 2007) explained that the Nigeria Police has been with a strength of personnel that is far below the capacity required to in policing the entire population of the country, considering the minimum standard of the United Nations. In line with this, the 1999 Constitution of the Federal Republic of Nigeria stipulated that the security and welfare of the people shall be the primary purpose of government.

Furthermore, with the rapid advancement of technology, a computer-based technique for exploring, visualizing, and examining the occurrences of criminal activity is essential. Thus, GIS is one of the most influential tools for facilitating and exploration of the spatial distribution of crime in our contemporary society. The fundamental strength of GIS over traditional crime analytical tools and methods is its ability to visualize, analyse and explain the criminal activity in a spatial context. Certain environmental factors, such as the physical layout of an area, proximity to various services and land use are likely to influence criminal behaviour. It is necessary therefore to take these factors into account when analysing the crime data. Burrough (1998) described GIS as a powerful set of tools for collecting, storing, retrieving at will, transforming and displaying spatial data from the real world for a particular or general set of purposes.

Smith et al (2006) lamented that GIS is a database system in which most of the data are spatially indexed and upon which a set of procedures operated in order to answer queries about spatial entities in the database. It is a decision support system that involves the integration of spatially referenced data in a problem solving environment. Environmental Systems Research Institute, California (1990), sees GIS as an organized collection of computer hardware, software and personnel to efficiently capture, store, update, manipulate, analyze and display all forms of geographically referenced information. Consequently, modern GIS software allows law enforcement agencies to produce more versatile electronic maps by combining their crime database of reported crime locations with digitized maps of the target areas (Sahu, 2010; ESRI, 1990).

Crime mapping refers to the process of conducting spatial analysis within the range of activities of crime analysis (Boba, 2005). It is used by analyst in law enforcement agencies to map, visualize and analyse crime incident patterns. In addition, it enables them to identify crime hot spots along with other trends and patterns of crime (Soneye, 2002). It was established that a large proportion of the men of the Nigeria Police hardly ascertain the areas under the jurisdiction of their stations or define the shortest route from their stations to specific crime areas. Crime mapping and spatial analysis of crime are recognized powerful tools for the study and control of crime, because crime maps help Police to identify problems at the block. The most powerful weapon in law enforcement is information technology. Law enforcement needs information management, especially location information. Traditional law enforcement for different types of Police applications really deals with data collection. However, GIS does not only allow for integration and spatial analyses of data but also to identify, apprehend, and prosecute suspects; it also aids more proactive measures through effective allocation of resources and better policy setting.

Crime maps are becoming significant tools in crime and justice control. As such, advancement in the information technology specifically Geographic Information Systems (GIS) has opened new opportunities for the use of digital mapping in crime control and prevention programs. Crime maps are therefore valuable for the study of ecology and location aspects of crime, because maps enable areas of unusually high or low concentration of crime to be visually identified. The ability to map locations of events by their characteristics is a valuable tool for Police officers. Access to this tool is one of the biggest decisions that Police departments face when implementing GIS onto their activities. Even though desktop mapping programs have become relatively user friendly, none are simple enough to use without extensive training. GIS and remotely sensed data allow analysts to identify hot spots, trends and patterns of crime locations (Burrough, 1998; Mostafa, 2003). GIS allows analysts to overlay other datasets such as census demography, location of Police stations, dispatching to emergencies, banks, filling stations and schools in order to understand the causes of crime which helps law enforcement agencies to devise strategies in dealing with such phenomenon (Sahu, 2010; Lawman, 1986).
Above and beyond that Ahmed (2012) used GIS to examine the pattern of crime distribution in Osun state. The study was on the way criminal activities affected liveability of the residents of urban centres. The results indicated that most residents in the area exhibit a significant higher level of fears (of crime) but still want to remain in their cultural homes. He suggested adequate planning of urban centres in the state so as to conform to the modern cities in the world. Clark (1993), on the other hand, noted that economic development increases criminal opportunities with respect to property crime. For instance, theft, robbery and burglary are committed crimes because personal property is cherishing in capitalist societies. When the valuable goods and services become unevenly distributed in societies, the consciousness of risk management and need for protection become more generalized. It is evident that most people tend to resist being dispossessed of their property which led to grievous harm or even death. It is concluded by Sahr (2006) that crime prevention strategies would require the intervention of both the police and city planners to be reasonably successful. This study therefore attempted the locational analysis of Police stations distribution vis-à-vis crime patterns with a view of ameliorating security situation using Geographic Information System in Gombe metropolis.

Studies in Nigeria on locational analyses bordering on crime hotspots are rare, among which are Dunn (1980); Johnson (2000); Ackerman & Murray (2004); Ahmed (2010); Ahmed (2012); Ahmed and Salisu (2013); Bottoms and Wiles (1995); Boba (2005); Eck et al (2005); Herbert (1982); Soneye (2002); Longley et al (2003) and Balogun et al (2014). In addition, Abbas (2012) looked at coverage vis a vis locations with a view to finding optimum locations. In view of diverse characteristics of different studies in most cities, generalisation based on these studies is not appropriate. It is against this background therefore, a detailed investigation on the locational analyses of crime distribution and the patterns of crime control in Gombe metropolis of Gombe state.

**Study Area**
Gombe metropolis is the capital city of Gombe state. It is located between Latitude 10°0’ to 10°20’N and Longitude 11°0’ to 11°19’E. It is also the whole of Gombe Local Government Area; Part of three Local Government Areas included Akko in the east, south and west; Yamaltu Deba to the east; and Kwami to the North. This is shown in Figure 1.

![Study Area](image)

**Figure 1: The Study Area (Gombe Metropolis)**
*Source: Authors Analysis, 2016.*
**Materials and methods**

**Sources of Data Collection**
Two major sources of data (primary and secondary) were identified and explored. Field survey was used to generate most of the primary data. The geographic coordinate of the existing police stations were obtained using hand held Global Positioning System (GPS) which provided the co-ordinates of all the Police stations in Gombe metropolis. Relevant administrative records of crime were obtained from the Nigeria Police, Gombe State Command in addition to documentary sources such as textbooks, journals, newspapers and magazines that were consulted from various libraries so as to complement primary data. The nature of data used included Northing (m) and Easting (m) coordinates data on the rate of crime at each Police station between January and December 2015 were used in the analysis. A handheld GPS, Scanner, a digital electronic laptop computer with Microsoft Office 2013 were all used in sorting coordinate data for the purpose of compiling and documenting the results with the help of ArcGIS 10.1 version.

**Method of Data Analysis and Presentation**
Data collected from the field were analysed using Geographic Information System (GIS) software (ArcGIS 10.1 version). In the analysis, information were expressed and depicted graphically using tables, charts and pictures to give a clear understanding of Police stations distributions in relations to the patterns of crime rate in Gombe metropolis.

a. Geo-Referencing
The secondary data set (satellite imagery and base map) acquired were first geo-referenced in order to make the computer accept the coordinate and treat the image as part or portion of earth surface. The processes involved using the handheld GPS to collect the geometric data which was used to geo-reference the satellite imagery.

b. Image Digitization
Satellite image of Gombe state area (map) was digitized in order to update the existing map of Gombe metropolis. In order to do this, shape files of the entities in the study area were first created in Arc-Catalogue. The shape files were added to the Arc-Map environment for digitizing. The process of digitization involved the use of Editor Tool Bar to trace out all the features in the satellite imagery and other points of interest.

c. Geographic Information System Analysis
This is the analysis in identifying and mapping the locations of Police stations and outposts in relations to the patterns of crime spots with a view to determine optimal locations for new Police stations in Gombe metropolis. Buffer zones of 1 km and 0.5km were created along the points of Police stations and outposts respectively in measuring the proximity of the Police stations in the study area. Longley et al (2007) noted the importance of buffers that it is any object which included points, lines or areas; a buffer operation build a new object or objects by identifying all areas that are within a certain specified distance of the original objects.

**Results and Discussion**
This section is dedicated to the presentation of analysed results and discussion of the major findings. Nothings and Easting (geo-coordinates) of various points were used for mapping of the police stations and the crime spots. Statistical records of crime rate by each Police station in Gombe metropolis for January to December, 2016 were analysed.

Table 1 shows geo-coordinates of the various Police formations in Gombe metropolis computed in degrees and converted to decimal points onto the GIS environment. This is corroborated with a map showing the locations, i.e. figure 2,

Table 2 presents crime statistical records with their locations in the study area from January to December 2015 obtained from Nigeria Police, Gombe State Headquarters.
Table 1: Northings and Eastings (Geo-coordinates) in metres of various points in Gombe Metropolis

<table>
<thead>
<tr>
<th>Location</th>
<th>Northing(m)</th>
<th>Easting(m)</th>
<th>LGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Command</td>
<td>10.29019</td>
<td>011.14172</td>
<td>Gombe</td>
</tr>
<tr>
<td>Area Command</td>
<td>10.29952</td>
<td>011.16278</td>
<td>Gombe</td>
</tr>
<tr>
<td>Gombe Division</td>
<td>10.29009</td>
<td>011.16768</td>
<td>Gombe</td>
</tr>
<tr>
<td>Gona Division</td>
<td>10.27725</td>
<td>011.20160</td>
<td>Akko</td>
</tr>
<tr>
<td>Tunfure Division</td>
<td>10.29046</td>
<td>011.09777</td>
<td>Akko</td>
</tr>
<tr>
<td>Lowcost Division</td>
<td>10.27756</td>
<td>011.18028</td>
<td>Gombe</td>
</tr>
<tr>
<td>Pantami Division</td>
<td>10.27442</td>
<td>011.17048</td>
<td>Gombe</td>
</tr>
<tr>
<td>Motorpol</td>
<td>10.28255</td>
<td>011.14215</td>
<td>Gombe</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

Table 2: Locations and Statistical Records of Crime in Gombe Metropolis from January to December 2015.

<table>
<thead>
<tr>
<th>Location</th>
<th>Armed F/%</th>
<th>Assault F/%</th>
<th>Being in F/%</th>
<th>Belonging to F/%</th>
<th>Causing F/%</th>
<th>Culpable F/%</th>
<th>House/Store F/%</th>
<th>Mischief F/%</th>
<th>Rape F/%</th>
<th>Theft &amp; Robbery F/%</th>
<th>Possession F/%</th>
<th>Gang of of Fire Arms F/%</th>
<th>Hurt F/%</th>
<th>Homicide F/%</th>
<th>Breaking F/%</th>
<th>Stealing F/%</th>
<th>Total F/%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Command</td>
<td>0/0</td>
<td>3/12.5</td>
<td>3/12.5</td>
<td>3/12.5</td>
<td>6/25</td>
<td>2/8.3</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>7/29</td>
<td>24/100</td>
<td>3.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gombe Division</td>
<td>2/3.4</td>
<td>0/0</td>
<td>4/6.8</td>
<td>0/0</td>
<td>0/0</td>
<td>16/27.1</td>
<td>5/8.5</td>
<td>0/0</td>
<td>3/5.1</td>
<td>29/49.1</td>
<td>59/100</td>
<td>8.94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gona Division</td>
<td>3/35</td>
<td>0/0</td>
<td>2/6.8</td>
<td>0/0</td>
<td>0/0</td>
<td>19/21.8</td>
<td>7/8</td>
<td>21/24.1</td>
<td>8/9.2</td>
<td>4/4.6</td>
<td>2/2.3</td>
<td>21/24.1</td>
<td>87/100</td>
<td>13.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowcost Division</td>
<td>9/33.3</td>
<td>0/0</td>
<td>4/14.8</td>
<td>0/0</td>
<td>4/14.8</td>
<td>2/7.4</td>
<td>2/7.4</td>
<td>0/0</td>
<td>4/14.8</td>
<td>27/100</td>
<td>21/200</td>
<td>4.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pantami Division</td>
<td>9/2.1</td>
<td>0/0</td>
<td>42/9.8</td>
<td>261/60.8</td>
<td>21/4.9</td>
<td>0/0</td>
<td>2/0.5</td>
<td>7/1.6</td>
<td>6/1.4</td>
<td>81/18.9</td>
<td>429/100</td>
<td>65.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tunfure Division</td>
<td>8/23.5</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>2/5.9</td>
<td>3/8.8</td>
<td>5/14.7</td>
<td>2/5.9</td>
<td>3/8.8</td>
<td>11/32.4</td>
<td>34/100</td>
<td>5.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorpol</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>31/4.7</td>
<td>3/0.5</td>
<td>55/8.3</td>
<td>283/42.9</td>
<td>40/6.1</td>
<td>44/6.7</td>
<td>22/3.3</td>
<td>15/2.3</td>
<td>14/2.1</td>
<td>153/23.1</td>
<td>660/100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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From table 1 above, the geo coordinates of all the police stations are captured and displayed as points of crime recording.

The results of the various types of crimes reveal that Pantami Police Division records the highest rate of almost three quarters (65%) of all the crimes and theft and stealing constitute 60.8% of the crimes recorded at the station. Area Command registered only 3.64% of the crimes and Motorpol registered 0%. In the whole of the study area, belonging to gangs of thieves constitutes the highest crime type in terms of rating (almost half of the total crime rate.

This is followed by Theft & stealing (23.1%). The least crime type in rating is ‘rape’ constituting only 2.1%. This is can be attributed to the fact that rape cases are seldom reported to the police, because some parents try to avoid exposing it to the members of the public. Most crime cases are reported at the nearest police station and the location of the stations also determines the number of cases reported. As indicated by previous studies (Ahmed, 2010; Ahmed, 2012; Ahmed and Salihu, 2013; Sahu, 2010), crimes such as raping are often hidden by parents in order to avoid stigmatization of their daughters which may lead failure to get husbands for them.

In this respect, belonging to gang of thieves is the highest type of crime committed at (42.9%) i.e. almost half of the total crime rates, followed by theft and stealing (23.1%), being in possession of fire arms (8.3%), culpable homicide (6.7%), causing hurt (6.1%), armed robbery (4.7%), house/store breaking (3.33%), mischief (2.27%), raping (2.1%) and then assault (9.5%).

One question that may be raised here is, why should Pantami Police Division account for over half of all crime types in Gombe metropolis and does that imply that there are more criminals in pantami than in the other areas of the town? The answer could probably be that its centrality in location and its proximity to the township stadium are probably some of the factors responsible for that.

**Figure 2. Location of police stations and outposts in Gombe metropolis**

*Source: Authors’ Analysis, 2016*
Figure 2 shows the Location of police stations and outposts in Gombe metropolis which included Area Command, Gombe Division, Gona Division, Lowcost Division, Pantami Division, Tunfure Division and Mortopol.

Figure 3 shows the spatial distribution of the ten selected criminal offences in Gombe metropolis. Pantami Division recorded (429) crime cases, Gona Division (87), Tunfure Division (81), Gombe Division (59), while Lowcost Division recorded (27), and Area Command (24) of the recorded crime cases in Gombe metropolis during the period under study.

**Analysis of Crime Rate and Type in Gombe Metropolis**

<table>
<thead>
<tr>
<th>S/No</th>
<th>Types of Crime</th>
<th>Total No: of Crime</th>
<th>Rate of crime in percentage(%)</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Armed Robbery</td>
<td>31</td>
<td>4.69</td>
<td>6th</td>
</tr>
<tr>
<td>2</td>
<td>Assault</td>
<td>3</td>
<td>0.45</td>
<td>10th</td>
</tr>
<tr>
<td>3</td>
<td>Being in Possession of Fire Arms</td>
<td>55</td>
<td>8.3</td>
<td>3rd</td>
</tr>
<tr>
<td>4</td>
<td>Belonging to Gang of Thieves</td>
<td>283</td>
<td>42.87</td>
<td>1st</td>
</tr>
<tr>
<td>5</td>
<td>Causing hurt</td>
<td>40</td>
<td>6.10</td>
<td>5th</td>
</tr>
<tr>
<td>6</td>
<td>Culpable Homicide</td>
<td>44</td>
<td>6.67</td>
<td>4th</td>
</tr>
<tr>
<td>7</td>
<td>House /Store Breaking</td>
<td>22</td>
<td>3.33</td>
<td>7th</td>
</tr>
<tr>
<td>8</td>
<td>Mischief</td>
<td>15</td>
<td>2.27</td>
<td>8th</td>
</tr>
<tr>
<td>9</td>
<td>Rape</td>
<td>14</td>
<td>2.12</td>
<td>9th</td>
</tr>
<tr>
<td>10</td>
<td>Theft and Stealing</td>
<td>153</td>
<td>23.2</td>
<td>2nd</td>
</tr>
</tbody>
</table>

*Source: Authors’ Calculation, 2016*
Table 3 shows the types of crime committed and reported at the Police stations in Gombe metropolis by percentage and ranking. These included, ‘belonging to gang of thieves’ which is the highest type of crime committed which is ranked the first, followed by theft and stealing which is ranked second, being in possession of fire arms which is ranked third, culpable homicide which is ranked fourth, causing hurt which is ranked fifth, armed robbery which is ranked sixth, house/store breaking which is ranked seventh, mischief which is ranked eighth, raping which is ranked ninth and then assault which is ranked tenth. Therefore, belonging to gang of thieves is first which has 42.87% based on ranking where by Pantami Division recorded the highest incidence. However, the least crime committed is assault which is ranked tenth and has 0.45%. The low rate of assault as a reported crime type could be attributable to the fact that most people consider this as trivial issue and often forgive even out of police station or court. Sometimes, people do intervene with the view to settling the matter amicably.

**Crime Spots in Gombe Metropolis**
Areas that are prone to crime or criminal activities are known as hot spots. Low spots are places or areas with less than the average amount of crime or disorder. Some hot spots may be hotter than others. Therefore, one can then calculate the hot spots of crimes of the Gombe metropolis in terms of its magnitude using the equation as

\[
\text{Average Crime Incidence} = \frac{\text{Total Number of Crime Cases}}{\text{Total Number of Zones}}
\]

\[
\text{Prevalence rate } T = \frac{\text{Number of victims in a specified population } T \times 1,000}{\text{Number of persons in the specified population } T}
\]

*Source: https://www.bjs.gov/pub/pdf/mpcncvs.pdf*

Thus, the total number of the crime cases and the differences between them and the average crime incidences presented in Table 4 were used in the creation of crime zones as shown pictorially in figure 4 (a ba chart).

**Table 4: Crime zones with hot and low spots in Gombe metropolis**

<table>
<thead>
<tr>
<th>S/No</th>
<th>Zones</th>
<th>Total No. of Crime Cases</th>
<th>Differences Between Average &amp; No. of Crime Cases</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bajoga/Shamaki/Ajiya</td>
<td>24</td>
<td>-86</td>
<td>Low Spot</td>
</tr>
<tr>
<td>2</td>
<td>Dawaki/Kumbiya/HerwaGana</td>
<td>59</td>
<td>-51</td>
<td>Low Spot</td>
</tr>
<tr>
<td>3</td>
<td>Bolari West/East</td>
<td>87</td>
<td>-23</td>
<td>Low Spot</td>
</tr>
<tr>
<td>4</td>
<td>Nasarawo</td>
<td>27</td>
<td>-83</td>
<td>Low Spot</td>
</tr>
<tr>
<td>5</td>
<td>Jekadafari/Pantami</td>
<td>429</td>
<td>319</td>
<td>Hot Spot</td>
</tr>
<tr>
<td>6</td>
<td>Tumfure</td>
<td>34</td>
<td>-76</td>
<td>Low Spot</td>
</tr>
</tbody>
</table>

*Source: Authors’ Calculation, 2016*

The total number of the reported crime cases during the period of this study is equal to six hundred and sixty (660) and the total number of zones is six (6). Therefore, the **Average Crime Incidence** is one hundred and ten (110). It is therefore revealed that there are areas of hot and low spots zones in the study area (see table 4). Jekadafari/Pantami zone is the hotspot zone with (319) differences between average crime incidence and total number of crime cases while the least low spot zone is (-86) which is Bajoga/Shamaki/Ajiya zone in Gombe metropolis.
Suitable Locations for the Proposed Police Stations

The study provided ways for the optimal locations of new Police stations through the creation of buffer zones in Gombe metropolis as seen in Figure 5. This is done by determining the patterns of crime at each police station in Gombe metropolis as seen in Figure 4. Since, Figure 5 shows that Pantami Ward has the highest record of crime incidence with a total of 429 crimes that were reported investigated and charged to court for prosecution between January and December 2015 out of 660 recorded crimes; and which has only one Police Division. It is therefore suitable to have an additional Police Station around the area to be able to reduce crime occurrences within the area. The suitable location is supposed to be around the boundary of Pantami and Jekadafari wards.

Buffers

A Buffer of one kilometre (1km) and half a kilometre (0.5km) around police station and outposts respectively were created to show the catchment areas of the police station and outposts distributions in Gombe metropolis as shown in Figure 5. This figure presents the creation of buffer zones around the Police stations and outposts in Gombe metropolis. It is observed that there is a limited coverage between the boundary of Pantami and Jekedafari wards which implies that if additional Police station is to be established and located, it would give a optimum coverage around the zone which would help in reducing crime occurrences in the area. It is noted that the establishment of accessible Police stations would complement the efforts of the police in their endeavour to combat crime (Sahr, 2006). This conforms with the assertion by Rilwani and Eguabor (2000) which states that, the level of effectiveness of the Police in any country depends largely on the manpower and equipment provided.
Figure 5. Buffer zone around the police stations in Gombe metropolis

Source: Authors’ Analysis, 2016

Conclusion
The analysis of location of Police stations distribution and the patterns of crime in Gombe metropolis determined the spatial distributions of police stations vis-à-vis patterns of crime and suggested that new Police stations should be optimally located so as to effectively reduce and control crimes. The study was a field work survey using GPS, crime records from Police and analogue map in the methodology. Crime zones were created for effective handling of the data in a GIS environment. As such, the study concluded that not all the Police Stations are centrally located and that the rate of crime is unequally distributed. Accordingly, additional locations of police stations were identified for the area that the police stations are not centrally located. The finding clearly revealed that belonging to gang of thieves is the highest type of crime committed and reported in Gombe metropolis with (283) crime cases. This is followed by theft and stealing (153), being in possession of fire arms (55), culpable homicide (44), causing hurt (40), armed robbery (31), house/store breaking (22), mischief (15), rape (14) and assault (3) committed and reported crime cases. In view of this, buffer of 1 km was created around the Police Divisional Headquarters, Area Command, State Command and Motorpol and also 0.5 km was created around the entire outposts for the purpose of effective control in Gombe metropolis.

Recommendations
The followings are recommended:

i. The Government should set up a GIS Unit in all police stations to provide an avenue for locational analysis, crime mapping and crime control which will help in spatial analysis of resource allocation for administrative planning.

ii. Patrol Unit in Police stations should be equipped with GPS facility which will help to detect locations of different areas in an effort to avert and control crimes.

iii. Buffer zones generated revealed that the location of a Police station at Pantami is not appropriate, where it can serve the entire area optimally. Therefore, another Police station should be established and located at the boundary between Pantami and Jekadafari wards for effective crime control in Gombe metropolis.

iv. Crime data should always be made available to the crime analysts so as to ensure data sharing from the Police to researchers. This will always unveil challenges of security agencies in an effort to control crime and suggest possible solutions.
v. Police should annually be organizing security meetings with stakeholders where seminars are to be presented by security analysts on the security challenges and crime control in relation to Police in Gombe metropolis.

vi. Reports and findings of seminars presented in relation to Police and crime control should be given attention in order to apply, execute and implement the findings and recommendations in Gombe metropolis.

vii. Future studies should embark on findings such as the most probable hidden point and residence of criminals in Gombe metropolis. This may help in identifying the hunter and poacher types of offenders which will aid Police authority in devising varieties of methods combat crime and arrest criminals.

References


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