Geospatial Assesment of Trends and Patterns of Terrorism in Nigeria from 2010 To 2015

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ABSTRACT

Terrorism in Nigeria has cost the loss of lives of thousands of Nigerian Citizens in the last five years. The war on terrorism have resulted in the loss of lives of innocent citizens as well as military personnels, not to mention the death of the terrorist perpetrating the evil acts, through suicide bombings and planned attacks. These loss of lives could have been prevented or reduced, if the necessary measures, infrastructures and policies were put in place. It is to this effect that this paper examines the potential advantages of adopting geoinformatics and specifically geographically-referenced information technology as a tool for combating terrorism in Nigeria. The research work looks at the history of terrorism in the country to predict future trends, and look at ways of fortifying areas of targets of terrorists' attacks in other to save lives of innocent citizens. Data about the terrorists' incidents that occurred within January, 2010 to November, 2015 were collected. Thematic maps and graphs emphasizing the distribution and frequency of terrorists' incidents in Nigeria within the period in review was produced. Recommendations were made on the policies, reforms, equipment and training of security personnel and harmonization of security operation with geoinformatics technology.

Keywords: *Terrorism, Geographic Information System, Nigeria, Geospatial Analysis, Trends and Patterns of Terrorism.*

1.0 INTRODUCTION

The last five years has seen a dramatic increase in the number of terrorists' incidents happening in the most populous country in Africa. To say the country, Nigeria, has lost tens of thousands of its citizens and billions of naira worth of properties to insurgence, would be stating the obvious. It is however important to note that the history of insurgency in Nigeria goes way back to the rise of Niger-delta militants in the southern part of Nigeria, claiming agitation for the empowerment of the youth in the oil-producing region of the country. Organizations such as Movement for the Emancipation of Niger Delta (MEND), MASSOB and many other groups in the Niger-Delta are famous for hostage taking, kidnapping for ransom, pipeline vandalization, oil-theft, arson and ambush (Oyeniyi, 2010). From the south to the North, terrorism in Nigeria has experienced a significant geographical shift in Nigeria. It can however be observed that in recent years terrorists incidents is majorly concentrated in the North-eastern region of the country, perpetrated by the deadly group popularly referred to as Boko Haram. whose chief motivation is believed to be echoed in the translation of the name which is said to mean that 'western education is forbidden (in Hausa language)' (simcox and Guitta, 2014), and this has often been highlighted with their attacks on educational institutions; even though this alone is probably insufficient in determining the real motivation of the group, as a significant number of attacks have been carried out in other specific locations, as their motivation varies. Other suggested motives of the group include establishing an Islamic state, while some experts believe the insurgency is just a political tactics employed by the opposition party, others relate it to the impoverishment and unemployment experienced by those inhabiting the troubled

regions of the country .Whatever the real motives behind the group's activities are, one thing is certain, terrorism is on the rise in the country and specific measures needs to be taken to curb this deadly acts. Curbing terrorism requires quantifying the measure and magnitude of the problem at hand, as this would help to arrive at an analysis of patterns and shift in trends of terror-related activities, which can be employed in tackling the problem of terrorism in the country.

1.1 OBJECTIVES

The objective of this study was to present and analyze the current trends and patterns of terrorism in Nigeria, using Geographical Information System (GIS) and graphical representations, from January, 2010 to November, 2015.

In order to accomplish the above mentioned objective, the following task was done. The first task is to make a digital map of Nigeria, second is to collect and verify individual terrorist incidents in the country. Third is to enter the specific data about terrorists incidents into the attribute database of the digital map of Nigeria, fourth is to present maps showing geographical distribution of terrorists' incidents and also charts and graphs to present statistical data to enable relevant personnel and information managers directly associated with anti-terror wars to make meanings out of data.

2.0 GIS AND TERRORISM
2.1 GEOGRAPHIC INFORMATION SYSTEM (GIS)

Geographic information system is a tool for handling geographic (spatial and descriptive) data. It is an organized collection of computer hardware, software, geographic data and the personnel designed to efficiently capture , store, retrieve, update, manipulate, analyze and display all forms of geographically referenced information according to the user defined specifications (Panda, 2013). Geoinformation experts often comment that it is important to note that a GIS

does not hold maps or pictures, it holds only a database. Thus the database concept is central to a GIS and this is the main difference between a GIS and a computer mapping system which can only produce good graphic outputs. A contemporary GIS incorporates a database management system (DBMS). So the GIS has become a tool to Visualize, model, analyze and query the database. Visualization is at the core of GIS, indeed GIS is very much dependent on visualization for its effectiveness (Deakin, 2011). One of the major advantages of GIS is its ability to incorporate different types of data into a meaningful presentation. GIS also allows for modelling of data by testing certain Criteria concerning data in the spatial database. GIS have a wide variety of applications in the fight against terrorism. Approaching a socio-political problem, such as terrorism, through a geographic lens leads to a greater understanding of not only locations of terrorists and their activities, but spatial processes, social network connections, social systemic operations, and changes in space and time. Social, political, and other systems, as well as their agents, operate in specific geographical contexts, whereby they are researched in socio-spatial or geopolitical realms (Bahgat and Medina 2013).

2.2 TERRORISM DATA

For the purpose of this research work, terrorists' incidents have been restricted to acts perpetrated by radical groups like MEND and Boko Haram from January, 2010 to November, 2015. The data used for this research was sourced from reports in the published print and electronic media. These terrorists' incidents considered do not include confrontations between the military against the terrorists. But incidents of attacks on the military and police base which occurs away from the theaters of the battle fields are recorded. The research does not takes into consideration terrorists incidents perpetrated outside Nigeria, no matter how close to the border of the country such events might have happened. The terrorists incidents considered were reported incidents, as it

is possible that so many act of terrorism might have happened and not been reported during the period in review. All reported attempts are recorded irrespective of whether such terrorists' incidents attempts were successful or not.

3.0 METHODOLOGY
3.1 PRODUCTION OF MAP OF NIGERIA
The hardcopy map of Nigeria was scanned and digitized using ESRI's ArcMap in the ArcGIS 10.1 software suite. Separate layers were created for the states and the boundary of the country. The 36 states in addition to the federal capital territory, which made up the geographical extent of Nigeria, were showed distinctively.

3.2 COLLECTION OF DATA CONCERNING TERRORISTS INCIDENTS
The data used for this research was sourced for from reports in the published print and electronic media. The data concerning the terrorists' incidents that happened in Nigeria from January, 2010 – November, 2015 were collected. A table was created for collecting the data with each columns housing separate fields some of which are explained below.

a. The date of the terrorists' incident.
b. The type of the terrorists' incident: – the terrorists' incidents can range from suicide bombings, car bombings, other forms of bombings, shootings, village attack, raid, kidnapping, massacre and any other terror-related activities perpetrated by terrorists that might have resulted in loss of lives and properties.
c. The perpetrators: - the group that claims responsibility or is highly suspected to have been behind certain terrorists' incidents, for example Boko Haram, MEND, Fulani militants etc.
d. The Target: - the apparent or obvious person, group of persons or institution towards which a terrorist incident was targeted at. This may include police, army, students, citizens, Christians, Muslims etc.

e. Location of the Incident: - the objective location at which a terrorist incident takes place e.g. A school, market, village, roadside, City Area, church, mosque etc.
f. Vicinity of the Incident: - the name of the town, community, village, local government area etc. at which a terrorists attack takes place.
g. State of the Incident: - the state at which the vicinity of a terrorists incidents takes place, which could be any of the 36 states in the country or the federal capital territory.
h. Number of Dead, injured, and kidnapped persons: - the number of persons reported dead, injured or kidnapped, after a terrorist incident, this does not include the number of people reported to be missing.

3.3 DATA CHECK
The data acquired from the open-source database of Wikipedia website were checked for correctness by investigating individual incidents by searches made on the search engines on the internet. Extensive searches were carried out on as many articles as possible reporting the same event, this helped to detect the degrees of conflicts in the reports. Where this situation arises, figures with the highest precisions were chosen. In cases where the precision in reported figures is insignificant and degrees of conflicts is significantly high, the average of the available reported figures is adopted.

3.4 DATA GROUPING
All the recorded terrorists incidents reported from January, 2010 – November, 2015 were further grouped into the following classes:

a. Number of incidents per year during the period under review.
b. Frequency of monthly terrorists' incidents during the period under review.
c. Frequency of terrorists' incidents in different states during the period under review.

3.5 ENTERING OF TERRORISTS' INCIDENTS IN THE SPATIAL DATABASE

The amount of terrorists' incidents per year was entered against their corresponding fields. The maps of distribution of occurrence of terrorists incidents across Nigeria was produced one for each year from 2010 – 2015 and also a general one showing the totality of terrorists incidents during the year under review.

4.0 DISCUSSION AND ANALYSIS OF RESULTS ON TERRORISTS' INCIDENTS IN NIGERIA

With a total of at least 116 terrorists' incidents reported to have occurred in the last 6 years, 114 of which happened in the last 5 years. Nigeria averages at least 23 terrorists' per year in the last 5 years, the highest occurrence for the years under review has happened within January, 2015 – November, 2015, with a total of 36 occurrences. With an average of 3.3 incidents per month in the first 11 months of 2015, the number of terrorists' incidents in Nigeria is expected to rise to 40, before the end of the year, 2015. This figures points to the fact that, despite the magnanimous amounts of money that has been exhausted, the thousands of soldiers lost to the -anti-terrorism cause, terrorism is still on the rise. With respect to the graph in figure 1, a form of linear progression is evident in the pattern of increase of terrorists' incidents in the country during the years in review, leaving an average increase of 8 terrorists' incidents per year, though the corresponding figures for the years 2012 and 2013, seems to alter the trend with a slight inverse variation. If drastic measures are not taken, terrorists' incidents in Nigeria might likely rise to a record-high of 48 occurrences in 2016, average a devastating 4 deadly strikes per month. With 90 percent of such incidents expected to happen in the north-eastern region of the country. Borno, Yobe and Adamawa states are likely to maintain their status as the states to expect the highest frequency of terrorists' attacks, considering their past records of which Borno state has suffered a devastating 50 percentage of the total terrorists' incidents in the country. The vulnerability of the north-eastern states to terrorists attacks indicates how weakly guarded that part of the country is. In states like Borno, Adamawa, and Yobe states, a similar pattern can be observed in the target-locations of terrorists' incidents in the region as they were mostly carried out in villages, markets, mosques. Only a few were carried out in random places, like the roadside, bars, football match viewing centers etc.

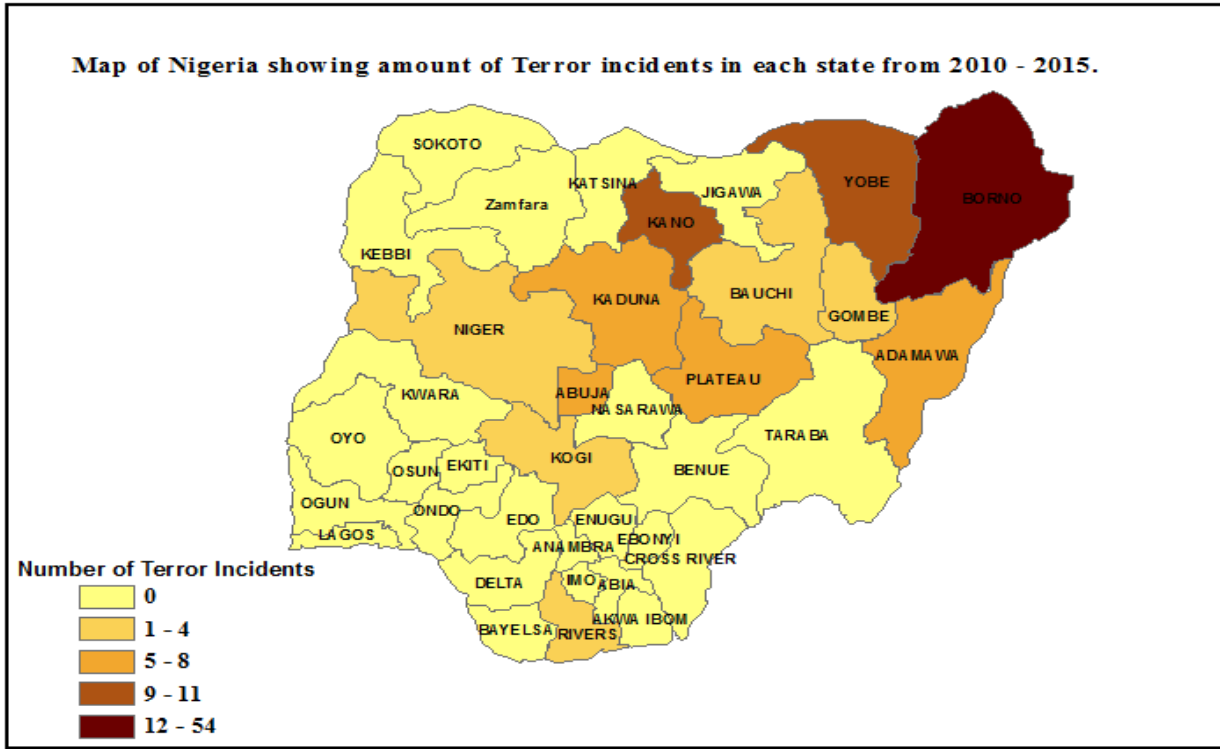**Figure 1:** Graph showing number of terrorists' incidents in Nigeria from January, 2010 – November, 2015
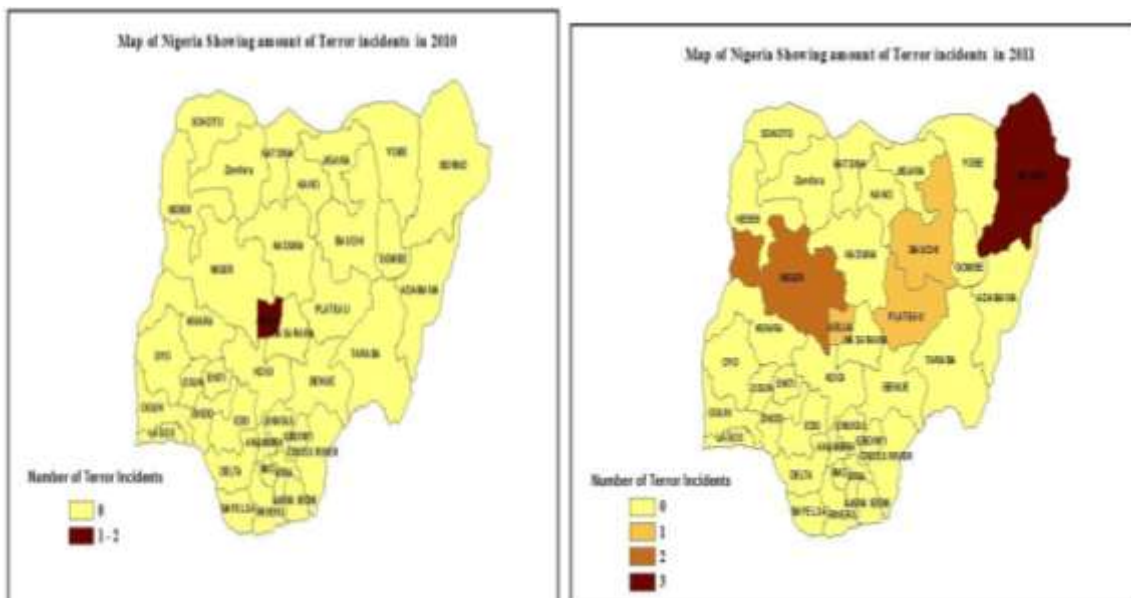
Figure 2: Map of Nigeria showing amounts of terrorists' incidents in the country from January, 2010 - November, 2015.
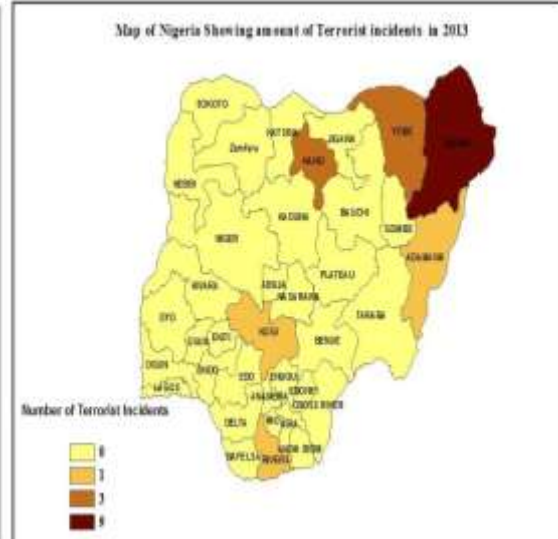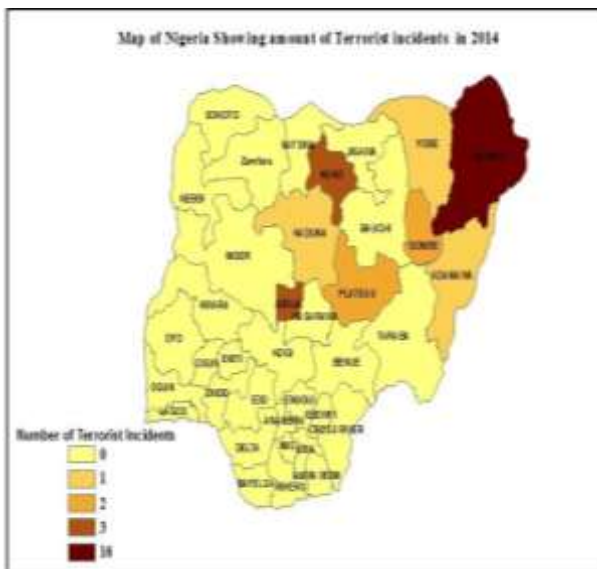
(a)2010　　　　　　　　　　　　　　　　*(b) 2011*
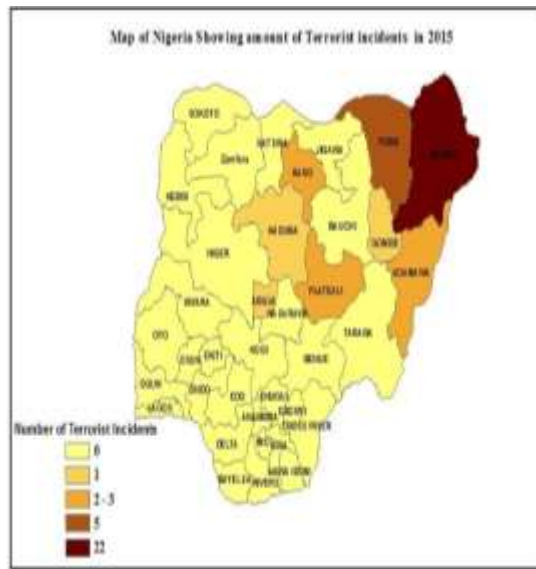
(c) 2012

(d) 2013

(e) 2014

(f) 2015

Figure 3a - f: Map of Nigeria showing amounts of terrorists' incidents in the country for individual year from 2010 - 2015.

While in states like Plateau, Kaduna, and Kano majority of the terrorists incidents that occurred were carried out in churches, markets and just a few were carried out in random places. The location of a terrorist incident can be used to predict the motivation behind such an attack. For example attacks on churches and mosques definitely have religious motivations behind it, while attacks on schools can be said to have some form of ideological motivations, attacks on markets, remote villages etc. could have some political motivations behind them.

The monthly distributions of terrorists' incidents in Nigeria from 2010 – 2015 shows the peak periods to be in January, with September being the month with the lowest numbers of terrorists' incidents.

(a)
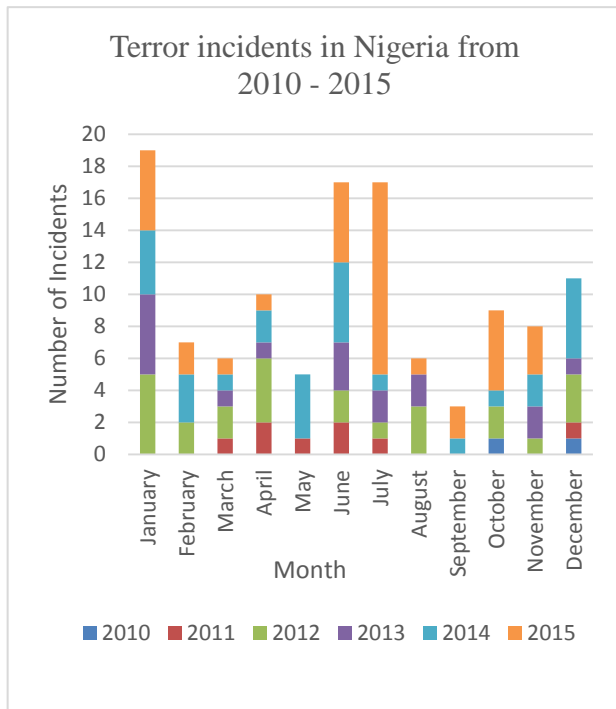
(b)

Year/month	2010	2011	2012	2013	2014	2015	Total	(%)
January	0	0	5	5	4	5	19	16.10
February	0	0	2	0	3	2	7	5.93
March	0	1	2	1	1	1	6	5.08
April	0	2	4	1	2	1	10	8.47
May	0	1	0	0	4	0	5	4.24
June	0	2	2	3	5	5	17	14.41
July	0	1	1	2	1	12	17	14.41
August	0	0	3	2	0	1	6	5.08
September	0	0	0	0	1	2	3	2.54
October	1	0	2		1	5	9	7.63
November	0	0	1	2	2	3	8	6.78
December	1	1	3	1	5		11	9.32

Figure 4a and 4b: Graph (a) and Table (b) showing monthly distributions of terrorists' incidents in Nigeria from January, 2010 – November, 2015.

Incident Location	States	Number of Incidents	Percentage(%)
Displaced People Camp	Adamawa	1	0.86
Media Houses	Abuja,Kaduna	1	0.86
On a Boat	Rivers	1	0.86
Public Park	Abuja	1	0.86
Government Facility	Borno, Kaduna	2	1.72
Match Viewing Centers	Yobe	2	1.72
Prison	Borno, Gombe	2	1.72
Army Base	Borno,Bauchi, Kogi	3	2.59
Bar	Borno,Plateau,Yobe	3	2.59
Police Base	Bauchi,Abuja, Rivers	3	2.59
Bus Station	Abuja, Gombe,Plateau	4	3.45
City Area	Abuja,Niger, Borno	6	5.17
Highway	Gombe, Kaduna	7	6.03
School	Adamawa, Borno,Kano,Yobe	8	6.90
Mosque	Adamawa,Borno, Plateau	9	7.76
Church	Bauchi,Kaduna,Kogi,Plateau,Yobe	11	9.48
Market	Adamawa,Abuja, Borno,Kano, Niger, Yobe	14	12.07
Unspecified	Borno, kano, plateau	15	12.93
Village	Borno,Plateau,Yobe	23	19.83

Figure 5: Table showing distributions of target locations of terrorists' incidents in Nigeria from 2010 - 2015.

State	2010	2011	2012	2013	2014	2015	Total	Percentage(%)
Abuja	2	1	1	0	3	1	8	6.9
Adamawa	0	0	1	1	0	2	4	3.4
bauchi	0	1	2	0	0	0	3	2.6
Borno	0	3	5	9	16	22	55	47.4
gombe	0	0	1	0	2	1	4	3.4
kaduna	0	0	4	0	1	1	6	5.2
Kano	0	0	2	3	3	2	10	8.6
Kogi	0	0	2	1	0	0	3	2.6
Niger	0	2	0	0	0	0	2	1.7
Plateau	0	1	3	0	2	2	8	6.9
Rivers	0	0	1	1	0	0	2	1.7
Yobe	0	0	3	2	1	5	11	9.5

Figure 6: Table showing Frequency of Terrorists Incidents in Specific Nigerian States from 2010 - 2015.

5.0 A PROPOSED GEOSPATIAL BASED SYSTEM FOR TACKLING TERRORISM IN NIGERIA

To solve the problems of terrorism in Nigeria, necessary infrastructures has to be put in place in order to get accurate and up-to-date information about the activities of terrorists' in the country. To get this information, it is important to set up a Geospatial based system for tackling terrorism in the country. The components of such a system should include Comprehensive maps, Terrorists-based GIS, Surveillance System, and GPS tracking system.

5.1 COMPREHENSIVE MAPS

It is no gain-saying that Nigeria, as a country lacks accurate and comprehensive maps of the land areas within its borders. Even though states like Lagos, Rivers and Abuja to boast of up-to-date maps, the same cannot be said of majority of other states in the country. The deficiency can only be a bane to winning the wars against terrorism. The importance of maps in tackling insurgency cannot be over emphasized. In this regard, the country need to produce the digital maps to each states in the country as this could help in the following areas:-

a. Instant response to hints on terror attacks by the police
b. Instant response in the aftermath of terrorists' attacks.

c. With sufficient understanding of the geography of an area, modelling of terror incidents will be made possible in a bid to train security personnel for swift response to emergency situations.
d. Determining areas to be marked as high-risks, hotspots and potential danger zones for terrorism-related activities.
e. Instructing the populace on places to avoid through predictions of possible terrorists attacks.
f. Availability of comprehensive digital maps would facilitate sufficient examination of the proximities of terrorists' incidents location.

5.2 TERRORISTS-BASED GIS

In every state in Nigeria, it's important that the police and military department have an information system that houses data related to terrorists, either arrested, convicted or suspected. This information system can be further optimized by being integrated into a GIS, as most terrorism-related activities are locational based. The terrorist-based GIS should be maintained as a separate spatial database, not to be mingled with the general database created for other categories of criminals. The terrorists-based GIS should contain important information about each identified terrorists such as name, age, gender, address, marital status, occupation, criminal history, offence committed, height, weight,

picture, location last seen, complexion, picture and other strategic information.

5.2.1 FUNCTIONS OF THE TERRORISTS-BASED GIS

a. With constant update, it should help in keeping tracks of likely locations of terrorists including their movements within, outside and inside of Nigeria.

b. Analyzing the socio-economic effects of the aftermath of terrorists' incidents in a locality, community, town, state and the nation at large.

c. Analyzing the effects of current socio-economic trends in the country on terrorism such socio-economic trend might be a change in government, unemployment or attacks on a terrorists' base camp.

d. Quantifying the effects of terrorists' attacks by terrorist's organizations outside of Nigeria on terrorists' incidents in the country. It is worthy to note if a correlation exist between frequency and type of terrorists incidents outside the country, with the recent terrorists' incidents within the country.

6.0 CONCLUSION

Terrorism is on the rise. With the number of terrorists' incidents in Nigeria expected to be around 48 at the end of 2016, if new approaches are not employed in the battle against terrorism in the country. It is very important, now, more than ever to employ geoinformatics technology at every level of planning and execution in the battle against terrorism in Nigeria.

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