

# SPATIAL ANALYSIS AND MAPPING OF PROPERTY CRIME IN OGBOMOSO NORTH LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA

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## ABSTRACT

*Research efforts on property crime are too few, and the menace is a great concern in environmental management, especially in the area of generating early warning systems for preparing against disaster. Urban areas tend to be criminal hosts and experience a high incidence of crime due to their characteristics and features. This research work, therefore, mapped and analyzed the incidence of property crime within residential densities in the Ogbomosho North Local Government area of Oyo state. It identified the causes of crime, rate of occurrence, and effects of crime and finally provided measures to control the incidence of crime within the study area. The primary data were sourced from interviews using questionnaires, while secondary data were maps of the study area and published materials related to crime. Descriptive statistics was used to summarize findings while chi-square was used to determine the level of difference between variables under investigation. Likert scale was used to rate the incidents of crime. The results from the analysis show that theft/stealing has the highest incident index of 1.06. This is followed by fraud, shoplifting, and burglary with incidents index of 0.49, 0.40, and 0.33 respectively. Also, the causes of crimes identified are unemployment, poverty, greed, family background, and drug abuse with percentage levels of 92.2, 87.2, 85.6, 82.7, and 81.7, respectively. Other causes include overcrowding, peer groups, and social class. The study identified two major categories of effects: physical damage (sickness that deforms the body of the victim) and heart damage (fear, sadness, and lack of trust). The study identified the following: efficient job creation, equitable wealth distribution, fair and just punishment of criminals, improved security strategy, and implementation of ideal and functional environmental planning and design as a strategic approach for curbing the menace of property crime incidents. It also underscores the need to ensure constant monitoring of the incidents of crime to prevent or minimize its occurrence.*

**Keywords:** Geospatial; Mapping; Analysis; Crime; Property; Urban area.

## 1.0 Introduction

Crime is one of the notable threats to human survival (Agbola, T., 1997). Everywhere one goes, one is reminded of insecurity, and it seems there is no better cover to enjoy a stable life (Afon A. O. 2001). Crime, as Gumus (2012) defines it, is the act of

illegality, breach of contract or trust committed by a person, the consequence of which may lead to prosecution and if found guilty, the culprit is liable to punishment under the law of the land. Crime is a serious impediment to development, an undeniable stigma to national image and a significant source of threat to people's safety and well-being (Omisakin, 1998). Crime is a hydra-headed social monster pervading every dimension of human survival and stable lifestyle (Ige, 2015).

Identification of crime location is crucial to curtail the spread and monitor the crime occurrence (Fajemirokun F. A. et al., 2006). Geospatial mapping and analysis can provide support to mitigate crime rates and harness their impact (Ojigi, M.L. 2009). Crime mapping plays a very significant role in crime location, detection, control and monitoring, prediction, and intelligent policing (Johnson, C.P. (2000).

Urban areas may be susceptible to crime incidents due to population increase especially where there is stark economic inequality and deprivation, unemployment, and social-political conditions among others (Dodo, 2008, Francis 2006). There have been several research efforts seeking to explain the geographic variation in crime rate for more than 150 years (Eck, 1995). It is noteworthy that crime type and crime rates differ from one location to the other (Krish, K., 2003). This research aims to analyze crime incidence in residential areas in Ogbomosho North local government area, Oyo State, Nigeria to examine spatial variation in crime occurrence.

## **2.0 Materials and Methods**

### **2.1 The Study Area**

The location of the study area is Ogbomosho North Local Government Area. It is one of the two local government areas in Ogbomosho town. The Local Government being an urban area is strategically located and serves as a link to the Northern part of the country. It covers a total land mass of approximately 183 square kilometers and using the growth rate of 3.2% from the 2006 census, the 2010 estimated population of study area is put at 225,408. The Local Government Area is bounded by Kwara state to the North, Ogbomosho South and Orire local government to the West, Surulere Local Government Areas to the East and Ogo-Oluwa local government to the south.

Ogbomosho town is located in the southwest Geo-political zone of Nigeria. The geo-spatial boundary of the town is between latitude  $8^{\circ} 5^{\prime}N$  and  $8^{\circ} 13^{\prime}N$  and longitude  $4^{\circ} 11^{\prime}E$  and  $4^{\circ} 20^{\prime}E$  of the equator. A derived savannah, Ogbomosho is about 105km northeast of Ibadan, the capital of Oyo state, and 58km northeast of Oyo town. The town is the gateway to the western part of Nigeria from the North. The Lagos-Ibadan-Ilorin express road under construction spans across it.

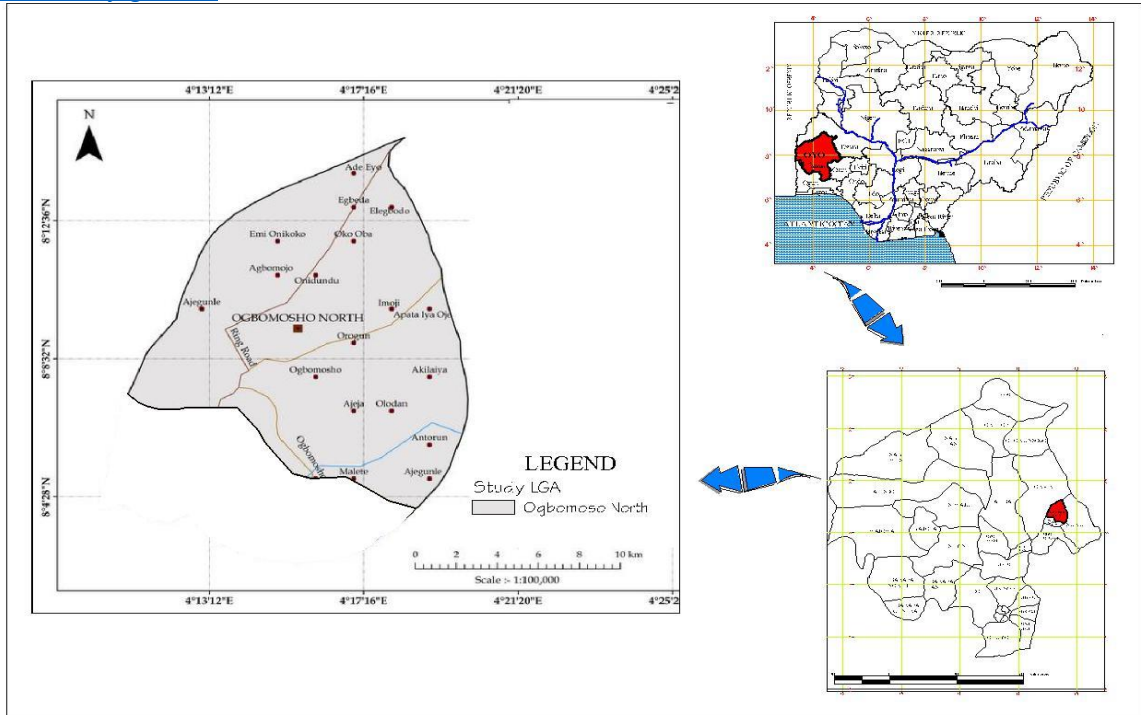


Figure 1: Ogbomosho North L.G.A. in the context of Oyo state and Nigeria (Source: GIS laboratory SVG Department, LAUTECH, Ogbomosho.)

## 2.2 Data Collection and Analysis.

Primary data were obtained through the inspection of the study area, oral interviews, and the administration of questionnaires, which formed the major data source. Secondary sources of data used include related research papers, published books, thesis, population census data from the National Population Census, and an existing map of the area. The questionnaire was used to obtain information about crime types, magnitude, causes, effects, and control. While the map was used to geo-visualize crime pattern

Using the formula  $P_2 = P_1 (1+r)^n$ , where  $P_2$  = projected population of 2022,  $P_1$  = Initial population,  $r$  = Growth rate (3.2%),  $n$  = Difference between the initial year and the projected year. The population figure of the study area was calculated as 329,171. This was based on a 3.2% projection of the 2006 figure, 198,859. Since it is unrealistic to administer several questionnaires. 0.05% of the population (sample data), which amounted to 163, was used. This was based on Neuman's (1991) basic principle governing sampling: the bigger the population, the smaller the sampling ratio, and vice versa. A multistage sampling approach was used in this research to define appropriate sample data. First, localities in the study area were stratified into three types: high, medium, and low-density residential areas based on the concentration of people and types as well as conditions of houses in the study area. In the second stage, a ratio of 3:2:1 was used for high, medium, and low densities, respectively, based on the densities' hierarchical selection model. Therefore, considering

the ratio 3:2:1 for the densities, 90:60:30 was used for high, medium and low densities respectively which amounted to 180 questionnaires for the study area. Figure 2 shows the population density distribution map of the study area. In the third stage, the questionnaires were administered randomly in the locality of each density based on lists of areas in each residential density as shown in table 1.0.

Table 1.0: Residential Densities Distribution of Ogbomosho North Local Government Area

Residential density area	Localities	No of localities
<b>High</b>	Aaje, Abogunde, Adenike, Aduin, Aguodo, Apake, Atenda, Bolanta, Federal, Hamama, Isale ora, Jagun, Kuye, Masifa, Nurudeen, Oke-aanu, Okelerin, Olomi, Olukoko, Randa, Sabo, Saja, Stadium, Star light, Takie, Under-G, Yoaco	27
<b>Medium</b>	Ajilete Estate, Akowojo, Ansarudeen, General, Isale General, Iwagba, Katangua, oke bebi, Owode	9
<b>Low</b>	Oke-Afin, New Waso Market, Sawmill	3

Sources; Author's work, 2023

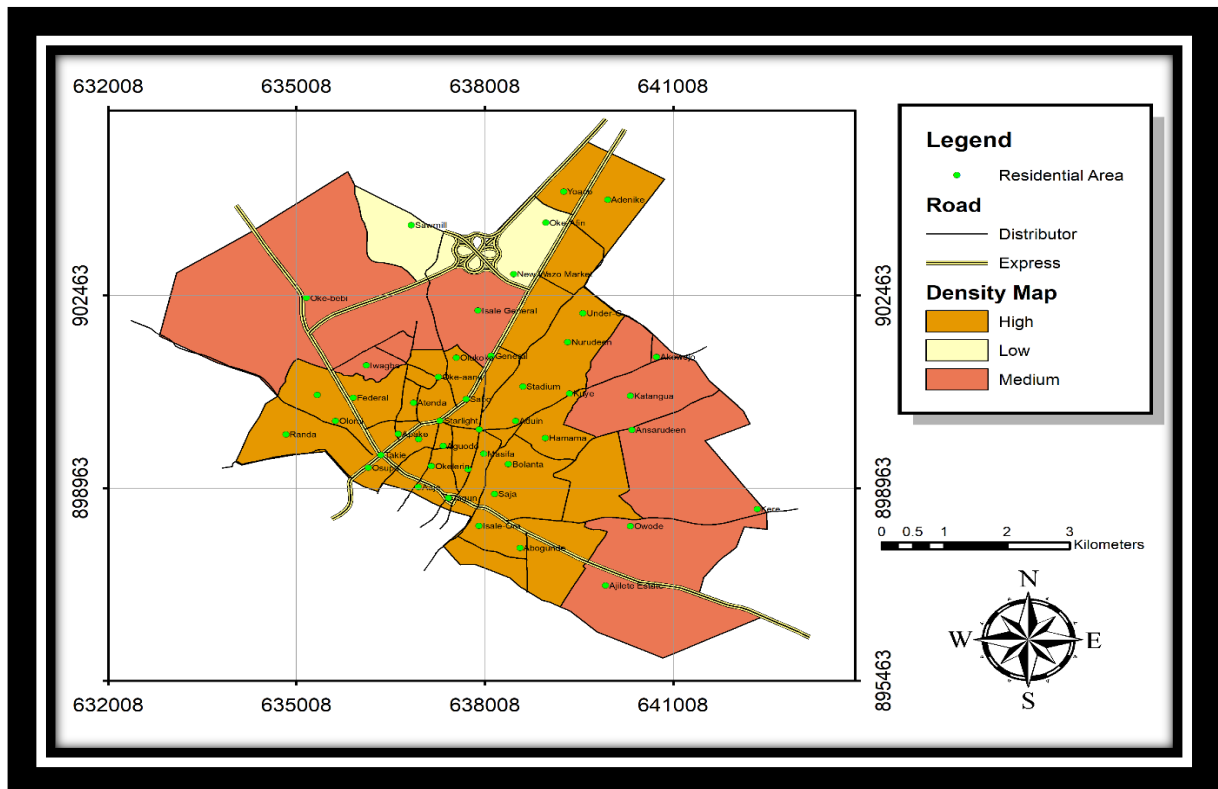


Fig. 2: Population density map of Ogbomosho North LGA. (Source: GIS laboratory SVG Department, LAUTECH, Ogbomosho, 2023).



The last stage in this method is the design of the questionnaire and administration. The design was done to reflect the social and economic characteristics of residents with their perception of the incidence of crime and crime types against property. The administration was also done according to the density distribution ratio in the previous stage.

The data obtained from questionnaires and interviews in the stages described above were subjected to two different statistical analyses. These include descriptive and inferential statistics. These two were used to aggregate the responses received and as well relate the responses with the social economics background of the respondents. This formed the basis of the result and discussion below.

### 3.0 Results and Discussion

#### 3.1 Social-economic characteristics of the study area.

The social economic characteristics of the study area were examined and analyzed. This is because the propensity to commit crime depends on different socioeconomic variables Paolo (Buonanno, 2003). The variables examined in this study include employment, income, education, social stratification, gender, cultural background, etc. The result analysis of the socioeconomic status of the study area is shown in Table 2.0 below

Table 2.0 Residential distribution and Social-economic status

Social-economic status	FREQUENCIES	
	Yes	No
<b>Indigene</b>	Indigene 70%	No-Indigene 30%
<b>Gender</b>	Male 53.3%	Female 43.7%
<b>Age</b>	Below 40 53%	Above 40 47%
<b>Tribe</b>	Yoruba 90.6%	Other 9.4%
<b>Marital status</b>	Married 72.2%	Other 17.8%
<b>Religion</b>	Christianity 51.7%	Islam 46.1%
<b>Education</b>	Formal 97.2%	Non-formal 2.8%
<b>Employment status</b>	Employed 85.6%	Unemployed 14.4%
<b>Average monthly income</b>	Below ₦50,000 33.4%	Above ₦50,000 66.6%
<b>Household size</b>	Less than 6 72.2%	Above 6 27.8%



From Table 2.0 above the social economic status of the residents shows that 70% of the residents are indigenes compared to non-indigenes who are 30%. This shows that strangers who have a tendency to commit crimes are not many. The population of males is also higher than females. The male gender has the characteristics nature of being secured and protected while the female is usually criminal prey in nature (Madden, 1996). The age range below 40 is more than the age range above 40 years. Youth and active workers who can fend for themselves and uphold household are many across the residential area. The majority of the people have employment with 85.6% compared to 14.4% of unemployment and 66.6% earn an average income of above ₦ 50,000 while 33.4% earn just below ₦50, 000. Also, the majority of the residents are of the same Yoruba tribe. There are 90.6% compared to other tribes who are 9.4% put together. This may be a strong factor of love, affection, and cooperation that bound the inhabitants of the residential area.

Married couples are 72.2 % while others (single, divorced, and widowed) are 27.8% only. Married people are essentially responsible in society and well protected (Sampson R.J. (2006). Islam and Christianity are the dominant religions in the study area. The trait of the belief has not shown excesses or extremisms. The level of education shows that the majority has formal education with 97.2% while 2.8% has non-formal education. This shows that there is a high impact of education against the commission of a crime in the study area. The household sizes are relatively moderate. 72.2% have less than 6 people, and 27.8% have above 6 people. This implied that the population of the study area is controlled and the population size is average across the residential area.

### 3.2 Types of crime in the study area

There are different types of crimes committed against property (Walsh, A. 2011). These were examined based on the frequencies of their occurrences. The results were analyzed using the crime type weight value (CTWV) model obtained by summing up the product of the total numbers of responses to each variable and the weight attached to each rating, i.e.  $(ax5) + (bx4) + (cx3) + (dx2) + (ex1)$ . The mean used in the course of computation was also obtained by summing up the CTWV and dividing it by the total number of variables (12). The deviation (which is also used as the crime occurrence index) and standard deviation were also calculated to be able to establish the degree (level) of incidence on types of crime. A positive deviation (D) indicates a high level of incidence of the concerned types of crime, and when the deviation is negative (-D), it connotes a low level of incidence of those particular types of crime in the study area. The results are as shown in table 3.0 below

**Note:**

CTWV = Crime Type Weight Value

NR (f) = Number of Respondents (frequency)

$X = \text{Mean} = \sum (\text{CTWV}/\text{NR}) / \text{no of crime type or variable}$

$D = \text{Deviation} = \text{CTWV}/\text{NR} (f) - X$

$D^2 = \text{Standard Deviation}$



Table 3.0: Crime against Property across the three Residential Densities

Types of crime	Frequency (%)		
	Low	Medium	High
Arm robbery	12.5	3.2	6.5
Arson	0	0.9	7.7
Burglary	18.1	16.2	12.3
Embezzlement	4.2	0	3.5
Extortion	0	1.9	4.9
False pretense	6.9	5.6	10.7
Fraud	18.1	13.9	10.7
Laceny	0	0	2.1
Shoplifting	6.9	17.6	10
Theft/Stealing	26.4	20.4	16
Trespass	6.9	16.2	8.4
Vandalism	0	4.2	7.2
<b>Total</b>	100	100	100

Table 4.0: Crime against Property across the three Residential Densities

S/N	CRIME TYPES	LEVEL OF OCCURRENCE					CWV	NR (f)	CWV/ NR(f)	X	D	D <sup>2</sup>
		5	4	3	2	1						
1.	Armed Robbery	45	140	201	120	9	515	180	2.86	35.75/ 12 = 2.98	-0.12	0.0144
2.	Arson	0	32	117	198	34	381	180	2.12		-0.86	0.7396
3.	Burglary	105	320	90	64	17	596	180	3.31		0.33	0.1089
4.	Embezzlement	15	60	228	160	6	469	180	2.61		-0.37	0.1369
5.	Extortion	0	100	234	130	12	476	180	2.64		-0.34	0.1156
6.	False Pretense	15	240	186	92	9	542	180	3.01		0.03	0.0009
7.	Fraud	105	312	156	46	6	625	180	3.47		0.49	0.2401
8.	Larceny	0	36	153	190	25	404	180	2.24		-0.74	0.5476
9.	Shoplifting	140	232	177	48	11	608	180	3.38		0.40	0.1600
10.	Theft/Stealing	370	232	96	26	3	727	180	4.04		1.06	1.1236
11.	Trespassing	100	224	189	66	8	587	180	3.26		0.28	0.0784
12.	Vandalism	40	128	204	124	10	506	180	2.81		-0.17	0.0289
<b>TOTAL</b>									<b>35.75</b>			<b>3.2949</b>

Table 4.0 shows various types of crime examined in the study area and the result of the average crime weight value of each type, the mean value, the deviation, and the standard deviation.

According to the table, it was observed that stealing/ theft has the highest index of incidence of 1.06, the incidence of fraud, shoplifting and burglary followed with incidence index of 0.49, 0.40 and 0.33 respectively. The incidence of trespassing and false pretense are positively low with index of 0.28 and 0.03 respectively.

Meanwhile, arson crime in the study area has the lowest level of incidence with index of -0.86. This is followed in increasing order by larceny, embezzlement, extortion, vandalism and armed robbery with index of -0.74, -0.37, -0.34, -0.17 and -0.12 respectively.



### 3.3 Causes of crime

The theoretical framework on criminal acts explains the philosophy behind the fundamental causes of the crime (Paolo, 2003). These are categorized as economic, social, and environmental causes Clifford R. Shaw and Henry D. McKay (1942). Therefore, the study examined the variables shown in table 5.0 as social economic factors responsible for crime occurrence across the residential density in the study area, the result of analysis are as shown

Table 5.0: Residential Density and causes of crime

Causes of Crime	FREQUENCIES (%)		
	Low	Medium	High
Family background	10.2	8.8	11.2
Drug abuse	12.8	11.2	9.4
Greed	12.8	12.3	9.7
Poverty	12.8	12.3	10.0
Overpopulation	10.6	8.4	7.4
Peer pressure	12.8	8.9	11.2
Religion	2.3	0.8	4.8
Society	3.4	7.6	7.2
Unemployment	12.8	12.3	11.5
Security	1.3	6.7	8.3
Criminal target	8.5	10.6	8.9
Total	100	100	100

Table 6.0 Residential Density and causes of crime

S/N	COURSES OF CRIME	LEVEL OF OCCURRENCE					CWV	NR (f)	CWV/ NR(f)	X	D	D <sup>2</sup>
		5	4	3	2	1						
1.	Family Background	44	104	16	16	0	696	180	3.87	30.91/ 9 = 3.43	0.44	0.1936
2.	Drug abuse	79	68	22	11	0	755	180	4.19		0.76	0.5776
3.	Greed	61	93	17	5	4	742	180	4.12		0.69	0.4761
4.	Poverty	68	89	10	13	0	752	180	4.17		0.74	0.5476
5.	Overpopulation	23	92	55	7	3	665	180	3.69		0.26	0.0676
6.	Peer pressure	37	111	32	0	0	725	180	4.02		0.59	0.3481
7.	Religion	8	33	47	61	31	465	180	2.58		-0.85	0.7225
8.	Society	37	56	55	30	2	636	180	3.53		0.1	0.01
9.	Unemployment	113	53	4	10	0	829	180	4.61		1.18	1.3924
<b>TOTAL</b>									<b>30.91</b>		<b>4.3355</b>	

Table 5.0 shows response analyses using the percentage frequency of the factors of crime, while Table 6.0 expresses the result in terms of the weight of each variable under consideration. The average weight value, the mean, the deviation, and the standard deviation were computed for the variable considered as shown. From the results, the highest deviation and standard deviation values are 1.18 and 1.3924. These values correspond to unemployment. Therefore unemployment is the most common and biggest



cost of crime in the study area. The lowest and least cause of crime is religion with deviation and standard deviation values of -0.85 and 0.7225 respectively. Other causes of crime include drug abuse, poverty, greed, peer pressure, overpopulation, and societal factors in that order.

### Incidence of crime in the study area

Table 7.0 Residential density and crime incidence

Residential density	Victims of crime		Crime (%)	Crime period	Annual rate of		Crime level (%)	
	Yes	No			Night	day	<10 (%)	>10(%)
<b>Low</b>	33.3	66.7	100	0	60	40	22.8	77.2
<b>Medium</b>	43.3	56.7	75.1	24.9	43.3	56.7	30.0	70
<b>High</b>	53.3	46.7	77.8	22.2	36.7	63.3	39.9	60.1
<b>Average</b>	43.3	56.7	84.3	15.7	46.7	53.3	30.9	69.1

Table 7.0 shows the result of the rate of incidence of crime in terms of time, victims, annual rate and level of crime across the residential density in the study area. The incidence of crime occurs most at night with the average response of 84.3% of respondents. This implied that criminals take advantage of the darkness of night to commit crimes. 46/7% of respondents testified that the annual rate of crime is less than 10 times in a year while 53.3% said the annual rate is greater than 10. The victim of crime in the study area was found to be 43.3% while non-victim is 56.7%. The level of crime incidence in the study area was found to be 30.9% serious and 69.1% not serious.

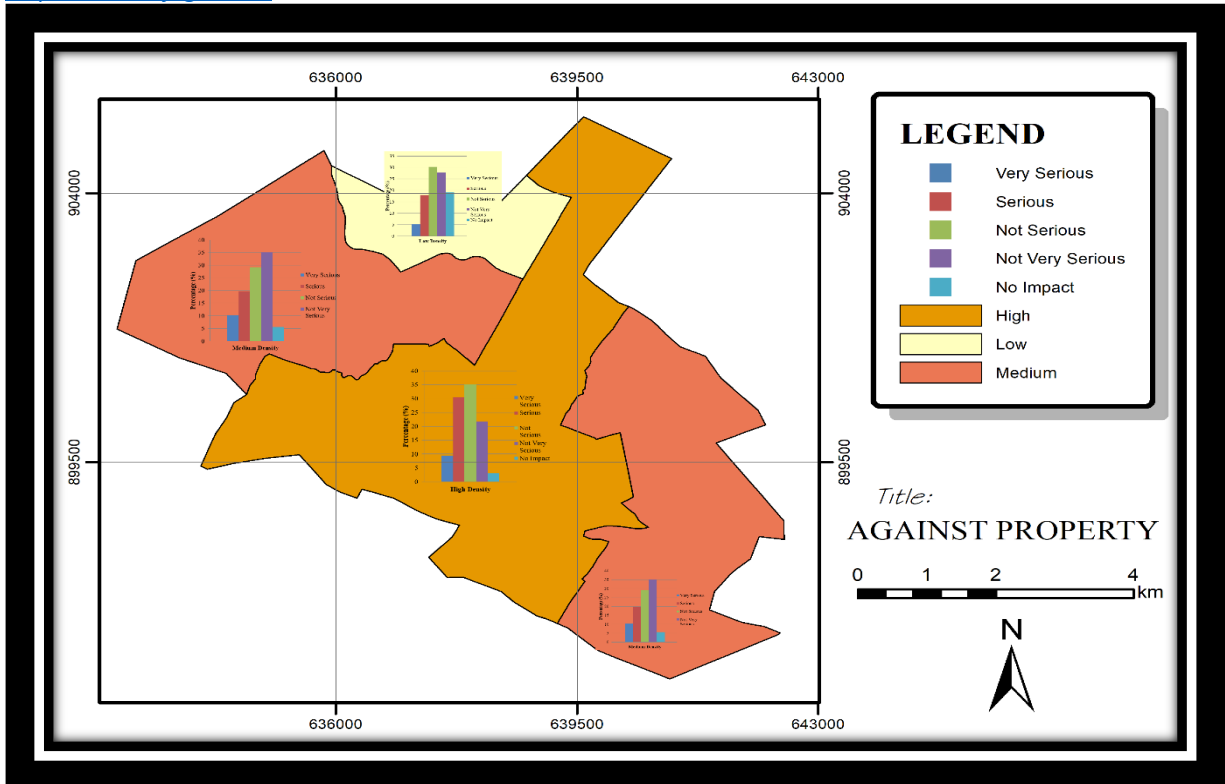


Figure 3. Crime incident map of the study area. (Source: GIS laboratory SVG Department, LAUTECH, Ogbomosho, 2023).

### 3.4 Effect of the crime occurrence in the study area.

When crimes are committed or occurred both the victim and non-victims suffer the consequences in different ranges. This study examines the variables shown in Table 4.5 as regards the effect of crime in the study area.

Table 8.0: Effects of crime in the study area

Effects	% rate
<b>Pain and suffering</b>	35
<b>Lack of trust</b>	23.9
<b>Fear of loneliness</b>	21.1
<b>Fear of being a victim</b>	12.8
<b>Post-traumatic disorder</b>	5.6
<b>Other effects</b>	1.6
<b>Total</b>	100

Table 8.0 shows the results of the effects of crime that were examined in the study area. From the table, it can be seen that pain and suffering by the victims of crime have a 35% rate while post-traumatic disorder was rated at 5.6%. Other effects of crime in the study area include fear of being victims, fear of loneliness and lack of trust with 12.8%, 21.1% and 23.9% respectively.



### 3.5 Preventive measures against crime in the study area

Crime in its entirety must be curtailed due to the socioeconomic loss it portends to society at large. Therefore measures applied in the study area were examined in other to test their effectiveness as crime control mechanisms. The variables examined and the rate of responses received under this are shown in Table 8.0

Table 9.0: Preventive measure against crime across the residential area

Security outfit	% rate	Security strategy	% rate	Treatment of criminals	% rate	others	%rate		
							Yes	No	Total
Police	25.6%	Vehicle patrol	70.6%	Handed to police	76.7%	Safety measure	77.2	27.8	100
Civil defence	14.4%	Bike patrol	5%	Handed to the community head	8.9%	Security cooperation	92.8	7.2	100
OPC	3.3%	Foot patrol	2.8%	Lynched	0%	Police adequacy	52.8	47.2	100
Vigilante	47.8%	Checkpoint	12.2%	Fine/isolated	0.6%	Police acceptance	93.4	6.6	100
Others	8.9%	Other	9.4%	Public Disgrace	13.9%				
<b>Total</b>	<b>100</b>		<b>100</b>		<b>100</b>				

From Table 9.0 Security outfits like police, civil defense, OPC, and landlord’s vigilantes were employed in the study area. The presence was rated and it can be shown that vigilante has the highest number of presence with 47.8%. Also, the security officers adopted a patrol strategy to curb crime and to fix out criminal elements in the study area as shown in the table. The results show that patrol by vehicle has 70.6% of all the means of patrol. Other means are foot, bike, and checkpoint patrols. Also in other to prevent the crime the criminal must be brought to justice accordingly. The methods of dealing with crime in the study area include taking the criminal to police custody/station for investigation and prosecution, handling them to community head, lynching of criminals, isolating and placing them on fine, and public disgrace. Among this approach, taking criminals to police custody/station has a 76.7% rate. This means that the criminals are allowed to face the law. Jungle justice is not allowed. Other preventive measures are safety guards, cooperation among security outfits, police adequacy, and police acceptance.

### 4.0 Conclusion and Recommendation

This paper presented a residential density locations map in Ogbomoso North local government with a few to assess the incidence of crime and critically examined the socio-economic factors responsible for the occurrence of crime across the residential areas.



Type, causes, effects, and preventive measures were also analyzed. Based on this research, the findings can be summarized as follows.

A review of social economics characteristics such as indigenous, tribe, marital status, age, household size, education, employment status, average income, occupation, and religion shows that the majority of residents are indigene and Yoruba by tribe. More than average of residents are married, with less than 6 members per household and Christian by faith. Also, the majority of the people across the study area are educated, and employed with an average income above ₦50, 000.00 and their major occupation is trading which may not be commensurate with their level of education. Youth has a large population compared to other age group in the study area,

The major crime that is prevalent in this area is stealing/theft and the rate of occurrence is 30.9%. It is usually committed at night. Other crimes that rarely occur are fraud, shoplifting, pretense, and burglary. The major cause of the crime identified in this research is unemployment with more than 90% of respondents in agreement. Other may include poverty, greed, peer pressure, drug abuse, etc. The preventive measures against crime in the study area as identified in this paper include, the presence of security officers, police patrols, and punishment of the criminal. Community vigilantes are the prominent security men present in the study area. There are collaborative efforts among all the security men including the members of the populace. Criminals are usually handed over to police for proper investigation and prosecution. No matter the level of crime laws are not allowed to be flouted because community leaders are always referred to for immediate intervention.

Therefore in order to reduce the crime occurrence to the barest level and to ensure the welfare and safety of the populace in this study area and any other society in general is guaranteed, the authorities concern must ensure that efficient job creation, just and equitable wealth distribution, implementation of ideal and functional environmental planning and design, fair and just punishment to criminal, and improved security strategy are taking into consideration and prioritized.

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