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Spatial Analysis of Urban Street Lights Infrastructure in Port Harcourt Metropolis, Rivers State, Nigeria

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Abstract: ***The importance of urban streetlight infrastructure to the growth and development of any economy cannot be undermined judging from numerous advantages accruing from it. However, the studies on streetlight distribution pattern are rare in the literature. The present study, therefore, examined the spatial analysis of urban street lights infrastructure in Port Harcourt Metropolis, Rivers State, Nigeria. The study made use of 120 copies of the questionnaire, administered on people living and doing business in Port Harcourt and Obio/Akpor Local Government Areas of Rivers State, Nigeria, along the three major selected roads (Ikwerre Road, Port Harcourt-Aba Road and Rumuola Road). Also, GPS was used to capture the locations of the streetlight along these major roads which were used to produce the distribution pattern of the streetlight. Both descriptive and inferential statistics were used for the data analysis. For instance, the Nearest Neighbour Analysis was used to depict the significant distribution pattern of the functional streetlights and non-functional streetlights. Findings showed that 40 streets in the metropolis have functional streetlights while 19 streets have non-functional streetlights. Further evidence from the study reveals that the causes of streetlight vandalization are non-maintenance of streetlight infrastructure, absence of security, absence of power, unemployment, reckless driving, violence, youth restiveness and theft. The study recommended that streetlight should be constantly powered using gas turbine and solar because of the abundance of gas reserve and sunlight in the country. It also recommends that streetlight and its infrastructure should be monitored with adequate technologies to protect it against vandals. Furthermore, adequate funding should be provided for training of personnel to man the GIS equipment and for maintaining streetlight infrastructure.***

Keywords: Distribution Pattern, Major Roads, Port Harcourt, Street Light, Urban

1. Introduction

Street light installations are an indication of the level of development of a nation. It is the undeveloped countries that do not care sufficiently about the environment to enhance it with streetlight. Poorer countries do not bother enough about the safety of their citizens to ensure that the streets are lit at night. Bad governments do not appear to appreciate the contribution of small businesses to the economy, they seem not to recognize that many small businesses operate at night and can only do so safely when streetlights are installed and functional. Only the non-caring nations do not realize that foreign investors will be deterred by dark and insecure roads at night. Underdeveloped countries should realize that installing and sustaining streetlights create direct employment and skills for engineers, technicians, craftsmen, manufacturers, contractors and traders (Beyer and Ker, 2009). One of the first notable differences between a developed and undeveloped country is the state of the street lighting installations. Flying in a city in a developed country at night, one cannot but be excited by the brightness and patterns of the streetlights, viewed from the aircraft. On the contrary, the dismal darkness when flying into a city in an underdeveloped country is depressing (Shaw, 2014).

Africa has long been described as a "dark continent", not only because of the pervading ignorance of its people, but also because much of Africa was unknown to the rest of the world. Satellite images of the world at night now also show that Africa is almost a dark continent. But for a few patches of lighting visible over parts of North Africa and Southern Africa, the continent is shown as totally black compared with other continents of the world, which are brightly lit at night. Based on economic and other indices, Nigeria is generally regarded as a developing nation, but road lighting being a fair measured or parameter of development; it is fit to say that street lighting portrays Nigeria as an under developing nation (Wesh and Farington, 2008). If the roads are dark at night, it suggests one of two things; either no street lights have been installed or the installed streetlights are not functional. Over the years, considerable sums have been spent by different governments on street lights and it is proposed that because the installations have not been maintained, the benefits of the investments have been short-lived, as is the case in Port Harcourt.

Most Nigerians cities are known for the display of streetlights on their major streets. But the sustainability and maintenance of the lights by the successive government in most cases have not been effective and consistent. One of the distinguishing features that made the Lagos Third Mainland Bridge a beauty to behold, particularly at night was illuminating street lights that adorned the entire stretch of the ever-busy dual carriage bridge. That was some years ago when the bridge was newly commissioned. Today, most of the streetlight have either been vandalized or are not in working conditions. The case of the Lagos Third Mainland Bridge is synonymous with what obtains in Port Harcourt where streetlights have become mere decorative poles because they are hardly powered. The legendary poor maintenance cultures of Nigerians play out well with our street light installations. There always seems to be more

willing to spend money on new projects than on the maintenance of existing ones. This is partly because the cost of maintenance contracts is usually much smaller than the cost of new projects, and is, therefore, of less interest to officials who want to award large contracts to their friends and relations. It is also because many streetlights maintenance works are done by direct labour of government staff with little or no contracts awarded. Long periods of neglect expose the installations to vandals and thieves and make restoration even more expensive (Wesh and Farington, 2008). Studies of this nature are very rare in the literature especially in the developing country like Nigeria. Thus, the present study examined the spatial analysis of urban street lights infrastructure in Port Harcourt Metropolis, Rivers State, Nigeria.

2. Study Area

The study was carried out in Port Harcourt. Port Harcourt is the capital of Rivers State of Nigeria. It is situated between latitudes 4o 15' and 5o 33' North of the equator and longitudes 5o 22' and 7o 33' East of the Greenwich Meridian. The study is limited to Port Harcourt City and Obio/Akpor Local Government Areas (Figure 1). Port Harcourt occupies a total land area of about 50,000sq km.

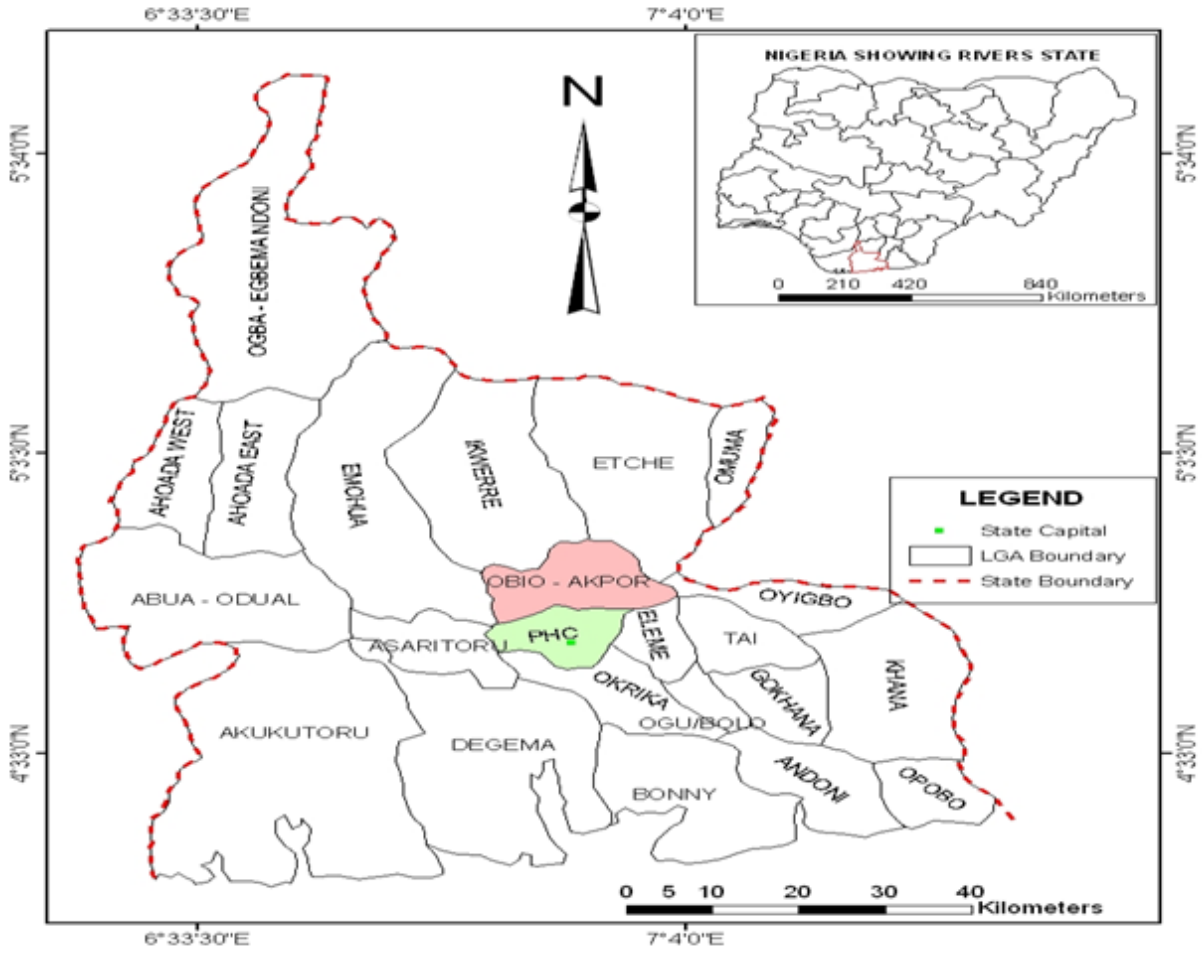

Figure 1: Rivers State showing Port Harcourt and Obio/Akpor LGAs

The Port Harcourt region is very unique in terms of general surface features. The area falls within the coastal belt dominated by low-lying coastal plains, which structurally belong to the sedimentary formation of the recent Niger Delta. Five major relief classes are recognized. One of the most striking features of the region within which Port Harcourt is located in is the uniqueness of its surface drainage. Areola (1983) and Oyegun (1999) described the drainage of the areas as poor, essentially due to a combination of low relief, high water table and high rainfall. The low relief of the region results in strikingly gentle slopes, which have the effect of making the flow velocities of the river very low. This situation results in the formation of well-developed river meanders (Oyegun 1999). Sedimentation in the Niger Delta geosynclines of which the Port Harcourt region belongs started in the late Cretaceous times and attained its present form in Quaternary. The surface materials thus consist of various types of surficial deposits overlying thick tertiary sandy and clayey deposits, which have depths often over 100m in thickness (Oyegun 1999). The major soil types in Port Harcourt region are the reddish-brown sandy clay loam, brownish sandy clay, light grey fine sand to slightly clay soil, dark organic peaty clay etc.

As one of the nation's industrial hub, the growth of Port Harcourt has been phenomenal since its inception in 1913. The 1991 census fixed the population of Port Harcourt and Obio/Akpor Local Government at 645,883. The projection for 1996 by the National Population Commission is 832,471 for the two local government and the interim figures for the 2006 National census is over one million. Presently the

economic activities in Port Harcourt cut across the primary, secondary and tertiary economic activities. The city dwellers were fishermen, farmers and traders, which characterized the level of development and population. Other economic activity prevalent in the city today is that of the tertiary activities which include services like repair works, banking, teaching, entertainment, government, lawyers, doctors, employees etc. Transportation growth in Port Harcourt was witnessed during the colonial era. In the pre-colonial era, the prevalent transportation was human porterage, the use of canoe for fishing, bicycles for transporting goods from farmlands to the market. The colonial period brought about railway development which was used to transport bulky goods like crude oil, rubber, coal, cocoa, palm fruits etc from the upland to the port for onward shipment to Europe. As economic activities increase in the city, roads were constructed to convey products from farms to the market; the movement of raw materials to the industry as well as the movement of labour necessitated the growth experienced in the transport sector. Road transportation is the most widely used mode in its riverine terrain. The Port Harcourt metropolis has three very important Trunks A roads. These are the Port-Harcourt-Aba Expressway, the Ikwerre Road and the East-West Road. The Port Harcourt/Aba Express and Ikwerre Roads are major entry and exit routes of the Port Harcourt metropolis.

3. Materials and Methods

Owing to the peculiarity of this study, a reconnaissance survey was undertaken by the researchers to have firsthand knowledge of the study area. This study involved both primary and secondary data. The primary data was collected through a Global Position System (GPS), which was used to locate and gather the coordinate points of functional and non-functional streetlights in the metropolis, questionnaire administration, direct interviews and personal observations made by the researchers. Secondary data were lifted from related literature, the government published statistics like national accounts figures, journals, books, newspapers, magazines, and periodicals.

A total of 120 copies of the questionnaire was administered. Among the sets of the population are the residents, traders, security operatives, drivers, traffic wardens and civil servants (especially those from the Ministries of Power and Environment) using the purposive sampling technique. The sample questionnaire was designed using the Likert Five Point Scale. The questionnaire consisted of two parts (A and B). Part "A" demanded information on the socio-economic characteristics of respondents while part "B" contained questions on respondent's perception on the analysis of streetlight infrastructure in Port Harcourt with the socio-economic and environmental wellbeing of the public. The distribution of the questionnaire showed that twenty copies were administered on each of residents, traders, security operatives, and drivers, ten copies for traffic wardens and thirty copies for the civil servants. Locations were randomly sampled along three roads which included Rumuola Road, Ikwerre Road and Port Harcourt-Aba Road (Table 1).

Table 1: Sampled Locations in Port Harcourt Metropolis

Rumuola Road	Ikwerre Road	PH-Aba Road
• Rumuola/Rumuokuta Junction.	• Mile one	• Oil Mill Junction
• Rumuola/PH-Aba Road Junction.	• Mile Two	• 1st Artillery Junction
• SBS Junction	• Mile Three	• Rumuola Junction
	• Mile Four	• G.R.A Junction
	• Mile Five	• Garrison Junction
		• Leventis Junction

To ensure the validity of the research instrument, the instrument was dully subjected to face validation. This was done by two other professionals in the Department of Geography and Environmental Management, University of Port Harcourt. These experts critically examined the instrument to determine the relevance of the content and clarity of the instrument. The study adopted the test-retest method to measure the reliability of the research instrument. The first and second test was administered within an interval of two weeks. The first and second data collected were analysed using Cronbach alpha statistics. The computation gave an r-value of 0.71 with the aid of SPSS. A total of 66 copies of the questionnaire was retrieved from respondents within Rumuola Road, Ikwerre Road and PH-Aba Road; while there were total compliance and co-operation from the ministries as all 30 copies of the questionnaire were retrieved. The overall number of questionnaires retrieved was 96 while the percentage-retrieval rate was 80%. Data were analysed using both descriptive and inferential statistics and data were presented using tables and charts.

4. Results

4.1 Socio-economic Characteristics of the Respondents

The socio-economic characteristics of the respondents were shown in Table 2 whereby 64 (67%) were males and 32 (33%) of the respondents were female. Concerning the age of respondents, 3% were below 18 years, 54% were between the ages of 18 and 30 years while 43% of them were above 30 years. However, 60% of the respondents were single and 40% of them were married while the analysis of their educational qualifications showed that 30.2% of the respondents possessed academic qualification below first degree, 60.4% possessed first degree and 9.4% of the respondents hold qualifications higher than first degree. The occupational status of respondents revealed that 15.6% of the respondents were traders, 14.6% were drivers. 6.2% were traffic wardens, 12.5% were security operations, while 17.7%, 27% and 6.2% respondents were civil servants, students and others respectively.

Table 2: Socio-economic Characteristics of Respondents

Gender	Frequency	Percentage (%)
Male	64	67
Female	32	33
Total	96	100
Age	Frequency	Percentage (%)
Below 18 years	3	3
18 – 30 years	52	54
Above 30 years	41	43
Total	96	100

Marital Status	Frequency	Percentage (%)
Single	58	60
Married	38	40
Others	0	0
Total	96	100
Qualification	Frequency	Percentage (%)
Below 1st degree	29	30.2
1st Degree	58	60.2
Above 1st degree	9	9.4
Total	96	100
Occupation	Frequency	Percentage (%)
Traders	15	15.6
Drivers	14	14.6
Traffic wardens	6	6.2
Security operatives	12	12.5
Civil servant	17	17.7
Student	26	27
Others	6	6.2
Total	96	100

4.2 Distribution Pattern of Functional and Non-Functional Street Lights in Port Harcourt Metropolis

The geospatial analyses of both functional and non-functional streetlights in Port Harcourt Metropolis in terms of their location are presented in Table 3 and Table 4 respectively. The pattern of distribution is shown in Figures 2 and 3 for the functional and non-functional streetlights respectively whereas the Nearest Neighbour Analysis depicting the significant distribution pattern is presented in Figure 4 for the functional streetlight and Figure 5 for the non-functional streetlight. Results showed that 40 functional streetlights were identified in the study area while 19 non-functional streetlights were identified. The analysis further revealed that the distribution pattern of streetlights was significantly clustered for both functional streetlights ($z=-3.806572$; $p<0.05$) and non-functional ($z=-3.867396$; $p<0.05$) (Table 5).

Table 3: Functional Street Lights in Port Harcourt Metropolis

S/N	Street	Northings	Eastings
1	New Airport Road	4.87646	6.95478
2	Wimpey by Ikwerre Road	4.83038	6.98195
3	Ibemere by Ikwerre Road	4.82576	6.98104
4	Tombia Extension, GRA 2	4.81978	6.98232
5	Agip by Ikwerre Road	4.81375	6.98365
6	Sani-Abacha by Ikwerre Road	4.813641	6.98411
7	Iloabuchi by Morpol Junction (Eagle Island)	4.78613	6.98024
8	Ojoto by Azikiwe	4.796	6.98724
9	Hospital Road	4.76461	7.01839
10	Amachree Road	4.76485	7.0187
11	Potts Johnson Street	4.7654	7.01868
12	Tari Sekibo Street	4.76614	7.01866
13	Club Road	4.76423	7.01862
14	Aggrey by Lagos Bus Stop	4.76167	7.01875
15	Ogu Street	4.76149	7.02076
16	Ilorin Street	4.76152	7.02186
17	Sokoto Street	4.761165	7.02257
18	Ben Harry Street	4.76157	7.02383
19	Okrika Street	4.76172	7.02481
20	Banham street	4.76173	7.02579
21	Bende by Ahoada Street	4.76092	7.03073
22	Creek Road	4.75915	7.03084
23	Moscow Road	4.77051	7.0184
24	William Jumbo	4.77769	7.01769
25	Forces Avenue	4.7817	7.01354
26	Odi Road	4.77758	7.01106
27	Forces Avenue by SPAR	4.77623	7.01315
28	Aba Road	4.78884	7.00336
29	Kaduna Street	4.79636	7.00451
30	Nzimiro Street	4.79636	7.00451
31	Trans-Amadi Road	4.80467	7.00872
32	Olu-Obasanjo Road	4.81657	7.0095
33	Mummy B Road, GRA Extension	4.82402	7.00623
34	Rumuola Road	4.83193	7.00486
35	G.U. Ake Road	4.83639	7.01453
36	Stadium Road	4.83621	7.01675
37	Old Aba Road	4.83586	7.02189
38	Market Road,Rumuomasi	4.83564	7.02518
39	Old Airport Road	4.89077	7.00222
40	Rumuekini Road	4.88236	6.94131

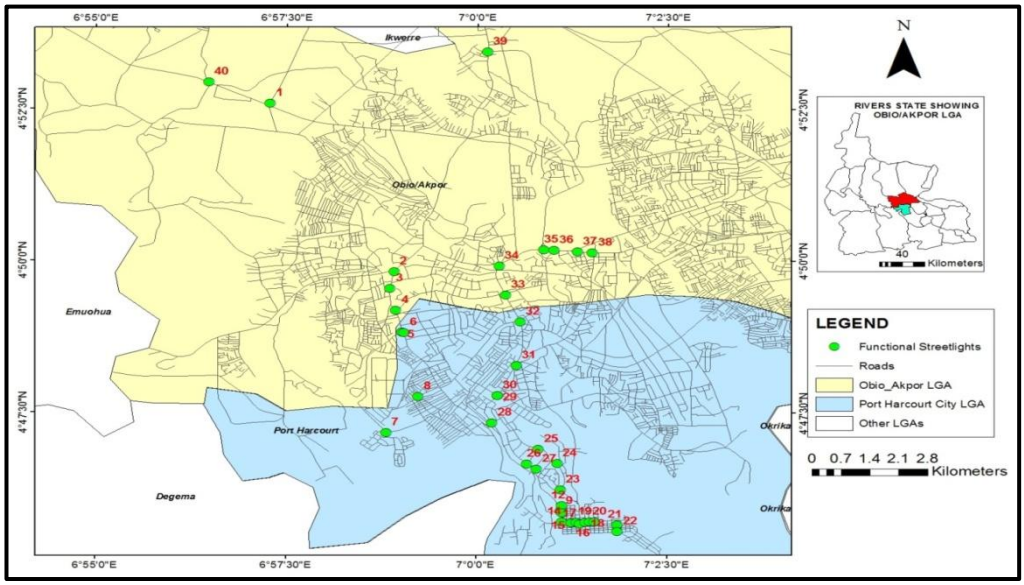

Figure 2: Functional Streetlights in Port Harcourt Metropolis (Numbers in the map correspond with the serial number given to each streetlight in Table 3)

Table 4: Non-Functional Street Lights in Port Harcourt Metropolis

S/N	Street	Northings	Eastings
1	Ogbogoro Road	4.81959	6.95674
2	Orazi Road	4.82746	6.9816
3	Amaechi Drive, GRA Phase 2	4.81856	6.9829
4	Olu-Obasanjo by UST	4.8057	6.98882
5	Obaziorlu Street	4.80098	6.99046
6	Egede Street	4.78812	6.99022
7	Degema Street	4.76145	7.0199
8	Cemetry Street	4.76184	7.02681
9	Diobu Street	4.76186	7.02767
10	Niger Street	4.76032	7.03069
11	New Road	4.7582	7.03466
12	Bomu Street	4.74666	7.04167
13	Etche Street	4.74357	7.04157
14	Ochili Road	4.74572	7.04307
15	Kolokuma Street	4.74897	7.04175
16	Okporo Road	4.84377	7.03868
17	Old Aba Road	4.8446	7.04065
18	Rumuokurushi Road	4.84971	7.05352
19	Eneka/Elimgbu Road	4.86399	7.05628

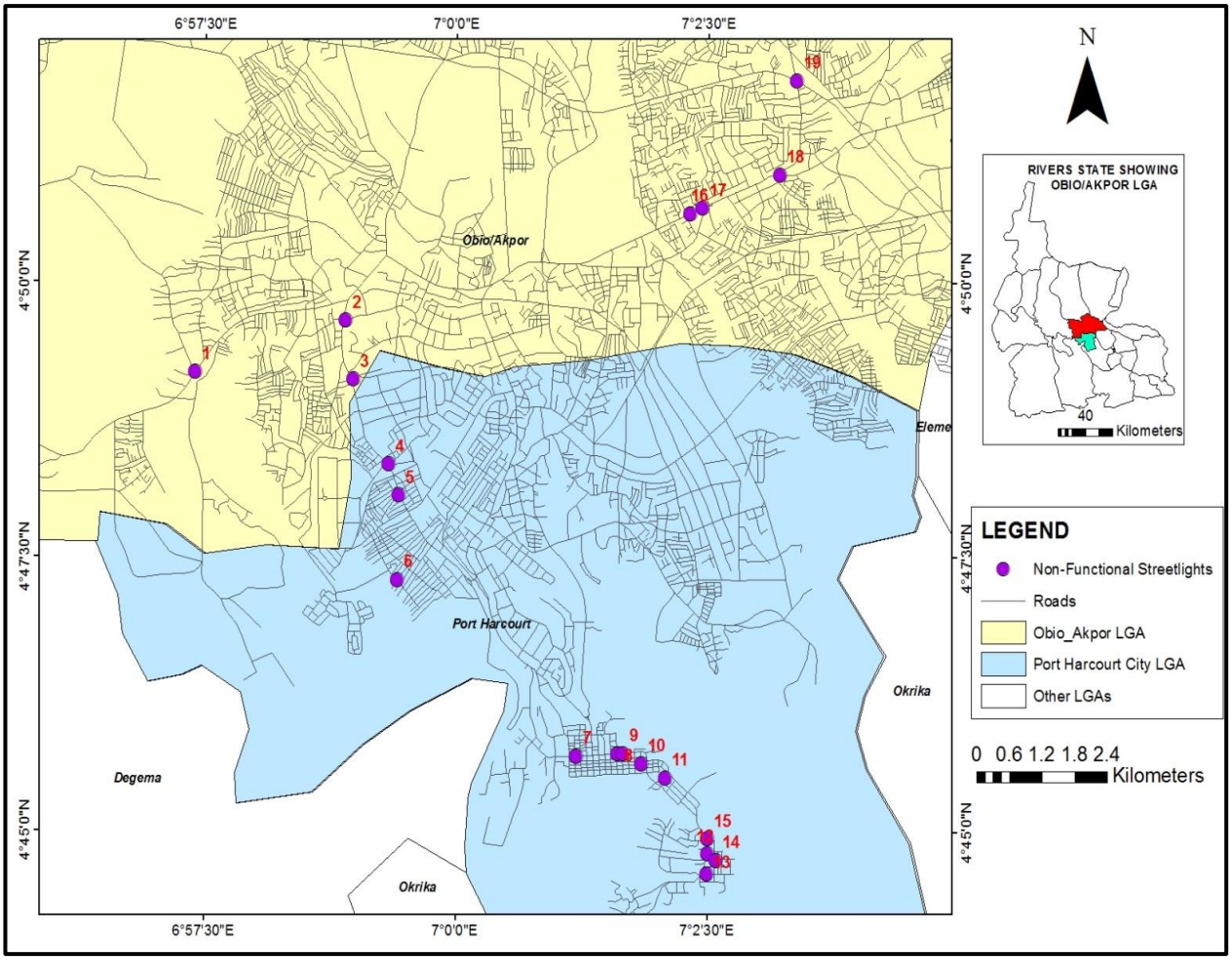

Figure 3: Non-Functional Streetlights in Port Harcourt Metropolis (Numbers in the map correspond with the serial number given to each streetlight in Table 4)

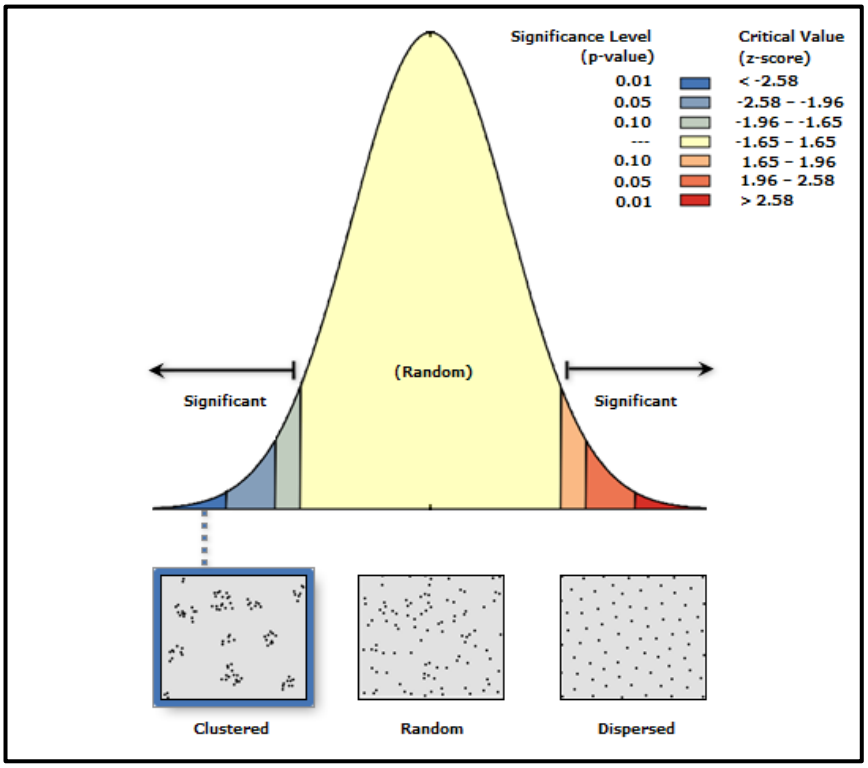

Figure 4: Nearest Neighbour Analysis for Functional Streetlights

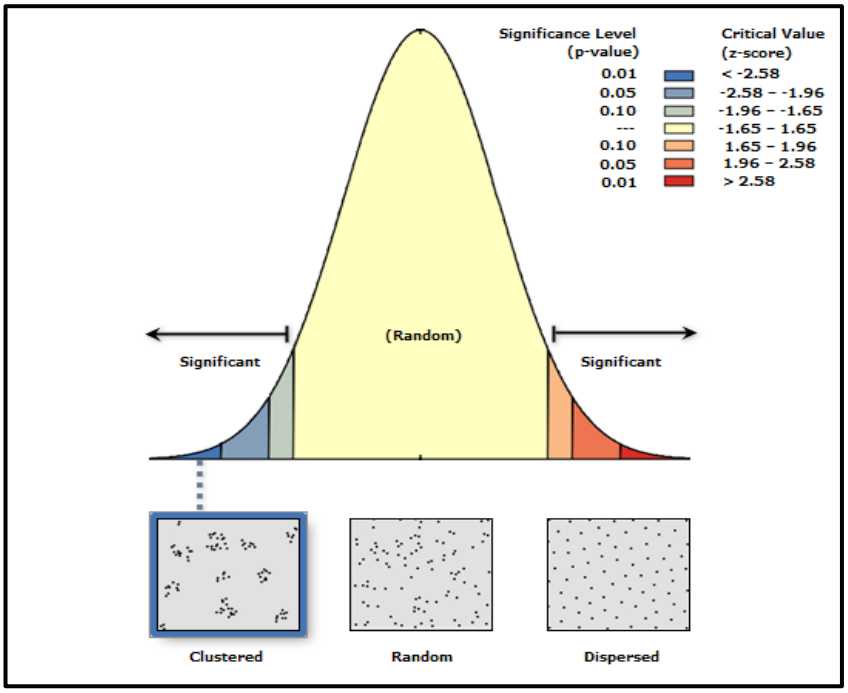

Figure 5: Nearest Neighbour Analysis for Non-functional Streetlights

Table 5: Average Nearest Neighbour Summary

Analysis	Non-Functional Streetlights	Functional Streetlights
Observed Mean Distance:	725.2548 Meters	566.1935 Meters
Expected Mean Distance:	1352.5295 Meters	826.0901 Meters
Nearest Neighbor Ratio:	0.536221	0.685390
z-score:	-3.867396	-3.806572
p-value:	0.000110	0.000141

c) Perception of Streetlight in Port Harcourt Metropolis

The distribution of responses based on the respondent's perception of streetlight in Port Harcourt through the use of the questionnaire is presented in Table 6. The analysis showed that 87% of the respondents agree that there are streetlights in the major streets of Port Harcourt. Attesting whether streetlight is part of urban development, 92% of the respondent agreed that it is part of urban development. However, 94% of the respondents accepted that functional streetlight encourages socio-economic activities in the metropolis while 92% agree that the presence of functional streetlight reduces crime. As to whether functional streetlight reduces road accidents at nights, 96% of the respondent agreed that it does while 94% of them accepted that streetlight enhances traffic operations at night. Results

also showed that 100% acceptance was given by the respondents that functional streetlight gives an aura of beauty to the city at night while 94% of them agreed that street light enhances and strengthens security operations at night. There was a low acceptance rate of 18% that the use of a generator to power street light is environmentally friendly. 60% of the respondents disagree with this statement while 22% of them were in-between opinion.

Table 6: Distribution of Responses by Respondents

Q/N	Perception	Percentage of responses				
		SA	A	UD	D	SD
1	There are Street Lights in Major Roads in Port Harcourt	51	36	3	5	5
2	Street Light is part of Urban Development	64	28	4	4	0
3	Functional Street Lights Encourages Socio-Economic Activities	54	40	3	3	0
4	The Presence of Functional Street Light Reduces Crime	61	31	0	4	4
5	Functional Street Lights Reduces Road Accidents at Night	60	36	0	0	4
6	Street Lights Enhances Traffic Operations at Night	47	47	0	6	0
7	Functional Street Lights Gives an Aura of Beauty to the City at Night	82	18	0	0	0
8	Street Lights Enhances and Strengthens Security Operations at Night	56	38	0	6	0
9	The Use of Generator to Power Street Light is Environmentally Friendly	9	9	22	32	28

d) Sustainable and Efficient Means of Powering Streetlights

Table 7 shows that 56.3% of the respondents accepted that solar is the most sustainable and efficient way of powering streetlight while 19.8% and 23.9% chose generator and PHCN respectively.

Table 7: Most Sustainable and Efficient Means of Powering Street Light

Means of Powering Streetlight	Means of Powering			Total
	Solar	Generator	PHCN	
Frequency	54	19	23	96
Percentage (%)	56.3	19.8	23.9	100.0

e) Causes of Streetlight Vandalism

Table 8 presents the causes of streetlight vandalism. The analysis shows that 26.0% of the respondents accepted that the cause of street light vandalism is the absence of power. However, 34.4% and 31.3% agreed that the vandalism of this infrastructure is caused by the absence of security and non-maintenance culture respectively. Others indicated that it is caused by unemployment, reckless driving (accident), violence and youth restiveness, which is represented by 8.3% of the respondents (Others).

Table 8: Perception towards Causes of Streetlight Vandalism

Causes of Street Light Vandalism	Response			
	Absence of Power	Absence of Security	Non-Maintenance	Others
	25	33	30	8
Percentage (%)	26.0	34.4	31.3	8.3

f) Social Vices in the Street without Functional Streetlights

Table 9 shows that 28.1% of the respondents opined that rape can occur in streets without functional street lights while 3.1% maintained that kidnapping and car-snatching can occur in areas without street lights. Furthermore, 16.7%, 24.0% and 25.0% of the respondents selected that pocket-picking, theft and all of the above can occur respectively.

Table 9: Social Vices in the StreetsWithout Functional Streetlights

SocialVices often Occur in Streets Without Functional Streetlights	Rape	Kidnap	Pocket picking	Car Snatching	Theft	All of theabove
Frequency	27	3	16	3	23	24
Percentage (%)	28.1	3.1	16.7	3.1	24.0	25.0

g) Agent Safeguarding the Streetlight Infrastructure

It is shown in Table 10 that 19.8% of the respondents indicated that it is only the responsibility of government to safeguard street light infrastructure while 80.2% indicated no to it and mentioned other stakeholders to include reasonable individuals, companies and other organizations, residents, vigilante group, communities, youths and the entire citizenry

Table 10: Agents safeguarding the Streetlight Infrastructure

It is the duty of Government alone to Safeguard Streetlight Infrastructure	Yes	No
Frequency	19	77
Percentage (%)	19.8	80.2

h) Activities Promoted by Functional Streetlights

Table 11 presents the activities promoted by functional streetlights. The analysis shows that 8.3% supported all the time street hawking, 16.7% attested to easy traffic control, 27.1% attested to safe driving while 29.2% believed inadequate security operative and 18.8% believed in all the activities. It is established through Chi-Square analysis that presence of functional streetlight has boosted security operation significantly at night ($X2=33.64$; $p<0.05$); enhanced trading activities at night significantly ($X2=11.74$; $p<0.05$); reduced road accident at night significantly ($X2=13.30$; $p<0.05$); and enhanced and eased traffic operations at night ($X2=18.76$; $p<0.05$)

Table 11: Activities Promoted by Functional Streetlights

Activities promoted by functional streetlight	All the time Street Hawking	Easy Traffic Control	Safe Driving	Adequate Security Operatives	All the above
Frequency	8	16	26	28	18
Percentage (%)	8.3	16.7	27.1	29.2	18.8

5. Discussion of Findings

Findings showed that the distribution pattern of the street light was a cluster for both functional and non-functional. This is similar to the findings of Asalor and Ujevwerume (2016) which discovered that light spread along the roads was not evenly distributed. The implication is that some

places will not be illuminated at night and these places are subjected to darkness which is a major environmental problem that can affect safety while driving. Perkins et al (2015) reported that the effects of the introduction of street lighting on road traffic injury found some evidence for improved road safety with increased street lighting [rate ratio (RR) 0.78, 95% CI 0.63 to 0.97]. Welsh and Farrington (2008) also reported that the effects of increasing street lighting on crime found a reduction in crime for those studies that examined changes over the course of the entire day (i.e. during hours of both daylight and darkness). Similarly, Lisa (1993) viewed that darkness predisposes younger drivers to more accidents, compared to when they are driving in the day time in Finland; and it was thought that the outcome which is increase in accident can be partly attributed to the to darkness and partly to increased blood alcohol (Asalor and Ujevwerume, 2016). The study has also revealed about 19 non-functional streetlights in Port Harcourt Metropolis and this shows that there might be problems in those areas. Aklorbortu (2009) reported that one of the biggest problems facing the twin-city of Sekondi/Takoradi presently is the security of residents, which is threatened by the malfunctioning of street and community lights at night. Thieves move into communities and dark street corners at night, breaking into vehicles and removing batteries and other accessories from vehicles parked in front of houses at night. Students, nurses and residents who walk alone at night either from work or group studies also become victims of these nocturnal attacks. Also, Singh (2015) reported several areas of the city lacking the basic facility of streetlights due to which the residents, as well as commuters, are having a tough time.

6. Conclusion and Recommendations

The importance of streetlight to any economy cannot be overemphasized. Better street lighting is proven to reduce crime and fear of crime, reduce the number and severity of road traffic accidents and sustain social, economic and environmental wellbeing of the public. Therefore, from the results of the study, it can be concluded that the presence of functional streetlight reduces crime and road traffic accidents; streetlight employs engineers, technicians, craftsmen, manufacturers, contractor and traders; streetlights to a great extent boost socio-economic activity and street lighting is part of urban development. Based on the findings of this study, the following recommendations are suggested:

1) Street lighting should be given a priority by the government as a good number of visitors and investors arrive in the city at night. The presence of functional streetlights encourages small and medium business and enhances adequate security patrol service. If this problem is addressed, it will give a face-lift to the city and a warm welcome to visitors and residents who check into the city at night for relaxation.
2) With the rapid increase in the number of new streets in the metropolis, functional streetlights should be installed in all streets to reduce road accidents and ease navigation at night. This is so because it will reveal potholes, road signs and street names to motorists who ply these streets at night.
3) Nigeria is blessed with an abundance of solar radiation and gas resource which is being flared every day by some oil companies. It will be in the right direction if this solar radiation and gas is utilized to power streetlights in the nation by the government, industries and other critical stakeholders.
4) Streetlight installations and maintenance should be privatized. To this end, capable private companies that will be responsible for the asset management, designing, service provision and maintenance should be engaged while the government should play the supervisory role. These private firms should design and manage street lighting projects to support local authorities in achieving their strategic priorities and objectives; ultimately helping to reduce carbon emissions, night time accidents and crime, sustaining and improving the social, economic and environmental wellbeing of the public. These private companies should have a strong supply chain relationship and should use innovative solutions and the latest energy-saving technology in conjunction with operational solutions to drive the effectiveness and efficiency of street lighting services.
5) The government should provide adequate funding to the managers of these streetlights to ensure continuous maintenance of its facilities for optimal output.
6) As a way to curb the problem of vandalism, streetlight facilities should be monitored using the Geographic Information Systems (GIS) which will lead to the arrest and prosecution of vandals.
7) The government, private companies, NGO's and other organizations should help to sensitize the populace on the importance of streetlight as it affects the activities and wellbeing of all and sundry.

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