Spatial Distribution and Analysis of Public Health Care Facilities in Yewa South Local Government, Ogun State

V.A. Uwala

Dept. of Urban and Regional Planning, School of Environmental Studies, The Federal Polytechnic, Ilaro, Nigeria

* Author's Mail Id: vincent.uwala@federalpolyilaro.edu.ng, Tel.: +2348137135219

Abstract— The problem of spatial inequality in the provision of key social facilities and services such as health care facility has been a bane of effective delivery of such services in many countries. This study assesses the spatial distribution of public healthcare facilities in Yewa South Local Government Area of Ogun State. The objectives include: to analyse the spatial distribution pattern of existing public healthcare facilities; identify the under-served settlements in the local government and propose optimal locations for future public healthcare facilities in the study area. Data were collected from both primary and secondary sources. For primary data, a field survey was conducted to pick the geographic coordinates of existing public healthcare facilities**.** The geographic coordinates of the health facilities were coded and integrated into ArcGIS 10.3 to determine the spatial distribution of the facility. The Nearest Neighbour Analysis (NNA) was used to determine the spatial pattern of health care facilities. The study reveals a random distribution pattern of public healthcare facilities with nearest neighbour index value of 0.89.Futhermore, buffer analysis brought to the fore that some settlements at the centre and north western part of the study area do not have access to any healthcare facility within 5 kilometres distance. This study therefore, recommends suitable locations for future public healthcare facilities in the study area to ensure spatial efficiency.

*Keywords—*Distribution, Health Care Facilities, Location, Public, Yewa South

I. INTRODUCTION

Health care service is universally acknowledged as one of the most important social services. It is important for the welfare of citizens and also for the reproduction of labour. Reference [1] identified access to it as essential for fostering and bolstering health, forefending and managing diseases and abating avoidable disability and untimely death.

This view underscores the importance of health care services and the priority accorded its provision by government across the world. However, inequality in access to health care facilities is a global problem with varying intensity from one country to another. For instance, in 1994 approximately 5 percent of Canadians reported they did not receive health care when needed, and by 2014 this figure had more than doubled [2]. In similar vein, [3] reported that lack of access to health services is a significant problem in the US mostly for poor or near poor people. However, access to health care is considered one of the poorest in Africa [4][5]. Nigeria was poorly ranked in the recently released first global healthcare access report. The country was placed in the 140th position, with 51 points, out of the assessed 195 nations on healthcare quality and access on the report's Healthcare Access and Quality Index [6].

Reference [7] identified inequalities in the geographical distribution of health care facilities an important constraint on the access to health care services, given that the distance between the location of supply and of demand imposes additional difficulties to the use of the services.

This worrisome dimension of inequalities in the distribution health facilities called into question the location of existing public health facilities and the scarce resources continually invested on its provision by government at all levels, especially in Nigeria. This study therefore, intends to evaluate the spatial distribution of public health facilities in Yewa South local government with a view of influencing policy direction for location of future public health facilities in the study area.

The remaining part of this research work is divided into six sections. The section after the introductory part examines the contribution of previous works in the subject matter of this research. This is done through the review of relevant literature with a view to keep abreast of the current state of knowledge in the subject area. The third section gives detailed information on the study area. The fourth section focuses on the research methods. Results and discussion the study will be presented in section five and section six concludes the research work.

II.   RELATED WORK

Public health facilities are health facilities owned and fully funded by government. In many countries, this type of health facility provide medical care at subsidies rate and in some countries, medical cares are provided free of charge. In Nigeria, public health facilities accounted for 73 percent of all health care facilities [8]. However, [8] observed that only 40 percent of Nigerians patronize public hospital at federal, state and local government level. This might not be unconnected with the haphazard location of the available health facilities where a great percentage of the populace have no access to them [9][10]. Consequently, locational distribution of healthcare facilities has generated diverse study all over the world. Besides identifying location of healthcare facility, studies have been conducted on the factors that influence the location of healthcare facilities [7][11] and effects of distance covered on patronage[10].

[7] posits that threshold population and economies of scale considerations are some of the factors that vitiate the pursuit of equity in the provision of health care facilities. He also observed that type of services and frequency of need also influences the spatial pattern of such facility. In many studies, geographical proximity has been found to be the leading factor influencing the choice of healthcare facility [11][12][13]. For instance, in his study of the factors influencing the choice of health care facility [11] reported that nearness to accounted for 31.8%. He however, noted that 70% of patients' behaviour was explained by other factors, including financial consideration. In a recent study, [13] observed that 69.2% of respondents in Mozambique visited the closet healthcare facility.

The effects of the distance travelled to health care facility have been reported to include; loss of interest in visit, prolong sickness, spending of more money, seeking for alternative facility and death. Reference[10] in his study in Akure, observed that 18.5% spent more money on healthcare services, 14.9% seek for alternative facility and 13.2% attributed the long distance travelled to the nearest healthcare facility to death of relatives.

In order to ensure spatial efficiency, [14], suggested that a minimum of one health post is needed per village or neighbourhood of about 500 persons. For a group of villages or neighbourhoods with 2,000-5,000 persons a primary health clinic is needed. One Primary Health Centre (PHC) is expected to serve a political ward with an estimated population of 10,000-20,000 while a local government area is expected to have a minimum of one general hospital.

Numerous studies have explored the locational distribution of health care facilities in Nigeria. Reference [15], analyzed the spatial distribution of Health Care Facilities in Akwa-Ibom. Reference [9] analyzed the spatial location of health facilities in Suleja, Niger State using a combination of spatial GIS tool. Reference [16] assessed the locational distribution of health care facilities in the rural area of Ondo state. Reference [17] explored the potential use of geospatial techniques for analysing public healthcare facilities accessibility and distribution pattern in Ile- Ife metropolis. This study, however, is the first attempt at the application of Geographic Information System in the analysis of the location public health care facilities in the study area.

III.   STUDY AREA

Yewa South Local Government is located in the south-western part of Ogun State, Nigeria. It is contained within latitudes 6°37′46″N and 6°55′42″N and longitudes 2°47′24″E and 3°6′48″E; and. The land area is 629 square kilometres. It is bounded on the west by Ipokia Local Government Area, to the south by Ado-Odo Local Government Area, to the east by Ifo and Ewekoro Local Governments, and to the north by Yewa North Local Government Area.

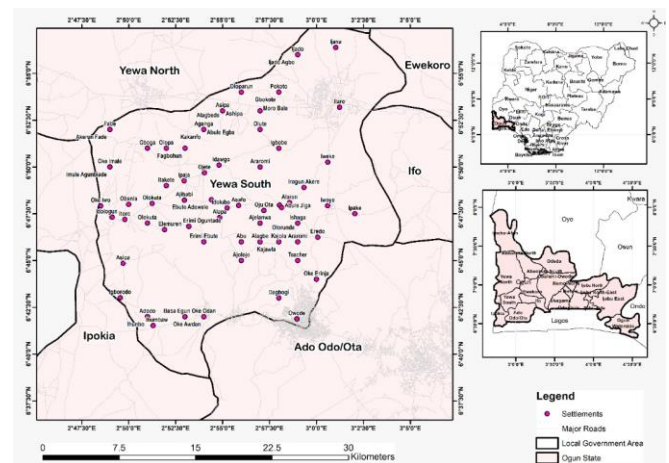The study area is as shown below in its national, regional and local settings in Figure 1

Figure 1: Yewa South Local Government Area in National Context

IV.   METHODOLOGY

For this study, a list of existing public health public facilities in the study area was obtained from Yewa South Local Government secretariat. Similarly, the administrative map of the local government was also acquired and geo-reference. A field survey was conducted to pick and document the geographic coordinates of existing public health facilities. The geographic coordinates of the health facilities were coded and integrated into ArcGIS 10.3 to determine the spatial distribution of the facility. The Nearest Neighbour Analysis (NNA) was used to determine the spatial pattern of health care facilities. According to [18] cited [19], the distribution pattern ranges from 0 to 2.15. Nearest Neighbour Index (R_n) with 0 value indicates cluster distribution, R_n with value of 1 indicates random distribution cluster while R_n with value of 2.5 indicates even distribution.

The nearest neighbour index (R_n) is obtained using the following equation

$$Rn = 2\bar{d}\sqrt{\frac{n}{A}}$$

Where R_n is the nearest neighbour index, A is the Area of space concerned (Yewa South Local Government) $\bar{d}$ is the

mean distance between nearest neighbours and n is the number public health facilities.

V.   RESULTS AND DISCUSSION

Distribution of Public Health Facilities in Yewa South Local Government

There are 24 public healthcare facilities in the study area. Majority (54.1%) of the health facilities are Primary Health Centres, this is followed by primary health clinic which accounted for 41.6 % of public healthcare facilities in Yewa South Local Government Area, while one (4.2%) of the healthcare facilities is general hospital (See table 1).

Table1. Location of Public Health Facilities in Yewa South Local Government

NAME		LOCATION	LATITUDE	LONGITUDE
Primary	Health	Ilaro	501771	761797
Centre				
Primary	Health	Ilaro	504686	761063
Clinic				
Primary	Health	Ilaro	500130	760787
Centre				
Primary	Health	Ijanna	501872	767223
Centre				
Primary	Health	Idogo	490366	755443
Clinic				
Primary	Health	Igbeji	482554	746421
Clinic				
Primary	Health	Ipaja	487145	753969
Clinic				
Primary	Health	Itoro	481239	750165
Clinic				
Primary	Health	Iwoye	501482	751384
Centre				
Primary	Health	Ijado	500343	766012
Clinic				
Primary	Health	Irogun	498794	753263
Centre				
Yewa	South	Owode	499947	739599
L.G.H.C				
Primary	Health	Owode	499540	739788
Centre				
Federal	Model	Erinja	500407	744938
P.H.C				
Primary	Health	Ilobi	504110	745695
Clinic				
Primary	Health	Isaga	499236	742602

Clinic	Owode		
Primary Health Centre	Ajilete	491961	740799
Primary Health Centre	Eredo	500003	748532
Primary Health Centre	Oke-Odan	489473	741241
Primary Health Centre	Oke-Odan	488313	740383
Primary Health Clinic	Isagbo	490560	733228
Primary Health Centre	Owo	490523	732173
Primary Health Centre	Orisade eyo	490616	732540
State (General) Hospital	Ilaro	502531	763580

Spatial Analysis of Public Health Care Facilities

The spatial pattern of health care facilities as determined by Nearest Neighbour Analysis revealed a random pattern distribution (see figure 2) with nearest neighbour index value of 0.89. This is statistically significant taking into consideration the z score value of -1.076337. The result shows that health care facilities are located randomly which does not guarantee equitable access to the facilities. Furthermore, a cursory look at figure 3 shows that there is concentration of these facilities in urban centers like Ilaro and Owode. This is in consonance with the view of [7] who observed that there is inequitable distribution of health facilities between urban and rural area.
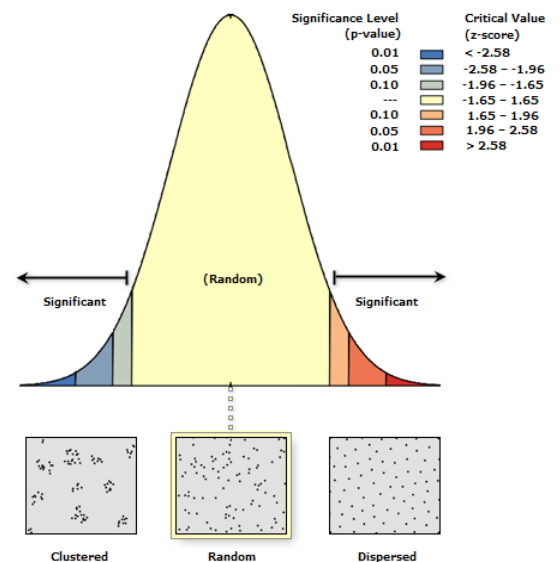

Figure 2: Average Nearest Neighbor Summary

Given the z-score of -1.07633740561, the pattern does not appear to be significantly different than random.
Nearest Neighbor Ratio: 0.885155
                    z-score: -1.076337
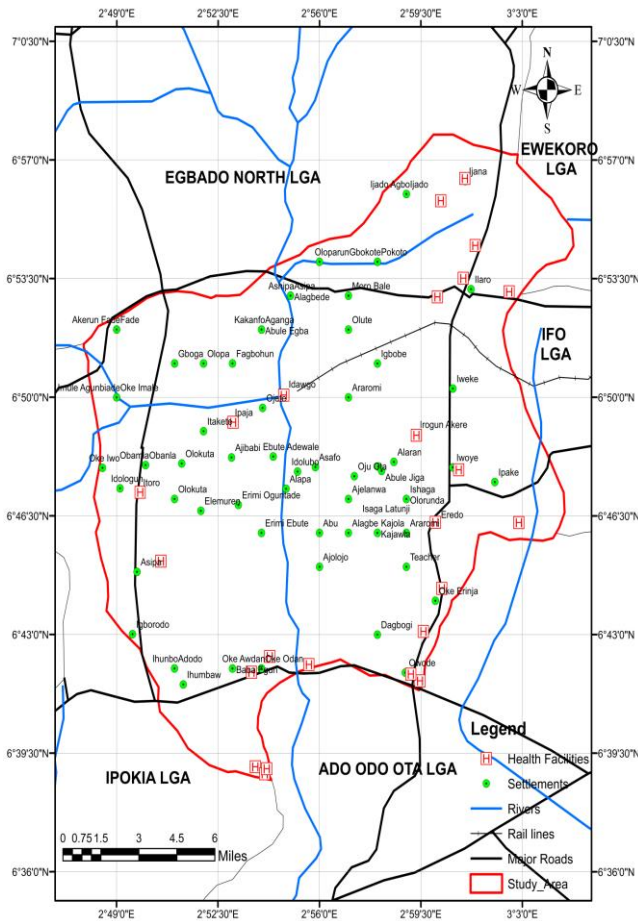   **p-value:** 0.281776

14

Figure 3: Spatial Distribution of Public Health Facilities in Yewa South Local Government Area

Figure 4: Five (5) Kilometres Buffer of Existing Primary Health Centres in Yewa South Local Government Area

Catchment Area of Public Health Facilities

A buffer analysis was performed to identify the undeserved areas. This was done using the Ogun State Regional Plan (2005) guidelines of 5 kilometres distance for Primary Health Centres and 20 kilometres for General Hospital. As shown in Figure 4 and 5, it is evident that majority of the settlements in the local government area have access to public Primary Health Centre within 5kilometres distance. However, some settlements at the centre and north western part of the study area do not have access to any health care facility within 5 kilometres distance. In respect of the only secondary health care facility in the study area, a buffer of 20 kilometres distance revealed that only settlements in the north western part of the study area are within the 20 kilometres distance. This is not too good because more serious ailments are expected to be referred to a secondary health care facility. Moreover, when compare with the population requirement of 100,000 people per one general hospital as stated in Ogun State Regional Plan of 2005-2025. It is crystal clear that the Local government requires more general hospital taking into cognizance the projected population of 237, 859 people. This finding is in tandem with the Ogun State Regional Plan of 2005-2025 which projected that by 2025, the local government area will need more secondary health care facilities.
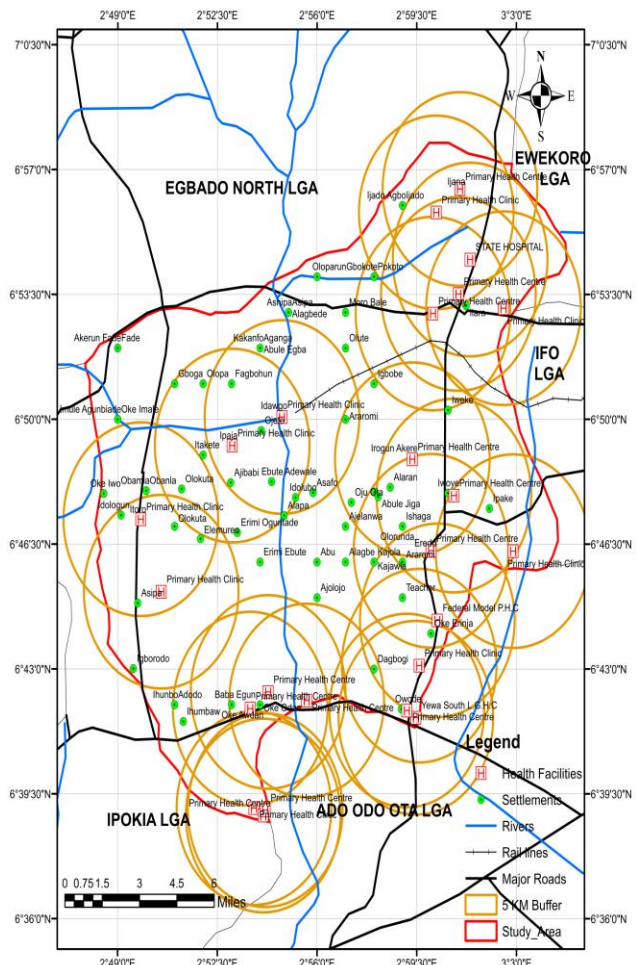
Optimal Locations for Future Public Health Facilities in Yewa South Local Government Area

Attempt was made to identify suitable site for public health facilities in the study area. The criteria for selecting suitable site as identified by [20] and [21] were adopted. The criteria include the following: Heath care facility should have a minimum set back of 45 metres from a major road, river and railway line; It should be in less than five (5) kilometres of residential areas and a distance of 500 metres minimum and 5 kilometres or 20 kilometres maximum should be maintained between two primary health centres and secondary health facility respectively. Figure 6 show suitable locations of future public health facilities in the study area. Three (3) Primary Health Centres and one (1) secondary health care facility were proposed in other ensure spatial efficiency in the distribution of health care facilities in the Local Government.
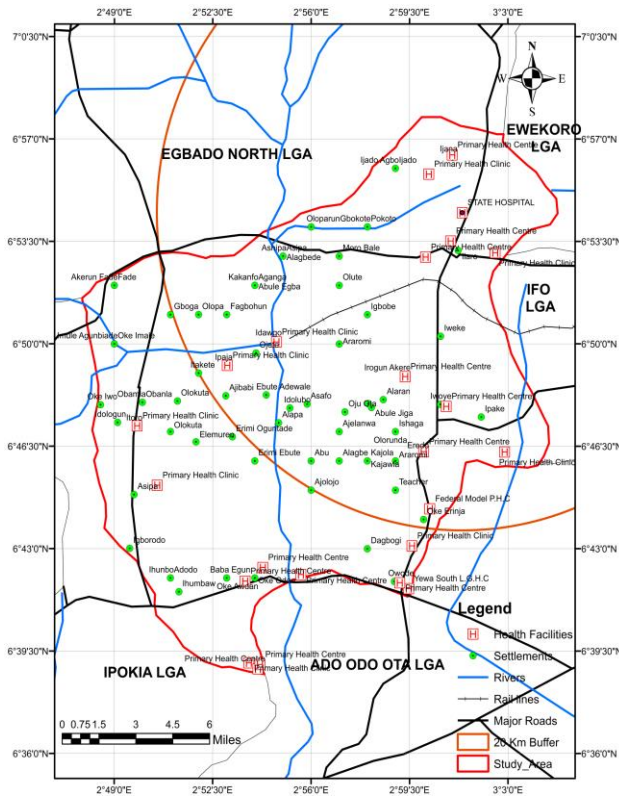
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Figure 5: Twenty (20) Kilometres Buffer of Existing Secondary Health Facility in Yewa South Local Government Area

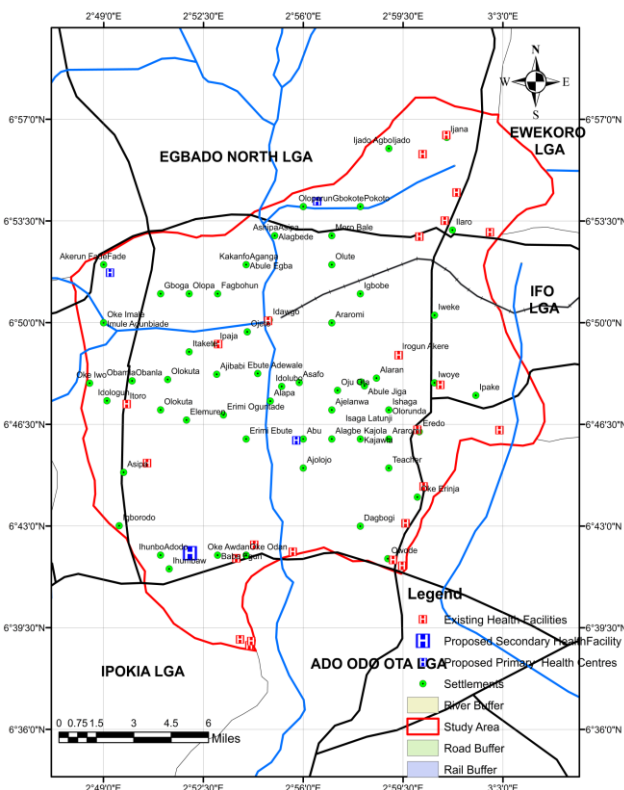Figure 6: Optimal Locations for future public health facilities in Yewa South Local Government Area

VI. CONCLUSION

This research work has attempted to address the issue of spatial inequalities in the distribution of health care facilities in Yewa South Local Government. The study assess the locational distribution and analysed the spatial spread of public health care facilities, it identifies the underserved areas and proposed suitable locations for future public health facilities. Finding reveals that public health care facilities are randomly distributed with Rn value of 0.89**.** The study has further shows that majority of the settlements in the local government have access to health care within 5kilometres distance. Although, it identified the need for more public health care facilities especially in the areas that are currently underserved by the existing public healthcare facilities. It is therefore, the submission of this study that problem of inequalities in the distribution of public health care facilities is not a serious one in the study area. However, there is need for further study to evaluate accessibility and utilisation of health care facilities in the area since potential access to healthcare facilities does not translate to realized access to health services.

REFERENCES

[1] World Health Organization, "Gender, equity and human rights" **2013**.

[2] T.I. Shah, S. Bell, K. Wilson,"Spatial Accessibility to Health Care Services: Identifying under-Serviced Neighbourhoods in Canadian Urban Areas," PlosONE, Vol.**11**, Issue.**12**, pp.**1-22**, **2016**.

[3] A. Paez, R.G .Mercado, S. Farber, C. Morency, M. Roorda, "Accessibility to health care facilities in Montreal Island: An application of relative accessibility indicators from the perspective of senior and non-senior residents," International Journal of Health Geographics, Vol. **9**, Issue. **5** pp. **2-11**,**2010**.

[4] World Health Organization,"World Health Report: Health Systems Financing—The Path to Universal Coverage," Geneva, 2010.

[5] World Health Organization, "World Health Observatory Data. World Health Statistics 2019. Monitoring Health for the SDGs,"2019.

[6] U.Atuma,"Nigeria's poor healthcare access ranking," Sun Newspaper, **2017**.

[7] S.I. Okafor, "Health and Health care facilities in Nigeria: The problems of Equity and Equality,". In S.B. Agbola, C.O. Olatubara, B. Wahab, L. Sanni and O. Ipingbemi (Eds).Environmental Planning and health in Nigeria, Ibadan University Printery, **Ibadan**, pp. 113-133, 2008.

[8] J. Ofoli, "Rationalising Public Hospital Governance and the Quality of Care," A paper presented at the International Conference on Hospital Management and Administration (ICOHMA) Abuja, 2019.

[9] G. S. Owoyele, T. O. Ajobiewe, O.O. Idowu, S.I. Shuaibu, V.I. Martin, "Spatial Analysis of health facilities in Suleja, Niger State, Nigeria," Ethiopian Journal of Environmental Studies & Management, Vol.**8**, Issue. **3**, pp.**264 – 271**,**2015**

[10] O.B. Olugbamila, "Spatial Distribution and Accessibility to Healthcare Facilities in Akure South Local Government Area of Ondo State,"AnaleleUniversitatii din Oradea, Seria Geografie, Vol. **28**, Issue.**1**, pp. **7-18**, **2018**

[11] T.O. Egunjobi, "Factors Influencing Choive of Hospitals: A Case Study of the Northern Part of Oo State, Nigeria,"Social Science and Medicine, Vol. **17**, Issue. **9**, pp.**585-589**, **1983**

[12] S. Gabrysch, S. Cousens,J. Cox, O.M.R. Campbell, "The Influence of Distance and Level of Care on Delivery Place in Rural Zambia: A Study of Linked National Data in a Geographic Information System," PLoS Med, Vol.**8**, Issue. **1**, pp. **1-12**, **2011**.

[13] J. Yao, V. Agadjanian, "Bypassing health facilities in rural Mozambique: Spatial, Institutional, and individual determinants," BMC Health Services Research, Vol. **18**, Issue. **1,** pp. **1-11**.

[14] National Primary Health Care Development Agency, "Minimum Standards for Primary Health Care in Nigeria," Department of Planning Research and Statistic, **Abuja**, pp.20-38, 2012.

[15] J. Atser, P.A. Akpan, "Spatial Distribution and Accessibility of Health Facilities in Akwa Ibom State, Nigeria," Ethiopian Journal of Environmental Studies and Management, Vol. **2** Issue.**2**, pp. **49-57**, **2009**

[16] U.U. Jimoh, B. Wahab, "Locational distribution of health care facilities in the rural area of Ondo State," British Journal of Education, Society and Behavioral Science, Vol. **11**, Issue.**1**,pp. **1-8**, **2015**.

[17] Sedenu et al., "Spatial Analysis of the Distribution Pattern of Primary Healthcare Facilities in Ile – Ife Metropolis Using Geographic Information System," Journal of Scientific Research and Reports, Vol. **10**, Issue.**1**, pp. **1-15**, **2016**

[18] E. Okoko, "Quantitative techniques in Urban Analysis,"Craft book limited, **Ibadan**,pp. 161-163, 2002.

[19] A.L. Lasisi, V.A. Uwala, "Spatial Analysis of Public Water Distribution in Ipokia Local Governmenr Area, Ogin State," A paper presented at the 6th National Conference of School of Environmental Studies, Federal Polytechnic, Ilaro, Nigeria, **2017**

[20] Ogun State Regional Report (2005-2025), pp. 301-306,2008

[21] J.T. Fadahunsi, O. Kufoniyi, O.I. Babatimehin, "Spatial Analysis of Distribution Patterns of Healthcare Facilities in Osun State,"Universal Journal of Public Health, Vol. **5**, Issue. **7**, pp. **331-344**, **2017**

AUTHOR PROFILE

Vincent Abimbola UWALA is a Lecturer in the Department of Urban and Regional Planning, the Federal Polytechnic, Ilaro. He holds a Diploma in Town and Regional Planning, B.Tech. in Urban and Regional Planning from Federal University of Technology, Akure. He is currently a post graduate student at the University of Ibadan, Ibadan, Nigeria.