Spatial Distribution and Accessibility of Primary Health Centre in Ife East Local Government of Osun State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors JEA and KHM designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors SAO and OF managed the literature searches and analyses of the study. Authors SAH and TAA carry out general textual editing. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

This study was carried out in Ife East Local government area of Osun State on the spatial pattern and accessibility of Primary health care centre. The objective of the study was to examine the spatial distribution of this health care facility, how accessible is the facility as well as the factors responsible for the disparity in accessibility level. Administrative map of the area, GPS coordinates of the healthcare facilities and questionnaire information are the sources of data for this study while GIS software and Microsoft Excel were used in analyzing the data. The result showed that there are twenty – two primary health centres in the study area; fourteen of these are functional while eight are non – functional. The result also showed that the Primary Health centres (functional) were clustered and not evenly distributed and is mainly in the urban area of the study area.

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1. INTRODUCTION

Access to health care is an important issue in Nigeria and other African countries. Some populations face substantial barriers in obtaining health care, and health care policies and imperatives are affecting the location, quality, and quantity of services available with concomitant effects on access [1,2]. Access describes people's ability to use health services when and where they are needed. Site selection and distribution of health care centres are important components of an overall health system [3]. It has a direct impact on the burden of diseases that affect many countries in the developing world. The creation of health care centres database and mapping helps in showing the spatial distribution and information about location and their physical relations to each other. Increased productivity by individual in all sectors of the economy depends on the health condition of the labour force. While improved health and quality of life depends to a great extent on the availability of, and accessibility to health care facilities at affordable cost [4,5]. Hence, the need to study the spatial distribution of health cares facilities in Ife East Local Government Area of Osun State.

The purpose of using GIS in site selection and distribution of health care centres is that maps provide an added dimension to data analysis, which helps in visualizing the complex patterns and relationships. The use of GIS for measurement of physical distribution is well established and has been applied in many areas including retail site analysis, transport, emergency services and health care services [6,7]. World Health Organization [8], specified the criteria for health care planning for third world countries which indicated that each service area should cover a 4km catchment area with a population of 60,000 for primary health care in order to have adequate and equity of access to health centres.

GIS application to health care facility distribution and accessibility emphasizes the geographical dimensions of access. Health care decisions are strongly influenced by the type and quality of services available in the local area and the distance, time, cost, and ease of traveling to reach those services. For medical conditions that require regular contact with service providers, travel time and distance can create barriers to effective service use. GIS is being used to create better measures of geographical access and to analyze geographical inequalities in access as well as those patterned along social and economic lines. There is growing recognition that geographical barriers to health care intersect with those based on class, race, and ethnicity leading to complex patterns of disadvantage.

There are numerous causes for the thousand of health problem, which attest to poverty level. Due to lack of social infrastructure facilities (i.e. water, electricity roads and health care), the rural areas have not been attracting personnel in the few available institutions like primary and secondary schools, dispensaries, maternity centers etc. when these personnel are posted to the rural areas rather than stay and work in these areas, they prefer to live in nearby urban centers and continue to shuttle between the urban centers and the location of their posting in the rural areas [9,10]. This and some other factors serve as an impediment to effective delivery of healthcare services The shuttling in most cases is usually one day per week affairs. This also does not allow for meaningful contribution through their work performance to the welfare of the rural people. Therefore, the aim of the study is to examine the spatial distribution and accessibility levels of residents to health care facilities in Ife East Local government area in Osun state, Nigeria and identify the factors associated with the observed pattern while the objectives are to identify spatial distributions of health care facilities in Ife East local government; carry out comparative analysis of the accessibility level between rural and urban dwellers to these health care facilities and examine the factors responsible for the disparity in accessibility level between the urban and rural areas.

2. MATERIALS AND METHODS

2.1 The Study Area

Ife East Local Government Area in Osun State lies between Longitudes 4°32′E and 4°40′E and Latitudes 7°15'N and 7°35'N. The Ife East Local Government was created in December 1996 out of the Ife Central L.G.A. with its Headquarter at Oke-Ogbo. The Local government area is inhabited predominantly by the Yoruba speaking people of South Western Nigeria. It has a total land area of 3,600 square kilometers, with population of 375,370. It consists of more than

60 villages and some part of Ile-Ife Township. There are (20) twenty health care facilities and (13) thirteen are functional in the study area. The Local Government is divided into seven (7) wards as shown in Fig. 1. These are Ilode I, Ilode II, Moore, Okerewe I, Okerewe II, Okerewe III and Yekemi administrative wards from which the data for this study was collected.

2.2 Data Collection and Analysis

Primary data for this study was collected through interview and a hand-held GPS receiver to capture the location of health care facilities. Health care facilities data include administrative map, demographic statistics from Health worker and statistics of health care' facilities. All maps and spatial data were captured in the GIS platform for geospatial analysis. The data obtained from the administered interview were coded and integrated into the GIS platform for geo-statistical analysis. Analyses were done in the GIS environment to obtain the Nearest Neighborhood analysis and the spatial inequalities of Health care facilities. Geospatial analyses performed on the geo databases include spatial concentration analysis and the use of nearest neighbor geo-statistical analysis to test the significance of the result of spatial concentration of health care centres in the wards.

Descriptive statistical analysis was also carried out on the data collected through the personal interview to examine the distance travel to hospitals.

2.3 Analysis of Spatial Distribution of Health Care Facilities

Nearest Neighbor Analysis was used to evaluate the spatial accessibility of population to health care facilities in the study area. The average Nearest Neighbor analysis and Manhattan distance method were also used to ascertain the spatial distribution and accessibility of health care facilities.

3. RESULTS AND DISCUSSION

3.1 Spatial Distribution Pattern of Primary Health Centers

A total of 20 twenty health care facilities were identified in the study area which comprises of fifteen (13) functional and Seven (7) Non-functional. It was observed that though three of the wards are not equal in terms of land area yet there is obvious concentration of health care facilities among the urban wards in the north eastern parts of the study area as shown in Fig. 2.
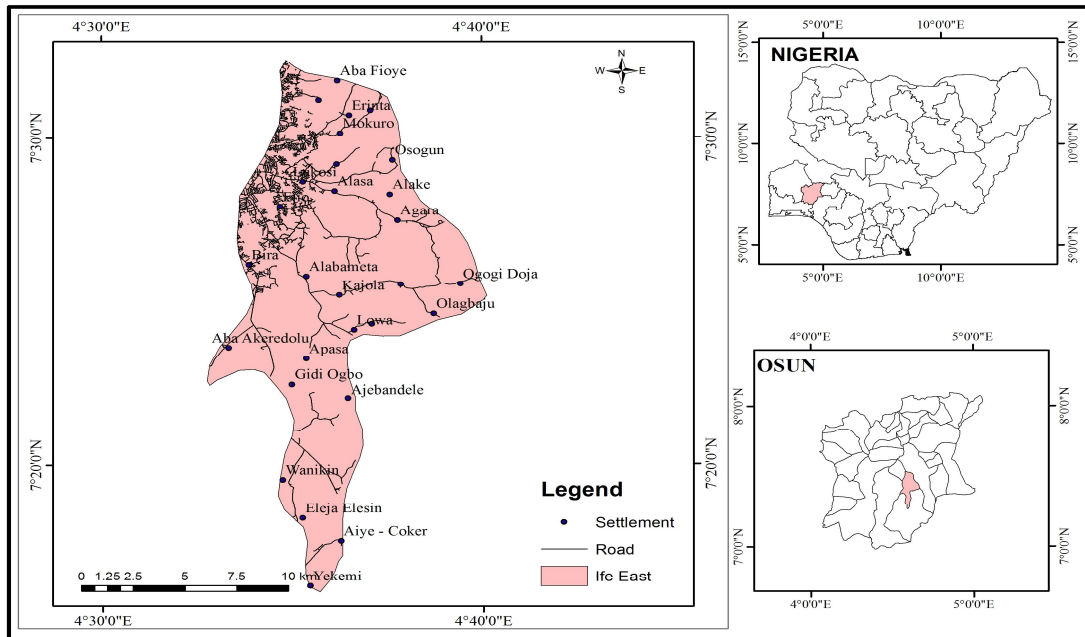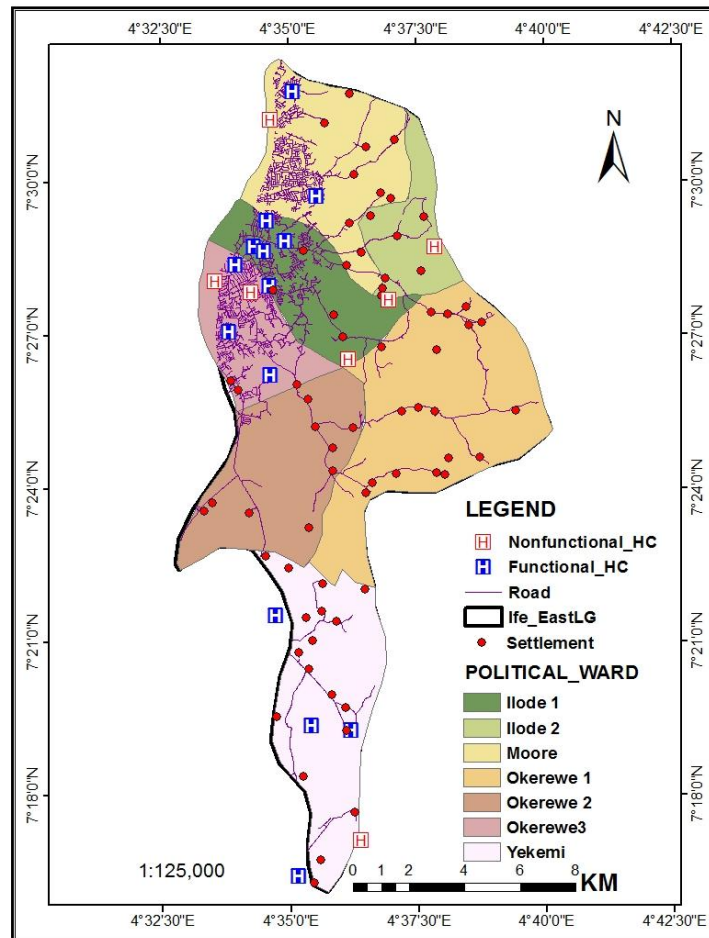

Fig. 1. Ife East local Government area
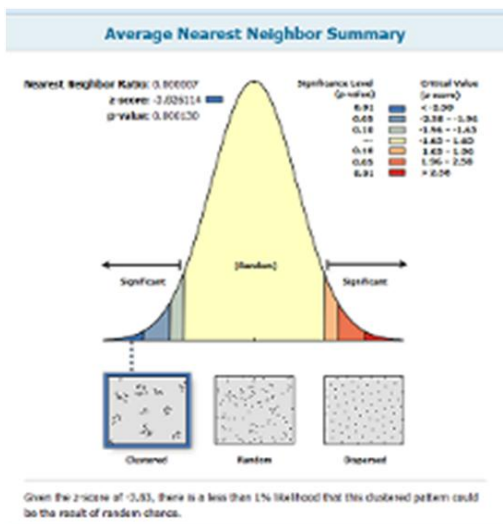
Fig. 2. Ife East political ward

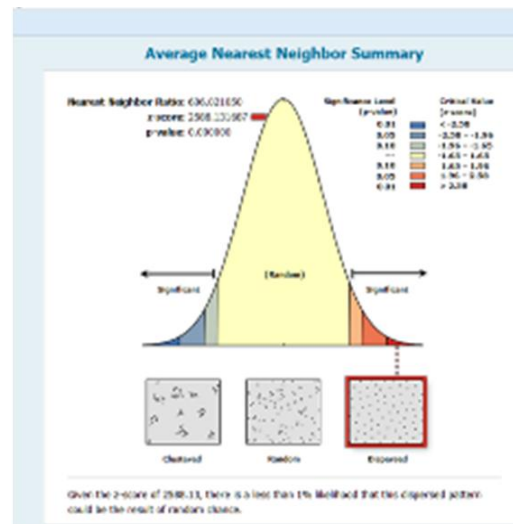**Fig. 3. Nearest neighbour analysis for urban area**

Fig. 4. Nearest neighbour analysis for rural area

Clustered (Urban) and Dispersed (Rural) pattern of health care facilities were identified from the study area. The wards that show the clustered pattern of health care facilities are Okerewe 3, Ilode 1 & 2, and Moore which represent the urban areas while Yekemi and Okerewe 1 & 2 ward represent the rural areas. This indicates that Patients in rural areas have to cover a distance of 5 kilometers or more before getting to their health care centres.

Though Urban areas have high concentration of population than the rural hinterland in the study area, and higher numbers of health care facilities in urban areas than the rural areas, the indication from this is that rural population have to cover longer distances to access health centres sometime more than 4 kilometers to reach the functional health facility.

Personal interview revealed that the factors responsible for the non-functionality of the health facility in rural areas are as a result of lack of social infrastructure facilities (i.e. water, electricity roads and health care) and low population. This corroborates the study of carried out by World Health Oganization in 2004. The rural areas have not been attracting personnel in the few available institutions like primary and secondary schools, dispensaries, maternity centers etc. when these personnel are posted to the rural areas rather than stay and work in these areas, they prefer to live in nearby urban centers and continue to shuttle between the urban centers and the location of their posting in the rural areas.

3.2 Spatial Accessibility Index

Spatial accessibility indexing is a procedure to categorize the different levels of access to a facility or resources based on distance or physical barriers that prevents or hinder access. This is a function of Geography and political and economic inhibitions imposed by nature or state actors [11]. In Osun State, accessibility to Health care facilities has persistently remained low. The distribution of the health care has favored the urban area than the rural area (see Fig. 5). In essence the access to health care services in the state is generally poor.

The nearest neighbor analysis for the spatial distribution of Health care facilities in the study areas revealed two major spatial patterns, that is the overall general pattern and specific pattern within wards. The overall distribution pattern in the Local Government area shows dispersion (see Fig. 5). The within ward spatial distribution pattern in Yekemi Ward also showed dispersed pattern. However the spatial distributions in the remaining electoral wards showed clustered pattern as shown in Fig. 5.

The Fig. 6 shows the distance travelled by residents to healthcare facility. The result of distance analysis reveals that Lukosi settlement has the least distance of 2.19 km, while Ejio has 2.82 km and Alasa has the highest of 3.91 Km respectively. This implies that the residents in these settlements travelled less than the 4km standard of the World Health Organization (WHO). Therefore the primary health centre is well placed and the residents within the region can access primary health care facility with ease.

Fig. 7 shows that residents of Mokuro travelled a distance of 2.49 km, while Erinta residents travelled a distance of 3.24 Km to access health care services and residents of Erinta1 travelled a distance of 4.55 km, which is more than the 4 km standard of the WHO, therefore a functioning health centre with ease of access should be provided for this settlement.

3.3 Health Care Facility and Record of Patients in Ife East Local Government

In the field survey conducted, it was discovered that there is only one doctor in the study area that is serving all the health care centres, with an average of eight health officers per health care centre. Large numbers of patients were recorded in those health centres located in urban centres while very low numbers of patients were recorded in the rural area between this period (January to March). The large number of patients that were attended to between January to March in the urban area is a function of the larger population in the urban area. Also the efficiency of health officers and provision of better equipment for the health centres located in the urban area of the study area makes some of the villagers come for treatment in some of the urban health centres within the study area. However, there are some rural areas in which the same facilities are provided but still record fewer numbers of patients within the evaluated period (January to March 2015) as a result of low population within the area see Figs. 8 and 9 and Table 1.
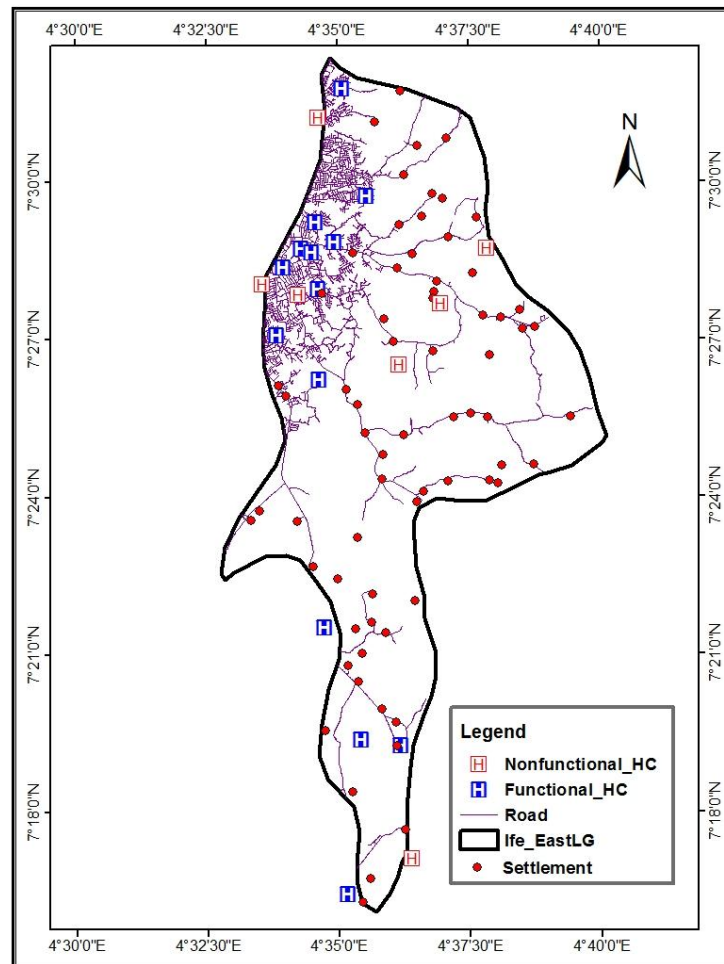
Fig. 5. Distribution of health care centres

Table 1. Hospital record

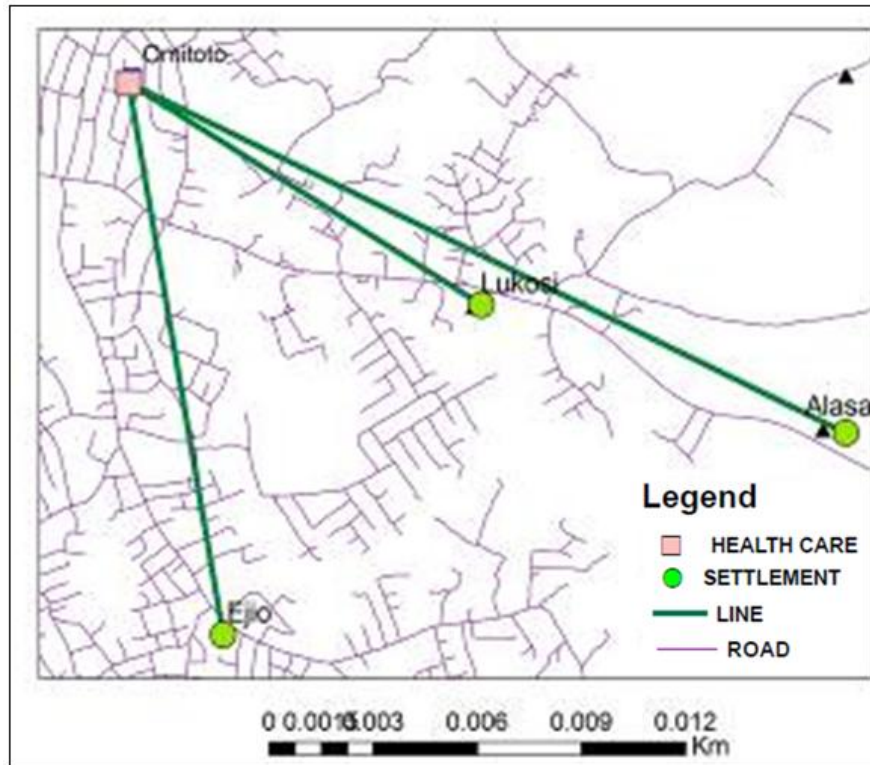| Name of health care facility	No. of health officer	No. of patient January to March, 2015
Ifelodun	13	606
Olugbodo	15	580
Ajigbore	9	506
Odowara	14	426
Moore	5	594
Oja – oba	6	169
Omitoto	4	473
Agric Opa	6	709
Safejo MDG	8	641
Iloro	14	346
Iyanfoworogi	5	426
Yekemi	4	41
Abata - Egba	4	23
Wanikin	5	41
Total	112	5,581

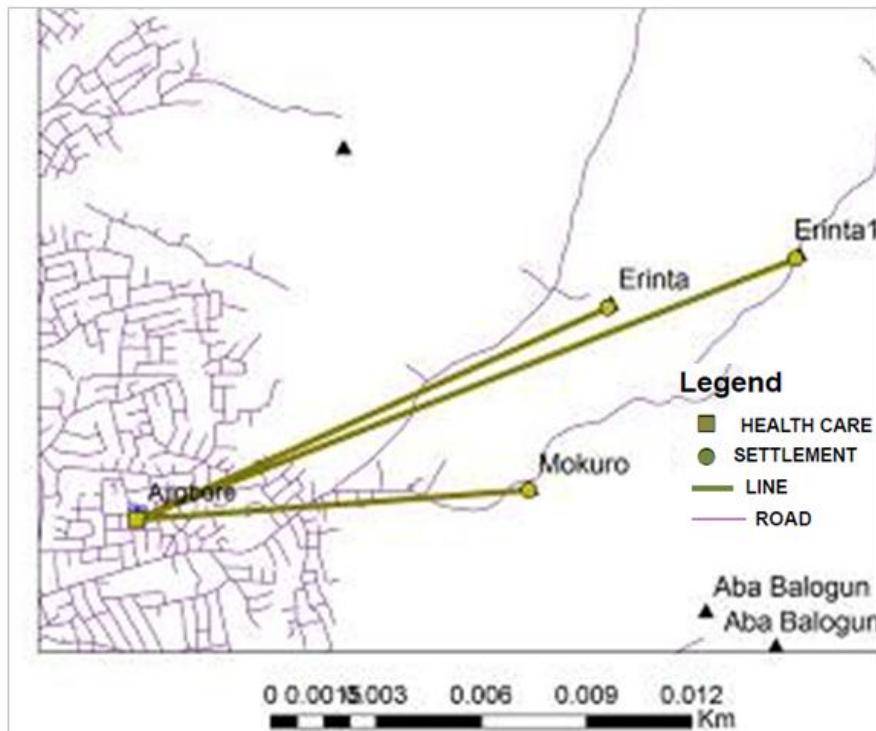**Fig. 6. Network analysis of omitoto primary health centre**

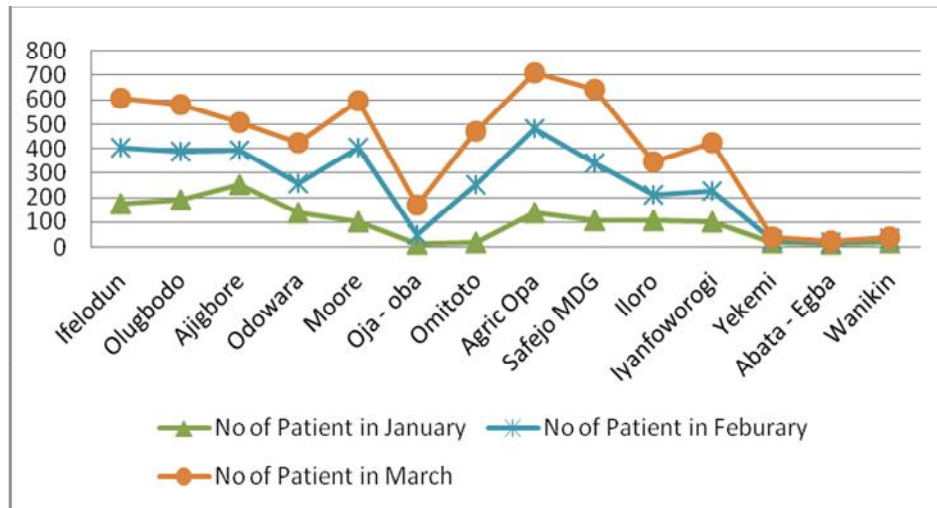**Fig. 7. Network analysis of Ajigbore primary health centre**

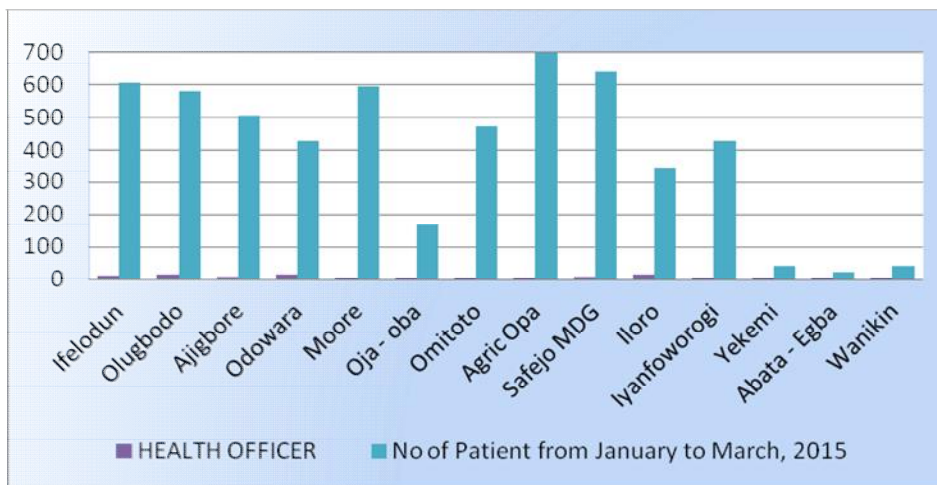**Fig. 8. Number of patient in each health centre**

Fig. 9. Health officers and number of patients attended to between January and March

4. CONCLUSION

Majority of the functional primary health centres are in the urban area of the study area. The pattern of distribution of the functional primary health centres are clustered and not widely spread or randomly or dispersedly spread. The network analysis of two of the functional primary health centres showed that some residents travelled a distance of less than 4 km as specified by WHO, while residents of Erinta1 travelled more than 4 km to the nearest primary health centre. Also the ratio of health officers to patients is very low, which implies shortage of health officers in the primary health centres in the study area. Moreover, it was discovered that it is only one doctor that is serving the whole Local Government Area. Therefore, there is need for intervention of the stakeholders in the health sector to site a new primary health centre close to this settlement, for easy accessibility and increase the number of health officers in the Local Government Area.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/12659