

## Oyo Town, Oyo State, Nigeria: Regional Disparities in Access to State-of-the-Art Healthcare Facilities

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### Abstract

The purpose of this research was to determine how the growth of Oyo Town has affected the geographical accessibility of health care services. Based on interviews with long-time locals and analyses of satellite images from three distinct time periods (1980, 2000, and 2015), the research region was split into three developed zones: old Oyo (before to 1980), 'old-new' Oyo (between 1980 and 2000), and new Oyo (between 2000 and 2015). The driving time and travel distance were used to determine each facility's service area. The typical urban speed restriction of 50 km/h was applied. In addition, each hospital used a unique set of parameters for distance and travel time depending on its particular method of service delivery. Parameters of 1 to 5 minutes and 1 to 4 kilometers were chosen for primary healthcare facilities, while those of 1 to 8 minutes and 1 to 10 kilometers were set for secondary healthcare

institutions. The WHO's suggested maximum distance of 4 kilometers from a health care facility was also taken into account. The research showed that out of the total of 38 hospitals and clinics in the region under examination, 14 were located in the traditional Oyo, 15 in the 'old-new' Oyo, and 9 in the contemporary Oyo. There were 68 percent primary care institutions, 21 percent comprehensive care facilities, and 11 percent secondary care facilities in the studied region. The bulk of the new Oyo zone fell beyond the service area of the facilities, both in terms of driving time and travel distance using approved standards. It was found that, in general, health care facilities were less accessible to residents in neighborhoods located farther from the city's core. Therefore, the results confirmed that urbanization has led to differences in patients' travel times to reach nearby medical centers.

**Keywords:** *Spatial accessibility, drive time, travel distance, service area, urban expansion.*

### 1. Introduction

Health is a resource for everyday life and it is fundamental for other man's endeavors. It is considered as a crucial component of wellbeing and economic development (Phillips 1990; Akpomovie, 2010; WHO 1978).

According to Cox and Reynolds (1974), health has a strong influence on peoples earning capacity and productivity; it affects educational performance (and thus determines employment prospects); and it is fundamental to people's ability to enjoy and

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appreciate all other aspects of life. Therefore, accessibility to modern health care can never be overemphasized. Access to health care is widely accepted internationally as a key goal in meeting the health needs of individuals (Matthew 2012). Despite the tremendous improvement in quality and quantity of health sector globally, it is very obvious in developing countries that health care provision is a serious problem (WHO 2014, David et al., 2008). Although, in Nigeria, health care facilities are stratified into primary, secondary, and tertiary care, none of the care centres is adequately staffed, equipped or funded. As a result, those who can afford it go to private hospitals, many of which are one-doctor and one-nurse operations. The effect of this situation is a high rate of avoidable deaths across the country (Adebowale, 2014; Menizibeya, 2011).

The population of Nigeria, with an estimated growth rate of 2.38 per cent, is projected to be over 140 million people (National Population Commission, 2006). It is therefore evident that the nation demand for health care is large and increasing over time due to a large and increasing population. However, resources for health care provision are limited. According to the WHO (2014), there are 4 physicians to 10,000 populations and 16 nurses and midwifery to 10,000 populations in the country. The three types of health care facilities are equally not well equipped and maintained. Also, the habit of periodic medical check-up has still not been formed and swaths of the population only go to the doctor or to the hospital when seriously ill only to be misdiagnosed or wrongly medicated. Most of the time, people seek medical assistance when the illness has reached an advanced stage. In some cases, no medical attention is sought due to paucity of funds. In such situation,

individuals are forced to seek quack or native doctors. It is rather absurd. Also, government expenditure on health has a lot to do with the quality of health care of any nation. This is one of the reasons international organisations like WHO and World Bank set standard on the proportion of money allocated to health sector from yearly budgetary allocation of their member states. There is generally inadequate funding of health care sector in Nigeria. Official statistics have shown that in 2011, 6.7% of Nigeria general government expenditure was spent on health sector compare to country likes United States of America where 20.3% of their general expenditure was spent on health (WHO, 2014).

Unfortunately, people in Nigeria continue to experience avoidable deaths; they continue to die of treatable illnesses (Orabuchi, 2014). While majority of countries have 0%, 20% of mortality among children aged less than five is malaria. The male adult mortality rate between the age of 15 and 60 years is 341 per 1, 000 population compared to places like USA and UK which are 130 and 90 respectively (WHO 2015). The health care provision is now so worse that 4% of mortality is caused by common injuries. Due to the nature of health care facilities and attitude of individual Nigerians towards their health, death is now becoming the 'cheapest commodity' in the country. In addition, majority of the studies have identified inaccessibility to quality health care in the rural area. More importantly, the major noticeable problems associated with the provision of health care services to the rural areas include the following: Problem of insufficient health centers, Problem of accessibility to the available health care centers, due to the spatial inefficiency of their distribution, Inefficiency of the available health care facilities, Insufficiency of trained

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medical personnel to the ratio of the existing population of a particular area. (Efe, 2013; Mohammed et al., 2010; Abdulraheem et al., 2012; Ekwuruke, 2005). However, concern should be on the urban areas also. Nigeria is not only one of the most urbanized countries in Africa but also one of the most rapidly urbanizing. Although, only 7.2% of the population was urban in 1921, this increased to 10.6% in 1952 and 19.1% in 1963. This percentage increased to 36.3 in 1991 (population census) and 50 in 2010 (Mabogunje, 1974; Ikporukpo, 2014).

Also, most of the cities in Nigeria have experienced rapid growth in the past 2 to 3 decade which has led to the expansion of the core urban areas of the city into adjoining rural land (Oyinloye and Fasakin, 2014). For instance, in the study area, between 1962 to 2003, the built-areas increased from 0.36 Hectares (Ha) to 182.75 Ha compared to between 2003 to 2007 which was from 182.75 to 345.34 (Oloyede-Kosoko et al., 2013). Also, using change detection method, in Abuja, it was found that the built-up area increased from 8% in 1987 to 22% in 2007, rock-outcrop decreased from 74% to 37%, vegetation decreased from 40% to 17%, while the area occupied by water body has remained constant overtime. Also projection was done for population in the next nine years and 1,925,464.089 figures which are about 37% as it is expected. The implication of this among other things includes pressure on limited infrastructure. This means within the urban centers some areas will be well served with health facilities than others (Ade and Afolabi, 2013). The study carried out by Ejiagbha et al., (2012) showed that there is need for accessibility of health care to be reexamined in the urban areas. Their findings showed that most of health care facilities in the urban area were located within a particular area and other

areas were badly deprived of the facilities. There are four main dimensions of access as a concept. They are geographic, availability, financial, and acceptability (David et al., 2008). The spatial or geographic dimension of access has received considerable attention from planners and researchers for many years. Accessibility (or geographic accessibility) is a measure of the "friction of distance" or "burden of travel" between locations, whereas, availability generally measures the number of services in comparison to the number of potential users of the service. Changing technology and the availability of detailed spatial data have allowed for the representation of geographic accessibility in a Geographic Information System (GIS) to more closely resemble the real-world phenomena of travel (Cromley and Mclafferty 2002; Guagliardo, 2004, Matthew 2012; Abdullah et al., 2010). Therefore, this study will examine the variation in the spatial accessibility to health within Oyo town using GIS.

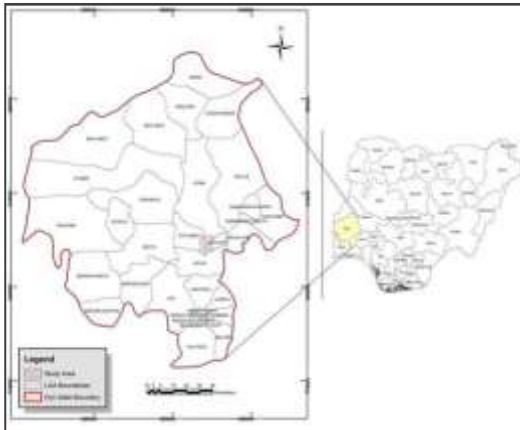
Studies have shown that there is inadequate accessibility to modern health care in developing countries and Nigeria in particular (Uneke et al., 2009). In order to have a clear understanding of inadequate accessibility to health care in the country, there is need to also consider the variation within the country of the inadequate accessibility to health care. Also, the urban sector of any country is never static. It changes per time. In fact, as days and years go by the urban landscape is altered. Development as well as growth in infrastructural amenities affects the land use/land cover (Ade and Afolabi, 2013). Oyo town is not an exception. Thus, there is need to assess the variations in accessibility to modern health care facilities as a result of urban growth. Therefore, the study has identified the gap to fill. Therefore, this study

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will examine how urban growth has led to the variation in the modern health care within the Oyo town using GIS.

### 1.1 Study Area

Oyo is a town in Oyo State, Nigeria (Figure 1). The town and its suburbs comprise of three Local Government Areas (LGA). They are Atiba, Oyo West and Oyo East LGAs. It is located within longitudes 3o54'11.48"E and 3o57'33.46" and latitudes 7o48'18.79"N and 7o52'41.07"N. It is about 52km north of Ibadan, 166km to Lagos and 480km to Abuja. The topography of the town is of gentle rolling low land rising to about 304m above sea level at 'Oke-Apitipiti' to the north of the town. It has an equatorial climate with dry and wet seasons and a relatively high humidity. The dry season lasts from November to March and wet season from April to October. Average daily temperature ranges between 25oC (77oF) and 35oC (95oF). Almost throughout the year, vegetation pattern is that of rain forest. Climate thus favours agriculture and the town is well drained.



**Figure 1:** Map of Nigeria showing Oyo state.

### 2.0 Methodology

This study was carried out in Oyo metropolis. The metropolis was divided into three different developed zones. The division was achieved by using the satellite imagery of different years. The first zone was the core

area of Oyo and satellite imagery of the year 1980 was used. The second and third zones were delimited by satellite imagery of 2000 and 2015 respectively. Satellite imagery of year 2000 and 2015 were used as a result of the fact that there was rapid development of built area between these years compared to the past years. Among other reasons, this development was a result of democracy in Nigeria which increased standard living and automatically increased residents' ability to build more residential building. Both the spatial and non-spatial information of the modern health care facilities will be collected. Primary health care facilities will be separated from the secondary health care facilities. The spatial information will be used to establish the service area or catchment based on drive time and travel distance using spatial analyst tool (ArcGIS 10.2.1). It was the results of the facilities catchment area that will be used to know the variation in accessing the facilities among the segregated zones.

The modern health care facilities in the study area was classified into three based on their delivery system. They were primary, comprehensive and secondary health care facilities. Different criteria were drawn for these three types health care delivery system. For primary health care facilities, a driving time between one to five minutes was used on a speed limit of 50km per hour. However, for both comprehensive and secondary health care facilities, driving time between 1 to 8 minutes was used on the same speed limit of 50km per hour. This is because these health care facilities have more 'range' than primary health care facilities. Also, network analysis tools were used to create the service areas of these modern health facilities. Using the recommended distance away from any health care facilities of 4km by the WHO

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(1997), the appropriate drive time was estimated. Therefore, the appropriate drive time was 3.32 minutes based on speed limit of 50km per hour.

In term of travel distance, different criteria were drawn for the three types of health care delivery system existed in the study area. For primary health care facilities, travelling distance between 1 to 4 Km was used. This criterion for primary health care facilities was used because the recommended distance by WHO (1997) for any public health facilities away from people is between the ranges of 1 to 4 km. For comprehensive and secondary

health care facilities, travelling distance of 1 to 10km was used.

3.0 Analyses and Information Presentation

This section focuses on the analysis of variations in physical accessibility to modern health care facilities among the purposively segregated developed zones in Oyo town, Oyo state. The variation in the number of the modern health care facilities based on ownership types and delivery system among the developed zones were examined. Figure 2 shows how the analysis was done.

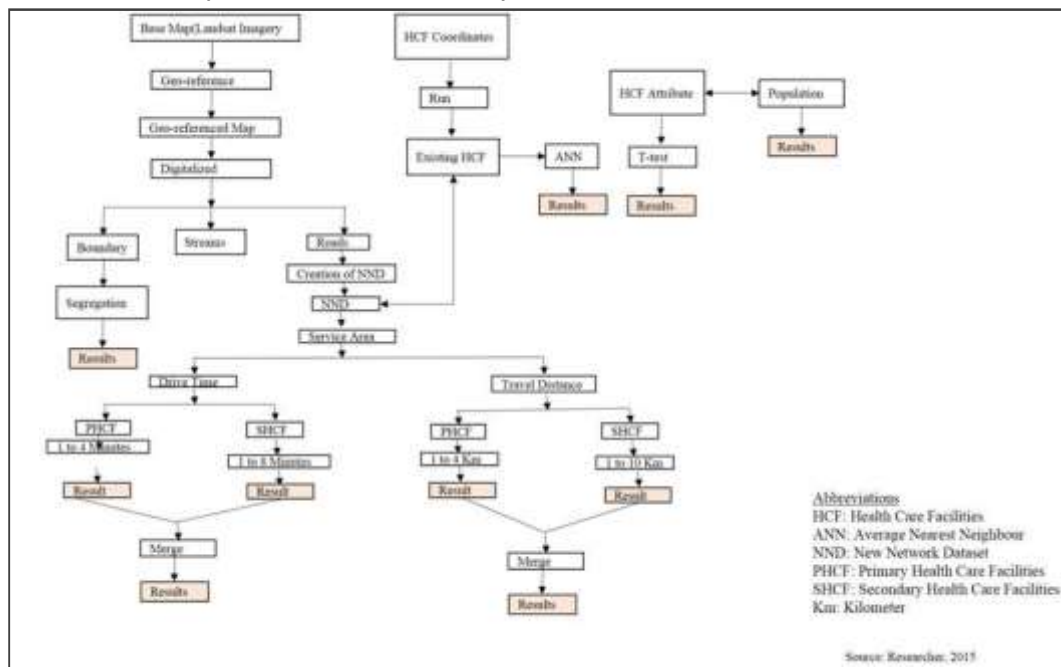


Figure 2: Cartographic Model.

3.1 Distribution of Modern Health Care Facilities

There were variations in number of modern health care facilities in the study area based on the location, ownership types and health delivery system (Table 1). The modern health care facilities varied in number based on the zone in which they were located. There were 14 modern health care facilities in the Old Oyo, 15 in 'old-new' Oyo and 9 in the new Oyo. Also, based on the delivery system, it

was discovered that there were more primary health care facilities than comprehensive and secondary health care facilities in the study area. 68% of the modern health care facilities in the study area were primary health care facilities, 21% were both the comprehensive and the remaining 11% were secondary health care facilities. 47% of the primary health care facilities were in Old-Oyo zone, 30% in 'old-new' Oyo and 23% in New Oyo. Among the

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three zones in the study area, there were more comprehensive and secondary health care facilities in 'old-new' Oyo zone. Out of all the secondary health care facilities in the study area, it was just only one owned by the public or government. There were no tertiary health care facilities in the study area.

Among other reasons, variation in the number of modern health care facilities in the study area based on delivery system and non-existence of tertiary health care facilities can be explained by the principle of range and threshold population especially more of the latter.

**Table 1:** Variation in the Modern Health Care Facilities Based on the Delivery System and Ownership Types.

Zones	Public Owned			Private Owned			Total
	PHC Facilities	CHC Facilities	SHC Facilities	PHC Facilities	CHC Facilities	SHC Facilities	
Before 1980 (Old Oyo)	8	0	0	5	1	1	15
Between 1980 to 2000 ('Old New Oyo')	5	0	1	3	4	2	15
2000 to 2015 (New Oyo)	3	0	0	2	3	0	8
Total	16	0	1	10	8	3	38

In addition, there were variations in the number of modern health care facilities based on the ownership types. There were more private modern health care facilities in the study area (Table 1). Although, selection by attribute showed that was practical difference between private and public ownership, the independent sample t-test results showed that there was no significant difference ( $t(6) = 0.531; P = 0.610 > 0.05$ ) between the number of private health facilities and the public in the study area. There were more private health care facilities in the study area and more in the 'old-new' Oyo than any other zone in the study area. Therefore, practically, there was significant difference between the number of private and the secondary health care facilities in the study area but no statistical significant difference between them.

**3.2 Modern Health Care Facilities Service Area Based On Drive Time.**

From the findings, it was discovered that there were variations in physical accessibility to primary health care facilities as a result of variation in the service area (figure 3).

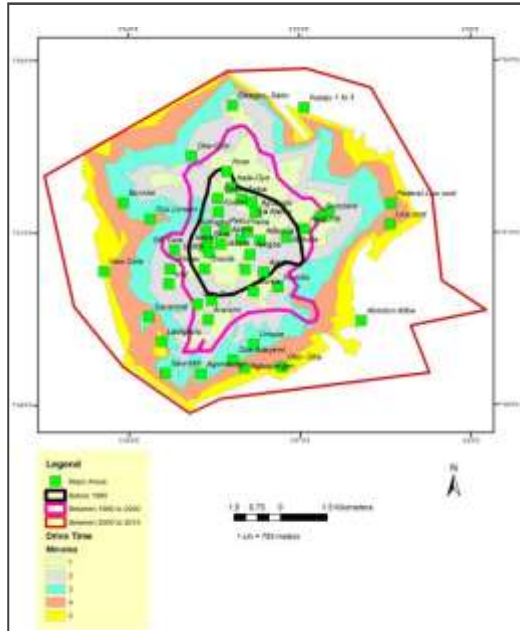
Among the zones, the old Oyo had the closest access to primary health care facilities in term of drive time followed by 'old-new' Oyo. The most distanced area in old Oyo zone had a maximum of driving time of two minutes before accessing the closest facility. This means, the highest driving time people living in old Oyo will drive to access primary health facility was two minutes. For instance, areas like old Iseke, Jabata, Landindin, Opapa, Kolobo etc. will only spend less than or equal to a minutes to access primary health care facilities.

In 'old-new' Oyo zone, the maximum drive time to access primary health care facilities was 3 minutes. Majority of the areas in the zone were between the ranges of 1 to 2 minutes of drive time. Areas like Winner, Iyaji, Durbar, old Cele, Araromi, Isale-Oyo etc. were within the range of 1 minute drive to access the closest primary health care facilities. More so, the study discovered that the minimum drive time for the people in the new Oyo zone to access closest Primary Health Care Facilities to them was 2 minutes. Figure 3 shows that areas like Bonnke,



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Sawmill, Oba-Adeyemi, Ilupeju, federal low cost, Oyo London etc. where with the ranges of 3 to 4 minutes to access closest primary health care facilities. In fact, there were some areas within the new Oyo zone that had to travel more than 4 minutes before accessing closest primary health care facilities.

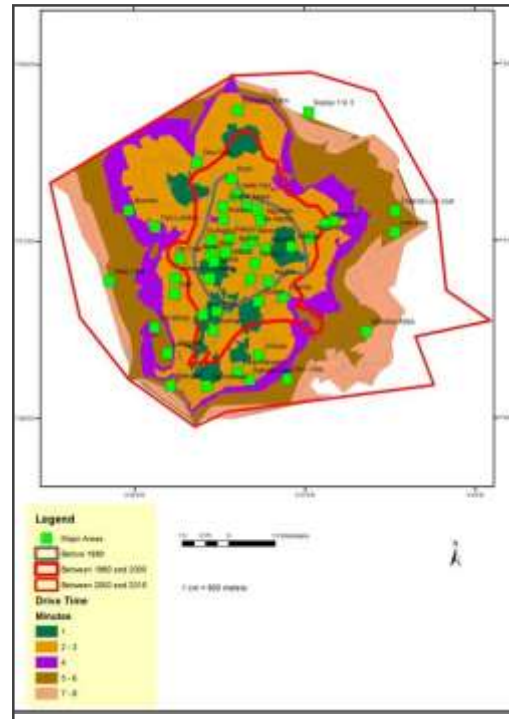


**Figure 3:** Map of Variation in the Served Areas of Primary Health Care Facilities Based On Drive Time.

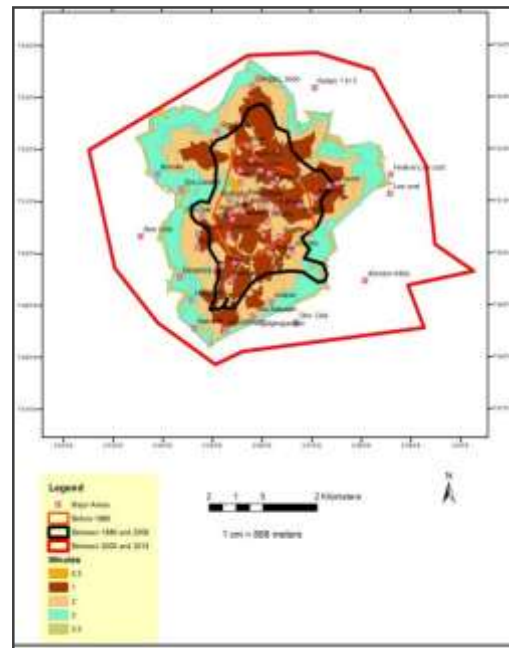
In the same vein, there was variation in physical accessibility to the secondary health care facilities in term of drive time. Among the zones, majority of areas in old Oyo and 'old-new' Oyo had a travel time between 1 to 2 minutes to access closest secondary health care facilities. The majority of areas within the new Oyo had a travel time between 3 to 5 minutes to access the closest secondary health care facilities.

Through the combination of both delivery systems, it was discovered that areas within old Oyo and 'old-new' Oyo zones were within the ranges of 2 to 3 minutes to access any closest modern health care facilities (Figure 4). The areas within the new Oyo zone were within the range of 5 to 6 minutes

driving time to access closest modern health care facilities.



**Figure 4:** Map of Variation in the Served Areas of Modern Health Care Facilities Based On Drive Time.



**Figure 5:** Map of Service Areas of Modern Health Care Facilities Based on Drive Time using WHO standard.

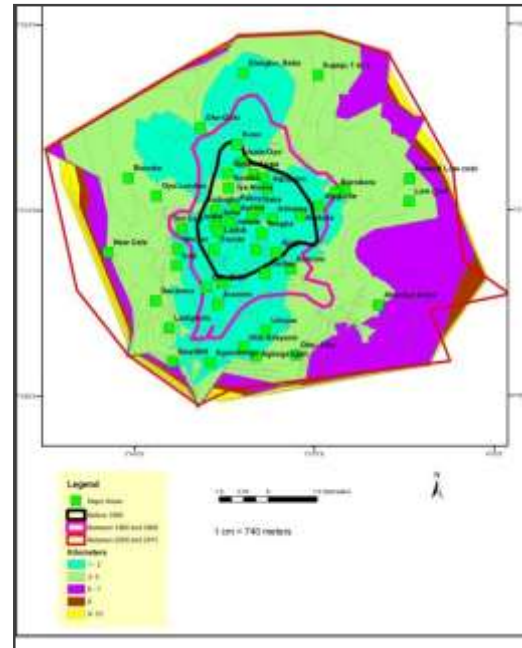
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Using the WHO standard, majority of areas in the new Oyo zone were not covered or served by the facilities (Figure 5). Thus, this unequal physical accessibility in term of drive time among the zones, among other reasons, was as a result of the spatial pattern health care facilities in the study area.

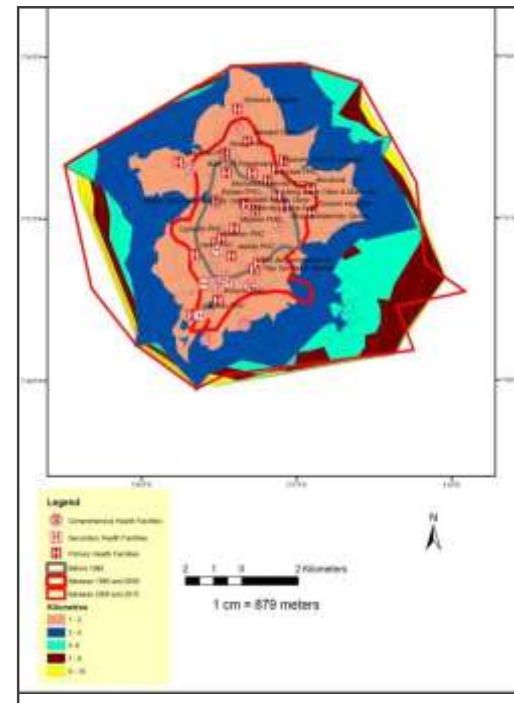
**3.3 Modern Health Care Facilities' Service Area Based On Travel Distance**

From the findings, it was discovered that there was unequal accessibility to primary health care facilities among the zones in the study area. It was discovered that all the areas in both old Oyo and 'old-new' Oyo were within the travel distance of 1 to 2km away from primary health care facilities. In the new Oyo zone, the areas that were served by the facilities were within the ranges of 2 to 4km. In fact, it is important to know that some areas like new Cele and Abiodun Atiba etc. in the new Oyo was not among the service areas covered by the primary health care facilities. In the same vein, old Oyo and 'old-new' Oyo zones were within the travel distance of 1 to 2km away from the secondary health care facilities. The majority of areas in new Oyo were within the range of 3 to 7km away from the facilities (Figure 6). The study has discovered that 'old-new' Oyo were more served by the facilities that the old Oyo because virtually all the areas within 'old-new' Oyo were in the travelling distance less than or equal to 1km away from the facilities. The major reason for this situation was as a result of higher number of the facilities in the 'old-new' Oyo. Generally, from the findings, it was observed that in terms of travel distance, both the primary and secondary health care facilities were closer to the people in old Oyo and 'old-new' Oyo (Figure 7). The areas within old Oyo and 'old-new' Oyo zones were within the ranges of 1 to 2km to access closest

modern health care facilities (Figure 8).



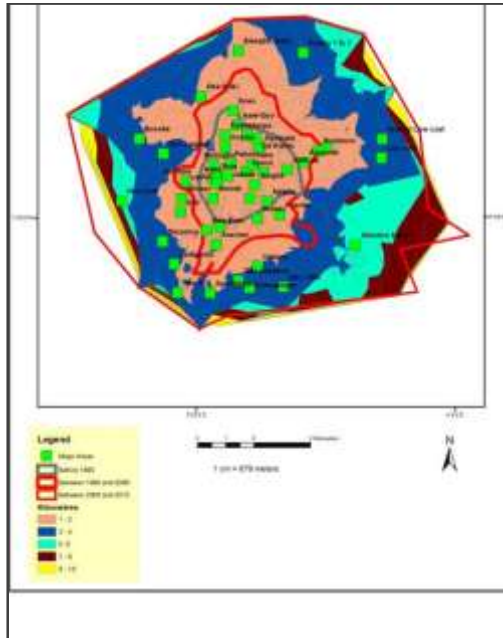
**Figure 6:** Map of Variation in the Served Areas of Secondary and Comprehensive Health Care Facilities Based On Travel Distance.



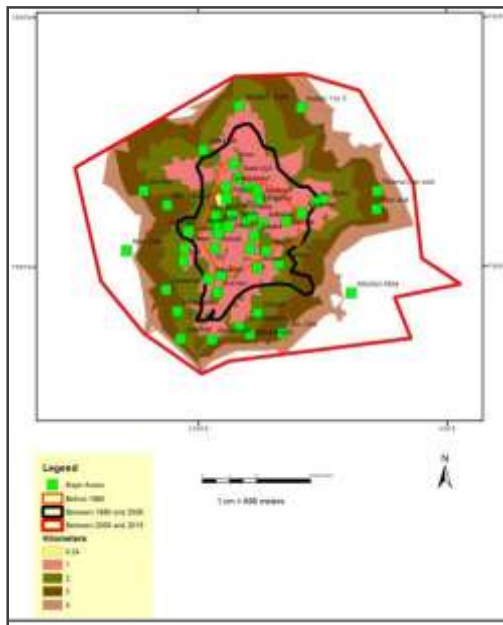
**Figure 7:** Map of Variances in Service Area of the Modern Health Care Facilities Based On Travel Distance.



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**Figure 8:** Map of Variation in the Served Areas of Modern Health Care Facilities Based On Travel Distance.



**Figure 9:** Map of Service Areas of Modern Health Care Facilities Based on Travel Distance using WHO standard.

The majority of areas the new Oyo zone were within the ranges of 3 to 6km travelling distance to access closest modern health care facilities. Thus, this unequal physical accessibility in term of travelling distance

among the zones, among other reasons, was as a result of the spatial pattern of health care facilities in the study area. Using WHO standard of distance away from facilities, majority of the areas in both old Oyo and 'old-new' Oyo were within 1km to any health facilities while new Oyo were within 2-4km (figure 9). Clearly, some areas with in the new Oyo were out of the service areas of the facilities.

**4.0 Conclusion**

As it is a well-known phenomenon, modern health care delivery system is in a poor state in most developing countries generally and Nigeria in particular. In order to have a clear understanding of the how bad the delivery system of the facilities, this study had gone further to assess the nature of disparities to the facilities using spatial elements. There were disparities between new areas and old areas in the study area in accessing modern health care facilities. In term of both drive time and travel distance, new areas were more far away from the modern health care facilities than old areas. There were variations in physical accessibility to modern health care facilities among the developed zones in the study area. Using the recommended distance away from any health care facilities of 4km by the WHO (1997), it was discovered that old Oyo and 'old-new' Oyo were within the range of less than 1 to 4km. However, the majority of areas in new Oyo developed zone were far away from health care facilities more than recommended distance. Using the drive time, based on the recommended distance, both the old Oyo and 'old-new' Oyo were within the catchment or service areas of modern health care facilities in the study area. Similarly, considering the travel distance, majority of the areas in the new Oyo were out of the service areas of modern health care facilities in the study area.

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Clearly, using WHO recommendation, majority of the areas within the new Oyo were out of the physical coverage of modern health care facilities. Therefore, there was unequal physical accessibility to modern health care among the developed zones in the study area.

### 5.0 Recommendations

From the research findings, the following are recommended:

1. There should be establishment of more modern health care facilities especially

primary health care facility in the new Oyo zone.

2. The study has identified a gap to be filled by estimating the population coverage of each health facilities in order to know optimal location to site new health care facilities using location-allocation model. Also, to know whether the variation in the accessibility to modern health has impact in the sick behaviour of the residents.

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