Urbanization, Spatial Distribution of Healthcare Facilities and Inverse Care in Ibadan, Nigeria

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Abstract

The global rate of urbanization outstrips the provision of social services, particularly healthcare. This situation, and the hypothesis that healthcare services are more accessible to people of higher socio-economic groups who live in the best parts of a city than to the relatively poor who live in the other parts of the city, inform this study. The study examines the trend of urbanization in Ibadan, Nigeria, assesses the spatial distribution of healthcare facilities in the city, and establishes the relationship among these and the population's access to healthcare based on their places of residence within the city. Secondary data for the study was analyzed using a combination of Pearson's Product Moment Correlation, ratios, Gini Coefficient and Lorenz Curves. The results show that while the population grew by 12.4% between 1999 and 2014, the number of hospitals and doctors changed by -53% and 38% respectively. These changes increased the hospital-population ratio from 1:1,000 in 1999 to 1:2,600 in 2014. The doctor-population ratio also increased from 1:79,000 to 1:86,000. The population in the more affluent neighbourhoods of the city was also found to have better access to the healthcare facilities when compared with the other neighbourhoods where the bulk of the urban poor reside. The study further showed that the increase in the number of PHCs in the poorest of the LGAs proved to be a determinant in increasing healthcare access for the population in the LGA in 2014. The study concludes that the inverse care and underclass hypothesis hold true in the study area, but that the provision of PHCs, despite their limited level of service provision, can enhance access to healthcare as societies urbanize.

Keywords: urbanization, urban poor, underclass, inverse care, healthcare facilities, Nigeria

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Introduction

The process of population shift from rural areas to urban areas and the gradual increase in the proportion of urban dwellers aptly describe the process of urbanization (Haralanova et al, 2005; Davis, 2006; Eckert and Kohler, 2014). Globally, the urban population increased from 13% in 1900 to 29% in 1950 and 49% in 2005, and it is estimated that by 2030, 60% of the population will live in the cities (United Nations, 2015). Nearly all this projected growth will be in Latin America, Asia and Africa. Asia and Africa particularly are urbanizing faster and are projected to become 56% and 64% urban respectively by 2050. India, China and Nigeria are expected to account for 37% of the projected growth of the world's population between 2014 and 2050 (Aliyu and Amadu, 2017). The process of urbanization is however not devoid of problems. One such problem is that the pace of social services delivery does not match the pace of urbanization and spatial distribution to address the needs of the population. Of these services, healthcare is critical because of the implications of population health for economic development at household and regional levels (WHO, 2016; UN, 2012; Bloom and Canning, 2008; IMF, 2004). Healthcare becomes more important because urbanization has consequences for population health, some of which are negative.

According to some World Health Organization (WHO) statistics, urban air pollution kills around 1.2 million people each year around the world, mainly due to cardiovascular and respiratory diseases (WHO, 2008). The pollution is caused mainly by smoke from motor vehicle exhausts, industrial pollution, domestic power generating plants and other household fuel combustion as a result of urbanization. Between 35% and 50% of urban dwellers in Africa do not have access to safe drinking water, about 60% lack adequate sanitation systems, over 1.2million people die annually from road traffic accidents and more than 50 million people suffer varying degrees of injury (UN, 2003). More than 40% of urban dwellers in sub-Saharan Africa are underweight due to malnutrition (Ruel and Garrett, 2004), while between 12% and 51% of urban adults suffer from one form of depression or the other (Blue, 1999) due to such reasons as exclusion, poverty and other forms of socio-economic instability. About 3% of global urban dwellers are involved in taking illicit drugs and abuse of substances (WHO, 2008), hence, there has been a steady increase in urban violence and homicide (Krug et al, 2002). The urban health situation is, thus, a source of concern.

Of greater concern, however, is the capacity of the urban dwellers to access healthcare for improved health outcomes based on their social class, income, and place of residence within the city. In other words, being an urban dweller does not guarantee access to desired healthcare. Almeida et al (2017) describe access as a set of dimensions that describe the adjustment between the individual and the health care system, as an intermediation between demand and entry into the service. According to Galea and Vlahov (2005), the relationship between provision of health and urban living is complicated and varies between cities and countries. The disparity in wealth distribution among individuals and residential neighbourhoods, for instance, has been found to affect the availability and quality of healthcare (Almeida et al, 2017; Andrulis, 2000; Franks and Fiscella, 2002; Wan and Gray, 1978). Studies have also shown that the distributional pattern of healthcare facilities affects the population's access to healthcare, such that, by virtue of where they reside within an urban center, some segments of the population are either at an advantage or a disadvantage (Ikporukpo, 1987; 2002; Okafor, 1982). A situation where healthcare is more accessible to people of higher socio-economic groups (those who live in the best parts of a city) than to the relatively poor (those who live

in the other parts of the city), and who by virtue of their status are more vulnerable to ill-health, has been described as the inverse care law (Hart, 1971) and the underclass hypothesis (Lineberry, 1976).

In Nigeria, 43.3% of the country's population lived in urban centers in the year 2000, with an expected increase to 58.3% in the year 2020 (Aliyu and Amadu, 2017). This implies that at present, more than half of the Nigerian population lives in urban centers. The poverty index in the country also increased from 27% in 1980 to 54% in 2004, 69% in 2012 (Obadan, 2013), and then to about 70% in 2017, with exacerbated income inequality. The foregoing suggests that the population of the urban poor and the underclass has also been on the increase. The urban poor tend to live in disadvantaged neighbourhoods within the cities, where average income is low, employment is informal, and public services are limited (Grant, 2010). Many of them live in the worst conditions in the cities (Stephens, 2011). On the other hand, urban elites are connected and often have a selection of homes in the best areas of many global cities (Stephens, 2011). In other words, there is a residential agglomeration within the city that is based on income and socioeconomic status. These factors have been found to have implications for health (Adewoyin and Adeboyejo, 2016; Kawachi and Kennedy, 1997; Barker and Osmond, 1991; Anderson and Armstead, 1995; Kennedy et al, 1996; Kaplan, 1996). Nigeria has a rapid rate of urbanization of about 6%, and as with most rapidly urbanizing societies, the country faces the dual challenge of ensuring that pace of provision of social services matches the pace of urbanization, and that the spatial distribution of the services addresses the needs of the population. These two challenges are further constrained by the adoption of the Structural Adjustment Programme (SAP) in Nigeria since 1986. SAP advocates a reduction in government funding and provision of social services (World Bank, 1981; Nigeria, 1986; Williamson, 1990; Colgan, 2002). From the foregoing, there is the need to investigate the nexus between urbanization, the distributional pattern of healthcare facilities and access to such services, based on where people live within the city, which in itself reflects their socioeconomic status.

Following from the above, this study examines the trend of urbanization and provision of healthcare facilities in Ibadan-Nigeria, with the aim of answering the questions: whether there is a spatial bias in the distribution of such facilities, and whether the trend of urbanization and healthcare provision impact access to the facilities. Following Ikporukpo (2002), access in this study is conceptualized as the availability of a facility in close proximity to the population and its affordability. The study becomes important against the background that most previous studies focused largely on health disparity between urban and rural areas as well as its accessibility and outcome dimensions rather than intra-urban access. Onokerhoraye (1976) and Akpomuvie (2010), for instance, concluded that the geographical disparity in the provision of health facilities is most severe between urban and rural areas. In studies where access to healthcare within the urban centers was the focus, the role of urbanization as a determinant was not investigated. Loewenson and Masotya (2015) also carried out a review of 105 studies on health inequality in selected urban areas of Africa and reported that health services are generally available while cost, quality and acceptability constituted barriers and led to inverse care. The studies, however, showed less evidence on social inequalities in health within the urban areas (Loewenson and Masotya, 2015). Furthermore, Dong (2015) posits that while the high rate of urbanization and the high barrier to health care access are two distinct features of many developing countries, the effect of the former on the latter remains unclear.

Materials and Method

Population and Sampling

Using a purposive sampling method, Ibadan, the capital city of Oyo State in South-Western Nigeria, was selected for the study. Ibadan is the largest city in Sub-Saharan Africa and has been an urban center for over 100 years. According to Mabogunje (1968), Ibadan was the most populous city in Nigeria, with a population in excess of 120,000 in 1891. This status was reflected again in the country's censuses of 1952 and 1963 that put the city's population at 459,156 and 627,379 respectively. The city is projected to have more than 3.5m inhabitants at present. Ibadan is located in the more habitable rain forest vegetation belt of Nigeria and situated about 150km north of Lagos, the country's commercial capital and the largest economic hub in West Africa. Other attractions in the city include seats of governments, higher institutions of learning, research centers, teaching hospitals, trade and commerce, and tourism. It is therefore a choice destination for rural-urban and urban-urban migration, a key component of urbanization. The population of the city is spread across 11 local government areas (LGAs), namely Akinyele, Ido, Egbeda, Ona-Ara, Lagelu and Oluyole. Others are the Ibadan North, North-West, North-East, South-West and South-East local government areas. The latter set of 5 LGAs constitutes metropolitan Ibadan while the former make up sub-urban Ibadan. The focus of this study was on the 5 metropolitan LGAs.

The metropolitan LGAs are more urbanized and show more diversification in terms of social stratification, occupation, and residential characteristics. The LGAs have a mix of the traditional and modern Ibadan, with multiple cores (Central Business Districts) around which other land uses in the city revolve. Within each of the metropolitan LGAs, it is possible to find residential neighbourhoods with high, medium and low residential population densities, largely associated with various shades of economic and social classes, unlike in the sub-urban LGAs where residential densities have little or no correlation with economic or social status of the residents. In other words, the low residential density neighbourhoods in the peri-urban areas of Ibadan are mostly due to the large uninhabited and unused expanses of land, undeveloped plots and farmlands, and not as a result of a careful planning for low residential land-use as obtains in the metropolitan area. Working with the background that there is a connection between residential areas and the socio-economic status of the inhabitants (Van de Poel, 2009; Bradshaw and Finch, 2003; Arimah, 1992; Atkinson, 1990 for instance), and using the wealth indices of their component localities (Adewoyin, 2015), the Ibadan North LGA is the most affluent of the LGAs in the study area, followed by Ibadan South-West, Ibadan North-West, Ibadan North-East and Ibadan South-East. The map of the study area is shown as Figure 1.

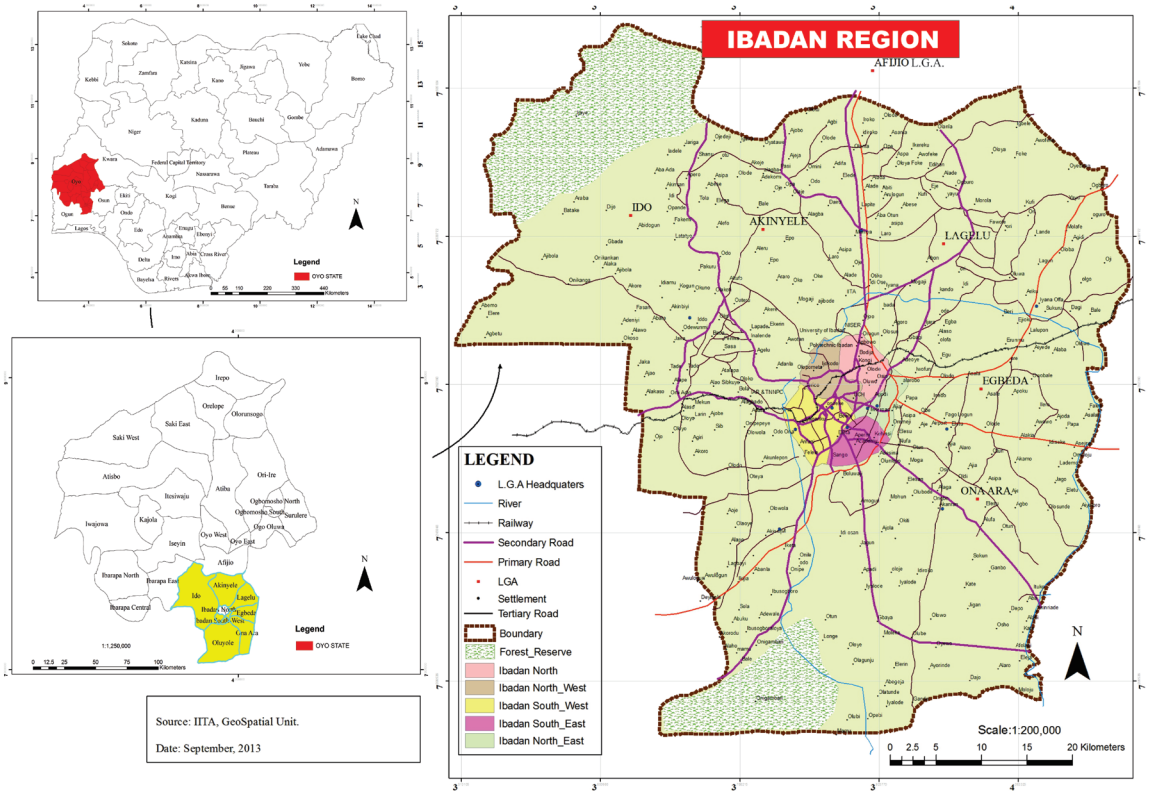

Figure 1: Map of Ibadan
Source: IITA, Geospatial Unit, 2013

Data Sources and Analysis

The study employed secondary data. Population growth was used as a corollary of urbanization in this study. Data on population distribution for the LGAs were sourced from the records of the National Population Commission (NPC) of Nigeria. To measure access to the healthcare facilities in the study area, data on their location and distribution were collected from the Oyo State Ministry of Health (OYMOH). The specific datasets collected were the number and location of public and privately owned facilities as well as the number and distribution of doctors in the government owned facilities. The study covered the period between 1999 and 2014 to coincide with the years of collation for the publication of comprehensive health facilities compendiums by the Oyo State Ministry of Health. Access is used to refer to the availability of a facility within the LGAs and whether or not it is patronized by the population.

The data were analyzed using simple frequency, ratios, Gini Statistics and Lorenz Curves. Where required, population projections were carried out using the annual growth rates advised by the NPC. In computing the ratios of access, weights were assigned to each facility type based on their position in the hierarchy of healthcare facilities. This was done to achieve a sort of balancing in the distribution, such that a teaching hospital would not count the same as a primary health center (PHC) because of the substantial difference in the levels of services provided, number of resources and personnel. In the study area, the PHCs are the lowest in the hierarchy of health care provision. They typically have a single doctor, one or two nurses, between 0 and 5 beds and no diagnostic laboratory, which is in contrast with teaching hospitals with their tertiary level of healthcare services. Analyzing the facilities in absolute terms, thus, equates a PHC with

a teaching hospital in spite of the wide disparity between them. Hence, PHCs were ranked 1, State and General hospitals and private hospitals were ranked 5 and teaching hospitals were assigned the rank of 10.

Results and Discussion

Population Growth Trend in Ibadan

According to the 1991 population census, Ibadan North had a population of 302,271 while Ibadan North-East and Ibadan North-West had a population of 275,627 and 147,918 respectively. Ibadan South-East had 225,800 inhabitants and Ibadan South-West, 277,047. This implied that as at 1991, with a 24.6% share of the population, Ibadan North had more people living there than in any of the other Ibadan LGAs. Ibadan South-West had 22.6% of the population and Ibadan North-East LGA, 22.4%. Ibadan South-East and Ibadan North-West LGAs had the lowest shares of the population with 18.4% and 12.0% respectively. Using the Nigerian National Population Commission (NPC) annual population growth rate of 2.8% for the period under review, the figures for the 5 LGAs were projected to 1999. The 2006 census figures for each of the LGAs (see Table 1) were equally projected to 2014 using a growth rate of 3.2% per annum as advised by the NPC (NPC, 2015).

From the 2006 census figures, the population of Ibadan North-East LGA had surpassed that of Ibadan North, as its share of the population had grown to 24.7% from 22.4% in the preceding years, whereas Ibadan North's share of the population declined from 24.6% in the 1991-1999 period to 22.9% in the 1999-2006 period. The other LGAs maintained their ranks in terms of population size, albeit with slight variations in the proportion of their respective shares of the population. For instance, the population of Ibadan South-East LGA increased in share from 18.4% to 19.9% as that of Ibadan North-West declined from 12.0% to 11.4%. Ibadan South-West lost 1.4% of its share in 2006 when compared with the preceding years. Since the projected figures for 1999 used the same growth rate for all the LGAs, it is assumed that the proportion has remained the same as that of the base year. The same can be said of 2014 figures projected from 2006 using a common population growth rate.

Table 1: Population Distribution of Ibadan 1991 – 2014

IBADAN LGAs	1991 Population Figures	1991 Proportion	1999 Projected Pop Figure	2006 Population Figure	2014 Projected Pop Figure	2006 / 2014 Proportion
Ibadan North	302,271	24.60	376,992	306,795	394,722	22.92
Ibadan North-East	275,627	22.43	343,762	330,399	425,091	24.68
Ibadan North-West	147,918	12.04	184,483	152,834	196,636	11.42
Ibadan South-East	225,800	18.38	281,618	266,046	342,295	19.87
Ibadan South-West	277,047	22.55	345,533	282,533	363,574	21.11
Total	1,228,663	100.00	1,532,388	1,338,607	1,722,318	100.00

Source: National Population Commission and Authors' Computation 2017

An analysis of the growth trend between the years 1991 and 2014 shows that the population figures increased progressively until the year 2006 when they declined slightly. Ibadan North LGA for instance had the highest decline of about 18.6% as against the 5.5% decline in Ibadan South-East LGA. The figures have subsequently increased by 28.7% across the LGAs as projected. The fluctuations may be attributed to over estimation of the growth rate between 1991 and 1996, under-estimation of incidences of mortality and out-migration, or

counting errors. Nonetheless, the trend (illustrated in Figure 2) also shows a positive correlation between the years and population figures with a correlation coefficient (r) of 0.71. This implies that in the study area, population increases yearly, thereby corroborating the projections of a rapid urbanization rate in Africa, fueled largely by population growth in Nigeria (United Nations, 2015; Aliyu and Amadu, 2017).

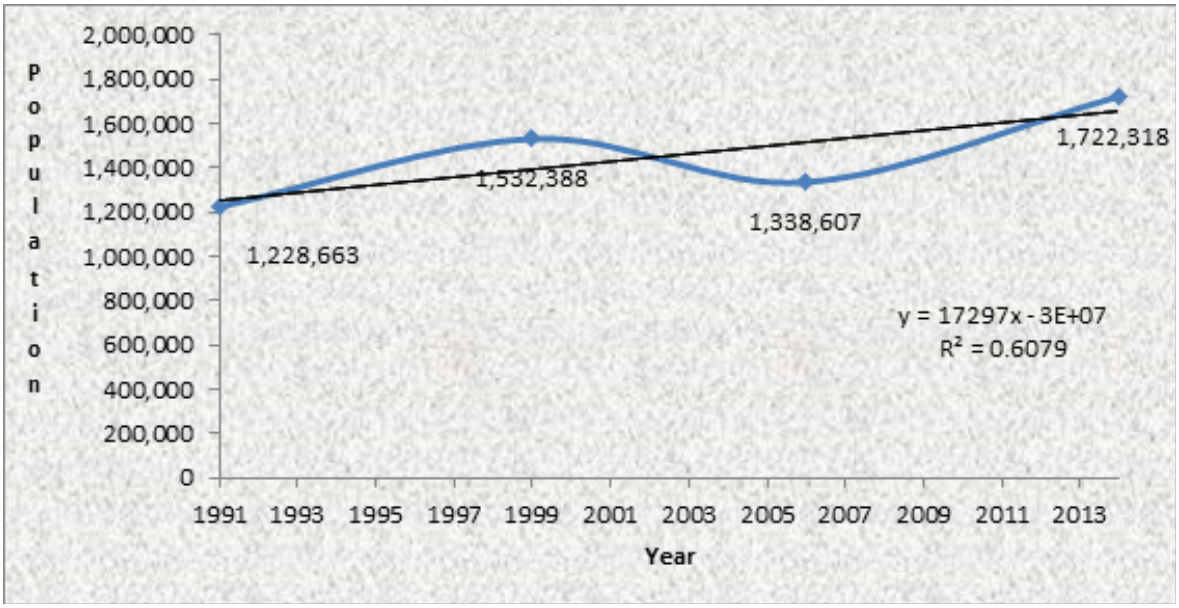

Figure 2: Population Growth Trend in Ibadan 1991 – 2014

Source: Authors' Analysis 2017

Distribution of Healthcare Facilities in Ibadan

Healthcare facilities include hospitals, hospital wards and hospital beds. In this study, we conceptualize healthcare facilities to include other healthcare resources, health personnel (like doctors, pharmacists, nurses, and other health workers involved in treatment of patients), health education and health awareness. This paper focused on the number of hospitals and doctors in public service. There were 438 hospitals in 1999, about 85% of them privately owned. Ibadan South-West LGA had the highest proportion of the privately owned facilities (37%), but was second to Ibadan North with respect to government hospitals. Ibadan North had the highest number of government hospitals while all the government hospitals in Ibadan South-East LGA were PHCs. Ibadan North LGA also had the highest number of doctors owing to the presence of the University College Hospital (UCH), a tertiary health facility. After 16 years, the number of private hospitals had declined by 72.5% to 103 while the number of government hospitals had grown from 64 to 103. The distribution is summarized in Table 2. It is believed that the decline in the number of private hospitals is due to a combination of several factors. These include outright closure of the facilities due to the death or relocation of the proprietors who in most cases were also the doctors in charge; poor income that did not cover operational expenses due to low patronage; and forced closure by government for reasons which include tax default. It is also possible that the ministry of health compiled the list merely based on the number of private hospitals that were duly registered with it. In other words, there may be other private hospitals not captured in the government records because they had not applied to the government for registration.

Table 2: Health Facilities in Ibadan 1999 and 2014

Year	1999	2014	1999	2014	1999	2014	1999	2014	1999	2014
LGAS	Teaching Hospital		State / General Hospital		Pry Health Center / Clinic		Private Hospital		Public Doctor	
Ibadan North	1	2	1		19	19	108	16	219	304
Ibadan NE			2	2	5	24	61	21	4	7
Ibadan NW			1	1	8	14	47	19	10	14
Ibadan SE					7	16	21	28	1	1
Ibadan SW			4	4	16	21	137	19	58	76
Total	1	2	8	7	55	94	374	103	292	402

Source: Extracted from the Records of Oyo State Ministry of Health, 2016

By 2014, Ibadan South-East LGA had most of the private hospitals (27.1%) while the total number of PHCs had increased by 71%. The number of doctors had also increased by 38%, with Ibadan North still recording the lion's share (75.6%) while Ibadan South-East had 0.25% of doctors. Situating this distribution within the spatial distribution of wealth and socioeconomic status of the LGAs shows that Ibadan North, the wealthiest of the LGAs, had more public hospitals and doctors than the other LGAs, and had the second highest number of private hospitals. Ibadan South-West LGA, the second wealthiest, came first in the distribution of private hospitals and second in the share of public hospitals and doctors. On all the indicators of healthcare employed for the study, Ibadan South-East LGA, with the majority of its population belonging to the lowest socioeconomic class, had the least numbers of hospitals and doctors. This distribution confirms that place of residence within an urban center confers both advantages and disadvantages on the population (Wan and Gray, 1978; Ikporukpo, 1987; 2002; Okafor, 1982; Andrulis, 2000; Franks and Fiscella, 2002; Almeida et al, 2017).

Population Growth and Access

From the above, healthcare facilities are not evenly distributed in the study area. With the variation in the population sizes of the LGAs, accessibility must vary as well. Access in this context refers to the number of facilities available to the population, whether they choose to use them or not. This is variously referred to in the literature as hospital to population ratio, doctor to patient ratio, etc. The facilities in the study area were ranked and weighted to reflect the hierarchy of services provided in them. The PHCs were weighted 1, State/General Hospitals, 5 and Teaching Hospitals, 10. With the ranking, the total weighted number of hospitals in the study area becomes 1,975 and 664 for the years 1999 and 2014 respectively. The numbers of doctors were analyzed in absolute terms. The ratios of access are summarized in Table 3. The analysis shows that in 1999, Ibadan South-West LGA had 479 people to a hospital, and thus emerged as the best ranked LGA in terms of hospital to population ratio. In Ibadan North and Ibadan North-West, there were 657 and 744 people to a hospital respectively. Ibadan North-East and South-East had more than a thousand people to a hospital. Ibadan South-West also had the best doctor to population ratio of 1:5,957, while there were almost 300,000 people to a doctor in Ibadan South-East in 1999. In 2014, all the LGAs but Ibadan South-East witnessed an increase in the hospital to population ratio, with the minimum number of people to a hospital being 1,725 for Ibadan North-West and 3,317 for Ibadan North. With a doctor to patient ratio of

1:1,298, Ibadan North had the minimum ratio among the LGAs while Ibadan South-East had only a doctor to about 350,000 people.

Table 3: Ratio of Access to Healthcare Facilities in Ibadan 1999 and 2014

LGAS	Hospital:Pop Ratio 1999	Hospital:Pop Ratio 2014	Doctor:Pop Ratio 1999	Doctor:Pop Ratio 2014
Ibadan North	1:657	1:3,317	1:1,721	1:1,298
Ibadan NE	1:1,074	1:3,058	1:85,941	1:60,727
Ibadan NW	1:744	1:1,725	1:18,448	1:14,045
Ibadan SE	1:2,514	1:2,194	1:281,618	1:342,295
Ibadan SW	1:479	1:2,673	1:5,957	1:4,784

Source: Author's Computation, 2017

The distributional pattern of the facilities was also analyzed for equality of distribution among the LGAs, with respect to the population distribution of the LGAs, using the three complementary models of Coefficients of Advantage (CoA), the Lorenz Curve and the Gini Coefficient. Essentially, the models recognize the population factor in the location and allocation of resources over space, and the output of one serves as the input of the other. The CoA is simply the percentage share of facilities divided by the percentage share of population. An equal distribution will be such that an LGA's share of a facility is commensurate with its share of population, thus giving a Coefficient of Advantage of 1.00. A coefficient greater than unity implies that the LGA has more facilities than its share of population, while a coefficient that is less than unity indicates the reverse (Smith, 1979). The Lorenz Curve is plotted using the CoA while the Gini Coefficient is derived from the curve. The Gini Coefficient (G) measures the degree of inequality in a distribution with values ranging from 0 to 1 (100%). The closer the value of G is to 1 (100%), the greater the inequality in the distribution. Table 4 and Figures 3 – 6 illustrate the distributional inequality.

Table 4: Coefficients of Advantage of Healthcare Facilities 1999 and 2014

LGAS	**CoA of Hospitals 1999**	**CoA of Hospitals 2014**	**CoA of Doctors 1999**	**CoA of Doctors 2014**
Ibadan North	1.18	0.78	3.05	3.30
Ibadan North-East	0.72	0.85	0.06	0.07
Ibadan North-West	1.04	1.50	0.28	0.31
Ibadan South-East	0.31	1.18	0.02	0.01
Ibadan South-West	1.62	0.97	0.88	0.90

Source: Authors' Computation, 2017

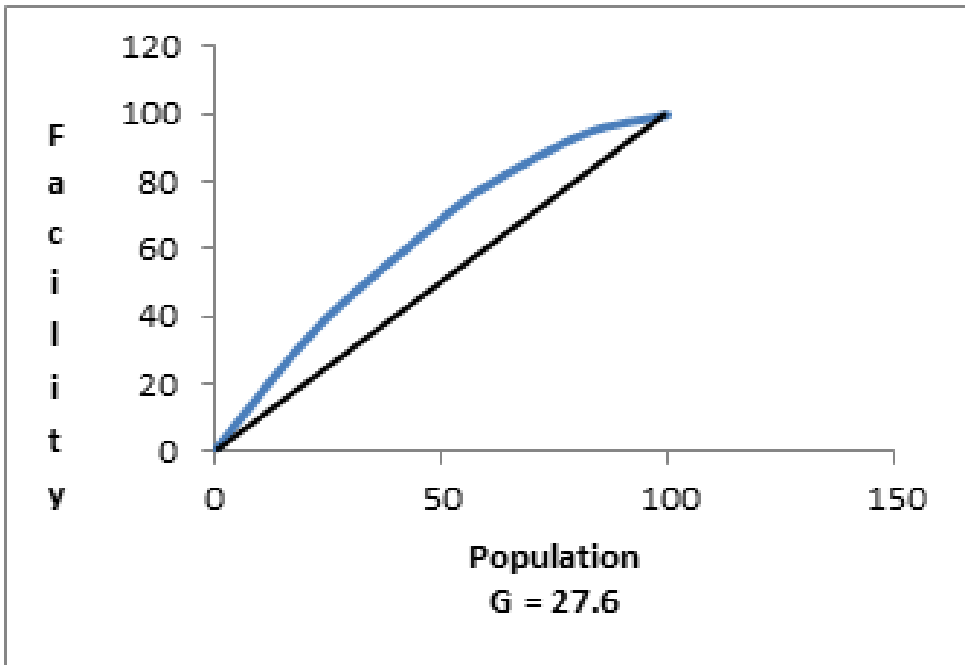

Figure 3: Lorenz Curve of Hospital Distributions in Ibadan, 1999

Source: Authors' Computation, 2017

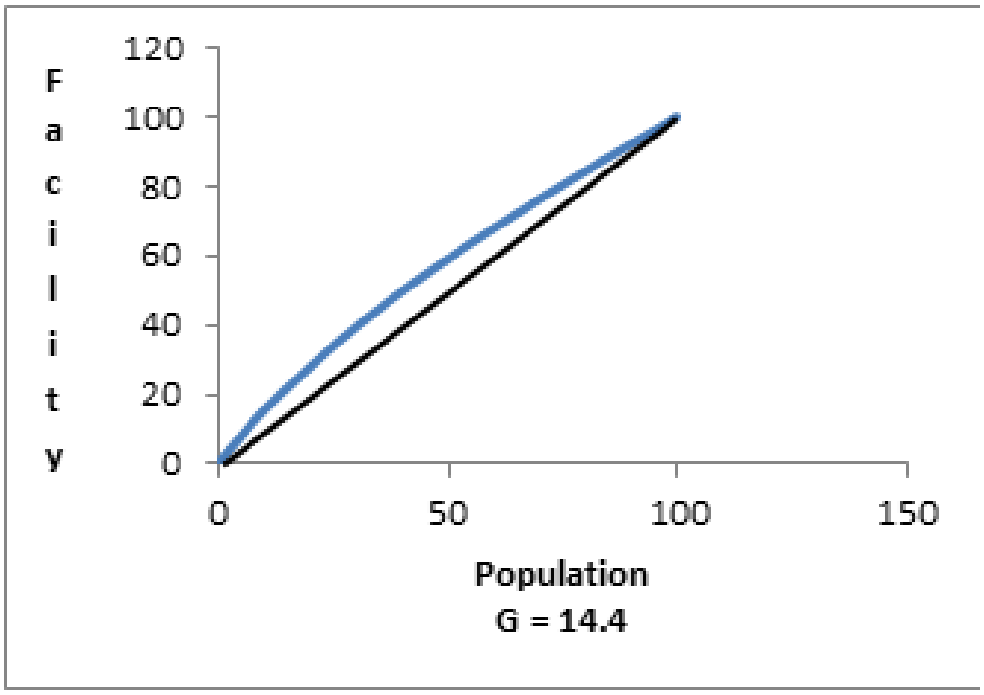

Figure 4: Lorenz Curve of Hospital Distributions in Ibadan, 2014

Source: Authors' Computation, 2017

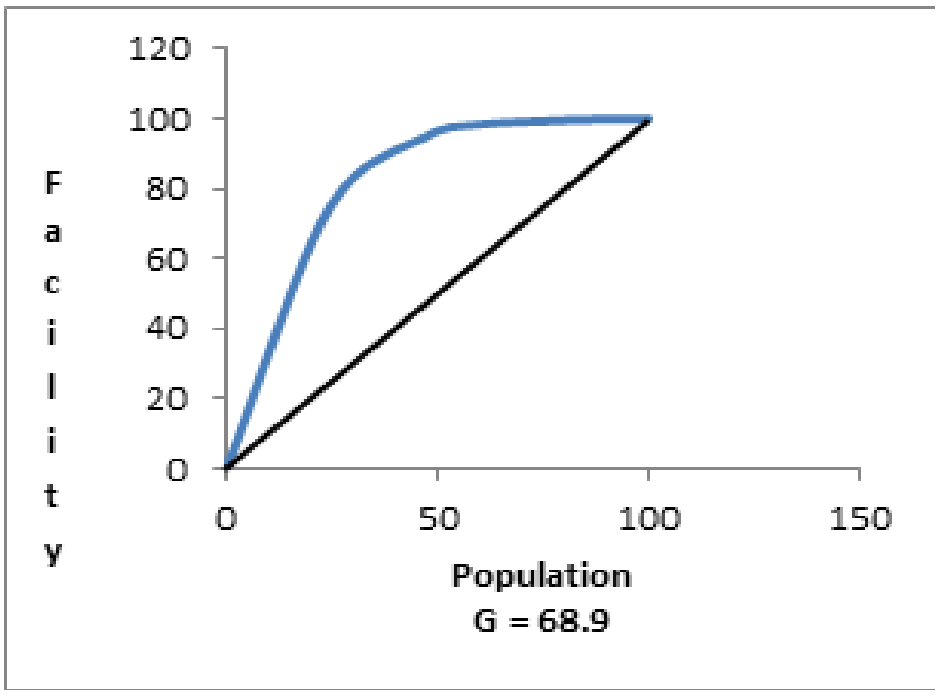

Figure 5: Lorenz Curve of Doctors Distributions in Ibadan, 1999

Source: Authors' Computation, 2017

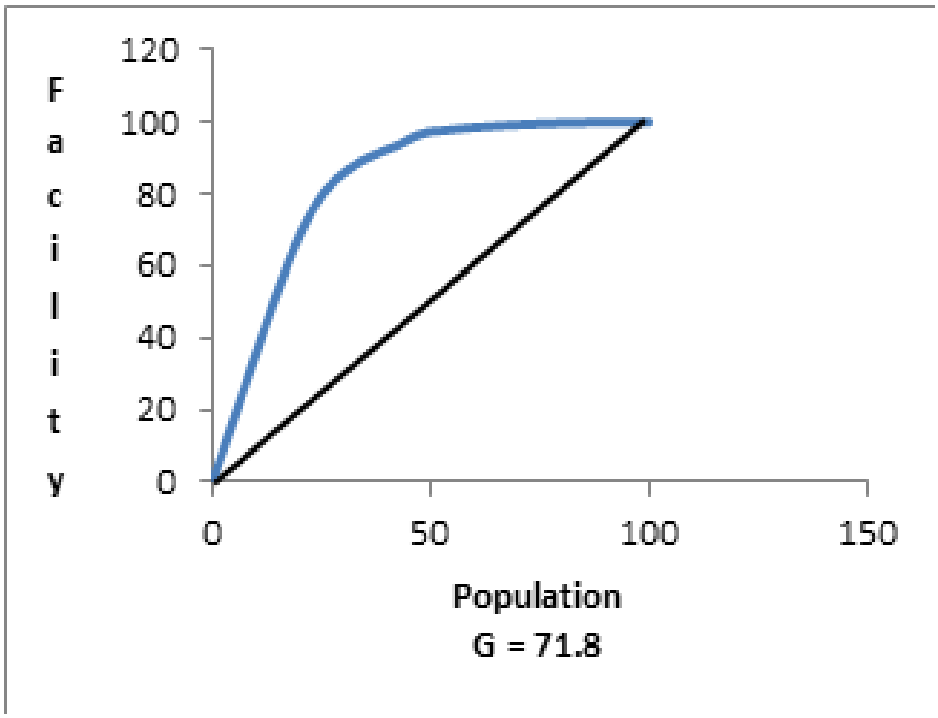

Figure 6: Lorenz Curve of Doctors Distributions in Ibadan, 2014

Source: Authors' Computation, 2017

Relative to the population sizes of the LGAs, the inequality in the distribution of hospitals reduced by 13% between 1999 and 2014. Most of the private hospitals were located in Ibadan South-West and Ibadan North LGAs in 1999 and this skewed the distribution in their favour. With the reduction in the number of hospitals, mostly affecting the private hospitals, both LGAs witnessed a drastic decline in their share of hospitals. This contributed to the reduction in the degree of inequality in the distribution of hospitals among

the LGAs. In contrast, the number of doctors increased from 292 to 402 in the 16-year period, translating into a 38% growth. This growth, however, ensured that the doctor to population ratio reduced slightly in all the LGAs except Ibadan South-East. For instance, the average doctor to population ratio was one doctor to 28,000 people in 1999 and this improved to one doctor to 20,000 people in 2014 when the South-East LGA figures were excluded from the computations. When the figures are included, the doctor to population ratio in the entire study area would have increased from about 1:79,000 in 1999 to 1:85,000 in 2014. This clearly shows that the distribution of doctors is unequal and Ibadan South-East LGA is the most disadvantaged in the distribution. The Gini Coefficients of doctor distribution in 1999 and 2014 equally show this. The degree of inequality was 68.9% in 1999 but widened to 71.8% in 2014. While the number of doctors actually increased within the period, their distribution was less equitable; infact, it worsened the existing degree of inequality by 3%.

From the foregoing, the number of hospitals in the study area decreased by almost 50% between 1999 and 2014 whereas the population increased by 12% within the same period. The decline in the number of hospitals further reduced the population's access to the hospitals as the hospital to population ratio increased severalfold except in Ibadan South-East LGA. At the city level in 1999, each hospital served an average of 1,000 people, but with the increase in population and a decline in the number of hospitals, there were about 2,600 people to a hospital in 2014. Beneath this general outlook however, the population in Ibadan South-West LGA and Ibadan North (the two most affluent LGAs) had the best level of access to healthcare in 1999, while Ibadan North-East and South-East LGAs (the two poorest LGAs) had the worst. Ibadan North-West was average in terms of access, as it was in wealth distribution. The same pattern of access was recorded on the doctor: population ratio among the five LGAs in 1999, except that Ibadan North displaced Ibadan South-West as the best. These findings corroborate the hypothesis that the underclass, relative to their health needs, experience inverse care (Hart, 1971; Lineberry, 1976; Smith, 1995; Asoka et al, 2013; Mander, 2015; and Nambiar et al, 2016).

By 2014, and with increased population across the LGAs, the population in Ibadan North-West had the best level of access to hospitals, followed by Ibadan South-East and Ibadan South-West, while Ibadan North-East and Ibadan North brought up the rear. This suggests that while LGAs were becoming more urbanized, the number of facilities in Ibadan North was outstripped significantly by the LGA's population, hence its dropping from the second rank in 1999 to the 5th in 2014. Conversely, Ibadan South-East, with no Teaching or General Hospital but a mere 7 Primary Health Care (PHC) centers and 21 private hospitals in 1999, witnessed an increase in the number of PHCs and private hospitals to 16 and 28 respectively in 2014. This increment enhanced access to healthcare in the LGA as it experienced its own share of population growth. An important point from this finding is that while the PHCs are the lowest in the hierarchy of healthcare provision in the country, its provision and availability has a positively disproportionate impact on the population's access to healthcare and provides a pathway for addressing the health of the underclass and the urban poor. The provision of more PHCs in Ibadan South-East LGA, however, did not impact the LGA's doctor to population ratio. This is because in Nigeria, the PHCs are run by the Departments of Health in the LGAs and each has only a single doctor who is more of an administrator heading the department. In other words, PHCs are populated by nurses and other categories of health workers. Hence, irrespective of how many PHCs are available in an LGA, there is only a single doctor in charge. Access to doctors in

1999 did not differ in ranking among the other LGAs, nor in 2014, with the more affluent neighbourhoods performing better than the less affluent LGAs. Ibadan North had the best access followed by Ibadan South-West, North-West, North-East and South-East in that order.

Conclusion

This paper has shown that within a period of 16 years, the population of Ibadan grew by 12.4% while the number of hospitals and doctors changed by -53% and 38% respectively. This scenario worsened the hospital to population ratio, from an average of 1 hospital to 1,000 people, to 1 hospital to 2,600 people. In spite of the increase in the number of doctors over the period of study, the doctor to population ratio also increased to 85,000 people to a doctor as against 79,000 people to a doctor at the outset. Within the city, the more affluent LGAs had better access to the healthcare facilities in 1999 as well as to the doctors in both 1999 and 2014 when compared to the other LGAs where the bulk of the urban poor reside. This shows that there is a spatial bias against the less affluent in the provision of healthcare facilities within the urban center. The study further showed that the increase in the number of PHCs in the poorest of the LGAs proved to be a determinant in increasing healthcare access for the population in the LGA in 2014. This suggests that while the PHCs may be limited in the level and quality of healthcare services provided, their availability matters for enhanced access as societies continue to urbanize.

Acknowledgements

We acknowledge the Oyo State Ministry of Health for providing us with the data on healthcare facilities and Prof. Aina Thompson Adeboyejo for helping to shape the study's conception.

Contribution of Authors

YA conceived the study, carried out the analysis and wrote the first draft of the manuscript. NAC and LMS reviewed the relevant literature and revised the manuscript to address the reviewers' comments. All authors wrote, proof-read and approved the final manuscript.

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