Geographical Analysis of the Patterns of Healthcare Facilities and HIV/AIDS Response Sites in Benue State, Nigeria

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Abstract: This study analysed the spatial patterns and characteristics of healthcare facilities and HIV/AIDS response sites; and the relationship between the distribution of population and healthcare facilities/HIV/AIDS response sites in Benue State, the State with the highest record of HIV/AIDS in Nigeria. Primary and secondary data were used for the study. GPS receiver was used to obtain the geographic coordinates of healthcare facilities and HIV/AIDS response sites; and questionnaire to acquire attribute data of the sites. The secondary data used included the list of all healthcare facilities at community and LGA levels, maps, and the population of the state. The spatial analyses of the phenomena of interest were done based on the LGAs. All the 1243 healthcare facilities in the 23 LGAs of the state were captured in the study. Four key HIV/AIDS services (VCT, PMTCT, ART and HBC) were purposively selected for the study. The analogue map of Benue State was processed and used for various GIS analyses and cartographic enhancement for the purpose of report presentation. The study identified three categories of Healthcare Facilities (primary, secondary and tertiary) in the state. There existed spatial variation in the distribution of the various healthcare facilities in the state. The PHCs were observed to be more widely distributed in the state (93.4%) than the SHCs (6.3%) and THCs (0.2%) which were observed to be largely concentrated in the urban LGAs. Also, specialised HIV/AIDS services like PMTCT and ART were observed to be concentrated in the urban LGAs. The population/Facility ratio for PHCF, SHCF and THCF were 2,371:1; 34,413:1; and 1,376,539:1 respectively. There existed a direct relationship between both population and distribution of healthcare facilities (r = 0.694, p > 0.5); and population and the distribution of HIV/AIDS response sites (r = 0.664, p > 0.5) in the state. The study concluded that the problem of HIV/AIDS in Benue State is more engendered by the paucity of information about the availability of response sites than their inadequacy; and recommends that a robust database for healthcare facilities and HIV/AIDS response sites be developed at all levels in order to enhance information flow to policy formulators and by extension people who require healthcare and HIV/AIDS services.

Keywords: Benue state, healthcare facilities, HIV/AIDS response sites, Nigeria, population.

1. INTRODUCTION

The distribution questions have continued to be vital in both academic and policy formulation circles because it is recognised that despite the provision of additional facilities in different locations, the question of the population served by these facilities in still very crucial in the assessment of the efficiency and optimality of such facilities [1].

The location of healthcare facilities, within which the Human Immuno-deficiency Virus and the Acquired Immune Deficiency Syndrome (HIV/AIDS) response sites are mostly located, is an important aspect of healthcare provision. The challenge of HIV/AIDS has been an issue of global concern, especially in developing and resource constrained countries of Africa, which today is the continent with the highest incidence of the disease [2].

In Nigeria, the first case of AIDS was identified in the mid-1980s and HIV incidence in the country reached a peak of 5.8% (among women attending antenatal) in 2001 [2]. Hence, Nigeria became the country with the third highest level of infection in the world, coming behind India and South Africa respectively. Spatio-temporal variations exist in the prevalence of the disease. As at 2001, estimates showed that the incidence of the disease in the North-Central geopolitical zone of the country was 7.0%; 5.8% in the North-East and South-South respectively, 4.2% in the South-East, 2.7% in the North-West and 2.3% in the South-West. By 2006, the incidence had reduced to 6.1% in the North-Central, 4.3% in the North-East and 5.3% in the South-South zone. However, in the South-East, North-West and South-West, the prevalence of the disease had increased to 4.7%, 3.5% and 2.6% respectively [2]. Estimates showed that as at
2. METHODOLOGY

2.1. The Study Area

Benue State, lies between Latitudes 6º 25' 54" and 8º 9' 34" North of the Equator and Longitudes 7º 29' 20" and 9º 56' 18" East of the Greenwich Meridian, covering a land area of about 30,800 km². It is situated within the Lower Benue Trough which separates the north-central highlands from the south-eastern scarplands and the Cross River Plains. The State is located in the North Central geo-political zone of Nigeria, and bordered by Nassarawa State in the north, Taraba State in the east, Enugu, Ebonyi and Cross River States in the south and Kogi State in the west (see Fig. 1).

2.2. Data Sources and Acquisition

Primary and secondary data were used for the study. The primary data involved the use of Global Positioning System (GPS) receiver to obtain the geographic coordinates of the location of healthcare facilities and HIV/AIDS response sites. The questionnaire, among other issues, sought information about the characteristics of each facility, and type of HIV/AIDS services provided. The secondary data included the list and addresses of all the healthcare facilities (HCF) in the state obtained from the State’s Ministry of Health. Also the population figures of the State and LGAs were derived from the records of the National Population Commission, Abuja.

2.3. Data Collection Procedure

The unit of spatial analyses of the patterns of HIV/AIDS treatment centres was conducted at the LGA level. All the 1243 healthcare facilities in the 23 LGAs of the State were captured in the study. Using the list of all registered health care facilities obtained from the State Ministry of Health, which contains the name and address of each facility, it was easy to navigate to where the facilities were located. For every facility mapped; a questionnaire was administered to the proprietor or the head of the facility.

Four HIV/AIDS services were purposively selected for the study, these were voluntary counselling and testing (VCT), prevention of mother to child transmission (PMTCT), administration of anti-retroviral therapy (ART), and home based care (HBC).

2.4. Data Preparation and Analysis

The analogue map of Benue State was scanned and exported to ArcGIS software, where it was georeferenced using the Universal Transverse Mercator, Zone 32N.
Geographical Analysis of the Patterns of Healthcare Facilities

The spatial pattern of the HCFs and HIV/AIDS response sites and their characteristics in Benue State were analysed using both GIS tools and simple frequency count. The geographic coordinates of all the HCFs were located on the LGA map of the State to show a quick view of the spatial patterns. Then, query analyses were carried out to represent the various categories (Primary, secondary and tertiary) of HCF. Furthermore, the frequency distribution of the facilities was performed and discussed. This was done in phases, first, the general patterns of HCFs, and then the various tiers. Thereafter, the spatial patterns of specific HIV/AIDS response sites (VCT, PMTCT, ART, and HBC) were analysed and represented cartographically.

3. RESULTS AND DISCUSSION

3.1. Spatial Distribution of Healthcare Facilities in Benue State

The location of the 1,243 HCFs in the state is shown in Fig. 2. The HCFs were made up of three different categories representing the three tiers of HCF in Nigeria – primary (93.4%), secondary (6.3%) and tertiary (0.2%), (see Table 1). In all, Gboko LGA with 107 (8.6%) HCFs had the highest number in the State. This was followed by Ushongo LGA with 80 (6.4%) and Otukpo with 78 (6.3%). Makurdi, Konshisha and Ukum LGAs accounted for 73 (5.9%), 68 (5.5%) and 67 (5.4%) respectively. Ado LGA had 13 (1.0%) HCFs, the least in the State.
In order to depict the distribution of HCFs according to the various tiers, the number of the various categories of HCFs in each LGA were aggregated and used in showing the LGA scenario. Data showed that the Primary Healthcare Facilities (PHCFs) were more widely distributed across the various LGAs than both the Secondary Healthcare Facilities (SHCFs) and the Tertiary Healthcare Facilities (THCFs), which were concentrated in mostly urban LGAs such as Makurdi, Gboko and Otukpo.

Specifically, Makurdi LGA had 21 SHCFs which represented 26.3% of the 80 SHCFs in the State. This was followed by Gboko 16 (20%), and Otukpo11 (13.8%). No SHCF was recorded in Ado, Agatu, Guma, Konshish and Ohimini. There were only two THCFs in the State and the two were located at Makurdi, the State capital (see Fig. 3).

3.2. Spatial Patterns of HIV/AIDS Response Sites

Four HIV/AIDS services were purposively selected for analysis. These are prevention of mother to child transmission (PMTCT), anti-retroviral therapy (ART), HIV voluntary counselling and testing (VCT) and home based care for HIV/AIDS sufferers (HBC). These services were mostly located within HCFs and there were occasions in which a given facility would provide more than one service simultaneously.

VCT was the most widely provided HIV/AIDS service. It was the only service provided in all the LGAs. On the other hand, provision of the relatively more specialised services like PMTCT and ART were concentrated in the urban LGAs. For instance, 57% of all the PMTCT centres in the State were located at Makurdi and Gboko with Makurdi alone accounting for 47% of the total. In addition, the two urban LGAs accommodated 51% of all the ART centres in the State (see Table 2 and Figs. 4-8).

3.3. Relationship between Population and Distribution of Facilities

The population/facility ratio in each LGA and the State in general is presented in Table 3. This was done for every category of HCF and all HCFs put together. On the average, there were 2,215 persons to every HCF in the State. The highest population/facility ratio was recorded in Ado LGA (8,011:1). This was followed by Kwande (4,624:1), Makurdi (3,286:1), and Okpokuru (3,223:1) LGAs respectively. The LGAs with the least ratio were Apa (1,048:1), Ohimini (1,158:1), Agatu (1,176:1) and Logo (1,273:1). Incidentally, these were some of the LGAs with the least population in the State (see Fig. 9). The pattern observed for the total number of HCFs is not radically different from what was obtained for the PHCFs. The urban LGAs, particularly Makurdi, did not present any unique advantage over the others in terms of the ratio for PHCFs (see Fig. 10).

However, this is different in the case of SHCFs where the urban LGAs of Otukpo, Makurdi, and Gboko recorded the lowest population/facility ratio (8,139:1, 12,690:1, and 14,993:1) respectively. The ratio recorded by these LGA were far below the State average which was 34,413 persons
per facility (34,413:1). It has already been established that the two THCFs in the State were located in the State capital (Table 1).

In order to ascertain the relationship between population and the distribution of HCFs and HIV/AIDS in the State, the Pearson’s moment correlation coefficient was used. The correlation coefficient \( r = 0.694, r^2 = 0.482, p > 0.05 \), implies a direct relationship between population and healthcare facilities. Although direct, but the relationship is rather weak as only 48% of HCFs is determined by population, leaving 52% to other factors. In a similar vein, the result of correlation analysis between population and HIV/AIDS response site is direct \( r = 0.664, r^2 = 0.441, p > 0.05 \). This also implies a rather weak relationship, meaning that there are other important locational factors of HIV/AIDS response facilities in the state other than population.

4. CONCLUSION AND RECOMMENDATION

This study has shown that there exists a direct (though weak) relationship between population distribution and number of healthcare facilities on the one hand and the number of HIV/AIDS response sites on the other. The study concludes that the problems of HIV/AIDS in Benue State, Nigeria is not as a result of the inadequacy of HCFs and HIV/AIDS response services but rather, the paucity of information on their distribution. The study, therefore, recommends that a robust database for healthcare facilities should be developed at all administrative levels. This will provide a framework for effective management of all aspects of HCFs and HIV/AIDS services. In addition, it will enhance information flow to people who require healthcare services especially the specialised ones and aid in locational decision-making.
Fig. (3). Distribution of HCFs according to Tier and LGA. [Source: Authors’ analysis].

Fig. (4). Spatial Variations in HIV/AIDS Services Provision. [Source: Authors’ analysis].
Fig. (5). Distribution of VCT Centres in Benue State. [Source: Authors’ analysis].

Fig. (6). Distribution of Centres that Provide HBC in Benue State. Source: [Authors’ analysis].
Fig. (7). Distribution of ART Centres in Benue State. [Source: Authors’ analysis].

Fig. (8). Distribution of PMTCT Centres in Benue State. Source: [Authors’ analysis].
Table 2. Distribution of HIV/AIDS services in Benue state.

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<th>PMTCT %</th>
<th>ART No</th>
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<th>HBC No</th>
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Fig. (9). Population/total healthcare facility ratio. [Source: Authors' analysis].
Table 3. Population-healthcare facility ratio.

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Fig. (10). Population-Primary Healthcare Facility Ratio. [Source: Authors’ analysis].
CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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REFERENCES


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