AN EVALUATION OF THE SPATIAL DISTRIBUTION OF HEALTHCARE FACILITIES IN EDO STATE

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Abstract

Spatial distribution of healthcare facilities in Edo State using South Senatorial District as a case is examined. The location of healthcare facilities in the seven local government areas is presented against the background of the pattern of population distribution. The study also examines the utilization pattern of the available services by a sample of households in the study areas. Methods of data analysis are simple ratios and average while chi-square, correlation and regression analysis were run with SPSS to test the hypotheses. Findings show that health care facilities are concentrated and their services more efficient in Egor and Oredo local government areas because of high urbanization and concentration of health personnel in urban areas. However, Ovia Northeast and Uhunmwode local government areas are not efficient in terms of healthcare services because of limited health facilities and reluctance of health personnel to go to most of the settlements because they are predominantly rural. The study is concluded by recommending a policy of dispersal of health care services to areas of inefficiency as well as to locate in an ideal catchment area. It is also suggested that the local people should be trained to provide the needed staff in the health care facilities located in their locality.

Introduction

Data on health administration and coverage in Africa indicate that in many countries, health services are not keeping pace with the changing population either in quality or quantity. There is also a wide gap between different groups within many countries. According to WHO (1977), the number of inhabitants per physician in African countries is in the range of 10,000. Similar poor situations exist with respect to medical assistants, nurses and midwives.

Above all, a number of factors are responsible for the spatial variation in the distribution of healthcare facilities among the states in Nigeria. Among these are population growth, economic development, increase in human knowledge, social transformation, psychological motives, political strategies, role of missionaries, role of community development, self-help activities and as well as the nature of settlement pattern and distribution (Onokerhoraye, 1995). Apart from the problem of inadequacy there is uneven distribution.

This paper is focused on evaluating and examining the spatial variation in the distribution of health care facilities in Edo state. Thus, the existing pattern of distribution and types of health care facilities will be examined in relation to the population pattern according to the local governments. The specific emphasis will be on identifying and examining the adequacy or otherwise of medical personnel and coverage of the healthcare services provision with the aim of:

- Assessing the spatial distribution of population as it influences the demand for healthcare facilities.
- Assessing the areas of efficiency in the distribution of healthcare facilities.
- Identifying areas with concentration of healthcare facilities and the factors responsible.

In order to achieve the above objectives, it is hypothesized that there is no significant relationship between levels of efficiency in healthcare delivery and healthcare facilities.

Location And Size

Edo State lies roughly between longitude 06° 04'E and 06° 43'E and latitude 05° 44'N and 07°'N of the equator. It is bounded in the south by Delta State, in the west by Ondo State, in the north by Kogi State and in the east by Kogi and Anambra States. Edo occupies a total land area of 19,794 square kilometers and a total population of 2.16 million in 1991, of which 50.13 percent were males.

The average population density for the state is 109 persons per square kilometer, which is slightly above the national level. There are three senatorial districts in Edo State: North, Central and S Senatorial Districts.

Edo South Senatorial District, which is used as a case study, has 10,864 square kilometer land area and a total population of 1,121,442 in 1991 national census and a projected population! 1,707,211 in 2003, Edo South Senatorial District is made up of seven local government areas ~ are: Oredo, Egor, Ikpoba-Okha, Orhionmwon, Uhunmwode, Ovia Southwest and Ovia Nortbc This is popularly known as the Edo land because it is dominated by the Edo speaking people " the seven local government areas in the study area are occupied by the Edo speaking people.

Methodology and Sources of Data

Questionnaires were administered to elicit information on demographic and socio-economic variables, perception about health institutions, available service and access of the selected household to the various health facilities. The following procedures were adopted in the selection of the sample and administration of the household questionnaires.

(a) There are seven local government areas in the senatorial district. Sample was drawn

63 settlements i.e. nine settlements from each local government area. A total c: questionnaires were recovered and analyzed.

(b) Stratified random sampling method was adopted in selecting households to «ii questionnaires were administered. The above sampling procedure was designed to ensure effective geographical coverage of each local government area and the probability of every household having a chance of being represented.

(c) In addition to the data from the household questionnaires, a short questionnaire • designed to elicit information from the local government offices in the seven I government areas and health establishments in various parts of the local government arei

(d) Other major secondary sources of data for this study were National -Pop^rjj Commission, Ministry of Health (Headquarters), Benin City; and Edo State HoiC"! Management Board.

Tables were used to analyze the secondary data in order to explain the spatial distribution health care facilities in Edo State while Statistical Package for Social Sciences was utilizec analyze the primary data to test for the hypothesis.

Analysis Of Spatial Distribution Of Healthcare Facilities

There are 32 state government owned hospitals in Edo State. These are distributed among 1 eighteen Local Government Areas in the state. In addition, there are 5 federal government owned hospitals, 8 mission hospitals and 102 private hospitals in the State. There are also 6 comprehensive health centers, 239 primary health centers, 34 health clinics, 15 health posts, 124 private maternity centers, 117 private clinics, 76 medical centers, 39 medical laboratories, 10 dental clinics and optometric clinics in Edo state (Edo State Health Management Board). These are distributed among the eighteen local government areas in the state.

Hospitals:

The state-owned hospitals have a work force of 122 doctors, 4 optometrists, 26 pharmacist 22 pharmacy technicians, 491 nursing personnel, 10 community health officers, 5 community health technicians and 475 hospital ward assistants. These are distributed among the 32 state g owned hospitals. There are 60 hospitals in Edo State South Senatorial District. These are among the seven local government areas of the district as shown in Table 1 and fig 2A.

S/N	Local Govt. Area	Estimated Population	Area Km^2	No Hospital	Population per Hosp.	Area served by one Hospital	No of beds	Bed
1	Egor	321,043	88.8	12	26,754	7.4	596	539
2	Oredo	503,161	317.8	24	20,965	13.2	510	987
3	Ikpoba-Okha	296,285	814.5	7	42,326	116.4	142'	2087 -
4	Uhunmwode	137,987	2062.4	1	137,987	2062.4	20	6899
5	Orhionmwon	26,291	2339.99	12	17.191	199.2	228	905
6	Ovia Northeast	168,592	2351.2	2	84,296	1175.6	78	2161
7	Ovia Southwest	114,404	2839.3	2	57,202	1419.7	86	1330
	Total	1747,763	10863.99	60	29,129	181	1,670	1047

Table 1: The Distribution of Hospitals in Edo South Senatorial District
Source: Ministry of Health (Headquarters), Benin City. Estimated Population is based on annual growth rate of 2.83%

This figure shows that 40.82% of hospitals in Edo state are located in Edo South Senatorial District of the state. Since, it is only in these hospitals that the regular services of medical doctors can be obtained in the district, the locational pattern of the hospitals also shows the varying degree of accessibility of various parts of the district to the services of a doctor. If the average area served by one hospital is used to measure the distance, which the people resident in different parts of the district must travel before obtaining the services of a medical doctor, Table 1 suggests a marked variation among the local government areas in the district. It indicates that the average area served by one hospital in the district is 181 square kilometers. This can be related to the catchments area for a hospital, which more often than not depends on its role and services, the health system rationalization and the radius of coverage. World Health Organization has recommended a maximum radius of 60 kilometers for an intermediate hospital (WHO, 1991, 1993, 1994). The best served local government in the district in terms of accessibility to the services of a medical doctor is Egor Local government area where the average area served by one hospital is 7.4 square kilometers. Some other local government areas such as: Oredo, Ikpoba-Okha and Orhionmwon also have less than the district average area served by one hospital, which is 181 square kilometers. On the other hand, Uhunmwode, Ovia Northeast and Ovia Southwest have a very high average area served and this is greater than the district average. Uhunmwode is the worst served local government area in the district in terms of accessibility to the

services of a doctor. With an area of 2062.4 square kilometers, the local government has only one hospital where the regular services of a doctor can be obtained. This suggests that some people in certain parts of the district must travel very long distances before getting to a medical establishment.

The average number of people served by one hospital in the district is 29,129. Egor, Oredo, and Orhionmwon local government areas have 26,754, 20,965 and 17,191 respectively. These are considerably lower than the district average while others such as: Uhunmwode, Ovia Southwest, Ovia Northeast and Ikpoba-Okha have a higher average number of people per hospital. This suggests that the hospitals are not enough for the population in the latter group of local government areas.

Also, as shown in Table 1, Egor, Oredo and Orhionmwon Local Government Areas have 539, 897 and 905 persons per bed per population ratio. These are lower than the district average which is 1047 person per bed per population ratio while Ikpoba-Okha, Uhunmwode, Ovia Northeast and Ovia southwest with 2087,6899, 2161 and 1330 person per bed per population ratio respectively are above the district average. This suggests that there are not enough bed facilities for the latter group of local government areas.

Primary Health Centers

Meanwhile, the situation is worsened if they are located too far from the people, as the district average area served by one such primary health centre would suggest. In spite of the overall high average population and areas served by a primary health centre in the district, some parts of the district have worse figures as can be seen in Table 2. For example, while some local government areas such as Egor, Oredo, Uhunmwode, Orhionmwon and Ovia Northeast have relatively lower average area per primary health centre other local government areas such as Ikpoba-Okha and Ovia Southwest have very large average area per primary health center. This suggests that people resident in the latter group of local government areas must travel longer distances before getting to a primary health center. The distribution of primary health center is cartographically represented in figure 2B.

Table 2: The Distribution of Primary Health Centres in Edo South Senatorial District

S/N	Local Govt. Area	Estimated Population	Area *. (Km^2)	Numbers of Primary • Health Centres'.	Population, per PHC	Area served by bone PHC (km^2)
1	Egor	321,043	88.8	4	80,261	22.2
2	Oredo	503,161	317.8	6	83,860	53.0
3	Ikpoba-Okha	296,285	814.5	7	42,326	116.4
4	Uhunmwode	137,987	2062.4	24	5,749	85.9
5	Orhionmwon	206,291	2339.99	25	8,252	95.6
6	Ovia Northeast	168,592	2351.2	24	7,025	98.0
7	Ovia Southwest	114,404	2839.3	10	li, 440	283.9
	TOTAL	1747,763	10863.99	100	17,478	109

Source: Ministry of Health (Headquarters), Benin City. Estimated Population is based on annual growth rate of 2.83%

In the same vein, Egor, Oredo and Ikpoba-Okha have population per primary health center which are 80,261; 83,860; 42,326 respectively. These-are higher than the average population served per health center, which is 17,478. Others such as Uhunmwode, Ornionmwon, Ovia Northeast and Ovia Southwest have lower average number of people per primary health center. Il does appear that as a matter of policy primary health centers are concentrated where there are no hospitals.

Maternities

There are 131 maternities in Edo South Senatorial District. These are distributed among the seven local government areas of the district as in Table 3. The district's average area served by one maternity is 82.93 square kilometers, and the district's average population served by one maternity is 13,342. In spite of the overall high average population and area served by a maternity in the district, some parts of the district have worse figures as can be seen in Table 3. For example, while some local government areas such as Egor, Oredo, and Ikpoba-Okha have relatively lower average area per maternity, the other local government areas Ovia Southwest, Ovia Northeast, Orhionmwon and Uhunmwode have very large average areas per maternity.

Table 3: The Distribution of Maternities in Edo South Senatorial District

S/N	Local Govt Area	Estimated Population	Area KW	Number of Marternity	Population served by MMC	Area served By IMMC(knr)
1	Egor	321,043	88.8	26	12,348	3.4
2	Oredo	503,161	317.8	70	7,188	4.5
3	Ikpoba-Okha	296,285	814.5	25	11,851	32.6
4	Uhunmwode	137,987	2062.4	3	45,996	687.5
5	Orhionmwon	206,291	2339.99	3	68,764	796.7

6	Ovia Northeast	168,592	2351.2	1	168,592	2351.2,
7	Ovia Southwest	114,404	2839.3	3	38,135	946.4
	TOTAL	1747,763	10863.99	131	13,342	82.93

Source: Ministry of Health (Headquarters), Benin City. Estimated Population is based on annual growth rate of 2.83%

Similarly, while Egor, Oredo, and Ikpoba-Okha have average population served per maternity which are considerably very low compared with the district average; others such as, Uhunmwode, Orhionmwon, Ovia Northeast and Ovia .Southwest have higher average number of people per maternity. This suggests that the numbers of maternity or medical ctntres are not enough for the population in this group of local government areas and therefore the people must travel longer distances before getting to a maternity.

Medical Personnel

There are 384 doctors and 964 nurses in Edo South Senatorial District.' These 'are. distributed among the seven local government areas in the district as shown in Table '4 and figure>2C. The average doctor/population ratio in the district is 1:4551 and nurse/population ratio. isil:1813, ' ,

Table 4: The Distribution of Medical Personnel in Edo South Senatorial District

S/N	Local Govt. Area	Estimated Population	Area Krn^2	No of Doctors	Population Per. Doctor	No of Nurses	Population Per Nurse
1	Egor	321,043	88.8	161	1994	456	704
2	Oredo	503,161	317.8	162	1871	265	1144
3	Ikpoba-Okha	296,285	814.5	30 '	9876	65	4558
4	Uhunmwode	137,987	2062.4	2	68993	35	3942
5	Orhionmwon	206,291	2339.99	14	14735	62	3327
6	Ovia Northeast	168,592	2351.2	8	21074	36	4683
7	Ovia Southwest	114,404	2839.3	7	16343	45	2542
	TOTAL	1,747,763	10863.99	384	4551	964	1813

Source: Ministry of Health (Headquarters), Benin City. Estimated Population is based on annual growth rate of 2.83%

These overall district figures are too high considering the frequent demand for services of doctors and nurses in any health establishment. The World Health Organization recommended doctor/population ratio in Nigeria is 1:10,000 by the year 2000 (WHO, 1991, 1993; World Development Report, 1993). This study shows that Egor and Oredo local government areas have lower doctor/population ratio as compared to the district average doctor/population ratio whereas, Ikpoba-Okha, Uhunmwode, Orhionmwon Ovia Northeast, and Ovia Southwest have a very high doctor / population ratio. This suggests that the number of doctors in the latter group of local government areas is not enough. Moreover, Egor and Oredo Local Government Areas have nurse/population ratio far lower than the district average nurse/population ratio, which is 1:1813, while the other local government areas have quite a higher nurse/population as compared with the district average. This suggests that the number of nurses is not enough in the other local government areas. The mere number of medical personnel does not however indicate quality of service but their presence means that patient will have some one to attend to them.

A comprehensive analysis of the various variables considered in the preceding examination of the distribution of healthcare facilities in the district is carried out so as to identify the local government areas, which are adequately or inadequately served in terms of the provision of health facilities. Because of the multivariate nature of the number of variables considered, a simple quantitative index is used to rank the seven local government areas in the district in terms of the nature and accessibility of health facilities within them. The variables used are: (a) Population served by one primary health care, (b) Area served by one primary health center, (c) Population served by one hospital, (d) Area served by one hospital, (e) Population served by one maternity, (f) Area served by one maternity, (g) Doctor per population ratio, (h) Nurse per population ratio and (i) Hospital bed per population ratio.

Accessibility, Quality And Adequacy Of Healthcare Facilities

The various local government areas in the district were ranked in a descending order on the basis of the variables stated above, and scores were assigned to each local government area on the basis of its rank. Thus, the local government area which came first with regard to area served by a primary health center scored 7 points while that which came last scored 1 point. Also, the seven local government areas were ranked in a descending order on the basis of their total scores on the eleven variables. From the result of the analysis, three groups of local government areas can be identified in Edo South Senatorial District, based on the availability of health care facilities.

The first group is Egor and Oredo local government areas, which have the best health establishments in the district. The area and population served by one primary health center is lower than that of other local government areas. This implies that there is greater accessibility of people to the services of a medical doctor. Moreover, the accessibility of this to health establishments in various parts of the local government areas is better and more efficient than those of other local government

areas. The second group of local government areas is IkpobaTOkHa, Orhionmwon and Ovia Southwest local government areas, which have comparatively better medical! facilities than those in the third group where the provision and accessibility of health facilities is very poor. The third group of local government areas is Uhunmwode and Ovia Northeast, which have very few medical facilities relative to its size of population, ;

From the above it could be said that there is spatial inequality and lopsidedness in the distribution and location of healthcare facilities in Edo South Senatorial District. Thus, there are areas of concentration and underserved areas. Table 1 reveals the same pattern of observation all through. It also agrees with the questionnaire result. Egor, Oredo and Ikpoba-Okha local governments, which fall within urban areas, are better equipped than the remaining local government areas under consideration. The implications are these: There is no local government within the state that is better equipped than Egor, Oredo and Ikpoba Okha because they are the most urbanized area of the state. Two, when the whole state is considered there will be local government areas in the state that will be less equipped than Uhunmwode, Ovia Northeast, Ovia Southwest and Orhionmwon Local Government Areas, especially those that are far from the state capital.

The findings of the survey also show that 39.9% of respondents reside close to the health facility that is less than one kilometer away. However, 49.8, 10.2, and 0.1 percent of the respondents reside between 2-3 kilometres, 3-5 kilometres and above 5 kilometres respectively.

On the level and quality of services provided by health facilities, only 2.3% of the respondents are of the opinion that the services are very good, whereas, 23.9, 49.6, 20.3, and 3.9 percent of the respondents are of the view that the services of health facilities in their locality are 'good[1], 'average', 'below average', and 'bad' respectively. Thus, it could be said that service provided by health facilities in Edo South Senatorial District is considerably moderate. There is however the great need for improvement and modernization of facilities in order to achieve high and good quality of services.

Findings show that health facilities in the locality are inefficient in services provided due to various reasons given by respondents. These reasons range between lack of qualified staff, lack facilities and lack of medicine. This suggests that most of the services provided are inefficient and below standard. It was also found out that in the course of utilization of health facilities in the district, 50% of the respondents are of the view that health services bill is very high, 47.4% stated that it is moderate while only 2.6% considered it to be low. There is a need to subsidize the bills and charges of health services, most especially by private and corporate bodies that own 55.1% of health establishments in the district. Thus, health care services will be affordable to all and good health will be enhanced.

Hypothesis was tested with chi-square and regression analysis. Here, the null hypothesis (H_0) is that: "There is no significant relationship between the levels of efficiency and health care facilities". To explore the levels of efficiency, data were collected from the following variables: Distance between facility and residence; Range of services provided by healthcare facilities, and numbers of qualified staff.

Applying chi-square test, the calculated X^2 values (X^2=6671.733) are greater than the critic values at 0.05 (X^2cv=40.11), the null hypothesis (H_0) is rejected and the inference is that there is a significant difference in the relationship between the levels of efficiency and health care facilities in or among the settlements in the various local government areas in Edo South Senatorial District.

Applying regression analysis, the calculated F-values are greater than the critical f-value, at 0.05 levels of significance and at the degree of freedom 3, 695 ( ). F-cal (41.744) > F-cv (.05, df 3) = (8.53). At this level, we can reject the null hypothesis and conclude mat ihe overall regression is significant. Thus, it can be asserted that there is 95% significant difference in the relationship in the levels of efficiency and health care facilities in or among the settlements in the various local government areas in Edo South Senatorial District. The above result shows that there is variance in efficiency of health care facilities, which implies that there are places of efficiency and inefficiency in the district,

Conclusion

The pattern of urban development in Edo South Senatorial District has been observed as one of the most important factors influencing the present pattern of distribution of health care facilities in the district. Most of the health facilities in the district are located in towns of over 50,000 people and more often headquarters of some local government areas. For instance, Egor, Oredo and Ikpoba-Okha Local Government Areas have the highest concentration of health establishments. These three local government areas are housing and administering the Benin metropolis commonly called Benin City. It is an urban center, the seat of government where facilities like water, electricity as well as good roads are available and where demand is high and hence quick return of capital. These urbanization characteristics attracted a large number of health establishments.

One major factor, which contributed to the present pattern of distribution of health care facilities in Edo South Senatorial District, is the generally low mobility of health personnel among the local government areas. Most Nigerians are reluctant to work in areas that are predominantly rural. The present pattern of distribution of primary health centers in Edo South Senatorial District is highly influenced by health policies made by the government. If not for the government's policy that is geared towards invigorating the primary healthcare system in order to reach the grassroots by establishing primary health centers in the rural areas, most rural areas would not have access to healthcare facilities.

Observations in recent periods indicate that even at the state level, there is marked variation among local government areas. This is why some local governments have a reasonable concentration of health care facilities relative to their population sizes; others do not have adequate facilities (Onokerhoraye, 1995). In most developing countries, over 60 percent of medical facilities are concentrated in the urban areas where less than 20 percent of the total population can be found (Onokerhoraye, 3999).

This study also shows that the distribution of health care facilities in Edo South Senatorial District conforms to the Christaller's central place theory. According to the concept, there are more lower order centers than the higher order centers. A higher order center performs both higher and lower order services; while a lower order center performs a lower order service. The lower order services/facilities such as: Primary Health Centers, Clinics, Maternity Homes and Medical Centers are more than the hospitals, which are higher order services/facilities. Also, these hospitals serve as referral centers for the lower order facilities. Thus, they perform both higher and lower order services.

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