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Accessibility to Public Health Centres: The Case of the Urban and Rural Poor in Delta State, Nigeria

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

For any nation to develop, three things are very critical and important; education, health and food. Citizens, particularly the workforce must be educated, healthy and well fed. If the workforce lacks any of the three, they cannot be competitive and if they are not, the country cannot develop. This realization provides the impetus for this study which aims to investigate poor users access to public health centres in Delta State, Nigeria. The sampling design adopted include a multistage sampling at two stages: first, a random sampling of public health centres and second, a stratified random sampling of 700 patients to solicit their responses on the service accessibility of public health centres in their environment. The questionnaire content was based on thirteen (13) independent variables namely: travel distance, educational status, sex, age, household size, travel cost, treatment cost, travel mode, travel time, waiting time, income, religion and perceived efficiency of public health centre services. Analysis of data was done using Multiple regression, Principal component analysis and Nearest Neighbour Analysis (NNA) as statistical tools. The coefficient of determination (R^2) = 0.972, confirmed that 97.2% of access to public health centres in the study area is explained by the selected independent variables. The principal component analysis showed that the four (4) most important predictor variables of service accessibility include – travel distance, travel time, waiting time and income. The study recommends re-distribution of mal-distributed public health centres in tandem with physical planning principles to minimize travel distance to

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public health centres and the provision of ambulatory services to reduce travel time for users of public health centres.

Keywords: Accessibility; public; healthcare; poor; Nigeria.

1. INTRODUCTION

Today in Nigeria, the sorry state of the country's health care system has left many Nigerians with the option of seeking medical treatment overseas. The reason for this is not far-fetched as majority of them have lost hope in the health care delivery of the country. The decision to go abroad is predicated on the conviction that hospitals in the choice country are better equipped for accurate diagnosis and treatment [1]. Modern medical equipments are lacking in Nigerian hospitals [2]. Apart from the public hospitals that can boast of some of such equipments, only a handful of private hospitals have some of the necessary modern equipments.

In the last 15 years, there has been growth of private sector health organizations and 60 per cent of the country's health services are provided by the private sector, making it a key entry point. Large role played by the private sector in health care delivery creates the need for standard and best practice and therefore to challenge medical tourism, private sector players need to improve on standard.

The current state of health care in Nigeria, a country with 170 million populations, a 2.8 per cent growth in the health sector is far from achieving the Millennium Development Goals [3]. Again, Nigeria has one of the highest maternal mortality ratio, estimated at 545 maternal deaths per 100,000 live births, while under five mortality rate is 157 per 100,000 live births [4].

In 2012, Human Immunodeficiency Virus (HIV), prevalence rate among adults (18-49 years) is 3.1 per cent, as the country has second largest number of people living with HIV/AIDS in Africa, while 47 per cent of health facilities are not regulatory radars [4].

In 2013, 18,000 Nigerians travelled to India for medical purposes and are reported to have spent N14.6 billion. Nigeria Ministry of Health spends about 70 per cent of its budget in urban areas where 30 per cent of the population resides [5]. Consequently, the Nigeria Ministry of Health spends only 30 per cent of its budget in the rural areas where 70 per cent of the population resides – marginalized citizens, who owing to their high poverty level can neither access private health care services because of its exorbitant cost arising from the economic motive of its operators, nor the public health care delivery with facilities concentrated in the urban areas to the detriment of the countryside.

This study aims to empirically verify the factors which hinder the urban and rural poor from accessing health care services in Delta State, Nigeria, for the benefit of public policy.

The paper is divided into nine sections. Section 1, the introduction, gives an insight or background to the study, section 2 presents the aim and objectives, while section 3 highlights the justification for the study. In section 4, data collection instruments are discussed, section 5 looks at tools for analysis, while section 6 discusses data analysis and presentations. Section 7 discusses the results, section 8 draws the conclusion, while section 9 presents the recommendations.

1.1 Aim and Objectives of the Study

The Alma-Ata Declaration of 1978 by the World Health Organization [6] of which Nigeria is a signatory, aimed to address some of the problems associated with health care delivery. The lofty goals of that declaration include: improving equity, accessibility and promotion of health on or before the year 2000. Unfortunately, these goals can be said to be hardly realized in Nigeria, in the year 2014 (fourteen years from the target date). Yet, enshrined in the State Social Order and Social Objectives in the 1999 Constitution of the Federal Republic of Nigeria are the ideas of equality, justice and easy accessibility to critical basic needs [7].

More glaring is the National Health Policy [8] declaration of 1986; thus: "The Federal, State and Local Governments in Nigeria, hereby commit themselves and all the people to intensive action to attain the goal of health for all citizens by the year 2000 and beyond. That is a level of health that will permit them to live socially and economically productive lives at the highest

possible level. The Federal Government undertakes to provide policy guidelines … for establishing health systems that are primary and accessible to all her people … care should be taken to ensure that these health facilities are evenly distributed geographically" [8]. The aim of this study is to examine accessibility of the urban and rural poor to healthcare services in Delta State, Nigeria.

1.2 Justification for the Study

The desire to study the urban and rural poor was predicated on the findings of the studies by the Centre for Disease Control and Prevention [9] which established that health outcomes are worse for individuals with low incomes than for their more affluent counterparts. Lower-income individuals experience higher rates of chronic illness, disease, and disabilities, and also die younger than their affluent counterparts [10,11,12,13,14]. One study showed that individuals with low incomes had life expectancy 25 percent lower than those with higher incomes [15]. Another research suggests that an individual's household wealth predicts the amount of functionality of that individual in retirement [16]. Ethical approval for this study was sought and obtained from the Ministry of Health, Delta State, Nigeria.

1.3 Data Collection Instruments

Data for this study were derived from primary and secondary sources. The primary data were obtained through questionnaire administration to patients in 35 sampled public hospitals in Delta State. While secondary data were collected from the following establishments: Health Management Board (HMB), Asaba; Ministry of Health, Asaba and Ministry of Economic Planning, Asaba. The sampling was done in two stages, each step ensuring that the sample is representative of the population studied. These involved sampling of public hospitals for study and sampling of patients in these hospitals. A total of 700 respondents (10 percent) of a sample size of 7000 patients were sampled from the 35 hospitals (see Table 1 in Appendix 1). The questionnaire consists of 31 items structured to solicit information from respondents on their socio-economic and demographic characteristics, access to hospitals, cost of accessing hospital services, and their suggestions on how to improve hospital services and utilization. The calculated reliability coefficient of the instrument was 0.76, and thus considered reliable for the study.

In all, the questionnaire was structured to derive data on 13 predictor variables influencing access to public hospitals by the urban and rural poor in Delta State. The predictor variables include: Sex, age, education, household size, income, travel mode, attitude, distance, journey time, transport cost, treatment cost, perception of efficiency and waiting time. The urban and rural poor were identified based on their estimated monthly income using the Nigeria Minimum wage (N18,000.00) as benchmark. The survey lasted for nine months (March – December, 2014).

1.4 Tools for Analysis

The data were analyzed using tables, multiple regression, principal component analysis and Nearest Neighbour Analysis. Data used in the analysis are presented in Table 2 (see Appendix 2).

1.5 Data Analysis and Presentations

Table 2 shows the coefficient (unstandardized and standardized) of the independent variables and the collinearity statistics. The Beta coefficients in this table are the relative sizes of each predictor variable. The model derived from Table 2 is:

$$Y = -0.266 - 0.40x_1 + 0.158x_2 + 0.109x_3 + 0.265x_4 + 0.038x_5 - 0.266x_6 + 0.114x_7 + 0.253x_8 + 0.230x_9 + 0.133x_{10} - 0.124x_{11} + 0.122x_{12} + 0.034x_{13}.$$

Where y = access of the urban and rural poor to public hospitals in Delta State, and

x_1 to x_{13} = the 13 independent variables.

Variables numbered 2 – 5, 7 – 10 and 12 – 13 have positive relationship with access to hospitals, while variable 1 (sex of respondents), variable 6 (travel mode) and variable 11 (treatment cost) are negatively related to access to hospitals (See Table 3, 4, 5 in Appendices 3, 4, 5).

Table 3 is the model summary of the multiple regression output and it shows that the coefficient of multiple determination (R^2) is 0.972. Therefore, about 97.2% of the variation in access to hospital visit is explained by all the independent variables. The regression model appears to be very useful for making predictions since the value of R^2 is close to 1 and since both the R-square and the adjusted R-square are

equal, it implies the model is very fit for making predictions.

From Table 4 (Summary of Anova), since the P-value (significant value) is less than 0.05 i.e. the $P \leq 0.05$, there is a statistically significant relationship between access to hospitals and the 13 independent variables. The principal component analysis is presented in Table 5 (see Appendix 5), to determine the major predictor variables.

The total variance explained (Table 5) is the major focus or outcome of the principal component analysis. Principal components have a general usage in making best use of the observed variability in multivariate situations. Following the appropriate SPSS commands, the components numbers and descriptions are given in the first two columns of Table 5. The three broad columns of Table 5 shows the initial Eigenvalues, the extraction sum of squared loadings and rotation sum of squared loadings. The variance explained by the individual component (the eigenvalues) and the percentage of the total variance these represent are shown in the 3rd and 4th columns of Table 5.

2. DISCUSSION OF RESULTS

A total of 700 poor respondents (patients) were sampled from 35 public hospitals in Delta State, Nigeria, to ascertain their accessibility to healthcare services. The statistical techniques used include multiple regression, principal component analysis and nearest neighbor analysis, the results of which are discussed herein.

Since the number of components are the same as the number of variables, the cumulative percentage of variance explained is 100 percent. Using the SPSS commands, the initial solution information as well as that for the extracted solution was requested – since the extraction criterion to extract the maximum number of components, both the initial and extracted solutions are the same.

The result obtained from this process shows that, first, there is a very large first principal component (travel distance) which explains 67.951 percent of the total variation in the data. The second principal component (travel time) explains 15.724%, waiting time explains 8.518% and income explains 3.413%. The variance explained by these four principal components is 96.606 percent, while all the other principal components effectively described only 3.394 percent of the variability.

From the result of the principal component analysis, the major variables that constitute barriers to hospital utilization in Delta State are travel distance, travel time, waiting time and income. The Nearest Neighbour Analysis (NNA) result affirmed the uneven distribution of public hospitals in Delta State where travel distances for hospital users range from 10 km – 35 km and hospital sphere of influence range from 100 km^2 – 295 km^2 respectively in defiance of the WHO threshold of 15 kilometers travel distance. This result further affirmed the findings of the following researchers – [17,18,19,20,21,22,23].

The study established that 92.83% of respondents have a maximum of 1 or 2 hospitals within 30 minutes travel distance, and only 7.17% have up to 3 public hospitals near to them. In other words, most patients travel over long distances to access hospital services, indicative of the uneven distribution of public hospitals.

The study also established spatial variation in the distribution of hospitals and deficiencies in the distribution in relation to areal extent, travel distance to hospitals, availability of doctors and bed capacity.

There is a marked spatial variation in the distribution of hospitals in relation to the population in Delta State. The study established that on the average, one hospital serves 67,187 people in the State. The statistics across Local Government Areas in the State indicate that only twelve Local Government Areas have hospital/ population ratio below the state average. The remaining 13 Local Government Areas have ratios above the state average. In this regard, Warri South, Uvwie and Udu are the worst hit with one hospital serving 140,000 people. The research finding clearly shows the discrepancy between population distribution/public hospital facilities.

Another dimension of the uneven distribution of public hospital facilities is reflected in the distribution of doctors and hospital beds across Local Government Areas in the State. The World Health Organization (WHO) recommended 1:10,000 (doctor/patient) ratio for developing countries. The study established that at the State level the doctor/patient ratio is 1:9,128, but the

picture is different at the local government level. The study affirmed that only four LGAs – Ika South; 1:6504; Oshimili South; 1:1360, Sapele; 1:6611; and Warri South; 1:5946 have lower doctor/patient ratios than the State.

The LGAs worst hit are found in Western end of the State due mainly to poor infrastructural provision and inaccessibility because of swampy terrain. Consequently, the distribution of hospital/facility is uneven as well as the distribution of medical doctors. This is very glaring in the rural and riverine Local Government Areas of the State where the doctor/patient ratio is higher than the WHO standard of 1:10,000 indicating the need for more doctors in the affected areas.

3. CONCLUSION

The study attempts to model barriers to hospital utilization by the low-income group in Delta State, Nigeria. Findings revealed that some of the user populations are not adequately served with hospital services mainly due to prohibitive travel distance and travel time constraints which are the results of the imbalance in the distribution of public hospitals in the State. There are marked spatial variations in the distribution of public hospitals in relation to area extent of local government areas, travel distances of users, population distribution, medical personnel and bed capacity.

4. RECOMMENDATIONS

Effective intervention strategies on the reduction of the magnitude of the distance to health care utilization should be employed by a joint effort of all stakeholders in the health care planning industry. In areas of neglect, ambulatory services should be employed as an interim remedial measure.

To encourage service utilization, the location of new public hospitals should conform closer to the spatial distribution of the population because facilities have to be available before they can be accessed.

To reduce the problem of disparity in the distribution of public hospitals, local government areas with large area extent should have more hospitals so as to make hospital services more accessible to users in different parts of such local government areas.

The state government should as a matter of deliberate policy embark on the employment of more medical doctors and be specifically posted to the rural or / and riverine local government areas where doctor-to-patient ratio is lower than expected.

Health care planning and delivery should use a multifaceted (or multidisciplinary) approach involving the clientele who is the ultimate consumer, physical planners, welfare economists, geographers and health planners among others.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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APPENDIX 1

Table 1. Sampled hospitals and respondents in Delta State

S/N	Category of health facility/centre	Location of health facility/centre	Grade of health facility/centre	Total population of patients / respondents	Percentage of total patients / respondents
1.	Small sized	Issele-Uku	PHC	19	2.71
2.	Small sized	Ogwashi uku	PHC	21	3.00
3.	Small sized	Isheagu	PHC	18	2.57
4.	Small sized	Abraka	PHC	20	2.86
5.	Small sized	Mosogar	PHC	21	3.00
6.	Small sized	Umunede	PHC	15	2.14
7.	Small sized	Owhelogbo	PHC	17	2.43
8.	Small sized	Aviara	PHC	24	3.42
9.	Small sized	Aboh	PHC	17	2.43
10.	Small sized	Akwukwu-Igbo	PHC	26	3.71
11.	Small sized	Ibusa	PHC	23	3.29
12.	Small sized	Patani	PHC	16	2.28
13.	Small sized	Agbarho	PHC	25	3.57
14.	Small sized	Umutu	PHC	19	2.71
15.	Small sized	Uzere	PHC	22	3.14
16.	Big Sized	Oghara	General	20	2.86
17.	Big Sized	Owa-Oyibu	General	21	3.00
18.	Big Sized	Agbor	General	22	3.14
19.	Big Sized	Ozoro	General	17	2.43
20.	Big Sized	Oleh	General	19	2.71
21.	Big Sized	Kwale	General	20	2.86
22.	Big Sized	Orerokpe	General	22	3.14
23.	Big Sized	Asaba	Fed. Med. Centre	34	4.85
24.	Big Sized	Sapele	Central	31	4.42
25.	Big Sized	Ughelli	Central	22	3.14
26.	Big Sized	Otu-Jeremi	General	17	2.43
27.	Big Sized	Ekpan	General	21	3.00
28.	Big Sized	Koko	General	9	1.28
29.	Big Sized	Obiaruku	General	22	3.14
30.	Big Sized	Bomadi	General	13	1.85
31.	Big Sized	Warri	Central	22	3.14
32.	Big Sized	Burutu	General	14	2.00
33.	Big Sized	Otor-Udu	General	15	2.14
34.	Big Sized	Isiokolo	General	13	1.85
35.	Big Sized	Umuola	General	23	3.29
	Total			700	100.0

Source: Fieldwork, 2014

APPENDIX 2

Table 2. Coefficients and Collinearity statistics

Model		Unstandardized coefficients		Standardized coefficient	t	Sig.	Collinearity statistics	
		B	Std. error	Beta			Tolerance	VIF
	Constant	-266	.051		-5.208	.000		
1.	Sex of respondents	-040	.046	-013	-869	.385	.098	10.171
2.	Age at last birthday	.158	.025	.176	6.427	.000	.031	31.749
3.	Educational attainment of respondents	.109	.027	.136	4.067	.000	.021	47.526
4.	Household size of respondent	.265	.030	.331	19.846	.000	.085	11.777
5.	Income of respondent	.038	.017	.06	2.209	.027	.026	37.806
6.	Travel mode of respondent	-.266	.022	-205	-12.014	.000	.081	12.377
7.	Attitude of parent towerds visit to hospital	.253	.033	.189	7.770	.000	.040	25.082
8.	Time spent on journey to hospital	.114	.021	.108	5.334	.000	.058	17.278
9.	Distance of patients to hospital	.230	.026	.171	8.818	.000	.063	15.900
10.	Transport cost from residence to hospital	.133	.025	.098	5.231	.000	.067	14.820
11.	Treatment cost	-.124	.021	-.127	-5.979	.000	.052	19.243
12.	Perception of the effectiveness of hospital services	.122	.033	.080	3.670	.000	.049	20.306
13.	Waiting time at hospital	.034	.034	.028	1.016	.310	.031	32.093

Source: Computer analysis of Table 1

APPENDIX 3

Table 3. Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.986(a)	.972	.972	.250

APPENDIX 4

Table 4. Summary of Anova

Model		Sum of square	df	Mean square	f	Sig
1	Regression	2573.462	13	197.959	3167.352	.000(a)
	Residual	74.125	1186	.062		
	Total	2647.587	1199			

APPENDIX 5

Table 5. Total variance explained

Component	Component identified	Initial eigenvalues			Extraction sum of squared loadings			Rotation sum of squared loadings		
		Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1.	Distance of patient to hospitals	6.453	67.951	67.951	6.453	67.951	67.951	4.890	34.928	34.928
2.	Time spent on journey to hospital	3.021	15.724	83.675	3.021	15.724	83.675	3.963	28.306	63.234
3.	Waiting time at hospital	2.452	8.518	92.193	2.452	8.518	92.193	2.925	20.891	84.125
4.	Income of respondent	1.598	3.413	95.606	1.598	3.413	95.606	1.396	9.969	94.095
5.	Educational attainment of respondent	1.327	1.925	97.531	1.327	1.925	97.531	0.246	1.755	95.849
6.	Age of last birthday	0.129	0.589	98.120	0.129	0.589	98.120	0.194	1.386	97.235
7.	Household size of respondent	0.069	0.496	98.616	0.069	0.496	98.616	0.097	0.689	97.925
8.	Transport cost from residence to hospital	0.051	0.362	98.978	0.051	0.362	98.978	0.074	0.529	98.454
9.	Attitude of patients religion toward visit to hospitals	0.034	0.242	99.220	0.034	0.242	99.220	0.045	0.319	98.773
10.	Treatment cost	0.032	0.231	99.451	0.032	0.231	99.451	0.038	0.273	99.046
11.	Sex of respondent	0.025	0.180	99.631	0.025	0.180	99.631	0.037	0.264	99.311
12.	Perception of effectiveness of hospital service	0.021	0.150	99.781	0.021	0.150	99.781	0.035	0.251	99.562
13.	Travel mode of respondent	0.017	0.119	99.900	0.017	0.119	99.900	0.032	0.229	99.791
14.	Access to hospital	0.014	0.100	100.000	0.014	0.100	100.000	0.029	0.209	100.000

Extraction method: Principal component analysis compiled from researcher's fieldwork

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