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RESEARCH ARTICLE

Application of Central Place Theory in the Planning of Health Care Facilities in the Rural Area of Ondo State

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Abstract

The study examines the application of central place theory in the planning of health care facilities in the rural area of Ondo State. The combination of Exploratory and survey research design was adopted for the study. Both primary and secondary data were used to elicit information from the respondents. Using a multi-stage sampling technique, Ondo state was divided into three senatorial districts. Then all the settlements were identified, of which eleven (11) rural settlements were randomly selected. Thereafter, all the health care facilities that were identified within the selected rural areas were purposively picked for the study. The observation checklist and the World Health Organisation (WHO) healthcare standard for all variables used in the study were adopted. An in-depth interview (IDI) was conducted with reference to various questions relating to the distance of the health care facilities from the respondents' residences, the time spent to reach the health care facilities, and the cost per trip. Both quantitative (descriptive statistics) and qualitative data were used to analyse the data. The qualitative data were content analysed. It was revealed that all the facilities were underutilized, given the present population threshold. The standard distance to cover fell within the minimum thresholds. The cost per trip standard was not met. Central place theory in the study area has been found to compromise the theoretical principles in its application. It is therefore recommended that the effective application of the theory, following the original guideline, be followed for adequate planning.

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1. INTRODUCTION

Healthcare systems increasingly emphasise the spatial dimensions of health planning, health-seeking behaviour, and health service provision. Early contributions by Mayer (1982) highlighted the importance of spatial perspectives in understanding healthcare delivery, while more recent studies, such as Carnero et al. (2021), underscore that access and its influence on the utilisation of health services remain central to effective health planning, particularly at national and regional scales. Penchansky and Thomas (1981) conceptualised access to healthcare in terms of availability, accessibility, affordability, and acceptability, implying that effective healthcare services must satisfy all four dimensions to meet users' needs. Achieving this requires the adoption of sound theoretical frameworks by both researchers and policymakers in the design and implementation of healthcare delivery systems.

Over the years, several theories have shaped scholarly debates on the most appropriate approaches for addressing challenges associated with meeting the demand for healthcare facilities. Among these is Location Theory, a foundational concept in economic geography that provides insight into the spatial organisation of economic activities and optimal facility location. Closely related is the Location–Allocation

model, which has been widely applied in planning public facilities to enhance accessibility, efficiency, and inclusiveness. In contrast, many countries rely on incrementalism in public facility provision, a pragmatic and piecemeal approach that responds to emerging needs rather than adopting comprehensive, rational planning strategies (Anderson & Harbridge, 2000). Empirical studies on facilities and infrastructure provision further demonstrate the relevance of these approaches in understanding spatial inequalities (Jimoh & Olagunju, 2022; Jimoh & Ayomide, 2022; Jimoh & Famewo, 2022; Jimoh & Otokiti, 2022; Jimoh & Salami, 2020).

Equitable distribution of healthcare facilities is fundamentally a product of careful planning grounded in robust theoretical constructs. However, in many developing countries, including Nigeria, the effective application of these theories is often undermined by factors such as political interference, resulting in the exclusion of target populations from development planning processes. While some theoretical approaches have yielded positive outcomes when properly applied, their misapplication remains a significant challenge for researchers and policymakers alike. Consequently, there is a notable gap in the literature regarding the selection and application of the most effective theories for optimising healthcare facility location and ensuring equitable distribution, particularly in rural areas.

Against this backdrop, this study investigates the spatial distribution of healthcare facilities in the rural areas of Ondo State using Central Place Theory. The study aims to apply the principles of Central Place Theory to healthcare facility planning with a view to promoting sustainable and equitable healthcare delivery in rural areas of Nigeria. Specifically, the study examines the population standards and catchment area radii served by healthcare facilities, assesses the adequacy of medical personnel relative to population thresholds, analyses the distances traveled by users to access healthcare services, determines the time required to reach healthcare facilities, and evaluates the cost incurred per trip in accessing healthcare services.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Central Place Theory

The central place theory, though one of the classical theories that addressed the location of urban facilities, as discussed by Walter Christaller (1933), has been used extensively in discussions of facility distribution in rural areas, following a hierarchical order of health facilities. It has been argued that health service provision has constituted an important human activity and has attracted considerable theoretical and practical interest. Okafor (1983) and Mabogunje (1991) similarly pointed out, from a welfare perspective, that the optimal distribution of health facilities was largely determined by the accessibility of services at the minimum aggregate travel cost. However, such an optimal specification closely linked the welfare problem to the central place theory.

By application, the thrust of central place theory is that the spatial pattern of central places displays irregularities in the ideal case, if there is:

a uniform place of constant population density and purchasing power;

- *a linear variation of transport cost with distance, and an equal movement ease in all directions, then central places will spring up at evenly spaced points to serve tributary market areas with goods and services. The aerial expression of this arrangement is a pattern of regularly spaced settlements or central places, with hexagonal market areas. When central places are considered in terms of their mutual relationship, their organisation follows a hierarchical pattern.*

According to Onokerhoraye (1976a, 1976b), there was a functional relationship between the size of a central place, the order of the goods or services it offered, and the size of its complementary region.

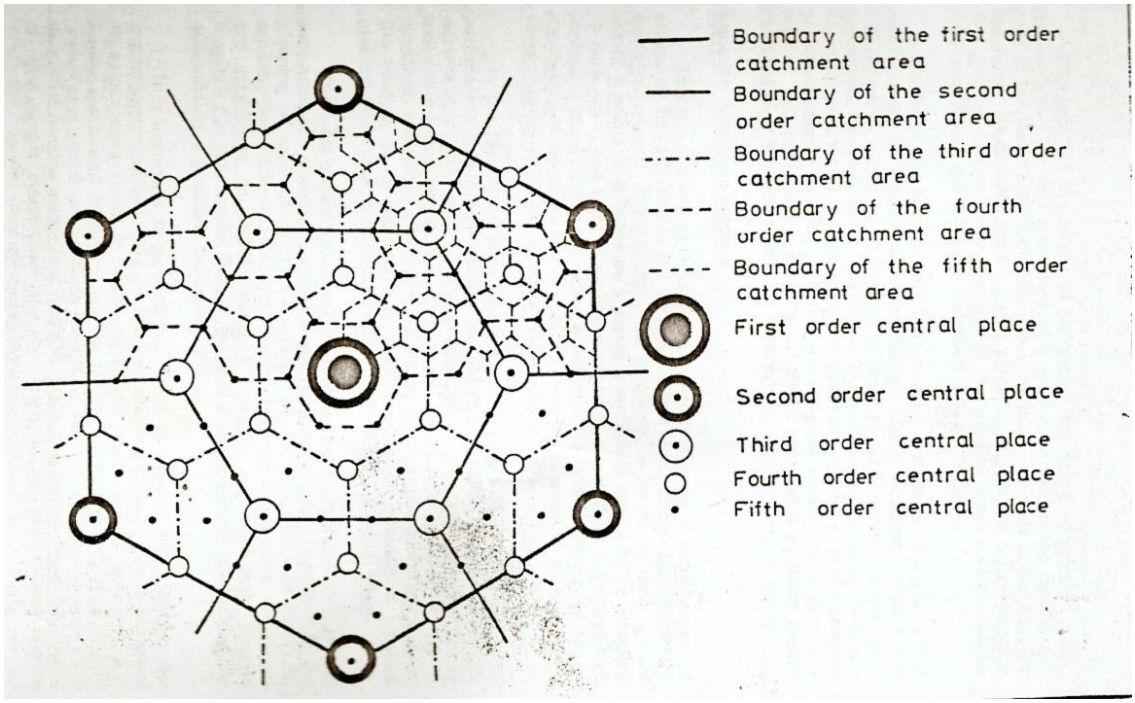

Fig. 1. Hexagonal arrangements of trade areas

Note: Adapted from Okafor, 1983.

Several questions concerning the basic postulates of central place theory remain unanswered. Such questions include the regularity of space settlement, which does not exist in any ideal setting, as well as uniform population density and purchasing power, among others. Okafor (1983) argued that, though the aim was not to re-examine the validity of the central place theory, it might be instructive to discuss the concepts that underlined the theory and had direct relevance to the interplay between location and the utilisation of health facilities.

The theoretical central place theory resembled a concentric layer. From the existing situation, the theoretical limit the patient would have to travel before his health would be jeopardised was 5km. For instance, if the settlements were located outside the maximum area, it might be difficult to access health care facilities. Ideally, the capability of any geographical area to satisfy the threshold requirements for the provision of a particular category of health care facility would depend on the pattern of population density. There was, therefore, a generally marked difference between rural areas in Nigeria in terms of satisfying the threshold population requirements. Knowledge of the threshold population and the range of goods would enable the researcher to determine the appropriate category of health facility to locate. In rural areas, settlements were small in population, and transport facilities were poorly developed or non-existent.

Literature Review

The concepts of the threshold population and range of goods, which are implied in the central place theory, were observed by Onakhoraiye (1996) to be relevant to the analysis and planning of health care facilities. According to Onakhoraiye (1976), the threshold population for a particular grade of health centre was the minimum population that justified the allocation of scarce financial and personal resources to the establishment and sustenance of that grade of health facility. Below that level, there were two patients, allowing the family to plan health services to operate with acceptable efficiency. On the other hand, the range of a particular category of health facilities was the maximum distance users were willing to travel. This distance would vary by the type of health facility and the modes of travel available to users (Onakhoraye, 1996).

Physical access of the population to health care depended not only on the number and location of facilities but also on the availability of the road network and appropriate transport means to link the different units where various levels of health care were provided. According to Onokoraiye (1999), the threshold

population for a particular grade of health centre was the minimum population that justified the allocation of scarce financial and personnel resources to the establishment and sustenance of that grade of health facility. On the other hand, the range of a particular category of health facilities is the minimum distance users are willing to travel to reach it. The distance range of health facilities is always measured in terms of travel time or transport cost (Onokoraiye, 1996).

Another aspect of a health facility's catchment area is the number of staff it can accommodate. Countries and local communities varied widely in their approaches to allocating health facilities and personnel. Moreover, different kinds of health facilities have different staffing patterns. Unsurprisingly, hospitals and other higher-order health facilities are better staffed by more qualified health workers than lower-order facilities (KSPA, 2004). Nurses are another staff that is needed to carry out various tasks in doctors' offices, clinics, and hospitals. By utilising nurses to carry out basic health service duties, doctors can perform more complex services, leading to reduced overall costs.

Zhao et al. (2023) investigated the central place theory using trajectory big data and found that settlement system distribution patterns and service ranges conform to the hierarchical law in central place theory. However, the former was closer to the administrative principles in Christaller's theory, while the latter was closer to the marketing principles.

3. MATERIALS AND METHODS

Location and Geography

Ondo State lies between latitude 5°45¹ and 7°52¹N and longitudes 4 ° 20' and 6 ° 51 'E. Its land area is about 15,500 square kilometres. Edo and Delta States bound Ondo State on the East, on the West by Ogun and Osun States, on the North by Ekiti and Kogi State, and to the South by the Bight of Benin and the Atlantic Ocean.

The state has two main vegetation belts; the rain forest has evergreen trees and thick undergrowth, which extends from the South Coast to about 50km inland (the riverine area of Ondo State). There are equally two seasons: the rainy season, April – October, and the dry season, November – March. Ondo State experiences heavy rainfall during the rainy season and high temperatures throughout the year, between 25 °C and 33 ~~°C~~ (See fig. 2).

According to the Ondo State Ministry of Information and Culture (2007), more than 55% of the rural population in Ondo State lived below the poverty line. There was a direct relationship between poverty, household size, and health. Specifically, the larger the household size, the poorer the household was likely to be. This condition of poverty was aggravated by the inadequate attention given to the health sector in the state. Going back in history, in 1979, when the civilian government took over, the number of health facilities increased – hospitals rose from 18 to 26, maternity centres from 127 to 164, and dispensaries from 153 to 173. By 1985, there were an additional 30 comprehensive health centres, as opposed to 2 in 1979.

However, the result of the location quotient analysis indicated increasing disparities in the distribution of both hospitals and lower-level health facilities. Apparently, though, relative to their populations, some LGAs have an excess of health facilities, while others have a shortfall. Spatial inequality in the distribution of health facilities, particularly reflected in the provision of hospital beds, nurses, and doctors, despite a substantial increase in manpower resources in the state. Despite the state government's efforts to ensure a more equitable distribution of health resources, there were nonetheless glaring disparities. The deterioration of the health facilities led to a mass exodus of health professionals, compounded by low salaries and poor working conditions. At the same time, the private sector's intervention in the State's health care delivery markedly increased as the government's attempts to revamp primary health care declined, owing to poor planning and management (Ondo State Ministry of Budget and Economic Planning, 2010).

Fig. 2: Ondo State and selected Local Government Areas
Source: Ministry of Land and Survey, Ondo State,2006

Methodology

The combination of Explorative research design and phenomenology was adopted for the study. Both primary and secondary data were used to elicit information from the respondents. Using a multi-stage sampling technique, Ondo State was divided into three senatorial districts, and 3 LGAs were randomly selected from each district. Consequently, the total number of settlements in the three selected LGAs, drawn largely from 36 wards, was 328, of which 11 (3, 2, and 6 for Akure North, Ose, and Ilaje LGAs, respectively) were rural settlements. Thereafter, all the health care facilities in the selected rural settlement were included in the study. An observation checklist and population data from the National Population Census (NPC) were used, while the Vagale 1971 and World Health Organisation (WHO) healthcare standards for all (catchment area for facilities population and doctors'/nurses' population ratio, respectively) were adopted for the study (see table). In-depth interview (IDI) comprising 15 (5 patients at the facilities, 5 village heads, and 5 general residents) people was conducted, in which various questions relating to the distance of the health care to the respondent's residence, the time spent to reach the health care facilities, and the cost of the trip were investigated. Both quantitative (descriptive statistics) and qualitative data were used to analyse the data. The qualitative data were content analysed.

Vagale's and the World Health Organisation standards for healthcare facilities in the study

	Categories of Healthcare facilities	Vagale's facilities population standard	WHO's Doctor/ population ratio	WHO's Doctor/ Nurse ratio	WHO's Nurse / population ratio
1	General Hospital	500,000-1,000,000	1: 600	1:4	1:500
2	Comprehensive health centre	100,000-150,000	1: 600	1:4	1:500
3	Cottage	100,000-150,000	1: 600	1:4	1:500
4	Basic health centre	30,000-50,000	1: 600	1:4	1:500
5	Maternity	15,000-20,000	1: 600	1:4	1:500
6	Clinic	15,000-20,000	1: 600	1:4	1:500

7	Health post	4,000	1: 600	1:4	1:500
8	Private Hospitals	As in General Hospital	1: 600	1:4	1:500

Source: Adapted from Vagale and WHO health care facilities standard.

4. RESULTS

Catchment Area

In the study, the catchment area was the geographical extent that met the threshold requirement for the provision of different categories of health care facilities, and the geographical spread was the pattern of population density. The existing populations of the settlements under study were used as the catchment area for different categories of health care facilities in the study. The theoretical standard requirements for different health care facilities were based on population density; these are presented in Table 2. Also, Table 2 shows the area of coverage for each catchment. As earlier indicated in this study, all the facilities in the selected settlements were considered.

Investigation on the population threshold required for the facilities under study revealed that from table 1, the standard population that was expected for a basic health centre was between 30,000-50,000 people within a radius of 9 to 13 km; for Comprehensive health and cottage hospital was 100,000-150,000 with a radius of 13 to 19km; and for general hospital was between 500,000-1,000,000 people with a km radius of 31 to 47km. As for the health post, it had a coverage of 4,000 people with a catchment radius of 5 to 9km, while the maternity and clinics were to serve the same number of people (20,000), with a catchment radius of 4km and 1 to 2km, respectively. Table 3 shows the survey results for each settlement in the study area. If the theoretical standard already established was to be followed based on the number of facilities and the category each belonged to, virtually all the facilities were underutilised, given the present population threshold that was supposed to utilise them. For instance, there were three public facilities in Iju, across varying categories, in addition to private hospitals: Basic Health Centre, Health Post, and General Hospital. Given the area's current population (23,466), maternity would be ideal for the entire settlement. In that case, the Iju settlement would need an additional population of 6,534 and 476,534 to qualify for a basic health centre and a general hospital, respectively. Meanwhile, if population growth had been considered before planning, the location of the basic health centre would have been justified, but other facilities could be said to be oversupplied. Normally, preventive medicine and first-aid treatment can both be administered by a basic health centre; general hospitals, on the other hand, should serve a much larger population. Besides, in Imeri, only a basic health centre was located there. With a projected 2011 population of 3,266, it could be inferred that the distribution of health facilities was too sparse for the area. Notwithstanding, the surplus facilities still suffered from underutilisation because of their inequitable population coverage.

Similarly, Okeluse had a projected population of 8,223, while the available health care facilities were the cottage hospital and the maternity unit. If the population they must serve were considered, the facilities could be said to be underutilised. In other words, if maternity, vis-à-vis the services it should render, were considered, they could serve the current 2011 population without including the cottage hospital, which will serve a much larger population.

Furthermore, Igbokoda had a total population of 16,378. Meanwhile, more health care facilities sampled were skewed to the settlement. This included the General Hospital, the Comprehensive Health Centre, and other private facilities such as Ayemafuge Hospital and Ebenezer Medical Clinic, all of which were supposed to respond to the health care needs of the people. The current Igbokoda population is almost within the 15,000-20,000 range, indicating it can be served by a maternity centre. Hence, the current threshold may render them underutilised.

Oberawoye had a total population of 5,197. The population number also did not justify the location of the basic health centre. The population should be served by lower-level health facilities, such as a health post or dispensary. It could then be argued that the facilities had also been underutilised. However, the reverse was true in Ugbo, one of the control settlements in the study. No health facility of any kind was in Ugbo. Meanwhile, the investigation revealed that the people patronised Ugbonla Health Centre, which did not fall within the coverage of the study area. It could be said that the health facilities in Oberawoye and Ugbo were

inefficiently and inadequately planned, implying that patients who require referrals might not be easily attended to by the expected higher-order facilities in the area. Other factors that might explain the poor health facility planning and distribution could be political. In addition, this factor could account for the shortage of health manpower to handle and manage the facilities.

According to WHO (1985), some unawareness of the defined and designed functions of a particular health care unit led to the duplication of services and a lack of coordination between them. Onakhoraiye (1999) also stated that it was easier to attain the threshold population for the three-tier health care facilities in most urban centres, but difficult in rural areas, where settlements were quite small (in terms of population), and transport facilities were poorly developed or non-existent. The expected number of facilities that need to be allocated to the study area is given in Table 3.

Table 2. Population standard to be served and radius of catchment areas for the health facilities in the study area

Facilities	Location	Based on the population in 1991	Existing Pop.2010	Population Standard Required	Shortfall	comment	Radius in Km
General Hospital	Iju	14679	23,466	500,000-1,000,000	-476,534	√	31 -47km
	Igbokoda	10245	16,378		-483,622		
Comprehensive health centre	Igbokoda	10245	16,378	100,000-150,000	-83,622	√	13-18km
Cottage	Okeluse	5144	8,223	100,000-150,000	-91,777	√	13-19km
Basic health centre	Iju	14679	23,466	30,000-50,000	-6,534	√	9-13km
	Imeri	2043	3,266		-26,734		
	Oberawoye	3,251	5,197			√	
Maternity	Okeluse	5144	8,223	15,000-20,000	-6,777	√	2-4km
CInic	Iju	14679	23,466	15,000-20,000	8,466	√	1-2km
	Okeluse	5144	8,223		-6,777		
	Igbokoda	10245	16,378		1,378		
Health Post	Iju	14679	23,466	4,000	19,466	√	5-9km
Private Hospital	Iju	14679	23,466	As in Gen. Hospital	-476,534	√	31-47km
	Igbokoda	10245	16,378		-483,622		

Author's field work, 2010
Note: √ represents non-compliance
Note, standards adapted from Vagale (1971)

Table 3: Expected facilities at the time of the survey

Settlement	Existing Population 2010	Existing Facilities	Expected Facility					
			Health Post	Clinic / Maternity	Basic Health centre	Comprehensive Health	Gen. Hospital	Private Hospital
Iju	23466	Health Post, Clinic, Basic Health centre,	6	2	1	-	-	-

		General Hospital and Private Hospital						
Araromi camp	1072	NA	2	-	-	-	-	-
Oladele camp	674	NA	2	-	-	-	-	-
Imeri	3266	Basic Health centre	1	-	-	-	-	-
Okeluse	8223	Maternity, Clinic	2	1	-	-	-	-
Idi Ogba	5539	NA	2	-	-	-	-	-
Ugbo	3541	NA	1	-	-	-	-	-
Uale Nla	1010	NA	2	-	-	-	-	-
Igbokoda	16378	Clinic, Comprehensive Health centre, General Hospital and Private Hospital	5	1	1	-	-	-
Odumogun	1109	NA	-	-	-	-	-	-
Oberawoye	5197	Basic health centre	1	-	-	-	-	-

Author's field work, 2010
Note, * represents no shortfall, while √ represents non-compliance
Note, standards adapted from Vagale (1971)

Medical Personnel by Catchment Area

Regarding the distribution of medical staff in the study area, this was determined based on the ratios of: population to a doctor; population to a nurse; a doctor to nurses; and population to an auxiliary nurse since the main catchment areas for the existing facilities were the settlements, the projected populations of these settlements were used to determine the shortfall and the required standard vis-à-vis the existing health facilities.

The standard doctor-to-population ratio is 1:600, while the nurse-to-population ratio is 1:500 (WHO, 1995). The existing ratio of auxiliary nurses to population, based on the standard, does not appear in the literature. The population-to-nurses' ratio in the study is presented in Table 4. Considering the population of 23,466, it was observed that the existing facilities sampled in Iju, aside from private hospitals, had a shortfall of 22,966. This meant that three nurses were available at a ratio of 1:500. Meanwhile, if the standard ratio were applied, the facilities would need 47 nurses. Imeri had a total population of 3,266. Given the number of nurses available at the facilities surveyed, there was a shortfall of 2,766 nurses. The implication was that the nurse would have to share the existing workload. The actual number of nurses needed was 7. In Okeluse, the total population was 8,223 with a shortfall of 8,223. Meanwhile, the expected standard number of nurses required to make up for the shortfall was 17.

However, in Ugbo, which fell within the sample settlements, no nurse was available. This may not be surprising, as the settlement fell within the control settlement, which had a total population of 3,541. If the ratio to the threshold population were considered, it would require 7 nurses for the area. In Igbokoda, 16,378 people per nurse showed a shortfall, indicating the number of people who would need a nurse; the expected number of nurses required was 33. In comparison, Iju health facilities seemed to employ more nurses than

in the other settlements. Oberawoye had a population of 5,197; considering the standard nurse-to-population ratio, it required 10 nurses.

Tables 4 (a and b) show the result of the survey of the doctor-to-population ratio in the study area. From the tables, the number of doctors present in Iju vis-à-vis the population showed a shortfall of 22,966, indicating that 46 doctors would be needed if the doctor-to-population accessibility ratio required in the existing facilities in the area were applied. In Imeri, there was a shortfall of 2,766 doctors, given a required total of 5 doctors. Okeluse had a shortfall of 7,023 due to only 2 doctors being available in the existing facilities. The required number of doctors was 5 if the ratio were considered. Igbokoda had a population of 16,378 with a shortfall of 13,978, indicating an acute shortage of medical doctors. But compared with other settlements, Igbokoda had an advantage, with up to 4 doctors out of the required 27 medical doctors in the area. For Oberawoye, the total population was 5,197, showing an expected number of nine doctors.

Another aspect of the medical staff distribution across catchment areas, as it affected the planning of health care facilities in the study area, is the doctor-to-nurse ratio, which is 1:4 (World Bank, 2010). From the facilities surveyed, there were few or no doctors in the settlements. This affected the doctor-to-nurse ratio. If the required number of doctors were 46, given a shortfall of 22,966 people in the area, the expected number of nurses per doctor would be 184. In Imeri, the ward's shortfall population was 2,766, indicating a required nurse-to-doctor ratio of 20. Igbokoda had a shortfall of 13,978; by inference, it would require as many as 108 doctors. Table 4 shows the distribution of doctors across the wards in the study area.

Private hospitals operated mainly with the assistance of auxiliary nurses. The ratio of auxiliary nurses to the population in the area was high. For instance, Iju had a ratio of 1,067:1; Imeri, 148:1; Okeluse, 373:1; Oberawoye, 236:1; and 744:1 for Igbokoda. The implication of the high rate of auxiliary nurses could be the inability of the operators to afford the payment of well-trained staff or the shortage of health personnel. Consequently, private hospital owners might, in the long run, reduce auxiliary nurses' salaries and maximise profits, which is an important objective of private health establishments. Certainly, this might have implications for quality health care services. Adejuyigbe (1973) argued that one of the reasons for attendance at each medical centre in Ile-Ife town was the facility type and services available.

Generally, the distribution of medical staff across wards indicates a lack of proper planning in the health facilities. Most rural areas had higher-order facilities designed for urban settings, leaving them understaffed with medical personnel. With understaffed health facilities, access to needed health services would be difficult; therefore, people would have to travel beyond the maximum distance to get medical care.

Table 4a. Doctor Population Ratio and Nurse-Doctor Ratio

Name of Settlement	**Base Population 2010**	**Doctors'** Population **Ratio**			**Nurses to Doctor ratio**	
		Standard ratio	**Shortfall population**	**Expected standard**	**Standard ratio**	**Expected standard**
Iju	23,466	1:600	22,966	46	1.4	184
Araromi camp	1,072	1:600	-	-	1.4	-
Oladele camp	674	1:600	-	-	1.4	-
Imeri	3266	1:600	2,766	5	1.4	20
Okeluse	8223	1:600	7,032	5	1.4	20
Idi Ogba	5539	1:600	-	-	1.4	-
Ugbo	3541	1:600	-	-	1.4	-
Igbokoda	16378	1:600	13,978	27	1.4	108
Oberawoye	5197	1:600	5,197	9	1.4	36
Uale Nla	1010	1:600	-	-	1.4	-
Odumogun	1109	1:600	-	-	1.4	-

Author's field work, 2010

Note- standard adapted from WHO, 1985

Table 4b: Nurses Population Ratio

Name of Settlement	Base Pop. 2010	Nurses' population ratio		Expected standard ratio
		Standard ratio	Shortfall Population	
Iju	23,466	1:500	22,966	47
Araromi camp	1,072	1:500	-	-
Oladele camp	674	1:500	-	-
Imeri	3266	1:500	3,266	7
Okeluse	8223	1:500	3,266	7
Ayetoro	14521	1:500	-	-
Idi Ogba	5539	1:500	-	-
Ugbo	3541	1:500	-	-
Igbokoda	16378	1:500	16,378	33
Oberawoye	5197	1:500	5197	10
Uale Nla	1010	1:500	-	-
Odumogun	1109	1:500	-	-

Author's field work, 2010

Note- standard adapted from WHO, 1985

Furthermore, an In-Depth Interview was conducted with one of the identified indigenes of the areas under investigation. Issues raised included meeting the 5-kilometre requirement, meeting the 10-minute time requirement before reaching the facilities, and the cost per trip to reach the facilities.

Distance covered to reach the healthcare facilities

One of the key attributes of health care facilities in ensuring a health delivery system is the distance covered to reach the health care centres. Investigation revealed that respondents cover a longer range of distances of more than 5km before accessing facilities of higher order in the area, but shorter distances before reaching health care of lower order. A situation that could be triggered by respondents' low income, especially when it involves long distances and the cost per trip is unaffordable. This may not be unconnected to poor planning of health care facilities in the study area. The result was corroborated by a respondent who articulated that;

> '*It takes us time to reach the hospital if the case we are diagnosed with is not treatable by the small clinic in our area. We must embark on a long journey of more than 5 km before we reach there. The case may even be worse by the time we get there, or would have resulted in complete death. Meanwhile, if this hospital were around us, we may not have had to travel that long, and the situation would have been salvaged. Some of the hospitals around us don't even have first aid, let alone facilities or drugs that take care of chronic cases. We always resort to prayers, believing that such A hospital will be equipped on time so that the lives of our people can be saved".*

Time spent reaching the health care facilities

Regarding the time dimension of accessibility, the expected time required to reach a health centre is 10 minutes. This is crucial, particularly during emergencies, when patients must reach health facilities within the shortest possible time if the medical safety of the patients in question is considered a matter of significance and urgency. The average time to reach the facilities was more than 10 minutes in some facilities, while it was within 10 minutes for a few respondents. This was attributed to poor transportation and road networks, and to a lack of the money needed to hire a taxi, mainly due to low income. This was buttressed by a respondent during an in-depth interview.

'When you talk about time, the possibility of reaching the hospital on time is far from realisation. To worsen the problem is the hospital that is located far away from us. It takes time, like one hour at times, and the situation would have gotten out of hand before getting to the hospital.'

Cost per trip to reach the health care facilities

People's income is crucial to the healthcare delivery system. Investigation in the study area revealed that the cost of transportation to the health facilities was very high due to poor road conditions. The challenges of income in rural areas, particularly in Nigeria, have been documented by different scholars. It lives below 1 dollar per day. This was evident in the statement made in one of the interviews by one of the respondents*:*

'Because we live in a rural area, we trek to the hospital. The reason is that, if we must pay for transport, it may affect other things we could use the money to do. Although the cost of transport to the nearest health centre cannot be less than 600 naira, it depends on the kind of transport car one chooses to use. For instance, an Okada (motorcycle) and a Keke Maruwa (tricycle) will be costlier than a normal taxi. You may be thinking that 600 naira is not too much, but it's a lot of money to us in the rural area here. Though there is no amount of money spent on health that is a waste.

By implication, this theory provides fundamental insights into the spatial patterns and factors that influence location decisions. It provides insight into the complex interplay of historical, economic, and cultural factors that shape the decision on patronage in any region when planning is undertaken. Furthermore, it provides researchers with valuable insights into the dynamics of location across different contexts.

5. CONCLUSION AND RECOMMENDATION

The application of this theory to the planning and management of health facilities, the focus of this study, is to attain efficiency in the provision of health care services in rural areas, since the threshold population must fall within the range of those categories of health care services. It was discovered that all the variables considered did not meet the specific minimum required planning standard, posing a threat to people's health. It is therefore required that the specific planning guidelines in place be strictly enforced to guarantee an effective healthcare trajectory.

Ethical Approval

The study did not involve animals, vulnerable populations, or invasive procedures. Participation was voluntary, and all information was treated with strict confidentiality.

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