

# Location Theory and Public Facilities: A Case Study of Health-Care Facilities in Ughelli-South Local Government Area of Delta State, Nigeria

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## ABSTRACT

This study examined the distribution and patronage pattern of public health-care facilities in Ughelli-South Local Government Area of Delta State, Nigeria. In doing this, existing location theories were examined for concepts and ideas that provide theoretical guidelines for issues relating to the location and patronage of public facilities. Furthermore, attempts were also made to see how the spatial distribution and patronage pattern of health-care facilities in the study area accord with these theoretical guidelines. Some problems facing the health-care delivery system in the study area were identified and appropriate remedial measures were suggested for implementation.

**KEYWORDS:** Location, Health-Care Facilities, Patronage, Spatial Distribution.

## INTRODUCTION

Most existing location theories are primarily concerned with agricultural, industrial, commercial and residential activities, with little attention **having been** specifically devoted to public facilities. The theoretical basis for determining the size, location and efficiency of public facilities are as yet rudimentary. Yet such a body of theory is undoubtedly necessary in view of the fact that public services, especially welfare facilities, have a profound impact on the lives of individuals. This paper **sets out to fulfill two major purposes**. Firstly, it examines existing theories for concepts and ideas that provide theoretical guidelines for issues relating to the location and patronage of public facilities. Secondly, it examines the spatial distribution and patronage of health-care facilities in Ughelli-South Local Government Area of Delta State to see how they accord with these theoretical guidelines.

## CLASSICAL LOCATION THEORY

In classical location theory, the spatial pattern of economic activities is explained mainly in terms of transfer costs which include both freight charges (i.e. transport cost) and the cost of insurance on materials and goods en route and losses incurred by deterioration of or damage to materials en route. The expense and inconvenience of shipping finished products to distant customers and procuring raw materials from distant sources induce producers to locate near their markets or raw materials (Hoover, 1948; Akhimien, 2005). Which of the market or raw material source eventually attracts an activity depends on the relative cost of assembling materials and distributing finished products. Many industrialists, therefore, tend to locate where aggregate transfer costs are at a minimum (Estall and Buchanan, 1968; Omole, 2001).

Transfer costs are usually reduced by bringing producers and consumers closer together on the transport and communications network. Therefore, profit-oriented enterprises respond to transfer costs by seeking to reduce them. Transfer costs, in essence, operate to cause a concentration of economic activities at strategic points on the transport and communications network and all types of production find favourable locations at transshipment and junction points on the transport network.

The notion of transfer costs has strong implications for the spatial distribution/location of public facilities. Public facilities have many important characteristics, two of which are particularly relevant for our present purpose:

- (1) The services they produce are mostly for final consumption, and
- (2) Public services generally require personal contact between producers and consumers.

As a result of these two characteristics, public facilities generally locate primarily with an eye to distribution, and are thus oriented towards the consumer market.

Location theory also makes important points about the spatial distribution of producers and consumers. The locational relation among producers competing for markets is usually one of mutual repulsion. This is largely because producers search for markets where competition is at a minimum. If the good supplied is standardized, affording no grounds for consumer preference apart from cheapness, each market point will buy from whatever production centre can supply it most cheaply. The delivered price of any good or product at any market is equal to its cost at the factory plus distribution costs. Consequently, the spatial pattern of producers

and consumers is a function of competition between producers and is largely resolved by the structure of transfer costs.

### **CENTRAL PLACE THEORY**

Central place theory concerns, among other things, the location and spacing of service centres. It might be instructive, therefore, to highlight some concepts, especially the locational concepts, which have direct relevance for the issue of spatial efficiency of public facilities. Central places are essentially places that provide a convenient point of focus for consumers for the purchase of goods and services, and centrality is the essence of the point of focus. Centrality refers to a state of high accessibility, the quality of being at the centre of the transportation system (Morrill, 1970; Ayeni, 1991; Inyang and Ogbonna, 2001). Thus, it follows that the term central place is a relative one. It describes the relationship between a point and other points in the surrounding region, and the central place is that point which can be most 'easily' reached from other locations in the region. This idea has relevance for the geographic distribution of public facilities since the primary concern of central place theory is with devising a spatial arrangement of central places which would minimise the travel costs of the population in gaining access to the services they require.

Centrality implies that consumers generally use service centres that will enable them satisfy their wants with the minimum effort. In other words, consumers tend to prefer locations that involve the least expenditure of travel time or transport costs. Among the factors frequently suggested as affecting trip patterns, travel costs have received the greatest consideration. It is argued that the travel behavior of consumers is influenced by the expense in money, time or effort that is involved in traveling to various service centres offering the goods and services desired.

### **WELFARE ECONOMICS**

**There are** two ideas in welfare economics **that** embody some central place concepts and also have important implications for the spatial location of public facilities. These are the social welfare function and the distribution of welfare between members of society. The social welfare function is comparable with the traditional concern in location theory with the minimization of costs and maximization of profits. This idea of welfare maximization can be translated into the proposition that for a given output of goods and services, total social welfare will be maximized by the spatial distribution of activities which minimizes the total costs of production and distribution in the system (Chrisholm, 1970; Aguda, 1997). In terms of public facilities, this is equivalent to the minimization of aggregate time, cost or effort expended in traveling to and from public facilities.

The second proposition relates to the distribution of welfare among all citizens and this is an aspect that has only been given little attention by location theory. In one of his works, however, Losch (1954) made two propositions that pertain to the distribution of welfare. The first one is that the net of market areas must cover the entire territory in question. The second is that the number of firms must be as large as possible, with reverse argument that their market areas must be as small as is consistent with the firm achieving at least zero profits. The first proposition implies that all consumers must have access to supplies while the second implies that the differences in the delivered prices between different consumers at different locations shall be as small as is consistent with the firm remaining in business. While the caveat in the second proposition is important in respect of private enterprises, it is not quite so with public facilities. In central place literature, the idea of the distribution of welfare among citizens is implicit in the form of hierarchy of central places.

Even in market area analysis, welfare viewpoints have strong implications. In traditional location literature, efficient market areas are ones that minimize total distance to supply points. Each consumer, therefore, uses the nearest source, and only along market area boundaries will consumers be indifferent to the centre they patronize, especially where goods and services are homogeneous in every respect.

### **THE PRINCIPLE OF LEAST EFFORT**

The arrangement of objects or activities in space is directly linked with the principle of least effort enunciated by Zipf in 1965, (Ayeni, 1991). Man strives to accomplish his tasks and satisfy his wants with the least possible effort. It is for this purpose that activities tend to be located at central places. An optimal location and spacing of service centres in an area implies that consumers will, in aggregate terms, expend the minimum amount of effort required to use the services or facilities. The principle of least effort can be expressed by an objective function in situations where it is, for instance, desired to minimize the total cost of movement in a system. This problem of minimizing the value of the objective function subject to certain constraints can thus be placed directly in a spatial context.

Theoretical guidelines for the efficient location of public facilities therefore abound in planning, geographic and other literature. However, the efficiency of the spatial pattern of facilities depends largely on the locational objectives of decision-makers.

## **LOCATIONAL OBJECTIVES AND SPATIAL EFFICIENCY**

In locating private and public facilities, the common objective of policy-makers is either to maximize utility or to minimize costs. However, public and private decision-makers differ in their definition of utility and cost. Since the major goal of shareholders or owners of private facilities is to maximize their profits, private locational decisions are necessarily profit-oriented. For all private enterprises, the ultimate basis of choice of location is the rate of earnings (wages, profits, or interests) obtainable at different locations (Aguda, 1997; Hoover, 1948; Omole, 2001). Regularity and security of earnings are also important. Consequently communities with stable economies are generally more attractive to entrepreneurs seeking to locate enterprises. Equally important is expected trend in earnings. Thus, from the point of view of private locational decisions, the important factors are stability and security of returns and bright future prospects.

While private enterprises mainly seek monetary profits for a comparatively small group of individuals, public decision-makers aim at maximizing social utility or minimizing social costs for those who use the services provided. In such situations, the definition of utility and cost for the user in human terms takes the place of variables structured solely in terms of monetary returns to the producer. The goal of public locational decisions could, for instance, be to minimize aggregate travel for a given population while simultaneously ensuring that all consumers have access to facilities. These objectives undoubtedly have welfare undertones. Such minimization problems are usually subject to some constraints like the number and size of facilities and the number of people to be served. The smaller the aggregate travel, the more efficient the set of facility locations and the more accessible the services to the user population.

Public and private decision-makers differ in their locational objectives, especially as their locational decisions are made within different frameworks. Monetary criteria are the basis of most private locational decisions. On the other hand, with regard to public facilities, non-monetary criteria become especially evident. The relevant variables in most public locational decisions refer to social or human entities to which it is extremely difficult to assign monetary values. It is impossible, for instance, to know how much monetary benefits result from suitable access to police protection, fire services, or medical facilities. Hence one of the primary objectives of public locational decisions is the maximization of accessibility to facilities.

It is against this background that the spatial pattern or distribution of health-care facilities **were** examined in order to identify the locational characteristics of this category of public facilities.

## **THE STUDY AREA**

Ughelli-South is one of the twenty-five Local Government **Areas** of Delta State. Located approximately within latitudes of 4°28' and 5°09' north of the equator and longitudes 5°14' and 5°40' east of the Greenwich Meridian, it has a population of 212,638 (NPC, 2009). Generally, the study area is flat and relatively low-lying with no part rising above 15 meters above sea level. Some parts of the area are consequently liable to heavy flooding. As a result of its location, the study area experiences a slightly modified equatorial climate with its characteristically high temperatures and rainfall all the year round. Annual range of temperature is considerably small. This slight contrast between the warmest and the coolest months is determined not so much by position of the sun as by the amount of cloudiness and precipitation. The study area is located in the zone of contact between the mangrove and the fresh-water swamps. Extensive swamps forest tracts with a variety of species occur in most parts of the study area. The economy of the study area is largely dominated by agricultural and commercial activities.

## **HEALTH-CARE FACILITIES IN THE STUDY AREA**

The specific objective of this study is to evaluate the locational characteristics, patronage pattern and spatial efficiency of health-care facilities in Ughelli-South Local Government Area of Delta State. There are two basic systems of health-care delivery in the study area. These are (1) the traditional medical care system and (2) the orthodox medical care. This study is, however, not concerned with the first type, i.e. the traditional health-care system. The second type is the orthodox health-care which is practiced by medical doctors assisted by other medical personnel in hospitals, primary health centres, maternity homes and clinics.

As with other forms of economic activities in the study area, health-care facilities are as much as possible located largely on the basis of centrality and hence accessibility to the user population. The health-care facilities in Ughelli-South Local Government Area are owned mainly by three categories of authorities namely:

- (a) The state government

- (b) The local government and
- (c) Private medical practitioners.

The medical facilities owned by the government, whether State or Local Government are not only located in the major towns but also the smaller villages and settlements across the study area. Most of these facilities were located with an eye to accessibility to the user population. While this may be the major reason for locating public health facilities, this is not so with the privately-owned facilities. In this case, an overriding reason for the establishment of these categories of health facilities is that of profit maximization.

### LOCATIONAL EFFICIENCY IN TERMS OF ACCESSIBILITY

The concept of accessibility has been defined as the relative ease with which a location may be reached from other locations (Morril, 1970; Storbeck, 1990; Inyang and Ogbonna, 2001). Accessibility may be measured in social, physical and economic terms. Physical distance influences accessibility a great deal since most of the inhabitants in a given area will have to spend a significant proportion of their resources, that is, time and energy, in movement.

In this work, accessibility is measured in terms of physical distance and mode of transportation. Transportational attributes are dominant factors of accessibility in any given area. Patronage of a particular health-care facility depends largely on the accessibility of the facility. In order to examine the role accessibility plays in the patronage patterns of patients, a survey of the General Hospital located at Otu-Jeremi was conducted in our attempt to see how patronage is influenced by distance to the facility. **The field survey was conducted in the month of August, 2013.** It was discovered during field survey that patronage decreases with increase in distance from the health facility and this patronage is restricted to those who can afford the cost of traversing the distance between their homes and the facility (see Table 1).

TABLE 1: **Approximate Distances Travelled by Patrons to Otu-Jeremi General Hospital**

Ward	Distances in Kilometers			Total
	1 – 5km	6 – 10km	11km & above	
1	31	8	7	46
2	33	10	6	49
3	5	6	4	15
4	16	3	2	21
5	12	5	3	20
6	9	6	3	18
7	2	2	5	9
8	-	6	4	10
9	-	2	3	5
10	-	4	3	7
Total	108	52	40	200

Source: Field Survey, Aug. 2013.

It can easily be observed from Table 1 that the greater the distance between the health facility and the patrons, the lesser the number of persons patronizing the facility. For instance, a total of 108 persons who patronized the General Hospital travelled not more than 5km. The corresponding figures for up to 10km, and 11km and above are 52 and 40 persons, respectively.

The mode of transportation used also seems to significantly influence distances patrons traverse in order to avail themselves of the services of the health facility. This assertion is amply illustrated in Table 2.

TABLE 2: **Transportation Mode used by Patrons**

Mode of Transportation	Sample Population	Percentage
Taxi/Bus	25	12.5
Motorcycle	45	22.5
Bicycle	15	7.5
Walking	115	57.5
Total	200	100.0

Source: Field Survey, August 2013.

Our field survey revealed, for instance, that 57.5% of the respondents walked to the health facility, while 7.5% used bicycles as means of transport to the health facility. What this implies is that about 65% of the

sample population patronizes the health facility because of its closeness to their homes. Only 35% of the respondents use public transport in order to patronize the health facility.

Apart from the mode of transportation, other factors equally influence patronage of health facilities in the study area, as illustrated in Table 3.

**TABLE 3: Factors Influencing Patronage of Health Facilities**

Reason for Patronage	No. of Respondents	Percentage
Proximity to home	72	36
Good medical care	32	16
Presence of medical facilities/personnel	20	10
The only available government-owned health facility	40	20
Lower cost of medication	22	11
Others	14	7
Total	200	100.0

Source: Field Survey, August, 2013.

Topping the list of reasons for patronizing health-care facilities in the study area is proximity to the homes of the patrons. Next on the list of reasons is that this health-care facility is the only government-owned hospital in the locality. Respondents who patronize the facility for reasons of cheaper cost of medication and availability of medical facilities and personnel are 22 and 20 accounting for 11 and 10 per cents of the sample population respectively.

Apart from the General Hospital located in the local government headquarters, there are also a number of privately-owned medical centres/clinics located across the various wards. Our field survey, however, revealed that most **respondents preferred the government owned** health-care facilities because they are better staffed with qualified medical personnel and provided with adequate facilities as well. It was observed in the course of our field survey that most of the privately-owned health-care facilities in the study area are not only poorly staffed but they also charge fees that are by far higher than those charged in the government-owned health-care facilities. Some of the health centres also lack essential medical facilities necessary to achieve an effective and efficient health-care delivery.

#### **LOCATIONAL EFFICIENCY IN TERMS OF THRESHOLD POPULATION REQUIREMENTS**

The location of economic activities on the landscape is a reflection of the effective demand of the surrounding population. This is well explained by the concept of the threshold population and the range of a good in the central place theory. One issue investigated in the **course** of our field survey was whether there existed any form of relationship between the distribution of both government-owned and privately-owned health-care facilities and the pattern of population distribution in the study area.

The 2006 National Population Census puts the population of Ughelli-South Local Government Area at 212,638 (NPC, 2009). As with other forms of distributions, the population of the study area in unevenly distributed among the wards. Although the ward by ward population figures are not available, it was observed in the course of field investigation that almost all the health-care facilities – both publicly – and privately-owned ones – are located in the few towns in the study area, including the local government headquarters of Otu-Jeremi.

#### **PROBLEMS OF HEALTH-CARE DELIVERY IN THE STUDY AREA**

There are a number of problems facing health-care delivery in the study area. Prominent among these is the fact that many of the medical facilities are grossly understaffed and ill-equipped. This problem is more obvious in the privately-owned medical facilities. Accessibility of the health-care facilities to the user population is also a major problem. Most of the roads in the study area are in a state of disrepair. A direct consequence of this is the high cost of transport that patrons of these medical facilities have to pay.

Government-owned health-care facilities in the study area are few. There is only one General Hospital in the area and it is located at Out-Jeremi. Those who seek medical attention are therefore obliged to patronize the private-owned health-care facilities whose charges are often too high.

#### **CONCLUSION**

This study examined as critically as possible the spatial distribution and patronage pattern of health-care facilities in Ughelli-South Local Government Area of Delta State. The study has highlighted a number of issues that may be of importance to planners and those charged with the responsibility of ensuring efficient operation of the health-care delivery system in the study area.



Three major categories of health-care facilities are available in the study area, namely, the General Hospital, privately-owned hospitals, Primary Health Centres, Dispensaries and Maternity Homes. The patronage of any particular medical facility depends, in part, on the accessibility of the facility to the user population. It was discovered that the most accessible settlement in the study area is Out-Jeremi where a number of the health-care facilities are located.

In the course of this study, a number of problems facing the health-care delivery system in the study area were identified. Most of the medical facilities are grossly understaffed and ill-equipped. This state of affairs cannot be overemphasized as the implications of an ill-equipped and grossly understaffed health-care facility are too frightening to contemplate. If the aim of government is to ensure an efficient health-care delivery system in the **study** area, the need for it to adequately equip and provide qualified medical personnel for its medical facilities becomes mandatory.

Accessibility of the medical facilities to the user population was also identified as a crucial factor in the patronage pattern of the facilities. It is necessary, therefore, for government to provide good road networks to link all the major settlements in the study area in order to ease mobility. The establishment of primary health centres in the rural area will also help to bring the services of the medical facilities closer to the rural poor. Furthermore, physical development of these facilities should be undertaken periodically so as to maintain a tolerable standard of health-care delivery in the study area.

If properly implemented, the above recommendations will go a long way in solving the problems identified in the study area. A healthy population is an asset to any society. Consequently, improving the health-care delivery system will in the long run improve the quality of life of the people in the study area.

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