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Public services in Egbedore local government area

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PUBLIC SERVICES IN EGBEDORE LOCAL GOVERNMENT AREA.

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ABSTRACT

This study is concerned with assessing the accessibility
of rural public service facilities like educational and
health institutions. Locational accessibility of the
selected services - Secondary schools, Primary Health Centres
Maternity Centres and Dispensary/Health Posts - in the area
are analysed with an accessibility index. Four experiments
are carried out in order to measure the potential spatial
accessibility of each of the services to the client
population within the Local Government Area. The analysis
shows that variation exists within the services in the
degree of inequity in potential access that stems from
locational separation of potential clients and the location
of the services in the rural environment, with dispensary
being more accessible than the primary health centres
which is the least accessible. The result of the R -
statistics shows that the service facilities are dispersed
in the area; the result of the ANOVA also shows that the
distance travelled to obtain the services varies among the
zones. The result of the X^2 analysis also shows that there
exists a significant relationship between utilisation and
the nominal variable of zone.

CERTIFICATION

I certify that the work was carried out by
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DEDICATION

With genuine humility, I acknowledge the sacrifice of my parents and those under their care.

This thesis is therefore dedicated to:

My parents, Mr. & Mrs. L.A. Adebayo, for providing me a conducive atmosphere for learning;

My brothers - Nurain, Abd-Lateef and Kamorudeen - and Sisters - Idiat, Sefiyat, Kafayat and Misitura - who always support my parents in their farming activities.

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I wish to express my thanks to my brother, Nurain Adebayo in the course of the field work and my sister, Latifat, for her fondness; my thanks to my friends, Rasaq Salam, Tawfiq Yagboyaju, Ikporukpo Ezekiel, and Oye Babatimehin; I enjoyed their company.

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CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION AND STATEMENT OF PROBLEM

Public facilities have of late started to attract the attention of social scientists, especially geographers. The reason for this interest lies in the importance of facilities like schools, hospitals and others in the economic development of a country (Okafor, 1979, p. 175).

The provision of these services in Nigeria, as elsewhere varies between one spatial unit and another (Okafor, 1989, p. 123). There is a heavy urban bias in the distribution of public service facilities (IBRD, 1993, p. 137), while rural areas are poorly served especially in Nigeria, despite their importance in economic development (Filani, 1993, p. 248), they are characterisedby a high degree of poverty.

In recent years,however, attention has also been given to the development of rural public services. Nigeria, for instance, has become increasingly interested in the problem of regional development seen in the creation of more states and Local Governments (Abumere, 1985, p. 93), and establishment of new public facilities (Ayeni, 1992), especially in rural areas, the aim is to improve access and so stimulate regional development as inaccessibility to basic human services is a barrier to improved welfare. Promoting the

quality of life of rural inhabitants will lead to increased agricultural productivity which Alimi (1991, p. 1) has described as a prerequisites of economic progress.

There is therefore the need to plan rural areas because of their role in sustaining partly the entire human activity system (Idachaba, 1985). Sustainability translates into agricultural policies of one kind or another one of which focuses on rural people and places (Wimberly, 1993, p. 1-2). The objective of the concern for spatial aspect of development, as reflected in planning process in Nigeria and other less developed countries, is to secure an equitable distribution of benefits from economic development for all geographic region (Dikenson et al, 1983).

The term public services refer to facilities or infrastructures that are open to the public, whether or not they are owned by government (Okafor, 1989, p. 125), they are things and actions done to improve the welfare of the people (Ayeni, 1992).

In Nigeria, it is not unusual that the consideration of efficiency of the services, not only in terms of sizes of facilities and functioning, but also in terms of location are often abandoned for other factors (Ayeni and Rushton, 1985/86 p. 115). Planning for location is rather more implicit than explicit, for instance the number of government

parastatals and organisations that engage in locational planning have increased in recent times; these include the Directorate for Social Mobilisation (MAMSER) and the Directorate for Food Road and Rural Infrastructure (DFRRI) (Ayeni, 1992).

The rationale for this study can be looked at from planning point of view; a common planning problem is to locate a limited number of central facilities so as to maximise service to an existing population (Holmes et al, 1972, p. 258); therefore, the main objective in determining the optimal location pattern for public services is to find the pattern that is best preferred by users (Rushton et al, 1981, p. 196). Improving accessibility has therefore become an accepted part of the rubrics of rural development planning especially in the third world countries, (Ayeni, 1987).

Rural inhabitants are scattered in small settlements (Rondinelli and Evans, 1983), as a result, the services are located in some central places, this leads to locational separation of the source of supply of a service and the service consumers. Spatial interaction therefore provides the means for the satisfaction of certain needs that arises from the locational separation of service producers and consumers (Ayeni, 1979; Kumuyi, 1976).

Utilisation of a service is a fundamental indicator of access (Donabedian) (Joseph, 1986, p. 11). The accessibility of a given location may be defined in terms of how easy it is to get there. It indicates the spatial relation between a location and others (Kansky) or the degree of connection between that location and all other places in a region (stutz) (Ikporukpo, 1987, p. 62).

Accessibility to a given service could also mean the possibilities of using the opportunities that economic, cultural, social and political facilities and institutions provide (Domanski, 1979, p. 1189). This idea defines effective accessibility, thus, a facility that is close to a person in terms of geographic space may be inaccessible because of economic, racial, or other social factors; however, Ikporukpo (1987, p. 63) has argued that the idea of effective accessibility become less relevant where there is some general homogeneity in either the type of facilities or users.

Various research works have revealed that spatial pattern of service facilities affects their accessibility and their consequent utilisation, considering the above, the problem of this study is one of analysing the emergent pattern of public service provision in rural areas in terms of some measures of accessibility, in other words, the

study assesses the accessibility of the public service facilities in the Local Government Area. The services to be studied are education and health services.

1.2 AIM AND OBJECTIVES

The aim is to study rural public services with emphasis on nature of provision, observed pattern, its accessibility and utilisation. The location of rural public facilities are planning issues that can guide development towards creating a liveable space for rural inhabitants, the planning with which this study is concerned is that which affects location and service utilisation. The specific objectives are:

(i) to examine the spatial distribution of the services and identify the nature of provision and the factors that influenced the spatial distribution of the facilities;

(ii) to examine the pattern and level of patronage of the services;

(iii) to determine the influence zones of the services with a view to ascertaining their significant catchment areas;

(iv) to examine the size and determining the relative geographic accessibility of the public service facilities to the client population within the Local

Government Area.

1.3   THEORETICAL AND CONCEPTUAL FRAMEWORK

There is as yet no definite location theory for public facilities, existing location theories are primarily concerned with agriculture, industries, commercial and residential activities (Okafor, 1979, p. 175). Notwithstanding, Central Place Theory is one of the idea that embody some element of location and utilization of central service facilities. Walter Christaller came up with this theory in 1933. His theory is based on the assumption of an isotropic plain ie. of uniform terrain, uniform distribution of purchasing power and accessibility in all directions; he further assumed that there is no differentiation between products (services) and that consumers are all economic men.

The theory is appropriate for explaining the size and spacing of settlements, it also seeks to explain both the centralisation of service activities and the locational characteristics of places in which they are found.

The main focus of the theory is centrality, this implies that consumers who need certain goods and services prefer that they are located at points which permit their purchase with the minimum effort. As a result, producer of

the service will congregate at a centre where the threshold for the survival of the service will be met.

It is argued that goods and services are of different orders and that each good/service possesses a range from which people travel to the central place to purchase it. The trade area has two limits; the lower limit is the threshold that assures the viability of the good/service, the upper limit defines the maximum reach above which nobody travels to the central place to demand for the service. Consequently, goods/services of a higher order would have longer ranges than goods/services of a lower order (Ayeni, 1979, p. 110 - 111).

Horizontally, there are fewer higher order centres than lower order ones. The higher order centres are more widely spaced with distances between similar centres increasing by the root of three over the proceeding smaller category. The distinct market areas of centres are demarcated by hexagon since it is more efficient than any other geometrical figure (Figure 1). In order that the lower order centres be efficiently served, they are nested within the trade areas of the higher order centres according to certain principles (Kumuyi, 1976, p. 15) See Figure 1.
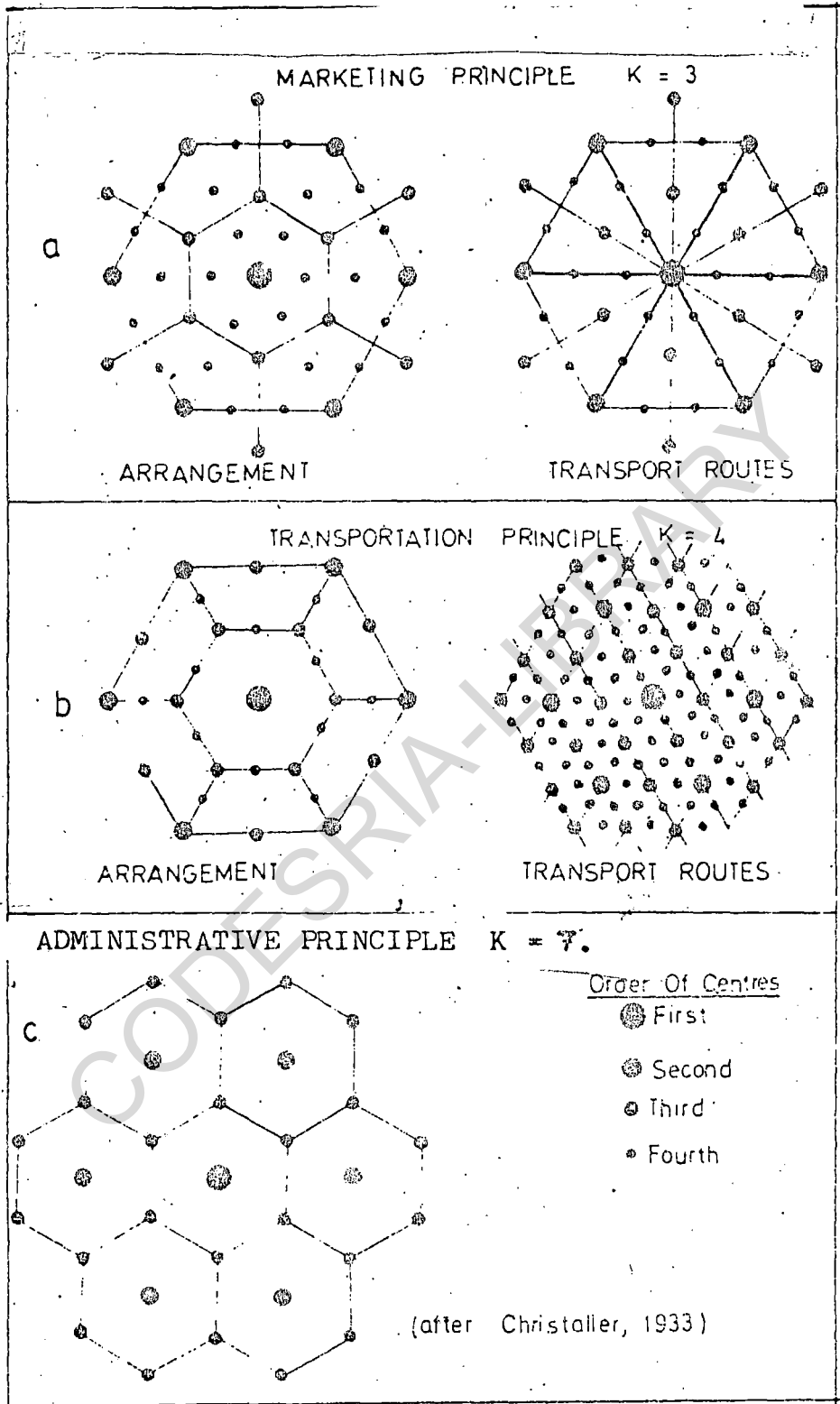
Figure 1: Christaller Network Principles.

Three principles are recognised, viz, the marketing, the transportation, and the administrative principles. In the marketing principle, every higher order centre is surrounded by a ring of six smaller centres, located at the six corners of the hexagon. The higher order centre serves three market areas of the next lower order centre. Under the transportation principle, a centre serves an average of four market areas of the next lower order centre. Finally in the administrative principle, a centre serves approximately seven market areas of the next lower order centre (Kumuyi, 1970, p. 15).

This theory has been criticised on a number of grounds. These includes its failure to agree on the basic measure of centrality, and its disregard for the preference/behaviour of consumers over space and time.

The concept of accessibility is equally important in the understanding of spatial distribution of public service facilities. It has become a key concept for characterising a fundamental principle of human activity: maximum contacts through minimum activity (Karlquist) (Pirie, 1979, p. 299). Accessibility of a given location may be simply defined in terms of how easy it is to get there.. However, in the utilisation of public facilities, it is not sufficient to define accessibility in terms of simple location (Locational accessibility) the effective accessibility of a

given facility is also fundamental in facility use
(Ikporukpo, 1987, p. 62 - 63).

Interaction theory based on Gravity model also provides
a framework for understanding interaction between service
location and consumers location. The assumption is that
the number of clients from a town/village is directly
proportional to the population of the town/village in
question and inversely proportional to the distance between
the settlement and the service location. The model is of
the form:

$$Iij = a. \; Mi \; Mj \; dij^{-b} \; \ldots\ldots\ldots(1)$$

Where Iij = the number of client coming to service

i from town/village j;

Mi = index of school size/hospital size;

Mj = the population of town/village j;

dij = the distance separating service i and village/
town j;

a = constant of proportionality;

b = an exponent of distance

In addition, numerous behavioural models have been
developed to analyse the use of health care services
(Stimson, 1981, p. 35). One of such models is that developed
by Rosenstock. He argued that utilization is a response to

a precipitating cue that will be influenced by the inter-
play of numerous psychosocial factors.

Suchman emphasised socio-environmental determinants
where choice in selecting the service to be used reflects
knowledge, availability, convenience of the service and
social group influence on the individual (see Stumson, 1981).
Anderson in his model depicts use of services as the outcome
of a set of predisposing variables (family composition,
social structure and health benefits), enabling factors
(family resources, and community resources), and need
(illness and response).

Gross developed a causal model of the form:

U = F (E, P, A, H, X) e, where

U = utilisation of health services by individual/
    family unit.

E = Enabling factors; P = predisposing factors;

A = Accessibility factors; H = perceived health level;

X = individual and area wide exogeneous variables;

e = residual error term.

In reviewing behavioural models, Veeder states:
"What is missing is a description of decision making factors
that occur between cue and utilisation action (Rosenstock),
between group affiliation and influence and action

(Suchman), between family life cycle status and discretionary action (Anderson), and between enabling predisposing factors and utilisation outcomes (Gross)" (Veeder) (Stimson, 1981, p. 35).

It does seem from the above that although there are other theories upon which to base this study, the above theories provide a framework within which to carry out a study on the nature of provision, observed pattern, accessibility and utilisation of rural public services.

1.4 HYPOTHESES

It is hypothesised that:

1. The services are randomly distributed;

2. there is a relationship between level of patronage of the services and the nominal variable of zones in the area;

3. there is spatial variation in distance travelled to obtain the services among different zones in the area;

4. the size of the service facilities varies as between the zones.

1.5 REVIEW OF PREVIOUS STUDIES

There has been a great interest on public services by geographers, urban and country planners, and other social

scientists in the last three decades. This persistent

interest springs from its strong association with human

welfare. Many of the studies on this subject started in

late 1960s and early 1970s and are centred around location

models. Many of these studies addressed the issue of

service performance - the key indices of performance according

to Savas (1978, p. 800) are efficiency, effectiveness and

equity measures. These studies however, focussed more

attention on medical care facilities.

One of such work is the study of intra - urban ecology

of primary medical care in four Scottish cities of Aberdeen,

Dundee, Edinburgh and Glassgow. Index of accessibility was

used (Knox, 1978) to calculate the relative levels of

accessibility of different zones in the cities to primary

care medical facilities. In Aberdeen and Dundee for instance,

there was a stark disparity in accessibility pattern between

central and peripheral areas, with the most favoured

central areas in both cities getting more than their 'share'

of accessibility to primary medical care with index value

of up to 130. In contrast, values for neighbourhood in the

suburban fringes, ranges between 20 and 30. In Glassgow,

the pattern of accessibility and its relationship with the

social ecology of the city was found to be more complex.

In Edinburgh, the city's worst served areas was found to

correspond depressingly with depressed local authority
estates.

In another study, Meerman (1979) assessed the
satisfaction of basic needs for public services in Peninsular
Malaysia; the result of the analysis revealed that the
poorest categories of Malaysians in the Peninsular – the
malays, rural dwellers, and those living in the north –
are the least well served by public utilities.

Stimson (1981) in a survey of provision and use of
General Practisioner Services in Adelaide (Australia) found
that there was under supply of doctors in many locations.
The result also shows that 80% or more of the population
tend to use local General Practitioners with most trips
less than 3km and a few exceeding 5km.

Rosenberg (1983) in a work on accessibility to health
care in North America disclosed that the medicare (for the
elderly) and medicaid (for the poor) legislation that were
intended to cater for health needs of this categories
of people have had very limited success. This is because
American and Canadian physicans tends to locate in clusters
where there is market at the expense of the poorer less
prestigious areas. He concluded that regardless, of the
economic access and spatial scale defined, physical access
to health care remains a serious problem in North America.

In New Zealand, primary health care is provided
largely by private practitioners on a fee-for- service
basis with small governmental contribution to the fee but
complete subsidy for almost all prescribed pharmaceuticals
(Bernett, 1984). The study revealed a marked geographic
inequality in the distribution of hospital beds that favours
greatly the rural areas.

Oludimu, reporting a survey of rural infrastructural
services in rural Ogun state, argued that without an efficient
and cheap transport system, food stuffs would not reach
consumers in desirable quantities, at appropriate time and
at reasonable prices (Oludimu, 1986).

In addition to the above studies, Joseph (1986)
employed accessibility measures to know the relative
accessibility of public health services in Auckland. The
result of the analysis shows that the single location
paediatric service has associated with it substantial
inequality in potential access than either the geriatric
or the maternity and neonatal services which are multi -
location.

Furthermore, in an indepth study on accessibility of
public facilities in Nigeria, Ikporukpo (1987) found that
the areas of highest accessibility in each state are centred
around the state capitals. The pattern also revealed

that the South east, the South west, the north central
and northwestern parts of the country are more accessible
to public facilities than otherparts, while the middle
belt and parts of the north east were found to be least
accessible to public facilities.

In a similar study on the analysis of accessibility
to seventeen different services and amenities in Oklahoma
city, Knox (1987) found that there were distinctive
variations in the type as well as the level of accessibility
enjoyed by different communities.

Okafor (1989) in a study that ascertain the impact
of population on the spatial pattern of public service
provision in Nigeria found that urban population is
generally more important in explaining the spatial pattern
of public services. What also emerged clearly from the
study is that the revenue base of local states is more
important than state population size in explaining the
pattern of public services in the country. He concluded
that ability to pay rather than need is the basis for
public service provision in Nigeria.

Households in villages that have no ready access to
water services place a surprisingly high value on time
they spend in collecting water. Whittington et al (1990),
in a study of village public service in Ukunda (Kenya)

concluded that the economic benefit of improved water
services in developing countries may be much greater than
is commonly realised.

CHAPTER TWO

METHODOLOGY AND STUDY AREA

2.1 METHODOLOGY

The services that are considered are education
(secondary schools) and health services (Primary Health
Centres, Maternity Centres and Dispensaries/Health Posts).
The reason behind this is that in Nigeria, health care and
education have had the greatest social impact because of
their wider availability (Okafor, 1989, p. 126) and
phenomenal growths in the provision of facilities for
these services (Ayeni, 1992).

DATA COLLECTION

The data for this study were collected during the
survey carried out in the month of March, 1994 by the
author. Data on the number and location of the services,
the population Figures (Table 2.1) of the wards and the map
of the study area were collected from appropriate offices
in the local government secretariat.

Data on locational characteristics (village and
distance) of the service consumers, the capacity/size of
the service facilities and the volume of the service
consumers (or demand data) were collected from various

health and education^al institutions ie from patients registers and school registers. The distance separating the sampled service consumers from the service centres were calculated using road distance, based on the map of the study area.

SAMPLING DESIGN AND SAMPLE SIZE

Data on location of the service consumers (clients) and the distance separating the clients from the service centres were collected using cluster random sampling technique; 20% of the clients were sampled in each establishments so as to have a fair picture of the influence zones of the services.

DATA ANALYSIS

Both descriptive and inferential statistics are employed in analysing the data; and the hypotheses were subjected to a number of appropriate statistical techniques.

1. To explain the pattern of distribution of the services, nearest neighbour analysis was employed (See Appendix 1), the technique is based on a comparison of the observed mean first nearest - neighbour distance, rA, calculated with respect to an actual point pattern, and the expected mean first - nearest - neighbour

distance, rE, derived under the assumption that the point pattern was generated by a spatially independent random process (Silk, 1979, p. 106 - 107); it is given by:

$$R = rA \div rE$$

$$rA = \frac{\leqq d}{N}$$

$$rE = 1 \div (2 \times \sqrt{P}); \text{ where}$$

rA = observed pattern

N = total number of points

d = distances

P = density of points in a region/an area

rE = expected distance

2. Chi-square (X^2) was employed to know whether there is a relationship or association between level of patronage of each of the services and the nominal variable of zones.

$$X^2 = \sum_{i=1}^{K} \frac{(0_i - e_i)^2}{e_i} \qquad \text{Where}$$

0_i = the observed level of patronage or return (in case of health services)

e_i = the expected level of patronage or return

$$e_i = \frac{\leqq 0i}{\leqq ni} \quad \times \quad ni \qquad \text{Where}$$

ni = population of the zones (See Appendix III)

3. Analysis of variance was employed in knowing whether there is a significant variation in distance travelled to obtain the services (Appendix II).

4. The fourth hypothesis to ascertain whether the size of the service facilities varies as between the zones was tested using analysis of Variance (Appendix V).

2.2   MEASURE OF ACCESSIBILITY

Joseph (1986), in his analysis of accessibility of public hospital services in Auckland, employed the index developed by Joseph and Bantock, their index is equally employed in this research.

The accessibility of any given areal unit, Ai, to a given service was calculated using the formular:

$$Ai = \sum_{j=1} (Sj/Cj)/dij^b \ldots (1), \text{ where}$$

Sj = size of a service facility in location j

Cj = catchment area population of service j

dij = distance between i and j

b = friction of distance parameter

$$Cj = Pi /dji^b \ldots (2), \text{ where}$$

Pi = the population of area unit i.

In this study:

Sj is the staff strength of either of the institutions

b value were obtained from simple linear regression

analysis of utilization data drawn from the service centres.

Scores are specific to areal unit, rather than to groups

of individuals living within them. Note that a supply

point was taken from each of the area units in measuring

the accessibility of the services to the client population.

Vertex Accessibility Index (Table 4.7 - 4. 10), a

measure of centrality was also employed in knowing how

central and accessible a settlement is.

2.30   STUDY AREA

The study area is Egbedore Local Government Area of
Osun state (Figure 2). It has a population of about
44552 (1991 census), the area was carved out of the
former Ede Local Government Area. The choice of this area
was made because of the focus of the study - rural public
services; Egbedore fits a pure rural environment that has
several small'towns', villages and farmsteds. The administra-
tive headquaters is Awo.
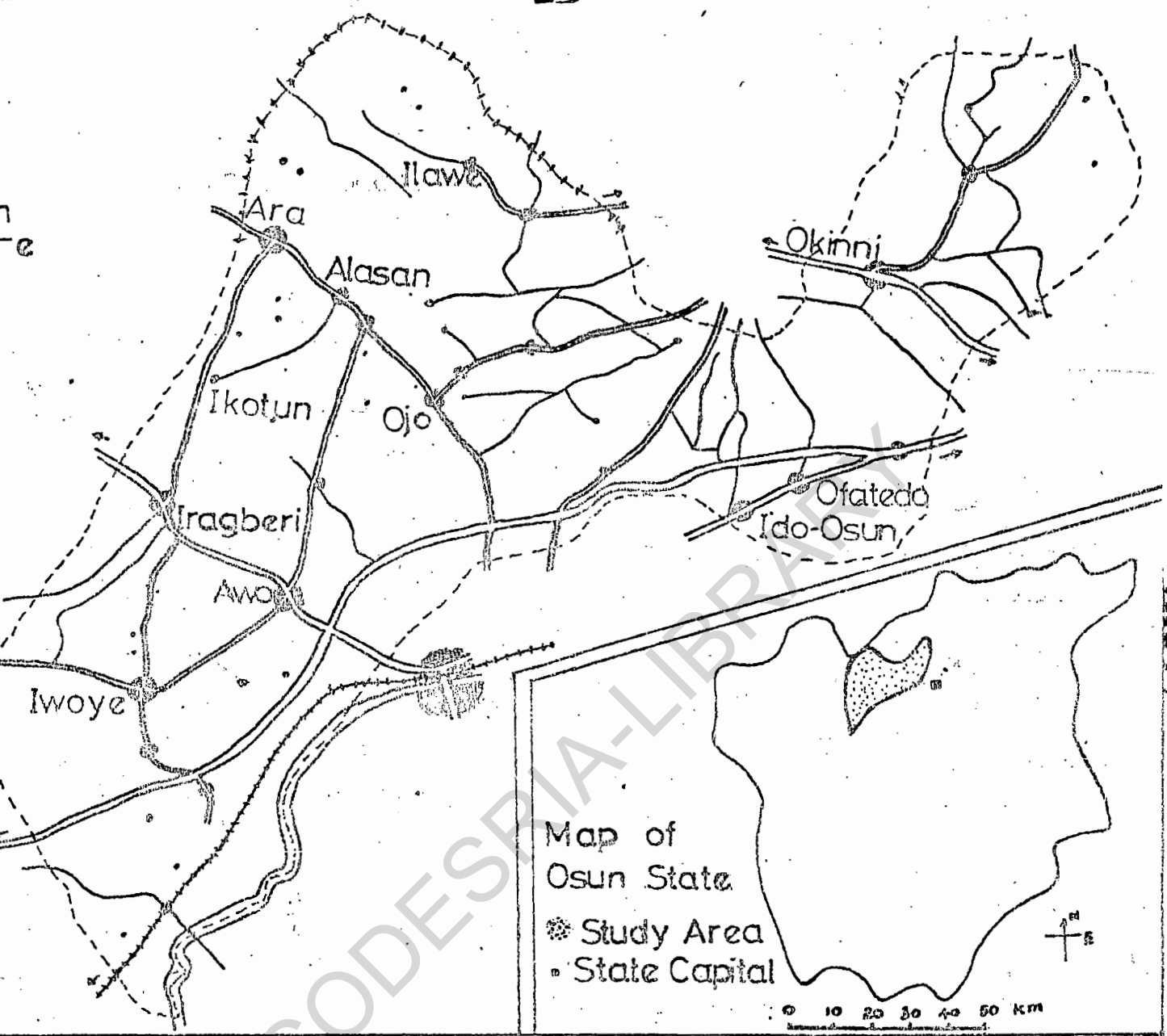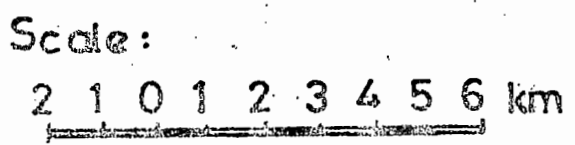
FIG . 2   STUDY AREA

Source: Egbedore Local Government Planning Authority, Awo.
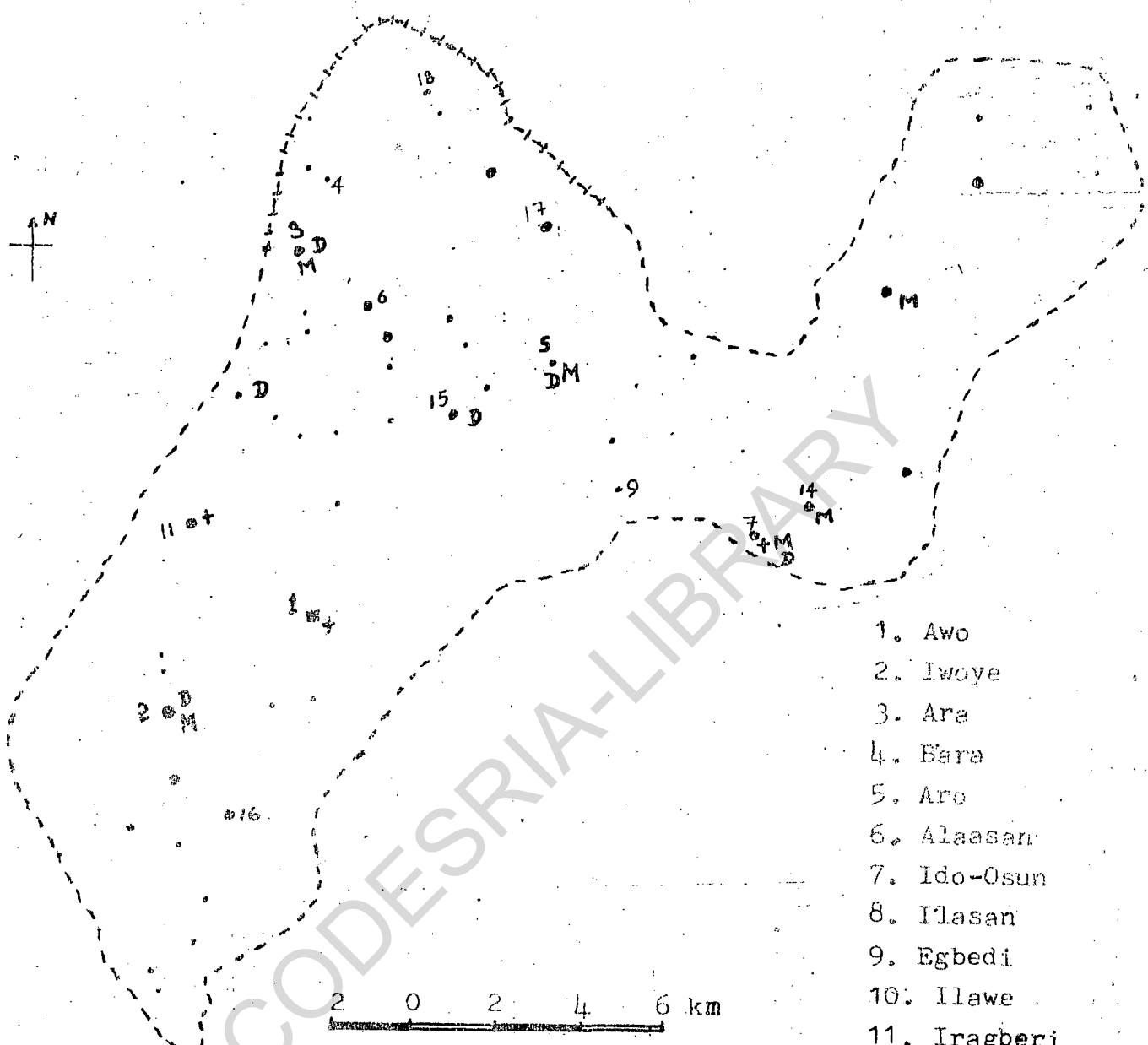
KEY

—·—·—·—	State Boundary
— — — —	Local Government Boundary
▦	Local Government Headquarters
⊙	Towns and Villages
○	Other towns and villages
+	Primary Health centre
M	Maternity centre
D	Dispensary/Health post

1. Awo
2. Iwoye
3. Ara
4. Bara
5. Aro
6. Alaasan
7. Ido-Osun
8. Ilasan
9. Egbedi
10. Ilawe
11. Iragberi
12. Okinni
13. Ikotun
14. Ofatedo
15. Ojo
16. Idoo
17. Iseki

Figure 3.1 The location of the Health Institutions
SOURCE: Egbedore Local Government Planning Authority.

The Local Government area has two Federal constituencies and these are further subdivided into ten wards (See Table 2.1). In order to bring out the area variation in service provision and use, the author sub-divide the area into four area units based on the wards (See Table 2.2 for further information) and area affiliation/contiguity.

There exists five secondary schools and twenty six primary schools in the area (Figure 3.2). Given the nature of the rural environment the primary schools were found nearly in all the villages that have the minimum threshold so as to bring primary education closer to the pupils. The highest health institution in the Local Government Area are Primary Health Centres (three in number), other health institutions are maternity centres (Six) and dispensaries/ health posts (6) (Figure 3.1) the highest medical officer in the whole local government area is staff nurse.

Agri-business and other rural informal sector activities dominate the economic activities of the people in the area.

Table 2.1   Egbedore Local Government Area: 1963 population

	Wards	Population		Federal constituency
1 A$_1$	Ara I	4800)		Egbedore II
2 A$_2$	Ara II	4800) Zone		
3 A$_3$	Ojo/Aro	2420) A		
4 B$_1$	Ido Osun/Egbedi/Ofatedo 6213)			
5 B$_2$	^{a}Okinni/Olorunsogo/ Igbokiti 1 & II	1503)	Zone B	a: note that the population figure here is for Okinni only
6 C$_1$	Awo/Abudo	2118)	Zone C)	Egbedore I
7. C$_2$	Iwoye/Idoo/Origo	2079)	)	
8 D$_1$	Iragberi I	5151)	Zone D)	
9 D$_2$	Iragberi II	7296)	)	
10 D$_3$	Ikotun	2145)	)	
	Total	38525		

SOURCE: NEC Office, Egbedore Local Government Area, Awo.

NOTE: The population of the Local Government Area as reflected in 1991 census is 44552, the difference between this and 1963 census figure (38525) is 6027. There existed no disaggregated data as at the time of the survey; to find the figures for the areas units/zones, it is assumed that the

growth rate was equal in all the areas. The increase of 6027 is therefore shared according to the area units' share of the 1963 census figure. (Table 2.2)

Table 2.2 Population of the area units/zones.

Areas units/ Zones	1963 population	Percent total (1963)	Share of the increase of 6027	1991 figure based on equal growth assumption.
A	12020	31.2	1881	13901
B	7716	20.0	1205	8921
C	4197	10.9	657	4854
D	14592	37.9	2284	16876
TOTAL	38525	100.0	6027	44552

SOURCE: Calculated from author's field-work.

Area unit B comprises two wards: Ido - Osun/ Egbedi/ Olatedo and Okinni/Olorunrogo/Igbokiti wards.

Area unit C comprises two wards: Awo/Abudo and Iwoye/ Idoo/Origo wards.

Area unit A has three wards: Ara I, Ara II and Ojo/ Aro wards.

Area unit D has three wards: Iragberi I, Iragberi II and Ikotun.

2.31 TRANSPORT SERVICE AND AVAILABILITY

There exists nearly all grade of roads in the Local Government Area, the newly constructed Iwo- Osogbo road passes through the Local Government Area (Figure 2). A lot of secondary and minor or feeder roads traversed the Local Government Area. There exists the problem of personal inaccessibility, this problem is compounded because of lack of effective and organised public transport system; rural - rural public transport service is non - existent. However, skeletal services is usually provided on market days.

2.32 THE BASIS OF THE FOUR ZONES:

The division into four zones is based on geographical contiguity, social afinity and division of the two Federal constituencies, for instance wards 4 and 5 in Table 2.1 above are geographically found in the same area of the local government, among the villages/towns in the wards are Egbedi, Ofatedo, Idoosun(ward 4) (See figure 2), the two wards are therefore grouped as zone B in the north eastern part of the area.

Zone A has Ara, Alasan, Ilawe, Ojo and Aro among others, these settlements are found in the north central portion of the Local Government Area. Awo, Abudo, Iwoye, Origo,

Kitibi, Idoo and Ekuro among others are found in the same geographic area, they are therefore grouped together as zone C comprising ward'6 and 7 (See Table 2.1).

CHAPTER THREE

SPATIAL DISTRIBUTION OF THE PUBLIC SERVICE FACILITIES

This chapter deals with one aspect of geographers interest - the distribution of phenomena in space. Point pattern analysis was employed to explain the spatial pattern of distribution of the public service facilities, the analysis also throw light upon the processes that have produced the observed pattern. Nature of provision of the services, and the factors responsible for the observed pattern are discussed.

3.1 NATURE OF PROVISION OF THE SERVICES

The provision and use of education and health services in a given geographical area needs to be studied within the organizational structure of the system. The Nigerian health care and education is characteristically a mixture of private enterprise provision and government involvement in its provision. However, in the study area, there exist no private secondary school nor any government approved private health centre. All the five secondary schools are owned by the state government, while the Local Government controls all the twenty six primary schools; the Local Government owns all the health institutions - the primary health centres, the maternity centres and the dispensaries/

health posts. Before the governments take over these
institutions, non - governmental organizations in the form of
mosques, churches and communities were the principal owners
of these institutions.

The state's public school system for instance provides
ready access to all students at primary and secondary level.
Primary and secondary education are free in the state, out of
 pocket - cost$(O.P.C) to keep students in school is high.
The principal components of OPC are informal school fees
like Parent Teachers Association dues, cost of books, uniforms
and snack purchases.

Health care services are predominantly publicly funded
by the government, the costs of using different clinical
services is subsidised by the government, clients at times do
purchase some prescribed pharmaceuticals.

The physical infrastructure, in some cases, is provided
by the communities - as in Ojo community Dispensary - while
the services or the social infrastructure is usually
provided by the government.

3.2   SPATIAL PATTERN OF DISTRIBUTION OF THE SERVICES

 The location of rural public services is governed
primarily by the ability of the population in a given rural
central place to meet the threshold of the service; hence
many of the service facilities are found in larger central places

places therefore, it is the distribution of rural settlement that affects the location of rural public service.

The locations of the three primary health centres, the six Maternity Centres and the Six Dispensaries/Health posts are shown in Table 3.1 as shown on the basemap of the area (Figure 3.1), the location of the secondary schools are shown in Figure 3.2.

Table 3.1   Number of service facilities in the zones

| Service | ZONE | | | | |
	A	B	C	D	TOTAL
Secondary School	1	2	1	1	5
Primary Health Centre	–	1	1	1	3
Maternity Centre	2	3	1	–	6
Dispensary/Health post	3	1	1	1	6

The primary health centres deals with in-and-out-patient treatments, taking of deliveries, immunization, monitoring and evaluation and dispensing. The three primary health centres are located at Ido Osun, Iragberi and Awo (Zone B, C and D respectively).

The maternity centres treat infant and ante natal cases, they are located in six different settlements, two of these are found in zone A located at Ara and Aro (Figure 3.1), three in zone B located at Ido - Osun, Ofatedo and Okinni and one in zone C, located at Iwoye.

The dispensaries/health posts are spread accross the zones, they deal with out patient cases,in some instances, they handle infant and ante - natal cases. It is a common feature to find maternity and dispensary located side by side in a settlement but with different organizational structure.

Primary school facilities are more numerous and distrubuted accross the zones (Figure 3.2), there were twenty six of them.

Nearest neighbour analysis, a geographic technique that make use of distance measured in 2 - dimentional space was employed to provide an objective assessment of the spatial pattern of the distribution of the service facilities. A null hypothesis was set up that the services are randomly distributed. This hypothesis was tested for the distribution of the secondary schools, the value of R. statistic is 1.672 (See Appendix I), this indicates that the points were produced by a dispersion process.
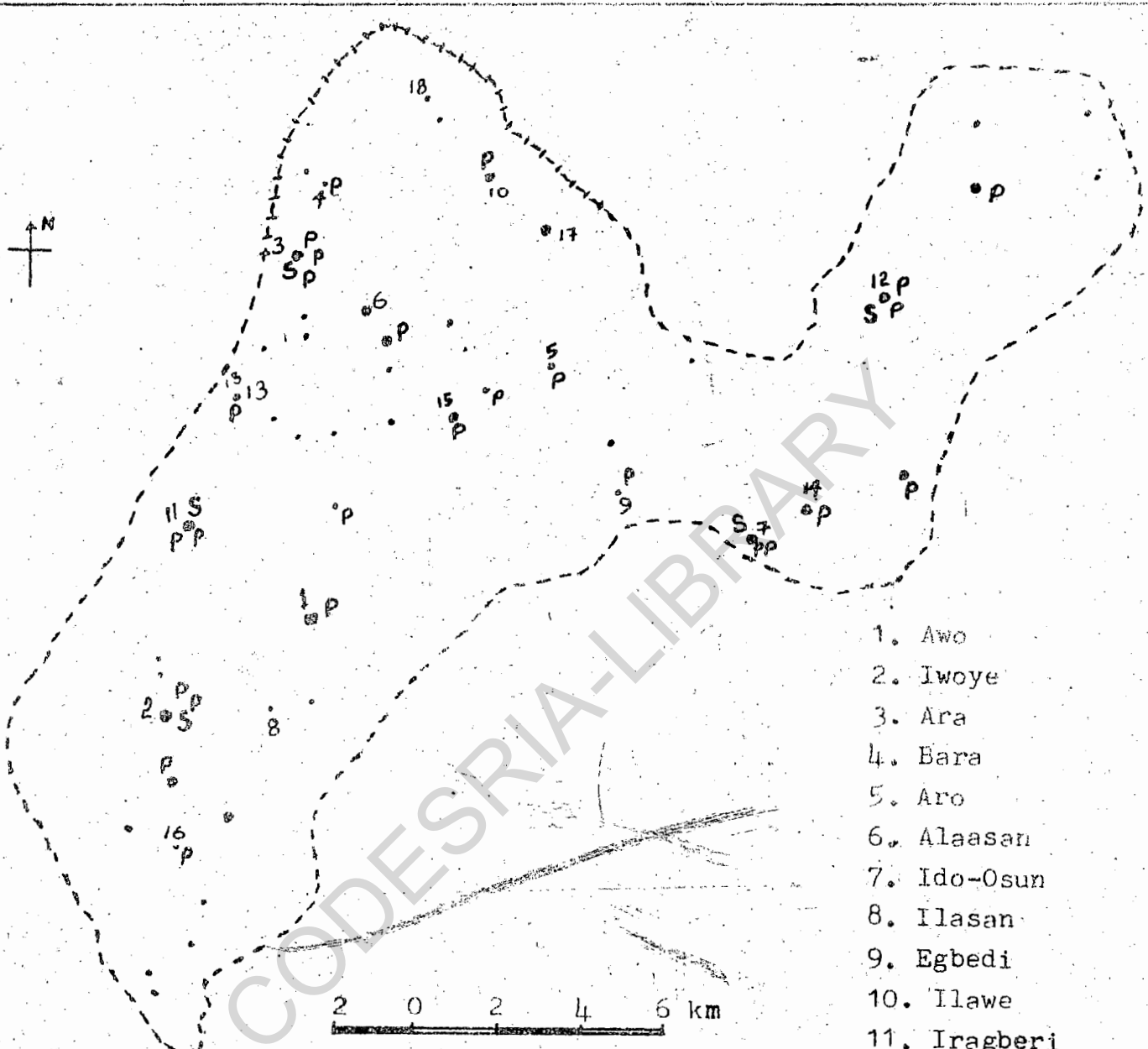
KEY

—ı—ı—ı—	State Boundary
— — — —	Local Government Boundary
▣	Local Government Headquarters
●	Towns and Villages
°	Other towns and villages
S	Secondary school
P	Primary school

1. Awo
2. Iwoye
3. Ara
4. Bara
5. Aro
6. Alaasan
7. Ido-Osun
8. Ilasan
9. Egbedi
10. Ilawe
11. Iragberi
12. Okinni
13. Ikotun
14. Ofatedo
15. Ojo
16. Idoo
17. Isehi

Figure 3.2 The location of educational institutions.

SOURCE: Egbedore Local Government Planning Authority.

The same null hypothesis was set up for the three levels of health services (See Appendix I). The nearest neighbour indices calculated with respect to service facilities in the area are shown in Table 3.2, ranked in descending order of their degree of dispersion. The R_n-statistics for the three categories of medical services indicates that the points (for each level) were produced by a dispersion process.

Table 3.2   Nearest neighbour indices for selected services

Service	Nearest neighbour index (R)	Number of points
Maternity Centre	1.701	5
Secondary School	1.672	3
Dispensary/Health Post	1.363	6
Primary Health Centre	1.29	6

SOURCE: Calculated from author's field-work.

3.3 VARIATION IN THE DISTRIBUTION OF THE SERVICE FACILITIES

There exists intra rural variation in the distribution of the service facilities. Though the pattern of distribution is dispersed in nature, Table 3.1 shows that there is localisation of the service facilities (education and health) in zone B, while Zone D is relatively served with fewer services. It is glaring that there is localisation of health service facilities in zone B, it has one of the three Primary Health Centres (PHC), three of the six maternity Centre (MC) and one out of the six dispensaries/health posts (D/HP) Figure 3.3 pictures the number of the service facilities in different zones.
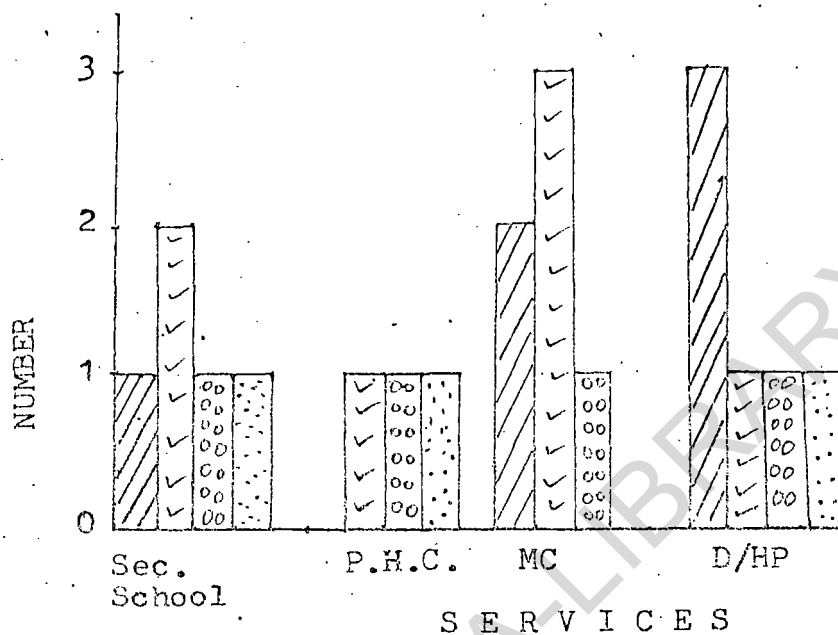
KEY

⧄	Zone A
⌄ ⌄	Zone B
∘∘∘	Zone C
⦂⦂	Zone D

P.H.C. Primary Health Centre
M C Maternity Centre
D/HP Dispensary / Health Post.

Figure 3.3 Service facilities in different zones.

SOURCE: Author's field-work (1994).

3.4 FACTORS RESPONSIBLE FOR THE OBSERVED PATTERN

Rural inhabitants in the study area are scattered in small nucleated settlements of dispersed pattern, the major factor that therefore responsible for the observed pattern of the services facilities is the dispersion process of the rural settlements, this process is indirectly shown in the result of the nearest neighbour analysis in Appendix I .

Given the observed pattern of the rural settlements, the geography of the services and facilities is also a product of other factors, one of these is the nature of provision and ownership structure of the services, the provider and owner of these services are the local and state governments with no profit motive, hence we find health institutions in many areas with very low level of patronage (Table 4.4), the cost of maintaining these facilities will therefore be greater than the revenue.

Other factors responsible for the observed pattern of distribution of the services and facilities is the local effective demand as reflected in population densities of the settlements; the contribution of non - governmental organisation (NGOs) and community development associations in some areas in providing the physical infrasturcture needed for the take - off of health or education services.

Lastly, variation in service provision in the rural area
is also related to established pattern of power at the
rural level.

3.5 SIZE CHARACTERISTICS OF THE SERVICE FACILITIES

The size of the service facilities have been measured
using the staff strength of each of the institutions. The
number of Staff for the secondary schools ranges from 18
in Zonce C to 71 (for the two secondary schools) in zone B.
There is variation in size of health facilities in the zones
as shown in Table 3.3 below.

Table 3.3 Size characteristics of the services

Service	No. of points	Z O N E					%	Average no of Staff
		A	B	C	D	TOTAL		
Secondary schools	5	22	71	18	23	134	72.04	27
Primary health C. (PHC)	3	–	7	11	7	25	13.44	8
Maternity centre (MC)	6	5	10	1	–	16	8.60	3
Dispensary/Health Posts (D)	6	6	2	1	2	11	5.91	2
Total	20	33	90	31	32	186	99.99	

SOURCE: Author's field – work (1994).

It is hypothesised that the size of the services varies as between the zones, the result (Table 3.4) shows that the size of the services does not vary significantly as between the zones (See Appendix V), at 5% level of significance.

Table 3.4   Analysis of Variance for size of the services.

The source of variation	Sum of Square	Degree of freedom	Variance estimate	F
Between sample	510.44	3	170.147	2.23
Within sample	3798.41	10	379.841	
Total	4308.85	13		

Source: Computed from author's field - work (1994).

The overall size of the services in the Local Government Area is show in Figure 3.4. below.
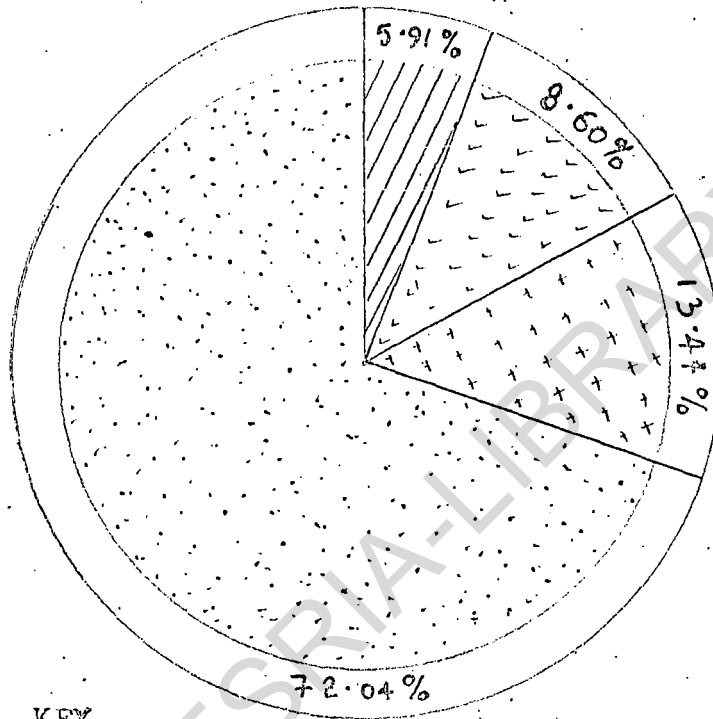
KEY

⧄ Dispensary/Health Post

〰 Maternity Centre

┼ Primary Health Centre

⋮ Secondary school

Figure 3.4:   Size of the services in the study area.

SOURCE: Author's field-work (1994).

CHAPTER FOUR

ACCESSIBILITY TO THE PUBLIC SERVICES

This chapter focusses on the analysis of the pattern of accessibility to health and education services. The effect of distance on utilisation, the relationship between level of patronage and population size (of each zone) are examined. Several techniques which enable the characteristic of point distribution to be analysed with some objectivity are available. These include Linear Programing Models, Location Allocation Models and Gravity Models; a simple index of nodal accessibility based on the conventional Gravity Model which clearly includes an important distance decay effect and a non captive population was employed to assess the locational accessibility of the public services to the client population in a rural environment. Vertex Accessibility Index, a measure of centrality was employed to see how central and accessible the locations of these services are.

4.1 CATCHMENT AREAS OF THE PUBLIC SERVICES

Catchment area refers to the area from which an institution (health or educational institution) draws its clients, it is also refered to as the sphere of influence of an institution which refers to all the points from which

an institution draws its clients.

Twenty percent of the clients in each institution were sampled to reflect the significant catchment areas of the services, physical distance are measured using route distance. The influence zones of the 5 secondary schools were studied and delimited as shown in Figure 4.1; an observation of the figure shows that the school at Ara (Zone A) has greater influence zones, extending as far as Aro (8km away), while the school with the lowest catchment area is at Ido-Osun (Zone B) with only Ofatedo (1.5km apart) as the second source of its clients (See Figure 4.1 for a clearer picture).

The catchment area of the three primary health centres shows a limited pattern with their sphere of influence not exceeding their respective zones (Figure 4.2). Given the importance of primary health centres in rural health services, the rural dwellers seems not to make full use of the services, this is reflected in the very limited catchment area and the low level of patronage as pictured by their respective average monthly return (See Table 4.4), this low catchment area/sphere of influence may be due to the problem of personal and locational inaccessibility facing rural people and places.

Figure 4.3 shows the influence zone of the six maternity centres found in the Local Government Area. The clients of

the maternity centres at Ido - Osun and Ofatedo are all from within the settlements respectively, while the maternity centre at Ara has the greatest sphere of influence (Figure 4.3) and monthly return of 200 clients.
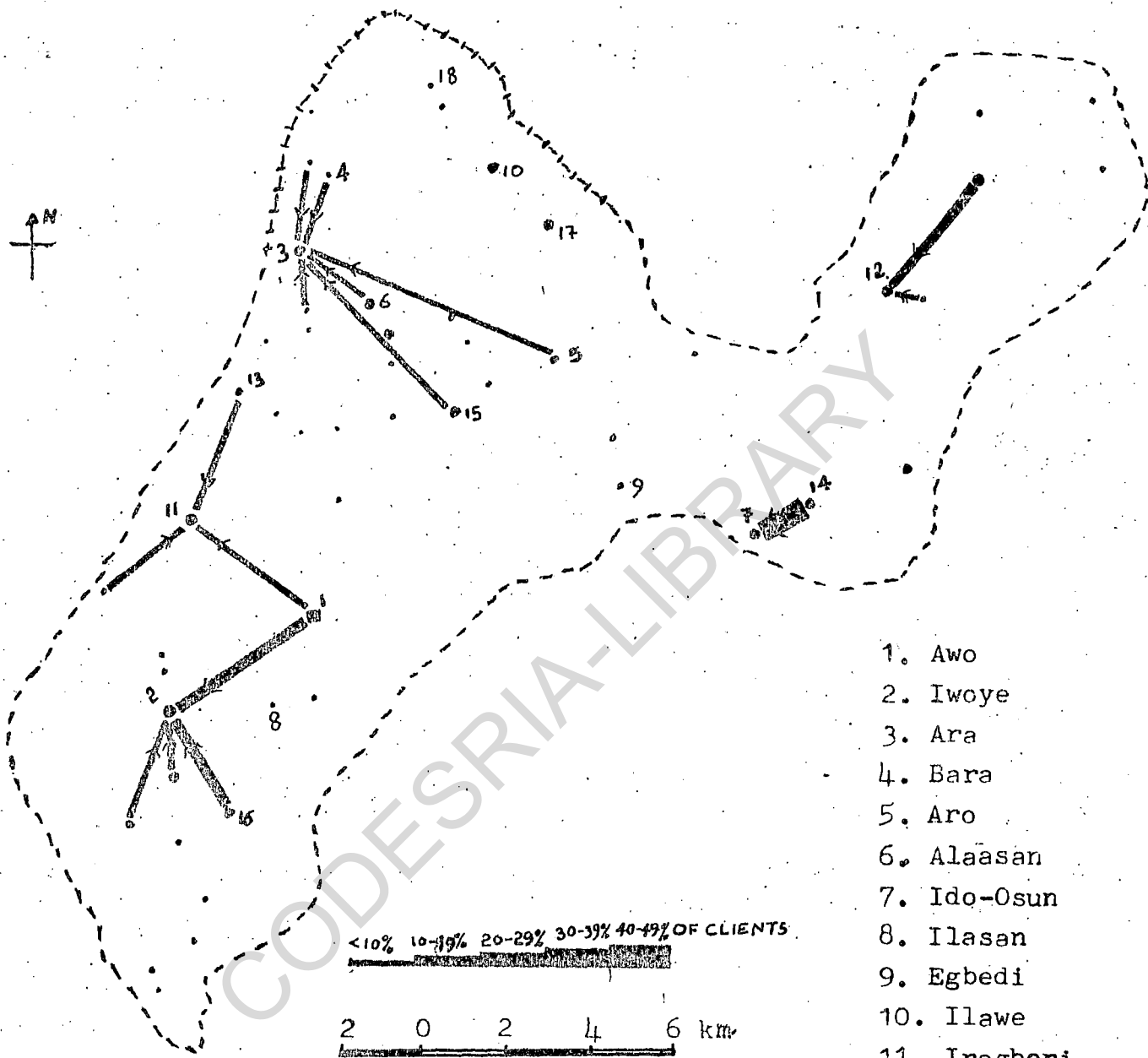
1. Awo
2. Iwoye
3. Ara
4. Bara
5. Aro
6. Alaasan
7. Ido-Osun
8. Ilasan
9. Egbedi
10. Ilawe
11. Iragberi
12. Okinni
13. Ikotun
14. Ofatedo
15. Ojo
16. Idoo
17. Iseki

KEY

—·—·—·—·—	State Boundary
— — — — —	Local Government Boundary
▨	Local Government Headquarters
⊙	Towns and Villages
•	Other towns and villages

Figure 4.1   Catchment areas of the Secondary schools
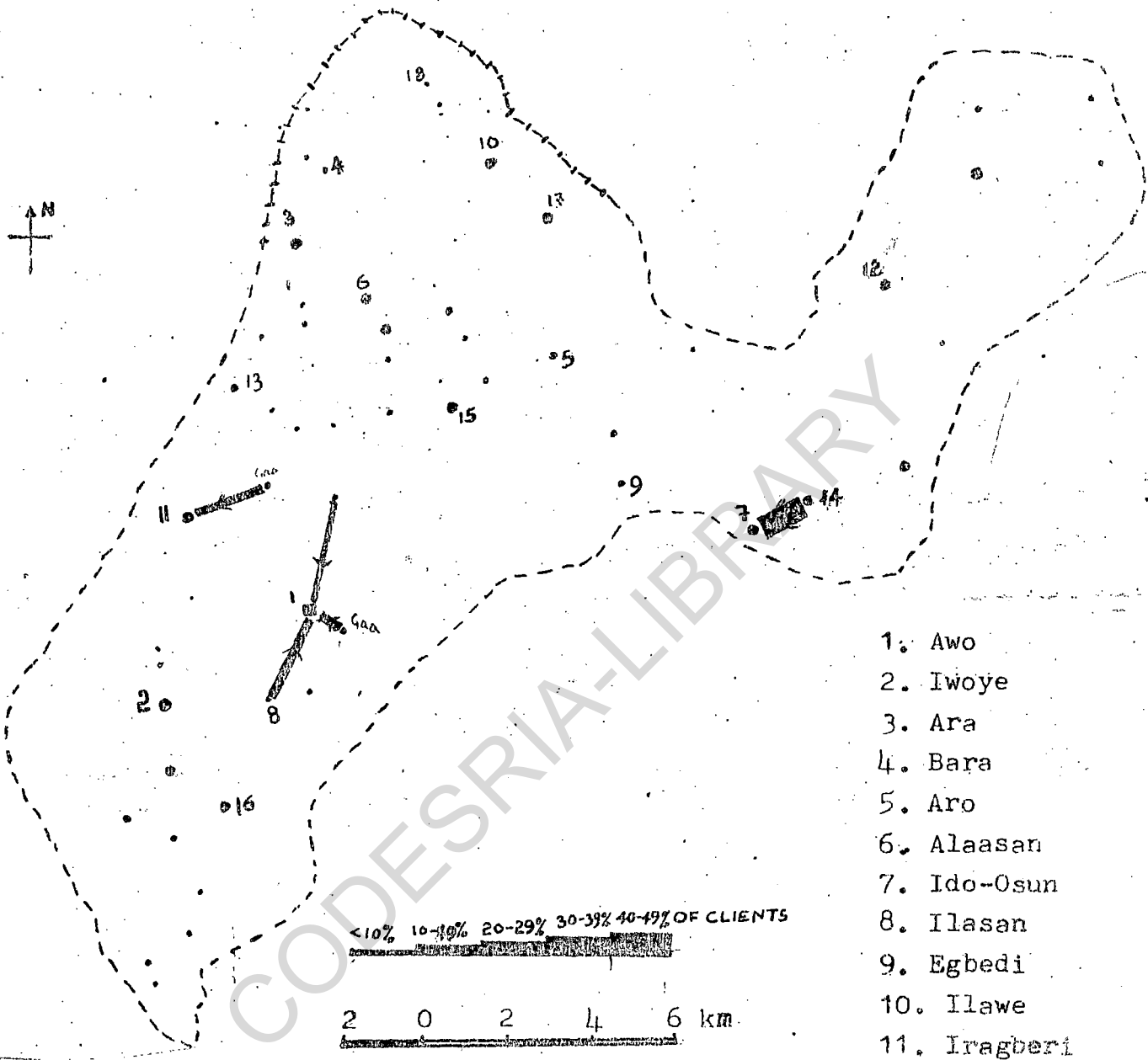
KEY

–·–·–·–	State Boundary
– – – –	Local Government Boundary
◙	Local Government Headquarters
●	Towns and Villages
•	Other towns and villages

1. Awo
2. Iwoye
3. Ara
4. Bara
5. Aro
6. Alaasan
7. Ido-Osun
8. Ilasan
9. Egbedi
10. Ilawe
11. Iragberi
12. Okinni
13. Ikotun
14. Ofatedo
15. Ojo
16. Idoo
17. Iseki

Figure 4.2 Catchment areas of the Primary Health Centres.

SOURCE: Author's field-work (1994).
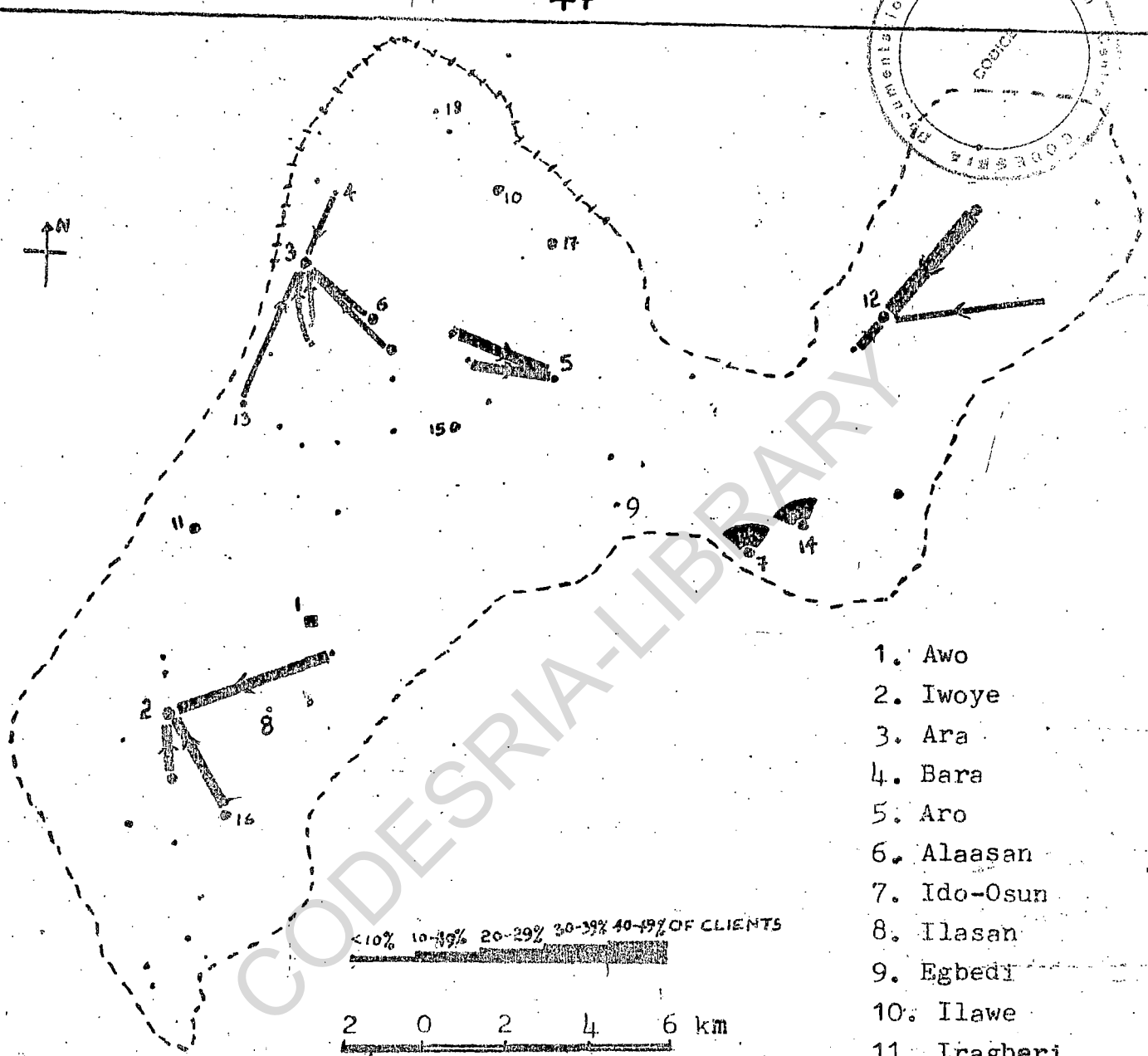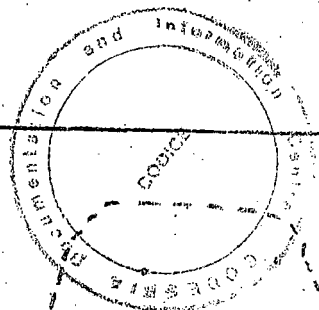
Figure 4.3 Catchment areas of Maternity Centres
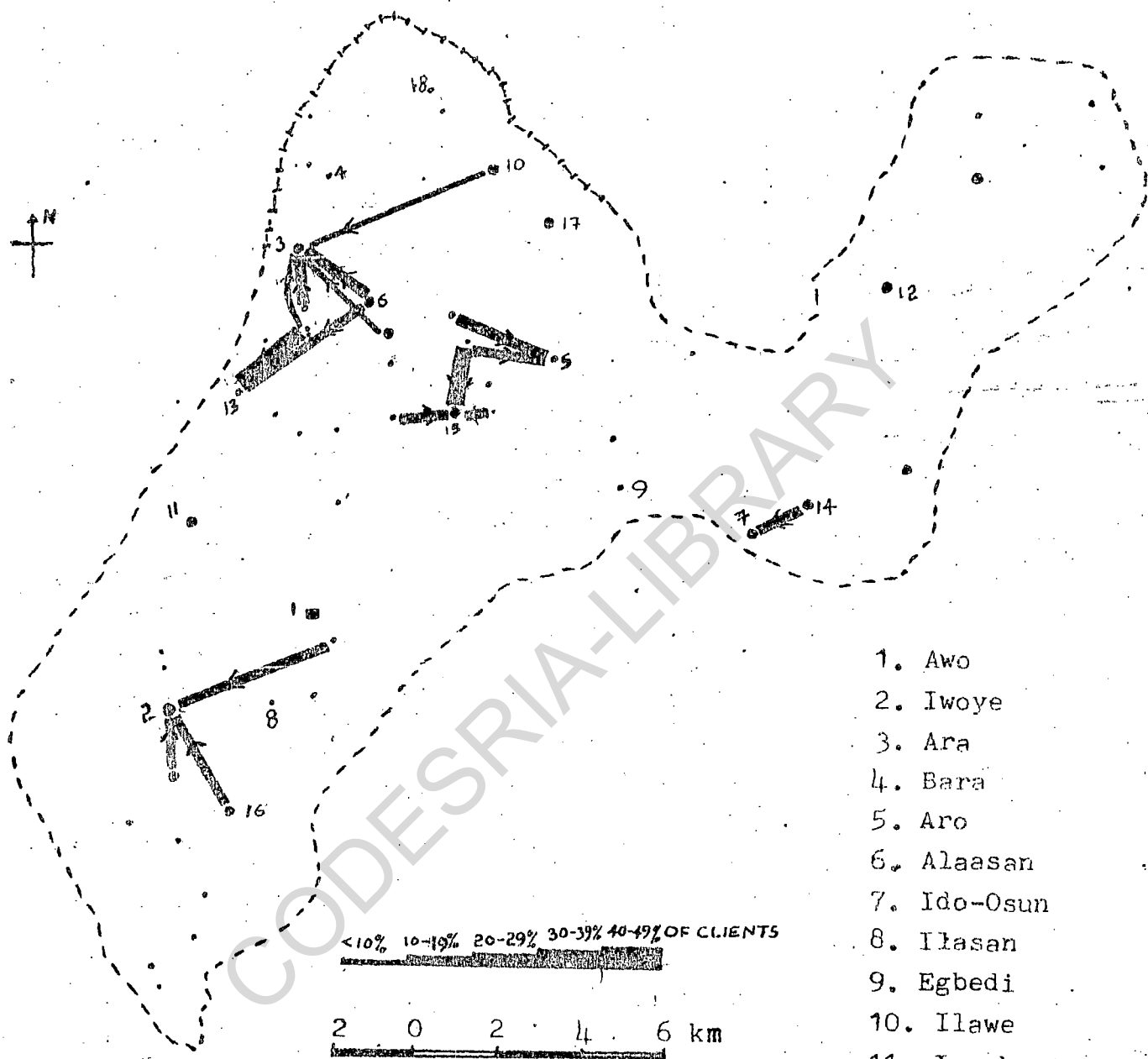
KEY

—·—·—·— State Boundary

————— Local Government Boundary

▣ Local Government Headquarters

● Towns and Villages

· Other towns and villages

<10% 10-19% 20-29% 30-39% 40-49% OF CLIENTS

2 0 2 4 6 km

1. Awo
2. Iwoye
3. Ara
4. Bara
5. Aro
6. Alaasan
7. Ido-Osun
8. Ilasan
9. Egbedi
10. Ilawe
11. Iragberi
12. Okinni
13. Ikotun
14. Ofatedo
15. Ojo
16. Idoo
17. Iseki
19. Iragberi

1. Awo
2. Iwoye
3. Ara
4. Bara
5. Aro
6. Alaasan
7. Ido-Osun
8. Ilasan
9. Egbedi
10. Ilawe
11. Iragberi
12. Okinni
13. Ikotun
14. Ofatedo
15. Ojo
16. Idoo
17. Iseki

KEY

—•—•—•— State Boundary

— — — — Local Government Boundary

▪ Local Government Headquarters

● Towns and Villages

∘ Other towns and villages

Figure 4.4 Catchment areas of the Dispensaries/Health Posts.

SOURCE: Author's field-work (1994).

The pattern of consumption of the dispensaries/health posts is shown in Figure 4.4. It emphasises the concentrated nature of this services in zone A (Ara, Aro and Ojo); this may be interpreted as compensating for the absence of a primary health centre in the zone.

The influence zones of the services shown in figure 4.1 through 4.4 are constructed from utilisation data that contained the locational characteristics of the clients.

It is hypothesised that there is spatial variation in distance travelled to obtain the services among the zones; a test of the hypothesis (Appendix II) shows that the difference in distance travelled to obtain the services among the zones A, B, C and D is significant at 5% level. The result of the Analysis of Variance is shown in Table 4.1 below.

Table 4.1 Analysis of Variance for variation in distance

Source of Variation	Sum of Square	Degree of freedom	Variance estimate	F
Between sample	3.6	3	1.16	
Within sample	3.66	10	0.302	3.84
Total	7.26	13		

The Table value is 3.71 at 5% level of significance.

SOURCE: Computed from author's field - work (1994).

4.2 LEVEL OF PATRONAGE OF THE SERVICES

Physical separation of the clients from the rural public services affects utilization, other things being equal, highest rate of use occur amongst population proximate to facilities (Table 4.2).

Table 4.2 Distance and Utilisation of the Services

Distance (km)	Sec. School		PHC		MC		D	
	NO	%	No	%	No	%	No	%
< 1	301	72.71	33	68.75	76	78.35	45	68.18
1-1.9	61	14.73	13	27.08	7	7.22	10	15.15
2 - 2.9	05	1.21	02	04.17	6	6.19	06	09.09
3 - 3.9	39	9.42	-	-	6	6.19	03	04.55
4 - 4.9	3	0.72	-	-	2	2.06	01	01.52
5	5	1.21	-	-	-	-	01	01.52
Total	414	100.00	48	100.00	97	100.01	66	100.01

PHC = Primary Health Centres; D = Dispensaries/Health posts
MC = Maternity Centres.

SOURCE: Calculated from author's field - work, 1994.

Distant users of the services in the area pay penalty cost in terms of travel inconveniences; the Table shows that more than 68% of the clients of the services travel less than

one kilometre to utilise the service.

Visiting pattern are more eratic and of lower
frequency for patients where village/town are distant from
the health facilities concerned; for instance, Table 4.3
below shows the level of patronage of the maternity centre
at Ara, in relation to the location of the clients' settlements.

Table 4.3 Utilization and locational characteristics of the
clients of Egbedore Local Government Maternity
Centre, Ara.

Settlement	No of clients	%	Distance to Ara (km)
Ara	30	75	-
Aba Ope	03	7.5	1.7
Alaasan	02	05	2.0
Bara	02	05	1.8
Abogunde	01	2.5	3.2
Ebunla	01	2.5	2.0
Ikotun	01	2.5	3.9
Total	40	100.0	

Note: Distances were computed using map produced by PEAS
ASSOCIATES obtained from Egbedore Local Planning
Authority, Awo. 20% of the clients were sampled to give the
above pattern.

SOURCE: Author's field work (1994).

The net benefits of education and health services are generally higher for those living nearby, who not only enjoy increased choice and opportunity, but also pay lower transport cost compared with those living further away.

Rural household have to travel considerably longer to reach the first level of referal services ie the Primary Health Centre (PHC); partly because of difficulties in access to the health facilities especially the Primary Health Centres, rural poor generally consume fewer health services, this is shown in the average monthly returns of the health institutions in Table 4.4 below.

Table 4.4 Students Population and Returns of the Health Institutions.

Zone	Sec. School	PHC	MC	Dispensary	Population
A	530	-	230[b]	179[e]	13901
B	885[a]	78	217[c]	78	8921[f]
C	171	73	38[d]	40	4854
D	484	87	-	35	16876
	2070	238	485	332	44552

a. 2 secondary schools are in zone B
b. 2 Maternity centres are in Zone A
c. 3 Maternity Centres are in Zone B
d. 1 Maternity centres is in Zone C
e. 3 Dispensaries/Health posts are in zone A
f. The population figure for this zone is not complete because the figure for Olorunsogo, Igbokiti I and Igbokiti II were not included in the 1963 estimates (1963 census estimates).

The predisposition to use health services for instance, varies, among other factors, with the nature of peoples illness, educational attainment and distance from the source of the services; if the predisposition to use these health services is measured using utilisation data, demand is likely going to be less than need because all people do not have the same access opportunity to the services.

It is expected that the level of patronage of these services will be a function of the population of the zones. A null hypothesis was set up that there is a relationship between level of patronage of each of the services and the nominal variable of zones (See Appendix III). A test of the hypotheses for the four services (Table 4.5) reveals that the probability that the type of relationship as was observed in the study could have occured by chance is 0.05. With this level of significance/probability, we may justifiably conclude that there is a relationship between level of patronage of the services and the nominal variable of zones, this is because the calculated values of X^2 at 3 degree of freedom, are greater than the Table value (See the Table below).

Table 4.5: **Summary** measure of the X^2 test of relationship
between level of patronage and the nominal
variable of zones.

Service	X^2	Level of significance Tabulated X^2 at 5%
Secondary schools	683	
Primary Health Centres (PHC)	179.3	7.81
Maternity Centres (MC)	376.8	
Dispensaries/Health Posts (D)	122.8	

SOURCE: Calculated from author's field-work (1994).

4.3 LOCATIONAL ACCESSIBILITY TO THE PUBLIC SERVICES

Four experiments were carried out in order to measure
the potential spatial accessibility of the three categories
of health services and the secondary schools to client
population within Egbedore Local Government Area (Table 4.6).
In each experiment, the distances used are road distance
between the settlements of the clients and the site of the
services in a given area unit or zone.

In all the experiments, the population values used are
those for the total population; this is appropriate for the

primary health centres and the dispensaries; but the population figures for the identified client groups for the maternity services (population of mothers and infants) and secondary school age group for the secondary school services were not available.

Summary measures on the accessibility surfaces (Appendix IV) are presented in Table 4.6 below, several observations could be made concerning the spatial access characteristics of the three categories of health services and the secondary school service.

Table 4.6   Summary measures for four Accessibility Experiements[a]

EXPERIMENT	X (Ai)	CV
Secondary school	2250.5	46.6
Primary Health Centre (PHC)	866.4	98.6
Maternity Centre (MC)	235.7	68.6
Dispensary/Health Post (D)	191.2	22.2

Note: [a] Mean values are multiplied by 10^6 to facilitate interpretation.

SOURCE: Calculated from author's field - work.

Examining the coefficient of variation (CV) which can be interpreted as a measure of equity of accessibility, the lower the CV, the greater the equity of accessibility. The result in Table 4.6 indicates that the primary health centres has associated with it relative greater inequality in potential access than the dispensaries or the secondary schools which have greater number of supply points. It is also clear from the Table above that, in potential access term, the dispensaries/health posts and the secondary schools are potentially more geographically accessible to their clients.

From the above analysis, the result arrouse some concern in terms of the efficiency and equity of primary health care services. It also implies that the fewer the number of supply points, the lower the equity of access among the client population. There is therefore the need for further decentralization of Primary Health Centres in the area because in-accessibility, in terms of distance is an impediment and sometimes a barrier preventing effective use of a service.

Geographic inaccessibility may compel patients living in distant settlement (from the health centre) to frequently make light of symptoms or put up with discomfort and uncertainty, perhaps thinking that their 'poor' health

condition is not related to any serious condition rather than making effort to travel to the required health centre.

It is acknowledged that the analysis of access pursued in this survey is only a partial one; physical distance is only one element in the equation that translates need for service(s) into use of the service(s). In the Local Government Area, as elsewhere the impact of economic, psychological and cultural heterogeneity in the population on the consumption of educationand health services are also recognised.

4.4 SETTLEMENT CENTRALITY AND THE LOCATION OF THE SERVICES

Rural inhabitants in the area re scattered in small settlements, and because the services cannot be provided in all the central places, they are therefore located in some more central places to perform the central functions required of them. In many cases, the location of the services have been seen in terms of the equalisation of their distribution paying little attention to the locational efficiency of the services.

A more centrally located settlement will be more accessible when compared to others in an area. Vertex Accessibility Index, a measure of centrality is employed to know how centrally located and accessible a settlement

is in a given zone/area unit. This idea is shown in matrix of settlements below (Table 4.7 through 4.10.

Table 4.7: Measurement of centrality in zone A
Interpoint distances (km) form point i to point j.

	Ara 1	Ojo 2	Aro 3	Abo-gunde 4	Bara 5	Ilawe 6	Balogun 7	Alaasan 8
1	0.0	5.5	6.4	3	1.9	4.8	5.2	2
2	5.5	0.0	2.0	2.4	6.4	5.9	1.0	3.4
3	6.4	2.0	0.0	3.8	6.9	5.5	1.9	4.5
4	3	2.4	3.8	0.0	4.0	4.7	2.4	1.0
5	1.9	6.4	6.9	4.0	0.0	3.9	6.2	3.2
6	4.8	5.9	5.5	4.7	3.9	0.0	5.3	4.5
7	5.2	1.0	1.9	2.4	6.2	5.3	0.0	3.4
8	2	3.4	4.5	1.0	3.2	4.5	3.4	0.0
Total	28.8	26.6	31.1	21.3	32.5	34.6	25.4	22.0
Rank	5	4	6	1	7	8	3	2

SOURCE: Computed from author's field work (1994).

Table 4.8: Measure of centrality in zone B
Interpoint distances (km) from point i topoint j.

	Ido-Osun 1	Egbedi 2	Ofatedo 3	Okinni 4	Olorunsogo 5	Igbokiti 6
1	0.0	3.4	1.7	6.9	3.9	9.2
2	3.4	0.0	4.5	8.7	6.9	11.1
3	1.7	4.5	0.0	5.3	2.4	8.6
4	6.9	8.7	5.3	0.0	4.4	3.4
5	3.9	6.9	2.4	4.4	0.0	7.1
6.	9.2	11.1	8.6	3.4	7.1	0.0
Total	25.1	34.6	22.5	28.7	24.7	39.4
Rank	3	5	1	4	2	6

SOURCE: Calculated from author's field work (1994).

Table 4.9:   Measure of centrality in Zone C
              Interpoint distances (km) from point i to point j.

	Awo 1	Iwoye 2	Ekuro 3	Origo 4	Idoo 5
1	0.0	4	4.9	6.3	4.9
2	4	0.0	1.6	3.2	2.8
3	4.9	1.6	0.0	1.7	1.6
4	6.3	3.2	1.7	0.0	1.6
5	4.9	2.8	1.6	1.6	0.0
Total	20.1	11.6	9.8	12.8	10.9
Rank	5	3	1	4	2

SOURCE: Calculated from author's field - work (1994).

Table 4.10:   Measure of centrality in zone D
                Interpoint distance (km) from point i to point j.

	Iragberi 1	Ikotun 2
1.	0.0	3.5
2	3.5	0.0
Total	3.5	3.5
Rank	1	1

SOURCE: Calculated from author's field-work (1994).

Distances from each settlement to others are measured using straightline distance, the distances along the columns (or rows) are summed, the settlement with the lowest value is the most accessible and the most central in each of the areas/zones.

Looking at Table 4.7 above, the settlements that are more central are Abogunde, Alaasan, and Balogun (in order of their centrality); Ara ranked 5th, while Ojo ranked 4th. The location of the secondary school is probably not found in Abogunde, Alaasan or Balogun because of their inability to meet the threshold requirements.

Table 4.8 shows that the location of maternity centre at Ofatedo was a good decision, Ofatedo, in zone B is the most central. Note that the zones were delimited based on social afinity and geographical contiguity. It also shows that the location of the secondary school and the primary health centre at Ido - Osun is a bit central because Ido - Osun ranked 3rd in accessibility term.

Zone C show a rather awkward arrangement, the most accessible village/town in the area is Ekuro followed by Idoo and Iwoye. However, when threshold is considered Iwoye is appropriate for the location of the dispensary, maternity centre, and the secondary school, but Ekuro would have been a more appropriate location if this measure is to be followed.

From the above, it can be infered that measure of centrality may not, in all cases, be a good measure of where to locate a service because settlement size, which influence threshold requirement of a service, is not well considered.

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.1   SUMMARY

The study is carried out in the spirit of welfare
approach to human geography; the location of the services
are treated as an aspect of rural geography of community
well being. The technique which enable the characteristics
of point distribution to be analysed with some objectivity—
the Accessibility Index based on Gravity Model – is
employed to assess the geographic accessibility of the
public services to the client population in the rural
environment.

With the application of the accessibility index, four
experiments were carried out in order to measure the
potential spatial accessibility of each of the services
с.   ⁚ ⁚ to the client population within the Local
Government area. The result demonstrates that variation
exists within the Services – Secondary Schools, Primary
Health Centres (PHC), Maternity Centres (MC) and Dispensary/
Health posts (D) – in the degree of inequity in potential
access that stems from locational separation of potential
clients and the location of the services. The analysis shows
that consolidating services at few central places, such as

the 3 primary health centres, reduces potential accessibility, as inaccessibility is an impediment or a barrier to effective use of a service.

With the application of nearest neighbour analysis (R) to know the spatial distribution of each of the services, the result shows that each of the service facilities are dispersed in the Local Government Area. It is important to note that some of the service facilities are found in the more centrally located settlements like Iragberi and Ofatedo, Iwoye too is found to be relatively central.

The study further shows that the geography of the services are a product of the pattern of the distribution of the settlements and governments decision to locate the services in some area that can probably meet the threshold demand of the service.

On the nature of provision of the services, the Local Government owns all the health institutions and all the secondary and primary schools in the area.

Level of patronage or utilization was shown to have a significant relationship with the nominal variable of zones, this is supported by the hypothesis that there is a relationship between the level of patronage and the nominal variable of zones. In addition, the survey reveals that the size of the service facilities does not vary as between the zones.

The survey further shows that the catchment areas of the three primary health centres — the highest medical facility in the area — are very limited when compared to the other services.

5.2   CONCLUSION

What emerges clearly from this study is that the net benefits of the services are higher for those living nearby, who not only enjoy increased choice and opportunity, but also pay lower transport cost compared with those living further away. A service location that is central will be more accessible and more efficient, therefore, the issue of accessibility and efficiency are important for the provider and user of rural public services especially when the user must travel to consume the services.

The results shows the cost, in geographic access terms, of consolidating services like the primary health centres at a few locations. The pattern of access to health care services, for instance, provide a good example of the way in which the location of public services can affect the quality of life of rural inhabitants. Distance to health services for instance, limits peoples willingness and the ability to seek care, this is so because of the problem of personal and locational inaccessibility facing rural

people and places.

Distance is also a key factor in the use of any health institution in the rural area; clients living further away from the location of the service will more often make light of symptoms or put up with discomfort and uncertainty rather than making effort to travel to obtain medical service. It therefore seems reasonable that the effect of distance will also exercise a direct effect on the utilisation of secondary school facilities and the urge to go beyond primary school education. It is important to note that the analysis of access pursued in this survey is a partial one, the importance of economic and social heterogeneity in the population are also recognised, especially with the gradual introduction of school fees and some medical expenses in various health institutions; notwithstanding, physical access is an important variable that influences service accessibility.

Finally, Misallocation and inequity are caused by mistakes in deciding what facility to build, where to build them, how to staff them, and what service to provide (in case of medical services).

The conclusions that emerge from this study are of important policy implications, this is viewed from three

perspectives:

(a) Location planning should be made more explicit rather than being implicit, an objective measure of settlement centrality and accessibility should be employed before a public service facility is located so as to maximise service and access to the client population.

(b) The highest health institution in the area are the three primary health centres with six beds each, none has a medical doctor, therefore, at least one medical doctor needs to be provided in each of the existing primary health centres and additional one primary health centre needs to be provided in Zone A comprising Ara, Ojo, Aro, Abogunde and Alaasan.

(c) There is the need for the directorate for Social Mobilisation (MAMSER) to engage in educating the rural inhabitants on the importance of using various health facilities in their environment, this is because of the very low average monthly return recorded by the health service facilities; and also the government, through the Directorate for Food Road and Rural Infrastructure, should formulate sound rural transport policies for the purpose of making rural areas more accessible and more liveable.

The implications of aggregate pattern of service locations must be considered not just in relation to the way they ameliorate socio - economic differentiations, but also in relation to the dynamics of rural development.

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APPENDIX I

Ho: The services are randomly distributed (Secondary schools).

Nearest Neighbour Analysis (R) is employed in this test.

~~through~~. Inter - point distances for the location of the secondary schools.

| from point (i) | Iwoye | Iragberi | Ara | Okinni | Odo-Osun | Minimum distance (km) |
| | | | To point (j) | | | |
	1	2	3	4	5	(d)
1	0.0	4.6	11.6	19.5	14.5	4.6
2	4.6	0.0	7.0	17.2	13.2	4.6
3	11.6	7.0	0.0	13.3	12.8	7.0
4	19.8	17.2	13.8	0.0	6.8	6.8
5	14.5	13.2	12.8	6.8	0.0	6.8
						29.8

$$rA = \Sigma d \div n = 29.8 \div 5 = 5.96$$

$$rE = 1 / (2\sqrt{5 \div 254}) = 3.564$$

The Area of the study area is $254 km^2$

$$rE = 1 / (2\sqrt{\lambda}) \; ; \qquad \lambda = n/A$$

$$R = rA \div rE \qquad where$$

rA = observed mean first - nearest neighbour distance

rE = expected mean first nearest - neighbour distance

n is the total number of points

λ is the density of points per unit area

A is the size of the study area ($254 km^2$), this is calculated by laying the map over a graph sheet and certain procedure followed.

The nearest - neighbour index = R, for the schools,

$R = rA \div rE = 5.96 \div 3.564 = 1.672$

The test statistic is $Z = (rA - rE) \div srA$ where

srA = standard error = $0.26136 \div \sqrt{n\lambda}$

$= 0.8330$

$\therefore Z = (5.96 - 3.564)/0.8330 = 2.876$

<u>R for the primary health centres</u>

<u>Interpoint distance for the location of PHC</u>

	Awo 1	Iragberi 2	Ido Osun 3	Minimum distance (km)
1	0.0	3.6	10.6	3.6
2	3.6	0.0	13.2	3.6
3	10.6	13.2	0.0	10.6
				17.8

$rA = 17.8 \div 3 = 5.93333$

$rE = 1 \div (2\sqrt{\lambda}\ ; \lambda = n \div A = 3 \div 254$

$= 0.011811$

$rE = 4.60072458$

$R = rA \div rE = 5.93 \div 4.601 = 1.29$

~~$SrA = 0.026136 \div \sqrt{n\lambda}$~~

$$0.026136 - 0.1882367 = 0.13885$$

$$Z = (rA - rE)/ SrA$$

$$= (5.93333 - 4.6007)/0.13885 = 9.597$$

R for the distribution of the MC (Maternity Centres)

From point (i)	I-Osun 1	Otatedo 2	Okinni 3	Ara 4	Aro 5	Iwoye 6	Minimum distance (km)
			To point (j)				
1.	0.0	1.7	6.8	12.8	6.4	14.5	1.7
2.	1.7	0.0	5.4	13.4	7	16	1.7
3.	6.8	5.4	0.0	13.8	8.6	19.8	5.4
4.	12.8	13.4	13.8	0.0	6.4	11.6	6.4
5.	6.4	7	8.6	6.4	0.0	12.4	6.4
6.	14.5	16	19.8	11.6	12.4	0.0	11.6
							33.2

$$rA = 33.2 \div 6 = 5.5333$$

$$= 6 \div 254 = 0.023622047$$

$$rE = 3.253$$

$$R = 5.533 \div 3.253 = 1.701$$

$$SrA = 0.26136 \div \sqrt{n\lambda} = 0.6942$$

$$Z = (rA - rE)/ SrA$$

$$= 3.285$$

R for the locations of dispensaries/Health Posts (D)

Ido-Osun from point (i)	Ara to point (j)	Aro	Iwoye	Ikotun	Ojo	Minimum distance (Km)
	1	2	3	4	5	6	
1	0.0	12.8	6.4	14.5	12.4	7.8	6.4
2	12.8	0.0	6.4	11.6	3.8	5.5	3.8
3	6.4	6.4	0.0	12.4	7.4	2.4	2.4
4	14.5	11.6	12.4	0.0	7.8	9.2	7.8
5	12.4	3.8	7.4	7.8	0.0	5.2	3.8
6	7.8	5.5	2.4	9.2	5.2	0.0	2.4
							26.6

$$rA = \sum d \div n = 26.6 \div 6 = 4.4333$$

$$= 6 - 254 = 0.023622047$$

$$rE = 1 \div (2\sqrt{\lambda}) = 3.253$$

$$R = rA \div rE = 4.433 \div 3.253 = 1.363$$

$$SrA = 0.6942, \therefore Z = 1.699$$

NOTE: The values of R as shown in the Table below shows that the distribution pattern of the services are produced by a dispersion process. The location of the services are produced by a dispersion process.

Nearest neighbour indices for selected public services

Service	Nearest neighbour Index R	Number of outlets
Maternity centre	1.701	5
Secondary school	1.672	3
Dispensary	1.363	6
PHC	1.29	6

R ranked in descending order of their degree of dispersion.

APPENDIX II

Ho: There is spatial variation in distance travelled to obtain the services among different zones in the area.

Analysis of variance (ANOVA) is employed here:

	Z O N E Average distance travelled (km)			
	A	B	C	D
Secondary school	3.5	2.1	3.1	3.8
PHC	−	1.5	2.0	2.6
MC	2.4	2.4	2.6	−
D	2.2	1.5	2.9	3.1
$\sum X$	8.1	7.5	10.6	9.5
$\bar{X}$	2.7	1.9	2.7	3.2

$$\bar{X} = 2.6$$

The between sum of square: $\sum_{j=1}^{k} nj (\bar{x} - \bar{X})^2$

$= 4 (2.7 - 2.6)^2 + (1.9 - 2.6)^2 + (2.7 - 2.6)^2 + (3.2 - 2.6)^2$

$= 4 (0.01 + 0.49 + 0.01 + 0.36)$

$= 3.48.$

The within sum of square =

$$(3.5 - 2.7)^2 + (2.4 - 2.7)^2 + (2.2 - 2.7)^2 + (2.1 - 1.9)^2 +$$
$$(1.5 - 1.9)^2 + (2.4 - 1.9)^2 + (1.5 - 1.9)^2 + (3.1 - 2.7)^2 +$$
$$(2.0 - 2.7)^2 + (2.6 - 2.7)^2 + (2.9 - 2.7)^2 + (3.8 - 3.2)^2 + (2.6 - 3.2)^2$$
$$(3.1 - 3.2)^2 = 3.02$$

Anova Table

The source of variation	Sum of square	degree of freedom	Variance estimate	F
Between sample	3.48	3	1.16	
Within sample	3.02	10	0.302	3.84
Total	6.50	13		

The difference in distance travelled to obtain this services in different zones is significant at 5%.

APPENDIX III

Ho: There is $_\wedge$relationship between level of patronage of
the secondary schools and the nominal variable of zones
in the area, X^2 is employed in this test.

Zone	Observed level of patronage (O_i)	Expected level[c] of patronage (e_i)	Population (n_i)
A	530	645.9	13901
B	885[a]	414.5	8921[b]
C	171	225.5	4854
D	484	784.1	16876
Total	2070		44552

Note:

a there exists two secondary schools in zone B as at (1994)
   the time of study.

b The population figure for this zone is not complete
   because the figure for Olorunsogo, Igbokiti I and
   Igbokiti II were not included in the 1963 estimates.

c the expected level of patronage (e_i) is got from the
   formular (See Silk, 1979, p. 50 - 51):

$$e_i = \frac{\sum O_i}{\sum n_i} \times n_i$$

Chi-square (X^2) is given by :

$$X^2 = \sum_{i=1}^{K}\left(\frac{(O_i - e_i)^2}{e_i}\right)$$

from the above table.

$$X^2 = \frac{(530 - 645.9)^2}{645.9} + \frac{(885 - 414.5)^2}{414.5} + \frac{(171 - 225.5)^2}{225.5} + \frac{(484 - 784.1)^2}{784.1}$$

$$X^2 = 683$$

The table value of X^2 at 5% level of significance, locate with 3 degree of freedom is 7.821 and it is acceptory ay. The calculated value is greater than the table value, we conclude that there is a relationship between level of patronage of the secondary schools and the nominal variable of zones in the Local Government Area.

Ho: There is a relationship between utilization of Primary Health Centre's Services and the zones.

Zone	Average monthly Return (Oi)	Expected monthly Return (ei)	Population (ni)
A	-	74.3	13901
B	78	47.7	8921
C	73	25.9	4854
D	87	90.2	16876
Total	238		44552

$$X^2 = \frac{(0 - 74.3)^2}{74.3} + \frac{(78 - 47.7)^2}{47.7} + \frac{(73 - 25.9)^2}{25.9} + \frac{(87 - 90.2)^2}{90.2}$$

$$X^2 = 74.3 + 19.2 + 85.7 + 0.1 = 179.3$$

Ho: There is a relationship between utilization of the Maternity centres and the nominal variable of zones.

Zone	Average monthly return (O_i)	Expected monthly return (e_i)	Population (n_i)
A	230^d	151.3	13901
B	217^e	97.1	8921^b
C	38^f	52.8	4854
D	_____	183.7	16876
Total	485		44552

$$x^2 = \frac{(230 - 151.3)^2}{151.3} + \frac{(217-97.1)^2}{97.1} + \frac{(38-52.8)^2}{52.8} + \frac{(0-183.7)^2}{183.7}$$

$$x^2 = 40.9 + 148.1 + 4.1 + 183.7 = 376.8$$

NOTE :

d Ara and Aro centres

e Ido-Osun, Ofatedo and Okinni centres

f One centre only at Iwoye.

Ho: There is a relationship between utilization of dispensaries and the nominal variable of zones.

Zone	Average monthly Return (O_i)	Expected monthly Return (e_i)	Population (n_i)
A	179	103.6	13901
B	78	66.5	8921
C	40	36.2	4854
D	35	125.8	16876
Total	332		44552

$$X^2 = \frac{(179 - 103.6)^2}{103.6} + \frac{(78-66.5)^2}{66.5} + \frac{(40-36.2)^2)}{36.2} + \frac{(35-125.8)^2}{125.8}$$

$$X^2 = 54.9 + 2 + 0.4 + 65.5 = 122.8$$

Note: g there exists three dispensaries in zone A, located at Ara, Ojo and Aro

Summary measure of the x^2 test of relationship between level
of patronage/utilization and the nominal variable of zones.
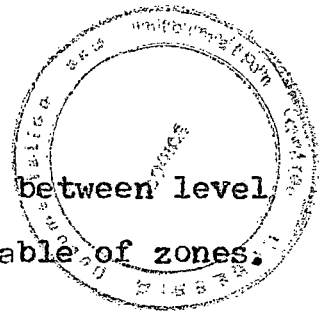
Service	x^2	Level of significance (5%) Tabulated x^2
Secondary schools	683	
Primary Health Centres	179.3	7.81
Maternity centres	376.8	
Dispensaries/Health Posts	122.8	

The calculated values of x^2 at 3 df are greater than
the table values, we conclude that there is a relationship
between level of patronage or utilization of the services
and the nominal variable of zones.

APPENDIX IV

ACCESSIBILITY MEASURE

$$Ai = \sum_j (Sj \div Cj) \div dij^b$$

Ai = accessibility (to a service) in an areal unit

Sj = staff strength in service j

Cj = catchment area population of services j

dij = distance between i and j

b = friction of distance parameter

$$Cj = \sum_i Pi \div dji^b \ldots\ldots (2) \text{ where}$$

Pi = the population of area i

ABCESSIBILITY TO EDUCATIONAL FACILITIES

Ai to the Secondary school at Ara (Zone A)

$Cj = 13901 \div 24.3^{-1}$

$Cj = 337794.3$

$Ai = (23 \div 337794.3) \div 0.041115$

$Ai = 0.001656056 \times 10^6 = 1656.1$

Ai to the school at Okinni (Zone B)

$Cj = 8921 \div 4.94^{-1.1}$

$Cj = 51702.69535$

$Ai = (31 \div Cj) \div 0.172544$

$= 0.00347495 \times 10^6 = 3474.95$

Ai to the schhol at Iwoye (Zone C)

$$Cj = 4854 \div 12.4^{-1.4}$$

$$= 164774. \ 5486$$

$$Ai = (18 \div Cj) \div 0.02946$$

$$= 0.003708084 \times 10^6 = 3708.1$$

Ai to the school at Iragberi (Zone D)

$$Cj = 16876 \div 11.5^{-2.2}$$

$$= 3637514.8$$

$$Ai = (23 \div Cj) \div 0.0046394$$

$$= 0.0013629 \times 10^6 = 1362.9$$

ACCESSIBILITY TO THE PRIMARY HEALTH CENTRES (PHC)

Ai to the PHC at Ido - Osun (Zone B)

$$Cj = 8921 \div 1.5^{-0.8} = 12339.18701$$

$$Ai = (7 \div Cj) \div 0.072298$$

$$= 0.00078466 \times 10^6 = 784.7$$

Ai to the PHC at Iragberi (Zone D)

$$Cj = 16876 \div 2.6^{-1.6} = 77844.31$$

$$Ai = (7 \div Cj) \div 0.216792$$

$$= 0.000414789 \times 10^6 = 414.8$$

Zone A has no PHC

Ai to the PHC at Awo (Zone C)

$$Cj = 4854 \div 6^{-1.3} = 49853.59$$

$$Ai = (11 \div Cj) - 0.097365113$$

$$= 0.002266172 \times 10^6 = 2266.2$$

ACCESSIBILITY TO THE MATERNITY CENTRES (MC)

Ai to the MC at Ara (Zone A)

$$C_j = 13901 \div 14.6^{-6}$$

$$A_i = (4 \div C_j) \div 0.000000103$$

$$= 0.0028442 \times 10^6 = 288.4$$

Ai to the MC at Okinni (Zone B)

$$C_j = 8921 \div 10.4^{-1.4} = 236733.7703$$

$$A_i = (4 \div C_j) \div 0.0376836$$

$$= 0.000448381 \times 10^6 = 448.4$$

Ai to the MC at Iwoye (Zone C)

$$C_j = 4854 \div 7.7^{-1.1} = 45839.46812$$

$$A_i = (1 \div C_j) \div 0.1058913$$

$$= 0.000206015 \times 10^6 = 206.0$$

Zone D has no MC

ACCESSIBILITY TO THE DISPENSARIES/HEALTH POSTS (D)

Ai to D at Ara (Zone A)

$$C_j = 13901 \div 14.1^{-1.5} = 735994.7417$$

$$A_i = (3 \div C_j) \div 0.001887363$$

$$= 0.000215968 \times 10^6 = 215.97$$

Ai to Ido Osun Dispensary (Zone B)

$$C_j = 8921 \div 1.5^{-3.6} = 38400.9591$$

$$A_i = (2 \div C_j) \div 0.232311906$$

$$= 0.00022419 \times 10^6 = 224.2$$

Ai to Iwoye Dispensary (Zone C)

$Cj = 4854 \div 8.7^{-1 \cdot 1} = 52428.92461$

$Ai = (1 \div Cj) \div 0.0925825$

$= 0.000206015 \times 10^6 = 206.0$

Ai to the Health P.x at Ikotun (Zone D)

$Cj = 16876 \div 6.2^{-1}$

$= 104631 \cdot 1997$

$Ai = (2 \div Cj) \div 0.161290$

$= 0.000118511 \times 10^6 = 118.5$

Zone	SERVICE			
	Sec. school	PHC	MC	D
A	1656.1	—	288.4	215.97
B	3474.95	784.7	448.4	224.2
C	3708.1	2266.2	206	206
D	1362.9	414.8	—	118.5
Average ($\bar{X}$)	2250.5	866.4	235.7	191.2
Std. deviation (σ)	1049.4	854.5	161.6	42.4
$CV = \dfrac{\sigma \times 100}{\bar{x}}$	46.6	98.6	68.6	22.2

Summary measure for four Accessibility Experiments[a]

Experiment	X	CV[b]
Secondary school	2250.5	46.6
Primary Health Centre (PHC)	866.4	98.6
Maternity centre (MC)	235.7	68.6
Dispensary/Health Post (D)	191.2	22.2

Note : a   mean values are multiplied by 10^6 to facilitate

interpretation.

b. $CV = \dfrac{\sigma}{\bar{x}} \times 100$

Note that to measure accessibility to each of the services
a service point was taken in each of the zones.

APPENDIX V

Ho: The size of the service facilities varies as between the zones.

Analysis of variance (ANOVA) is employed here:

Size of the services

Service	ZONE			
	A	B	C	D
Secondary school	22	71	18	23
Primary Health centre (PHC)	-	7	11	7
Maternity centre (MC)	5	10	1	-
Dispensary/Health Post (D)	6	2	1	2
Total	33	90	31	32
Average ($\bar{X}$)	11	22.5	7.75	10.67

Overall average $\bar{X}$ = 13.29

The between sum of square :

$= 4 (11 - 13.29)^2 + (22.5 - 13.29)^2 + (7.75 - 13.29)^2 + (10.67 - 13.29)^2$

$4(5.24 + 84.82 + 30.69 + 6.86) = 510.44$

The within sum of square:

$$= (22-11)^2 + (5-11)^2 + (6-11)^2 + (71-22.5)^2 + (7-22.5)^2 +$$

$$(10-22.5)^2 + (2-22.5)^2 + (18-7.75)^2 + (11-7.75)^2 +$$

$$(1-7.75)^2 + (1-7.75)^2 + (23-10.65)^2 + (7-10.67)^2 +$$

$$(2-10.67)^2$$

$$= 121 + 36 + 25 + 2352.25 + 240.25 + 156.25 + 420.25$$

$$+ 105.06 + 10.56 + 45.56 + 45.56 + 152.03 + 13.47$$

$$+ 75.17 = 3798.41$$

ANOVA TABLE

The source of variation	Sum of Square	Degree of freedom	Variance estimate	F
Between sample	510.44	3	170.147	2.23
Within sample	3798.41	10	379.841	
Total	4308.85	13		

The table value of f at 5% is 3.71, this implies that the size of the services does not vary significantly among the zones.