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SPATIAL ANALYSIS OF SCHOOL DISTRIBUTION IN POLITICAL WARDS OF IFE CENTRAL LGA OSUN STATE NIGERIA

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ABSTRACT

Education is a fundamental driver for socio-economic development and growth of individuals. Educational system has witness challenges because of inadequate planning and facilities distribution in schools. Thus there is need to establish schools in various political wards of the country for the growth of the individuals. This research was conducted to assess how Public Primary schools were distributed in all political wards in Ife Central LGA in OSun State Nigeria.

Spatial and non-Spatial data used for this research were acquired through field work. The field work involved the visitation of all Government public primary schools in Ife Central LGA and oral interview were conducted for the head teachers from each school visited to form the database of the primary schools in the study area. The global positioning system was used in collection of coordinate points of the schools. Spatial and non-Spatial data was used to developed data base for educational authority. The result obtained were analyzed using Geographic information system (GIS) technology to visualize the distribution of the public primary schools in their various political Wards.

The result showed that public primary schools were not evenly distributed among the political wards. Some wards had more schools than others while some had none. Teachers were not randomly distributed based on school's enrolment and some schools established in some wards failed the standard for establishment.

Based, on the findings, it was recommended that more schools should be establish in those wards that have no public primary schools for equity and fairness and provide teachers where they are needed based on school enrolment. More so, many decision makers in Education management and planning can utilize the technology of GIS for making and implementing educational programs with cost effective in school administration.

Key words: GIS, Planning, School, Geo-spatial, Assessment.

1. INTRODUCTION

Education is the basic key of Socio –economic development, and national growth needs access to quality education which is crucial for societies and individuals. However, the distribution of educational facilities, like schools, is often uneven causing disparities in educational opportunities. Ife Central, a local Government area in Osun State Nigeria, is no exception. The uneven distribution of schools can lead to issues like overcrowding, poor academic performance and limited access to education, especially in marginalized areas. Knowing the spatial patterns of school distribution is essential for policy makers and educators to make informed and infrastructural development.

However, to ensure equitable distribution and efficient management of the facilities in the LGA as well as guarantee maximum access and utilization of the facilities by the target population, there is need to assess public primary schools and create a database of the facilities in an easily query able manner as well as ascertain the current distributional pattern of the available facilities in the LGA. This calls for geospatial assessment of public primary schools in Ife Central area of Osun State to correct the imbalances in distribution of human and material resources for educational planning and administration.

Researchers (Okan 2012, Anurag *et al* 2014, Khalid *et al* 2013, Akpan 2015, Okoth and Andrew 2014) had evaluated the applicability of Geographic Information System(GIS) in educational system and their results proved that GIS is effective for developing a database for educational planners and administrators.

Based on this situation, there is need to apply information communication technology system which will help educational planners in preparing a set of decisions about the educational enterprise in such a way that the goals and objectives of education will be realized in future with the available resources. Geographic Information System (GIS) is an Information Communication Technology (ICT) based system which can support decision making in education planning and administration. GIS is computer programs designed over the past 20years to store and process geographical information. More specifically, GIS provide methods to capture and collect such information, store the information, process it statistically and spatially, and finally make that information available according to the needs of whoever requires it. GIS had developed at a remarkable place over the past two decades and will play a key role in development in the 21st century (Anurag *et al*, 2014, Akpan P.E 2015,Agrawal and Gupta 2016). Time has come for all decision makers to discuss the appropriateness of GIS technology and its applications to educational planning (Mzuza *et al* 2019, Kholoshyn *et al* 2021, Jackson K.M 2019,Osborne *et al* 2020,Tibendra R.B 2014,). Thus, this study uses geospatial techniques to analyze the distribution of schools in Ife Central political wards, aiming to provide insights and identifying areas of need for improving educational access and equity.

2. MATERIALS AND METHODS

Research design

Primary and secondary data were used in this study. The primary data are coordinate of the location of schools obtained using GPS and oral interview from school heads. The secondary data are Administrative Map of Ife Central Local Government Area, teacher's personnel data, Students enrolment data, and statistic of schools facilities.(Table1.)

Data	Source
1. School Name and Ward	Local Education Authority Board Ife Central LGA
2. School enrolments, and Personnel Information	Head Teacher of the School
3. Administrative Map of Ife Central LGA.	Nigeria copy of Administrative Map
4. Location of Schools	Garmin Global Positioning System

Table 1: Primary and Secondary Data.

Data collection

The data used for this study were acquired through field work. It involved the visitation of all primary schools in Ife Central LGA, oral interview for all the head teachers from each school visited to assess the personnel in terms of number of teachers, pupil's information and school facilities data. GPS was used to collect coordinate points of the schools. The GPS was used to determine the precise location of schools. All the spatial data and non-spatial were captured in GIS platform for Geospatial assessments of the school and personnel.(Table 2)

S/N	Name of school	Name of ward	School population/enrolment	Number of teachers	Latitude(coordi nate)	Longitu de (coordin ate
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Table 2: Spatial data

The study area

Ife Central Local Government Area Osun State Nigeria is bounded in the south by Ife East Local Government Area, in the West by Ife North Local Government, in the East by Ondo State and in the north by Ilesha. The headquarters of Ife Central Local Government is on Ibadan Road.

Geographically, it is located between latitudes $7^{\circ}28'43.5''\text{N}$ and $7^{\circ}34'51.41''\text{N}$ and longitude $4^{\circ}27'22.5''\text{E}$ and $4^{\circ}35'40.61''\text{E}$ and an altitude of 256m above sea level (Fig1). The climate is tropical, like every other southwest area. The rainy season starts from April to October while the dry season lasts October to March with mean annual rainfall of about 1400mm. Relative humidity is about 75.8% and 86% while the dry season runs from November to March with temperature ranging between 28°C to 34°C . The population of the area is about 167254 persons consisting of 88403 males and 78,801 females based on the National Population Commission 2006 census result. The study area is characterized by two types of soil; deep clay soil formed on the lower smooth hill crests and upper slopes and sandy soil from loamy soil and this helps water retention from seepage. The natural vegetation of the area is under tropical rainforest belt characterized with multiple canopies and lianas. The people are mostly farmers. Ife is home to prestigious Obafemi Awolowo University and other important places like Teaching Hospital Complex, Ife Museum of Antiquities. Opa Oranmiyan, Okemogun Shrine, Oduduwa palace, Zoological Garden and Odua Shrine. The Olojo Festival, an important event in the ancient town holds annually.

Method of analysis

The data used for this study were acquired through field work. It involved the visitation of all primary schools in Ife Central LGA, oral interview for all the head teachers from each school visited to assess the personnel in terms of number of teachers, pupil's information and school facilities data. GPS was used to collect coordinate points of the schools. The GPS was used to determine the precise location of schools. School data and GPS point coordinates of the schools were typed into excel spread sheet for easy import into GIS environment. The coordinates of schools were typed in Microsoft excel and imported into GIS environment for conversion into point map.

The administrative Map of the study area was scanned, geo-referenced and digitized to extract Roads and Towns while GPS points of schools were converted from Degree to Decimal. The School names and non-Spatial data were joined and related for conversion to Database format. All the data collected were used to form database of the study area. The database developed was analyzed in GIS environment using Arcgis platform to visualize the pattern of distributions of the schools, location into various wards and a choropleth map of the schools, (Figure 2).

Flowchart of the methodology

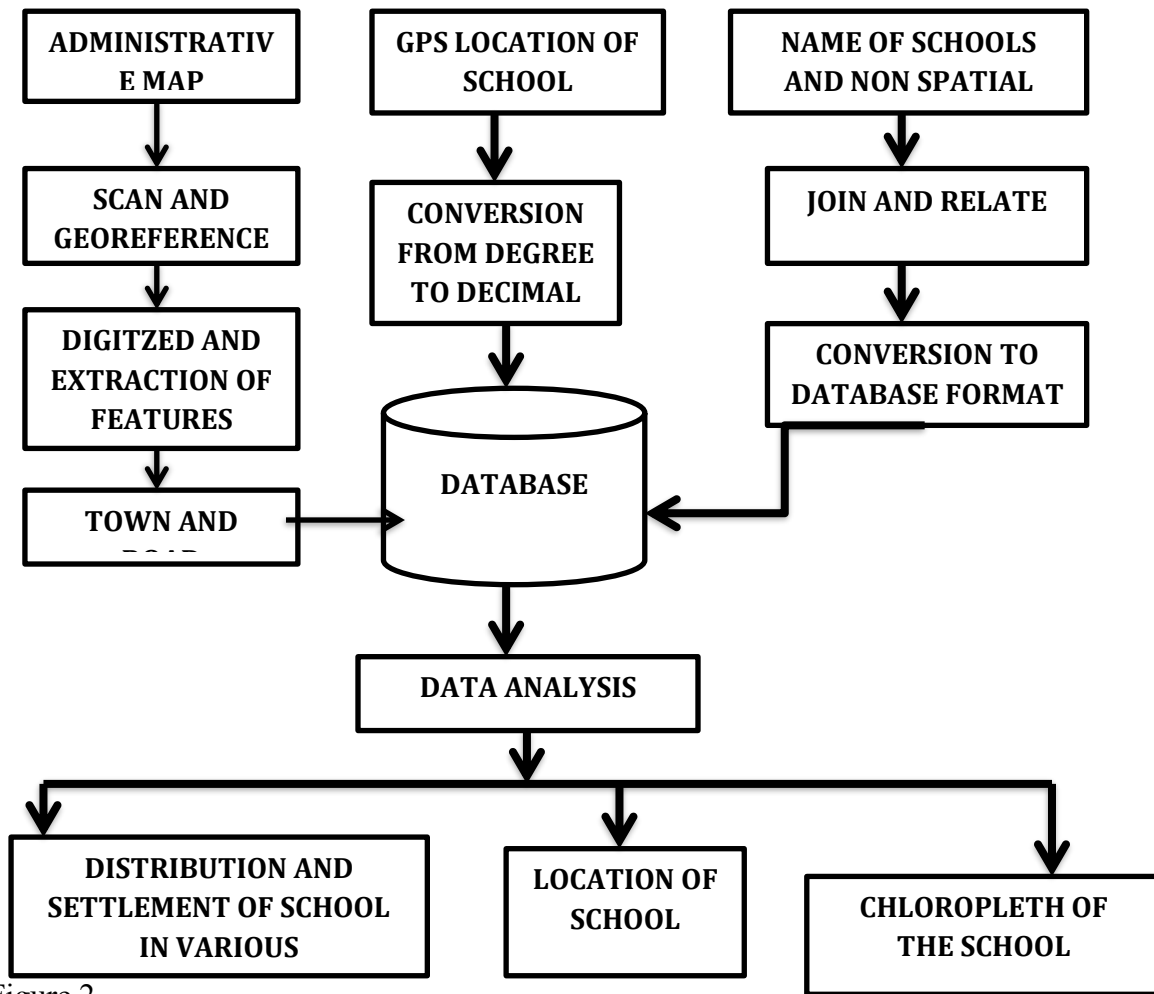


Figure 2

3. RESULTS AND DISCUSSIONS

3.1 Results

Table 3:Geo-database of primary schools

S/N	Name of School	Location	Ward Name	Longitude X	Latitude Y
1	SS Peters and Paul primary	Ajigbayin	Iromo 2	4.55063	7.48641
2	CAC elem. school	Ojoyin	Ireomo 5	4.54990	7.48261
3	St Micheal primary	Ogboagbara	Ireomo 5	4.55147	7.48045
4	St Micheal primary	Ogboagbara	Ireomo 5	4.55147	7.48045
5	AUD primary school	Ogboagbara	Ireomo 5	4.55112	7.48128
6	CAC primary school	Ita-Elewa	Ireomo 4	4.50671	7.56945
7	LA Elementary middle school	Agbogboro Ifefun	Ireomo 4	4.51275	7.54524
8	United Anglican Elementary primary	Ojo-olosa	Ireomo 4	4.53661	7.57488
9	OAU Elementary school	OAU Campus	Iremo 4	4.53770	7.51716
10	LA Eleso primary	Ogbagile	Iremo 1	4.54690	7.57599
11	LA Elementary Middle school	AbaIya Gari	More Ojaja	4.56480	7.52878
12	Community Primary School	Opa	More Ojaja	4.56480	7.52091
13	Ifedapo Community Middle Elementary	Opa	More Ojaja	4.57596	7.51104
14	Baptist Elementary School	Ilare	Ilare 4	4.55880	7.49224
15	AUI Sabo	Ola-Olu Street	Ilare4	4.55330	4.55330
16	Special Needs Children School	Ilare	Ilare4	4.55918	7.49181
17	AUD Primary School	Ogbondo	More Ojaja	4.56354	7.49047
18	St Peter Primary	Sabo	Ilare4	4.55650	7.49273
19	Methodist Primary School	Opposite Oja	Ilare 4	4.55315	7.49015

20	St Peters Elementary School	Iremo	Iremo 3	4.55372	7.49015
21	LA Primary School	Akarabile	Akara bata	4.55372	7.48235
22	CAC Elementary School	Oke-Aanu	Akarabata	4.55707	7.48277
23	Community Primary School	Akile Kajola	Iremo1	4.48997	7.51131
24	Holy Saviour Primary School	Fasina	Iremo 1	4.48018	7.49531
25	LA Primary School	Ajabandele	Iremo 1	4.4998	7.49572
26	Community Primary School	Obawinnin	Iremo 1	4.52919	7.48178
27	Munumba Elementary School	Lagere	Iremo 3	4.54690	7.48950
28	ST Bernard School	Lagere	Iremo 3	4.54900	7.48950
29	LA Elementary Eleyele	Eleyele	Iremo 2	4.54576	7.49087
30	Igboya Community School	Agbola Street	Ilare 1	4.55899	7.50156
31	Community Elementary School	Oluorogbo	Ilare 1	4.54730	7.50624

Source: Ife Central Local Education Authority and Field Work (2026).

Geo-database of primary schools

Table 4: Ward, number of School, Name, enrolment, and number of teachers

S/N	Ward Name	Number of School	Name of School	Enrolment	Number of Teachers
1.	Ilare 1	3	Igboya Community School	98	13
			Community elementary School Oluorogbo	120	13
			OAU Ele/Primary School	200	16
Total				418	39
2.	Ilare 2	-	-	-	-
3.	Ilare 3	-	-	-	-
4 .	Ilare 4	4	St Peters Sabo	258	20
			Special needs Children	78	8
			AUI Sabo	200	19
			Baptist elementary School	600	50
Total				1136	87
5.	Iremo1/Ajabandele	8	Community Primary School Akili	56	9
			Holy Saviour Fasina	30	5
			LA Pri. Ajabandele	180	18
			LA el/middle School Olukotun	46	4
			LA elementary Eleso Ogbagie	52	6
			CAC Pri/Elementary Itaelewa	68	6
			LA el/middle School Ilefun	80	5
			United Anglican Ojolooso	65	7
Total				580	60
6.	Iremo 2	2	LA Elmentary School	110	10
			Methodist Sabo	205	19
Total				315	29
7.	Iremo3	3	St Mulumba Pri School	200	16
			St Benards Pri School	120	8
			St Peters Iremo	385	26
Total				605	26
8.	-	-	-	-	-
9.	Iremo 5	4	SS Peter and Paul Pri. School Ajigbayin	200	20

			CAC Elementary School Ojoyin	94	9
			St Micheal OgboAgbara	142	10
			AUD Ogbo Agbara	275	17
Total				711	56
10.	Akarabata	3	LA Primary Akarabilie	158	10
			CAC Elementary Okeyaanu	140	9
			Community School Obawinin	67	6
Total				365	25
11.	More/Ojaja	4	AUD Ogbondo	106	17
			LA Elementary/Middle School Igbologbo Abaiya Gari	75	8
			Community Pri School Opa	80	10
			Ifedapo Community /Middle /Elementary School	186	22
Total		31		447	57

Source: INEC Ife Central LGA and Field Work (2024).

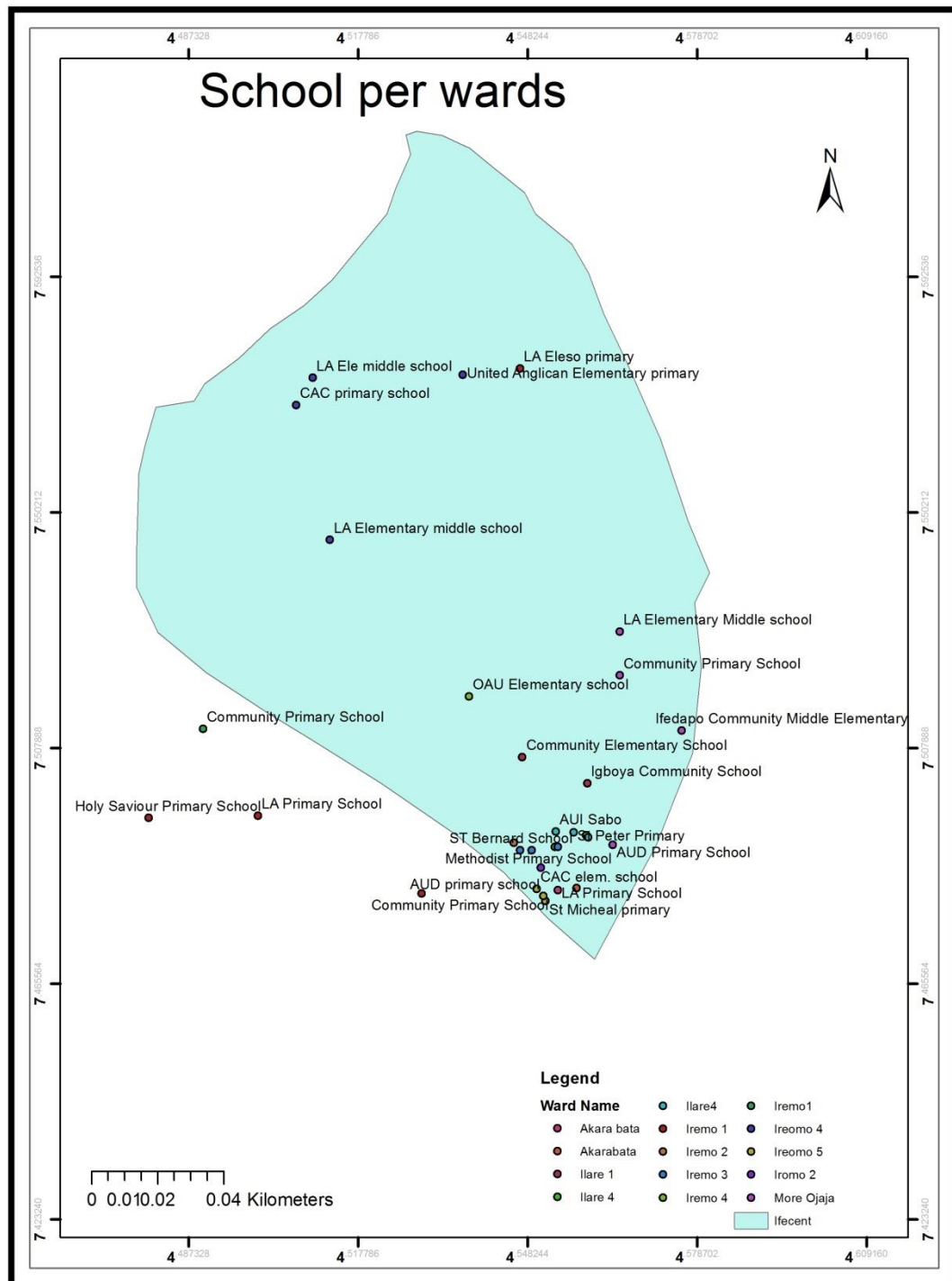


Figure 3

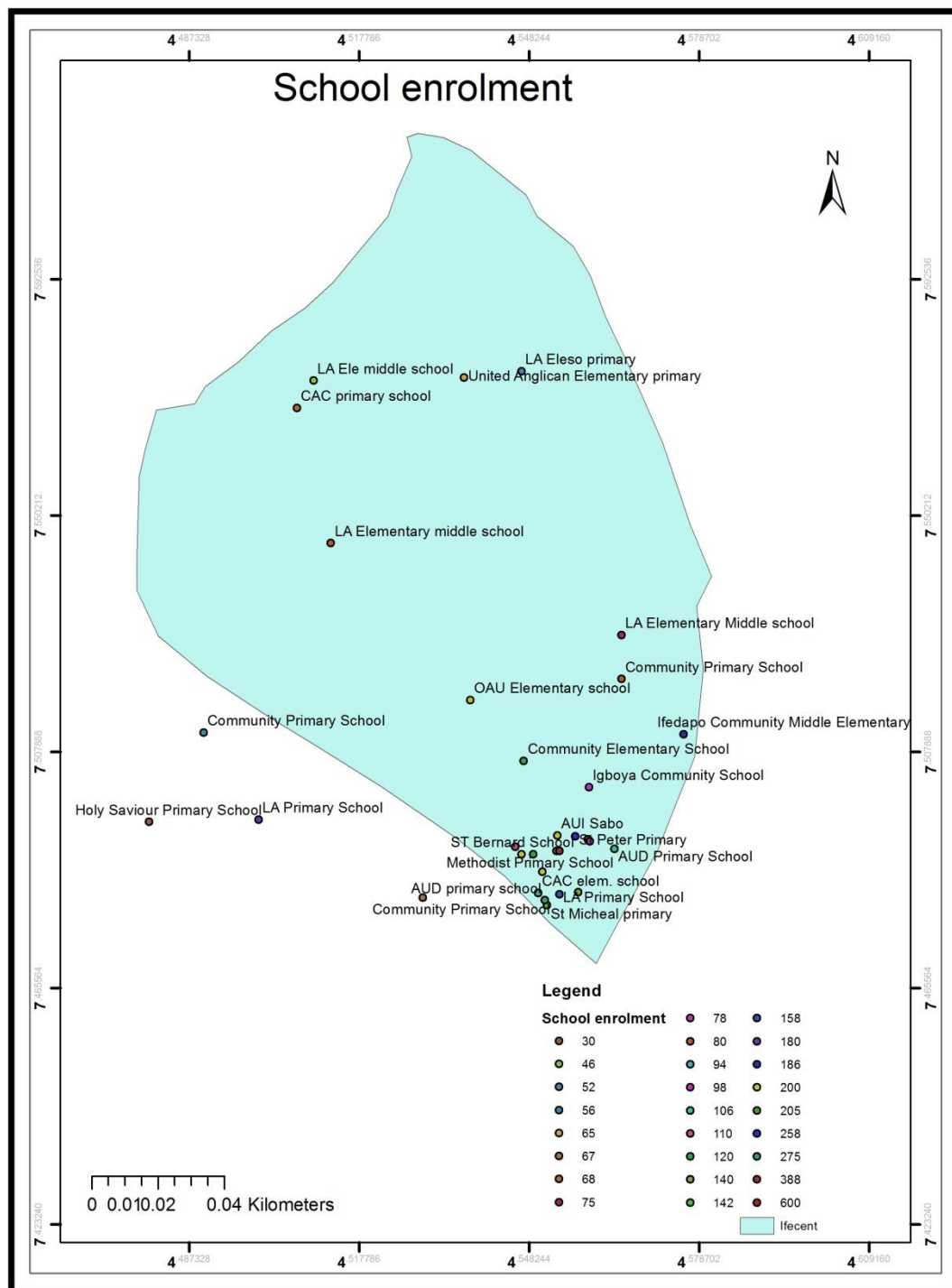


Figure 4

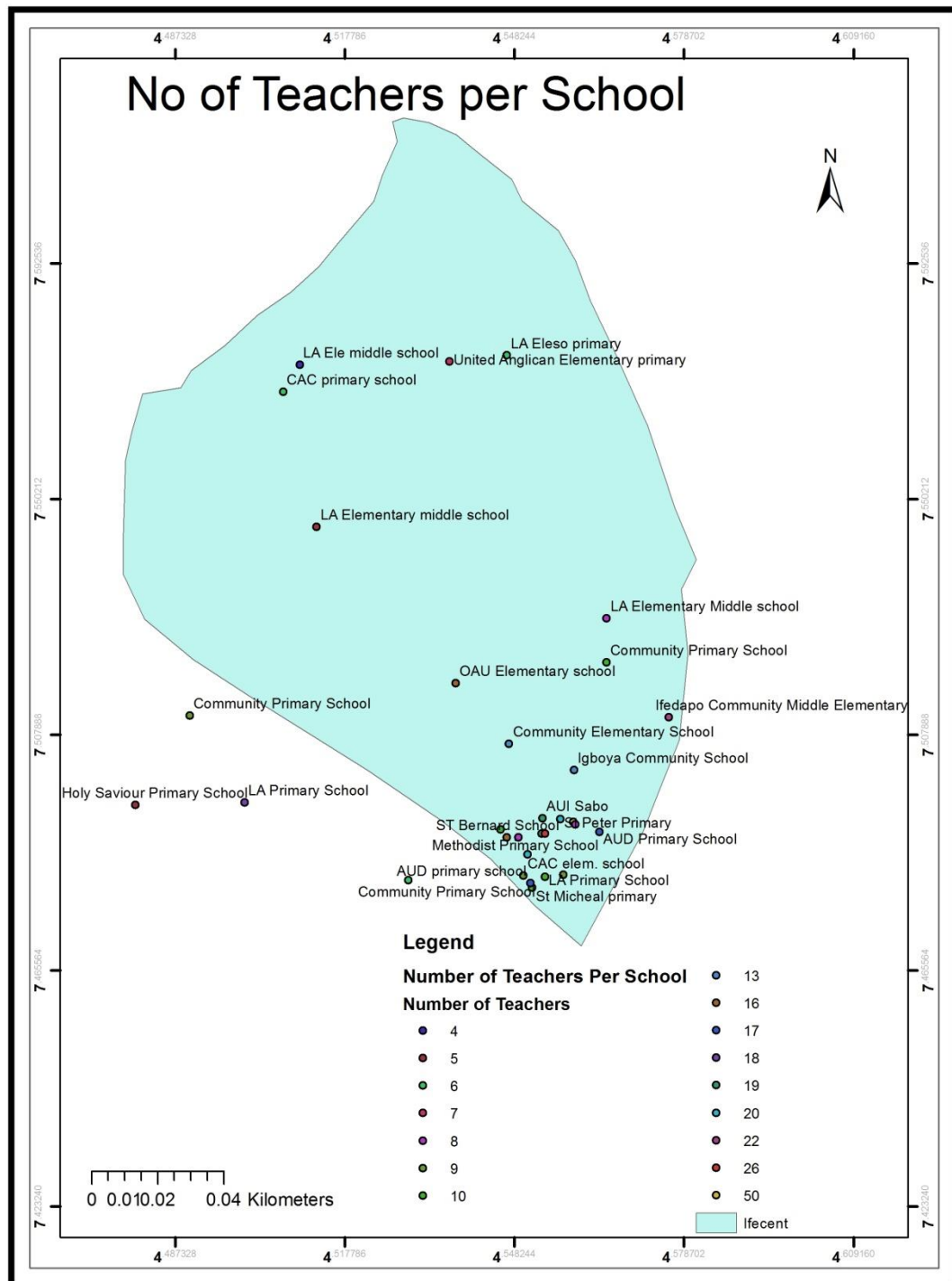


Figure 5

3.2 Discussion

Figure 1 showed the major Towns, Roads, and facilities available in Ife Central L.G.A, the major towns are Kojola, Ajibodu, Eleweren Asun, Odun Asun. The facilities available are Obafemi Awolowo University and Opa Dam.

Distribution of schools on wards level: The result showed that there were thirty one (31) Public Primary Schools and 11 Political wards in Ife Central LGA. (Figure3). The schools were distributed in various wards as shown in geo-data base. The result showed that primary schools were not properly distributed as shown in table 3. There were 11 electoral wards in Ife Central LGA which had 31 primary schools. From the result 8wards had primary school and 3 wards had none. It also indicated some wards had more schools compared to others. Iremo ward1, had 8 schools, Iremo ward 2, 2 schools, Iremo ward 3, 3schools Iremo ward5 4schools, Ilare ward1 3schools Ilare ward4, 4schools, More/Ojaja ward, 4schools. The wards that had no school include liare ward2, Ilare ward3 and Iremo ward4. Teachers were distributed according to the number of schools per wards, and enrolment. The higher the enrolment the higher the number of teachers posted to the school.(Table 3). The study is in line with Akpan 2013 who revealed a random to near concentration of the schools in particular wards in the LGA with some left areas educationally deprived. Inobeme *et al* 2009 also reveals that the spatial distribution of Government Owned Secondary Schools in Zaria area is very uneven. The result from the study reveals that the application of GIS to the school mapping is very useful to find the appropriate sites of locating new school buildings efficiently and rationally.

Average class size: This is measured by the average enrolment in a class at any level of the school system. The average class size in this study showed one class per seventeen pupils (1:17) which was small based on their enrolment. The result also failed the UNESCO standard of 1:30 for average class size. This had led to underutilization of various buildings in some of the schools visited. Average class size is calculated by dividing the total enrolment by total number of the functional classroom available in the school system. (Figure 4). The finding was in line with Ogunyemi *et al* 2013 who reported none of the secondary schools in the study area met this UNESCO standard

Teacher's pupil ratio: This is one of the most useful and commonly used planning indicators in educational system. In this study the result showed that the ratio of pupil per teacher is 1:11 meaning that in all the 31 primary school visited there was 1 teacher per 11 pupils. The study area failed beyond the UNESCO standard for primary school which stipulated one teacher to thirty pupils (1:30). Based on this finding, Ife Central primary schools had many teachers with less number of pupils. (Figure 5). The result of the finding was in line with Akpan 2013 who reported that some primary schools were over staffed and there is need for the use of GIS in the educational sector for planning.

The findings were in line with Robert 2001 who reported that useful information products on important educational indicators such as schools distribution, enrolments, pupil-teacher ratios and gender parity indices have also been generated from GIS analysis of the data.

4 CONCLUSION

The application of GIS as educational decision support system (EDSS) has being a new area of research in the process of building the EDSS through GIS in Ife Central LGA local education board of Osun State. This research attempted to show how GIS could be used to build a proper spatial decision support system that can be used for school planning and management. As a result of its capabilities, the use of GIS technology in decision making in all spheres in Nigeria has become inevitable.

Findings revealed, that the use of GIS technology for education planning is very important in the decision making in Ife Central Local education board. The applicability of GIS in education by determining education district, teachers qualities, infrastructural facilities, school mapping, where school can be establish and help decision makers to solve problems which are related to geographical locations in education are easily and quickly provided. GIS mapping and education management information system (EMIS) are strong analytical system that would be more applicable in making educational policy and to be well-structured. GIS had provided database for primary education and ensured that limited educational resources are rationally allocated among the various competing educational demands and programs. The educational planners and end users in Ife Central Education Authority and Osun State should consult the database provided by GIS technology for proper decision making for Primary School management.

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