Original Research Article

Spatial Distribution of Public Lower Secondary School and Its Impact On Students' Enrolment in Ogun Central Senatorial District Ogun State, Nigeria

Abstract

Given the quest for universal basic education, the large enrolments in the Nigerian secondary educational institutions has resulted in the problem of over-crowded classes, shortage of teachers and shortages of classroom, which portend enormous challenges to the development of the educational sector in Ogun state. Using Ogun Central as a case study, the study identified the spatial pattern of the schools; analyzing students' enrolment trends in the area, and identifying the factors associated with the observed pattern. Spatial analysis tool in ArcGIS was used to analyze both the spatial accessibility index and the students' annual enrolment trend of the lower secondary school in the area. The result of the nearest neighbor analysis for the spatial pattern of lower secondary schools in the study revealed a random pattern. This pattern implies that the lower secondary schools are located far from one another, which indicates, that for students to attend the schools, most of them need to cover long distances. The spatial distribution of junior secondary school is influenced by socioeconomic status, environmental factors, demographic characteristics, transportation infrastructure, and geographic accessibility, which are key determinants of educational equity.Linear regression analysis was employed to identify trends and predict future enrollments of students.Further, the results of the trend analysis of enrolments of students in the zone from 2020 – 2023 reveal a negative trend. This implies a decrease in students' enrolment as the year increases. The four years (2020 – 2023) annual trend of enrolments in the zone is represented by the negative trend y = -3180.3x + 99400. This result suggests that the students' enrolments in the zone would gradually keep decreasing as time goes on if quick remedial actions are not taken. However, factors such as shortage of teachers, shortage of classrooms, COVID-19, insufficient infrastructural facilities and fuel subsidy removal could be responsible for the negative enrolment trend

Keywords: Lower Secondary Schools；AnnualEnrolment；Spatial Analysis；Spatial Pattern

Introduction

Most of the developing countries made efforts to make education accessible to all because education is important in the country's development. However, these efforts differ in every nation (Getachew, 2018). In developing countries like the Philippines, poor quality of education is linked to different factors such as school location and society (Saeed, 2003). The students' population catered for by each school and the distance that students need to travel daily are some of the important aspects that the government needs to consider when building lower secondary schools (Duze, 2010). In rural areas where individuals living in the community are far from one another, school distance is oftentimes a problem for students because they need to travel long distances every day to reach their various schools. A distance of two or more kilometers of walking is considered a long-distance walk for students (Thomas, 2016). Education is a basic human right(Human Rights Watch,2016) and is indispensable for the

achievement of other human rights.Accessibility to education is universally acknowledged as one of the most important public facilities because it provides good services to the communities of interest and alsoimposes negative impacts on the community who do not have access to the services. Educational facilities are the major resources that enhance the all-round development of mankind and its environs (Inobeme and Ayanwole, 2009).

Spatial accessibility

The practical importance of school location is based on the needs of thecommunity/society. The planning of the lower secondary school is of vital importance for both urban and rural development. Therefore, accessibility to secondary education can be considered as both human right issues and development programme for socioeconomic transformation (Fabiyi and Ogunyemi, 2015). The importance of effective and accessible education system in any nation cannot be overemphasized. In a nation like Nigeria, the provision of educational facilities is the responsibility of all the three tiers of government i.e. Federal, State, and Local government (Hite, 2008). According to UNESCO (2006), the growth of the educational industry is essential to the development of economies around the globe. World Bank(2002) opined that the Gross Domestic Product (GDP) of a country will increase by 4% yearly as the level of education increases. The ideal goal of government in providing services to maintain the capability of each neighborhood in both urban and rural areas school planning is a type of facility planning, and the distribution of lower secondary schools is determined by the availability and openness for students' schooling (Owolabi, 2006).

Nigeria education

The Nigerian educational system is categorized into three stages, primary, secondary, and tertiary education(UBE 2004). Lower secondary education serves as a link between primary education and higher secondary education and it plays an important role in the life of every citizen and the nation at large. Nigeria is among other countries that concur to education as an undoubted means of fulfilling national development, thereby making private individuals, government, and private organizations set up educational institutes at all levels to meet educational yearnings and wants of the citizens; although the expectation for equal distributions of educational infrastructure is a major challenge (Adebola,2011). Secondary education was divided into two categories: lower secondary school and senior secondary school. At this stage, the future of students was determined by the type of subjects he/she registered for inthe SSCE examination.

Spatial accessibility to lower secondary education

Accessibility to lower secondary education refers to the spatial and economic distances which people have to cover to benefit or receive the services available at the location of the lower secondary schools. Spatial distance relates to physical barrier that have to be overcome by student between home and school facilities while economic distance refers to the cost to be incurred by the students to access education, including cost of school travel and cost of tuition. The services available in such facilities include teaching, sports, computer labs, and skill acquisition, among others. The services available and accessed at the educational institutions are also based on the level of the society’s technological development. Technology development can provide various brand of distance learning; computer aided instruction, geographic information system,and other technology assisted learning platforms, which may reduce physical distance between teachers and students. Among the many technology tools for solving spatial

locational problems, the capability of Geographic Information System (GIS) in the areas of spatial planning, distribution and management has been acknowledged (NCGIA, 1991). This recent technology is a robust suite of technical software designed to accept data, process the data, store, and give out geo-based information like maps. It has been applied in different geo-location, visualization, and numerous decision support contexts(Kufoniyi, 1998).

Statement of the problem

The major challenges facing secondary educational institutions do not only concern the horizontal relationship between academic secondary education and improvement in vocational skills, and the inter-relationships between the wide variety of learning prospects, they also worryabout the vertical relationship between lower secondary education and upper secondaryeducation. The need, as demonstrated by the historicalexperience from other parts of the country, is to draw a clear demarcation between lower secondary (junior secondary school) and upper secondary education (senior secondary school). The first isconsidered as an overall general education to which all youths are entitled as a right, and the second as one option among many for continuing education in relation to opportunities to the extent available. The Universal Basic Education (UBE) report (2004) indicated that the transition rate from elementary schools to lower secondary schools in Nigeria is almost 86 percent under Universal Basic Education programme, which is very impressive but most of these students/pupils that make their way to lower secondary schools often drop out of school due to several factors including disproportionate spatial and economic distances to lower secondary schools' education.

In this hint, lower secondary education constitutes the final phase of universal basic education, after which young persons may enter the labor market or find opportunities for further education. Thus, the lower secondary school core curriculum must be planned to impart the general knowledge and range of skills all teen-agers and young people should possess, preparing them for life or for further learning. Such a core curriculum would leave options for emphasizing other learning areas, including vocational skills. Upper secondary education differs from lower secondary, which leads students to various types of academic studies in tertiary institution. Other options concern a variety of vocational and technical training options leading to labor market entry or also to types of tertiary education or training.

Objective of the study

The central objective of the study is to examinethe spatial distribution of lower secondary schools and its impacts on students' enrolment in each local government in Ogun central and identify the factors associated with the observed pattern.The specific objectives of the study were to identify spatial distributions of lower secondary schools in each local government; to analyze the trends of students' enrolment in the local governmentareas and to identify the factors associated with the observed distribution.

Methodology

The study area

Ogun Central lies between Longitudes 2°59′59″E and 3°48′47″E, and Latitudes 7°29′57″N and 6°38′24″N. Thearea is bounded on the East by Remo North, Ikenne and Sagamu local Government, and on the West byEgbado North, Egbado South and Ado Odo/Ota Local Government, South by Lagos State,and north by Oyo State. Ogun Central area is inhabited predominantly by the Yoruba-speaking people of South Western Nigeria. It has a total land area of

629.38 square kilometers, with population of 1,387,944 (NPC 2006). There are (103) one hundred and threelower secondary schools (Ogun State Ministry of Education) and the Ogun Central senatorial district is divided into six local governments as shown in Fig. 1. These are Abeokuta South, Abeokuta North, Odeda,Ewekoro, Ifo andObafemi Owodeadministrative local government from which the data for thisstudy was collected.

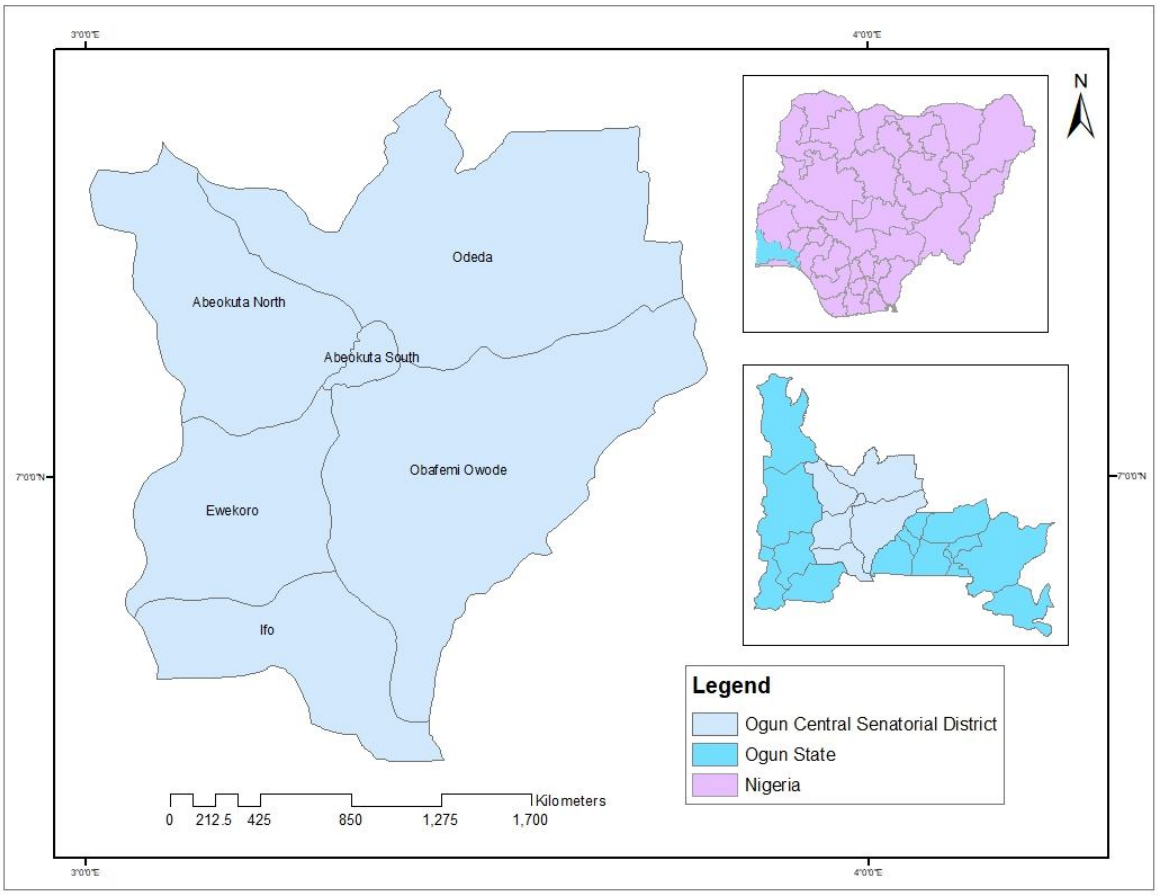


Fig. 1: OgunState Central Local Government

Data and data sources

Primary data for this study was the locations of the schools, collected through a hand-held GPS receiver. Secondary data include administrative map, demographic statistics from students and statistics of schools' facilities. All maps and spatial data were captured in the ArcGIS platform for geospatial analysis. The data obtained from the lower secondary school were coded and integrated for geo-statistical analysis. Analyses were performed to obtain the nearest neighborhood analysis and the spatial inequalities of lower secondary schools. Geospatial analyses performed on the geodatabases include spatial concentration analysis and the nearest neighbor geo-statistical analysis to test the significance of the result of spatial concentration of schools in the local government.

Analysis of spatial distribution of lower secondary schools

Nearest Neighbor Analysis was used to evaluate the spatial accessibility of the population to Lower Secondary Schools in the study area. The average nearest neighbor analysis and ManhattanDistance Method were also used to ascertain the spatial distribution and accessibility of Lower Secondary Schools. The nearest neighbor analysis

examines the distance between each school location and the closest school location to it and measures the extent to which a particular pattern is clustered, Random, and Regular (uniform) while the Manhattan distance method measures the distance between two school points along axes at right angles, used to determine the spatial pattern of distribution of lower secondary schools in each local government in Ogun Central. The Manhattan method was more suitable than the Euclidean method,whichmeasures the distance between two points along a straight line.

Nearest Neighbor Equation

The Nearest Neighbor formula is given as:

$Rn = 2đ\sqrt{n/a}$

Where

Rn = the nearest neighbor index

a = the size of the study area (Ogun central local government)

đ = the mean distance between the lower secondary schools

n = the total number of lower secondary schools in each local government.

Therefore,

When Rn = 0. The pattern is clustered. This means that all the schools are close to the same location.

When Rn = 1. The pattern is random. Meaning the observation does not follow any pattern and

When Rn = 2.15. The pattern is regular. This means that there is an accurate regular pattern where each school is equidistant from its neighbors.

Results and Discussion

Spatial Distribution of Public Lower Secondary School in Ogun Central Senatorial District

A total of 103 lower secondaryschools were identifiedin the study area. It was observed that two of the local governments were not equal in terms of land area yet there isan obvious concentration of public lower secondaryschools among the urban local government areas in the central-eastern andeast, west, south south-eastern parts of the study area as shown inFig. 2.

Figure 2 shows the spread of lower secondary school across the various local governments in the study. There appears to be an overlap between these schools especially in local government with more than six schools. Local government such as Obafemi Owodeand Odeda has a scanty lower secondary school. The spatial distribution of schools also seemed to be more towards the southern and middle sections of the area compared to its northern region.

Table 1 Public lower secondary schools in Ogun central senatorial districts with their coordinates.

S/N	Longitude	Latitude	Name of Lower Secondary School
1.	3.2529	6.7690	Olorunda Community High School, Olorunda
2.	3.2011	6.8088	Adenrele High School (Junior), Ifo
3.	3.3152	6.6856	Agbado District Comprehensive High
4.	3.3485	6.6744	Ajuwon High School (Junior), IjuAjuwon
5.	3.1856	6.8168	Anglican Grammar School (Junior), Okenla Ifo

6.	3.2886	6.7188	Community High School (Junior), Itoki
7.	3.3701	6.649	Community High School (Junior), Ojodu Abiodun
8.	3.1777	6.81	Ifo High School, Ifo
9.	3.2124	6.8060	Nawair-Ud-Deen Grammar School
10.	3.1955	6.8058	Pakoto High School
11.	3.2333	6.8166	Coker Area Comprehensive High School.
12.	3.3672	6.6796	Community High School, Akute
13.	3.3228	6.7041	Community High School, Matogbun
14.	3.3145	6.6992	Community High School, Moboluwaduro
15.	3.2882	6.7026	Community High School, Odewale
16.	3.3065	6.7234	Community High School, Okungbowa
17.	3.2710	6.7998	Community High School, Oluke
18.	3.1086	6.8138	Ibogun Comprehensive High School, Egbeda
19	3.2309	6.824	Okepata Community High School, Ososun
20.	3.2984	6.7477	IgboreRobiyan Community High School, Robiyan
21.	3.3407	6.7039	Community High School, Olambe
22.	3.1847	6.7536	Igbusi Comprehensive High School, Igbusi
23.	3.1248	6.8304	IbogunOlaogun Community Grammar School
24.	3.3584	7.1217	Agunbiade High School, Magbon, Abeokuta.
25.	3.7879	7.1437	Ogunmakin High School (Junior), Sowunmi
26.	3.5117	6.9525	Owode High School, Owode Egba
27	3.7111	7.1102	Ajebo Community High School (Junior), Ajebo
28.	3.4983	6.9423	Egba Owode Grammar School (Junior), Owode
29.	3.616	7.1076	Egba Obafemi Community Grammar School
30.	3.4295	6.8682	Ofada Community High School, Ofada
31.	3.4515	7.037	Kobape Community High School, Kobape
32.	3.3593	7.0426	Oba Community High School, Oba
33.	3.6025	6.9646	OrileIgbore Grammar School, Ajura
34.	3.4218	6.8239	Adesanolu Community High School, Mowe
35.	3.511	7.1335	Olorunkole Grammar School, Kajola
36.	3.3606	6.8813	Community High School, Iro
37.	3.7513	7.1464	Alapako-Oni Community High School, Alapako-Oni
38	3.401	6.7167	Magboro Community High School
39.	3.4136	6.8456	Community High School, Abaren
40.	3.2207	6.9487	Itori Comprehensive High School
41.	3.1878	6.8816	Papalanto High School
42.	3.1949	6.8426	Methodist High School Arigbajo
43.	3.2853	7.0649	Adeoye Lambo Memorial High School Obada Oko
44.	3.2268	6.9944	Akin Ogunpola Model College Akinale .
45.	3.2322	7.0376	Community Comprehensive High School Owowo
46.	3.1274	6.8769	Ifedapo Community Comprehensive High School
47.	3.1584	6.9697	Owu Community High School Elere Adubi
48.	3.2217	6.9750	United Comprehensive High School Wasimi
49.	3.1206	6.8855	Govt. Science and Technical College Ajegunle
50.	3.2855	7.0650	Obada Grammar School, Obada
51.	3.3355	7.1377	African Church Grammar School, Ita Iyaloode
52.	3.3483	7.1608	Gateway Secondary School, Ita- Iyalode, Abeokuta.
53.	3.3542	7.1901	Ilugun High School, Elega, Abeokuta
54.	3.3438	7.1608	St Peters College, Olomore
55.	3.3386	7.1202	Abeokuta Girls Grammar School, Onikolobo
56.	3.3754	7.1433	Abeokuta Grammar School, Idi-Aba, Abeokuta.
57.	3.3280	7.1376	Anglican High School, Quarry Road, Abeokuta.
58.	3.3781	7.1729	Asero High School (Junior), Asero, Abeokuta.

59.	3.3483	7.1608	Baptist Boys High School, Saje, Abeokuta.
60.	3.3339	7.1281	Catholic High School, Onikolobo, Abeokuta.
61.	.37236	7.1705	Egba Comprehensive High School, Asero, Abeokuta
62.	3.339	7.1503	Igbore High School, Igbore, Abeokuta.
63.	3.3375	7.1404	IjemoTitun High School, Ibara, Abeokuta.
64.	3.3775	7.1517	Lantoro High School, Lantoro, Abeokuta.
65.	3.3400	7.1397	Lisabi Grammar School, Idi-Aba, Abeokuta.
66.	3.3384	7.1198	Macjob Grammar School, Onikolobo, Abeokuta.
67.	3.3264	7.1323	Methodist High School, Ogbe, Abeokuta.
68.	3.3487	7.1478	Nawair-Ud-Deen High School, Isabo, Abeokuta
69.	3.3587	7.1799	Saje High School, Saje, Abeokuta.
70.	3.3490	7.1426	St John's Anglican High School, Kuto, Abeokuta.
71.	3.3483	7.1608	Saint Leo's College, Onikoko, Abeokuta.
72.	3.3642	7.1455	Government Science And Technical College, Abeokuta
73.	3.3541	7.1896	Ilugun Central Academy, Ibido/Senbora
74.	3.427	7.2069	Oke-Ona Grammar School
75.	3.4	7.1833	Mamu Community High School Mamu Ijebu
76.	3.5313	7.2369	Egba Odeda High School Odeda
77.	3.4035	7.1803	Nawair-Ud-Deen Grammar School, Obantoko, Odeda
78.	3.6716	7.3792	OrileIlugun Comprehensive High School OrileIlugun
79.	3.6083	7.2955	OrileKeesi Grammar School Olodo
80.	3.6201	7.2270	OrileKemta Comprehensive High School, Olugbo
81.	3.4434	7.1901	Salawu Abiola Comprehensive High School, Osiele
82.	3.4391	7.21	Muslim High School, Isolu
83.	3.5033	7.3138	Alabata Community High School, Alabata
84.	3.5326	7.4254	Olokemeji High School, Olokemeji
85.	3.7212	7.2854	Alagbagba Community High School, Alagbagba
86.	3.6964	7.2363	OrileIporo Community High School, OrileIporo
87.	3.5548	7.1911	Emulu Comprehensive Grammar School, Orile-Itesi
88.	3.3256	7.1583	Army Day Secondary School, Alamala
89.	3.3452	7.1846	Ebenezer Grammar School, Iberekodo
90.	3.3258	7.1557	Lafenwa High School, Lafenwa
91.	3.3317	7.1436	Premier Grammar School(Junior), Lafenwa
92.	3.3296	7.1582	Unity High School, Ago-Ika
93.	3.1743	7.1064	Ansar-Ud-Deen Grammar School, Isaga
94.	3.184	7.1464	Ilewo High School, Ilewo-Orile
95.	3.3369	7.1824	Ikija High School, Iberekodo
96.	3.1345	7.2751	Imala Community High School, Imala
97.	3.1442	7.2250	Olorunda Community High School, Olorunda
98.	3.3235	7.1429	Olumo High School, Sabo, Abeokuta
99.	3.2331	7.1412	Ajiboyede Comprehensive High School, Ibara Orile
100.	3.3311	7.1562	Baptist Girls College (Junior), Idi-Aba, Abeokuta.
101.	3.3493	7.1759	Rev. Kuti Memorial Grammar School, Isabo, Abeokuta.
102	3.3310	7.1562	Community High School, Igbala
103	3.1418	7.1041	Obalaju High School, Joga Orile

Source: Author's field work

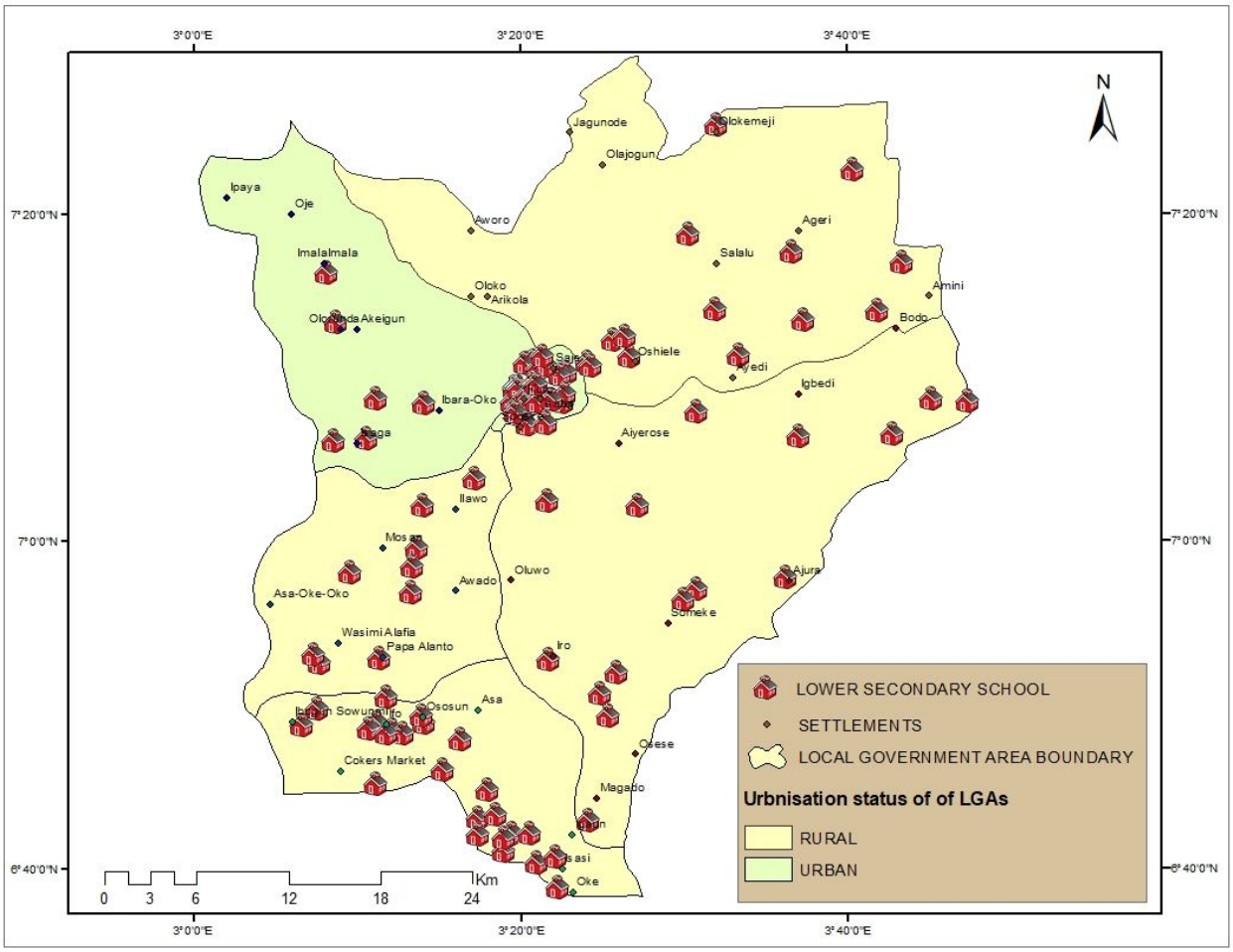


Fig. 2: Urban status and spatial distribution of lower secondary schools in the study area.

Spatial Distribution Pattern of Lower Secondary Schools in Ogun Central.

The result of the nearest neighbor analysis for the spatial distribution pattern of lower secondary schools in Ogun Central zone revealed a random pattern (see Fig 3). This pattern implies that the lower secondary schools in the zone are located far from one another, which by indication, for students to attend their schools, most of them need to cover long distances. This by implication contributes to tardiness (lateness) to school among the majority of the students. The random pattern of the schools' distribution is attributed to a lack of proper planning of the school locations by the education, administrative and planning body in the State.

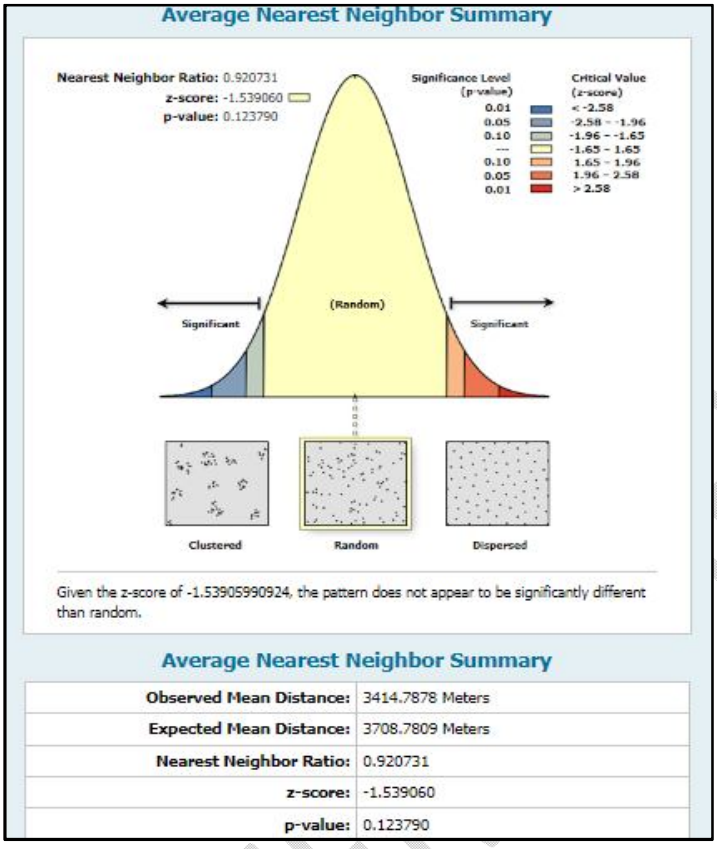


Fig. 3: NNA of Lower Secondary School in Ogun central

Spatial Distribution Pattern of lower secondary Schools According to LGAs

The nearest neighbor analysis for the spatialdistribution of lower secondary schools in the study areas revealed both clustered pattern and dispersed pattern.The spatialdistribution pattern of lower secondary schools in the following local governments Abeokuta south and Abeokuta north shows clustered pattern while Ifo, Ewekoro, Odeda, Obafemi Owode local governments exhibit dispersed spatial distributions of lower secondary schools respectively.

The clusteredpattern of distribution observed in the study areashows that there is uneven distribution of lower secondary schools in both Abeokuta south (see Fig 9) and Abeokuta north (see Fig 10) local government areas which are located within theCapital city of Ogun state. The result of the analysis showed that all the lower secondary schools are clustered pattern asobserved in the two LGAs, thiscan be explained from the fact that the local governments are relatively urbanized. This finding is in agreement with earlier studies by UNESCO, (2005)which observed that the result of the Spatial analysis of primary schools showed that all the primary schools are clustered and there is no equal accessibility to primary schools in the area while random pattern in this analysis indicated disorderly and inefficient distribution of lower secondary school in the state.

The spatial distribution pattern of lower secondary schools in the following LGAs:Ifo (Fig 5), Obafemi Owode (Fig 6) Odeda (Fig 7), and Ewekoro (Fig 8) exhibited dispersed pattern spatial distribution. This implies that some areas or communities in these LGAs will face some form of deficiency in basic educational facilities, which in turn, would affect the academic performance of students and education standard in such areas. The dispersed pattern

of school distribution in the areas could be, perhaps, the population concentration and school siting were not put into consideration. Hence, the population and number of school distribution are in inequitable level. This study also conforms to the finding of Musa and Mohammed (2012), who observed inequality in the distribution of schools and low level of utilization by the residents, in the spatial distribution of secondary schools in Bida. This is in agreement with the findings of Mustapha et al. (2015) which discovered a random pattern in the spatial distribution of primary school that are not guided by population distribution of the community. The implication of these two patterns means that accessibility is poor in the study area. Students travel more than normal to overcome the function of distance. Though urban areas have high concentration of population than the rural hinterland in Ogun central area, the study shows higher numbers of Lower secondary schools in urban areas than the rural areas indicating that rural population have to cover more distance to access lower secondary school education, sometimes, more than 4 kilometers. Moreover, Duze (2010) examined the average distance travelled to school by students in primary and secondary schools in three states of Nigeria and its effect on attendance. Results revealed that majority of the students travelled up to five kilometerswhich had negative effects on their attendance.

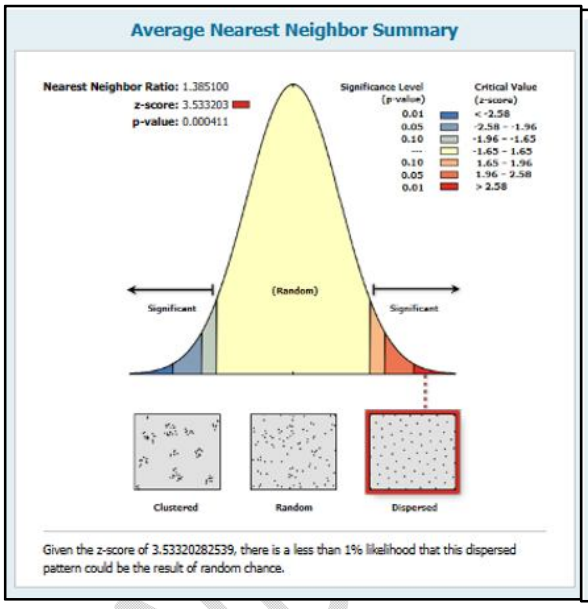


Fig. 4: NNA of School in Ifo LGA

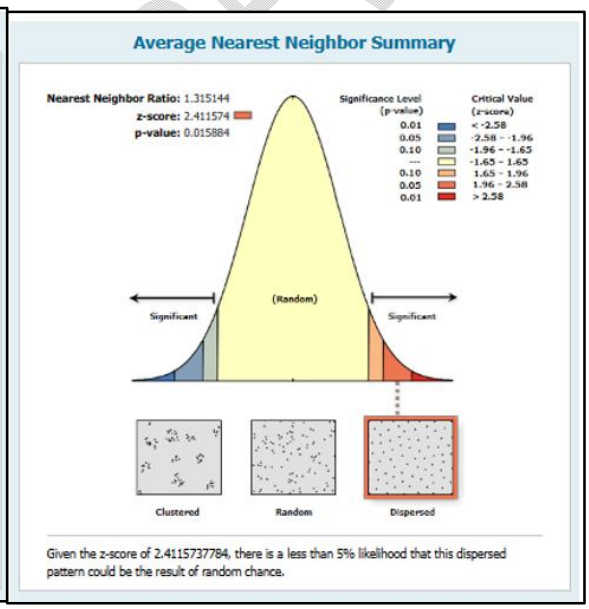
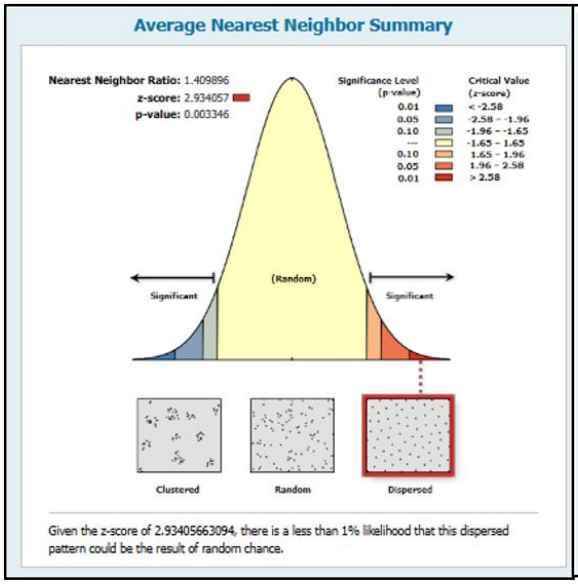


Fig. 5: NNA of School in Obafemi OwodeLGA



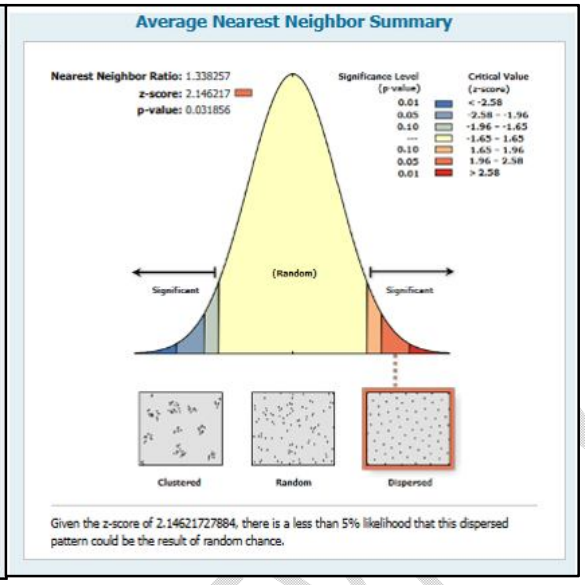
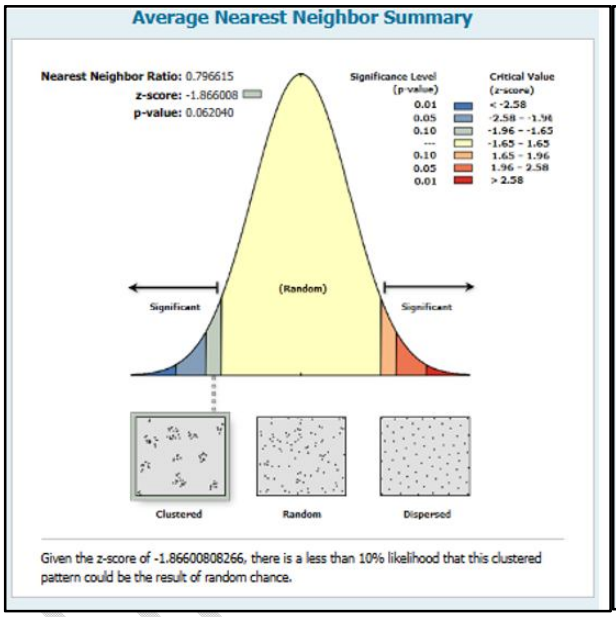


Fig. 6:NNA of School in Odeda LGAFig. 7:NNA of School in Ewekoro LGA



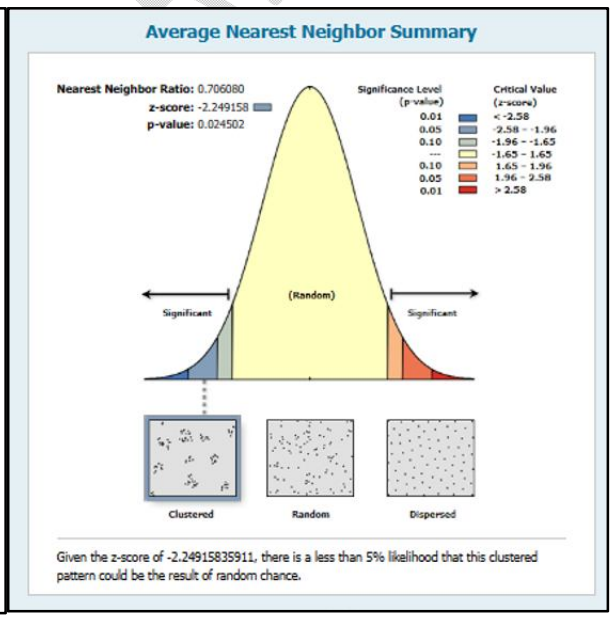


Fig. 8:NNA of School in Abeokuta South LGA **Figure 9:NNA of School in Abeokuta North LGA**

Lower Secondary School Students Enrolment in Ogun Central

Table: 2 Yearly enrolment distribution of students in public lower secondary school in the study area.

S/N	Names of Local Government	Number of Schools		Total Enrolment		
			2020	**2021**	**2022**	**2023**
1.	Ifo	23	23702	23226	22646	20782
2.	Abeokuta South	23	21201	20959	19058	23024
3.	Obafemi Owode	16	13924	13804	13415	12995
4.	Abeokuta North	16	25026	17421	17023	17523
5.	Odeda	14	6902	6816	5712	7774
6.	Ewekoro	11	8507	8232	8041	8087
	TOTAL	**103**	**99262**	**90458**	**85895**	**90185**

Students' EnrolmentTrend ofLower Secondary Education in Ogun Central Zone

This section involves the identification of the pattern of enrolment of the lower secondary schools in Ogun Central. The analysis of the annual trend of enrolment of the schools was looked at from two ways. Firstly, the general annual trend of school enrolments in Ogun central senatorial district is considered, and secondly, the annual trend of school enrolments based on LGAs. This was done in order to have an informed decision making that would bolsterschool planning in the zone. The analysis of the annual trend of enrolments of the schools was done to identify the changes in the students' enrolments, through which future predictioncan be made. The results of the study are presented and discussed accordingly in the following subheadings:

The result of the trend analysis of enrolments of schools in Ogun central zone from 2020 – 2023 reveals a negative trend. This implies a decreased in students' enrolment with increase in a year. The four years (2020 – 2023) annual trend or variability of enrolments in the zone is represented by the negative line $y = -3180.3x + 99400$, which shows a slight decrease in the number of enrolments in recent years compared to the earlier years.This result suggests that the number of enrolments in the zone would gradually keep decreasing as time goes on. Factors such as shortage of teachers, shortage of classrooms, COVID- 19, insufficient infrastructural facilities, fuel subsidy removal and migration of students from rural school could be responsible for the negative enrolment trend.

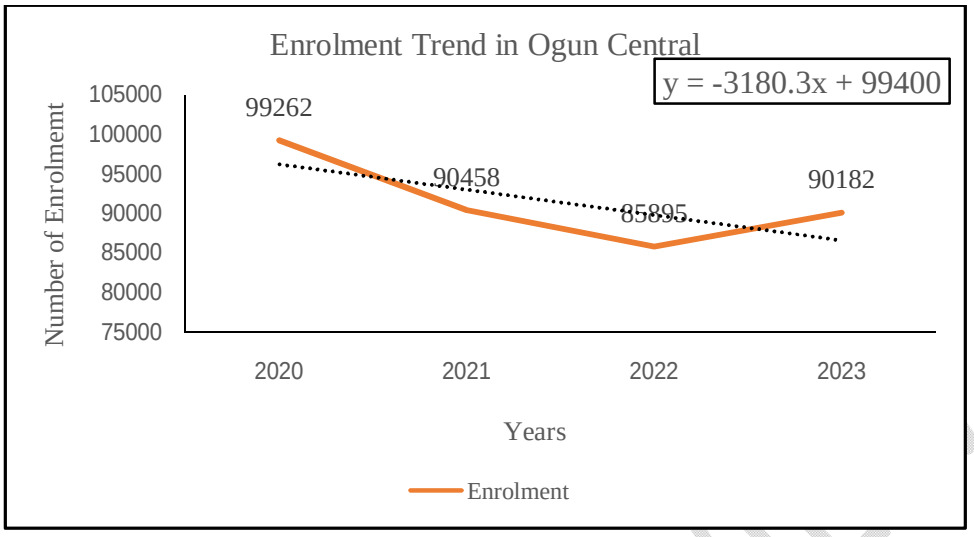


Figure10: Lower Secondary Education enrolment trend in Ogun central zone

Students' EnrolmentTrend of Lower Secondary Schoolin Ifo LGA

The result of Students' enrolments in Ifo LGA was analyzed and presented in Fig 11 and discussed accordingly.

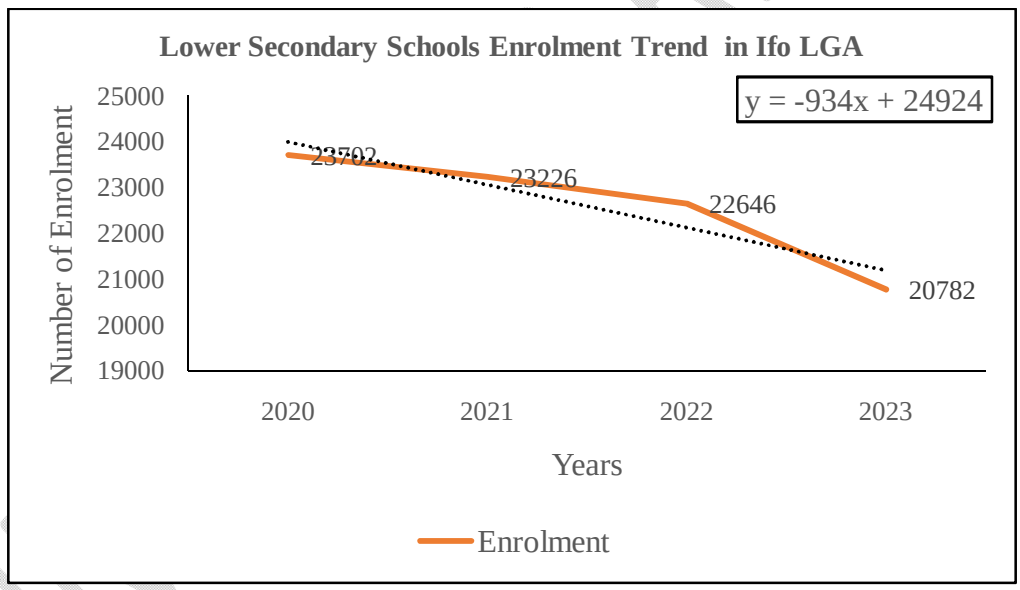


Figure11: Lower Secondary Education enrolment trend in Ifo LGA

In Ifo LGA, the students' enrolment trend reveals a negative result, which indicates the enrolment in the area is decreasing as the year increases. The four years (2020 – 2023) annual trend or variability of enrolments in the local government is represented by the negative line y = -934x + 24924, which shows a slight decrease in the number of enrolments in recent years compared to the earlier years.This result indicates that the number of students enrolling in schools would gradually be decreasing as time goes on if actions are not taken. Factors such as shortage of teachers, shortage of classrooms, COVID- 19, insufficient infrastructural facilities, fuel subsidy removal and migration of students from rural schooli.e Ifo Local Government, Ogun State to urban school in Ojodu Berger, Lagos is responsible for the decrease in the number of schools enrolment in the local government.

Students' EnrolmentTrend of Lower Secondary School in Abeokuta South LGA

The result of the students' enrolment in Abeokuta South LGA is presented in Fig 12 and discussed accordingly.

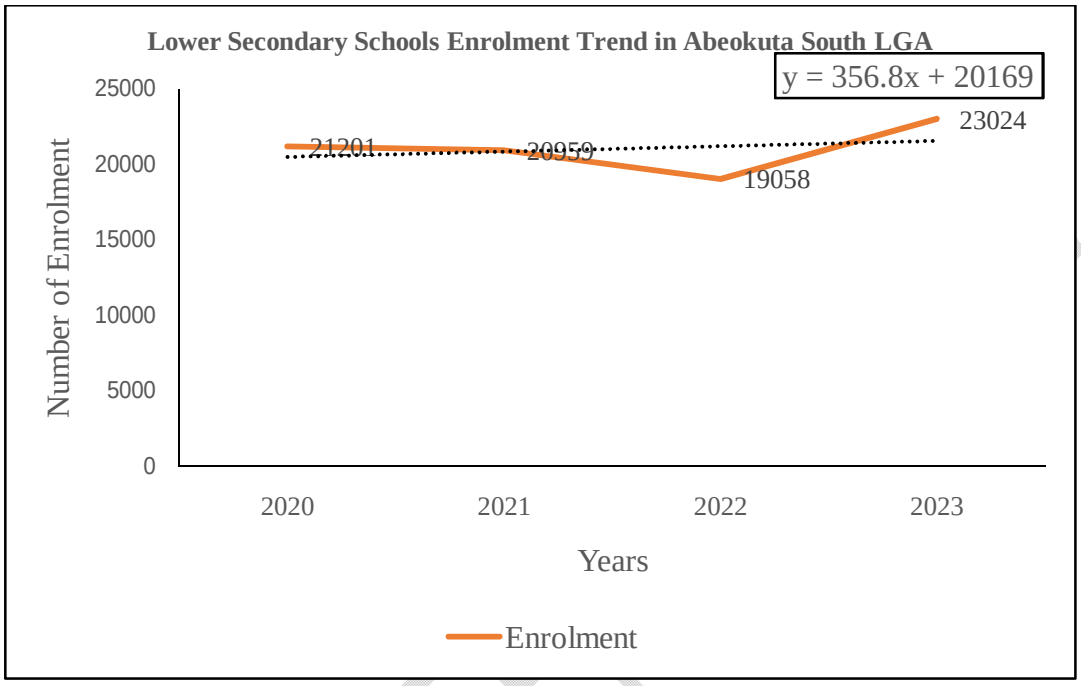


Figure12: Lower SecondaryEducationenrolmenttrend in Abeokuta South LGA

The result presented in Fig 12 reveals that there is a positive (or upward) students' enrolment trend in Abeokuta South LGA. The positive trend line y = 356.8x + 20169 indicates an increase in the annual enrolment in recent years in the area. This result suggests that the local government area will continue to experienceincrease in number of students enrolling in schools. This result, perhaps is attributed to the location of the LGA within the State Capital, which attracts people because of urbanization and other opportunities. The increase in the enrolment in the LGA is also attributed to factors such as large number of classrooms, adequate teaching staffs, parental educational qualifications, and academic standard.

Students' EnrolmentTrend of Lower Secondary School in Obafemi Owode LGA

The result of the students 'enrolment in Obafemi Owode LGA is presented in Fig 13 and discussed accordingly for better comprehension.

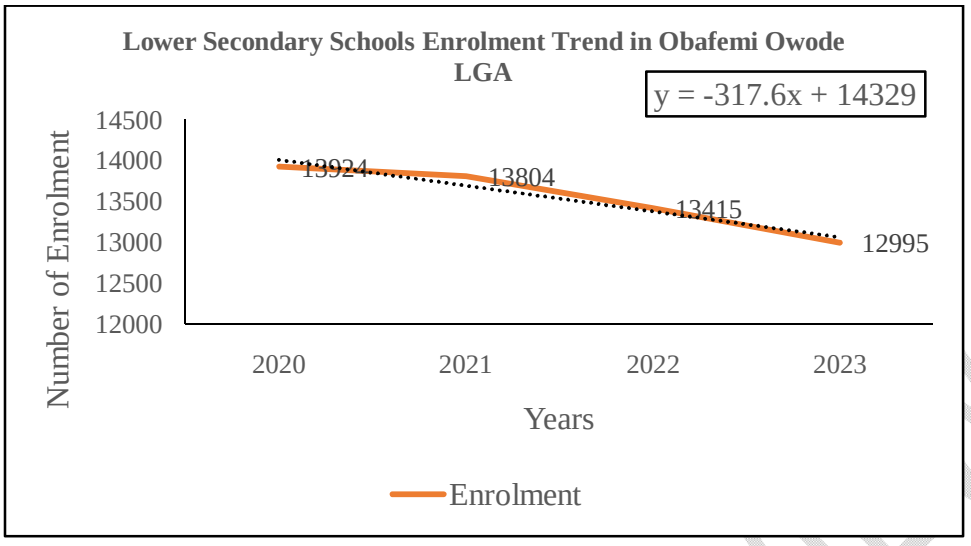


Figure13: Lower Secondary Education enrolment trend in Obafemi Owode LGA

From Fig 13, it was observed that there is a negative (or decrease) enrolment trend in Obafemi Owode LGA. There was a continuous decrease in the number of enrolments in the area from 2020 – 2023. Factors such asfuel subsidy removal,unqualified teachers, and poor school planning, uneven distribution of educational resourcesare responsible for the continuous decrease in the enrolment of students in the area. Therefore, strategic actions such as recruitment of teachers, proper school planning should be carried out to establish distribution of lower secondary schools and construction of new schools,else, education in the area would be diminished with time in the area.

Students' EnrolmentTrend of Lower Secondary Educationin Abeokuta North LGA

Similarly, the result of the students 'enrolment in Abeokuta North LGA, is presented in Fig 14 and discussed accordingly.

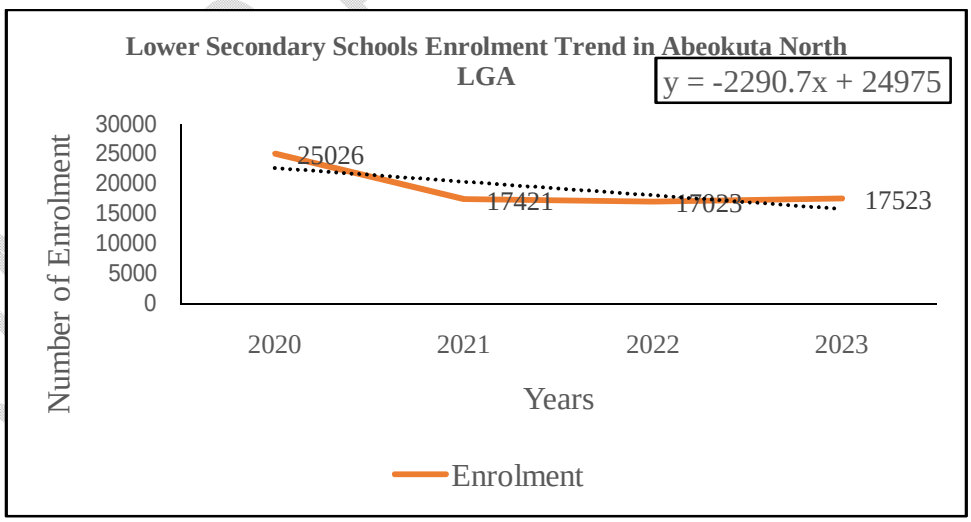


Figure14: Lower secondary Education enrolment trend in Abeokuta North LGA

The result presented in Fig 14 reveals a decrease in annual enrolments in Abeokuta North LGA as year increases. The four years (2020 – 2023) annual trend or variability of enrolments in the LGA is represented by the negative line y = -2290.7x + 24975, which suggest a continuous decrease in the number of enrolments. This result implies

that the number of enrolments in the area would gradually continue to decrease as time goes on if actions are not taken to bolster education. Factors such as parental socio economic, lack of qualified teachers, uneven distribution of lower secondary schools and lack of educational facilities are responsible for the decrease in the number of schools enrolment in the local government.

Students' EnrolmentTrend of Lower Secondary Educationin Odeda LGA

A negative annual enrolment trend was also observed in Odeda LGA. The result obtained is presented in Fig 15 and discussed accordingly.

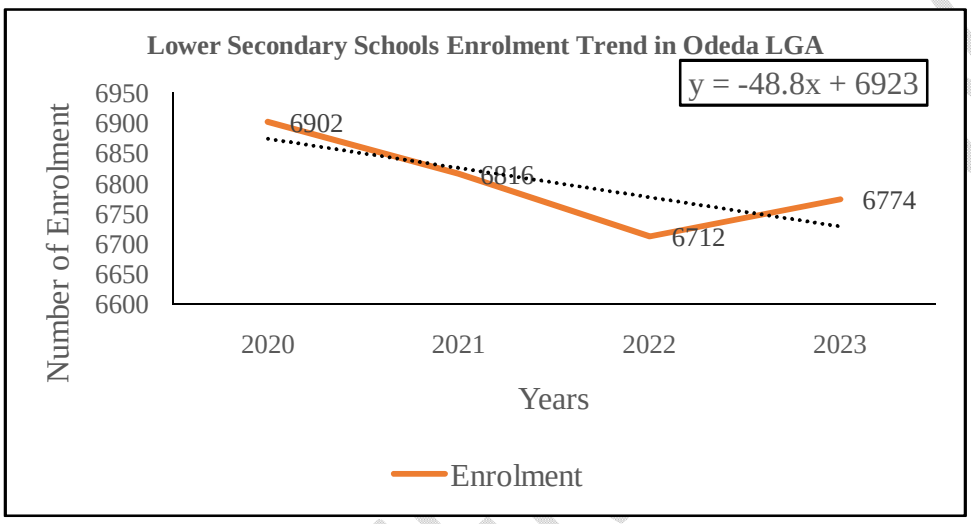


Fig 15: Lower Secondary Education enrolment trend in Odeda LGA

In Fig 15, the result shows a negative (or decrease) enrolment trend in Odeda LGA, which the trendline y = -48.8x + 6923 indicates a sharp decrease in the students' enrolment in the area from 2020 – 2022; with a slight increase in 2023. Factors such as COVID – 19 pandemics, inadequate classrooms, short supply of teachers, poor accessibility to education and poor academic performance of studentswere responsible for the sharp decrease in the enrolment of students in the area from 2020 - 2022. The recent (2023) enrolment tends to indicate an increase in future, with factors such as good accessibility to lower secondary education and good academic performance of students are responsible for the increase of the enrolments.

Students' EnrolmentTrend of Lower Secondary Education in Ewekoro LGA

The result obtained in Ewekoro LGA is presented in Fig 16 and discussed accordingly

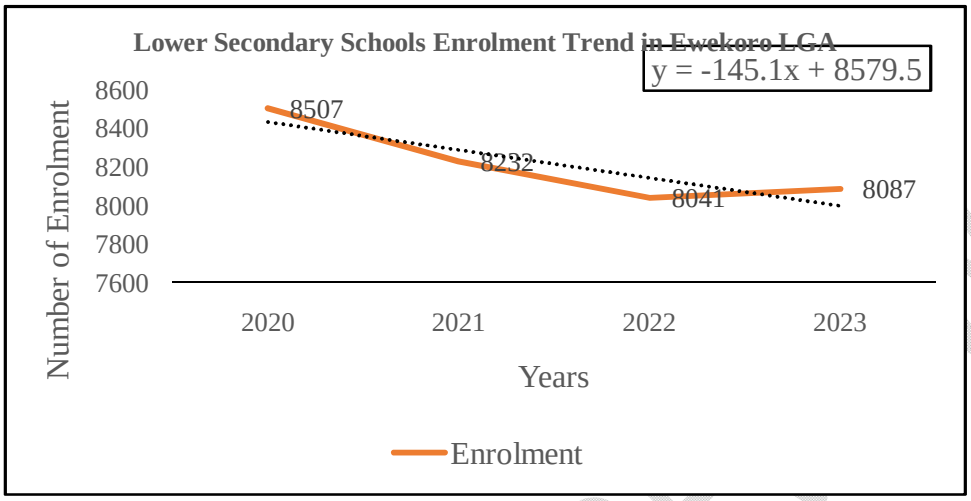


Figure16: Lower secondary education enrolment trend in Ewekoro LGA

The result shows a negative (or decrease) trend in the number of enrolments in in Ewekoro LGA, which the trend line y = -145.1x + 8579.5 indicates a sharp decrease in the enrolment from 2020 – 2022, there was an increase in 2023. Factors such as COVID – 19 pandemics and Lasa fever could be responsible for the gentle decrease in the enrolment of students in the area. The recent (2023) enrolment tends to indicate an increase in future.

Effects of Spatial Distribution of Schools on Lower Secondary School Student's Enrolment

The effects of the spatial distribution pattern of lower secondary school on student's enrolment in each Local government in Ogun central was discussed below:

The law of this nation has enforced the government to provide free and compulsory basic education for all the citizens'i.e. urban and rural community (FME, 1999). The basis for achieving this is not mere provision of educational facilities alone, but such facilities must be equitably distributed and be accessible in order to reach out to the hitherto neglected rural population. However, in terms of accessibility to lower secondary school in Ogun central, urban areas are more favored than rural areas. This biasness in the distribution of lower secondary school has led to decrease in school enrolment in these study area.

The implication of this is that education is limited to the sons and daughters of the rich, chiefs and kings. The sons and daughters of the poor parents were neglected. All these neglected children formed basic percentage of youth involved in criminal activities such as yahoo, cultism, kidnapping and Boko Haram. This finding is in agreement with Universal Basic Education Commission that revealed that Nigeria needs an additional 20,000 schools and 907,769 classrooms to be able to absorb the growing numbers of out-of-school children in the country, UBE September, 2023.

Conclusion

Spatial distribution of schools is a dependent of school planting, which include the physical aspects, distance from home to school, type of building, capacity of classrooms, number of teachers, students' enrolment, mode of transport, parental socioeconomic statuses, nature of development, that is rural or urban are very important to be analyzed. This is because they have great impacts on students' performances and achievements. In Ogun central, it was observed that the spatial distribution of the lower secondary schools is random; connoting the lower secondary schools in the zone are located far from one another, which by indication, for students to attend their schools, most of them need to cover long distances. This in turn contributes to tardiness (lateness) to school among the majority of the students. Students' annual enrolments trend in the lower secondary schools in the zone from 2020 – 2023 was observed to be negative. This implies a decreasing enrolment with increase in years, which suggests that the number of students' enrolments in the zone would gradually keep decreasing as time goes on.

Competing Interests Authors have declared that no competing interests exit

Availability of data and materials The data that support the findings of this study are not publicly available.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

Reference

Adebola OJ. Primary school teachers' knowledge of primary education objectives and pupils development. The African Symposium. 2011;1(11):4-11. *Document,* International Institute for Education Planning (UNESCO).

Duze, C. (2010). Average Distance Travelled to School by Primary and Secondary School Students in Nigeria and Its Effect on Attendance. African Research Review, 4, 378-388. https://doi.org/10.4314/afrrev.v4i4.69236

Fabiyi OO, Ogunyemi SA. (2015). Spatial distribution and accessibility to post primary educational institution in Ogun State, Southwestern Nigeria: Case study of Yewa South local government area, Nigeria. Journal of Scientific Research & Reports. 2015; 5(7):542-552.

Federal Ministry of Education (1999). Nigeria-UNESCO Collaboration in the Education Sector. Abuja.

Getachew, B. (2018). Factors Affecting Student's Academic Performance in Ahuntegen General Secondary School, North Wollo Zone, Ethiopia. Journal of Education and Learning, 12, 198-206. https://doi.org/10.11591/edulearn.v12i2.8404

Hite, J. S. (2008). *School Mapping and GIS in Educational Micro-Planning. Working*

Human Rights Watch (2016). The Education Deficit Failures to Protect and Fulfill the Right to Education in Global Development Agendas. https://www.hrw.org/sites/default/files/accessible_document/educationdeficit0616_accessible.pdf

Inobeme J, and Ayanwole A. K. (2009). An assessment of the spatial distribution of government secondary schools in Zaria area, Kaduna state. The Information Manager. 2009; 9:1.

Kufoniyi, O (1998). Basic Concept in Geographic Information System in Principle and Application of GIS (G.U Ezeigbo, edited) series of Geoinformatics of the Department of surveying at the University of Lagos.

Musa, H. D. and Mohammed, B. B. (2012) An Analysis of Spatial Distribution of Primary and Secondary Schools in Bida Town, Nigeria. Abuja Journal of Geography and Development, 3(2): 30-40.

Mustapha, O. O, Akintunde, O. S., Alaga, A. T., Sharafdeen, O. B., Sunday, K., IsaIbrahim, Hafeez, S. A., Muibi K. H. (2015). A Geospatial Approach to Evaluation of Accessibility to Government Primary Schools in Ilorin West Local Government Area, Kwara State, Nigeria. *European International Journal of Science and Technology, 4(8),* 96-107.

NCGIA, (1991). What is GIS: Definition of GIS. [Online] Available at http://www.geomaics/GIStheory.htm, [Accessed 4th Match, 2009]

Ogun State Education Hand Book(2007). Trends in Educational Development in Ogun State 229 - 233.

Owolabi J. Quantitative methods of educational planning Moboroda: Lucky Odoni Enterprises, Nigeria; 2006.

Saeed, K. A. (2003). Quality in Higher Education and Universities. In National Conference on Quality Assurance in Education in Pakistan. Pakistan Institute of Quality Control Lahore.

Taiwo, O. R. (2019). Impact of School Plants Planning on Primary School Pupils' Academic Performance. International Journal of Advanced Academic Research|Arts, Humanities and Education, 5, 83-90. https://www.ijaar.org/articles/Volume5-Number9/Arts-Humanities-Education/ijaar-ah e-v5n9-sep19-p30.pdf

Thomas, C. A. (2016). Going the Distance: How Distance to School Relates to Student Education Outcomes. Doctoral Dissertation, University of California. https://escholarship.org/uc/item/97f0n3mq

UNESCO, (2005) Education for All (EFA) Global Monitoring Report, UNESCO.

UNESCO. Paper Commissioned for the Education for all (EFA) Global Monitoring Report. Literacy for Life. 2006;5-15.

Universal Basic Education Act 2004

Universal Basic Education Commission *National Conference on Out-of-School Children in Nigeria, September 2023.*

World Bank (2002). Human development sector for African Region, Uganda Post Primary Education