A Spatial Framework for the Distribution of Public Primary Schools in Munya Local Government Area of Niger State, Nigeria

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Abstract

Education is the key to development in any society and it is true that the educational institutions in any given society reflect the standard of living and the attitudes towards life of that society. This study presents a spatial framework of public primary schools in Munya Local Government Area of Niger state with the specific objectives of identifying the various public primary schools in the study area, attempt a spatial mapping and distribution pattern of the schools; determine spatial equity and accessibility of pupils to the schools and finally to advance appropriate planning policy measures to resolve the identified problems. The main sources of data for the study are through the primary and secondary sources. The location quotient, distributional equity, Gini co – efficient and P – median techniques were used for data analysis. It is observed that primary school's provision has surpassed the maximum required in the area. It is therefore recommended that there should be be guided in the sitting of future schools, while maintenance of the existing ones should be pursued to sustain the likely future growth in school's enrolment. Furthermore, the establishment of future public schools should be based on threshold population in the study area.

Keywords: Infrastructural Investment, Community Facilities, Spatial Equity and Spatial Distribution

Introduction

Investment in community facilities is capital intensive; it requires huge capital outlay and the returns in the form of revenues are often not immediate in the short run. As a result, such facilities are normally provided by the government, indeed the social nature of the facilities implies that it should be the responsibility of the government to ensure every member of the society irrespective of social and economic status or place of residence has access to such facilities (Allen Consulting Group, 2003, Frischmann, 2007). Thus, central to the issue of provision of social facilities is that of the location and spatial distribution of such facilities. The effectiveness of any community facility, among which is education, depends on the location characteristics, as it affects the level of accessibility by the population being catered for. Education is basic to human welfare and is a fundamental necessity for any community; therefore, the education of a people has a direct correlation with the productive capacity and labour efficiency of that community (Olaniyan, and Okemakinde, 2008).

One of the main objectives for economic development planning in a country like Nigeria is to maximize the welfare of the people living in its various parts and therefore public services must be located in such a way that the total cost or effort of the people moving to the facilities is minimized

(Mabogunje, 1974). Efficient schools' locations will save children's time and also encourage parents to send their children to school.

Education, as clearly declared in the National Policy on Education, has been adopted as an instrument "par excellence" for effecting national development (Federal Republic of Nigeria, 1999). Therefore, education shall continue to be highly rated in development plans because it is the most important instrument of change, either intellectually or socially, in any society. According to Vagale (1970), Teboho (2000) and Human Development Reports (2009), primary education is essential for the economic progress and social development of any country. There will not be accelerated economic growth and social change in a developing country like Nigeria without a modern and progressive educational system that is capable of developing to the full human potentials of the community and eradicating illiteracy and ignorance, providing the trained and skilled manpower required by the changing socio-economic system.

The provision and distribution of educational facilities are areas that need the input of physical planning professionals at the various levels of government in the country. In addition, planning for the location and distribution of public primary schools must be made on viable catchment population and a convenient travelling distance for primary school children. Education has a strong influence on people's earning capacity and productivity (Peterson, and Arnn, 2005). Also, it determines employment prospects and fundamental to people's ability to enjoy and appreciate all aspects of life. Therefore, no person should be deprived of accessibility to essential social services or basic needs because of lack of finance or its geographical location (Okafor, 2008).

Education is the key to development in any society and it is true that the educational institution in any given society reflects the standard of living and the attitudes towards life of that society (Saqib et al, 2010). Furthermore, it has been estimated that the level of illiteracy in Nigeria is as high as 68% (Wang, 1995) and such high illiteracy level is occasioned by lack of access to primary education by children of primary school age in the rural country side. This is probably, is as a result of inadequate access to public primary schools in the urban and rural areas that has necessitated the general urge by private organization and individuals for the establishments of private primary schools nowadays. Consequently, the need to correct this ugly trend by observing the present spatial inequality in accessing public primary schools cannot be over emphasized.

The need to review the existing distribution pattern of public primary schools across the local government areas in the country is essential, by means of appropriate planning efforts and initiative for the overall sustainable development in the sector. The need to plan for the spatial location and distribution of public services and facilities in any community is an essential task for the planners and public policy makers. Till date, there has been inadequate source of reliable information on the spatial distribution of primary schools and facilities in the study area. It is on this basis that the study aimed at advancing a spatial framework for the distribution of public primary schools in Munya local government area of Niger state Nigeria. This is with a view to identifying, mapping and determining the spatial equity and accessibility in the distribution of public primary schools in the Local Government Area (L.G.A.). This, no doubt, will constitute a reliable data base for determining the spatial location and distribution of public primary schools in the L.G.A. and any other parts of the country. Indeed, the document will lend itself to policy (framework) formulation for spatial distribution and allocation of scarce resources (financial, social and human) to public primary schools and other related physical development in the area.

The study thus provoked a germane question: what significant role did population distribution play in the provision and distribution of public primary school in the study area? The question further prompted the following hypothesis:

There is no statistically significant relationship between population distribution and primary school provision in the study area.

Materials and Methods

Munya Local Government Area is one of the Gbayi speaking local government areas in Niger state, located to the North-Eastern part of the state with the headquarters at Sarki Pawa town. It is bordered in the north by Kaduna state, to the South by Paikoro Local Government Area and to the west by Shiroro Local Government Area respectively as indicated in figure 1.

Figure 1: Ward Map of Munya Local Government Area

Source: Local Government and Chieftaincy Affairs, Minna

The local government area has eleven (11) administrative wards: Dangunu, Kazari, Guni, Beni, Sarki Pawa, Dandauda, Kuchi, Kabula, Daza, Fuka and Gini. Munya Local Government Area has an estimated population of 130,021 in 2014 (National Population Commission 2014), with an estimated number of primary schools of 20,673 and primary school enrolment of 12,489 with 109 public primary schools. The people of the area depend mostly on agriculture for sustenance.

The data used for this study were obtained mainly from both primary and secondary sources. List of available primary schools was obtained from the State Universal Basic Education Board, Niger

State, verified from the Munya Local Education Authority (LEA) Office in Sarki Pawa. These schools were equally visited directly for on the spot survey on ward to ward basis, covering the eleven (11) wards in the local government area. This facilitated the picking of the coordinate numbers for geo-referencing and school-home distance measurement with the use of hand-held GPS. Other relevant information such as, student's enrolment and the number of teachers per school were obtained from the Local Education Authority (LEA).

To determine the degree of equity in Public schools' provision and distribution, an examination of the Location Quotient (LQ) values was done. This was conducted on ward basis and was done across the eleven (11) wards in Munya Local Government Area. Spearman's rank correlation coefficient was further employed to explain the association between population (x) and primary schools provision (y) within the local government area. On the other hand, the P-median, a quantitative technique was used for determining the best location for public facilities, following Saad, (2011) and Arifin, (2011). P-median analysis was based on the maximum distance of 1-kilometre service radius required for pupils to access primary school in the study area.

Results and Discussion

Distribution of public primary school in Munya Local Government Area: The distribution of public primary school in Munya Local Government Area is uneven (Figure 2). A breakdown of the distribution of these primary schools as shown in Table 1 indicated that there are one hundred and nine (109) public primary schools with 11(10.1%), 12(11.0%), 20(18.3%), 12(11.0%), 13(11.9%), 5(4.6%), 5(4.6%), 9(8.3), 7(6.4%), 6(5.55) and 9(8.3%) in Sarki Pawa, DanGunnu, Kuchi, Kanbula, Guni, Kanzai, Beni, Danzai, Fuka, Daudauda and Gini wards respectively.

Table 1: Distributional Equity of Public Primary School in Munya Local Government Area

Wards	Ward Population	Schools	Percent-age
Serkin Pawa	20,649	11	10.1
DanGunnu	11,229	12	11.0
Kuchi	12,579	20	18.3
Kanbula	11,039	12	11.0
Guni	1,1498	13	11.9
Kanzai	9,088	5	4.6
Beni	9,057	5	4.6
Danzai	11,130	9	8.3
Fuka	12,427	7	6.4
Daudauda	13,544	6	5.5
Gini	7,781	9	8.3
Total	130,021	109	100

Source: Authors Survey, 2014

Figure 2: Public Primary Schools Distribution in Munya L.G.A

Source: Local Government and Chieftaincy Affairs, Minna

Distributional Equity of Schools in the Local Government Area: The commonest measure of equity in the provision of public facilities is the equality among the various sub- units that constitute the study area (Ayeni et al 1986, Morenikeji 2006). In the case of public primary schools, an appropriate measure would be the number of schools-to-population ratios. There are 109 public primary schools in the local government area such that Sarki Pawa, DanGunnu, Kuchi, Kanbula, Guni, Kanzai, Beni, Danzai, Fuka, Dauda and Gini wards have public primary school to population ratio of 1:1877, 1: 942, 1:629, 1:918, 1:881, 1:1818, 1:1811, 1:1237, 1:1775, 1:2257, and 1:765 respectively. This is shown in Table 2.

Table 2: Distributional Equity of Public Primary School in Munya Local Government Area

Wards	Ward Population	Schools	Percent-age	Ratio
Serkin Pawa	20,649	11	10.1	1:1,877
DanGunnu	11,229	12	11.0	1:942
Kuchi	12,579	20	18.3	1:629
Kanbula	11,039	12	11.0	1:918
Guni	11,498	13	11.9	1:881
Kanzai	9,088	5	4.6	1:1,818
Beni	9,057	5	4.6	1:1,811
Danzai	11,130	9	8.3	1:1,237
Fuka	12,427	7	6.4	1:1,775
Dauda	13,544	6	5.5	1:2,257
Gini	7,781	9	8.3	1:765
Total	130,021	109	100	1:1,193

Source: Authors Survey, 2014

Determination of the Degree of Equity in Public Primary Schools Provision: The Gini-coefficient estimated for the 109 public primary schools in the eleven (11) wards is 41.3, with inequality value of 20.7 in the local government area. This value of Gini-coefficient shows a fair distribution of public primary schools in the local government area. This value is reasonable since it falls within the range of Gini-coefficient value of 0 - 100. From the values calculated in Table 3, it can, however, be seen that, six (6) wards Sarki Pawa (11),Kanzai (5), Beni (5), Danzai (9), Fuka (7) and Daudaudu (6) in the local government area are under served with public primary schools. On the other hand, Five (5) wards of DanGunnu, Kuchi, Kanbula, Guni and Gini are over serviced with 12, 20 , 12, 13 and 9 public primary schools respectively instead of 9.5, 10.5, 9.2, 9.6, and 6.5 schools each if population was the parameter considered in the distribution of schools among communities.

Determination of the Degree of Concentration of Schools in the L.G.A: An examination of the Location Quotient (LQ) values estimated for the wards in Munya Local Government Area as indicated in Table 4, shows that five (5) wards of Sarki Pawa, Kanzai, Beni, Fuka and Daudaudu with 0.6, 0.7, 0.7, 0.7 and 0.5 Location Quotient (LQ) values respectively have less than fair share

Table 3: Gini – Co Efficient of Public Primary Schools in the 11 wards of Munya L.G.A

Wards	Population(X)	Schools(Y)	Y%	Expected YA	Y-YA	Pop %
Serkin Pawa	20,649	11	10.1	17.3	6.3	15.9
DanGunnu	11,229	12	11.0	9.5	2.5	8.7
Kuchi	12,579	20	18.3	10.5	9.5	9.6
Kanbula	11,039	12	11.0	9.2	2.8	8.4
Guni	11,498	13	11.9	9.6	3.4	8.8
Kanzai	9,088	5	4.6	7.6	2.6	7.0
Beni	9,057	5	4.6	7.6	2.6	7.0
Danzai	11,130	9	8.3	9.3	0.3	8.6
Fuka	12,427	7	6.4	10.4	3.4	9.6
Daudaudu	13,544	6	5.5	11.4	5.4	10.4
Gini	7,781	9	8.3	6.5	2.5	6.0
Total	130,021	109	100	109	41.3	100

Source: Authors' Analysis, 2014.

of public primary schools. On the other hand, the five (5) wards of DanGunnu, Kuchi, Kanbula, Guni and Gini have more than fair share of public schools with 12.7, 1.9, 1.3, 1.4 and 1.4 Location Quotient (LQ) values respectively and only Danzai has a fair share with 1.0 Location Quotient.

Table 4: Location Quotient of Population and Public Primary Schools Provision

Wards	Schools	Schools Enrolment	Population	Location Quotient/ Ratios	LQ
Serkin Pawa	11	1,372	20,649	0.10092/0.15881	0.6
DanGunnu	12	1,740	11,229	0.11009/0.00868	12.7
Kuchi	20	1,999	12,579	0.18349/0.09675	1.9
Kanbula	12	1,347	11,039	0.11009/0.08474	1.3
Guni	13	1,555	11,498	0.11927/0.08806	1.4
Kanzai	5	438	9,088	0.04587/0.06990	0.7
Beni	5	726	9,057	0.04587/0.06966	0.7
Danzai	9	987	11,130	0.08257/0.08560	1.0
Fuka	7	737	12,427	0.06422/0.09558	0.7

Dandaudu	6	814	13,544	0.05505/0.10417	0.5
Gini	9	774	7,781	0.08257/0.05984	1.4
Total	109	12,489	130,021		

Source: Authors' Analysis, 2014

Relationship between Population Distribution and Primary Schools Provision: This section examines the relationship between population and primary schools' provision in the study area. The result of the spearman's rank correlation co-efficient as shown in Table 5 indicates a positive rank correlation co-efficient (rs) of +0.34. This index portrays a poor positive relationship between population distribution and primary schools' provision in the area. In testing for the statistical significance of the rank correlation co-efficient value, the student t-test was used.

Table 5: The Values of t and p of Population and Schools Provision in Munya L.G.A

L.G.A.	Population /Schools	T	P value	Remark
Munya	Ho	1.08	0.007	Insignificant

@ 0.005

Source: Authors' Analysis, 2014

At a confidence level of 0.05% and degree of freedom at 9, the table value at 95%, with $p = 0.007 < 0.05$, the association is significant. Therefore, the Null hypothesis (Ho) which states there is no statistically significant relationship between population distribution and public primary schools is rejected and the alternative hypothesis (Hi), that there is statistically significant relationship between population distribution and public primary schools in Munya Local Government Area of Niger state is accepted.

Result of analysis of the Underprivileged Settlements in Schools Provision in the Study Area: It was found that some of the settlements in the study area, are without public primary schools Figure 3. Therefore, primary school children in such settlements, cover more than the required maximum of one Kilometre distance, to access schools in places farther away from their homes. As shown in Table 6, there are 41 and 7 settlements within and outside the buffer zones respectively.

Table 6: The Under Privileged Settlements in Munya L.G.A

L.G.A.	Population	Settlements	School	No. of Settlement	No. of Schools
		Within Buffer	Outside Buffer		
Munya	130,021	41	7	48	109

Source: Authors' Analysis, 2014

Figure 3: Schools buffering in Munya Local Government Area of Niger State
Source: Authors' Analysis, 2014.

Median Analysis of Schools Provision and Distribution in the Study Area: The estimated P-median is a quantitative technique for determining the best location for public facilities (Saad, 2011, Arifin, 2011). The P – median analysis was based on the maximum distance of 1-kilometre service radius required for pupils to access schools in the study area. The results are presented in Table 7 and depicted in Figure 4.

Table 7: Iterations for Public Primary Schools Provision in Munya L.G.A

Distribution and Distance					
No. of Schools	109	42	37	36	38
Average Distance	0.00Km	0.66Km	1.062Km	1.09Km	1.02Km

Source: Authors' Analysis, 2014.

Number of Settlements - 48, Number of Schools - 109

The analysis shows that 38 primary schools are optimally needed to sustain an average of 1.02 Km for primary school pupils to get to schools as indicated in Table 7.

Figure 4: Solution Map of Munya L.G.A

Figure 4 indicates the geographical locations where if the schools are sighted will optimally serve the respective population around it within the optimum travel time and distance. This actual location can easily be identified for future siting of public primary school in the respective location with the use of GPS to establish the geo-references (co-ordinates).

Conclusion

The study analysed the location and distribution of public primary schools in Munya Local Government Area and identified the associated defects observed in most of the wards under considerations. Considering the role of education in the total eradication of illiteracy and key to growth and development of a people, the study underscore the need to be adequately guided in the location of public primary school in Munya local government of Niger State, Nigeria (the solution Map, Figure 4 will be helpful), to close access gaps, while the existing schools are renovated to provide for decent learning environment. This will sustain the likely future growth in school's enrolment in the study area

It is further noted that future public schools establishment be related to the needs of the population as the of the analysis will assist us in Location Quotient (LQ) and Gini co efficient on population and schools provision indicated that most wards are either under - served or over - served with schools.

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