

SPATIAL ANALYSIS OF HEALTH CARE FACILITIES IN BABURA LOCAL GOVERNMENT AREA OF JIGAWA STATE, NIGERIA

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This paper examined the spatial distribution of health care facilities in Babura local government area of Jigawa state using GIS. Data obtained from primary and secondary sources: a GPS was used to collect the coordinates of each health care facility. Data from the Ministry of Health (Jigawa State) about the location, name and types of health care facilities in the study area included one general hospital; one model primary health center, fourteen primary health centers, one clinic, one dispensary and one health post. Population data was obtained from the National Population Commission (NPC, 2006). The analysis of nearest neighbouring data was done by using GIS analysis the extension of Arc GIS 10.1 in the spatial analyst tool and average nearest neighbour. The result shows that there is less than 1% (0.01 level of significance) likelihood that the spatial pattern of the distribution of health care facilities in Babura Local Government Area is dispersed and this could be as a result of random chance. This might be as the result of the fewer number of health facilities. The research recommends that government should locate health care services close to the people as possible as at a distance found to influence utilization.

Key Words: GIS, Health care services, Health care facilities, Babura.

INTRODUCTION

One of the commanded objectives of creating local government is to bring development nearer to the

populace. A vital aspect of development that the creation of local government was expected to offer,

is the health care service. In Nigeria, spatial considerations have usually been given insufficiently in provision of health care facilities for rural areas (Kamorudeen, 2013). The provision of effective rural health care services is necessity for the overall social and economic development of rural communities in particular and nation in general. There are many challenges faced by rural communities concerning health care access which include economic destabilization, shortages of medical personnel; as well as transportation and barriers to care (Isaac, 2011). Inadequate infrastructures led to serious impact on the wellbeing of rural inhabitants. It has led to increasing decline in productivity and efficiency of production. Similarly, inaccessibility of public infrastructures especially health care services is contributed by serious poverty in Nigeria more especially in rural areas (Ajala et al., 2005).

Location of health care facility influences utilization and also efficiency more when compared with influence of decision to seek and receive care (Adamu, 2007). There are several factors that influence the utilization of health facilities which include social and economic systems, cultural beliefs and practices, status of women, level of education, gender, socio demographic variables and also location of health facilities.

According to Ajaero and Madu (2008) the ease and comfort with which public can utilize health facilities are among the most important variables determining the benefits individual can obtain from these facilities. The most determining factor of the utilization of health care facilities is distance that the patients must travel in order to obtain treatment. This is more pronounced in rural areas of less developed countries where health facilities are low and majority of patients prefer alternative sources of medicine because they are cheaper and also very easy to access. The rate of distance in utilization levels varies according to the type of facility, socio-demographic variables and illness (Cheptum et. al., 2014).

There are three tiers of health services that Nigeria operates namely; Primary Health Services, Secondary Health Services and Tertiary Health Services. Primary Health Services are the basic services which fall under the jurisdiction of local government councils such as dispensaries, clinics, health centers, health post and comprehensive health centers. On the other hand, Secondary

Health Service is a complex healthcare system that handles referral cases from Primary Health Service and includes general hospitals, specialist hospitals and cottage hospitals. This tier of health services is usually under the jurisdiction of State government. The third tier is Tertiary health services which are supervised by federal government of Nigeria dealing with more difficult and complicated health problems particularly specialized and referral cases from the secondary tier. Such health services include Teaching Hospital and Federal Medical Centre.

Study Area

The geographical location of the Local Government Area is approximately $12^{\circ} 10'$ to $12^{\circ} 14'$ N latitude and $8^{\circ} 30'$ to $9^{\circ} 5'$ E longitudes It is bordered by Sule Tankarkar to the east, Garki to the south east, Danbatta (Kano State) to the south, Kazaure to the west and Baure (Katsina) to the north (JSMOH, 2010). It has an area of about 1037 square kilometers with a total population of 212, 955 people (NPC, 2006). Babura has 11 wards namely; Babura, Batali, Dorawa, Garu, Gaskoli, Insharuwa, Jigawa, Kanya, Kuzumzumi, Kyambo and Takwasa.

Study Methods

The first step in conducting this study involves collecting information from records in government files from Babura Primary Health Care Department in Babura Local Government in order to identify all the settlements with health care centers in the study area. Study visit conducted in all wards in the study area to find out the availability or otherwise of the health care center so that no settlement with health care center is excluded.

The second step involves taking coordinates (Latitude and Longitude) of the various health care centers using Global Positioning System (GPS) that enable mapping. Some vital information such as year of establishment, type, status, type of services provided, and number of personnel and qualifications of health facilities in the study area were collected. The third involves collection of data from the attendance register of facilities in the study area.

The fourth step involves collecting population data of Babura Local Government and various wards in Babura from National Population Commission.

Table 1: Geo-Database

S/NO	Name of Health Facility	Ward	Latitude	Longitude
1	Babura General Hospital	Babura	12.78000	9.01563
2	Jarmai Primary Health Centre	Babura	12.75251	9.08276
3	Albha Clinic	Babura	12.77001	9.00579
4	Batai Primary Health Centre	Batali	12.63719	8.75568
5	Dorawa Primary Health Centre	Dorawa	12.51712	8.82989
6	Garu Primary Health Centre	Garu	12.57844	8.74177
7	Gaskoli Dispensary	Gaskoli	12.46888	8.70984
8	T/Dankyambo Primary Health Centre	Gaskoli	12.50411	8.78583
9	Insharuwa Primary Health Centre	Insharuwa	12.71786	8.95765
10	Jigawa Model Primary Health Centre	Jigawa	12.64548	8.97125
11	Gurfai Health Post	Jigawa	12.67699	8.98193
12	Kanya Primary Health Centre	Kanya	12.44192	8.84949
13	Kuzumzumi Primary Health Centre	Kuzumzumi	12.59000	8.66252
14	Kyambo Primary Health Centre	Kyambo	12.49907	8.73817
15	Danhalili Primary Health Centre	Kambo	12.48925	8.75990
16	Dozau Primary Health Centre	Kyambo	12.47571	8.77230
17	Lamintani Primary Health Centre	Kyambo	12.44221	8.70841
18	Takwasa Primary Health Centre	Takwasa	12.55708	8.89590
19	Masko Primary Health Centre	Takwasa	12.63045	8.86293

Source: Fieldwork, 2016

RESULTS AND DISCUSSION

Spatial Distribution of Health Facilities in Babura L.G.A

The study of the distribution of health care facilities is important as it enable us to establish a pattern to show the distribution of health facilities in the study area.

From Table 1 it gives the Geo-database of the health care facilities in Babura L.G.A Jigawa State. Table 1 shows the name, ward and location of all the health facilities in Babura Local Government Area of Jigawa State. It can be seen that all the wards have one or more health facility (ies) and Kyambo ward has the highest number of health facilities four which all of them are primary health care. Babura ward has three health care facilities. One is General hospital, one is private clinic and the other one is primary health care. Jigawa, Gaskoli and Takwasa wards have two facilities each and remaining wards of Kanya, Batali, Garu, Kuzumzumi, Insharuwa and Dorawa have one facility each. The table shows that the Kyambo ward has the highest number of health facilities.

From Table 2 it can be seen that 18 out of the 19

Health facilities were owned by the Public and maintained and managed by the state government or the local government. While the remaining one is owned and maintained by private individual be it a personal or organizational. This shows that majority of the health facilities are public because majority of the people are in the rural areas cannot afford to pay fees for services in the Private clinics. This is in line with what Shamaki (2006) observed, that access to health facilities is centered on economic accessibility and pointed out that 25% of the population in extreme poverty lacks access to health services. Also health workers mostly if not living nearby usually, shun away from working in the rural areas. Furthermore, running a private clinic requires enormous sum of money and skill that might not be obtainable in the rural areas.

Table 3 gives the summary of the services rendered by each health facilities in the study area. All the health facilities offer Outpatient Services and Antenatal Services, 18 offer Routine Immunization Services, 17 offer Outreach Services, 7 offer Community Management of Acute Malnutrition (CMAM), 5 offer Tuberculosis and Leprosy Control Programme (TB and TB DOTS), 4 offer Family Planning and Inpatients Services 3 offer Laboratory Services, 2 offer Drug Revolving Fund and only 1 offer Health Information

Table 2. Distribution of Health Care Facility by Ownership.

S/NO	Name of Health Facility	Ward	Type of Facility by Ownership
1	Babura General Hospital	Babura	Public
2	Jarmai Primary Health Centre	Babura	Public
3	Albha Clinic	Babura	Private
4	Batali Primary Health Centre	Batali	Public
5	Dorawa Primary Health Centre	Dorawa	Public
6	Garu Primary Health Centre	Garu	Public
7	Gaskoli Dispensary	Gaskoli	Public
8	T/Dankyambo Primary Health Centre	Gaskoli	Public
9	Insharuwa Primary Health Centre	Insharuwa	Public
10	Jigawa Model Primary Health Centre	Jigawa	Public
11	Gurfai Health Post	Jigawa	Public
12	Kanya Primary Health Centre	Kanya	Public
13	Kuzumzumi Primary Health Centre	Kuzumzumi	Public
14	Kyambo Primary Health Centre	Kyambo	Public
15	Danhalili Primary Health Centre	Kyambo	Public
16	Dozau Primary Health Centre	Kyambo	Public
17	Lamintani Primary Health Centre	Kyambo	Public
18	Takwasa Primary Health Centre	Takwasa	Public
19	Masko Primary Health Centre	Takwasa	Public

Source: Fieldwork, 2016

Management System (HIMS), Integrated Monitoring and Childhood Illness (IMCI), Gynaecology and Obstetrics, Physiotherapy, Prevention of Mother to Child Transmission (PMTCT), Theatre, Ultrasound Scanning, X-Ray, Dental Clinic and Postal (DNC). Babura General Hospital offers the widest range of services followed by Jigawa Model Primary Health Centre. This has implication in terms of utilization since only Babura General Hospital offer various services where other health facilities do not offer such as Eye Clinic, Integrated Monitoring and Childhood Illness (IMCI), Pharmacy, Physiotherapy, Prevention of Mother to Child Transmission (PMTCT), Gynaecology and Obstetrics. Patients must opt for the use of the services which are not accessible to many patients, more especially those from dispersed settlements.

II. Spatial Pattern of the Health Facilities in Babura L.G.A of Jigawa State

It should be mentioned in that mere aggregating the raw data in the presented Tables and Figures 1, 2, 3 a&b, cannot adequately portray the degree of spatial pattern of the Health Facilities. However, Average Nearest neighbour of the Health Facilities

is computed for the LGA in ArcGIS 10.1 and the results are shows that;

Average Nearest Neighbour Summary

Observed Mean Distance: 0.049173

Expected Mean Distance: 0.038077

Nearest Neighbor Ratio: 1.291403

Z-score: 2.365167

P-value: 0.018022

The outcome of the spatial statistical analysis returned five values within the software interface: Observed Mean Distance, Expected Mean Distance, Nearest Neighbour Ratio, z-score and P-value respectively and then automatically calculated for the L.G.A the average nearest neighbour ratio by dividing the observed average distances by the expected average distances with expected average distances being based on a hypothetical random distribution with the same number of facilities covering the L.G.A.

Figure 3 show that there is less than 1% (0.01 level of significance) likelihood that the spatial pattern of the distribution of health care facilities in Babura Local Government Area is dispersed could be as a result of random chance. This might as the result of the fewer number of health facilities. Haruna (2015) use Near

Table 3. Distribution of Health Facilities by Type of Services Rendered.

S/NO	Name of Health Facility	Ward	Type of Services Rendered
1	Babura General Hospital	Babura	With the exception of Orthopaedic cases Babura General Hospital handles all kind of services.
2	Jarmai Primary Health Centre	Babura	Antenatal, Outpatient cases.
3	Albha Clinic	Babura	Antenatal, Outpatient and Inpatient.
4	Batali Primary Health Centre	Batai	Antenatal and Outpatient cases.
5	Dorawa Primary Health Centre	Dorawa	Antenatal and Outpatient cases.
6	Garu Primary Health Centre	Garu	Antenatal and Outpatient cases.
7	Gaskoli Dispensary	Gaskoli	Antenatal and Outpatient cases.
8	Tashar Dankyambo Primary Health Centre	Gaskoli	Antenatal and Outpatient cases.
9	Insharuwa Primary Health Centre	Insharuwa	Antenatal and Outpatient cases.
10	Jigawa Model Primary Health Centre	Jigawa	Antenatal, Outpatient and Inpatient.
11	Gurfai Health Post		Antenatal and Outpatient cases.
12	Kanya Primary Health Centre	Kanya	Antenatal, Outpatient and Inpatient.
13	Kuzumzumi Primary Health Centre	Kuzumzumi	Antenatal and Outpatient cases.
14	Kyambo Primary Health Centre	Kyambo	Antenatal and Outpatient cases.
15	Danhalili Primary Health Centre	Kyambo	Antenatal and Outpatient cases.
16	Dozau Primary Health Centre	Kyambo	Antenatal and Outpatient cases.
17	Lamintani Primary Health Centre	Kyambo	Antenatal and Outpatient cases.
18	Takwasa Primary Health Centre	Takwasa	Antenatal and Outpatient cases.
19	Masko Primary Health Centre	Takwasa	Antenatal and Outpatient cases.

Source: Fieldwork, 2016

Neighbour Analysis and finds that the spatial pattern of Kyambo and Gaskoli. This is in line with what Girma distribution of health facilities in Dekina L.G.A of Kogi (2011) observed in Jimma zone, Southwest Ethiopia State, Nigeria is clustered towards a particular section that those individuals located less than or equal to of Dekina L.G.A. This is in contrast with what is 10 km from nearest health centers or hospitals had obtainable in Babura L.G.A of Jigawa State. The reason 2.9 times higher chance of using health services as for this contrast might be because in Dekina L.G.A those residing 10 km away. This corroborates with politicians worry about the number of health care what Le Seuer (1997) observed in South Africa that facilities available there by building more health 96% of the patients use the nearest clinic. facilities.

It is obvious from Figure 4 that the residents of Babura ward utilize the health facility more than people from all wards in all the year, and this is because the facility is located in Babura ward. Also the utilization of the neighboring wards such as Insharuwa, Garu, Jigawa, kuzumzumi, Batali, Takwasa, is higher than that in Dorawa. Kanya,

In the same figure also it is shown that accessing of Babura General Hospital varies among the neighboring local governments. The proximity of Babura General Hospital to the residents of Baure L.G.A in Katsina State is a factor that accounts high utilization. In addition to Baure Sule Tankarkar and Garki residents were also seen as patients at the hospital. This is in line with what Girma (2011)

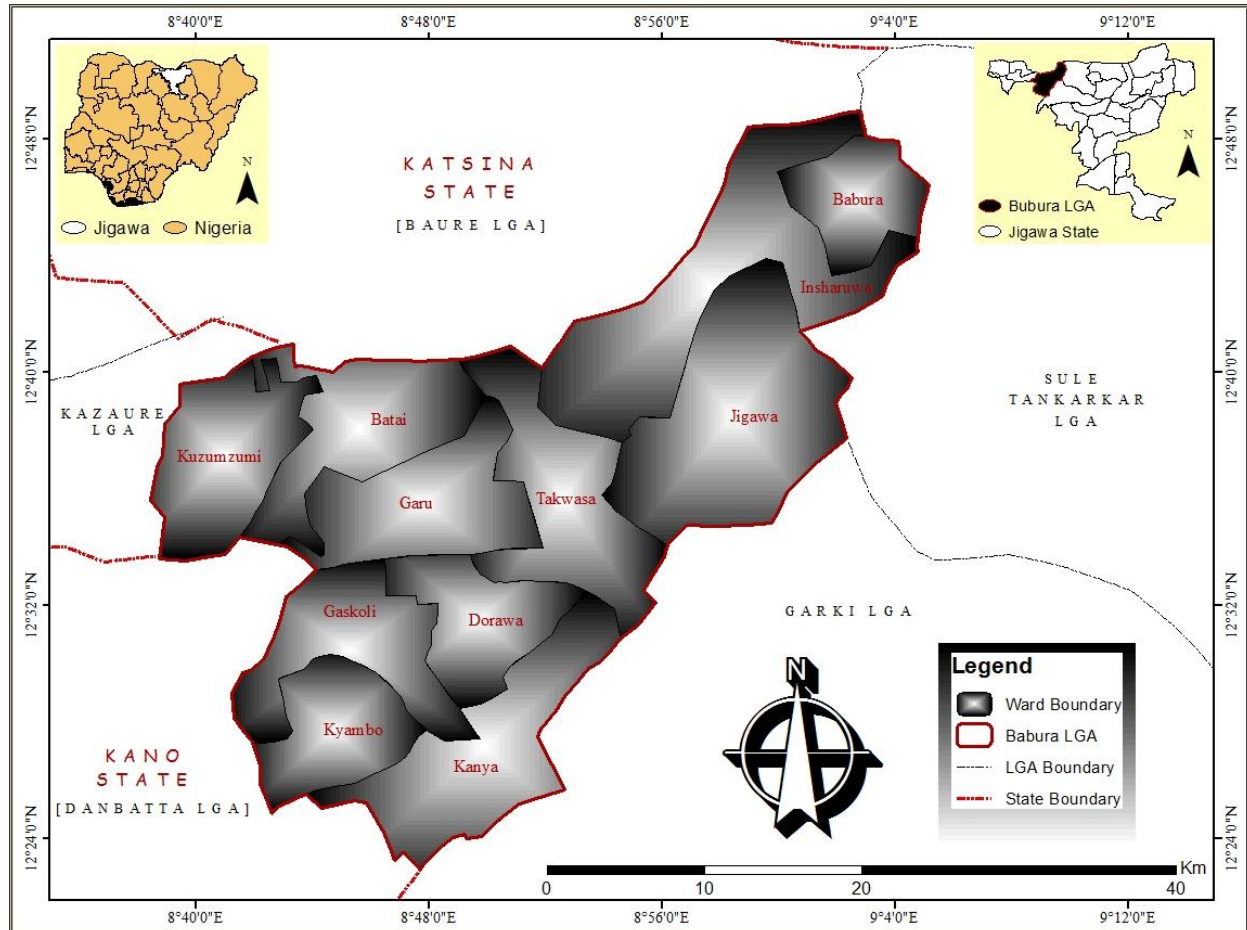


Figure 1. The Study Area

Source: Modified from Administrative Map of Jigawa State.

observed in Jimma zone Southwest Ethiopia that those individuals located less than or equal to 10 km from nearest health centers or hospitals had 2.9 times higher chance of using health services as those residing 10 km away. This is also in line with what Le Seuer (1997) observed in South Africa that 96% of the patients use the nearest clinic.

CONCLUSION

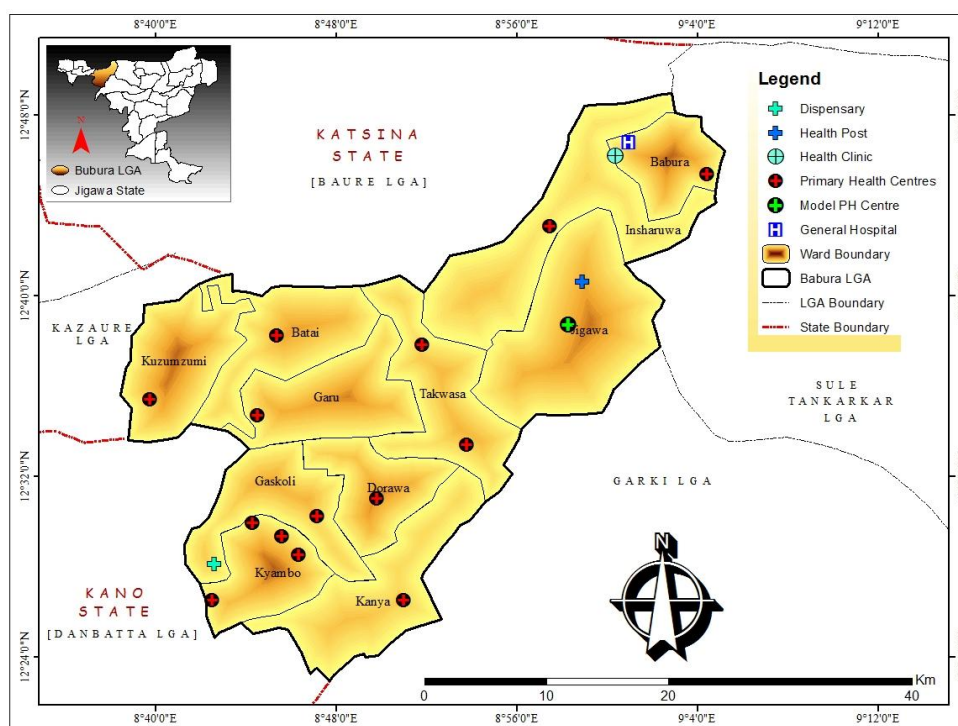
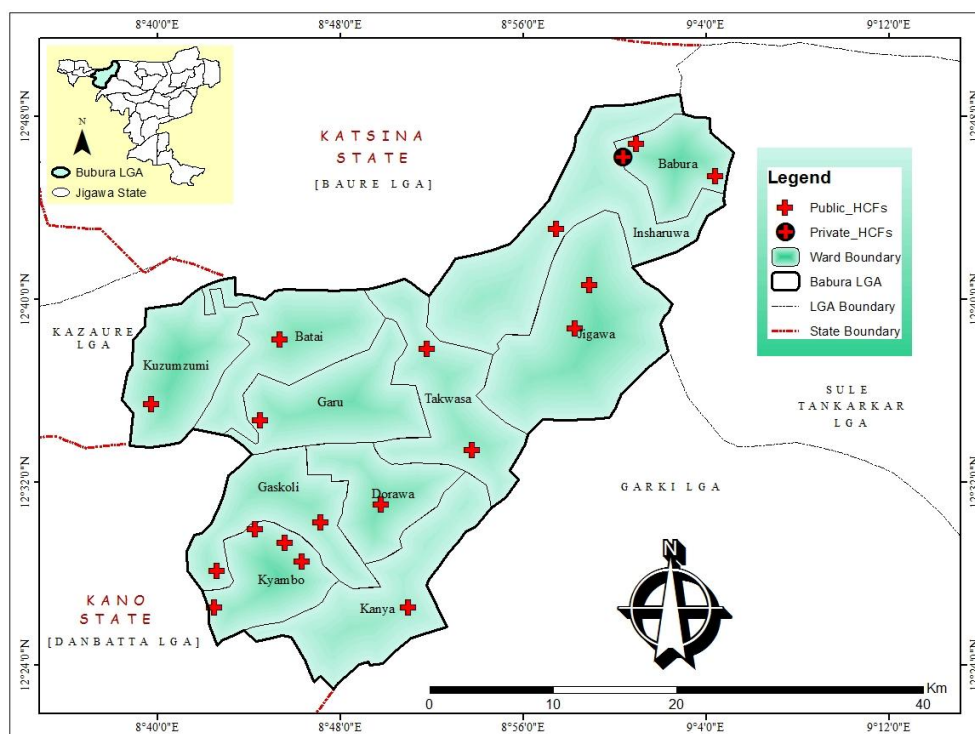
This research examined the spatial distribution of health care facilities in Babura Local Government Area. The spatial pattern of the distribution of health care facilities in Babura Local Government Area is dispersed and this could be as a result of random chance. This might be as the result of the fewer number of health facilities. There is less fairness in spatial distribution of health care facilities each ward

out of 11 wards has at least one health facility and a maximum of 4. There are a total of 19 health facilities: 18 are public health facility and only one is private clinic.

RECOMMENDATIONS

The following recommendations are made:

- i) In view of the delays experienced in the health facilities which could be due to inadequacy of physicians, government should focus its attention on recruitment and re-training of medical staff so as to reduce the wide ratio that already exist between the population and health care personnel. This will reduce waiting time and enhance attention to patient by medical personnel.
- ii) There is the need for government to provide



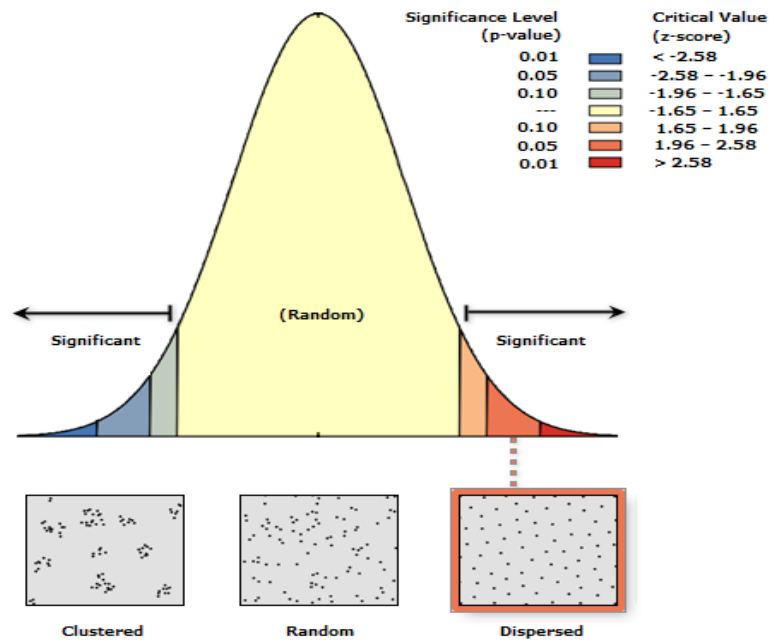


Figure 3b: Average-Nearest Neighbour Summary of Babura L.G.A
Source: Field work, 2016

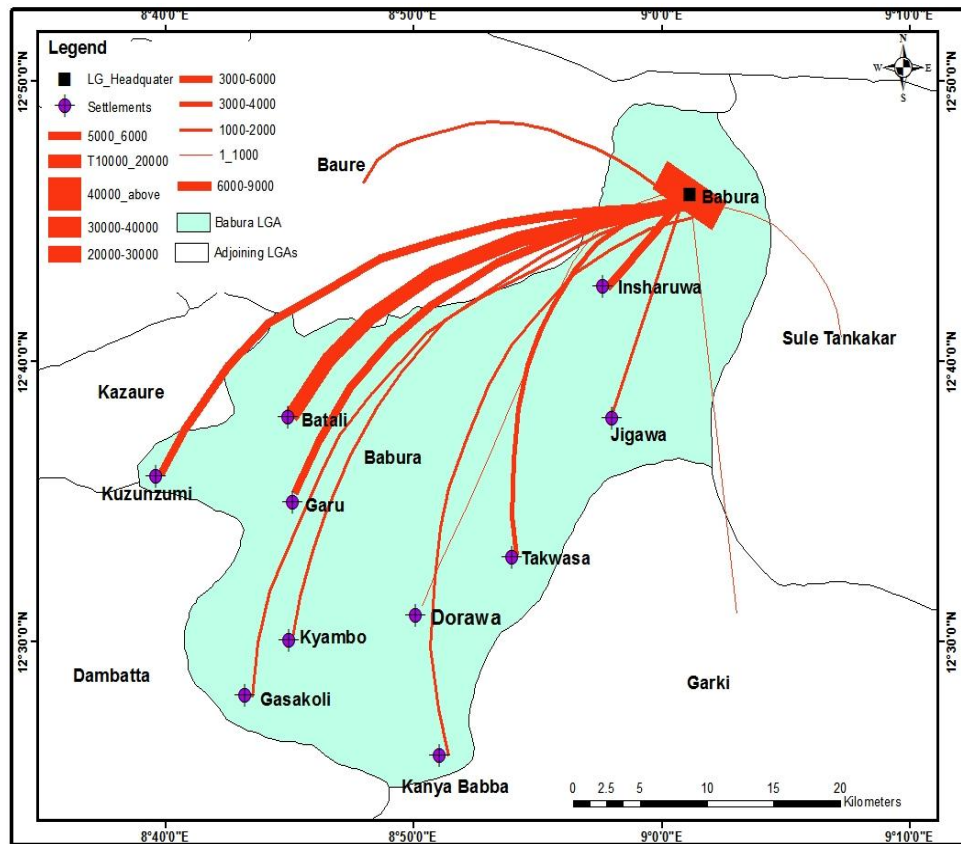


Figure 4: Flow Chart of People Utilizing Babura General Hospital from 11 Wards of the L.G.A and Neighbouring L.G.A.

good transportation network and ambulances in the all health facilities so that people who are in emergency situations will make a call to the personnel in charge to take them to the health facilities. This will reduce delay and also will help people more especially those in the dispersed settlements to utilize the health care facilities.

- iii) There is need to improve the welfare of clinical staff by providing basic social amenities to serve as motivation in the rural areas so as to reduce the concentration of medical personnel in the administrative capital.
- iv) There is need to educate populace about the importance of health and appropriate services.
- v) Enforcing standard and protocols for service delivery, management and supervision, using them to monitor and evaluate the quality of service along with feedback from patients and health providers.

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