

Population Analysis of Spatial Distribution of Health Care Facilities in Akko Local Government Area, Gombe State, Nigeria

Umar Yusuf Abdullahi, Adam Modu Abbas, Abubakar Abdullahi and Ayuba Philip

Department of Geography,
Federal University Kashere, Gombe.

Abstract

The knowledge about location, concentration and distribution of resources using geospatial techniques has become an important and interesting area of study today; this is because of the increasing population growth and demand of resources among people especially in the rural areas. Hence, this research provides a spatial analysis of healthcare facilities in relation to population in Akko Local Government Area. The study investigates types, location and concentration of health care facilities in relation to population in Akko Local Government Area. Secondary source of data was used and Survey of all health care facilities was conducted. GPS and Google Earth Maps were used to get data in the field. Percentages, location quotient formula, and GIS were used to analyze data obtained from the field. Results inferred that, Pindiga Emirate Council is more favoured in allocation and distribution of health care facilities than Akko Emirate Council which is deficient in allocation and distribution of health care facilities while Gona Emirate council is lacking in secondary health care facilities and services in Akko L.G.A. Hence, this study recommends the provision of more primary health care facilities in Akko Emirate Council and secondary health care facility in Gona Emirate council, Political influences on allocation of resources should be minimized, Population experts should be considered in allocation of resources.

Keywords: Location, Concentration, Distribution, Population And Geospatial Techniques

INTRODUCTION

Public health and healthcare facilities are of important concern for emerging countries, especially Sub-Saharan Africa and access to the facilities is a significant factor that contributes to the health of the population. According to World Health Organization, (2018), stated that Africa has the lowest rate of Universal Health Care coverage than any part in the world as a result of poor infrastructure, human resources, medicine and lack of political will among others. Socio-economic development of a country or region is achieved through better, accessible and available health care services and facilities. This is because people do all types of activities that bring societal progress to a region if they are healthy and vice versa. Furthermore, one of the indices of measuring development according to the United Nations is people's longevity which is achieved through improved health care services and facilities. Thus, there is no doubt good health is a prerequisite for global livability of man and it is a critical component of societal needs. A need for equitable distribution of health facilities as a factor for sustaining the population in a region is therefore paramount (Oyinloye, 2014).

According to World Health Organization (WHO) (2018), health-care facilities are places that provide health care services such as hospitals, primary health-

care centres, clinics, outpatient care centres, isolation camps, burn patient units, feeding centres and other specialized care centres, such as birthing centres and psychiatric care centres (Medline Plus, 2018).

Traditionally, Geographers have been interested in the spatial aspects of phenomena, which include distribution questions (who get what, when and where). Geographic location is important in these matters because people live in places and this location is one of the determinants of access to essential goods and services in geographic space. Similarly, the spatial distribution of socio-economic facilities including health care facilities varies from one geographic location to another (Babatimehin, Ayanlade, Babatimehin and Yusuf, 2011).

Healthcare services and facilities need capacity building which involves promoting an environment that increases the potential of individuals, organisations and communities to receive and possess knowledge and skills as well as to become qualified in planning, developing, implementing and sustaining health-related activities according to changing or emerging needs, (Crisp, Swerissen and Duckett 2000 and Poole D. 1997). In other words Capacity Building in health is "the development of sustainable skills, organisational

structures, resources and commitment to health improvement in health and other sectors, to prolong and multiply health gains many times over, (European Portal for Action on Health Inequalities, 2019). Capacity Building is an important instrument in tackling social health inequities by enhancing the capacity of organisations at national, regional and local levels to address the social determinants of the health inequalities. The objective of capacity building is to develop competency among health professionals, and to install institutional measures, such as funding and policy, which are conducive to such efforts, (European Portal for Action on Health Inequalities, 2019). However, capacity building in developing countries especially in Nigeria is very poor, especially in allocation and distribution of healthcare facilities in relation to population, this lead to unequal distribution of health facilities in the region. For instance in Nigeria today, the unplanned and chaotic distribution of health facilities has been on the radar of national debates, therefore planning the location of health facilities as well as the travel distance to access health care services has been a major concern to urban planners over the years. Similarly, accessibility to health facilities for an individual in spatial perspective and the physical accessibility of a household member to health care facilities are of considerable importance, but it is however constrained by distance (Oyinloye, 2014).

The United Nations office in Nigeria identified "inadequate decentralization of services" among other problems as a major weakness that continues to affect health care delivery in Nigeria (WHO, CCS, 2008-2013). The report further stated that most of the health care services are accessed at secondary and tertiary level while ignoring the primary health care level and consequently limiting access by the rural population. World Health Organization (2019) recognizes three aspect of capacity building in health which includes: human resources, institutional and infrastructural capacity building. Hence this study focused on the infrastructural capacity building on health, because healthcare facilities are grossly in short supply in developing countries especially in rural areas.

STATEMENT OF RESEARCH PROBLEM

Stakeholders in the media and health industries have decried the poor state of health facilities in Gombe State. The stakeholders made this position known after rising from a five-day workshop on Investigative Journalism and evidence-based reporting on Maternal and Newborn Health (MNH). Participants lamented that poor healthcare delivery in the state has led to the alarming rise in maternal and infant mortality (Abare, 2017). In a communiqué issued at the end of the workshop, journalists decried the poor state of health facilities in Gombe State, while urging the state government to address the issue with a view to

reducing the high rate of maternal and newborn deaths (Abare, 2017). Hence, Akko Local Government Area is not exceptional from the above problems bedeviling the state. Various studies were conducted on the spatial analysis and utilization of health care facilities in various regions, both nationally and internationally, among which are:

Ni, Qian, Xi, and Wang, (2016), studied the Spatial Distribution Characteristics of Healthcare Facilities in Nanjing (China). Network Point Pattern Analysis and Correlation Analysis were used. The results of network K-function analysis show that private hospitals are more evenly distributed than public hospitals and pharmacy stores tend to cluster around hospitals along the road network. Oyinloye, (2014), examines the location of health facilities in Akure and their proximity to residential houses in the surrounding neighbourhood. The results revealed that most people especially the poor are significantly disadvantaged in access to basic health facilities. Babatimehin, Ayanlade, Babatimehin and Yusuf, (2011), Ujoh, Kwaghsende (2014) and Ngozi, Nwakeze and Kandala, (2011) conducted research in different states in Nigeria and the results show variation in the distribution of healthcare facilities, in which some parts are having more healthcare facilities than others. Abdullahi, Abdullahi, Abbas, Bibi and Adamu, (2019), which studies health care facilities and human resources concentration in Nigeria, and findings shows that there is high density of healthcare facilities in South Eastern Gombe State.

In view of the above problems and reviewed literatures; it is clear that, research of this kind is deficient in Akko L.G.A, because all the reviewed literatures were conducted in other places within and outside Nigeria but not in Akko L.G.A. It is also conspicuous that none of the above studies investigated healthcare facilities concentration in the three (3) districts in Akko L.G.A in relation to population using location quotient, and mapping out the absolute location of healthcare facilities. Hence, this study filled the research gap above which aimed to analyze distribution and concentration of healthcare facilities in relation to population in Akko L.G.A using Geographic Information System (G.I.S) and other instrument of measurement to identify the different types of health care facilities, their spatial distribution and location and to determine the degree of spatial concentration in the region. This research therefore is limited to healthcare physical structures only without considering other aspects of healthcare deliveries like human resources (doctors, nurses, medical lab technicians etc.) or institutional organization; this will give the researcher opportunity to have thorough investigation.

STUDY AREA

Akko Local Government Area has an area of 2,627 km² and lies between latitude 10° 17' 00" to 10° 28' 33" N and Longitude 10° 58' 00" to 10° 56' 67" E. Its Headquarters is in Kumo town, south of the state capital. The L.G.A is bounded by Gombe Local Government Area to the North, Billiri Local Government to the South, Bauchi State to the West and Yamaltu-deba to the East (Ministry of Land and Survey Gombe State, 2018).

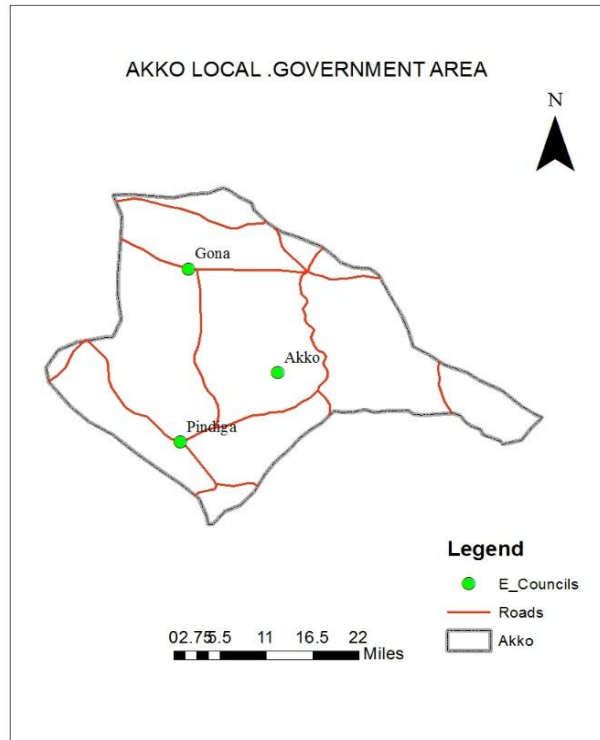


Figure 1: Akko Local Government Area
Source: Geographic Information System Laboratory, Federal University Kashere, 2018

According to the National Population Commission, (2006) Akko L.G.A had a population of 337,435. The L.G.A comprises three (3) Emirate Councils namely: Akko, Gona and Pindiga with a population of 136,683, 120,850 and 79,902 respectively. But according to population projection of 2018 at 3.3 annual growth rate the population of Akko L.G.A is approximately 501,394 while Akko, Gona and Pindiga having 203,097, 179,571 and 118,726 people respectively. There are numerous ethnic tribes in the region, the popular ones are Fulani, Kanuri, Hausa, Jukun, Tangale, Tera, Waja, Bolawa etc.

METHODOLOGY

This research consists of data from primary and secondary sources. The data are either spatial or non-spatial, the spatial data are in form of lines, points, and polygons while the non-spatial data are the attributes of the spatial data and data collected using field notebook.

The primary data include information collected from the field about the location of each health care facility using a Global Positioning System (G.P.S) instrument. While, the secondary data sources involve data collected from Gombe State Primary Healthcare Development Agency (GSPHDA), to obtain the various health care facilities in the area. The data consist the names and list of all existing healthcare facilities in each ward and their geographical references. However, to ascertain the absolute location of the facilities, ground-truthing was done. Map of the results were generated using ArcGIS 10.1 version to show the spatial location of each health care facilities. Descriptive statistics was used to show the number, frequency, and types of all existing health facilities within the study area. Location Quotient (L.Q) was also used to analyze data to find the concentration and spatial distribution of healthcare facilities in the area using the formula below:

Number of Commodity X in L.G.A (A) ÷ No of Commodity X in the

L.Q. (X, A) = State.

Population of Local Government (A) ÷ Population of the State

Where L.Q= the location quotient

(X, A) = Number of commodity X in local government A.

The above method assumes that the State exhibits, throughout its jurisdiction, at least an average representation in the facility concerned, and each local government area consumptions per capital approximates to the state's average. This study further adopted the LQ formula with little modification but having the same criteria and procedure by showing health care facilities concentration in the emirate councils in relation to Akko Local Government Area. Therefore, the formula used is presented as follow:

Number of Commodity X in Emirate Council (A) ÷ No of Commodity

L.Q. (X, A) = $\frac{\text{X in Akko L.G.A}}{\text{X in State}}$

The population of Emirate Council (A) ÷ Population of Akko L.G.A

Where L.Q (X, A) = the location quotient of commodity X in Emirate Council A. The following points below are use to interpret the results obtained from the L.Q computation:

- If $LQ > 1$, the results indicates high spatial concentrtrion of public healthcare facilities in a LGA compared to the average share of each LGA i.e. the facilities are more than sufficient enough to meet the local demand of the population.

- If $LQ = 1$, the healthcare facilities has a share of the total equal in accordance with it share of the base. Therefore, the facilities are equal to the demand of the population.
- If $LQ < 1$, the public healthcare facilities are less than share of the total than is generally found in the state, this means the healthcare facilities are not sufficient to meet the local demand of the population.

RESULT AND DISCUSSION

Types of Health Care Facilities in Akko Local Government Area

According to Gombe State Primary Healthcare Development Agency (GSPHCDA), (2018), Akko L.G.A has two types of health care facilities which are spatially distributed in the region namely: Primary Health Care and Secondary Health Care Facilities. Table 1 bellow shows the types of health care facilities in different emirate councils in the region.

Table 1 List of Primary and Secondary Healthcare Facilities in Akko Local Government Area

Types of Health Facilities	Gona Freq.	%	Akko Freq.	%	Pindiga Freq.	%	Akko L.G.A Freq.	%
Primary	24	36.4	15	22.7	27	40.9	66	100
Secondary	0	0	1	50	1	50	2	100
Both Primary & Secondary	24	35.3	16	23.5	28	41.2	68	100

Source: Gombe State Primary Healthcare Development Agency (GSPHCDA), (2018) Akko L.G.A Secretariat.

As shown in table 1 above, the study area has more of primary health care facilities than secondary facilities, this agreed with research conducted by Olusesan, Abayomi, Olayinka and David (2018), which showed that there are more primary health facilities in Nigeria than secondary and tertiary health facilities. Further results shows that there is sixty six (66) existing primary healthcare facilities across the three (3) Emirate Councils of the study area, with Pindiga having the highest number of primary health facilities in the region, followed by Akko having more than one third of the primary health care facilities in the study area and Gona emerged the emirate council with the lowest of just less than one fourth of the total primary health care facilities in Akko Local Government Area. Considering the above analysis one can see unequal allocation of primary health care facilities in the region, because if we relate the distribution of this health care facilities to the population of these emirate councils; Akko emirate council suppose to have high number of the facilities due to the fact that it has the highest

population followed by Gona and then Pindiga but this goes contrary.

Further results indicate equal allocation of secondary health care facilities in Akko and Pindiga Emirate Councils while Gona has no any secondary health care facility. Considering the population of Gona which is the second highest after Akko, there is a need for public secondary health care facility in the region. In general Pindiga having the lowest population in Akko L.G.A but has the highest health care facilities in the region.

Absolute Location of Health Care Facilities in Akko L.G.A

This research located the exact positions of all primary and secondary health care facilities in Akko Local Government Area by using point data and represents them in the map shown in figure 2 below.

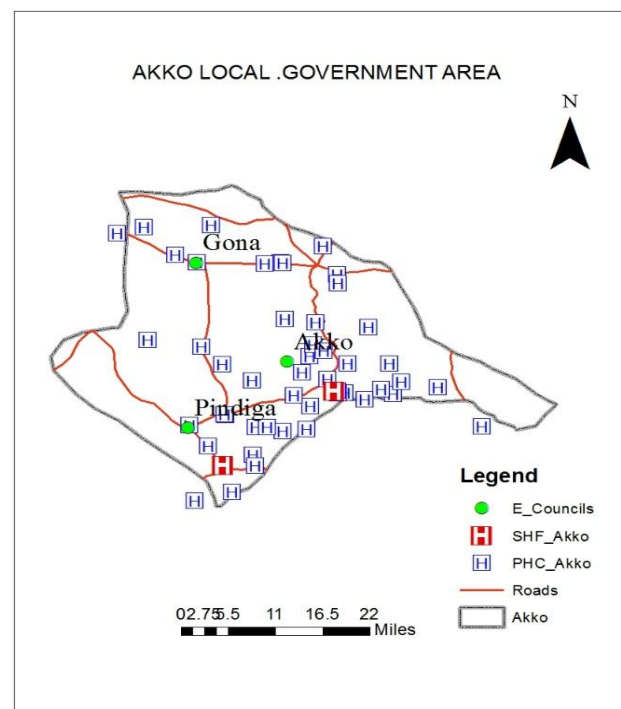


Figure 2: Absolute Location of Primary and Secondary Health Care Facilities in Akko L.G.A

Source: Geographic Information System Laboratory, Federal University Kashere, 2018.

Figure 2 shows relatively high density of healthcare facilities in the South Eastern part of the region while sparse population density of healthcare facilities is obvious in the North West and South Western part of the study area. This means that places in the South East have more healthcare facilities like Pindiga and Akko than in the other parts of the region like Gona. This is in concurrent with the research conducted by Abdullahi, Abdullahi, Abbas, Bibi and Adamu, (2019), that shows high density of healthcare facilities in South Eastern Gombe State.

Degree of Concentration of Health Care Facilities in Akko L.G.A

This section attempts to explain the degree of concentration of health care facilities in Akko Local

Government Area using the Location Quotient (L.Q) Formula.

Table 2 Health Care Facilities Concentration in Akko Local Government Area

Names of Emirate Councils/L.G.A	Healthcare Facilities	Primary Healthcare Facilities	Secondary Healthcare Facilities	Population Size	LQ of Primary Healthcare Facilities	LQ of Secondary Healthcare Facilities	LQ of Healthcare Facilities
Gona Emirate Council	24	24	0	179,571	1.0	0.00	1.0
Akko Emirate Council	16	15	1	203,097	0.5	1.3	0.5
Pindiga Emirate Council	28	27	1	118,726	2.0	2.5	1.0
Akko L.G.A	68	66	2	501,394	1.0	2.0	1.0

Source: Field Survey 2018.

Note: 2018 Projected Population of Gombe State is **3,514,213** using a base population of 2006 population census of **2,365,040** and growth rate of **3.3%**. Total health care facilities for the state is **636**, with primary having **624** and secondary having **12**.

The above results in table 2 inferred that Gona has a fair share of primary health care facilities but lacking in secondary health care facilities. In other words Gona has the normal distribution of primary health care facilities without over allocating or under allocating it to the region, this shows primary health facilities available in the region are equal to the demand of the population. Further results also shows general analysis of both primary and secondary health care facilities in Gona as having a fair share of health care facilities in relation to its population.

The results above shows that, Akko Emirate Council has less than fair share of primary health care facilities but more than a fair share distribution of secondary healthcare facilities in the region. In other words Akko Emirate Council is marginally disadvantaged in the location of the primary health care facilities; this means the primary healthcare facilities are not sufficient to meet the local demand of the population in the region but having secondary health care facilities that are more than enough to meet the local demand of the population. The general analysis of both primary and secondary health care facilities in Akko Emirate Council shows less than fair share of health care facilities in relation to its population. This means health care facilities in Akko Emirate Council are not sufficient to meet the demand of people in that area.

Further results in table 2 indicate more than a fair share distribution of both primary and secondary healthcare

facilities in Pindiga Emirate Council. In other words Pindiga is marginally advantage in the location of primary and secondary health care facilities; this means the primary and secondary health care facilities are more than enough to meet the local demand of the population in the region. But the total result in the area shows a fair share of health care facilities in relation to its population; meaning the health care facilities available in the region are equal to the demand of people.

With the above analysis it shows healthcare facilities are not equally distributed because Pindiga is more favored than Gona and Akko Emirate Councils in the allocation and distribution of primary and secondary health care facilities in Akko Local Government Area, this is in concurrent with the studies made by Nwakeze and Kandala, (2011); Ujoh, Kwaghsende (2014); and Babatimehin, Ayanlade, Babatimehin and Yusuf, (2011) which stated that, there are inequalities in health care provision across various regions relative to their population size. The overall result inferred that Akko Local Government Area has a fair share distribution and allocation of health care facilities in relation to its population i.e. the health care facilities are equal to the demand of the people of that area, only that they are more skewed to one region (Pindiga) despite its low population.

CONCLUSION

The knowledge of population growth and development in relation to resource allocation is very vital in the effective development planning because this will guide the allocation of resources without under allocating or over allocating it in a region. Government at all levels has an obligation to meet the welfare of its citizens more especially in the capacity building of health care

delivery. The provision of healthcare facilities in areas where they are lacking or inadequate is paramount to any responsible government. This will improve the health of citizens and reduce unnecessary death.

In view of the fact that the uneven spatial distribution of healthcare facilities in Akko Local Government Area of Gombe state is conspicuous, we hereby forward some recommendations in light of the findings:

- Gona Emirate Council need secondary health care centre which is strongly recommended to avoid long distance movements of patients when such need arise.
- Political influences on allocation of resources should be minimized; this may affect the uneven distributions of healthcare facilities in the region. This could be seen in the case of Gona that is having the second largest population in Akko but does not have secondary health care facility but could be fund in Pindiga (kashere general hospital) who is having the least population.
- Considering the large number of people in Akko Emirate Council which emerged the highest among the emirate councils in Akko L.G.A, there is a need for provision of more primary health care centres because the region is deficient based on that type of facility.
- Government or policy makers should consider population size as one of the most important criteria of allocating resources to any region. This would give proper allocation of resources without over or under allocating it to a region.

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