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ANALYSIS OF SPATIAL DISTRIBUTION OF HEALTH CARE FACILITIES IN AKKO LOCAL GOVERNMENT AREA, GOMBE STATE

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ABSTRACT

The knowledge about population, location, concentration, and distribution of resources using geospatial techniques has become an important and interesting area of studying present and future demand of resources; this is because of the increasing population growth and demand of resources among people especially in rural areas. Hence, this research provides a spatial analysis of healthcare facilities in the Akko Local Government Area. The study investigates types, location, and concentration of health care facilities in Akko Local Government Area. A 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 and Gona Emirate council which 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.

Key Words: *HealthCare Facilities, Location, Concentration, Distribution, And Geospatial Techniques***.**

INTRODUCTION

Healthcare provision is among the seventeen (17) proposed sustainable development goals targeted by United Nation States, which is to ensure healthy lives and promote wellbeing for all at all ages, (UNDP, 2019). 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), 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. The 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 the 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 (Okafor, 1990 in (Babatimehin, Ayanlade, Babatimehin and Yusuf, 2011).

Nigeria today has unplanned and uneven distribution of health facilities, this call for serious concern and 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, (Aregbeyan, 1992 in 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 the secondary and tertiary level while ignoring the primary health care level and consequently limiting access by the rural population.

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 an 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 with 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 show that there is a high density of healthcare facilities in South-Eastern Gombe State.

In view of the above problems and reviewed literatures; it is clearly shown that research of this kind is deficient in Gombe to be specific in Akko L.G.A because all the reviewed pieces of literature 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 using location quotient techniques in the study area. Hence, this research aimed to analyze the distribution of healthcare facilities in Akko L.G.A of Gombe state using Geographic Information System (G.I.S) and other instruments 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.

STUDY AREA

Akko Local Government Area has an area of 2,627 km² and lies between latitude 10^0 17^1 00^{11} to $10^0.283^133^{11}$N and Longitude 10^0 58^1 00^{11} to $10^0.966^1$ 67^{11}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).

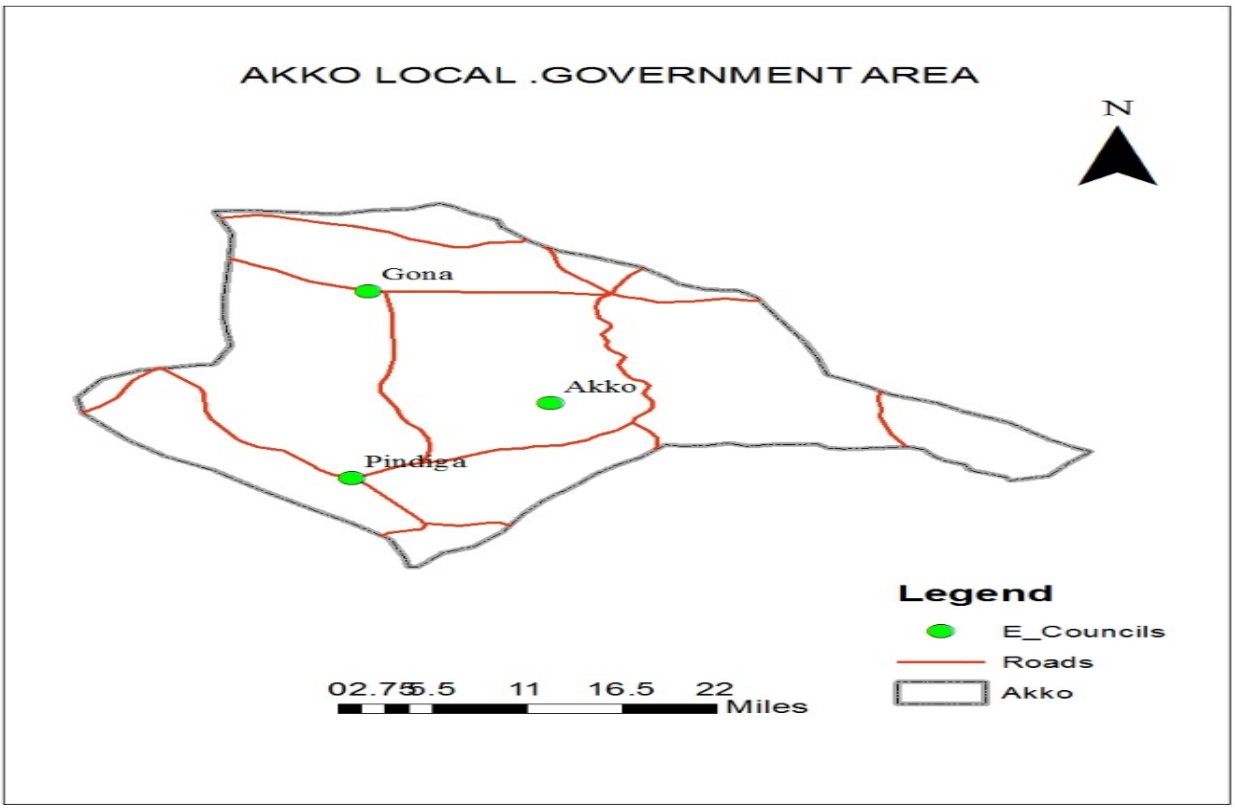

Figure 1: Akko Local Government Area
Source: Geographic Information System Laboratory, Federal University Kashere, 2018

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 79902 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 203097, 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 the 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 of 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. A map of the results was generated using ArcGIS 10.1 version to show the spatial location of each health care facility. Descriptive statistics were used to show the number, frequency, and types of all existing health facilities within the study area. Location Quotient (L.Q) adopted and modify from Sanni, (2010) and was used to analyze data to find the concentration and spatial distribution of healthcare facilities in the area using the formula below:

$$\text{L.Q. (X, A)} = \frac{\text{Number of Commodity X in L.G.A (A) } \div \text{ No of Commodity X in the State.}}{\text{Population of Local Government (A) } \div \text{ Population of the State}}$$

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:

$$\text{L.Q. (X, A)} = \frac{\text{Number of Commodity } \mathbf{X} \text{ in Emirate Council (A)} \div \text{No of Commodity } \mathbf{X} \text{ in Akko L.G.A}}{\text{The population of Emirate Council (A)} \div \text{Population of Akko L.G.A}}$$

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

- If LQ > 1, the results indicate a high spatial concentration of public healthcare facilities in an 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 have a share of the total equal in accordance with its 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 the 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 that are spatially distributed in the region

namely: Primary Health Care and Secondary Health Care Facilities. Table 1 below 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 show that there are 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 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 the equal allocation of secondary health care facilities in Akko and Pindiga Emirate Councils while Gona has no secondary health care facility. Considering the population of Gona which is the second-highest after Akko, there is a need for a 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.

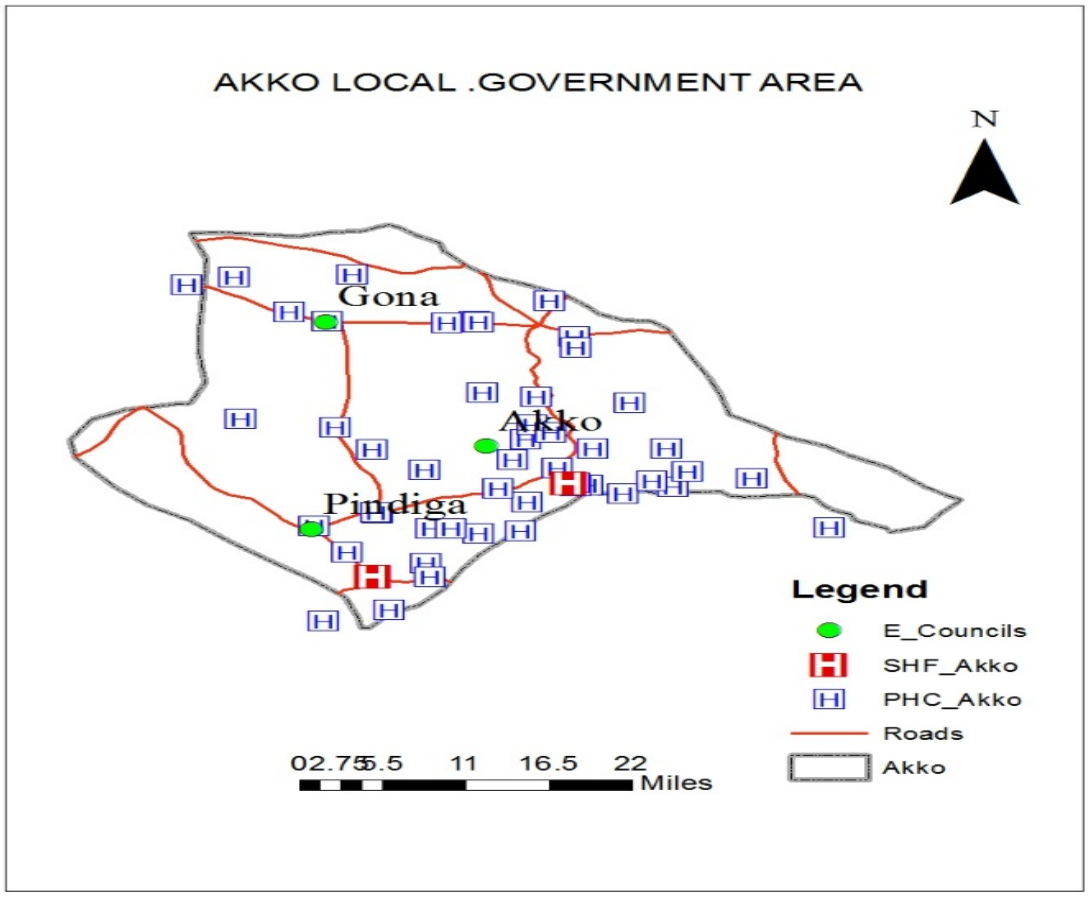

Figure 2: Absolute Location of Primary and Secondary Health Care Facilities in Akko L.G.A
Source: Geographic Information System Laboratory, Federal University Kashere, 2018.

Figure 2 shows a relatively high density of healthcare facilities in the South-Eastern part of the region while the 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 concurrent with the research conducted by Abdullahi, Abdullahi, Abbas, Bibi, and Adamu, (2019), which shows a 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 **P**rojected Population of Gombe State is **3,514,213** using a base population of 2006 population census of **2,365,040** and a 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 show a 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 show that Akko Emirate Council has less than a 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 the Akko Emirate Council shows less than a 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 the Pindiga Emirate Council. In other words, Pindiga is marginally advantaged 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 achieving sustainable development goals, because its guide the allocation of resources without under allocating or over-allocating it, and to focast for the need of future generation in a region. Government at all levels has an obligation to meet the welfare of its citizens today and in the future more especially in the areas of health care delivery. Healthcare facilities provision and distribution in Akko L.G.A did not meet with the sustainable development goal of the United Nations because results show that areas with high population have less healthcare facilities while areas with low population has more healthcare facilities. Therefore, provision of healthcare facilities in areas where they are lacking or inadequate is paramount to any responsible government in order to meet with the demand of United Nations sustainable development goals. 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 needs a secondary health care centre which is strongly recommended to avoid long-distance movements of patients when such need arises.
- Considering the large number of people in Akko Emirate which emerged the highest among the emirate councils in Akko L.G.A there is a need for the provision of more primary health care centres because the region is deficient based on that type of facility.
- Political influences on the 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 a secondary health care facility but could be fund in Pindiga (kashere general hospital) who is having the least population.
- Government or policymakers should consider population size at the moment and in the future as one of the most important criteria of allocating resources to any region. This would give a proper allocation of resources without over or under allocating it to a region.

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