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Appraising the Location and Distribution of Secondary and Tertiary Health Facilities in Maiduguri

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Abstract: *Healthcare is central to community well-being as well as a fundamental aspect of life. Lack of basic health facilities and services in any community is significantly associated with poor productivity, reduced life expectancy and increased mortality rates. The study examined the location and distribution of secondary and tertiary health facilities in Maiduguri with view to provide physical planning solutions for improvement. Data was collected from GRID3 Nigeria, Global Administrative data repository, Open-street map, primary healthcare unit of LGAs and federal ministry of health. They comprise point shapefiles of health facilities, ward boundary and road network for Maiduguri town respectively. Nearest neighbour and descriptive statistical techniques were utilised for the analysis. The findings were that majority of the facilities were concentrated in Maisandari ward alone, an ample number of facilities were privately owned and the distribution and location of the facilities were clustered. It was recommended that standards for location and distribution should be strictly adhered to making sure that the appropriate professionals oversee the activity. Also, more sustainable approaches to location and distribution of health facilities, especially giving due considerations to increase in population should form the basis of policies tackling distribution of health facilities in Maiduguri.*

Key words: *Health Facilities, Secondary, Primary, Distribution, Location*

Introduction

Healthcare is central to community well-being as well as a fundamental aspect of life. Lack of basic health facilities and services in any community is significantly associated with poor productivity, reduced life expectancy and increased mortality rates (Ajala et al, 2005). This therefore necessitate the need for equity in distribution of health facilities. Both accessibility and utilization are important aspects of equitable distribution of health

resources, which is based on needs of the population rather than equal distribution. Health System as an organizational set-up is charged with the responsibility of distributing and servicing the health care needs of a given population (Makinde Sule, Ayankogbe, & Boone, 2018) thereby achieving positive health outcomes. In developed nations, a tangible proportion of its wealth is budgeted to healthcare provision and sustainability, thus there is a better health outcome. In most developing countries on the other hand, there is need for increased expenditure on healthcare provision and parameters need to be put in place to ensure its sustainability. Awoyemi et al., (2017) opined that, improvement in healthcare leads to improvement in life expectancy, which serves as a robust indicator of human development.

Evidences have also shown that among the least developed countries, increase in life expectancy is strongly correlated with increase in income/productivity (Adewole, Reid, Oni, & Adebowale, 2021). Therefore, there is need for adequate and equitable distribution of healthcare services in any given country, particularly in sub-Saharan Africa, where health outcome is poorest. Healthcare provision in Nigeria is the responsibility of the three tiers of government; the Local, State and the Federal Governments, which handles the primary, secondary and tertiary health facilities respectively. The Federal Government's role is majorly limited to coordinating the affairs of university teaching hospitals and federal medical centers (tertiary healthcare) while the State Government manages the various general/specialists' hospitals (secondary healthcare). The local government on the other hand focus on Primary Health Care (PHC), which is regulated by the Federal Government, through the National Primary Health Care Development Authority (NPHCDA) (Nwakeze & Kandala, 2011)

This is particularly seen in rural areas of Nigeria and many sub-Saharan African countries, where barriers, notably distance of health facilities impedes utilization (Sanni, (2010). On these notes, Inyang (2015) opined that access to health facilities is a function of the degree of fairness in spatial distribution of the facilities. Similarly, Ujoh and Kwaghsende (2014) added that the quality of services rendered is directly proportional to the level of manpower available (Erinosho, 2006). This explains the need for adequate/qualified health professionals, who can deliver quality services to the people concerned. Studies in this field in Nigeria are limited, most of which use secondary data or Geographic Information System (GIS) to compute distribution/utilization of health facilities. Furthermore, most of these studies were conducted in the Nigerian regions of North-Central, South-South, South-East or South-West, North-Western and North-eastern regions have the poorest health outcomes in the country (Oladeji, 2006), with northeast being the worst affected area, partly due to the recent insurgency that characterized the area. Similarly, it is a common norm in developing countries like Nigeria, where most of developmental policies are targeted toward urban areas, which could be associated with lack of political-will and/or limited available evidence from rural areas. This study therefore aims to assess the spatial distribution and capacities of health facilities as well as utilization of the facilities in a semi-urban area of Borno State, NorthEast Nigeria. This study therefore is aimed at examining the location and distribution of secondary and tertiary health facilities in Maiduguri under the premise of established criteria.

Methodology

For this study point data (vector data) of the location of public secondary and tertiary health facilities for the entire Borno state was obtained from GRID3 Nigeria. this data was uploaded into the ArcMap window of ArcGIS. The data within the confines of the built-up area of Maiduguri was clipped using the clip tool. Data on the road network and wards of Maiduguri town were obtained from GADM (Global administrative Boundary) and OSGOF (Office of the Surveyor General of the federation) data repositories. Data on the population and households by wards was collected from primary healthcare units of Jere, MMC and Konduga LGAs respectively. Data on the standards for tertiary and secondary health facilities were obtained from the federal ministry of health. The point data for the individual health facilities were charted into ArcMap to ascertain their locations. Each of the facilities were buffered according to the service radius provided for in tables 3 and 4 to identify areas not under coverage. Nearest neighbour analysis technique was utilized to understand the nature of distribution for the facilities. Descriptive statistics on the other hand was utilized to understand the nature of their location and the shortfall for health facilities in the town.

Table 1: Population of Wards in Maiduguri

Names	Number of Household	Population
Ngomari	265	2120
Galtimari	1092	8736
Maimusari	3354	26832
Mashamari	758	6064
Mairi	952	7616
Old Maiduguri	4909	39272
Auno	884	7072
Bolori 1	1173	9384
Bolori 2	5563	44504
Bulabulin	1619	12952
Fezzan	1837	14696
Gamboru	2894	23152
Gwange 1	2843	22744
Gwange 2	4395	35160
Gwange 3	3095	24760
Hausari	3728	29824
Lamisula	1105	8840
Limanti	2366	18928
Mafoni	3342	26736
Shehuri North	2815	22520
Shehuri South	2307	18456
Maisandari	5701	45608
Total	**57709**	**461672**

Source: Primary Healthcare units of Jere, MMC and Konduga LGAs

Table 2: Standards for Secondary Health facilities

Secondary Health Facilities	Population	Service radius
Health care	20,000	80km
Medical clinic	2,000	24km
Diagnosis	900	10km
Chest and disease screening centre	50	15km
General Hospital	150,000	80km
Specialist	120,000	90km
Eye hospital	70,000	60km
Dental hospital	30,000	20km
Nursing home	60,000	90km
Maternity	**40,000**	**30km**

Source: Federal Ministry of health

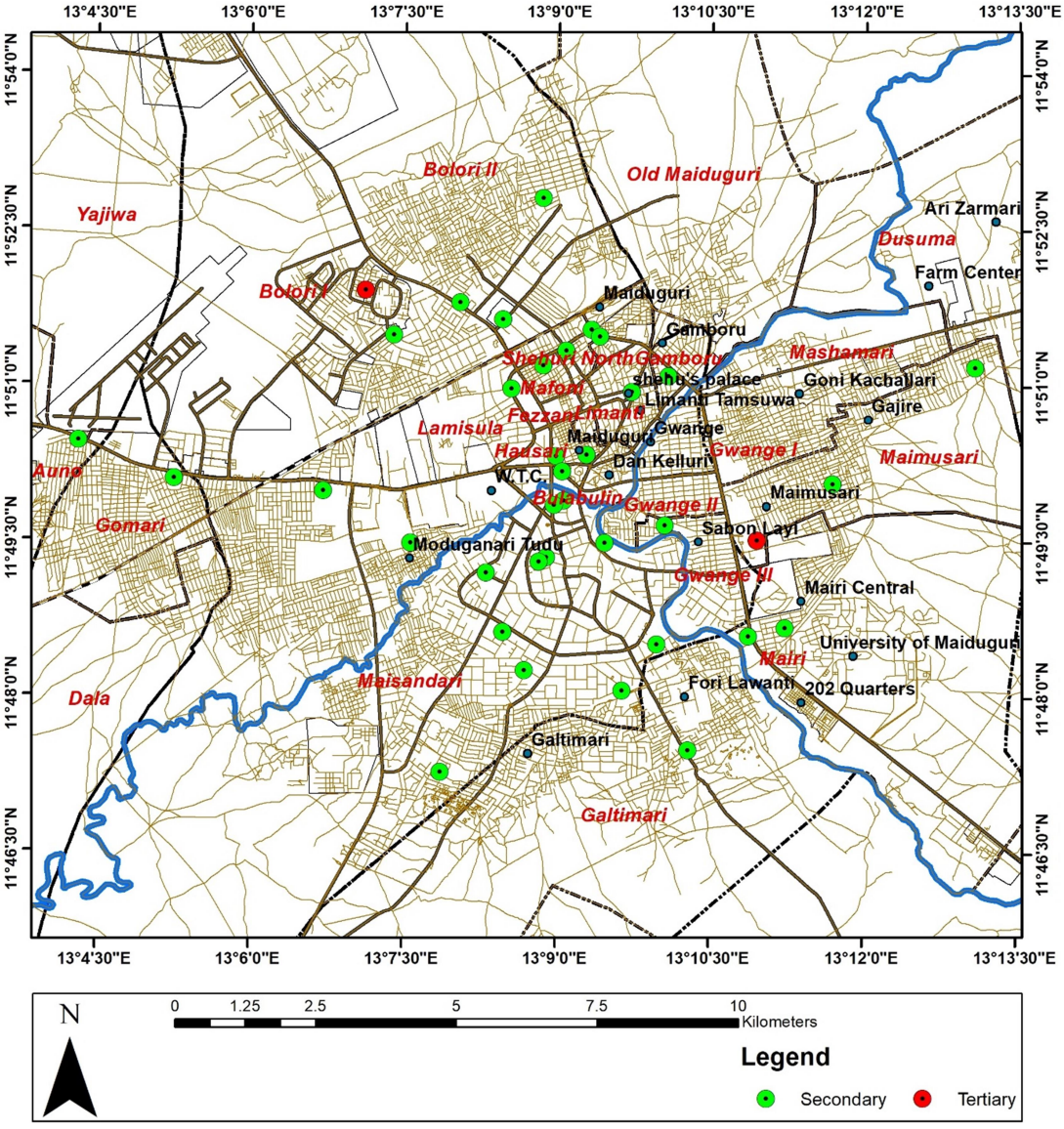


Fig 1: Distribution of Secondary and Tertiary Health Facilities in Maiduguri
Table 3: Standards for Tertiary Health facilities

Tertiary Health Facilities	Population	Service radius
Teaching hospital	Entire state	Entire state
Federal neuropsychiatric	10,000	1000km
Federal medical health centre	**15,000**	**500km**

Source: Federal Ministry of Health

Results and discussion

Table 4: Inventory of health facilities in Maiduguri town

Ward	No.	Percentage
Mafoni	1	3
Maimusari	3	8
Auno	1	3
Gomari	1	3
Mairi	2	5
Bolori 1	2	5
Bolori 2	3	8
Gamboru	2	5
Gwange 3	1	3
Hausari	3	8
Lamisula	2	5
Maisandari	13	36
Shehuri South	2	5
Galtimari	1	3
Total	**37**	**100**

Source: field survey, 2022

Table 4: Number of Health facilities by category

Health facility category	Frequency	Percentage
Secondary	35	96
Primary	2	4
Total	**37**	**100**

Source: field survey, 2022

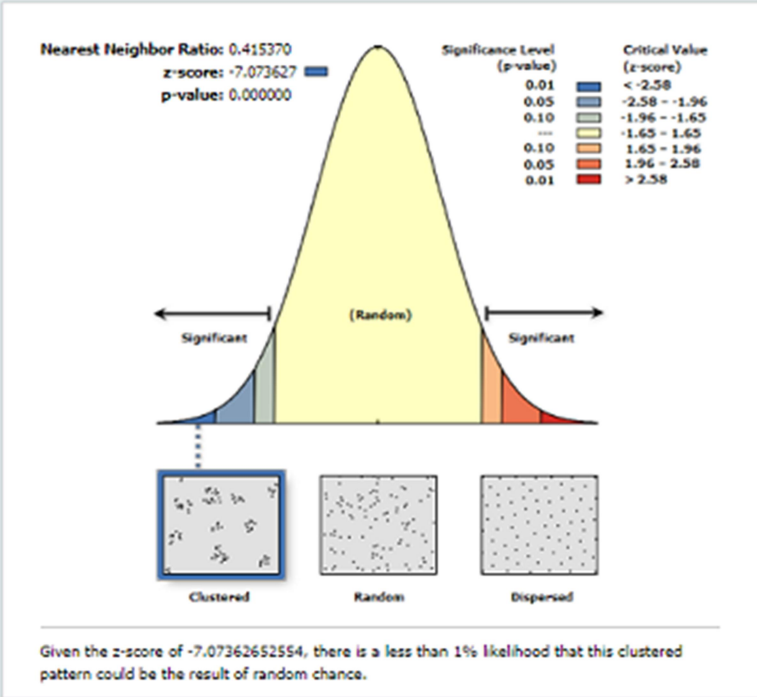
Table 4: Number of Health facilities by operator

Health facility type	Frequency	Percentage
Private	14	37
Public	23	63
Total	**37**	**100**

Source: field survey, 2022

The majority of the health facilities in Maiduguri constituting 97% are of the secondary category. Medical clinic comprises the majority out the entire types of health facilities. Also, 36% of the health facilities comprising the majority are situated in Maisandari ward alone with a considerable 37% of the health facilities being privately owned. Given the fact that spatially, Maisandari ward is the largest ward in Maiduguri town, it population is not dissimilar from other wards like Bolori II, Maimusari and Old Maiduguri. This is a clear indication that health facilities have not been distributed and located according to the population. Also, there seems to be so sense of class segregation since Maisandari House most of the low and medium density areas of the town.

Another pertinent indication is the presence of an ample number of private health facilities. With little or no regulation and overseeing operations of the facilities it can be a major drawback in terms of access to the general public especially the low-income.



Average Nearest Neighbor Summary	
Observed Mean Distance:	932.0164 Meters
Expected Mean Distance:	2243.8232 Meters
Nearest Neighbor Ratio:	0.415370
z-score:	-7.073627
p-value:	0.000000

Dataset Information	
Input Feature Class:	Health Facilities
Distance Method:	EUCLIDEAN
Study Area:	805558805.371000
Selection Set:	False

Fig 2: Distribution analysis for health facilities in Maiduguri

Given the Z- score of -7.0362652554, there is a less than 1% livelihood that this clustered pattern could be the result of random chance. The results shows that the pattern of distributing for health facilities in Maiduguri is clustered. In this situation, the indication is that the respective locational standards for locating health facilities were not taken into consideration.

Conclusion and Recommendations

The research investigates the Location and distribution of secondary and tertiary health facilities in Maiduguri, Borno State. This study cover issue regarding the adequacy of the location and distribution of secondary and tertiary health facilities in Maiduguri. And limits itself to only location and distribution of secondary and tertiary health facilities in Maiduguri. Maisandari ward carries the majority health facilities. A total of 96% of are of the secondary category with 63% being public facilities.

It is important to adhere strictly to the set-out standards for the location and distribution of health facilities both by the federal and state government. Population is another important component that influences the location and distribution of health facilities. Though population must continue to increase by time, it is indedd pertinent for the government to involve necessary professionals to provide sustainable location and distribution formulars that can stand the test of time regarding the facilities. Policies for location and distribution should also be made flexible and continually reviewed.

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