



ORIGINAL RESEARCH ARTICLE

An Analysis on the Spatial Distribution of Healthcare Facilities in Mubi North Local Government Area, Adamawa State

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ABSTRACT

This research examined the spatial distribution of healthcare centers in Mubi North Local Government area of Adamawa state using GIS. Data were obtained from primary and secondary sources. The objective of the study is to map out the health care centers of the study area: A GPS was used to collect the coordinates of each Healthcare center. All the health centers constitute the study area. Data from the field survey about the location, name and types of Healthcare centers in the study area were collected which includes one general hospital; one model primary health center, 23 primary health centers, six clinic, four dispensaries and seven private hospitals. About 397 questionnaires were distributed by convenience sampling across the health centers. Descriptive analysis was used in analyzing the data. Analysis shows the accessibility to primary Healthcare centers in the study area is uneven. The also results indicate that primary Healthcare centers in the study area have an irregular distribution pattern; this shows an uneven distribution across all the wards in the study area. The study recommended that accessible roads should be constructed to link up settlements and Healthcare centers and there should be synergy between federal, state and Local Government Areas in investing their resources to improve primary Healthcare centers most especially employing health personnel.

Introduction

In Nigeria, much concern has been focused on providing the basic needs of the people as a strategy to reduce the level of poverty in the society, hence the concern for the spatial patterns of distribution of the basic development needs that affect the wellbeing of the people. In Nigeria, the health sector is one area where much concern is directed. This is because a healthy population is a prosperous one as it influences the level of productivity in all ramifications. Health is a universal human right and focus of social and political concern worldwide. The WHO (WHO, 1978: Felix. K

and Fanan, 2014) defines health as “a state of complete physical, mental and social well-being”. Such an ideal state may be desirable but is practically limited as most of humanity would be unhealthy at all times and in many cases without access to health services. Hence, healthcare institutions are service-oriented establishments that provide medical care facilities comprising of observational, diagnostic, research, therapeutic, and rehabilitative services to the public. Adequate and effective distribution of Healthcare facilities contributes immensely to Healthcare service provision and needs of the people.

According to Berman (Berman, 1998: Felix and Fanan, 2014), upon independence, most sub-Saharan African countries attempted to provide universal health services to the population through primary healthcare provisions. But the emerging situation where the carrying capacity of existing public

Health facilities in Nigeria have evolved through a series of historical development including a succession of policies and plans which had been introduced by various administrations. (Hafeez Sedenu, Alaga and Mustapha, 2016) However, the health facilities are inadequate in meeting the needs and demands of the public. Man through technology has continued to expand his land holding capacity and to improve his wellbeing. Also, various religious bodies and private agencies established hospitals, dispensaries and maternities in different parts of the country without considering the convenience of residents at patronizing them. Primary Healthcare (PHC) service delivery in Nigeria has been faced with a lot of problems some of which are inadequate manpower, obsolete equipment and unavailable drugs etc. (Oloko-Oba, Popoola and Ogbole 2016) Depending on which perspective of observation, some have applauded the efforts of the government in providing. By implication, the distribution of primary healthcare services in Nigeria has been characterized by significant disparity. Such disparity is shown in the ways some of these medical facilities are concentrated in one geopolitical region at the expense of others. (Oloko-Oba et al, 2016). Also, this inequality places pressure on the facilities which are already inadequate. There is need to ascertain how this spatial inequality can be reduced to favour patients patronizing these healthcare facilities. Even though the government has shown serious commitment towards

addressing these inequalities, more is still expected in the areas of technical knowhow. However, attempt to address such disparity from technical perspective may require the use of a cut edge information management tool such as the Geographic Information Systems (GIS). This research will investigated the nature of distribution pattern of primary healthcare facilities in Mubi North LGA Adamawa state with the view to addressing disparity where available.

Materials and Methods

Study Area

Mubi North local government area is located in Northeast Nigeria between latitudes 10°04'30" N and 10°15'00" N of the equator and between longitudes 13°20'00" E and 13°21'00"E of the Greenwich meridian. The local government area covers about 148.43km². It is bordered by Hong local government area in the West, Mubi South in the south, and the Republic of Cameroon in the East. Mubi, town, Northeast of Adamawa State, Nigeria, is situated I the western flank of the Mandara Mountains. Probably founded in the late 18th century by the Fulani people, Mubi remained under the jurisdiction of the sultanate of Mandara until conquered in the Fulani jihad (holy war) by Modibbo Adama. By the 1820s the peoples of Mubi and the surrounding area were incorporated into Adama's Fulani kingdom of Fumbina, later called Adamawa; in the 1890s they were subjected to slave raids by Adamawa's emir Zubeiru. The town was taken by German forces in 1903 and served as a frontier post and administrative center of German Cameroon until its capture by the British in 1914. Mubi and its surrounding region were placed in the British Cameroons by a League of Nations mandate in 1922. In 1961 it became part of Nigeria as seen in figure 1 and 2. (Adebayo et al 2020).

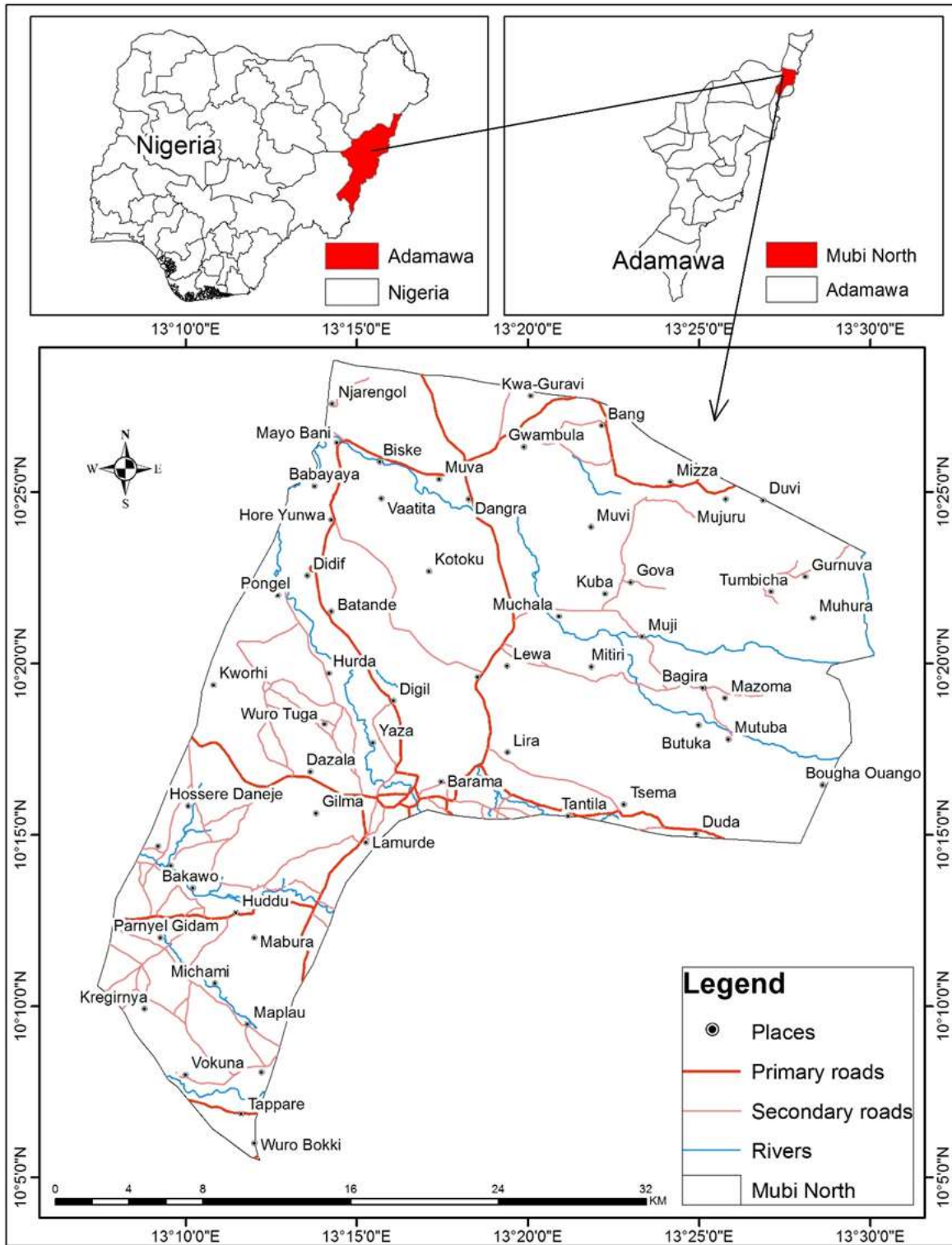


Figure 1: The study Area.

Methodology

Data sets were obtained from both Primary and secondary sources .The primary data was obtained through purposive interview, questionnaires, field observations and use of Global Positioning System to get the absolute location of the Primary Healthcare Centers. The secondary data include the address of each of the primary Healthcare center and satellite image of the study area, specifically Google earth images of the study area. The secondary data was sourced from Adamawa State Primary Healthcare Development Agency (ASPHCDA) and Google Earth. The sample size is made up of all the health centers in the study area. To determine the set of questionnaire to be used, the Taro Yamane formula was employed.

This is given as:

$$n = N/1+N (e)^2 \quad (1)$$

Where N = sample population

e = error margin

1 = constant

Therefore:

$$N = 15,810$$

$$E = 0.0$$

$$\text{Therefore, } n = 15,810 / 1+15,810 (0.05)^2 = (397) \text{ A total of 397}$$

A total of 397 questionnaire were administered using convenience sampling, and the questionnaires was further subjected to descriptive statistical analysis such as

percentage and pie chart. The primary health centers are facilities that are owned by the Local government authorities. Secondary health centers are facilities that are owned by the state authority while Tertiary health centers are the facilities that are owned by the Federal government. As at the time of this research, majority of the health centers are Primary health centers, one secondary health center and one Federal health center in the study area.

Results

There are above 48 health centers in the study area among which 8 are private health centers, and 40 ate public health centers. Among the 40 heath centers, 1 is secondary health center, 1 is tertiary while 38 are primary health centers as at the time of this research. The primary health centers are facilities that are owned by the Local government authorities. Secondary health centers are facilities that are owned by the state authority while Tertiary health centers are the facilities that are owned by the Federal government as seen in table 1 and 2 below.

From figure 2 above, the findings reveals that there is an uneven distribution of the health centers in the study area, with the distribution tilted towards Mubi metropolis which is the seat of government.

Table 1: List of Health Centers in the Study Area

S/No	WARD	FACILITY NAME	FACILITY LEVEL	OWNERSHIP
1	Bahuli	Maduguva Primary Health Clinic	Primary	Public
2	Bahuli	Burha Vango Primary Health Clinic	Primary	Public
3	Bahuli	Bahuli Primary Health Care Clinic	Primary	Public
4	Betso	Primary Health Care Clinic	Primary	Public
5	Betso	Kwa Primary Health Care Center	Primary	Public
6	Betso	Suzuwa Primary Health Care Clinic	Primary	Public
7	Digil	Yaza Primary Health Care Clinic	Primary	Public
8	Digil	Digil Primary Health Care Clinic	Primary	Public
9	Digil	Didif Primary Health Care Clinic	Primary	Public
10	Kolere	Kolere Primary Health Care Center	Primary	Public

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11	Lokuwa	Wuro Gude Primary Health Care	Primary	Public
12	Lokuwa	Bilmade Health Clinic	Primary	Private
13	Lokuwa	Sa'adatu College Of Health Clinic Barama	Primary	Private
14	Lokuwa	New Life Health Clinic	Primary	Private
15	Lokuwa	Lokuwa Primary Health Care Center	Primary	Public
16	Lokuwa	Bafa Health Clinic	Primary	Private
17	Lokuwa	College Of Health Technology Clinic	Primary	Public
18	Lokuwa	General hospital	Secondary	Public
19	Lokuwa	ADSU Health Clinic	Primary	Public
20	Muchalla	Fed Model Health Center	Primary	Public
21	Muchalla	Jillu Primary Health Clinic	Primary	Public
22	Muchalla	Bagira Primary Health Clinic	Primary	Public
23	Mijulu	Miza Primary Health Clinic	Primary	Public
24	Mijulu	Mijulu Primary Health Clinic	Primary	Public
25	Mijulu	Kiraya Primary Health Clinic	Primary	Public
26	Mayo Bani	Muva Primary Health Clinic	Primary	Public
27	Mayo bani	Mayo Bani Primary Health Care Clinic	Primary	Public
28	Mayo bani	Kotride Primary Health Care Clinic	Primary	Public
29	Sabon layi	Woru Alkali Primary Care Clinic	Primary	Public
30	Sabon layi	Sabon Layi Primary Health Care Clinic	Primary	Public
31	Vimtim	Vimtim Primary Health Care Clinic	Primary	Public
32	Vimtim	Santama Memorial Clinic	Primary	Public
33	Vimtim	Ribawo Primary Health Care Center	Primary	Public
34	Vimtim	Duda Primary Health Care Center	Primary	Public
35	Yelwa	Bishop T Cotter Memorial Clinic	Primary	Private
36	Yelwa	Kochifa Primary Health Care Clinic	Primary	Public
37	Yelwa	Dazala Primary Health Care Clinic	Primary	Public
38	Yelwa	Basira Health Clinic	Primary	Private
39	Lokuwa	College Of Health Technology Clinic	Primary	Public
40	Lokuwa	Adsu Health Clinic	Primary	Public
41	Muchalla	Fed Model Health Center	Tertiary	Public
43	Muchalla	Jillu Primary Health Clinic	Primary	Public
44	Muchalla	Bagira Primary Health Clinic	Primary	Public
45	Mijulu	Miza Primary Health Clinic	Primary	Public
46	Mijulu	Mijulu Primary Health Clinic	Primary	Public
47	Mijulu	Kiraya Primary Health Clinic	Primary	Public
48	Mayo Bani	Muva Primary Health Clinic	Primary	Public
49	Mayo bani	Mayo Bani Primary Health Care Clinic	Primary	Public
50	Mayo bani	Kotride Primary Health Care Clinic	Primary	Public
51	Sabon layi	Woru Alkali Primary Care Clinic	Primary	Public
52	Sabon layi	Sabon Layi Primary Health Care Clinic	Primary	Public
53	Vimtim	Vimtim Primary Health Care Clinic	Primary	Public
54	Vimtim	Santama Memorial Clinic	Primary	Public
55	Vimtim	Ribawo Primary Health Care Center	Primary	Public
56	Vimtim	Duda Primary Health Care Center	Primary	Public
57	Yelwa	Bishop T Cotter Memorial Clinic	Primary	Private
58	Yelwa	Kochifa Primary Health Care Clinic	Primary	Public
59	Yelwa	Dazala Primary Health Care Clinic	Primary	Public
60	Yelwa	Basira Health Clinic	Primary	Private

Table 2: Health Centre/Ward and their Co-ordinates

WARD NAME	LONGITUDE (°)	LATITUDE (°)
Bahuli	13.41065	10.25211
Bahuli	13.47978	10.26540
Bahuli	13.45225	10.21943
Betso	13.32623	10.5306
Betso	13.28269	10.47308
Betso	13.34532	10.48880
Digil	13.22894	10.37232
Digil	13.26262	10.26191
Digil	13.26263	10.26210
Kolere	13.27036	10.24156
Lokuwa	13.28091	10.28235
Lokuwa	13.29279	10.27435
Lokuwa	13.28101	10.28255
Lokuwa	13.28020	10.26729
Lokuwa	13.28397	10.26873
Lokuwa	13.17195	10.16442
Lokuwa	13.26698	10.26046
Muchalla	13.40057	10.32165
Muchalla	13.45223	10.36342
Muchalla	13.37586	10.35843
Mijulu	13.36549	10.45982
Mijulu	13.42054	10.41430
Mijulu	13.39302	10.41985
Mayo Bani	13.28101	10.43603
Mayo bani	13.24169	10.44165
Mayo bani	13.23596	10.35750
Sabon layi	13.27035	10.24157
Sabon layi	13.26690	10.27017
Vimtim	13.34110	10.27781
Vimtim	13.32445	10.24915
Vimtim	13.30806	10.32241
Yelwa	13.23582	10.27332
Yelwa	13.27947	10.27041
Yelwa	13.27049	10.24156

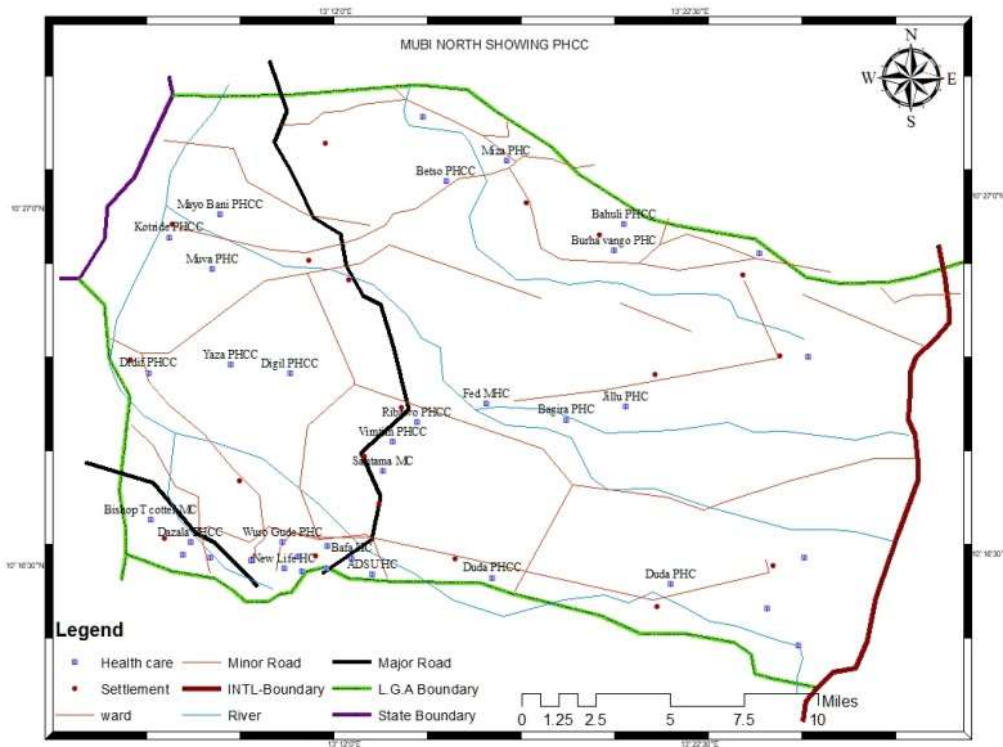


Figure 2: Spatial distribution of Health Care Centres in Mubi North LGA

Discussion

The results of the data analyzed are presented in the tables below and discussed as follows:

Table 3 reveals that about 88% of the Healthcare facilities found in the study area is primary Healthcare facility, while about 12% of the facilities are secondary Healthcare facilities.

Table 4 reveals that about 88% of the Healthcare facilities found in the study area are public Healthcare centers, while about 12% of the centers are private Healthcare center which implies that the majority of the health

centers in the study area are government owned Healthcare centers.

Table 5 reveals that about 25% of the health centers have a total number of 6-10 staff, while about 75 % of the health centers have a total number of 11-15 staff respectively.

Table 6 reveals that about (80%) of the respondents are agrees that there is Inequality in distribution of health centers, while about (20%) of the respondents opines that there is equality in distribution of health centers in the study.

Table 3: Type of Facility

Facility	Frequency	Percentage (%)
Primary	88	88.0
Secondary	12	12.0
Total	100	100.0

Source: Field survey, 2021.

Table 4: Type of facility Ownership

Ownership	Frequency	Percentage (%)
Public healthcare	88	88.0
Private healthcare	12	12.0
Total	100	100.0

Source: Field survey, 2021.

Table 5: Number of staff in the primary Healthcare

Number of staff	Frequency	Percentage (%)
6-10	25	25.0
11-15	75	75.0
Total	100	100.0

Source: Field survey, 2021.

Table 6: Inequality in distribution of health facility

Responses	Frequency	Percentage (%)
No	80	79.0
Yes	20	21.0
Total	100	100.0

Source: Field survey, 2021.

Table 7. Reveals that about 56% of the study area have about 1-2 number of Healthcare centers in the study area, while about 44% of the study area have about 3-4 Healthcare centers in the area. Table 8 reveals the distance of health centers from one Healthcare

center to the nearest, in which about (74%) of the respondents covers about 250-500 meters to reach the health center closed to them, while about (26%) of the respondents' covers 500-750 meters to any Healthcare center in the study area.

Table 7: Number of health facilities

Healthcare	Frequency	Percentage (%)
1-4	80	80.0
5-8	20	20.0
Total	100	100.0

Source: Field survey, 2021.

Table 8: Distance to access Healthcare centers

Distance	Frequency	Percentage (%)
250-500 meters	74	74.0
500-750meters	26	26.0
Total	100	100.0

Source: Field survey, 2021.

Table 9 reveals that about (74%) of the respondents are agree Yes, that distance affect the accessibility to Healthcare facilities in the

study area, while about (26%) of the respondents' says is No, that distance do not affect the accessibility to Healthcare centerin

the study area. Table 10 reveals that about (40%) of the respondents are in support that terrain is the major factor that affect the accessibility to Healthcare center in the study area, and about (40%) of the respondents are with the opinion that Mobility is the major

factor that affect the accessibility to Healthcare centers in the study area, while about (20%) of the respondents' agrees that road transport is the major factor that affect the accessibility to Healthcare centers in the study area.

Table 9 : Effect of distance on accessibility to Healthcare centers

Responses	Frequency	Percentage (%)
Yes	74	74.0
No	26	26.0
Total	100	100.0

Source: Field survey, 2021.

Table 10 : Roads that link to the primary Healthcare

Reasons	Frequency	Percentage (%)
Terrain	40	40.0
Mobility	20	20.0
Road	40	40.0
Total	100	100.0

Source: Field survey, 2021.

Table 11 reveals the means of mobility to the primary Healthcare centers in the study area, in which about (45%) of the mobile transport employ the use of tricycle, and about (34%) of the means of motorcycle, while about (21%) of the means of mobility is the use of vehicle in the Study area. Table

12 reveals that about 100% of the type of services rendered in the health centers is primary Healthcare. Accessibility to the primary Healthcare centers in the study area was found to be either uneven by the virtue of the land area covered or the number of roads linking the primary Healthcare centers with various settlements around it.

Table 11: Mobility to the primary Healthcare center in the study area

Mobility	Frequency	Percent
Tricycle	50	50.0
Motorcycle	20	20.0
Vehicle	30	30.0
Total	100	100.0

Source: Field survey, 2021.

Table 12: Reasons for other comments

Reasons	Frequency	Percentage (%)
Lack of good medical facility	50	50.0
Lack of linking road	30	30.0
Other facilities	20	20.0
Total	100	100

Source: Field survey, 2021.

Conclusion

This research examined the spatial distribution of Healthcare facilities in Mubi Local Government Area. The spatial pattern of the distribution of Healthcare facilities in Mubi North 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 in the study area. There is less fairness in spatial distribution of Healthcare facilities in each ward, out of 12 wards each has at least one health center and a maximum of 8. There are a total of 37 Health centers: 28 are public health centers, and 7 private clinics.

Recommendations

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 Healthcare personnel. This will reduce waiting time and enhance attention to patient by medical personnel.

There is the need for government to provide 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 Healthcare facilities.

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.

There is need to educate populace about the importance of health and appropriate services. Enforcing standard and protocols for service

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