

Distribution and patronage of health facilities in Lafia, Nasarawa state, Nigeria

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Abstract

Health facilities are places that provide health care. They include hospitals, clinics, outpatient care centers, and specialized care centers, such as birthing centers and psychiatric care centers. The study aimed at assessing and classifying the distribution and patronage of health facilities in Lafia, Nasarawa state with the objectives to classify the distribution of the primary health centers in Lafia, Nasarawa State; examine the spatial distribution of primary health centers in the study area; and assess the patronage pattern of primary health centers in the study area. The study utilizes the use of primary and secondary data to include questionnaires, interviews, and direct observation analyses using ArcGIS 10.4, Microsoft Excel, and SPSS software. The study area's primary health facilities were found to be clustered, with an Rn of NNR less than 1.0 and a less than 1% likelihood of random chance at ($P < 0.01$). Regression analysis showed negative coefficient values, meaning that the study area's primary health facility patronage falls as inhabitants' distance from health facilities increases ($P < 0.05$). The socio-economic data reveals that 56.1% of the sampled population, predominantly aged 21-40, consists of respondents. The survey revealed that only 6.3% of the population had formal education, and 72.5% of public health facilities (PHFs) were government-owned, while 22.4% were privately owned. Therefore, the prevailing trend of location analysis calls for proper planning, and GIS tools are needed for research on health facility distribution and patronage in Lafia Nasarawa state, identifying coverage gaps, and recommending intervention and planning strategies to improve health.

Keywords: Health facilities; Ministry of health; NPHCDA; Distribution; Clustered pattern; Patronage and Distance

1. Introduction

Social facilities are simply regarded as any enclosed building established to serve several public services geared towards aiding and supporting to particular group or the whole society or community [1]. Social facilities are also noted as any buildings where the execution of social services can be seen. These facilities are identified to include schools, fire brigade station, cemetery, hotel, public convenience, restaurant, community center, stadium, health facilities among others.

Secondary Health Facilities (SHF) are provided by regional or district clinics that offer inpatient services and outpatient consultation [2; 3; 4]. However, the persistence in the halting of the spread of avoidable diseases is one of the aims of sustainable development goals [2]. Similarly, the continuous preservation of this aim is a function of the spatial distribution pattern of the healthcare facilities and a measure of healthcare accessibility which in turn induced the

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public patronage [2; 5]. Studies examine distance, drugs, equipment availability, staff strength, and individual differences in health facility utilization using questionnaire administration and interviews as key informants. [6; 7].

Furthermore, studies reveal the spatial distribution and patronage of health facilities in Lafia, Nigeria. Prior research concentrated on examinations of general healthcare facilities rather than on particular healthcare levels [8]. This study takes a constrained approach, concentrating on the distribution and use of basic healthcare facilities. This study explores the application of Geographic Information Technology (GIS) techniques to relate distance and socio-economic factors to primary health center patronage patterns.

This study aimed to assess the spatial influence of primary health centres in Lafia, Nasarawa State, Nigeria. This shall be with the view of analysing the accessibility and spatial influence of primary health centres in the study area. To achieve this broad aim, the specific objectives were to: classify the distribution of the primary health centres in Lafia, Nasarawa State; examine the spatial distribution of primary health centres in the study area; and assess the patronage pattern of primary health centres in the study area.

1.1. Study area

Lafia, Nigeria's capital, is the administrative headquarters and largest town. It lies between latitudes 8°20'N and 8° 53' 5"N; and longitudes 8°40' 03"E and 90 01 E. With a population of 348,000, it has a tropical sub-humid climate with wet and dry seasons and an average daily temperature of 23-25°C.

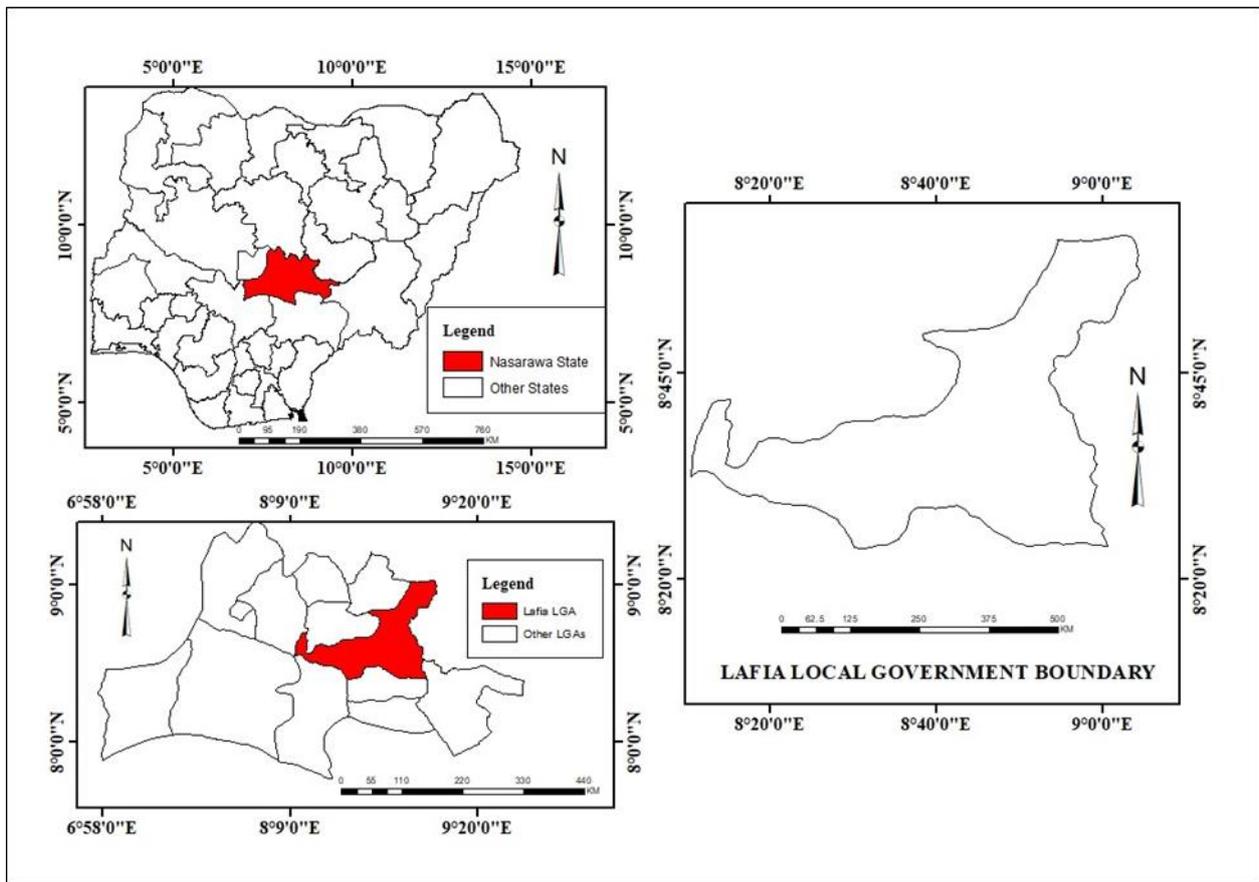


Figure 1 Study Area Map

2. Materials and method

The study examines primary healthcare facilities distribution and patronage in Lafia, Nasarawa State, using primary and secondary data sources, focusing on socio-economic characteristics, accessibility, utilization, and factors influencing patronage.

This study used questionnaire administration and locational features of primary health facilities from the Lafia Ministry of Health to analyse data. Descriptive and inferential statistics were used, including Pearson correlation and regression analyses. Correlation was used to determine patronage and distance relationships, while linear regression was used to determine cause relationships. Secondary data was analysed using attribute query and spatial statistics, with patch tools in ArcMap 10.8. Query and Nearest Neighbour analysis were employed to determine classification and spatial distribution patterns.

The study utilized a multi-stage sampling technique, using electoral wards from the Independent National Electoral Commission and purposive sampling. Thirteen electoral wards were identified, and the sample size was calculated using population projections from the 2006 Census. The estimated 2021 number of households in Lafia was presented, using 0.25 percent of the estimated HHS as the sample size.

Table 1 Identification of Primary Health Facilities in Lafia Local Government Area

Names of Primary Health Facilities	Owners hip	Longitude	Latitude
Aboki Clinic & Maternity, Lafia	Private	8.50997	8.49929
Aboki clinic Ashigye	Private	8.80601	8.57855
Abu Agori Health Post	Public	8.71166	8.53387
Abuja Koronkuje Health Post	Public	8.42618	8.61049
AdamuAgyo Primary Health Care Clinic	Public	8.792663	8.76677
Adogi Primary Health Care Center	Public	8.64449	8.52401
Agba Primary Health care Clinic	Public	8.44003	8.50395
Agbalagu Primary Health Care Clinic	Public	8.74158	8.79086
AgbulaguKadaura Primary Health care Clinic	Public	8.72437639	8.7966161
Agreaba Hospital	Private	8.53471	8.47977
Agu Hospital, jos Road- Lafia	Private	8.52208889	8.5172105
Agyaragun Koro Primary Health Post	Public	8.66774	8.52628
AgyaragunTofa Primary Health Care Clinic	Public	8.54449463	8.4447021
Agyebawa Health Post	Public	8.72974	8.67688
Akunza MDG Clinic	Public	8.61063	8.47124
Akura Primary Health care Clinic	Public	8.67935	8.63053
Akuya Health Post	Public	8.36062	8.58874
Al-Nour Clinic- Lafia	Private	8.52825	8.49213
Alawagana Primary Health post	Public	8.77248	8.62274
AlheriAqwale Clinic	Private	8.63984	8.51995
Alheri Dispensary	Private	8.62967	8.51997
Alheri Dispensary	Private	8.63992	8.51989
Alingani Health Post	Public	8.82777	8.71867
Ambana Health Post	Public	8.46572	8.51079
Andasime Primary care Health Post	Public	8.611189	8.595032
Angbas Clinic	Private	8.50153	8.50368
AngwaMadaki Health Clinic	Public	8.79779	8.75984

AngwanMallam Sabo Primary Health care Clinic	Public	8.51953	8.49534
AngwanShalele Primary Health Care Clinic	Public	8.53465	8.49901
Angwan Toni Primary Health Care Clinic	Public	8.50851	8.49325
AngwanYakubu Primary Health Care Centre	Public	8.55394	8.40285
AridiAjege Primary health care clinic	Public	8.42704	8.58309
Aridin Usman Primary Health Care Clinic	Public	8.41864	8.59851
Arikya Primary Health Care Center	Public	8.67286	8.82849
Ashigye Primary Health Centre	Public	8.80744	8.58244
Ata Clinic Agyaragu	Private	8.55183721	8.4045249
Awoge Primary Health Care Clinic	Public	8.37217	8.57061
Awuma Primary Health Care Clinic	Public	8.45300853	8.5605222
Awunza Health Post	Public	8.36277	8.56984
Azuba Center Health Clinic	Public	8.55612	8.62692
BAD Primary Health Care Centre	Public	8.37173	8.60328
BakinRijjiya Primary Health Care Clinic	Public	8.61145	8.51766
Buba Health Centre Gidan	Public	8.518656	8.524621
BukanBurga Primary Health Care Clinic	Public	8.51796	8.46236
BukanKwato Primary Health Care	Public	8.56955	8.45557
DankanBako Health Post	Public	8.61623	8.59112
Dele Dispensary Lafia	Private	8.62011	8.52159
Diamond Clinic	Private	8.50894	8.50197
Dogly Clinic Shuku	Private	8.71744	8.74872
DogoYashi primary Health Care	Public	8.81058	8.79111
Doka Health post	Public	8.61623	8.59112
Doma Road Primary Health Care Centre	Public	8.490007	8.526396
Dungu Health Clinic	Public	8.70368	8.60162
Dungun Akpamani Primary Health Clinic	Public	8.72354	8.60665
Ekosons Clinic	Private	8.57347	8.46445
Ercc Clinic Assakio	Private	8.84977162	8.5998273
ERCC Clinic keffinWambai	Private	8.52858245	8.5269731
Ewu Clinic	Private	8.50022	8.48788
Fadama North Primary Health Care clinic	Public	8.75527203	8.7610978
Fadama South Primary Health Centre	Public	8.76093	8.74299
Feferuwa primary Health Care Clinic	Public	8.68780128	8.7003208
GadaEbagaku Health Post	Public	8.38769531	8.6019287
Gallo Health Post	Public	8.90565	8.77818
Gidan Mai Akuya Evangelical Reformed Church Of Christ (Ercc) Dispensary	Private	8.74339	8.54911
Gidan Mai Akuya Primary Health Care Clinic	Public	8.73344	8.54403

Gosha Hospital	Private	8.51772	8.49373
Gwayaka Health Clinic	Public	8.85519	8.69771
Haske Clinic	Private	8.22878328	8.537737
Hope Clinic	Private	8.53959024	8.559224
Igibi Health Post	Public	8.44461	8.50051
Jibyal Primary Health Care Clinic	Public	9.02452	8.94431
Kampani primary Health care Clinic	Public	8.76552	8.82066
Kayarda Primary Health care Clinic	Public	8.52447	8.39626
KeffinWambai Primary Health Care Clinic	Public	8.45242	8.54923
Kibba Health post	Public	8.72764	8.66102
Kowa Hospital (Lafia)	Private	8.52286	8.49994
Kun-Warki Clinic	Private	8.61063	8.47124
Kurmin Kiki Health care Clinic	Public	8.60494	8.55706
Kwandare Comprehensive Health care Center	Public	8.49527	8.56391
Lafia Clinic	Private	8.51314	8.50095
M/D Dispensary	Private	8.52163	8.51323
Madarasi Clinic	Private	8.62478	8.52189
Maina Clinic Lafia East Lafia	Private	8.52922	8.49494
Mana Emirs Palace Health Centre	Public	8.51341	8.49122
Mankwar primary Health care Clinic	Public	8.94538	8.89083
Namu Clinic and Ultrasound Centre	Public	8.5069	8.50255
Nason Clinic	Private	8.71633	8.53445
Nkechi Memorial Hospital	Private	8.51691	8.50172
Nonso Clinic	Private	8.49479	8.48471
Olivet Medical Centre	Private	8.51729	8.52188
Oshala Dispensary	Private	8.41369	8.57294
Oshyegba Josh Medical Centre	Private	8.53028	8.50758
Primary Health Care Clinic Agy-Tofa	Public	8.51445	8.44461
Primary Health Care Mallam Anza	Public	8.31091309	8.5300903
Primary Health Care Mana Emirs Palace	Public	8.51225833	8.49035
Primary Health Center Agabija	Public	8.61404103	8.574136
Primary Health Center Agba	Public	8.43993	8.5041933
Primary Health Center AguYakubu	Public	8.55401983	8.4029629
Primary Health Center Ajaula	Public	8.50372315	8.4163208
Primary Health Center Akruha	Public	8.5692749	8.5319214
Primary Health Center Alhaji	Public	8.57236147	8.4957093
Primary Health Center Amba	Public	8.50369833	8.4846867
Primary Health Center Aruba Isa	Public	8.64802128	8.6170192

Primary Health Center Ashigogo	Public	8.84659588	8.59074
Primary Health Center Azara	Public	8.52079868	8.6094618
Primary Health Center Bashayi	Public	8.5567832	8.5909009
Primary Health Center BukanFadama	Public	8.51634176	8.4626624
Primary Health Center BukanSidi	Public	8.52209473	8.5258789
Primary Health Center Burumburum	Public	8.32138	8.5755
Primary Health Center Doka	Public	8.61619	8.5913
Primary Health Center GadaBiyo	Public	8.29165445	8.5702193
Primary Health Center Gambo	Public	8.89873266	8.6248684
Primary Health Center Gbamze	Public	8.30027445	8.5919744
Primary Health Center Gwandara	Public	8.50745597	8.5080935
Primary Health Center Igibi	Public	8.44454333	8.5004517
Primary Health Center Isa	Public	8.64786565	8.6170095
Primary Health Center Kayarda	Public	8.524555	8.3961967
Primary Health Center Kiki	Public	8.60499	8.55722
Primary Health Center Kpangwa	Public	8.51147461	8.427124
Primary Health Center MararabaAkunza	Public	8.58868	8.47204
Primary Health Center Rigiya	Public	8.61150563	8.5176981
Primary Health Center SabonKasuwa	Public	8.52566058	8.4902104
Primary Health Center Sidi	Public	8.52211833	8.5257661
Primary Health Center Tako	Public	8.6203891	8.6147833
Primary Health Center Tofa	Public	8.54450052	8.4445873
Primary Health Center Toni	Public	8.50843428	8.4932906
Primary Health Centre AzubaBashayi	Public	8.55676	8.59058
Primary Health Centre Clinic Agba	Public	8.90387	8.62636
Primary Health Centre Clinic Rafin Kudu	Public	8.40726	8.55634
Primary Health Centre Shabu	Public	8.53541	8.48779
Primary Health Clinic Abu Agori	Public	8.71209717	8.5335083
Primary Health Clinic Adogi	Public	8.64473464	8.5238971
Primary Health Clinic Agyabawa	Public	8.72998416	8.6770266
Primary Health Clinic Akurba	Public	8.56936	8.53183
Primary Health Clinic Akuya	Public	8.36139768	8.5891042
Primary Health Clinic Anotsa	Public	8.84176	8.59035
Primary Health Clinic Ashagwan	Public	8.78509522	8.5687256
Primary Health Clinic Ashige	Public	8.8073744	8.582634
Primary Health Clinic Awuma	Public	8.4528469	8.5604144
Primary Health Clinic GidanBuba	Public	8.76540893	8.6786668
Primary Health Clinic GidanMaiakuya	Public	8.73299275	8.543776

Primary Health Clinic Kibba	Public	8.72767018	8.6609479
Primary Health Clinic KoronKuje	Public	8.41877512	8.598716
Primary Health Clinic KoronKuje	Public	8.41870308	8.5986632
Primary Health Clinic RuwaWayo	Public	8.421911	8.5597014
Primary Health Clinic TudunDaudu	Public	8.81122	8.66233
Primary Health Clinic TudunGwandara	Public	8.50097	8.5131
Primary Health Clinic Ugah	Public	8.80375918	8.6926472
Primary Health Clinic UngwaMadaki	Public	8.80226418	8.7613772
RafinKudi Health Post	Public	8.40724468	8.5563219
RandanAttah Primary Health Care Clinic	Public	8.44628	8.61223
Ruwayo Health Post	Public	8.42238	8.56113
Sandaji Medical Centre	Private	8.53832	8.5088
Sauki Hospital	Private	8.52645	8.50168
Tako Health Care Clinic	Public	8.62049	8.61475
Takpa Primary Health Carea Clinic	Public	8.34743	8.61301
Tonsun Clinic	Private	8.58558	8.47772
Tudun Abu Primary Health Care Clinic	Public	8.54849	8.50745
TudunAmba Primary Health Care Clinic	Public	8.50447	8.48357
TudunKawari Primary Health Care Centre	Public	8.53817	8.48876
TunganDaudu Primary Health Clinic	Public	8.81137	8.66139
TunganNupawa Health Clinic	Public	8.82004738	8.6413908
Ugah Primary Health Clinic	Public	8.80341	8.69306
Ugwan Isa Health Post	Public	8.64784	8.61696
UngwanAzara Health Clinic	Public	8.52101821	8.6092789
UngwarRere Primary Health Clinic	Public	8.59242833	8.522765
Voice of Islam Hospital	Private	8.52363	8.52368
Wadata Primary Health Care Clinic	Public	8.51592	8.49293
Wakwa Primary Health Care Clinic	Public	8.57233	8.49572
Wauwau Maternity Clinic	Private	8.52708	8.48658
Wayo Health Clinic	Public	8.75575	8.81086
Zamalak Primary Health Care Clinic	Public	8.98318	8.89919
Zumuntal Clinic	Private	8.65733	8.52443

Source: Ministry of Health Lafia, Nasarawa State (2021)

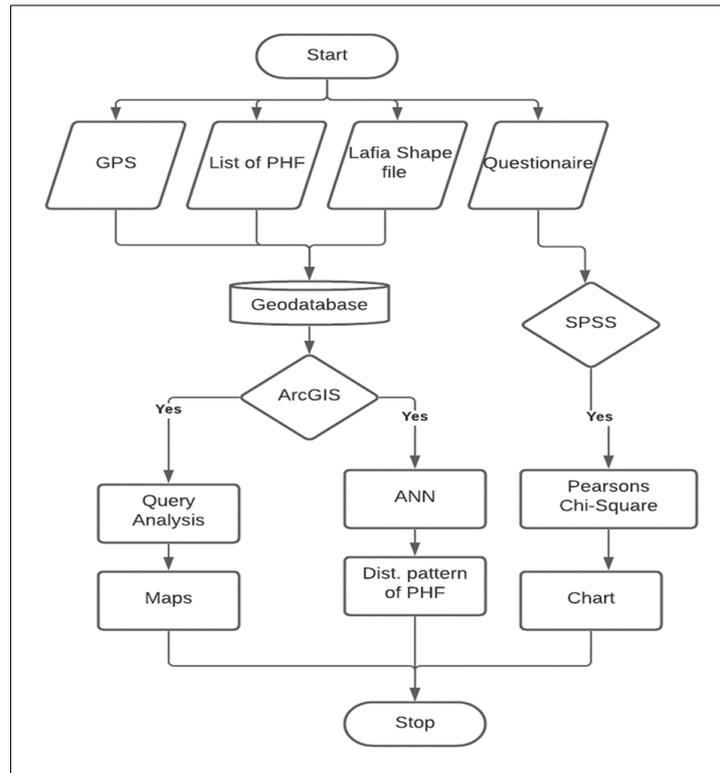


Figure 2 Methodology Flowchart

3. Results and discussion

The study analyzed the spatial distribution of primary health facilities in Lafia, Nasarawa State, Nigeria, revealing 135 public and 39 private facilities, with private facilities not evenly distributed. The results of the analysis showed three distribution patterns of health facilities in the study, Low clusters, random, and high clusters were the three prominent patterns identified in the study area. Further analysis showed that the identified primary health facilities were significant at ($P=0.01$) and ($P= 0.05$). It was established that the health facilities tend to be clustered between low and high at the aforementioned significant level.

3.1. Correlation Analysis of Patronage of Primary Health Facilities and Distances

The correlation shows whether there is a significant relationship between patronage of health facilities and distance in the study area as well as the direction of the relationship. The results of the correlation analysis are presented (Table 1). This study reveals a significant relationship between health facility distance, service efficiency, types, and patronage factors, with a magnitude of $P<0.01$. While the types of healthcare facilities had no significant relationship with factors influencing the patronage pattern. Correlation analysis shows a strong correlation between distance to health facilities, service efficiency, and patronage factors, with weak correlations between facilities and patronage patterns. Positive and negative correlations were also observed. This implies that the longer the distance the lower the patronage pattern and the rate of service efficiency of PHFs induced by low patronage. Also, the positive correlation here indicated the relationship between patronage and rate of efficiency, that is the high level of service efficiency commands high patronage pattern.

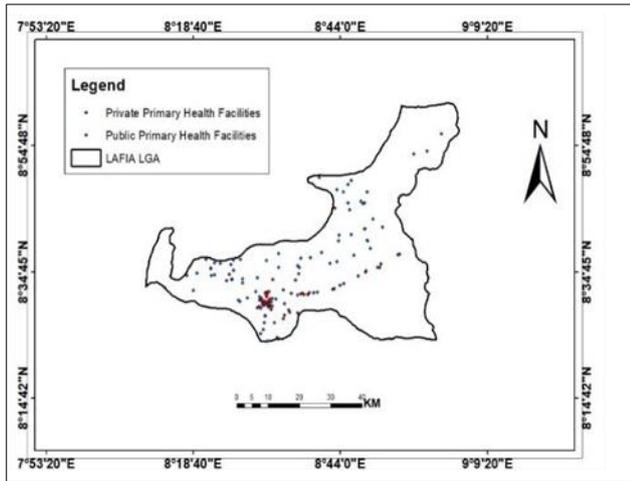


Figure 3 Distribution of public and private Primary health facilities in Lafia

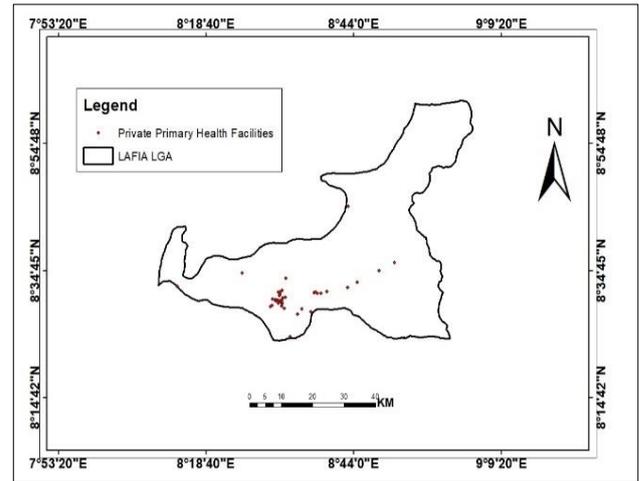


Figure 4 Distribution of private Primary health facilities in Lafia, Nasarawa state

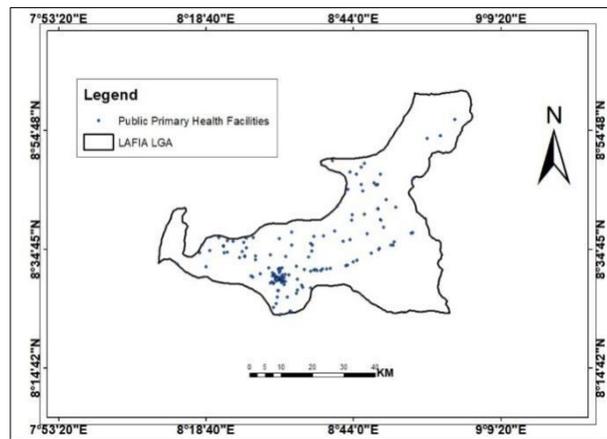


Figure 5 Distribution of public Primary health facilities in Lafia, Nasarawa state

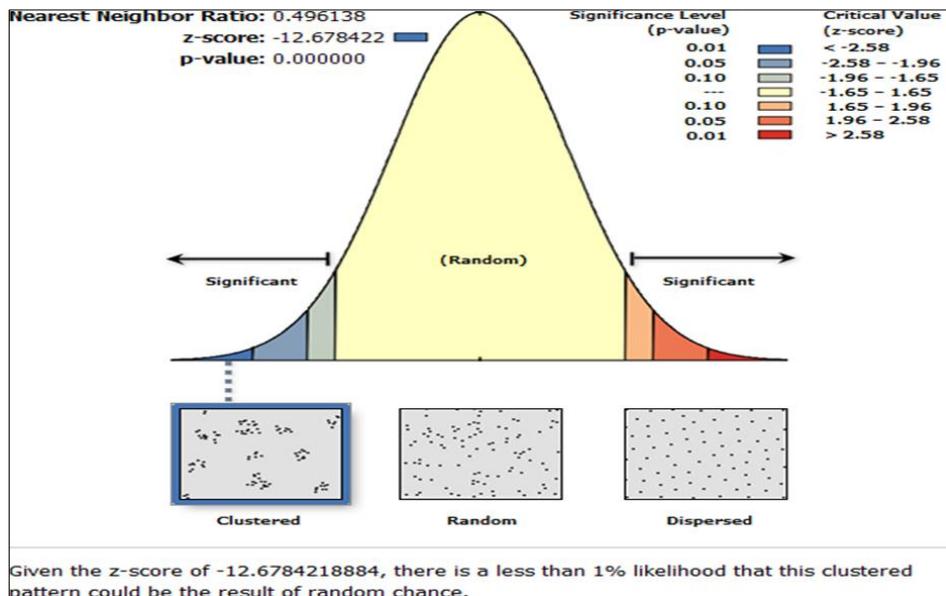


Figure 6 Results of Nearest Neighbour Analysis on Distribution Pattern of PHFs

This study investigated the distribution pattern of two primary health facilities in the study area using Nearest Neighbour Analysis (NNA) using ArcGIS. The Nearest Neighbour Ratio (NNR) patch was used to determine if the pattern was random, clustered, or dispersed. The results showed that the distribution was clustered, with a Rn value of less than 1.0 and a less than 1% likelihood of random chance. The nor Result of the Nearest Neighbour Analysis on Distribution Pattern of Primary Health Facilities.

- The pattern does not appear to be significantly different than random.
- The result of the analysis shows that low and high clustering are significant at (P= 0.01) and (P= 0.05)

Table 2 Results of Nearest Neighbour Analysis on Distribution Pattern of PHFs

LGA	Observed Mean Distance (Meters)	Expected Mean Distance (Meters)	Nearest Neighbour Index (Rn)	Z-Score	P-Value
Lafia	1067.1549	2150.9218	0.496138	-12.678422	0.000000

3.2. Proximity of Health Facilities to Residence and Patronage Pattern

Distance of the identified primary health facilities to the respondents' residence obtained from questionnaire administration. It was revealed that majority of the PHFs were located within 2km to 3km of the respondents' residence and this accounted for 86(45.5%). Similarly, next in magnitude was those PHFs located above 3km away from the respondents' residence and this also accounted for 54(28.6%). The result of this analysis showed that the PHFs in Lafia were relatively far from the respondents' residence (Table 2). In addition, Figure 7 showed that 117(61.9%) of the total respondents indicated that patients were prepared to trek a long distance to receive treatment from primary health care while 72(38.1%) of the respondents indicated otherwise. It could be inferred that the readiness of the patients to trek a long distance to receive treatment was a result of the proliferation of public primary health care in the study area compared with the private counterparts. The public PHFs were easily accessible in terms of affordability and the low level of private PHFs might be due to competitively cheaper cost of treatments of the public

Table 3 Frequency Distribution of Types of Health Facilities in Lafia

Types of Health Cares	Responses	Percentage
Maternity	35	18.5
Primary health care	85	45
Hospital	32	16.9
Clinic	37	19.6
Total	189	100%

Table 4 Distance of Primary Health Facilities to Residence

Distance (Kilometer)	Frequency	Percentage
Less than 1km	35	18.5
1-2km	14	7.4
2-3km	86	45.5
3km and above	54	28.6
Total	189	100

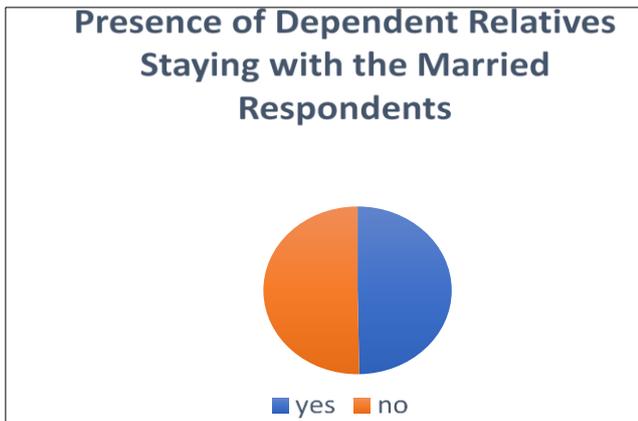


Figure 7 Sectorial representation of Dependent relatives staying with respondents

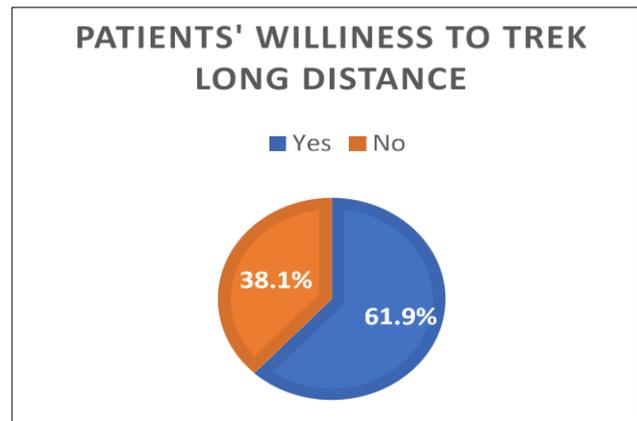


Figure 8 Patients Readiness to Trek Long Distance

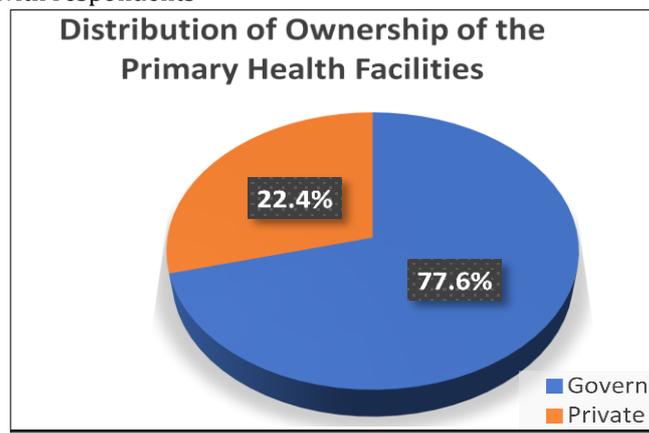


Figure 9 Distribution of type of ownership of the Primary health centre

The results of the regression analyses showed negative coefficient values which imply that any increase in the distance of the residents to health facilities would also produce a decrease in patronage of primary health facilities in the study area. The frequency distribution of PHFs showed that there was maternity, health centre, hospital and clinic which were 18.5%, 45%, 16.9%, 19.6% respectively, health centres have the highest frequency distribution of 45%. Frequency distribution of distance of PHFs to residents indicated that 18.5%- 1km, 7.4%- 1to 2km, 45.5%-2km to 3km and 28.6%- above 3km respectively, it was revealed that majority of the PHFs were located within 2km to 3km of the respondents' residence and this accounted for 86(45.5%). The result of Pearson chi-square showed that patronage pattern decreased with distance. Hence, null hypothesis was rejected to accept alternative hypothesis significant at $P < 0.05$.

This study found clustered primary health facilities in Lafia, Nasarawa State, with a low likelihood of random chance. The distance to home significantly influenced patronage patterns, with a strong correlation between service efficiency, facility types, and patronage factors. Primary health facilities in the study area were clustered, with a R_n of less than 1.0 and a significant probability of random chance ($P < 0.01$). The questionnaire revealed a strong relationship between primary health care facilities' proximity to homes and patronage patterns in Lafia, Nasarawa State. Factors that influence patronage include efficiency rate, facility types, and factors influencing patronage. Lower patronage patterns and service efficiency in primary healthcare institutions are a result of greater distances. Patronage and efficiency have a positive relationship, indicating that efficient service increases patronage. Regression analysis reveal negative coefficient values, which imply that putting residents further from healthcare facilities reduces use.

This suggests that residents primarily use government-owned facilities, possibly due to the proliferation of public health facilities and being the state capital. The study found that 70.9% of the population in the study area found primary health centers' treatment costs affordable, possibly due to the high number of government-owned healthcare facilities. Only 29.1% of residents found treatment costs unaffordable, possibly due to proximity to private facilities. The majority of respondents rated facilities as fairly efficient, with 34.9% indicating they were more government- owned

4. Conclusion and recommendation

The study found that 174 primary health facilities were clustered around thirteen electoral wards, with 135 public and 39 privately owned. Nearest neighbour analysis on Arc GIS revealed a clustered distribution. The prevailing trend of location analysis calls for proper planning. GIS tools are needed for research on health facility distribution and patronage in Lafia Nasarawa state, identifying coverage gaps and recommending intervention and planning strategies to improve health.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest is to be disclosed

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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