GIS-Based Assessment of the Spatial Pattern, Accessibility and Utilization of Healthcare Facilities in Keffi LGA, Nasarawa State, Nigeria

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DOI: 10.56201/ijhpr.vol.10.no5.2025.pg1.17

Abstract
It has been observed that public policy on healthcare provision in Nigeria over the years addresses the distribution and spatial equity question mainly at the regional level while neglecting the distribution of such facilities within a given Local Government Area (LGA). This study, therefore, mapped and examined the pattern of, and accessibility to, the identified healthcare facilities (HCFs) in keffi LGA, and then assessed the level of their utilization. Using Global Positioning System (GPS) handheld receiver to geo-locate the identified HCFs across the 10 wards, the GIS software was used to create a database in ArcCatalog (ArcGIS). The spatial pattern was analyzed using the Average Nearest Neighbour Statistical Analysis (ANNSA) while the utilization of HCFs was assessed from 200 copies of questionnaires randomly distributed purposely to adult population made up of HCFs users and managers. The ANNSA reveals that with an Observed Mean Distance of 0.009957 Degrees, Expected Mean Distance of 0.008385 Degrees, Nearest Neighbor Ratio of 1.187494, a z-score of 1.682398, and a p-value of 0.092492, there is a less than 10% likelihood that the observed dispersed pattern of healthcare facilities could be the result of random chance. The study also revealed that Kofa Pada PHC is the most centrally located HCF in Keffi LGA with a 6km maximum distance to travel from the Centroid of Urban Keffi. The study further showed that cost effectiveness of health services is ranked 1st (66%) as one of the major factors responsible for the choice or utilization of HCFs in the study area. This is understandable as most of the facilities are government-owned and are usually subsidized for National Health Insurance Scheme (NHIS) card holders. On the average, 33.5% of the patients only need to move within less than 1km while 56% do travel between 1 and 5km to obtain medical services while only about 9.5% had to travel >5km. The non-availability of doctors, especially, in the rural-urban fringes of rural Keffi do sometimes warrant their movements to Keffi urban to access HCFs such as the Federal Medical Center (FMC) and the General Hospital, Keffi. Despite the services obtained in various HCFs, rudeness of some nurses have to be curtailed so as to improve access to, and utilization of, available HCFs. More NHIS approved HCFs are needed in Keffi LGA.

Keyword: *Accessibility, Average Nearest Neighbour Analysis, GIS, Healthcare Facility (HCF), Utilization*

1. Introduction

Reiterating the World health Organization's (WHO) definition of health, Medicalnewstoday (2025) affirmed that *health* is a state of complete physical, mental, and social well-being and

not merely the absence of disease or infirmity. It is also asserted that the word *health* refers to a state of complete emotional, mental, and physical well-being and that healthcare exists to help people stay well in these key areas of life. In other words, health is a resource for everyday life, not the objective of living, as well as a positive concept emphasizing social and personal resources, as well as physical capacities. Consequently, good healthcare delivery in a harsh environment where seasonal weather variations can lead to health hazard like harmattan (dry weather with huge amount of suspended particulate matter) will require health impact assessment that will take into consideration effective and efficient healthcare system (Sufiyan, Mohammed, Bello & Zaharaddeen, 2020; Bello & Omoyajowo, 2015).

According to the World Health Organization (WHO, 2025), the World Health Day, celebrated on 7th April 2025, kicked off a year-long campaign on maternal and newborn health. The campaign, titled *"Healthy beginnings, hopeful futures"*, urged governments and the health community to ramp up efforts to end preventable maternal and newborn deaths, and to prioritize women's longer-term health and well-being. It has been predicted that 2025 is poised to be a pivotal moment of transformative changes in medicine as groundbreaking technological advancements will reshape healthcare, enhancing efficiency (Medparkhospital, 2025). The health trends anticipated for 2025 signal a significant transformation of the healthcare landscape. Treatments are expected to become increasingly precise and personalized, emphasizing holistic care that addresses physical and mental well-being driven by cutting-edge technology. It is anticipated that people will have easier and quicker access to health information and medical services as time goes on as 2025 is foretold to revolutionize healthcare, ushering in a new era of precision and accessibility that promotes sustainable and improved well-being. Based on current trends, a staggering 4 out of 5 countries are off track to meet targets for improving maternal survival by 2030; as 1 in 3 will fail to meet targets for reducing newborn deaths (WHO, 2025).

Medicalnewstoday (2025) has recognized different types of health. For instance, mental and physical health are probably the two most frequently discussed types of health. Spiritual, emotional, and financial health also contribute to overall health. Medical experts have linked these to lower stress levels and improved mental and physical well-being. People with better financial health, for example, may worry less about finances and have the means to buy fresh food more regularly. Those with good spiritual health may feel a sense of calm and purpose that fuels good mental health.

Furthermore, Medicalnewstoday (2025) opined that a person who has good physical health is likely to have bodily functions and processes working at their peak, and this is not only due to an absence of disease. Regular exercise, balanced nutrition, and adequate rest all contribute to good health. People receive medical treatment to maintain the balance, when necessary. Thus, physical well-being involves pursuing a healthful lifestyle to decrease the risk of disease. Maintaining physical fitness, for example, can protect and develop the endurance of a person's breathing and heart function, muscular strength, flexibility, and body composition. Looking after physical health and well-being also involves reducing the risk of an injury or health issue, such as: minimizing hazards in the workplace, using contraception when having sex, practicing effective hygiene, avoiding the use of tobacco, alcohol, or illegal drugs, taking the recommended vaccines for a specific condition or country when traveling. Consequently, good physical health can work in tandem with mental health to improve a person's overall quality of life.

As noted by Joachim, Osibanjo & Abioro (2020), healthcare planning in low-and-medium-income countries can be intellectually demanding. However, users' centric planning approach is intuitively promising to enhance utilization, resource allocation, and strengthening of the health system. The importance of healthcare to humans can never be over-emphasized. For instance, adequate and equitable distribution of health care facilities (HCFs) in rural areas, and in urban areas by extension, is critical to human capital development (Awoyemi, Obayelu & Opaluwa, 2011). Correspondingly, healthcare management requires dedicated facilities and infrastructure because of the delicate nature of some aliments. Conceptually, healthcare facility (HCF) is any location where healthcare delivery is available; and it ranges from small clinics with doctor's office to urgent/emergency care centers and large hospitals with elaborate emergency rooms and trauma centers. The number and quality of medical facilities in a country or region is one common measure of the prosperity and quality of life; thus, the increasing population, especially in developing countries such as Nigeria, amplifies the demand for more health facilities other than the numerous local herbal care homes where malaria and other ailments are treated (Rilwani & Bello, 2015).

In Nigeria, HCFs are usually owned by both the government and private individuals. No matter who owns it, where to locate a new HCF is an important question to ask as site selection plays a vital role in the hospital construction and management (Garg, 2024). On the part of government, appropriate hospital site selection will help optimize the allocation of medical resources, matching the provision of health care with the social and economic demands, coordinating the urban and rural health service development, and easing social contradictions. On the part of the citizen, proper hospital site selection will improve access to the health care, reduce the time of rescue, satisfy people's medical needs as well as enhance the quality of life. On the part of the investors and operators or managers of the HCF, optimum hospital site selection will definitely be cost saving on capital strategy. Resulting from the above premise, it is important to note that it is an inevitable trend for hospitals to adopt cost accounting in order to adapt to the development of the market economy. Besides, better HCF site selection will promote the strategy of brand, marketing, differentiation and human resource, and thus enhance healthy competitiveness which ultimately favours the people (Garg, 2024). Keffi LGA suffers from distribution disadvantage due to poor locations.

2. Literature Review and Conceptual issues

As reiterated by Joachim, Osibanjo & Abioro (2020), the location of healthcare facilities is known to influence its utilization and efficiency, as proximity to them do influence the decision to seek and receive healthcare services. The question of who gets what and where, in terms of public facilities in rural and even urban area has not been fully exploited in the Nigerian context hence, the integration of Geospatial Mapping of Healthcare Facilities in heathcare assessment has become inevitable in order to achieve a balance geographic spread (Abubakar & Ibrahim, 2013). It should be noted that the health of the people does not only contribute to better quality of life but also essential for sustained economic and social development of the Country. Interestingly, health is known to be an important resource in the process of economic development, thereby making expenditure on health a productive investment. This is because, the status of health of any population at any point in time determines the level of her productivity (Rilwani & Bello, 2015). Owoseni, Jegede and Ibikunle (2014) opined that the health seeking behavior of people and utilization of healthcare facilities is influenced by the socio-economic status of people. Utilization is the way in which something is put into use and there are number of factors which facilitate the utilization of any facility, including healthcare infrastructures. Accessibility is key.

Accessibility refers to the ease of reaching destinations, including HCFs (Onokerhoraye, 1999). According to Beedasy (2010), access to health care services is a function of many variables which includes financial resources of patients, education, age, gender, race, access to medical insurance, availability of health providers, culture, knowledge of how and when to access health providers, recommendations of family and friends, familiarity with the hospital, geographical location of health care services, distance, transportation facilities and travel cost. It is the cost of travel in terms of distance time or expenses between patient and service locations that partly determines the patronage and utilization of HCFs. The geographic accessibility is anchored on how easily a health user can physically reach the provider's location (Onokerhoraye, 1999). When examining geographic accessibility to health care facilities, the dimensions put into consideration are spatial and special. The spatial considers the availability and accessibility while the special considers the socio-cultural and economic factors, all of which are important. Geographic access is a determining factor of healthcare seeking behavior of a patient for utilization of a facility to be achieved, this makes examining spatial availability and accessibility of health care facilities is important. As noted by Beedasy (2010), calculating physical accessibility to health care services can be done in several ways, these include; Euclidean distance (Buffering), road network analysis or road network travel time. The research emphasis is on the utilization of the facilities having considered location distribution, but accessibility is looked into as it influences the utilization of services in any region. Access to healthcare is an important component of an overall health system and it has a direct impact on the burden of disease that affects many countries in the developing world.

Jaro & Ibrahim (2012) opined that accessibility to HCFs has physical, time, economic and social dimensions. The physical dimension deals with the condition of the road, the time dimensions refer to the time spent on a journey, the economic dimension deals with money spent on a journey and the social dimension has to do with the culture and values of the people, which determines the use of particular facility. For any facility to be utilized in any region, the accessibility has to be considered and this is mainly hinged on the transport, which serves as a medium by which movement from one place to the other is made possible (Jaro & Ibrahim, 2012). Accessibility, therefore, aids the patronage and utilization of basic welfare facilities, which brings about changes in the use of such a facility (Onokerhoraye, 1999). The maintenance of good health and easy access to adequate healthcare has been a challenge to mankind. This challenge has led to attempts by government(s) and non-governmental outfits to set up public healthcare facilities (PHFs) in various parts of the world.

The tenability of Okafor's claim on how to determine who gets what in public healthcare services (Okafor,1981), even as at today, remains to be explored. This is one of the reasons for this study. Furthermore, Sanni (2010) reiterated that empirical studies in both developed and developing countries have linked inadequate access to HCFs with increasing, avoidable and preventable deaths. In investigating the level of provision of essential facilities (like healthcare), emphasis has shifted from mere provision to the degree of accessibility of people to these facilities (Onokerhoraye, 1999). Barton & Tsourou (2000) re-emphasized in their observation that human beings are the centre of concern for sustainable development and they are entitled to a healthy and productive life in harmony with nature. Awoyemi, Obayelu & Opaluwa (2011) noted that improvement in health leads to improvement in life expectancy, which serves as a robust indicator of human development. Therefore, there is need for adequate and equitable distribution of HCFs in any given region or nation in order to increase overall productivity. This partly justifies this study using Keffi LGA as a proof-of-concept.

Evidences have shown that among poor countries, increase in life expectancy is strongly correlated with increase in productivity and income (Deaton, 2003). Consequently, increased productivity by individual or group of people in all sectors depends on the health conditions of the labor force, while improved health and quality of life depends, to a large extent, on the availability of, and accessibility to, health care facilities at affordable cost. The utilization of these health care services by people they are provided for is regarded to be paramount: as it is assumed that increased access and use of health services will improve the health status of the population (Onokerhoraye, 1999). It has been separately reiterated by Manzoor, Hashmi & Mukhtar (2009) and Onah, Ikeako & Iloabachie (2009) that health care utilization by a population is importantbecause it is related to the availability, quality and cost of services, as well as to socio-economic structure and personal characteristics of the users. Nevertheless, more is still expected to be done in addressing this issue, and an attempt to address the disparity in localities like Keffi Local Government Area (LGA) in Nasarawa State (the study area) from a technical perspective for better and effective planning requires the use of an information management tool such as the Geographic Information Systems (GIS).

The Geographic Information System is a robust suite of technical software designed to accept, analyze, store and output geo-referenced health information in static mode or from crowd-sourced media (Rilwani & Bello, 2015: Bello & Ojigi, 2013). Among the many tools for solving health spatial locational problems, GIS has been acknowledged for its capability in spatial planning and management as far as healthcare distribution and utilization are concerned (Akpan & Njoku, 2013).

Methodologically, a GIS or Geoinformatics (computer-based technical geography dealing with map and database) consists of components which interacts together to answer spatial questions of *what* (spatial feature/phenomenon) is *where (location)*, *when (time of occurrence)*, *how (pattern/condition/status)*, *why (reasons behind occurrence)*, and *what if*? *(conditional statement requiring prediction)* can be relied upon in decision making process (Bello, 2023). The components of a typical GIS includes geodata, hardware, software, users and operational procedures. GIS technology has been associated with mapping and management of health and natural resources (Sufiyan, Mohammed, Bello & Zaharaddeen, 2020). To Longley, Goodchild, Maguire & Rhind, 2005), GIS represents three different concepts which are; information system about a territory, its database (attributes), and the software (Nichols, *nd*). Representation of these data in GIS is done based on the perception of the earth surface and it is usually represented in two formats; raster and vector data formats. The raster format is a field representation where points in space have values attached to it. It represents a continuous field such as elevation, temperature, vegetation or water flow while the vector format is a geometric object representation where spatial phenomena are defined as lines, points and polygons, it is arc-node representation which stores points by (x,y) or (x,y,z) coordinates (Bello & Ojigi, 2013). It is a discrete field representation which describes a relative position of objects to one another. In addition, the vector data format can also be used for continuous data but such representations lead to more complex algorithms for analysis than the raster data representation, in the same manner, raster data format can also be used for discrete feature representation (Galati, 2006).

In GIS analysis, a phenomenon is the entity which has been seen to have a spatial location on the surface of the earth, its database talks about the attributes of the entity; this gives a description about the different characteristics of the object or entity. These attributes are usually

managed in a database which uses coordinates or identification numbers to link attributes to the data it represents. Among the software used for this analysis are ArcGIS, Erdas Imagine, ILWIS, and IDRISI. In this research, GIS is used for the analysis of data with spatial references in order to give a visual representation of phenomena and to solve location problems of HCF in Keffi LGA in terms of spatial planning.

Based on the above premise, this research tends to concentrate on the spatial pattern, accessibility and Utilization of mostly Government and privately owned Health Care Facilities delivering immunization using GIS as a tool in data capture, database creation, analysis and presentation of results. According to Galati (2006), GIS system is a collection of computer hardware, software, and geographic data for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographically referenced information. It is simply put as set of useful tools, which helps everyone from scientists to ordinary citizens to solve geographic problems (Bello, 2023). This tool and computer-based system seems to be so efficient and accurate in solving most, if not all, health and environmental issues as long as it has its basis in geographic space as demonstrated in similar health studies (Cromley & McLafferty, 2002; Sufiyan *et al.*, 2020; Bello, 2023). For instance, Rilwani & Bello's (2015) studies have proven that GIS and related spatial analysis provides a set of tools for understanding the spatial organization of health care activities. It has been used by several scholars to combine different data and generate information required for decision making in health management (Black, Ebener, Aguilar, Vidaurre & El Morjani, 2000), hence the adoption of GIS technology in this study.

This study, therefore, seeks to examine the nature of the spatial pattern, accessibility to, and the level of utilization of existing healthcare facilities in Keffi LGA, Nasarawa, Nigeria.

3. Materials and Method

3.1 Study Area Description

Geographically, Keffi Local Government Area (LGA) in Nasarawa State, Nigeria (Figure 1a) is located between latitudes 8^0 18' N and 8^0 51'N, and longitude $7^0$18'E and 7^0 40'E.

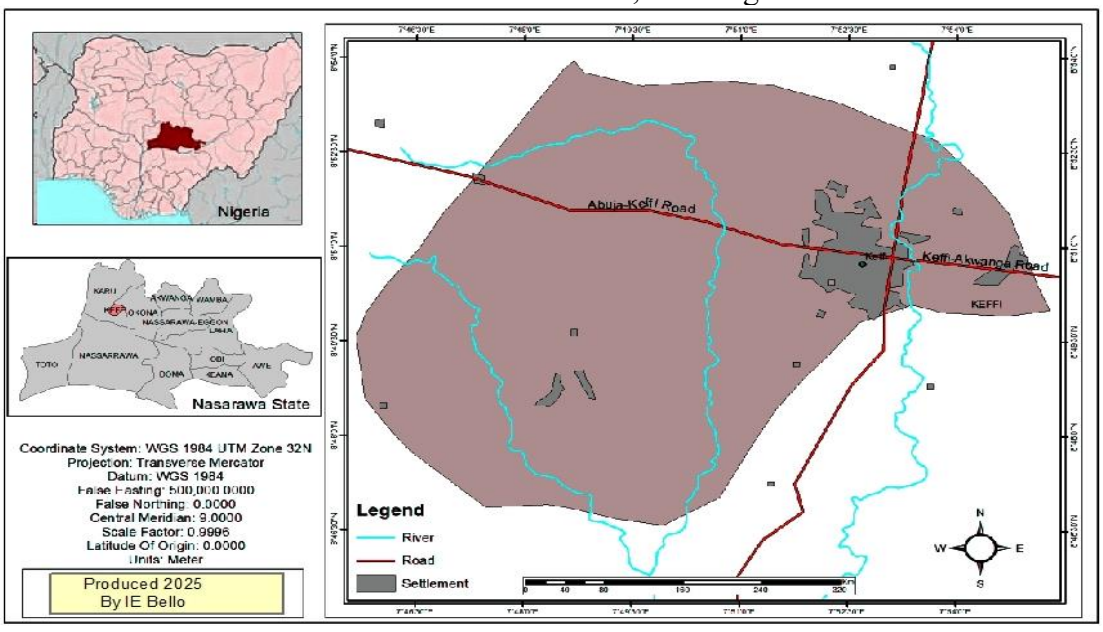

Figure 1a: Location of Keffi Local Government Area in Nasarawa State, Nigeria
Source: Adapted from the Administrative Map of Nasarawa State, NAGIS, Nigeria

Keffi LGA has a population figure of 92,664 people as at 2006, comprising of 47,527 males and 45,023 females (NPC, 2006) with a postal code of 961. Historically, Keffi town was founded around 1802, A.D. by a Fulani warrior leader called Abdul Zangan who took the title of Emir (Sciortino, 1920; Muzzammilwrites blog, 2017). Keffi LGA is made up of people of diverse ethnic and cultural background. Some major tribes in keffi LGA includes Fulani, Hausa, Mada, Eggon, Yeskwa, Gwandara and other minority. The area is characterized by a tropical sub-humid climate with two distinct seasons. The wet seasons last from the beginning of May and ends in October. The dry season is experienced between November and April. Temperature is generally high during the day particularly between the months of November and April. The mean monthly temperature ranges between 20^0C and 34^0C with the hottest months in March and April and the coolest months being December /January (Figure 1b). Annual rainfall figure ranges from 1100mm to about 200mm about 90% of the rain falls between May and September the wettest months being July and August (Figure 1c)

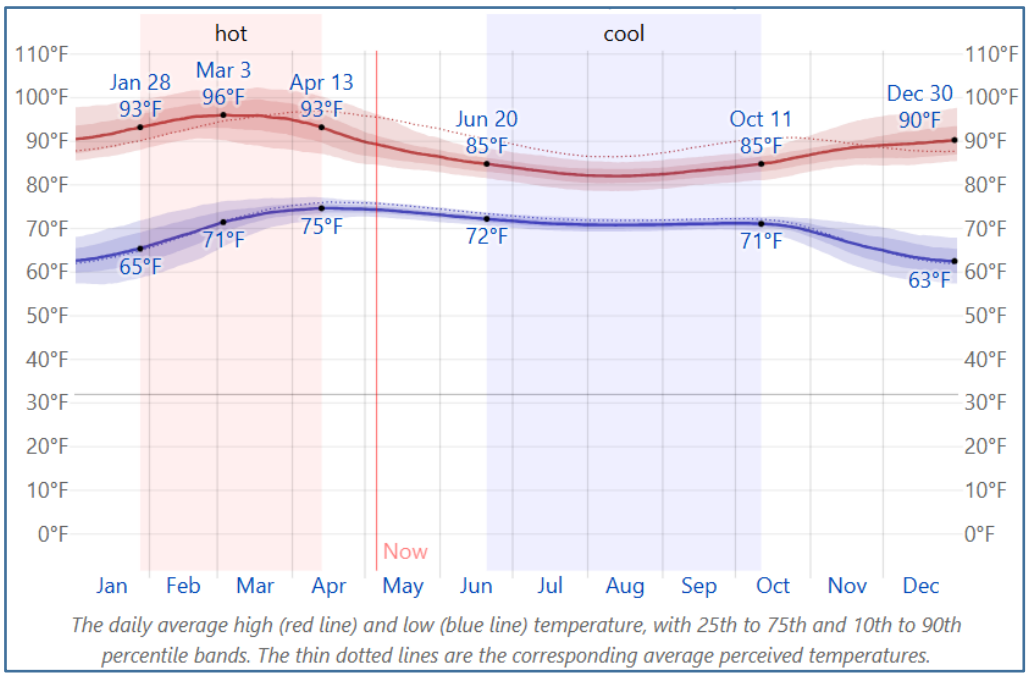

Figure 1b: Average High and Low Temperature in Keffi

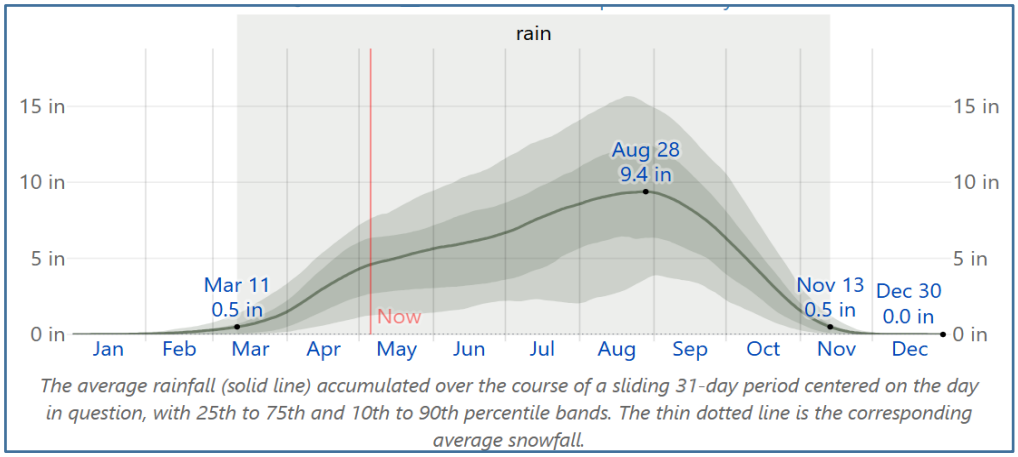

Figure 1c: Average Monthly Rainfall in Keffi, Nasarawa State

Nigeriahttps://weatherspark.com/y/55089/Average-Weather-in-Keffi-Nigeria-Year-Round

Most of the inhabitants of Keffi are mostly farmers and civil servant. Human activities, climate change coupled with rural poverty have led to increased deforestation in the rural areas of Nigeria. Most farmers in keffi are poor and rely on subsistence agriculture for a living, this has a direct relationship with their nutritional intake and invariably their state of health.

Agriculture is the mainstay of the people in Keffi LGA because the fertile nature of the land allows the production of varieties of both grains and root crops such as maize, beans, yams, cassava, among others. In addition to varieties of fruits trees and herbs, about 70% of the land area in Keffi LGA is farmland as there are local industries like wood carving, pottery, dyeing, cloth weaving and blacksmithing that also thrive in the area. Keffi Town is also one of the commercial centers in Nasarawa State. Its close proximity to the Federal Capital Territory (FCT) has led to development of housing estates, hotels, business centers, shopping centers. The town is growing fast since the location of the Nasarawa State University in Keffi, the School of Health and Federal Medical Centre, together with other private healthcare centers.

3.2 Materials and Method

All Government owned Primary Healthcare Facilities (PCF) operating in keffi LGA constitutes the population for this research work. As a check, private healthcare facilities that offers similar services were also examined. These healthcare facilities are charged with the responsibility of taking care of the health issues as well as improving the health status of the people through health intervention strategies and services. Keffi LGA constitutes 10 wards, . In terms of data used and sources of collection, field survey was carried out to obtain locational and attribute information of Healthcare Facilities. The handheld Garmin 72s Global Positioning System (GPS) receiver was used to collect the Geo-locational attributes (coordinates of the PHC facilities).

Also, user information was gathered from residents and healthcare managers using 200 copies of structured questionnaire in each of the wards visited to enquire about the choice of health care facility and to know reasons for their choice. For sampling the target group, the purposive sampling was used. Purposive sampling means sampling selected population based on the need of the researcher, which is health-centric. In this case, only perceived adults more than 18 years were targeted. In the same manner, data gathered from the management of the Healthcare Facilities surveyed in the sampled wards include their capacities in terms of status or number of Doctors, Nurses/Midwives, Bed space and Laboratory Technologists and other medical specializations using questionnaires. Others include data on the list of all Primary Health Care facilities in the LGA which was obtained through the Health Department of Keffi LGA, so as to identify the Settlements with these HCFs in the study area. The administrative map of Keffi LGA was sourced from the Nasarawa Geographic Information Service (NAGIS) which served as the base Map. Most recent satellite image covering the study were acquired to map the spatial extent of settlements from Google Earth Pro.

In specific terms, the objectives analyzed were carried out as follows:

(i) The spatial pattern and accessibility to healthcare facilities in Keffi LGA were examined first by mapping the geographic locational spread and then using the Average Nearest Neighbor Analysis (ANNA) tool in ArcGIS to determine the spatial pattern. The ANNA spatial statistical method is selected for this study because of its capability in examining the spatial disparity in point datasets of a given data layer such as HCFs' locations. The

statistical pattern of spatial spread of either as Random, Clustered or Dispersed enable the researcher to advice policy makers on what to do in ensuring equitable distributions of PHC facilities in Keffi LGA. In assessing the spatial distribution and utilization of the primary health facilities found in the study area, the category of the facilities such as government owned, private owned and other health facilities were determined and mapped, so also the distribution pattern of the capacity of the health facilities. With the existing general spatial distribution map, each information for mapping were plotted on the map in the ArcMap environment to show the distribution pattern. With each facility located as point features in the ward map using their geo-locations, the attribute data of each facility was compiled in MS Excel which was then integrated into the ArcCatalog in ArGIS software.

To assess the specific geographic/spatial accessibility, the centroid of the healthcare facility was used as a based point and using the Euclidian distance (as the crow flies), the maximum distance to travel was determined therefrom.

ii. To access the level of utilization of existing HCFs in the study area, the collected questionnaires on the biometrics and response from users were computed and results shown using basic statistics such as graph; the frequency table was used as well to analyze the results. Statistical analysis and visualization (map) were carried out in this study because of the ease of understanding in data presentation (Rilwani, 2005). % Ranking (1st-highest to n- lowest) was used to show the level of services rendered in terms of important of utilization.

4. Results and Discussion

Result of the study shows that out of the 200 respondents sampled, the male respondents were slightly more with 102 (51%) while the female counterparts constitute the remainder 98 (49%). Similarly, the age distribution indicate a significant difference with ages 26 to 40 years having about 79 respondents (39.5%) followed by ages 15 to 25 with 66 respondents (33%) while the least age group is 71 years and above accounting for only 2 respondents (1%) (Figure 2).

In the same vein, 66% of the total surveyed are married, 24% single, 4% widower/widow, 3% divorced and the remaining 2.5% are separated. No doubt, married people do copulate and have the tendencies to utilize healthcare facilities especially during antenatal and postnatal followed with regular family check-ups.

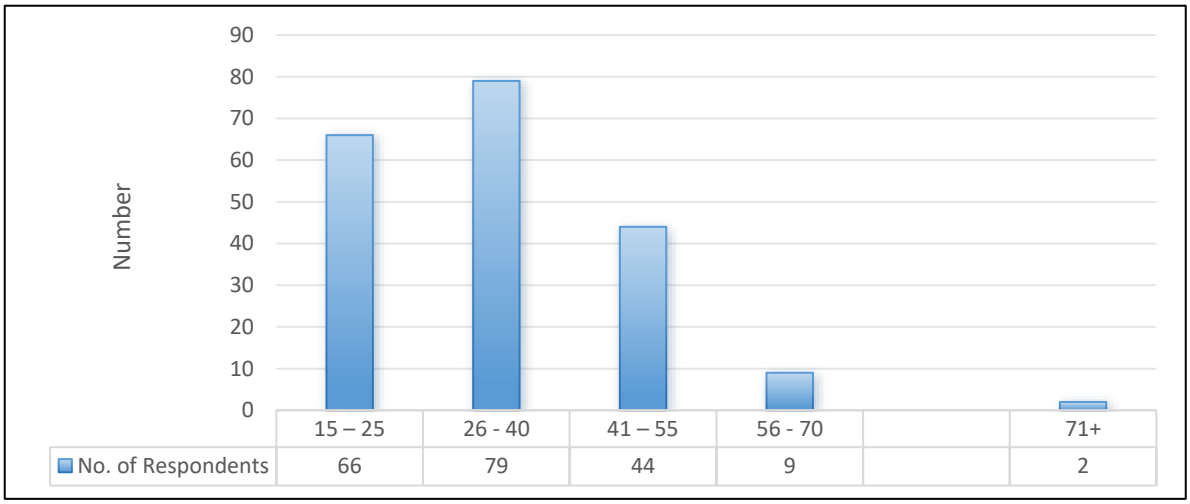

Figure 2. Age distribution of respondents to questionnaire survey in Keffi LGA
Source: Fieldwork (2024)

4.1 Geospatial Pattern and accessibility to healthcare facilities in Keffi LGAs

Figure 3 shows the dispersed spatial pattern of the identified healthcare facilities in Keffi LGA.

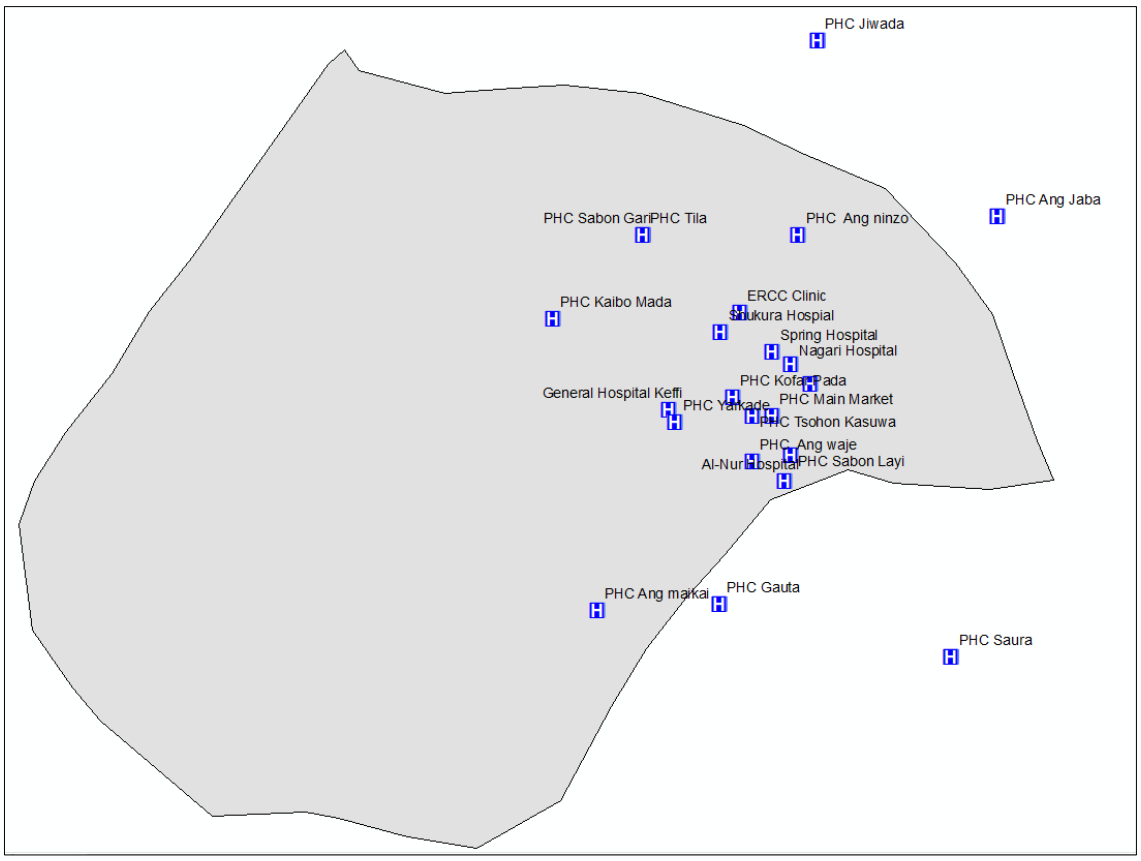

Figure 3: Spatial Pattern of Healthcare Facilities in Keffi LGA

Source: Authors' Fieldwork (2024)

In an attempt to examine the physical accessibility to the healthcare facilities in Keffi, the locational attributes (latitudes and Longitudes) of the respective facilities which were subjected to the Average Nearest Neighbour Statistical Analysis (ANNA) reveals that with an Observed Mean Distance of 0.009957 Degrees, Expected Mean Distance of 0.008385 Degrees, Nearest Neighbor Ratio of 1.187494, a z-score of 1.682398, and a p-value of 0.092492, the result of the ANNA analysis (Figure 4) shows that Given the z-score of 1.68, there is a less than 10% likelihood that the dispersed pattern could be the result of random chance since it is it shows a dispersed pattern.

Figure 5, 6 and 7 respectively shows Kofa Pada PHC, the Most Centrally Located Healthcare facility in Keffi LGA, 6km Maximum Distance to Travel from the Central Urban Keffi and the Elipse Pattern directional distribution of Healthcare facilities in Keffi. Distance to aa given HCF significantly impacts healthcare access, utilization, and patient outcome because longer distance coupled with longer travel times can lead to delays in seeking treatment, increased mortality, reduced adherence to treatment plans, especially in local rural or remote areas.

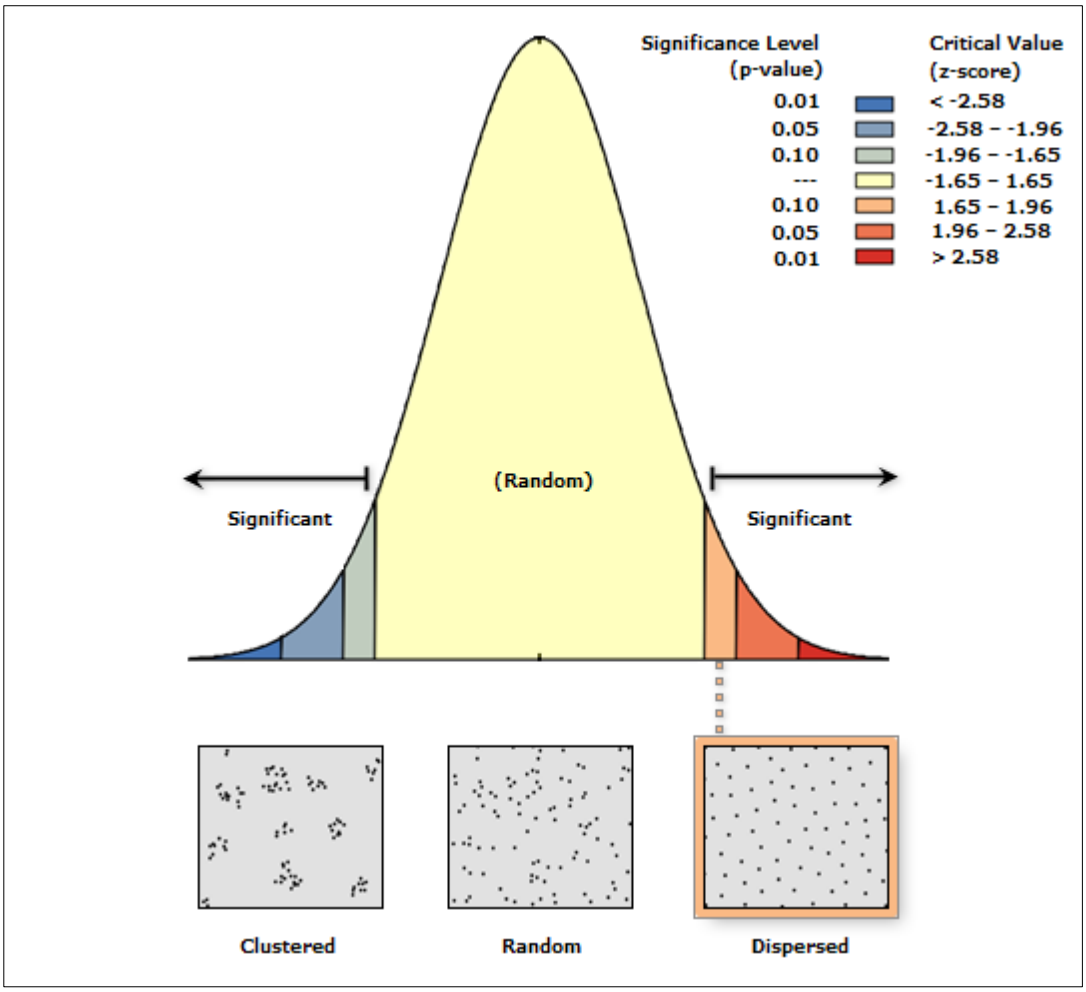

Figure 4: ANNA of Spatial Pattern of Healthcare Facilities in Keffi LGA

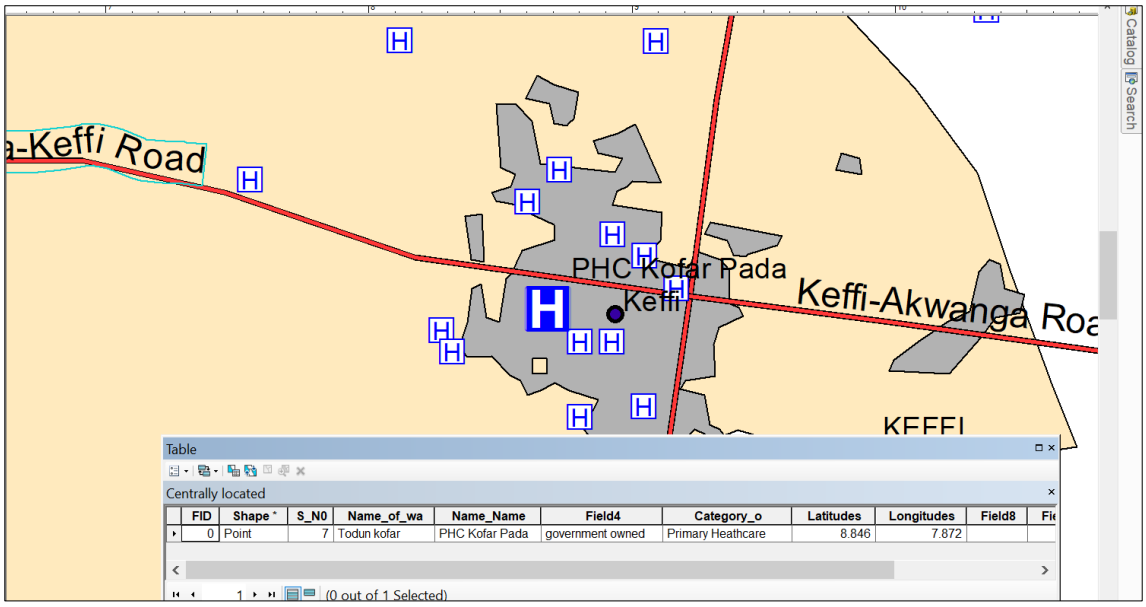

Figure 5: Kofa Pada PHC, the Most Centrally Located Healthcare Facility
Source: Authors' Analysis (2025)

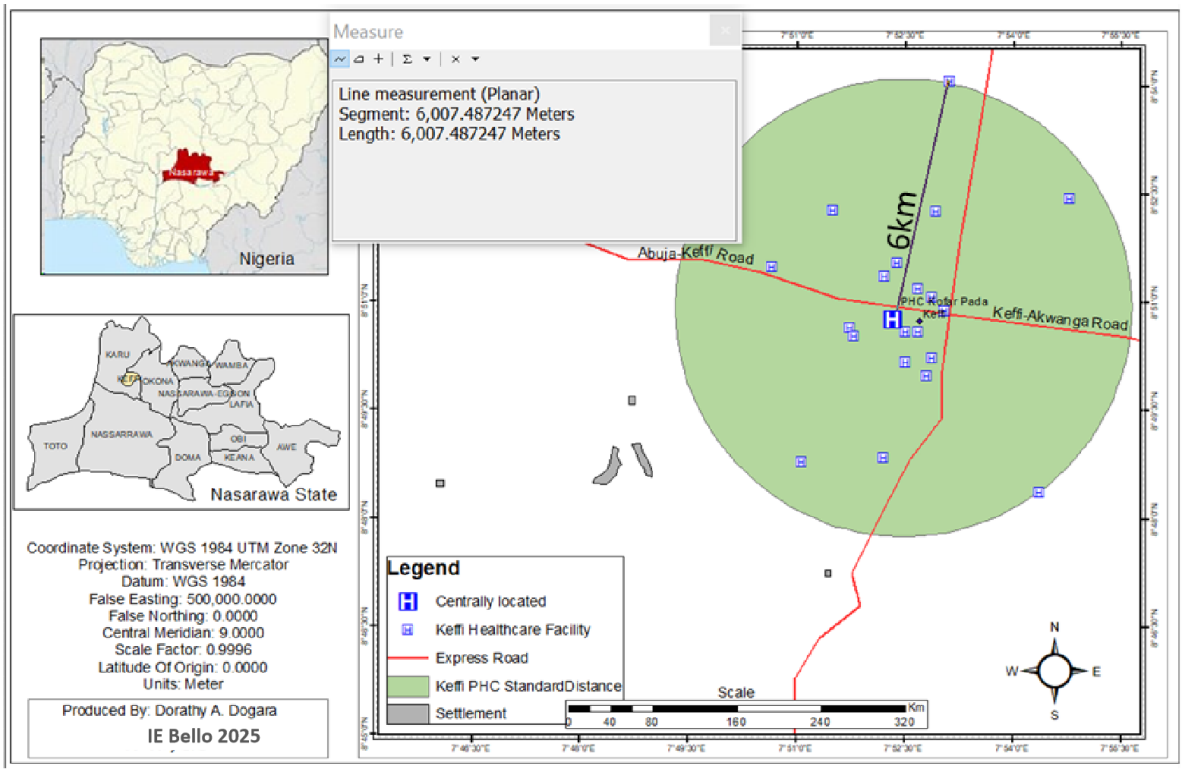

Figure 6: 6km Maximum Distance to Travel from the Central Urban Keffi
Source: Authors' Analysis (2025)

4.2 Utilization Assessment of Healthcare Facilities in Keffi LGA

4.2.1 Major Services Rendered in the Healthcare facilities in Keffi

The study showed that in terms of major services rendered in the healthcare facilities in keffi LGA (Figure 7), maternity services ranked 1st (186, 31.3%) closely followed by general consultancy (178, 29.3%) ranked 2nd were the topmost services carried out in the HCFs in the study area.

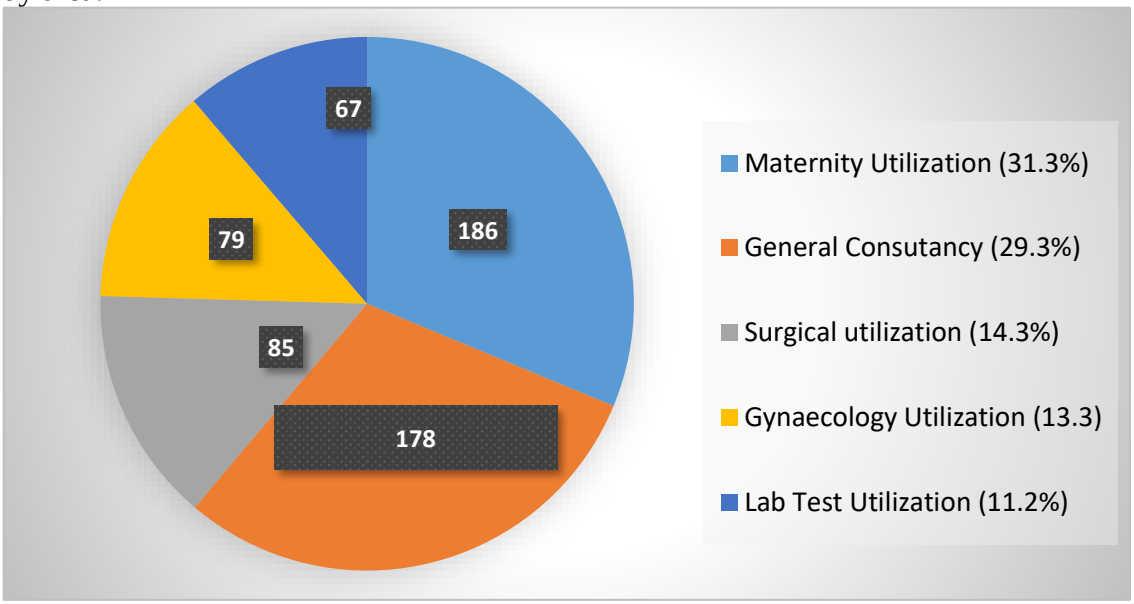

Figure 7: Patients' Utilization of Healthcare Facilities (HCFs)
Source: Fieldwork (2024)

Other services in order of rankings are Surgical services (85, 14.3% - 3rd), Gynecological services (79, 13.3% - 4th), and (e) Lab Test (67, 11.2% - 5th). The result indicate the importance of ensuring that maternal health services are made available always. This has been made easier with the advent of the National Health Insurance Scheme (NHIS) been utilized by patients. This scheme should be improved upon to allow more families have access to healthcare for the overall well being of the people because, health is wealth.

4.2.2 Ranking Factors Responsible for the choice of Healthcare Facilities in Keffi

In ranking of the factors responsible for the choice of Healthcare Facilities in the study area, the study showed, as indicated in Table 1, that among the competing rationale, Cost effectiveness [66%] is ranked 1st as the major reasons for the patronage of HCFs in Keffi LGA. This is understandable as most of the facilities are government-owned and are usually subsidized for National Health Insurance Scheme (NHIS) card holders and independent users unlike the privately owned healthcare facilities which are seen as been for the super-rich in the society. Secondly, availability of equipment is ranked 2nd with 13.5%, followed by suitability of locations with 11% (ranked 3rd) as most of the patients don't have to travel too far to access their choice of HCFs for their needs. Finally, and fifthly (5th), availability of drugs is ranked the least with 9.5%. This is due, partly, to the fact that most of the drugs can be purchased cheaply from nearby pharmacies; hence, it's not really the major reasons for their choice of HCFs when the need arises.

Table 1: Factors Responsible for the Choice of Healthcare Facilities in the study area

S/No.	Reasons for Choice of HCFs	No. of Respondents	%	Ranking
1.	Cost Effectiveness	132	66	1st
2	Availability of equipment	27	13.5	2nd
3	Suitability of location	22	11	3rd
4	Availability of drugs	19	9.5	4th
	Total	***200***	***100%***	

Source: Fielwdork (2024)

4.2.3 Cost, Distance and Time taken to Receive Healthcare Services in Keffi

The study revealed that as regards **financial cost**, 142 (71%) agreed that the cost of treatment is generally *moderate*, although 38 (19%) still holds the view that it is *Very expensive* with only about 20 (10%) agreeing that it is *not expensive*. The above claims, though perceptual, should be understandable in view of the fact that all patients are not equally endowed in terms of finance. One thing is clear, that, on the average, the cost of treatment in the study area is generally affordable.

As regards the possible **distance travelled** to access healthcare services, the study revealed as illustrated in Figure 8 that, on the average, 33.5% of the patients only need to move within less than 1km while, 56% have to travel between 1 and 5 kilometers to obtain medical services. This range of distance is within the allowable distance to access healthcare. It is also interesting to note that only about 9.5% have to travel between 6 to 10 km for same services. This is understandable as the non-availability of doctors, especially, in the rural-urban fringes of Keffi Local Government Area do sometimes warrant their movements to Keffi urban to access healthcare from facilities such as the Federal Medical Center (FMC) and General Hospital,

Keffi. As expected, only very insignificant number (1%) do agree to travel more than 10km to obtain similar services.

In terms of **time taken** to be attended to, about 62% agreed that it takes between 30 minutes to 1 hour to be attended to depending on the cases and doctors involved (Table 2). Nevertheless, others claimed that it can take even more than 1 hour, and up-to 3 hour, or more especially when medical tests are involved. This is similar to what obtains in many other HCFs in order to satisfy the patients.

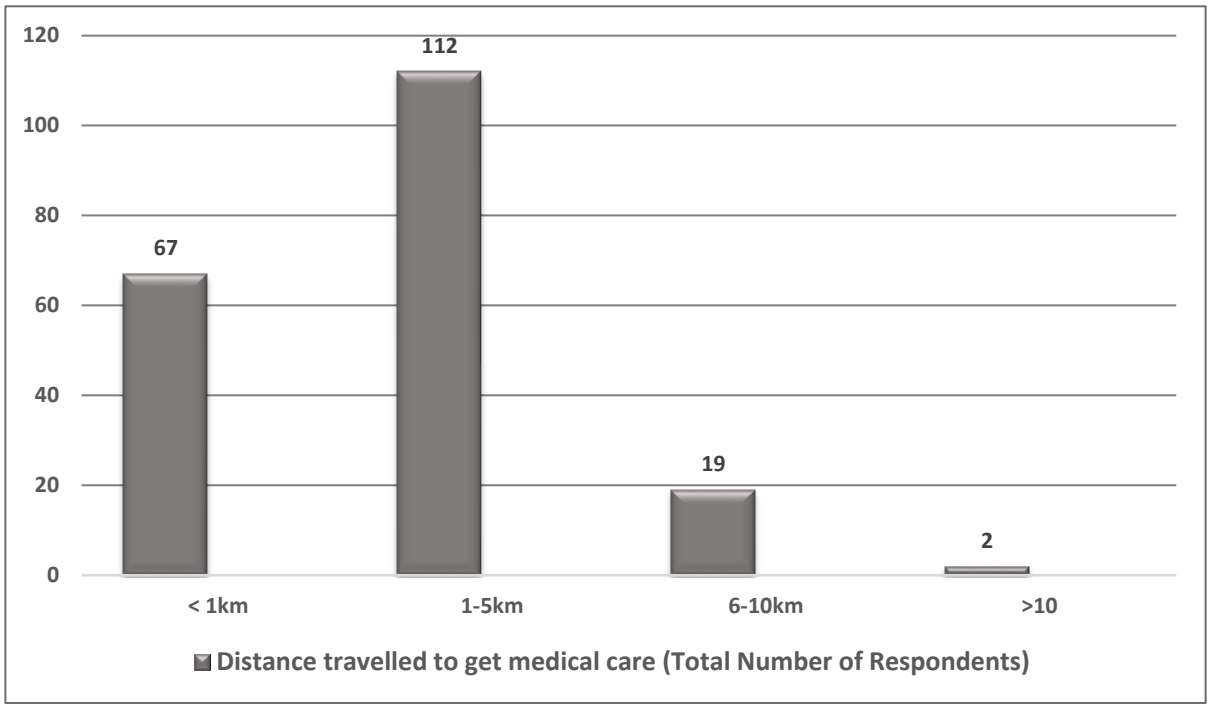

Figure 8: Distances travelled to access healthcare services in Keffi LGA
Source: Fieldwork (2024)

Table 2: Time taken to be attended to by Healthcare Officer

S/No.	Time Taken	No. of Respondents	%	Ranking
1.	30 mins - 1hr	124	62	1st
2	1 hr – 2 hrs	49	~25	2nd
3	2hrs and above	18	9	3rd
4	Almost immediately	8	4	4th
	Total	***200***	***100%***	

5. Summary and Conclusion

Literature reveals that in the first decade of the 21st century, the conceptualization of health as an ability opened the door for self-assessments to become the main indicators to judge the performance of efforts aimed at improving human health. Health is, therefore, seen as a resource for everyday life, and not the objective of living. Health is seen as a positive concept emphasizing social and personal resources, as well as physical capacities. Good health is a

major resource for social, economic and personal development and an important dimension of quality of life. Political, economic, social, cultural, environmental, behavioural and biological factors can all favour health or be harmful to it. Using geo-located sampling of Government hospitals and private healthcare facilities that render essential services, the study reveals that there is a less than 10% likelihood that the observed dispersed distribution pattern of healthcare facilities could be the result of random chance. The study also revealed that Kofa Pada PHC was the most centrally located Healthcare facility in Keffi with a 6km maximum distance to travel from the Centroid Urban Keffi. The study further showed that cost effectiveness of health services ranked 1st (66%) is one of the major factors responsible for the accessibility and utilization of health facilities in the Keffi LGA. On the average, 33.5% of the patients only need to move within less than 1km while 56% do travel between 1 and 5 kilometers to obtain medical services. It is important to remark that despite the services obtained in various HCFs, staff conduct needs to be improved upon as more NHIS approved healthcare facilities are recommended in Keffi to meet the growing need for health challenges.

Expression of interest: There is no competing interest in this paper.

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