ACCESSIBILITY OF PRIMARY HEALTHCARE FACILITIES IN CHANCHAGA LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

BY

BAHAGO, HAFSAT AHMED
MSUD /CHSUD/2018/7811

CENTRE FOR HUMAN SETTLEMENTS AND URBAN DEVELOPMENT (CHSUD), FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA

SEPTEMBER, 2021

ACCESSIBILITY OF PRIMARY HEALTHCARE FACILITIES IN CHANCHAGA LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

BY

BAHAGO, HAFSAT AHMED
MSUD /CHSUD/2018/7811

A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE MASTER IN SUSTAINABLE URBAN DEVELOPMENT (M.SUD), CENTRE FOR HUMAN SETTLEMENTS AND URBAN DEVELOPMENT (CHSUD), FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA

SEPTEMBER, 2021

ABSTRACT

The increasing need for the efficient and effective healthcare delivery in Nigeria has for long been the dream of many governments. Primary Healthcare Services as an instrument in ensuring the availability and functioning of healthcare services at the grassroot is present in Minna the administrative capital of Niger State in Nigeria. As the headquarters of urban Local Government, this study assessed the functions of the PHCs in Minna in other to gauge their accessibility to the target groups in terms of functions, physical access and satisfaction to service delivery. Using social and physical survey methods coupled with physical observations by the researcher, this study established that the PHCs are mainly in areas dominated by those earning low-income with many earning below the national minimum wage. The health facilities are spread across the study area, dominated by emergency and paediatric services and over 90% are general health clinics mainly attending to out-patients (over 75% do not admit patients). The daily capacity of the PHCs range from 5-25 patients, and over half (50%) do not have even a single medical doctor, but, each have at least a cleaner. About 60.2% of the facilities are within 1,000m (1km) distance from people as against the recommended 500, hence, only 20% of residents are able to walk to the health facilities. In terms of accessibility to the PHCs, over 70% of users are confronted by the issues of bad roads, 43% by high costs or charges due to low-income, and, 48% and 64% due to lack of manpower and equipment respectively. These factors are seriously challenging the full utilization of these facilities needed for sustainable urban development and management in growing urban areas like Minna and similar cities. In order to ensure sustainable and efficient urban primary healthcare services provision, it was recommended that there should be increased efforts of the government particularly the Local Government in terms of equipment and manpower provision; this can boost healthcare delivery and further reduce distance covered to access healthcare services. This also calls for the utilization of the strength and potentials of other stakeholders especially the Community Based Organizations (CBOs) in funding and safeguarding the PHCs and similar urban facilities in cities and towns.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

When it comes to the provision of public health care service, the achievement of social and spatial equity is one of the main objectives. The word equity brings to mind fairness and justice when it has to do with responsibility in the distribution resources in the community (Samuel & Adagbasa, 2014). One example is to ensure a balanced distribution of resources related to healthcare according to the population that are in need of them. It is regrettable to note that healthcare services are not evenly available and most people do not have adequate access to it (Alavi, Jiao, Buttlar, & Lajnef, 2018; Brock & Saks, 2015; Fotso, Ezeh, & Oronje, 2008; Y.-F. Lin, Shie, Yang, & Tseng, 2014; Luz, Masoodian, Cesario, & Cesario, 2015; Zahedi, Sizemore, Malcolm, Grossniklaus, & Nwosu, 2014).

Even though access is a spatial concept, it has become very vital not only in the discussion of healthcare accessibility but is indispensable when planning and delivering healthcare services. Current debate shows that there exist a state of confusion when the concept of access is being discussed (Lawanson & Fadare, 2015; Low & Iveson, 2016). More often, researchers have focused on how the place where services are located is related to where recipients of such services are located and this takes into consideration cost of travel, time spent and distances covered (Penchansky & Thomas, 1981).

Access has represented various things in different circumstances. In the context of people, accessibility describes how easy it is for an individual or a group of people to reach a given opportunity or a defined group of opportunities and this is called origin accessibility. In the context

of service provider, the concept of accessibility refers to how easy it is for a given destination to be reached with reference to an origin (Simmonds *et al*., 1998). This is usually termed as either destination, facility or catchment accessibility (Halden, *et al.,* 2005).

In terms of health facilities, accessibility means that the five types of healthcare (promotive, preventive, curative, rehabilitative and supportive) are collectively provided for the reach of every client irrespective of location. Most of the time, the underlying principle governing accessibility can better be made into operation by making the communities to manage vital services in healthcare delivery. To make healthcare accessible and to foster the concept of accessibility, professionals in healthcare are supposed to be distributed in rural, urban and remote communities. Accessibility here implies that beneficiaries have access to healthcare services from professionals within a suitable timeframe.

It is essential to locate public facilities in geographic areas that people can easily have access to. Making this decision is with the intension to provide services to different kinds of people in a fair and equitable manner. The fundamental principle regarding this decision is the concept of access. There are two distinguishable perspectives with regards to healthcare service when geographical view point is discussed (Di, Wang, Dai, & Yang, 2020; Dodman et al., 2013; Jayaweera, Ngui, Hall, & Gerdts, 2018; H. yu Liao, Cade, & Behdad, 2021) and these are: accessibility (potential accessibility) - making services reachable and available; and, Utilisation (revealed accessibility): making use of the services provided in real sense.

Due to changes in politics and the associated effect, people have been forced or willingly moved from one place to another and this has given rise to several challenges in attending to healthcare needs of the dispersed population in the society. There are differing perspective on how

accessibility is seen and this depends on the context of development of countries. In the view of Gulliford and Morgan (2003), low-income nations' is basically availability and accessibility of the fundamental healthcare services like being able to visit a doctor or to be attended to from the time of inception to the time of delivery. On the contrary, developed countries considers accessibility as the level of comprehensive healthcare service rendered or received by clients and the extent to which fairness and equity is realised and how efficient these healthcare services are (Gulliford & Morgan, 2003:1).

Inadequate state of healthcare accessibility is one major challenge confronting developing nations. A typical situation in Sub-Sahara Africa is frequent deprivation of people in need of healthcare service and it has often been reported by experts that adequate provision of healthcare services is becoming a major challenge in urban areas and according to Ewing, Handy, Brownson, Clemente & Winston (2006); Amer (2007); Lowe, Whitzman and Giles-Corti (2018); Abid, Ali, Rahut, Raza and Mehdi (2020), this may be linked to: rapid urban growth and the corresponding population; rising cases of poverty in urban settlements; and, slow economic growth.

The aforementioned reasons might be responsible for the current increase in rapid urban densities that further creates severe pressures on the available healthcare services and resources expressed by unbearable cases of long queues and long waiting times with regards of fair access to basic healthcare services. A common case in Nigeria is severe inconvenience, traveling of long distance and visiting of several healthcare service Centres provided in government facilities (FMH, 2011). In most cases, these are some low-income groups in the society who live in locations that are more exterior with regards to urban areas or groups of people that live in marginalized areas in the society. The implication of this is that some people are suitably integrated in the areas where they live while some are not. Apart from that, some of these areas have poor state of macro-accessibility

due to their exterior locations when it has to do with having access to healthcare facilities like hospitals, clinics and maternity.

1.9 STATEMENT OF RESEARCH PROBLEM

Having access to healthcare facilities is one vital area in the process of planning in health sector. Primary healthcare has remained the number one point of contact in the alleviation of the problems regarding none accessible healthcare products and related services. Nigeria has witnessed reduced challenges of none accessibility to fundamental health service since the introduction of Primary Health Care. This may be associated with the fact that Primary Health Care is operated in a decentralized manner in the society. Some people in the community have the opportunity to physically access Primary Health Care because of these facilities are strategically located to individuals to access them. But it is also important to note that there are many cases where people do not still have access to these healthcare facilities due to the fact that these people are remotely located. (Bahago, 2008; and Odubanjor *et al*., 2009) examined the distribution pattern of facilities like Primary Education and Health Care services in Nigerian cities and reported that there exists remarkable inequitable access to both the services and the facilities when it comes to comparing urban areas with rural areas, public and private sectors and northern and southern Nigeria.

It is a common knowledge that having access to effective and efficient healthcare service in Nigeria has continued to be limited and has continued to be a problem to many people (Ensor & Cooper, 2004). The implication of Access to Primary Health Care is that the facilities are available, the people are well informed about their availability, these facilities can be reached by the people they are met for and the cost enjoying the healthcare services is affordable. This also implies that people have access to the necessary information about these healthcare facilities, they can afford to pay for the service and these facilities a strategically located for people to have physical access to them

(Alumana, 2003). It is important to note that some issues have affected the willingness and ability of the people to access these healthcare and some of these impingement have remained unclear. This is in agreement with Inyan (19940 view that accessibility implies that ease at with potential healthcare seekers reach the place where healthcare service is rendered.

In the view of Brown, Franco, Rafah and Hatzel (1993), health care accessibility implies unlimited access by reason of geography, economic status, culture, religion, social affiliation, organization or language barriers. In the perspective of Frost and Reich (2008), one of the identified bottlenecks with regards to accessing healthcare facilities in Nigeria is the distribution of primary health service and this has created severe barrier to access to healthcare centres. This is in agreement with Inyang (1994) who noted that lopsided distribution of health facilities is a major problem confronting fair and equitable access to healthcare services in Nigeria and this implies that most of these facilities are located around urban settlements.

Rural dwellers have to travel long distance to urban centres in order to have access to these facilities. In most cases, some of these rural dwellers are confronted with a discouraging challenge of traveling long distance to access healthcare (World Bank, 2006). The work of Onokerhoraye (2000) has also showed in his study that geographical location has direct influence on access and utilization of health facilities in Nigeria. In the same vein, Ensor and Cooper (2004) also reported in their study that distance remain a deciding factor in accessing healthcare facility in Nigeria and that healthcare service declines with distance from the Healthcare Centre.

Several studies have also showed that there is inverse correlation between the utilization of healthcare facilities with distance from the people (Egunjobi, 1989 and 2008). This implication of this is that with increased distance of the people from the Primary Health Care Service, there exist

poorer utilization of the facilities and this is a common feature in many rural communities in Niger State and Chanchaga Local Government in particular (Bahago, 2008). Some rural communities in Chanchaga Local Government are encumbered with both physical and psychological distance between the people and healthcare facilities. The facilities may be physically close but the people can be said to be are culturally distant from them (Bahago, 2008; Mayer, 2013; Minelgaitė & Liobikienė, 2019).

These aforementioned challenges implies that the cases of rising rate of mortality in Nigeria may not be unconnected with poor access to Primary Healthcare services in most communities. It is also important to note that even though this is a common problem confronting most of the communities in Nigeria, it is worthy to mention that the way they manifest may not be the same from one location to another. This is in agreement with Frost and Reich (2008) with their conclusion that "the presence of effective health technology does not guarantee its delivery, use and the achievement of its tendency to deliver good health to the people". The major deciding factor here is distance and this can be physical or cultural.

For this reason, it is a major challenge to identify the factors influencing access to primary healthcare service in Chanchaga Local Government Area of Niger State. As urban local government with high population and poverty rates; it has become imperative to understand roles of healthcare in both curative and preventive service delivery systems. Hence, the necessity of exploring the impacts of spatial distribution and locational efficiency of the PHC system.

As metropolitan environments are dynamic in nature and will continuously experience development and relative expansion, Minna metropolitan area has continued to experience rising density with regards to population (Kawu, 2016; Umar & Kawu, 2011) and the effect is that service

delivery systems in Chanchaga Local Government have continued to experience overbearing pressure. Healthcare planners are confronted with ways to overcome these pressures on available healthcare facilities in the Local Government. This must put into consideration of future demand as they efficiently make use of the inadequate resources available.

1.10 RESEARCH QUESTIONS

1. Does geographical location influence accessibility to PHC facilities?
2. Are there spatial differences in access to PHC facilities by communities in Chanchaga Local Government Area?
3. What are the peculiar economic and socio-cultural factors affecting access to PHC facilities in Chanchaga LGA?
4. Does access to urban PHC facilities in Chanchaga Local Government Area tend to decline with distance?

1.11 AIM AND OBJECTIVES OF THE STUDY

1.11.1 Aim

The aim of this research is to assess the availability and spatial distribution of healthcare facilities in Chanchaga Local Government Area of Niger State. This is in order to evaluate the locational efficiency or otherwise of Public Health Care (PHC) delivery in the core areas of Minna metropolis.

1.11.2 Objectives

The aim of the research was achieved through the following objectives that were to:

1. Analyse the spatial distribution of Primary Healthcare (PHC) facilities and services in Chanchaga Local Government Area.

2. Assess the main functions of the available primary healthcare facilities in Chanchaga Local Government Area.
3. Examine the locational challenges confronting effective and efficient PHC and services delivery in Chanchaga Local Government Area.
4. Assess elements of sustainable urban healthcare delivery in Chanchaga Local Government Area.

1.12 SIGNIFICANCE OF THE STUDY

Efficient and adequate planning of service provision is vital in the improvement of the quality of life in the society. Even as it is vital to strategically locate health facilities in such a way that the population in need of them can access them easily. The provision of effective public owned health facilities and infrastructure can be improved for better access by the people if there is proper planning. Spatial planning with regards to healthcare provision and services has to do with effective control of resources and allocation. This study will provide data on available, spatial distribution and hierarchy of functions of all PHC facilities in Chanchaga local government area. In addition, useful information shall be provided by this study with regards to locational challenges and efficiency of primary Health care service delivery especially in developing countries.

This research will also serve as a valuable tool for future research purposes; as it provides observed data that can be used to test how relevant some of the contemporary theories related to accessibility of PHC in rural areas of Niger State. Findings from this study will show elements militating against effective utilization of primary health care services and how it affects child mortality in the study area. Findings will also be helpful to planners in the design and provision of spatial inputs accessible primary health care facilities in rural and urban areas.

1.13 SCOPE OF THE STUDY

This study is on the accessibility of primary healthcare services in Chanchaga Local Government, the administrative capital of Niger State, central Nigeria. The research scope covers all the various communities in Chanchaga LGA with emphasis on Minna metropolis and the locational assessment of the various PHC facilities in the fast-growing metropolis that is also the headquarters of Chanchaga LGA of Niger State.

The study involves the viewpoint of the first perspective accessibility with the use of service access planning approach in the determination of the demand for public primary health care in the study area. This approach is later accompanied by joining it with facility utilisation statistics as it relates to the second perspective.

1.14 THE STUDY AREA

1.14.1 Location and Physical Characteristics of Minna

Niger State derived its name from the River Niger that cut across the country. Most areas of the state lie within the floodplains of River Kaduna and is characterized by wooded Savanah. It is mainly semi-tropical in nature and having slight features of rainforest vegetation. Niger state occupies a land area of about 76,363 km^2 and having annual rainfall in the range of 152cm to 203cm and average temperature in the order of 87^oF. Figure 1.1 shows the map of Niger state with other boundary state. The state is bounded in the north by Zamfara and Kebbi states, in the south by Kwara and Kogi states, and, north-east by Kaduna state. It shares boundary with the Republic of Benin in the western part and the Federal Capital Territory (FCT) in the south-eastern part of the state. According to the 2006 population census figure, it was estimated to have a population of about 3,954,722 peoples. Based on the projected annual growth of 3.4%, it is expected that Niger state will have a population of about 6,630,163 by the year 2021.

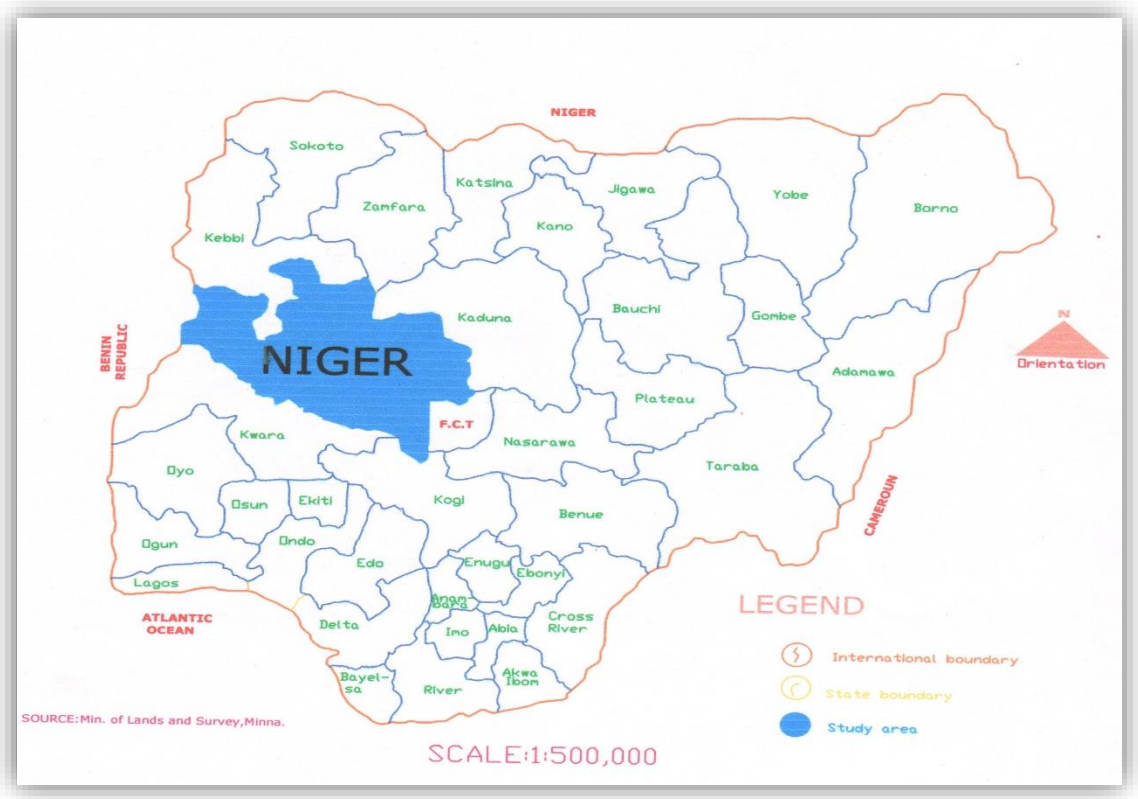


Figure 1.1: Niger State in Nigeria
Source: Niger State Ministry of Lands & Housing, Minna

Chanchaga local government is one of the twenty-five LGAs in Niger State, located in the South-eastern parts of the State. Minna, the state administrative capital is also the headquarters of Chanchaga LGA. The coordinate of Minna is $9^{o}37^{/}$ North and $6^{0}33^{/}$ East (Longman, 2003; FUTMinna, 2008 and 2013) and bordered by latitudes $9^{0}33^{/}$ and $9^{0}42^{/}$ to the north and longitudes $6^{0}27^{/}$ and $6^{0}35^{/}$ to the east (Googlearth, 2012; cited in Kawu, 2016:17). Minna, is presently the administrative capital of Niger State, Nigeria, and, it is about 120km away from the Federal Capital Territory, Abuja through the south-eastern Minna-Suleja road (Bahago, 2008; Kawu, 2016). The settlement is also characterised by basement complex rocks that are undifferentiated which majorly consists of gneiss and magnetite. Minna is bounded to the South West by Paikoro Local Government Area, in the north is Shiroro Local Government Area, and, in the southwest is Bosso Local Government, and is approximately 163km northwest of Abuja, the nation's Federal Capital Territory (Lock, 1980; Bahago, 2008). See Figures 1.1 and 1.2.

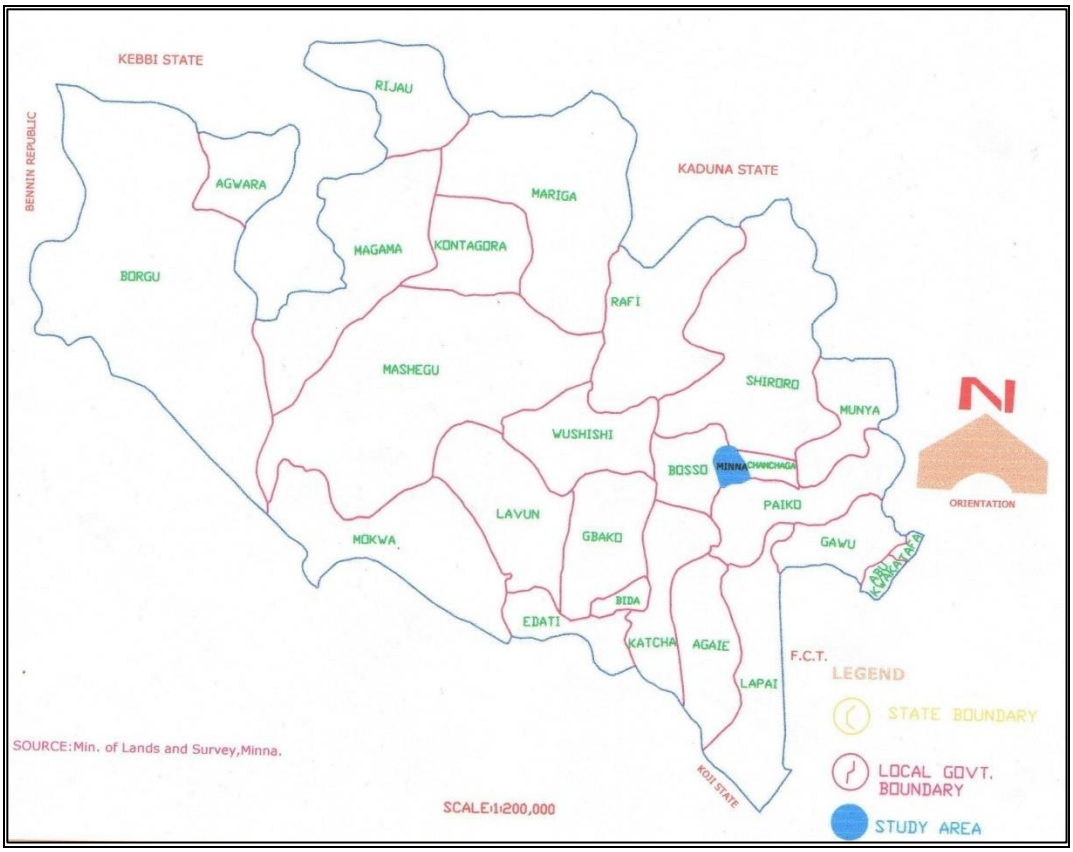


Figure 1.2: Chanchaga LGA in Niger State
Source: Niger State Ministry of Lands & Housing, Minna

As a political and an administrative region, Minna is a rapidly growing metropolis that covers an area of approximately 1,000 hectares since the 1980s and has been growing in all directions since then; a situation that is powered by the increasing location of federal and local regional administrative centres in the hitherto sleepy town.

CHAPTER TWO

3.0 CONCEPTS, THEORIES AND LITERATURE REVIEW

3.1 Conceptual Frame

This chapter introduces general principles and provides a survey of related research works on spatial accessibility to healthcare facilities. This was carried out in order to abreast the researcher on contemporary issues relating to the field and the advantages of their application in the present urbanizing world as it affect developing countries and Nigeria in particular. The concepts of spatial accessibility and location are included in the conceptual issues. Types of healthcare facilities in Nigeria were among the relevant literatures evaluated, historical perspectives of public health care systems as well as the relevance and opportunities for GIS-Based measures to accessibility of primary healthcare facilities in Chanchaga LGA of Niger State.

3.1.1 Concept of Spatial Accessibility

Access to healthcare services entails the use of personal health services on a timely basis in order to obtain the greatest possible health outcomes. Furthermore, access to healthcare has an impact on overall physical, social, and mental health; disease and disability prevention; health condition detection and treatment; quality of life; and preventable mortality and life expectancy (Ervin & Kennedy-Stephenson, 2002; Michels & de Graaf, 2010; Takeuchi, 2010). Unmet healthcare demands, delays in accessing adequate care, inability to obtain preventative services, and hospitalizations that may have been avoided are all consequences of access barriers (Flood, King, Ruggles, & Warren, 2015).

Osotimehin (2009) and El-hussain (2018) describe access as the availability of resources, as well as the freedom to access and use them. “Permission, liberty, or the ability to enter, approach, communicate with, or pass to and from, freedom or the ability to obtain or make use of; ability or

means to participate in, work in, or gain understanding, or the ability to reach a desired need when and if available," according to Webster (1993). When people need to get to places that are far away from their home, accessibility is a critical aspect. It could be the ability to shop, go to school, or get to work or hospitals (Oliver & Mossiales, 2004). Accessibility can have an impact on one's quality of life by allowing them to visit friends and family, as well as go on trips as well as tours (Guagliardo, 2004). Conceptually, experts have shown that accessibility to healthcare services includes the degree of approachability to the healthcare, acceptability, availability; affordability and appropriateness of the services render (Adusah-Poku & Takeuchi, 2019; Cai & Lu, 2015; McGranahan, 2013; Nwuba & Kalu, n.d.; Rodríguez Bolívar, 2021; Whitehead, 1992; Haddad & Mohindra, 2002; Shengelia, Murray & Adams, 2003; Harris, Harris & Roland, 2004).

Approachability refers to the fact that people with health needs recognize that services exist, that they can be reached, and that they have an impact on the individual's health (Harris, Harris, & Roland, 2004). Services might become more or less well-known among distinct social and geographical groupings. Transparency, information about available treatments and services, and outreach initiatives are all factors that could make services more or less accessible (Bahadur & Tanner, 2014; Meth, 2021).

In addition to service accessibility, the ability to recognize the need for care among the public is critical and is influenced by characteristics such as health literacy; that is, understanding regarding health as well as beliefs associated with sickness and health (Jiang, Ashekuzzaman, Jiang, Sharifuzzaman, & Chowdhury, 2013; Puri, Yiannias, Mangold, Swanson, & Pittelkow, 2020; Haddad & Mohindra, 2002).

Acceptability refers to the cultural and social characteristics that influence people's willingness to accept aspects of a service (providers' sex or social group, beliefs about medical systems) and the

evaluated suitability for them to seek care (Brochmann & Midtbøen, 2021; Brooks, 2003; Cheeseman & de Gramont, 2017; Lowe et al., 2015). For example, if health service providers are largely men, a culture prohibiting casual physical contact between unmarried men and women might diminish the acceptability of care and the willingness to seek care for women. It's possible that certain services are inequitably organized, making them unacceptably inaccessible to some members of the community they're supposed to be of service (Whitehead, 1992).

The notions of personal autonomy and capacity to choose to seek treatment, knowledge of healthcare options, and individual rights that would influence expressing the intention to acquire healthcare are all related to the ability to seek healthcare. Female discrimination in the commencement of care, as well as abuse and neglect, discourage ethnic minorities from seeking help. This pertains to the problem of ensuring that care fulfils the requirements of many cultural groups, as well as those who are socioeconomically poor and vulnerable. This is a significant difficulty since various groups may assess appropriateness and quality differently, this is very significant issue (Harris, Harris, & Roland, 2004).

The availability and accommodation of health services (either the physical space or those working in health care professions) refers to the ability to reach them both physically and in a timely manner. The physical presence of health resources with the capability to produce services (the presence of production facilities) is defined as availability (Hollomotz, 2021; Jiménez, Cortobius, & Kjellén, 2014; Masellis M., Ferrara M.M., 1999; Frenk, 2010). It is the outcome of characteristics of facilities (for example, density, concentration, distribution, and building accessibility), urban contexts (decentralization, urban spread, and transportation system), and individuals (for example, decentralization, urban spread, and transportation system) (duration and flexibility of working hours for example). It also has to do with provider characteristics (presence

of a health professional, qualification) and service delivery modes like, contact procedure and possibility of virtual consultations (Hollomotz, 2021; Tong et al., 2018; Wang et al., 2020).

If available resources are spread unevenly across a country or across levels of care (with specialist care created at the price of general care), access is limited (Whitehead, 1992). The notion of personal mobility and availability of transportation, vocational flexibility, and awareness of health services that would enable one individual to physically contact service providers is referred to as "ability to reach healthcare." Affordability reflects the People's economic capacity to spend resources and time on acceptable services (Allen, 2007; Ohta, Ryu, Katsube, & Sano, 2020) is determined by direct prices of services and related charges, as well as opportunity costs associated with loss of income (Haddad & Mohindra, 2002).

The ability to pay for healthcare is an often-used notion in the literature on health services and health economics (Frenk, 2010). It refers to the ability to generate economic resources - such as income, savings, borrowing, or loans - in order to pay for healthcare services without depleting essential resources (e.g. sale of home). Poverty, social isolation, and debt are examples of circumstances that limit people's ability to pay for essential treatment (Haddad & Mohindra, 2002).

Conceptually, spatial accessibility means that; economically, there is the Clients can afford products and services; there is social or cultural acceptability of services within the context of the client's cultural values, beliefs, and attitudes (Osotimehin, 2009; Frenk, 2010); organizationally, access to services are well-organized for potential clients, and include things like clinic hours and appointment systems, wait times, and service delivery methods (Osotimehin, 2009; and Frenk, 2010). The term "linguistic access" refers to the availability of services in the client's native language or dialect (Lori, Lynne, Nadwa & Theresa, 1992).

Spatial accessibility, also known as geographic or physical accessibility, is concerned with the relationship between population distribution and healthcare facility availability, and so has a major geographic component (Guagliardo, 2004). Spatial access is commonly quantified using the concept of cost of reaching the service, where cost is characterized in a variety of ways such as distance, time, or economic cost (Guagliardo, 2004) (Adetunji, 2010). It was Osotimehin (2009) who further opined that Physical accessibility is mostly governed by the number and quality of connection, which impacts travel time, distance, speed defined by the road and its surface condition, sinuosity, and mode of transport based on road conditions. Because location matters, it is better to establish healthcare services in central locations with a higher degree of convenience; thus, spatial access to healthcare facilities emphasizes the importance of location and distance (Abbas, 2009; Boeing, 2018; Rybarczyk, Ozbil, Andresen, & Hayes, 2020; Yin, Su, Fan, & Li, 2020).

2.1.2 Concept of Spatial Location

The word "location" means a point or area on the earth's surface that is identified by its position on the globe (Rushton, 1991). It could be a room, a factory, a house, a school, a town or a city, a hospital, and so on. Each house on a street or road, for example, has its own location, yet the buildings are arranged in a pattern across space (Sikder, Nagarajan, Kar, & Koetter, 2018). However, distribution is defined as the organization of items viewed at various scales, which can range from organized patterns to apparent randomness (Cutumisu, Blanchard, Plotnikoff, Berry, & Spence, 2012; Y. L. Lin, Yen, & Yu, 2018; Wuyep & Rampedi, 2018), and can be observed at or near the earth's surface or beyond (Fabrikant, Gabathuler, & Skupin, 2015).

Although spatial patterns can be drawn from the primordial concept of position, they are not primitive in and of themselves (Golledge, 1995). The analysis of spatial patterns becomes very

complex; not only when looking at spatial patterns formed by entities' locations in space, but also when looking at spatial patterns created by the combination of spatial and attribute values. Tobler's (1970) first rule of geography (TFL) famously summarizes this theoretical construct: everything is related to everything else, though close things are additionally connected than distant things (Harnesk, 2018; To, Lee, & Yu, 2020).

2.1.3 Concept of Spatial Pattern

The organizing and placement of people and objects in the human environment is referred to as "spatial patterns" in geography. It could be referring to the distances between them or the regularity of their distribution. In other words, refers to how resources, activities, human demographics or features of the landscape are distributed across the surface of the earth (Golledge, 1995). There are spatial patterns all throughout the place. Natural patterns, such as the concentration of plant life in a specific location, as well as man-made patterns, such as those found in towns, cities, and communities, are examples of this. In fact, anything that has a physical place qualifies in geographic space inevitably creates or contributes to a spatial arrangement (Skupin & Fabrikant, 2007).

2.1.4 Concept of Health

The World Health Organization (WHO) defines health as the ability of an individual or a community to achieve their goals and meet their basic needs, as well as alter or cope with their surroundings (Dines & Cribb, 1993). In 1946, the World Health Organization (WHO) defined health in its broadest sense as a condition of complete physical, mental, and social well-being, not just the absence of sickness or infirmity (WHO, 2006). These descriptions affirmed that health is all encompassing in all human society as it always performs a significant responsibility in the

wellbeing of man (Chu, Mehrmal, Uppal, & Giesey, 2020) and therefore must be given utmost attention at all times.

2.1.5 Concept of Health Care Facilities

All units held by public and private entities, as well as volunteer groups, that provide health care services, such as hospitals, health and maternity centers, are considered health care facilities (Dodman et al., 2013; Liu, Tsai, & Jang, 2013). In other terms, hospitals and health care centers are organizations or decision-making units whose mission and resources are dedicated to improving the health of patients through health intervention measures and services such as curative, preventive, protective, and health promotion activities (Onokerhoraye, 1999; Falchetta, Hammad, & Shayegh, 2020; Oginni, Ahmadu, Okwesa, Adejo, & Shekerau, 2018; Tong et al., 2018).

2.1.6 Concept of Health Care

Health care is the diagnosis, treatment, and prevention of disease, illness, injury, and other physical and mental disabilities in humans in order to maintain or improve their health. Health care is provided by experts in allied health professions, chiropractic, physicians, physician associates, dentistry, midwifery, nursing, medicine, optometry, pharmacy, psychology, and other health professions - providers or practitioners (Fotso, Ezeh, Madise, Ziraba, & Ogollah, 2009; Oldfield, 2017; Sen, 2020). It encompasses work in primary, secondary, and tertiary care, as well as public health. In many countries, the system of healthcare delivery comprises a range of institutions that are categorised on the foundation that their specialization, sophistication and the level of care they can provide. Basically, there are three main levels identified, these are: Primary, Secondary and

Tertiary healthcare delivery systems (Pavignani, 2007; and Adamu, 2001). Primary Health Care by policy arrangements is within the purview of LGA, based on the residual operation of Local Government Authority.

2.9 **Healthcare Services Provision and Outreaches**

2.9.1 **Primary Healthcare Services**

Primary health care facilities are unquestionably the first port of contact for sick and injured people. They handle minor medical issues such as fever, malaria, nutrition disorders and colds, among others. They are mainly used for minor health issues and education in terms of health; such as sensitization (Coast & Murray, 2016; Di et al., 2020; Fee, McIlfatrick, & Ryan, 2021; Fotso et al., 2008; Jayaweera et al., 2018). They likewise deal with issues relating to infants, mothers, and pregnancies. Family planning and immunization are two other health considerations in their care (Allen, 2007; Schuler, Rottach, & Mukiri, 2011), through focus on healthcare as well as are concerned with keeping of records, case reporting, and referring patients to higher levels of care.

The content of primary health centres, maternity homes/clinics, and dispensaries are known within the system (Momoh, Opaluwah, & Albeera, 2018; Sadeniemi et al., 2014). These categories of medical care refer complex cases to general hospitals in the secondary care setting. PHC facilities are also to perform functions such as health education, diagnosis, and treatment of common ailments (Muhammed, 2011; Roy & Pramanick, 2019; Tong et al., 2018; Yegon, Kabanya, Echoka, & Osur, 2016), according to the Medical and Dental Council of Nigeria (MDCN) in Badru (2003), using adequate technology, infrastructure, and an essential medicine list.

2.9.2 **The General Hospitals – A Secondary Healthcare Institution**

The Secondary level care more commonly called General hospitals, to which patients from wide surrounding area or district are referred, when necessary, by the primary care units for more serious

diagnosis or treatment. The majority of general hospitals are found in urban regions, with only a few in rural locations. They provide surgical and emergency treatment in addition to outpatient care. In many circumstances, the out-patient component (which mostly provides first-contact care) is significant. Among other services, general hospitals have an accident and emergency unit and a diagnosis unit (which includes X-ray, scan machines, and other pathology services) (Badru, 2003).

The status of being a second layer of health institutions sets certain requirements and infrastructure levels that must be met. Furthermore, to fulfil its duty as a second-tier health institution, the general hospital combines the PHC's facilities into its own. In reality, in order to be considered qualified, it should be able to provide basic surgical services, as well as beds and bedding for a minimum of 30 patients. Auxiliary facilities for effective diagnosis and treatment of common diseases should also be available. State governments and private people or groups of individuals frequently control general hospitals (WHO, 1997).

2.9.3 The Teaching Hospitals – A Tertiary Healthcare Institution

Finally, there are big speciality teaching hospitals (tertiary), which are usually only found in major capital cities. They are more technologically advanced and are mostly used for in-patient care. This is usually larger than regular hospitals and focuses more on training, especially of doctors (Pavignani, 2007, Adamu, 202001 and WHO, 1997). This category of medical institution Complex health problems and situations are handled either as referrals from ordinary hospitals or as direct admissions to its own facility. It has an accident and emergency unit, a diagnostic unit, wards, a treatment unit, and an out-patient consultation unit, among other things. All of these units must have the proper equipment and be staffed by qualified workers.

Teaching hospitals also undertake research and report the findings to the government in order to influence health policy (Badland et al., 2017; Carr, Dunsiger, & Marcus, 2011; Gidlow et al., 2019;

Momoh et al., 2018). This explains why this type of health facility is frequently associated with a university; such as University College Hospital (UCH), Ibadan, Lagos University Teaching Hospital (LUTH), Ahmadu Bello University Teaching Hospital (ABUTH) in Zaria, Kaduna State, Aminu Kano Teaching Hospital (AKTH), in Kano, Kano State, Psychiatric Hospitals in Aro, Abeokuta and Yaba in Lagos, The National Orthopedic Hospital Igbobi Yaba. Several others include University of Nigeria Teaching Hospital, Enugu (Badru, 2003), National Hospital in Abuja.

2.10 Health Services Provision in Niger State

2.10.1 Niger State Strategic Health Development Plan Policy (2010 – 2015)

In Niger State, as in the rest of the country, health services are divided into three levels: tertiary, secondary, and primary. The federal government is in charge of tertiary services at the Federal Medical Centre in Bida, while the state manages secondary health care centers through the State Hospital Services Management Board, and the LGAs are in charge of providing primary health care services to the communities, with the State's Primary Health Care Development Agency (SPHCDA) assisting with coordination and technology (bridging the gap between PHC and secondary level) (Niger State Ministry of Health (NSMOH), 2010).

Priority restrictions to health-care delivery in the state have been classified based on the following coverage determinants: Availability of commodities (weak procurement processes, insufficient funds, and lengthy bureaucratic processes); Availability of human resources (poor recruitment policy, and low institutional capacity for personnel training and retraining); Accessibility (a number of routine distribution health facilities are not well maintained/functional). Initial and ongoing use (low awareness, inadequate IPC skills and attitude) as well as effective coverage (poor

health seeking behaviour and low awareness level). The SSDHP has established a foundation for the entire state for streamlining every activity of the health sector in Niger State (NSMOH, 2010).

It has, however, determined that certain high-priority, low-cost, and high-impact interventions must be identified among these activities, which can be classified into three main service delivery modes: Community and Family-Oriented Services, Population Oriented/Outreaches/Schedulable Services and Individual/Clinical Oriented Services (KSMOH, 2010).

2.11 **Geographic Information Systems**

As described by Burrogh (2001) Geographic Information Systems (GIS) is the technology and science related to a set of robust tools for collecting, storing, retrieving, altering, and displaying geographically referenced data at will. A Geographic Information System is also designed to store, retrieve, manipulate, analyze, and display huge volumes of spatial data generated from a number of sources, including remote sensing, according to user-defined standards (Marble & Pequet, 1983). GIS's spatial modelling capability has considerable promise and has been used in a variety of industries, including: government, education, planning, law enforcement, military, agricultural, et cetera.

Since The type and quality of services available in the area, as well as the travel distance, duration, cost, as well as ease of reaching such services, all impact health-care decisions; more literature is needed, through the applications of GIS, on how these tools can help in the planning and management of PHCs. Therefore, visualization and mapping of disparities in the health sector as well as their association to the geographical positioning of Health Care facilities could permit for improved allocations of resources to underserved and contrasting individuals (Parker and Campbell, 1998). This can be aided by empirical data needed to generate a database application

useful for ascertaining the spatial distribution of PHC facilities and their available equipment which could aid effective decision-making processes.

2.12 Theories of Location

2.12.1 Hoover Location Theory

According to Hoover (1948), the spatial pattern of economic activities is mostly explained in terms of transport cost in location theory. Therefore, Hoover remarked that the expenses as well as inconveniences of moving processed goods to distance consumers as well as producing raw materials from distance source points induce manufacturers to be located in close proximity to their market base or their source point for raw materials. That is, Industrialists prefer to locate where the total transfer costs are the lowest. As a result, locations at critical nodes in the transportation network are more likely to reduce travel expenses for the user population (De Stefano, Hernández-Mora, Iglesias, & Sánchez, 2017; Fernald et al., 2012; Filion & Saboonian, 2019; Flyvbjerg, 2012). Looking at it differently, in public facilities, the cost of transportation (for people and consumers) is more important than the cost of material transfer (by the supplier) because it involves primarily the movement of people to points where services are located: in this study, patients to Health Care facilities.

There is the increasing demand for further works to express these attributes in the location of Health Care facilities, with the main objective is the maximisation of social utility or the minimization of social costs for a given population particularly in growing cities of Nigeria (Cyril, Oldroyd, & Renzaho, 2013; Hassan, 1990; Jemaku, 2007; Peter, Gadiga, & Mshelia, 2015). At the same time, all patients should have access to medical care. For this reason, the basic issue to note is that a non-monetary criterion is highly significant when it comes to the location of these public

infrastructure. Efficient locations from the user point of view are required if society resources are not to be squandered in the pursuit of distance. A well-organized network of sites can save time and money that can be put to better use elsewhere (Dahlgren, 2008).

2.5.1 Central Place Theory

The Central Place Theory (CPT), propounded by a Geographer from Germany, Walter Christaller (1933) is an effort in the explanation of the settlements' systematic spatial organization, size, and quantity. Partly about the location and spacing of service centres or central places, where a service centres is a settlement that provides some kind of service for surrounding catchment area (Fotso et al., 2009; Mensah & Enu-Kwesi, 2019; Xia, Liu, Liu, He, & Hong, 2014). An important issue here is the main objective of the spatial distribution of service centres. From the welfare point of view, optimal distribution is largely determined by accessibility to services at the lowest possible total trip cost. The welfare problem and CPT are inextricably linked in such an ideal specification (Christaller, 1933).

The main principles of the CPT that are relevant to this study are: the range of good, and the principle of least effort. The average maximum distance people will go to obtain goods and services is referred to as the range of goods. Different goods and services have different threshold range. While the principle of least effort on the other hand, indicates that people generally travel to the nearest location where a good or service is obtainable. Consumers therefore are guided by the principle of least effort in selecting where they obtain the goods or services they require (Christaller, 1933).

Relating these principles to the Health Care facilities; studies have highlighted that such facilities cannot just be located everywhere, even though they are public utilities. Resources cannot be

wasted through duplicating similar projects in virtually every locality a single facility can suffice. In a similar manner, a facility may be considered as service centre. It would on the other hand, have an identifiable catchment area. Consequently, Health facilities of varied standards would have different areas of influence. The Tertiary Health Care facilities normally have an extensive catchment area (WHO, 1997). Conversely, a village dispensary offers only a limited range of services, which are also offered by its equivalents located in other villages. As a result, it has smaller catchment regions that are controlled by accessible recommended distance (WHO, 1997).

The principle of least effort is also relevant in this study, since people are more likely to patronize Health Care facilities close to them, due to higher cost of travelling to distant ones. This is true especially with remote areas, where low income and low level of education, may make other alternative sources of medical care, like Traditional medicine being relatively cheaper and without the trouble of overcoming the frictional effect of distance (Onyemelukwe & Ariyo, 1996).

Generally, in the Central Place Theory, movement is recognized by the frequent reference to distance and travel cost. And travel cost affects the range of good or service and the size of the complementary region within which it is offered. The complementary region is the tertiary in which the central place or service centre has competitive advantage because of the factor of distance (Morrill, 1970). Travel costs are therefore less for consumers within a centre's complementary region than for those outside it (Creutzig, Baiocchi, Bierkandt, Pichler, & Seto, 2015; Levinson, Mathieu, Gillen, & Kanafani, 1997; Litman, 2014). For this reason, demand decreases with increasing distance. This pattern of fall in demand reflects the effects of distance on movement in general and on the consumption of central goods and services in particular, and is associated with travel costs (Owumi, 2005). Again "these costs occur because of the friction component of space that can be overcome only by expending energy for travel (Ahmed, 2000;

Bigazzi, 2019; Dalla Chiara, De Franco, Coviello, & Pastrone, 2017; Versteijlen, Perez Salgado, Janssen Groesbeek, & Counotte, 2017; Xydis & Nanaki, 2015). The effect of this friction component of space is to restrict travel distance in the interest of limiting travel costs (Bush & Gauthier, 1968).

2.6 Literature Review

2.6.1 Historical View of Hospitals and Public Health in Nigeria

According to Onokerhoraye (1982), Christian missions built the first medical centers in Nigeria in the rural areas. However, the colonial overlords did not go unnoticed in their efforts to spread Christianity (Onibonoje, 1985). These medical centers, on the other hand, were just moveable clinics or, at the very least, community dispensary outposts that treated primary health issues such as snake bites and minor injuries. The administrators supported the development of medical facilities in the true sense of hospitals in later years, when British administration had been well established, to deal with epidemics such as sleeping sickness, small pox, malaria, and other fundamental health concerns (Aluko-Arowolo, 2006). Hospitals, on the other hand, were only found in urban areas with a significant population of Europeans and government officials. Official housing, such as Government Reserved Areas (GRAs), was set aside for government officials. European Quarters were the name given to such restricted regions. In Lagos (Ikoyi/Victoria Island), Ikeja, Ibadan, Kaduna, Jos, Enugu, and other large cities, such quarters existed (Akin-Aina, 1990, Home, 1983).

Two different side effects of these particular arrangements could be detected right away: out of these specified arrangements, first a complete disregard for rural areas in terms of healthcare, and

second, a well-established unevenness in urban centers between colonialists, together with their black counterparts, as well as the general populace. Despite the fact that Nigeria gained independence nearly fifty years ago, the pattern of residential areas are still visible in Nigerian towns and cities (Mabogunje, 2005 and 2007; Home, 1983). Apart from this, no attention was placed on traditional health care types, resulting in a vast void that exacerbated inequality between the have-nots and the haves, as well as between urban as well as rural areas (Mabogunje, 1996, 1999 and 2007).

The contrast highlighted the limitations in the health-care system and other related services, in that infrastructure and staff that are critical to an efficient hospital system, including as food, roads, pipe-borne water, and electricity for drug storage and surgical operations, were not available (Aluko-Arowolo, 2005; Baffour Awuah, Hammond, Lamond, & Booth, 2014; Pennisi, 2020; Popoola *et al.*, 2021). This influenced subsequent Nigerian governments' health policies, and a roadmap for the country's health system and other services was developed, which placed health services on three pedestals: primary, secondary, and tertiary institutions for the rural, mixed population, and urban elite, correspondingly (Mabogunje, 1996,1999).

2.7 GIS-Based Measures to Accessibility

Increasing advancement in GIS in health institutions, together with the availability of data, has supported research associated with developing measures of access to Health Care services (Lercher, Widmann, & Thudium, 2014; Y. Liao et al., 2018). They also opined that GIS is appropriate for the measurement spatial accessibility to Health Care as they enable specialists to store, input, manipulate, manage both attribute and spatial (textual) data, analyze and visualize spatial information. Literatures such as (Boeing, 2018; Rybarczyk et al., 2020; Yin et al., 2020) and several others have given explanation concerning the measurement of spatial dimension of

accessibility, the measurement of straight-line distance (Euclidean distance), Origins Destinations Matrix as well as the creation of Theisen polygons are certain easy methodologies within accessing physical access (Badland et al., 2016; Bielik, König, Schneider, & Varoudis, 2018; Duncan et al., 2016; Glikman & Semyonov, 2012; Kelly, Tanner, Vallely, & Clements, 2012; Parry et al., 2017; Tu, Zou, & Chen, 2019). (Katpatal & Rama Rao, 2011) used GIS-based measurements to investigate correlations between geographical locations, health-care utilization quality, and health outcomes.

These studies look at the various configurations of the health-care delivery system, as well as the services provided to people of various socioeconomic classes and the characteristics of people or the area in which they live when seeking health-care services, in order to determine access to health-care services (Katpatal & Rama Rao, 2011). The effectiveness of gravity metrics as a technique to analyze geographic accessibility to Health Care services in Indiana was demonstrated by Eda, Susan, and Waldorf (2007). The gravity metrics reported in their study take into consideration three factors: distances between the population and health-care providers, health-care provider capacity, and demand for health-care services. According to the empirical findings, access to health care varies dramatically among Indiana counties, with large pockets of deprived access. Rural counties in southern Indiana and near the Illinois border have the weakest access to healthcare, whereas the population in centrally positioned and metropolitan areas has better access.

Their findings revealed that more than a third of Indiana residents lack appropriate access to health care, with rural inhabitants being disproportionately disadvantaged. Adamu (2012) used two distance methods to determine geographic accessibility to hospital services in Sheffield: Euclidean and Network distance. In Sheffield, a Geographic Information System (GIS) was utilized to analyse population distribution and assess the distance and availability of hospital services (Kelly

et al., 2012; Tu et al., 2019; van Westen, 2000). Euclidean and Network distance measurements were used to compute the distance between population centroids (origin) and hospital postcodes (destination).

To measure the level of accessibility in the study area, the researcher employed a 7-kilometer threshold distance as a benchmark. Because most hospitals are located within the city center, the population in the city centre had better access to hospital facilities, according to the study's findings. Second, a comparison of distance types based on different age groups reveals that Euclidean distance and network distance are significantly associated, with values larger than 0.90. Young and middle-aged people, on the other hand, appeared to have greater access to hospital services in Sheffield than the elderly.

Many functions and tools are created for Health Care studies in GIS software packages such as ArcGIS, which includes ArcMap, ArcCatalog, ArcInfo, ArcView, and ArcScene. GIS software offers excellent capabilities for spatial data administration and visualization, as well as spatial analysis (Amer, 2007). They are critical in any health-related study because they allow for better decision-making by presenting health status and needs for a specific area or region from a geographical perspective (Burrough, 1990). It is sufficient to have a database and a geographic base to accomplish this (like a map of the area of study), moreover, the GIS is capable of analysing the data and presenting a coloured map that permits visualization of the phenomenon's spatial pattern. (Luo & Wang, 2003).

2.7.1 Spatial Pattern and Accessibility to Health Care Facilities

Several studies have been conducted to determine the spatial accessibility of health-care facilities in diverse localities. Bindu and Janak (2013), for example, investigated the use of a geospatial

technique to assess and model the spatial accessibility of primary health care services in the tribal Talukas of Gujarat's Vadodara District. Findings revealed that the locational pattern of PHCs in the study area was randomly dispersed, as determined by Average Neighbour analysis, and that all such PHCs are overburdened, serving large populations in accordance with the norms, with 8 PHCs serving a total population of more than 22,000 people, with a maximum of 51,000 people. In terms of time and distance, the data show that the study area's central and southern villages were more accessible than the study area's eastern and northern communities. According to the analysis, the population of the study area can be effectively accommodated by designating a few new facilities, but greater focus must be placed on increasing connection, particularly in less accessible areas that are rendered as dark zones due to inadequate road connectivity.

Murad (2011) used a GIS-based spatial profile to investigate the supply and demand for health services in Jeddah, Saudi Arabia. Level of accessibility was identified using accessibility indicators scores. A demand-based catchment area was also established to describe the size and scope of the health catchment region. His application's results are considered a spatial decision support system for health planners in the city, as they provide spatial tools for evaluating the location of health services supply and demand.

Abdurahaman and Nurünnisa (2013) explored GIS could be used to model the spatial distribution and accessibility of Yola's health-care delivery system. A variety of digital and non-digital data sets were gathered and converted into GIS data. The analysis was carried out using spatial analytic tools such as symbols, overlay operations, Kernel Density Estimation (KDE), buffer operations, and a raster calculator. Primary, secondary, and tertiary were assigned to all identified public and private facilities. Jimeta was home to the majority of these institutions.

2.8 Local Examples and Research Gaps in Nigeria

With specific reference to the situation within Chanchaga Local Government Area of Niger state, PHCs' spatial distribution can be classified as clustered in selected places, with other areas with tough topography and physical environment being ignored (Beller, Kelly, & Larsen, 2020; Ibes, 2015). It was found that if the current maldistribution of PHCs is fixed, people's health in local government regions will improve (WHO, 2012). In separate research in Osun State, Sanni (1990) found disparities in access to healthcare services among local government areas in the state, concluding that the government needed to step up its efforts to provide healthcare facilities in the state. In another study of the distribution and accessibility of PHCs in Kogi state, Awoyemi, et al (2012) reported that household size, distance and total cost of seeking health care affect the utilization of PHCs while total cost of seeking health care and the quality of access route affect the use of the more available traditional healthcare services. As a result, experts proposed that the distance to PHCs and the total cost of obtaining healthcare be lowered in order to improve access to PHCs for people from all socioeconomic classes in the state (Onokerhoraye, 1977 & 1999; Omotor, 2011).

The main focus of previous works seems to be in the areas of population and the spatial extent of healthcare coverage. However, the establishment of the fundamental socio-spatial variables that warranted these distributions in the first instance have received less attention. Equally important is the aspect of optimal utilization of healthcare facilities when eventually provided by the target groups; as regards acceptability of the facilities to the different socioeconomic classes in a rapidly growing metropolis (Kawu, Ahmed, & Usman, 2012; Paul & Sen, 2018; Umar & Kawu, 2011). The efficient and sustainable management of healthcare infrastructure is another dimension of PHCs that has been ignored. For an urban area with diverse population composition and further

divergent socioeconomic segregation (Aliyu Mohammed Kawu & Owoyele, 2008), coupled with the increasing call for self-reliance, the manner and aspects of locally financing public facilities becomes relevant to the urban authorities and researchers alike.

CHAPTER THREE

4.0 METHODOLOGY

4.1 INTRODUCTION

Research methodology can be referred to as the viewpoint of the research procedure. These include the values and assumption that stand as the rationale for research work as well as the typical requirement utilised for the interpretation of data and arriving at a logical conclusion (Bailey, 1987). To assess the availability as well as spatial representation of healthcare facilities in Chanchaga Local Government Area (LGA), this study evaluates the locational efficiency or otherwise of PHC distribution. Blaikie (1993) described the relationship between the theoretical basis and research problems, and methodology as a technique of collecting knowledge, producing and testing theories, and generating and testing hypotheses.

4.2 STUDY POPULATION

The study is restricted to Chanchaga Local Government Area (LGA) located in the central part of Minna – the administrative capital of Niger State, central Nigeria. The study area has a population of 202,151 in year 2006 and average annual growth rate of 3.42% (NPC, 2010: 9 & 40), the fast-growing local government is having a population of about 334,768 in year 2021. The area has a land mass of about 72.0 square kilometers. For this particular study, Chanchaga LGA has been sub-divided into twelve wards namely: Makera, Minna South, Minna central, Nassarawa C, Nassarawa B, Nassarawa A, Sabon gari, Rijau, Tudun wada South, Tudun wada north, Limawa B, Limawa A (Table 3.1).

Table 3.1: Political Wards and Sample Points for the Study

S/N	Main Political Wards	Sub-divisions & the Sample Wards
1	Limawa	Limawa A
		Limawa B
2	Makera	Makera
3	Minna central	Minna central
		Minna South
4	Nassarawa	Nassarawa A
		Nassarawa B
		Nassarawa C
5	Sabon Gari	Sabon Gari
		Anguwan Daji
6	Tudun Wada	Tudun wada north
		Tudun wada South

Source: Field Survey, August 2020

4.3 SAMPLING

4.3.1 Sample Size

There are more than 32 health facilities both private and public in Chanchaga LGA including five (5) secondary healthcare facilities. The town also possess more than 25 primary healthcare facilities and 2 healthcare posts, with patent medicine vendors spread across the different communities with Tudun wada South ward having about 10 healthcare facilities.

The research sample was determined using the Cochran formula, known for simplifying stratified sampling and field assessments and methods generally. The formular was utilised for the determination of the required number of persons to be administered the structured questionnaire. The sample size (of 141 respondents) was determined proportionally to the population of individuals within the local government area using Cochran formula propounded by Cochran in 1977 (See Appendix I).

4.3.2 Sampling Technique

The following are the main sampling techniques used for this research work.

4.3.2.1 **Non-probability convenience sampling method**

According to Teddue & Yu (2007), this type of sampling is known to be a sampling method that involves choosing from a sample that is not only accessible but the respondents are willing to take part in.

4.3.2.2 **Stratified sampling technique**

This is a sampling strategy that is used to draw a sample from a heterogeneous population in order to obtain a representative sample from that group. This technique divides the population into subpopulations that are individually comparable to the whole population; these subpopulations are referred to as strata. It is feasible to obtain more accurate estimates for each stratum, and by estimating each portion more precisely, a better estimate can be obtained from the whole population. It therefore results in a more detailed and reliable information.

4.4 **DATA COLLECTION**

The sources of data and sets of data utilised in this research work could be categorised as secondary and primary sources.

4.4.1 **Primary Sources of Data**

The primary sources include physical observations, personal interviews and structured questionnaire administration to different respondents.

4.4.1.1 **Interview**

This is a data gathering tool that is similar to a questionnaire in that it is defined as an oral questionnaire because respondents do not have to provide written responses. Instead, information

is delivered orally, face to face, or via phone conversation. The main target group here are those less learned or literate to directly utilize the structures questionnaire without seeking help or assistance from someone else. It was also used for those who are challenged by language barrier or similar difficulties.

4.4.1.2 **Questionnaire administration**

This is a common data gathering tool that consists of a list of questions created by the researcher and distributed to a group of people called respondents. Its goal is to collect data using an inquiry form in which respondents react to pre-written questions. the questionnaire was designed in such a way as to elicit information on healthcare facilities from the residents and institutions responsible for each of these facilities in the study area.

Questionnaire could be classified as unstructured or structured. When a question is structured, respondents are given multiple options from which to choose one or more, depending on the question's form. When respondents are allowed the opportunity to react to the specified questions in their own language and manner, they are said to be unstructured. Digital cameras were also used to capture pictures and images for detailed analysis of the physical healthcare facilities and infrastructures in the study area.

4.4.2 **Secondary Sources of Data**

These are sets of data collected from published and unpublished works like text books, magazines, internet materials, academic projects work and others. Also, data on healthcare facilities relating to the theme of the research were collected from the state and federal authorities in the study area.

4.5 **Data Analysis and Presentation**

The data analysis methods used in this study were both quantitative and qualitative. Using the Statistical Package for Social Sciences, the researcher entered data from the questionnaire into a computer (SPSS). The responses were described using descriptive statistics such as percentages and frequency tables. To highlight the association between key socio demographic characteristics and access to PHC services among the respondents, correlation analyses were conducted using chi-square (2) and Pearson's correlation.

The interpretation, description, and recording/writing of what is actually stated were all highlighted in the qualitative data analysis. The transcripts were written in the native tongue first, then translated into English. While reviewing the transcriptions, statements with contextual or particular connotations were highlighted and used as illustrative quotes to supplement the statistical data. To do so, suitable themes for categorizing and sorting qualitative data were constructed.

The presentation would be presented in the form of tables, charts, photographs, and report write ups in order to highlight more on data collected from the study area and make comparison from publish and unpublished works.

CHAPTER FOUR

5.0 DATA ANALYSIS

5.1 DISTRIBUTION OF PRIMARY HEALTHCARE FACILITIES IN MINNA

5.1.1 Socioeconomic Characteristics of the Respondents

The study area is dominated mainly by youthful population consisting of 61% of the residents aged between 18-35 years. As the sampled population also consists of 63% as married residents and only 23% are single, in addition to having 76.3% and 23.7% as female and male respondents respective, the need for functional healthcare services in this area cannot be over-emphasized. The respondents to the surveys are also largely learned as over one-thirds have gone beyond secondary school in addition to more than half that have at least a secondary school education (Figure 4.1). This means that over 87% of the residents can read and write in English language. Over 64% of the residents have lived in the area for over 4 years now.

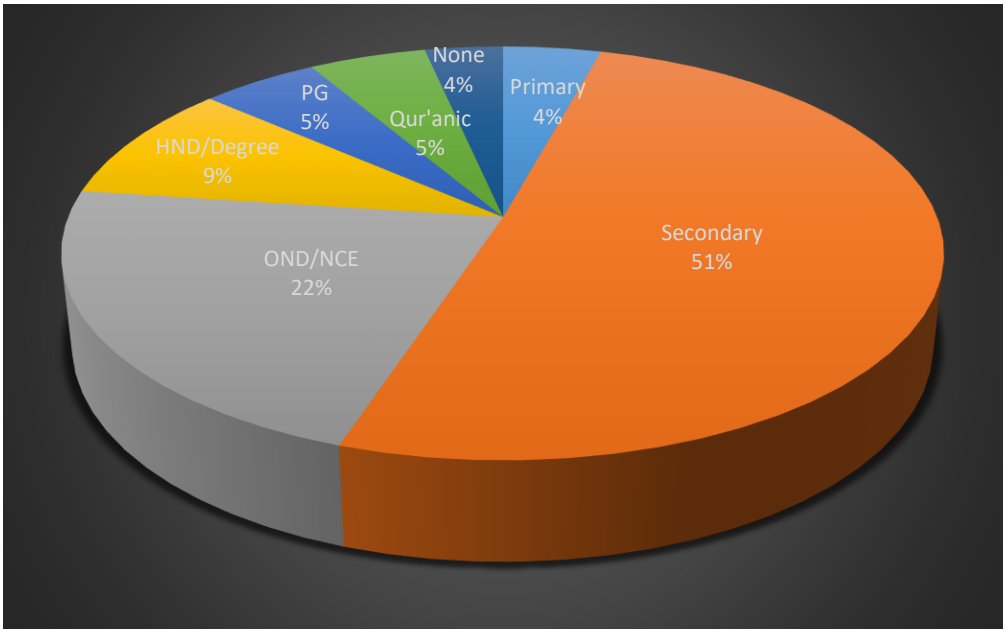


Figure 4.1: Educational Attainment of Respondents

Source: Field Survey, August 2020

The respondents are also largely employed as almost 60% are traders and civil servants at various government and non-government agencies and outlets. This translate to the fact that the residents are also regular income earners, although with the majority of them earning less than the monthly minimum wage of Thirty thousand Naira (N30,000:00). However, over one-fifths of the population (20.3%) are earning more than the monthly minimum wage as salaries (Figure 4.2).

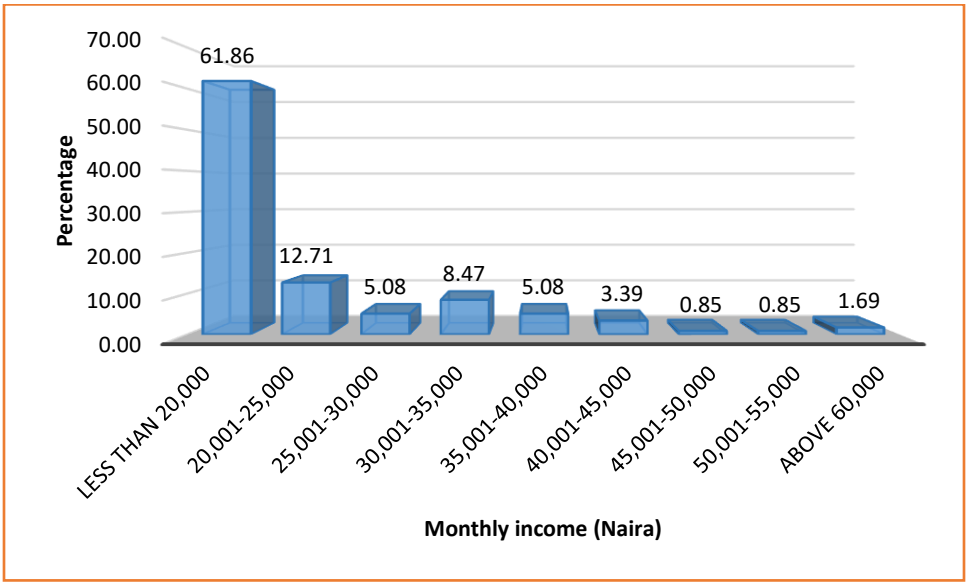


Figure 4.2: Income per Month of respondent (Naira)

Source: Field Survey, August 2020

5.1.2 Locational Characteristics of the PHCs

The main healthcare facility (PHCs) in the study area is the health clinic (81.8%) the remainder is maternity home. Three (3) each of the total of eleven (11) PHC facilities in the study area are both located in Limawa and Tudun Wada wards which together are home to over half (54.6%) of the facilities (Table 4.1 and Plate I).

Table 4.1: Location of PHC facilities in the Study Area

Neighbourhood	Number of PHC
Limawa A	1
Limawa B	1

Limawa C	1
Makera	2
Minna south	1
Nassarawa A	1
Nassarawa B	1
Tudun wada north	1
Tudun wada South	2
Total	**11**

Source: Field Survey, August 2020

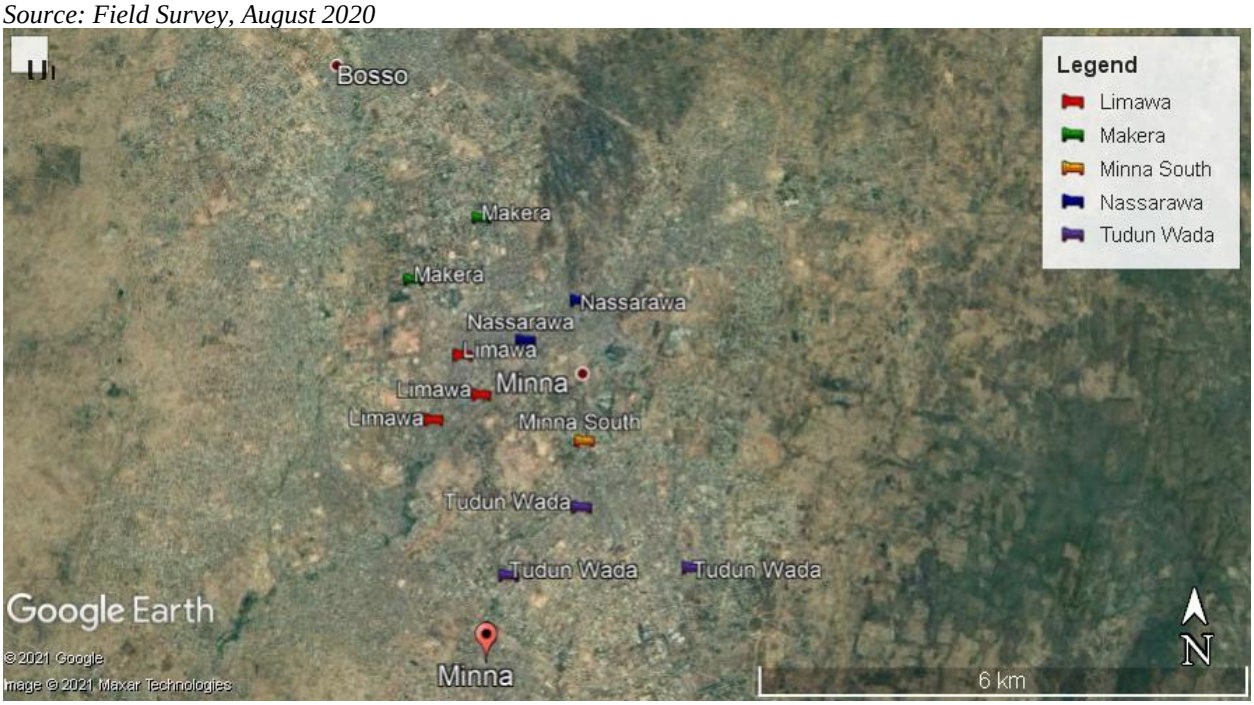


Plate I: Locational Distribution of PHCs in Minna

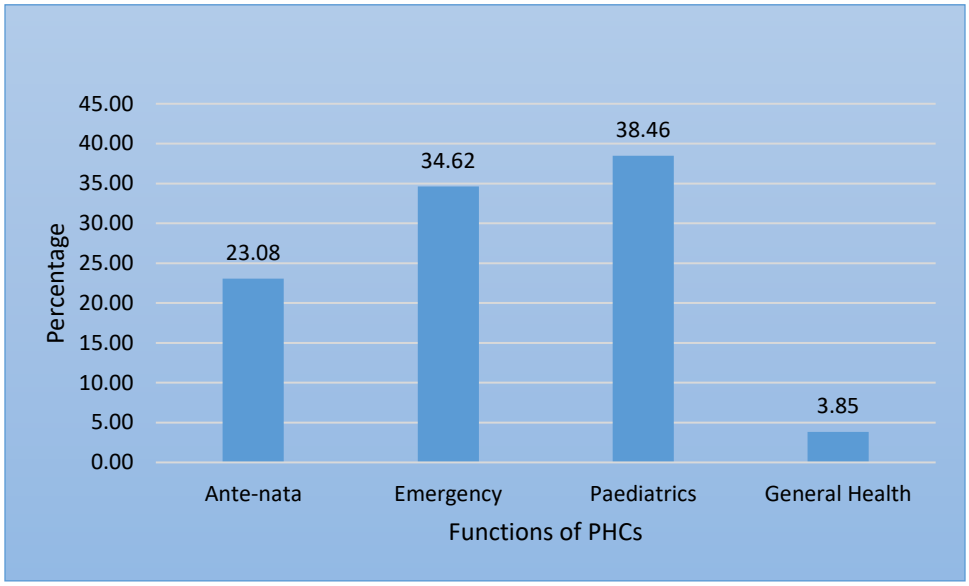
Source: Google Earth, June, 2021

The distribution or presence of the PHCs is more on the northern parts of central Minna than the other parts of the study area. This could be a reflection of the fact that these are the locations of the initial residential areas of the town and the major population concentration hubs of the entire Chanchaga Local Government Area.

5.1.3 **Types and Functions of the PHCs**

The main functions of the PHC facilities are also different. For example, Emergency and paediatric services are the dominant functions rendered by over 73% of the facilities sampled (Figure 4.3 and Plate II). All the

PHC centres are also known to treat malaria and typhoid fever. However, only about 36% of them usually welcome patients in need of other services like ante-natal care and general health check-up (Figure 4.3).



Source: Field Survey, August 2020
Figure 4.3: Functions of PHCs in Chanchaga LGA

Source: Field Survey, August 2020
Plate II: A PHC Facility in Chanchaga LGA

5.1.4 **Manpower Availability in PHC in Central Minna**

All hospitals and similar facilities are expected to possess skilled manpower in order to carry out their activities. However, field assessment revealed that more than half of the PHC in Chanchaga LGA does not have even a dedicated medical doctor stationed in the facility. About three quarter have no nurse or laboratory technician, while only cleaners can be said to be present in all the PHC facilities in the study area. See Figure 4.4.

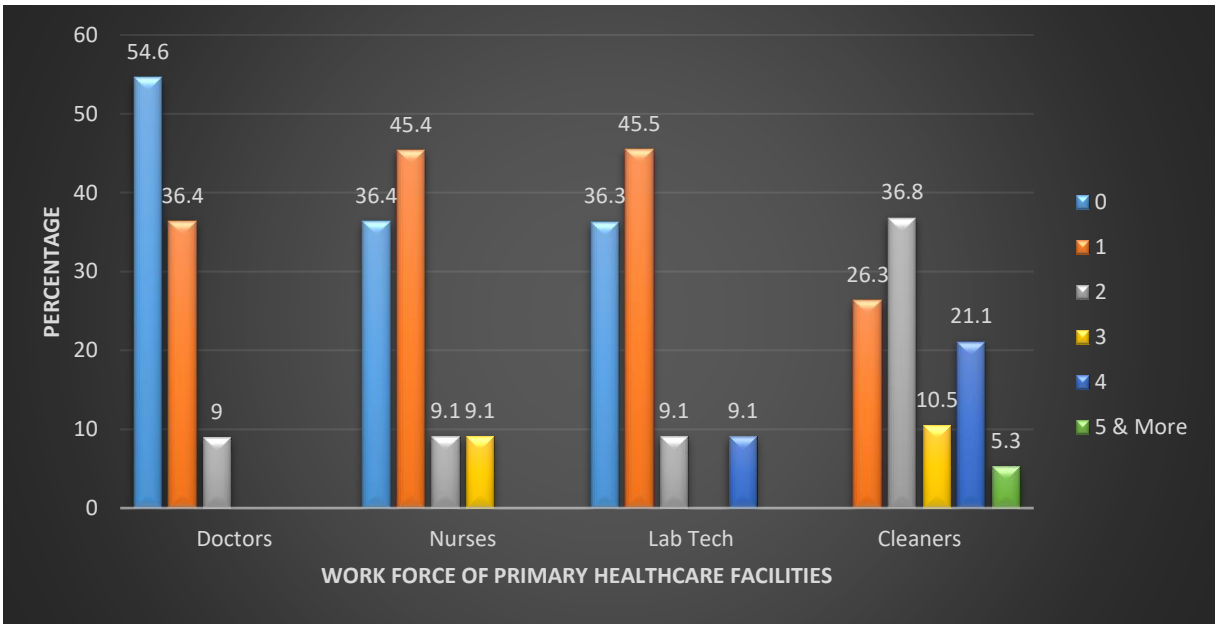


Figure 4.4: Work force and Personnel of PHCs in Central Minna

Source: Field Survey, August 2020

5.1.5 **Patients' Status of PHCs**

The PHCs are mainly rendering services to out-patients. This could be for the fact that they have limited man-power and facilities that can easily be overwhelmed if other people-attracting activities were to take place on regular basis. Only about one-thirds of the PHCs have the capacity and do admit between 1-5 patients for medical treatment in their facilities.

Perhaps due to their capacity, field surveys revealed that the PHCs also catered for relatively small number of patients. Less than one-fifths (18.2%) of the facilities have the capacity to accommodate more than twenty-five (25) regular out-patients daily.

5.2 FUNCTIONS OF PHCs FACILITIES IN CHANCHAGA LGA

The assessment of the PHCs by the residents and users of the facilities shows that the people of Chanchaga LGA do patronize healthcare outlets and are equally conscious about the services they offer. The respondents are also aware of the areas of high demands that needs to be filled in order to ensure high sufficiency in healthcare delivery.

5.2.1 Hierarchy and Functions of PHCs in Chanchaga LGA

The respondents showed that there are five categories of healthcare facilities in the study area. These are Maternity homes, Health clinics, The General hospital, Private hospitals/clinics and pharmaceutical chemists. However, health clinics constitute the majority of these facilities with upward of ninety percent (90.7%). See Figure 4.5. This is due to the fact that, these health clinics are the easily accessed health service providers that majorly operate as private practitioners besides maintaining regular employment. Some of them are also manned by nurses as services rendered are usually those medical consultation and guidance.

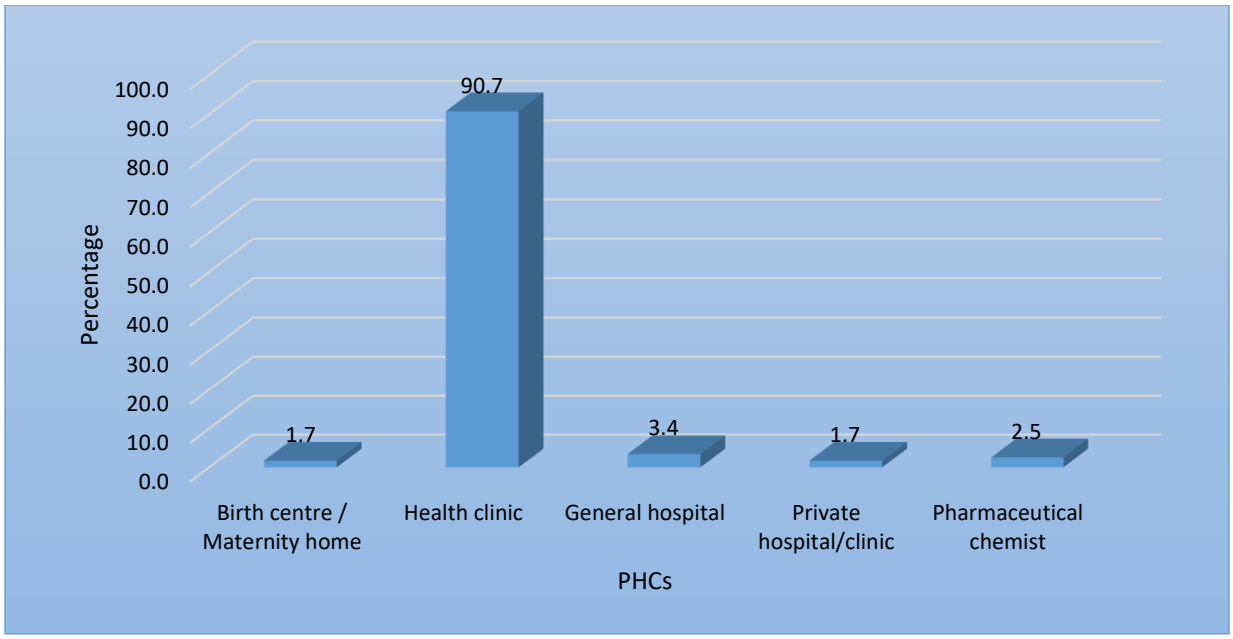


Figure 4.5: Health facilities in the neighbourhoods

Source: Field Survey, August 2020

The facilities are also within easy reach of the residents as 60.2% are within 1km distance from the people. However, 12.7% are beyond 2km from their users. This makes walking to the facilities a choice to over a quarter of the respondents, as almost 60% uses personal motorcycles, making the use of commercial buses, taxis and motorcycles a rare occurrence. Again, over 70% of those who usually pay for transportation to the healthcare centres, spend less than N150:00 on such trip; and only 9.3% pay more than N200:00 for the same purpose.

5.2.2 Legal Status of PHCs in Chanchaga LGA

Field assessment revealed that over half (53.8%) of the PHCs are not registered with the National Health Insurance Scheme (NHIS), while only about a quarter (23.1%) of them are with the insurance scheme as about 7.7% are not even aware of it.

On the part of registration with the State authorities, it was gathered that almost all (81.8%) of the sampled health facilities have registered with the Local Government Council (LGC). However, about the same number (81.8% and 100%) have not registered with either the Niger State or Federal Government controlling/administrative agencies respectively. This shows that the facilities either register with the State or federal government, as there is none that have refused to register.

5.3 CHALLENGES OF PHCs AND SERVICES DELIVERY IN CHANCHAGA LGA

The PHCs are faced with a number of challenges and the users of the facilities too are also encountering obstacles in order to access the services of the highly needed urban facility. These problems and challenges varies but mainly in the form of; limited access, man-power shortage, lack of equipment, dwindling or total lack of assistance from users and the urban authorities that should be there to acknowledge their immense contributions to urban management and sustainability.

5.3.1 Challenges of Accessing the PHCs

In accessing the facilities, users of PHCs are on daily basis having to contend with several issues that often limit the usability and affordability of these essential urban services. For example, the main hurdle in deriving full benefits from the PHCs is the lack of equipment for the health workers to attend to patients. While high cost or charges demanded by the operators of the facilities is the main hindrances for many residents in receiving healthcare services. To many urban dwellers, both high and low-income earners, bad road or inadequate access is seen as the main hindrance to free utilization of healthcare services that ought to be within easy reach. See Table 4.2 and Plate III.

Table 4.2: Main Challenges and Problems of the PHCs

	Challenges/Problems	Challenges of Access %	Receiving services %	The Facilities %
1	Lack of money	20.00		
2	Distance	10.00		

3	Lack of doctors			18.12
4	Lack of nurses			8.05
5	High charges/cost		46.97	
7	Lack of drugs			1.34
8	Bad roads	70.00		
9	Facility closes early		30.30	
10	Serve only workers		1.52	
11	Facility mismanagement		21.21	
12	Inadequate staff			2.68
13	Fake drugs			6.04
14	Lack of equipment			63.76
	Total	**100.00**	**100.00**	**100.00**

Source: Field Survey, August 2020

Plate III: Road leading to PHC Facility in Minna

Source: Field Survey, August 2020

Another leading problem observed by the residents is the glaring lack of doctors and nurses to attend to the people, forming over 26% of the peculiar challenges faced by the facilities. This could be the reason why another 30% of residents indicated that the facilities close early thereby disallowing free access at all times.

5.3.2 **Challenges of Man-power in the PHCs**

While lack of equipment is a major challenge affecting individual PHCs facility (over 63%), high cost or charges demanded by the operators is the main hindrance for people from receiving medical treatment in these health facilities. Again, the facilities are also deprived of the adequacy and the availability of Medical Doctors to treat the increasing number patients in these neighbourhoods. The consequence of inadequate man-power expressed in the limited number of medical doctors, has given way to the problem of the facilities closing too early (30%) thereby depriving a growing number of people from accessing and using them (Table 4.2).

5.4 SUSTAINABLE URBAN HEALTHCARE DELIVERY IN CHANCHAGA LGA

In order to have full access and efficiency of PHCs, this study examined certain locational variables that can help assist in mapping not only achievable healthcare facilities, but can also assist in assessing users' satisfaction for empirical analysis. Hence, a comparative study was carried out to help achieve this objective.

5.4.1 Residential Areas and Preferred Locations of PHCs

Residents were assessed based on their residential areas, the PHCs patronized and their preferred or most suitable location for these healthcare services. It was noticed that both the present location of the facilities and the preferred locations are all unevenly distributed. Although, the distribution seems to be influenced by population, certain areas or wards can be said to have been favoured more than others. For example, Anguwan Daji with only 4.3% of respondents, is presently home to over 7.7% of the PHCs (Table 4.3).

Table 4.3: Residential Areas and Preferred Locations of PHCs

SN	Wards	Percentages		
		Residents	PHCs Located	Preferred PHCs location
1	Limawa	18.60	11.90	11.80
2	Makera	5.90	5.90	9.30
3	Minna central	21.20	22.00	22.90

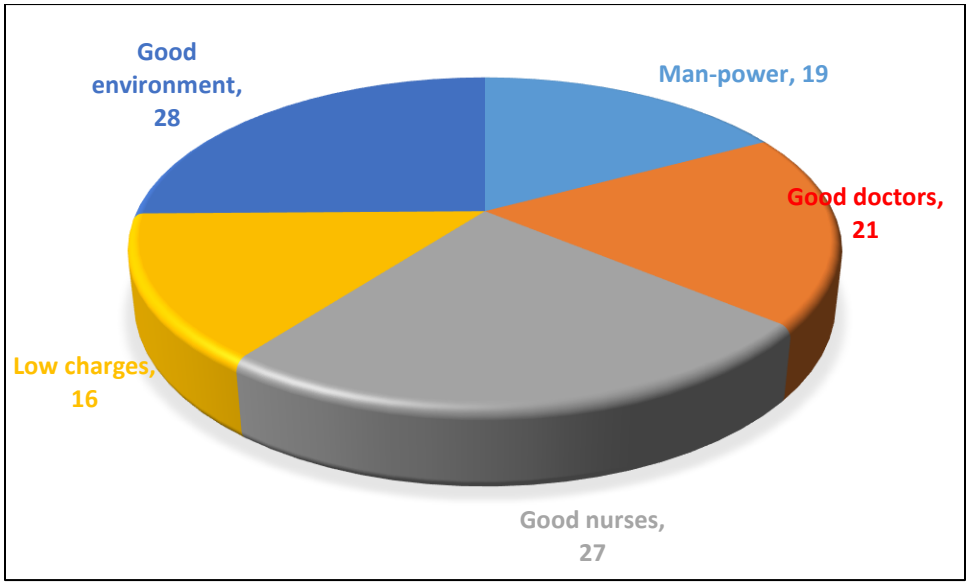
4	Nassarawa	24.60	27.10	25.60
5	Anguwan daji	4.30	7.70	3.30
6	Sabon gari	11.00	10.20	11.00
7	Tudun wada	14.40	15.20	16.10
Total		**100.00**	**100.00**	**100.00**

Source: Field Survey, August 2020

Table 4.3 shows that presently there are about 27% of the PHCs located in Limawa ward with about 24% of the sampled population, however, only 25% of the residents there preferred to have and use the health facilities in their immediate domain. Although, Anguwan Daji is home to only 4.3% of the interviewed residents and having 7,7% of the PHCs, only 3.3% of users of these facilities will preferred to patronize these locations. And while Makera is only having 5.9% of the facilities in the entire LGA, over 9% of the respondents interviewed would prefer to access healthcare facilities in that ward.

5.4.2 Reasons for the Preferred Locations of PHCs

Further analysis of field data revealed that more than half of the respondents (56.8%) preferred those facilities located in the highlighted wards because they possess man-power, and the remaining 43.2% based their preference on low charges (or cost of access and services) and good environment (Figure 4.6 and Plate IV).



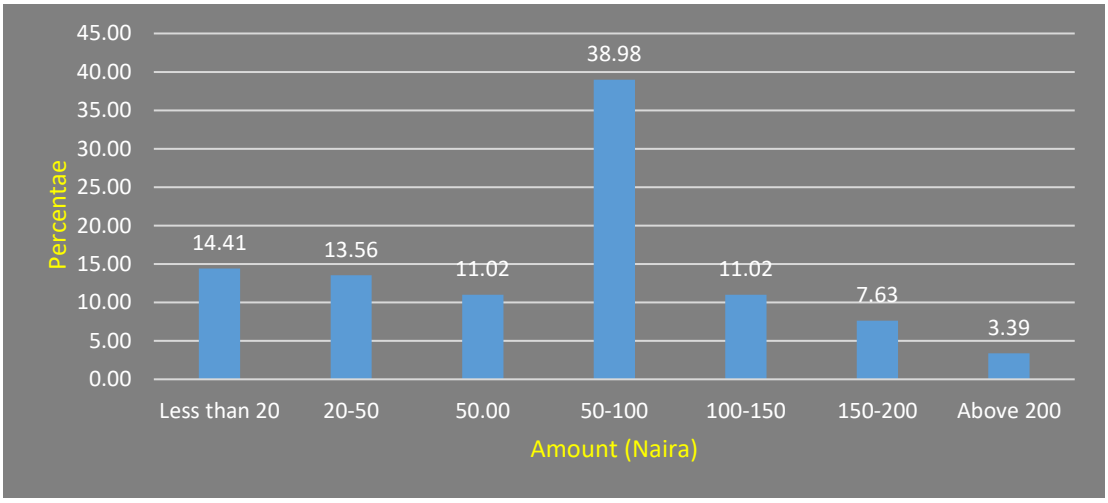
Source: Field Survey, August 2020

Figure 4.6: Reasons for the Preferred Locations of PHCs in Central Minna

Source: Field Survey, August 2020

Plate IV: A PHC Environment in Central Minna

The stated reasons for preference of PHCs and their locations are backed by the means and convenience of transportation as expressed by distance and cost of commuting to the PHCs. Almost one-thirds (28.0%) of the users of these facilities spend less than N50:00; and nearly 40% spend between N50-N100, as transport fare, with only 3.4% spend above N200:00 on the same activity. See Figure 4.7.



Source: Field Survey, August 2020

Figure 4.7: Transport Cost to the Preferred PHCs in Central Minna

5.4.3 Types of Assistance Required by The PHCs

All government provided or public facilities are faced with different constraints and challenges. However, clearly mapped out plans to effectively address these hurdles often give birth to accepted long term policies fashioned out to ensure the sustenance of the good input of the facilities in people's lives and livelihood. These elements of sustainability varies from issues of seeking assistance to strategies for funding and management of resources.

The main areas the PHCs are looking forward in order to be assisted are in the field of public health is basically on government intervention which was expressed in about 50% of such areas listed. This is in the form of supply of doctors, paying for patients, public enlightenment on community and public healthcare services and the government's needed constant attention in the particular areas of the enforcement of regular and effective environmental sanitation, community medicine and enrolment of urban residents particularly the low-income in the nation's health insurance scheme (The NHIS), in order to enjoy full coverage (Figure 4.8).

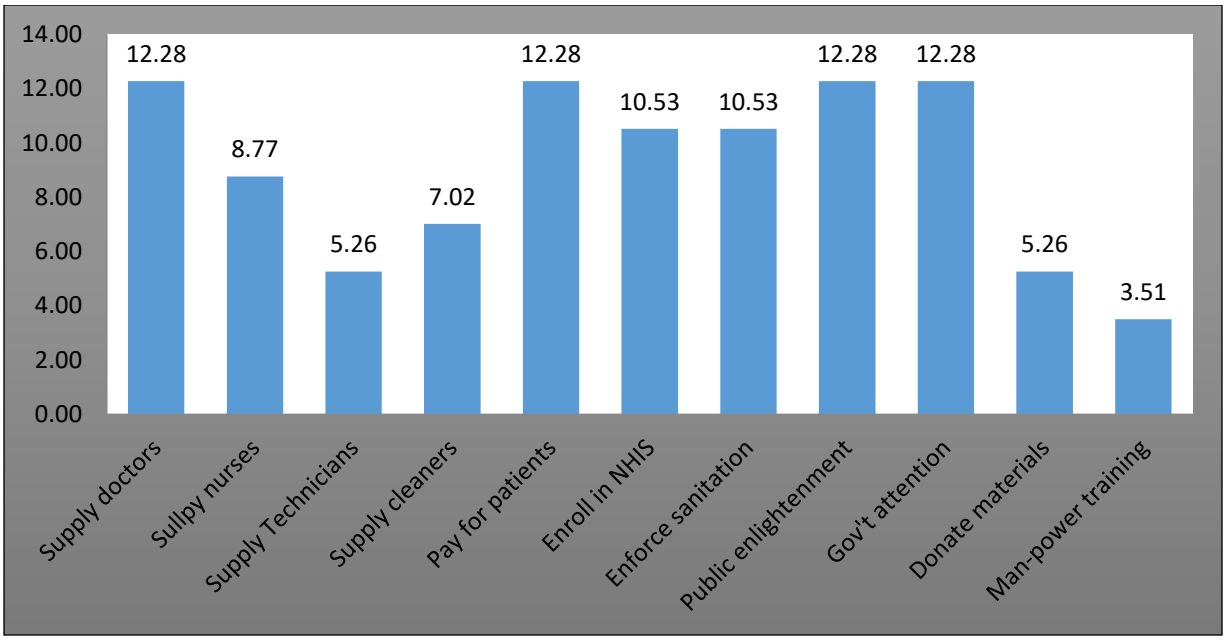


Figure 4.8: Types of Assistance sort by the PHCs in Minna
Source: Field Survey, August 2020

These preferences clearly shows that the study area is facing serious issues of poverty and deprivation at different dimensions. This explain the reason for almost half of the types of expected assistance are deeply rooted in fiscal and administrative interventions like; assisting patients to pay for services, supply of doctors, governments' constant support to the healthcare sector and similar activities.

5.4.4 Types of Assistance Received by The PHCSs

The PHCs have shown that they do receive assistance and goodwill from the people in different forms. The main assistance is building of more healthcare facilities and increase in the maintenance of space in the existing ones. The supply and maintenance of urban services and utilities like water supply, electricity power supply, proper and regular municipal waste evacuation and proper disposal and road maintenance are all items that are regularly receiving government attention. The least is however, the supply and maintenance of medical equipment and machineries, see Figure 4.9 and Plate V.

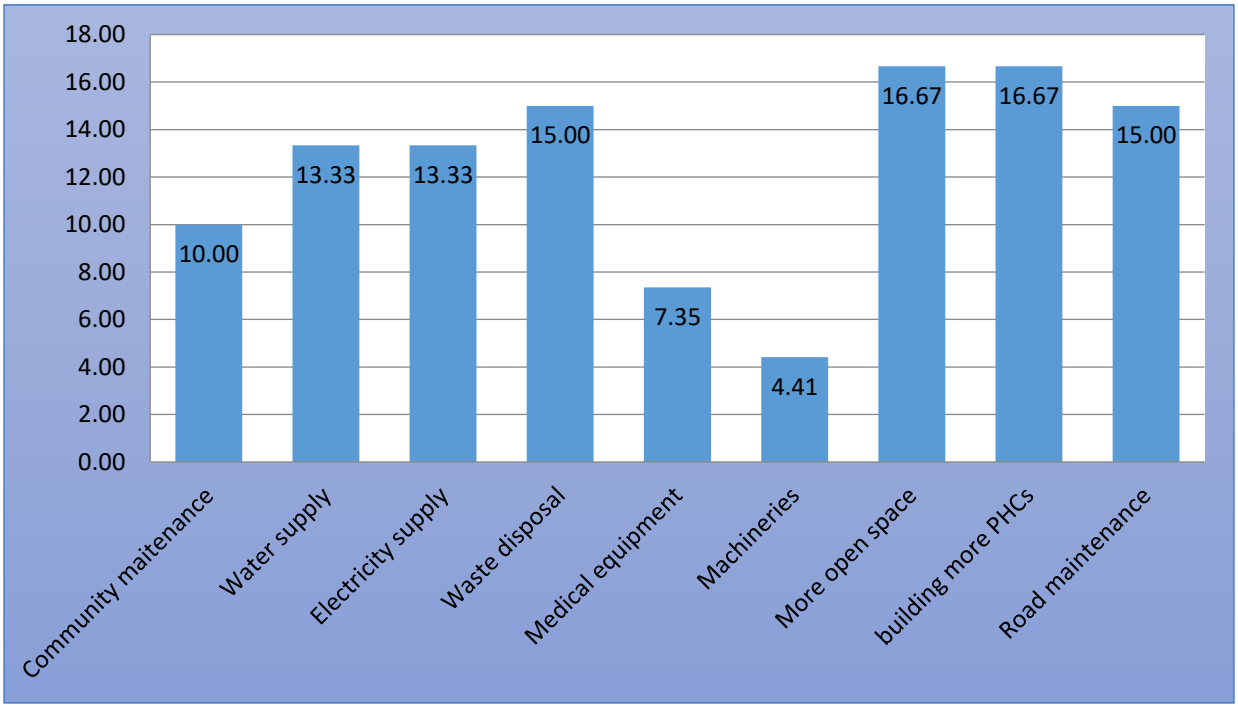


Figure 4.9: Types of Assistance Received by The PHCSs

Source: Field Survey, August 2020

Plate V: Massive Water Storage by the PHCs Due Epileptic Supply in Minna

Source: Field Survey, August 2020

The need for assistance is often warranted due to the nature of the problems. Sometimes, inadequacy of working materials and equipment can be realised only at short notice. In certain circumstances it is discovered that those items or materials are supposed to be supplied by the users of the facilities (that is, the patients or their families).

5.4.5 Avenues for Intervention and Assistance to the PHCSs

Avenues to assist the sampled PHCs are many, but can be grouped into two - The government and the people. However, while the bulk of the interventions, according to the owners and users of the neighbourhood health facilities, can be more sustainable if coming from the government particularly the Local Government (LGs). This is due to the fact that the LGs are much closer to the people, and its decision-making machineries are equally people-oriented (Table 4.4). Assistance is also expected from the immediate and prospective beneficiaries of the facilities but preferably as individuals and organizations and least is expected from the individual patients or members of their families especially in the crucial time of need for treatment and subsequent medications.

Table 4.4: Avenues for Intervention and Assistance to the PHCs

Intervention from	Organizations intervening	Percentage
The Government	LGCs	40.00
	State Gov't	20.00
	Fed Gov't	8.00
	Healthcare regulators	4.00
The people	N/Hood residents	12.00
	N/Hood Orgs	12.00
	Patients	4.00

Source: Field Survey, August 2020

Neighbourhood organizations are particularly known and expected to play the role of physical contributions like the provision of free labour, advocacy, public enlightenment, and giving of advice whenever work is being done to uplift the status of these facilities.

5.5 SUMMARY OF FINDINGS

The study area, Chanchaga Local Government Area, enqulfs the main traditional area of Minna that is sometimes referred to as central Minna. There are a number of PHCs in the study area both owned by government and those operating as private enterprise. The area is mainly populated by the low-income earners with less than a quarter of the residents earning a monthly income that is above the national minimum wage of Thirty thousand Naira (N30,000:00).

The health facilities are available and almost evenly spread accrossed neighbourhoods that constitute central Minna. However, low-income, and lack of adequate working materials have limited the use of these facilities. This has also made accessing of the facilities a difficult task for the majority of the residents who are low-income earners doing daily manual jobs.

Limited access has equally influenced the people in terms of choice of these facilities to use and patronize by family and friends. However, field assessment revealed that the preferences are mostly induced by the number of facilities available for use and the distance of the facilities from the abode of those to patronize them – current and prospective beneficiaries.

The PHCs are faced with many challenges: lack of doctors and technical team, insufficient and ill-equip working environment, bad roads, lack of urban utilities like regular water supply, electricity power, and proper waste management practices. Although, they usually receive help and assistance in tackling these shortcomings, with fast growing urban population, these interventions are often over-stretched before reaching their targets. It was discovered that all of these hindrances affect the use and patronage of these facilities in one way or the other.

In order to have a sustainable PHCs in a growing city like Minna, intervention is emphasized as a veritable medium and people-oriented policy measure to revamp the closest health facility to the

people. Interventions from the public mainly through the Local Governments in the city is hoped to provide the needed people-driven interventions. Such intervention is also expected from the people particularly the various people or neighbourhood organizations like Community Based Organizations (CBOs), Non-Government Organization (NGOs), Religious or Faith-based organizations, trade unions and organizations, and so on.

CHAPTER FIVE

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The research has analysed salient areas in public healthcare services delivery in Minna, Niger State administrative capital and a rapidly growing urban Local Government Area. Minna, being also the seat of Chanchaga Local Government Area is daily attracting population from far and near. This has made the assessment of PHCs a necessity for all stakeholders like urban policy makers, urban planners, urban designers and managers.

The study area being largely occupied by the low-income earners is in need of government intervention in order for the PHCs to function properly and regularly as required by the people. These sets of interventions are expected in different forms. For example: the regular sourcing and full engagement of medical doctors, provision of equipment and other working materials, good environmental management.

Individuals are mostly dissatisfied with the present PHCs in their neighbourhoods mainly because of the very limited number that are available to them to use. Preference to other neighbourhoods' facilities is not likely to be pronounced if people-oriented solutions are adhered to in addressing the challenges faced by the PHCs. This is mostly in the areas of adequate provision of functional health infrastructure like the PHCs studied in this work, road provision with adequate maintenance, and regular collective management of the existing facilities – where government or the public work together with the people.

With little difference between the preferred locations and the present locations of these PHC facilities, it shows that additional provision could be the immediate strategy. The yearnings of better and available facilities are bound to be addressed when more functional and sustainable healthcare facilities are provided in these rapidly growing urban neighbourhoods. Hence, the call by the beneficiaries of these

facilities that, in addition to seeking registration of these facilities, governments at various levels should also endeavour to provide them to the people.

6.2 RECOMMENDATIONS

Based on findings from the field and the existing literatures, the following recommendations are made in order to increase PHCs services and the effective and efficient delivery of general healthcare services in the study area and Niger State as a whole.

6.2.1 Increase Public Awareness

Greater awareness is needed for effective delivery of healthcare services. The action should all-inclusive of all the stakeholders. This can help accelerate actions needed to improve on the existing present state of the facilities and to also help to draw attention of the authorities to the urgent needs of the people as far as healthcare is concern.

6.2.2 More Interventions for PHCs

With the present deficiencies in the PHCs activities and equipment needed for healthcare delivery, it has become necessary to call on providers of these services, government in this case, to increase the tempo of interventions. This can be in regularly increasing funding for these facilities, having more time or periods of such interventions, and, calling on others to also assist to provide and manage equipment and properties for the PHCs.

6.2.3 Increase the Involvement of All Stakeholders

In managing public facilities and infrastructures, collaborative efforts has been shown to be a very useful and rewarding approach (Aliyu Mohammed Kawu, 2015, 2016). The present state of the PHCs can be well

improved with the activities of neighbourhood organizations like the CBOs and NGOs. These increasingly important urban development partners are known to assist with both materials and cash to build, repair and manage public facilities.

Governments and other stakeholders can enter into workable agreement with these urban groups in order to assist in the management of the healthcare facilities. As members of the same society, who are also beneficiaries of urban infrastructures, these urban groups can help in managing the facilities by not only being their custodians but, also participate fully amongst the financiers of the facilities.

References

Abid, M., Ali, A., Rahut, D. B., Raza, M., & Mehdi, M. (2020). Ex-ante and ex-post coping strategies for climatic shocks and adaptation determinants in rural Malawi. *Climate Risk Management*, *27*(February 2019), 100200. https://doi.org/10.1016/j.crm.2019.100200

Adusah-Poku, F., & Takeuchi, K. (2019). Energy poverty in Ghana: Any progress so far? *Renewable and Sustainable Energy Reviews*, *112*, 853–864. https://doi.org/10.1016/j.rser.2019.06.038

Ahmed, A. (2000). *An Evaluation of the Spatial Planning Input in the Ningi Development Area of the Bauchi State Integrated Rural Development Programme (BASIRDP)*. Unpublished PhD (URP) Thesis, Ahmadu Bello University Zaria - Nigeria. Retrieved from www.abu.edu.ng

Alavi, A. H., Jiao, P., Buttlar, W. G., & Lajnef, N. (2018). Internet of Things-enabled smart cities: State-of-the-art and future trends. *Measurement*, *129*, 589–606. https://doi.org/10.1016/j.measurement.2018.07.067

Allen, R. H. (2007, November). The role of family planning in poverty reduction. *Obstetrics and Gynecology*. https://doi.org/10.1097/01.AOG.0000287063.32004.23

Badland, H., Davern, M., Villanueva, K., Mavoa, S., Milner, A., Roberts, R., & Giles-Corti, B. (2016). Conceptualising and Measuring Spatial Indicators of Employment Through a Liveability Lens. *Social Indicators Research*, *127*(2), 565–576. https://doi.org/10.1007/s11205-015-0978-6

Badland, H., Mavoa, S., Boulangé, C., Eagleson, S., Gunn, L., Stewart, J., … Giles-Corti, B. (2017). Identifying, creating, and testing urban planning measures for transport walking: Findings from the Australian national liveability study. *Journal of Transport and Health*, *5*, 151–162. https://doi.org/10.1016/j.jth.2016.08.010

Baffour Awuah, K. G., Hammond, F. N., Lamond, J. E., & Booth, C. (2014). Benefits of urban land use planning in Ghana. *Geoforum*, *51*, 37–46. https://doi.org/10.1016/j.geoforum.2013.09.019

Bahadur, A. V., & Tanner, T. (2014). Policy climates and climate policies: Analysing the politics of building urban climate change resilience. *Urban Climate*, *7*, 20–32. https://doi.org/10.1016/j.uclim.2013.08.004

Bahago, H. A. (2008). *Analysis of the Physical Effects of Rural – Urban Migration on Secondary Education Facilities in Minna, Niger State*. Unpublished BTech (URP) Project, Federal University of Technology, Minna, Nigeria.

Beller, E. E., Kelly, M., & Larsen, L. G. (2020). From savanna to suburb: Effects of 160 years of landscape change on carbon storage in Silicon Valley, California. *Landscape and Urban Planning*, *195*(November 2019), 103712. https://doi.org/10.1016/j.landurbplan.2019.103712

Bielik, M., König, R., Schneider, S., & Varoudis, T. (2018). Measuring the Impact of Street Network Configuration on the Accessibility to People and Walking Attractors. *Networks and Spatial Economics*, *18*(3), 657–676. https://doi.org/10.1007/s11067-018-9426-x

Bigazzi, A. (2019). Comparison of marginal and average emission factors for passenger transportation modes. *Applied Energy*, *242*, 1460–1466. https://doi.org/10.1016/j.apenergy.2019.03.172

Boeing, G. (2018). Planarity and street network representation in urban form analysis. *Environment and Planning B: Urban Analytics and City Science*. https://doi.org/10.1177/2399808318802941

Brochmann, G., & Midtbøen, A. H. (2021). Philosophies of integration? Elite views on citizenship policies in Scandinavia. *Ethnicities*, *21*(1), 146–164. https://doi.org/10.1177/1468796820950453

Brock, D. M., & Saks, M. (2015). Professions and organizations: A European perspective. *European Management Journal*, *34*(1), 1–6. https://doi.org/10.1016/j.emj.2015.11.003

Brooks, N. (2003). *Vulnerability, risk and adaptation: A conceptual framework* (Tyndall Centre Working Paper No. 38 No. 38). Norwch.

Cai, W., & Lu, X. (2015). Housing affordability: Beyond the income and price terms, using China as a case study. *Habitat International*, *47*, 169–175. https://doi.org/10.1016/j.habitatint.2015.01.021

Carr, L. J., Dunsiger, S. I., & Marcus, B. H. (2011). Validation of Walk Score for estimating access to walkable amenities. *British Journal of Sports Medicine*, *45*(14), 1144–1148. https://doi.org/10.1136/bjsm.2009.069609

Cheeseman, N., & de Gramont, D. (2017). Managing a mega-city: Learning the lessons from Lagos. *Oxford Review of Economic Policy*, *33*(3), 457–477. https://doi.org/10.1093/oxrep/grx033

Chu, S., Mehrmal, S., Uppal, P., & Giesey, R. L. (2020). Burden of skin disease and associated socioeconomic status in Europe : An ecologic study from the Global Burden of Disease Study 2017. *JAAD International*, *1*(2), 95–103. https://doi.org/10.1016/j.jdin.2020.07.001

Coast, E., & Murray, S. F. (2016). "These things are dangerous": Understanding induced abortion trajectories in urban Zambia. *Social Science and Medicine*, *153*, 201–209. https://doi.org/10.1016/j.socscimed.2016.02.025

Creutzig, F., Baiocchi, G., Bierkandt, R., Pichler, P. P., & Seto, K. C. (2015). Global typology of urban energy use and potentials for an urbanization mitigation wedge. *Proceedings of the*

National Academy of Sciences of the United States of America, *112*(20), 6283–6288. https://doi.org/10.1073/pnas.1315545112

Cutumisu, N., Blanchard, C., Plotnikoff, R., Berry, T., & Spence, J. (2012). Effect of neighbourhood space syntax on the frequency of walking in Edmonton, Canada. *Journal of Science and Medicine in Sport*, *15*, S30–S31. https://doi.org/10.1016/j.jsams.2012.11.073

Cyril, S., Oldroyd, J. C., & Renzaho, A. (2013). Urbanisation, urbanicity, and health: a systematic review of the reliability and validity of urbanicity scales. *BMC Public Health*, *13*, 513. https://doi.org/10.1186/1471-2458-13-513

Dalla Chiara, B., De Franco, D., Coviello, N., & Pastrone, D. (2017). Comparative specific energy consumption between air transport and high-speed rail transport: A practical assessment. *Transportation Research Part D: Transport and Environment*, *52*, 227–243. https://doi.org/10.1016/j.trd.2017.02.006

De Stefano, L., Hernández-Mora, N., Iglesias, A., & Sánchez, B. (2017). Defining adaptation measures collaboratively: A participatory approach in the Doñana socio-ecological system, Spain. *Journal of Environmental Management*, *195*, 46–55. https://doi.org/10.1016/j.jenvman.2016.10.042

Di, X., Wang, L., Dai, X., & Yang, L. (2020). Assessing the Accessibility of Home-Based Healthcare Services for the Elderly : A Case from Shaanxi Province , China.

Dodman, D., Brown, D., Francis, K., Hardoy, J., Johnson, C., & Satterthwaite, D. (2013). *Understanding the nature and scale of urban risk in low- and middle- income countries and its implications for humanitarian preparedness, planning and response - Human Settlements Discussion Paper Series, Climate Change and Cities 4.* Retrieved from http://pubs.iied.org/10624IIED.html%0ADisclaimer:

Duncan, D. T., Méline, J., Kestens, Y., Day, K., Elbel, B., Trasande, L., & Chaix, B. (2016). Walk score, transportation mode choice, and walking among french adults: A GPS, accelerometer, and mobility survey study. *International Journal of Environmental Research and Public Health*, *13*(6), 1–14. https://doi.org/10.3390/ijerph13060611

El-hussain, A. M. (2018). Factors of Spontaneous Physical Housing Changes in Urban Centres of Southwest Nigeria, (May). https://doi.org/10.5923/j.arch.20180802.04

Ervin, R. B., & Kennedy-Stephenson, J. (2002). Mineral intakes of elderly adult supplement and non-supplement users in the Third National Health and Nutrition Examination Survey. *Journal of Nutrition*, *132*(11), 3422–3427. https://doi.org/10.1093/jn/132.11.3422

Ewing, R., Handy, S., Brownson, R. C., Clemente, O., & Winston, E. (2006). Identifying and Measuring Urban Design Qualities Related to Walkability. *Journal of Physical Activity and Health*, *3*(s1), S223–S240. https://doi.org/10.1123/jpah.3.s1.s223

Falchetta, G., Hammad, A. T., & Shayegh, S. (2020). Planning universal accessibility to public health care in sub-Saharan Africa. *Proceedings of the National Academy of Sciences of the United States of America*, *117*(50), 31760–31769. https://doi.org/10.1073/pnas.2009172117

Fee, A., McIlfatrick, S., & Ryan, A. (2021). Exploring Formal Care Providers' Perspectives of the Support Needs of Older Male Spousal Care-givers: A Focus Group Study. *British Journal of Social Work*, *51*(1), 205–222. https://doi.org/10.1093/bjsw/bcaa019

Fernald, A., Tidwell, V., Rivera, J., Rodríguez, S., Guldan, S., Steele, C., … Cibils, A. (2012). Modeling Sustainability of Water, Environment, Livelihood, and Culture in Traditional Irrigation Communities and Their Linked Watersheds. *Sustainability*, *4*(12), 2998–3022. https://doi.org/10.3390/su4112998

Filion, P., & Saboonian, S. (2019). Large multifunctional suburban centres and the transformation of the suburban realm. *Journal of Urbanism*, *12*(3), 296–319. https://doi.org/10.1080/17549175.2019.1576759

Flood, S., King, M., Ruggles, S., & Warren, J. R. (2015). Integrated Public Use Microdata Series, Current Population Survey: Version 4.0. https://doi.org/10.18128/D030.V4.0

Flyvbjerg, B. (2012). Why Mass Media Matter to Planning Research: The Case of Megaprojects. *Journal of Planning Education and Research*, *32*(2), 169–181. https://doi.org/10.1177/0739456X12441950

Fotso, J. C., Ezeh, A., Madise, N., Ziraba, A., & Ogollah, R. (2009). What does access to maternal care mean among the urban poor? Factors associated with use of appropriate maternal health services in the slum settlements of Nairobi, Kenya. *Maternal and Child Health Journal*, *13*(1), 130–137. https://doi.org/10.1007/s10995-008-0326-4

Fotso, J. C., Ezeh, A., & Oronje, R. (2008). Provision and use of maternal health services among urban poor women in Kenya: what do we know and what can we do? *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, *85*(3), 428–442. https://doi.org/10.1007/s11524-008-9263-1

Gidlow, C., Cerin, E., Sugiyama, T., Adams, M. A., Mitas, J., Akram, M., … Sallis, J. F. (2019). Objectively measured access to recreational destinations and leisure-time physical activity: Associations and demographic moderators in a six-country study. *Health and Place*, *59*. https://doi.org/10.1016/j.healthplace.2019.102196

Glikman, A., & Semyonov, M. (2012). Ethnic Origin and Residential Attainment of, (June), 198–219. https://doi.org/10.1111/j.1540-6040.2012.01398.x

Harnesk, D. (2018). Biomass-based energy on the move – The geographical expansion of the European Union's liquid biofuel regulation. *Geoforum*, (June), 1–11. https://doi.org/10.1016/j.geoforum.2018.09.019

Hassan, N. S. (1990). *The Effect of City Size Distribution on Regional Development of Kano State*. Unpublished MSc (URP) Thesis, Ahmadu Bello University, Zaria – Nigeria. Retrieved from http://www.abu.edu.ng/library/

Hollomotz, A. (2021). Successful Community Resettlement of Men with Learning Disabilities Who Have Completed a Hospital-Based Treatment for Sexual Offending. *British Journal of Social Work*, *51*(1), 150–169. https://doi.org/10.1093/bjsw/bcaa038

Ibes, D. C. (2015). A multi-dimensional classification and equity analysis of an urban park system: A novel methodology and case study application. *Landscape and Urban Planning*, *137*. https://doi.org/10.1016/j.landurbplan.2014.12.014

Jayaweera, R. T., Ngui, F. M., Hall, K. S., & Gerdts, C. (2018). Women's experiences with unplanned pregnancy and abortion in Kenya: A qualitative study. *PLoS ONE*, *13*(1). https://doi.org/10.1371/journal.pone.0191412

Jemaku, M. M. (2007). *Effects of Construction Works Within A Built-Up Residential Area; A Case for Controlled Development In Minna, Niger State*. Federal University of Technology, Minna - Nigeria. Retrieved from www.futminnna.edu.ng

Jiang, J. Q., Ashekuzzaman, S. M., Jiang, A., Sharifuzzaman, S. M., & Chowdhury, S. R. (2013). Arsenic contaminated groundwater and its treatment options in bangladesh. *International Journal of Environmental Research and Public Health*, *10*(1), 18–46. https://doi.org/10.3390/ijerph10010018

Jiménez, A., Cortobius, M., & Kjellén, M. (2014). Water, sanitation and hygiene and indigenous peoples: a review of the literature. *Water International*, *39*(3), 277–293. https://doi.org/10.1080/02508060.2014.903453

Katpatal, Y. B., & Rama Rao, B. V. S. (2011). Urban spatial decision support system for municipal solid waste management of nagpur urban area using high-resolution satellite data and geographic information system. *Journal of Urban Planning and Development*, *137*(1), 65–76. https://doi.org/10.1061/(ASCE)UP.1943-5444.0000043

Kawu, A. M, Ahmed, A., & Usman, A. S. (2012). Learning from Tradition : Elements and Practice of Urban Development Control in Zaria City , Nigeria. *American International Journal of Contemporary Research*, *2*(7), 205–213. Retrieved from www.aijcrnet.com

Kawu, A. M. (2015). Climate change, urban management and livelihood challenges in low-income neighbourhoods of developing countries. In M. H. Watkins & C. A. Griffith (Eds.), *Synthesis Report from the 2nd International Conference on Urbanization and Global Environmental Change, Urban Transitions & Transformations: Science, Synthesis and Policy* (pp. 156–157). Taipei: The Urbanization and Global Environmental Change Project, Tempe, USA. https://doi.org/10.1017/CBO9781107415324.004

Kawu, A. M. (2016). *Assessment of Urban Development Activities of Community Based Organizations in Minna, Nigeria*. Unpublished PhD (URP) Thesis, Ahmadu Bello University, Zaria.

Kawu, A. M., & Owoyele, G. S. (2008). Slums: Hubs of Opportunities and Sustainable Development. *Environ: Journal of Environmental Studies, Ahmadu Bello University, Zaria, Nigeria*, *2*(9), 51–61.

Kelly, G. C., Tanner, M., Vallely, A., & Clements, A. (2012, July). Malaria elimination: Moving forward with spatial decision support systems. *Trends in Parasitology*. https://doi.org/10.1016/j.pt.2012.04.002

Lawanson, T., & Fadare, S. (2015). Environment and health disparities in urban communities: Focus on Eti Osa, Nigeria. *City, Culture and Society*, *6*(1), 43–52. https://doi.org/10.1016/j.ccs.2014.12.003

Lercher, P., Widmann, U., & Thudium, J. (2014). Hypotension and environmental noise: a replication study. *International Journal of Environmental Research and Public Health*, *11*(9), 8661–8688. https://doi.org/10.3390/ijerph110908661

Levinson, D., Mathieu, J. M., Gillen, D., & Kanafani, A. (1997). The full cost of high-speed rail: An engineering approach. *Annals of Regional Science*, *31*(2), 189–215. https://doi.org/10.1007/s001680050045

Liao, H. yu, Cade, W., & Behdad, S. (2021). Markov chain optimization of repair and replacement decisions of medical equipment. *Resources, Conservation and Recycling*, *171*.

Liao, Y., Shibata, A., Ishii, K., Koohsari, M. J., Inoue, S., & Oka, K. (2018). Can neighborhood design support walking? Cross-sectional and prospective findings from Japan. *Journal of Transport and Health*, *11*, 73–79. https://doi.org/10.1016/j.jth.2018.10.008

Lin, Y.-F., Shie, H.-H., Yang, Y.-C., & Tseng, V. S. (2014). Design of a real-time and continua-based framework for care guideline recommendations. *International Journal of Environmental Research and Public Health*, *11*(4), 4262–4279. https://doi.org/10.3390/ijerph110404262

Lin, Y. L., Yen, M. F., & Yu, L. C. (2018). Grid-based crime prediction using geographical features. *ISPRS International Journal of Geo-Information*, *7*(8). https://doi.org/10.3390/ijgi7080298

Litman, T. (2014). Evaluating Public Transit Benefits and Costs - Best Practices Guidebook. *Victotia Transport Policy Institute*, 1–138. Retrieved from www.vtpi.orgInfo@vtpi.org

Low, S., & Iveson, K. (2016). Propositions for more just urban public spaces. *City: Analysis of Urban Trends, Culture, Theory, Policy, Action*, *20*(1), 10–31. https://doi.org/10.1080/13604813.2015.1128679

Lowe, M., Whitzman, C., Badland, H., Davern, M., Aye, L., Hes, D., … Giles-Corti, B. (2015). Planning Healthy, Liveable and Sustainable Cities: How Can Indicators Inform Policy? *Urban Policy and Research*, *33*(2), 131–144. https://doi.org/10.1080/08111146.2014.1002606

Lowe, M., Whitzman, C., & Giles-Corti, B. (2018). Health-Promoting Spatial Planning: Approaches for Strengthening Urban Policy Integration. *Planning Theory and Practice*, *19*(2), 180–197. https://doi.org/10.1080/14649357.2017.1407820

Luz, S., Masoodian, M., Cesario, R. R., & Cesario, M. (2015). and prevention of neglected tropical diseases q. *ENTERTAINMENT COMPUTING*, 1–13. https://doi.org/10.1016/j.entcom.2015.11.001

Masellis M., Ferrara M.M., G. S. W. A. (1999). Fire Disaster and Burn Disaster: Planning and Management. *Annals of Burns and Fire Disasters*, *XII*(2), 67. Retrieved from http://www.medbc.com/annals/review/vol_12/num_2/text/vol12n2p67.htm

Mayer, M. (2013). First world urban activism: Beyond austerity urbanism and creative city politics. *City*, *17*(1), 5–19. https://doi.org/10.1080/13604813.2013.757417

McGranahan, G. (2013). Community-driven sanitation improvement in deprived urban neighbourhoods Meeting the challenges of local collective. Retrieved from http://www.shareresearch.org/LocalResources/FINAL_Community_drive_sanitation_improvement_in_deprived_urban_neighbourhoods_McGranahan_June_2013.pdf

Mensah, J., & Enu-Kwesi, F. (2019). Implications of environmental sanitation management for sustainable livelihoods in the catchment area of Benya Lagoon in Ghana. *Journal of Integrative Environmental Sciences*, *16*(1), 23–43. https://doi.org/10.1080/1943815X.2018.1554591

Meth, P. (2021). Broken cities: Inside the global housing crisis. *Regional Studies*, *55*(7), 1337–1338. https://doi.org/10.1080/00343404.2021.1922168

Michels, A., & de Graaf, L. (2010). Examining citizen participation: Local participatory policy making and democracy. *Local Government Studies*, *36*(4), 477–491. https://doi.org/10.1080/03003930.2010.494101

Minelgaitė, A., & Liobikienė, G. (2019). The problem of not waste sorting behaviour, comparison of waste sorters and non-sorters in European Union: Cross-cultural analysis. *Science of The Total Environment*, *672*, 174–182. https://doi.org/10.1016/j.scitotenv.2019.03.342

Momoh, J., Opaluwah, A., & Albeera, H. (2018). Challenges Facing Nigeria's Urban Environment: The Abuja Case. *Journal of Sustainable Development in Africa*, *20*(2), 34–49.

Muhammed, M. (2011). Modeling Accessibility to Primary Health Care Facilities in Chanchaga

L.G.A of Minna, Niger State using Geographic Information System. *Journal of Science, Technology, Mathematics and Education (JOSTMED)*, *7*(2), 23–32. Retrieved from www.jostmed.com

Nwuba, C. C., & Kalu, I. U. (2018). Measuring Housing Affordability: The Two Approaches. *ATBU Journal of Environmental Technology*, *11*(1), 127–143.

Oginni, A., Ahmadu, S. K., Okwesa, N., Adejo, I., & Shekerau, H. (2018). Correlates of individual-level abortion stigma among women seeking elective abortion in Nigeria. *International Journal of Women's Health*, *10*, 361–366. https://doi.org/10.2147/IJWH.S143388

Ohta, R., Ryu, Y., Katsube, T., & Sano, C. (2020). Rural Homecare Nurses ' Challenges in Providing Seamless Patient Care in Rural Japan. *Int. J. Environ. Res. Public Health*, *17*(9330). https://doi.org/doi:10.3390/ijerph17249330

Oldfield, K. (2017). The Social Aspects of Hand Washing in American Restaurants: An Administrative Approach to Reducing Public and Private Health Care Costs. *Administration and Society*, *49*(5), 753–771. https://doi.org/10.1177/0095399716638121

Parry, L., Davies, G., Almeida, O., Frausin, G., de Mora?s, A., Rivero, S., … Torres, P. (2017). Social Vulnerability to Climatic Shocks Is Shaped by Urban Accessibility. *Annals of the American Association of Geographers*, 1–19. https://doi.org/10.1080/24694452.2017.1325726

Paul, A., & Sen, J. (2018). Livability assessment within a metropolis based on the impact of integrated urban geographic factors (IUGFs) on clustering urban centers of Kolkata. *Cities*, *74*, 142–150. https://doi.org/10.1016/j.cities.2017.11.015

Pennisi, E. (2020). Growth of cities could boost mosquito-borne diseases. *Science*, *368*(6492), 695–695. https://doi.org/10.1126/science.368.6492.695

Peter, Y., Gadiga, B. L., & Mshelia, A. D. (2015). Landuse/landcover change detection of Mubi Metropolis, Adamawa State, Nigeria, *4*(6), 70–78.

Popoola, A., Magidimisha-Chipingu, H., Chipungu, L., Adeleye, B., Akogun, O., & Medayese, S. (2021). Household Water Stress, Adaptation and Resilience in Some Selected Peri-urban and Rural Communities of Oyo State, Nigeria. *IOP Conference Series: Earth and Environmental Science*, *654*(1). https://doi.org/10.1088/1755-1315/654/1/012006

Puri, P., Yiannias, J. A., Mangold, A. R., Swanson, D. L., & Pittelkow, M. R. (2020). The policy dimensions , regulatory landscape , and market characteristics of teledermatology in the United States. *JAAD International*, *1*(2), 202–207. https://doi.org/10.1016/j.jdin.2020.09.004

Rodríguez Bolívar, M. P. (2021). Understanding affordability: The economics of housing markets. *Regional Studies*, *55*(7), 1338–1339. https://doi.org/10.1080/00343404.2021.1922173

Roy, A., & Pramanick, K. (2019). Analysing progress of sustainable development goal 6 in India: Past, present, and future. *Journal of Environmental Management*, *232*, 1049–1065. https://doi.org/10.1016/j.jenvman.2018.11.060

Rybarczyk, G., Ozbil, A., Andresen, E., & Hayes, Z. (2020). Physiological responses to urban design during bicycling: A naturalistic investigation. *Transportation Research Part F: Traffic Psychology and Behaviour*, *68*, 79–93. https://doi.org/10.1016/j.trf.2019.12.001

Sadeniemi, M., Pirkola, S., Pankakoski, M., Joffe, G., Kontio, R., Malin, M., … Wahlbeck, K. (2014). Does primary care mental health resourcing affect the use and costs of secondary psychiatric services? *International Journal of Environmental Research and Public Health*, *11*(9), 8743–8754. https://doi.org/10.3390/ijerph110908743

Schuler, S. R., Rottach, E., & Mukiri, P. (2011). Gender norms and family planning decision-making in Tanzania: A qualitative study. *Journal of Public Health in Africa*, *2*(2), 102–107. https://doi.org/10.4081/jphia.2011.e25

Sen, M. (2020). Regional Disparity in Availability of Health Care Facilities of Birbhum District, West Bengal: A Spatio-Temporal Analysis. *Journal of Global Resources*, *6*(2), 92–99. https://doi.org/doi.org/10.46587/JGR.2020.v06i02.013

Takeuchi, K. (2010). Rebuilding the relationship between people and nature: The Satoyama Initiative. *Ecological Research*, *25*(5), 891–897. https://doi.org/10.1007/s11284-010-0745-8

To, W. M., Lee, P. K. C., & Yu, B. T. W. (2020). Sustainability assessment of an urban rail system – The case of Hong Kong. *Journal of Cleaner Production*, *253*. https://doi.org/10.1016/j.jclepro.2020.119961

Tong, M. X., Hansen, A., Hanson-Easey, S., Xiang, J., Cameron, S., Liu, Q., … Bi, P. (2018). China's capacity of hospitals to deal with infectious diseases in the context of climate change. *Social Science and Medicine*, *206*, 60–66. https://doi.org/10.1016/j.socscimed.2018.04.021

Tu, M., Zou, Q., & Chen, Z. (2019). Research on location characteristics of logistics industry in wuhan based on spatial syntax and poi. In *ICTIS 2019 - 5th International Conference on Transportation Information and Safety* (pp. 1330–1336). Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/ICTIS.2019.8883755

Umar, A. A., & Kawu, A. M. (2011). Examining The Relationship Between Economic Activities and Water Pollution in Urban Streams in Minna, Nigeria. *Environmental Technology & Science Journal (ETSJ)*, *4*(1), 50–59. Retrieved from http://repository.futminna.edu.ng:8080/jspui/handle/123456789/13797

van Westen, C. J. (2000). *Remote sensing for natural disaster management* (Part B7) (Vol. XXXIII). Amsterdam, The Neitherlands.

Versteijlen, M., Perez Salgado, F., Janssen Groesbeek, M., & Counotte, A. (2017). Pros and cons of online education as a measure to reduce carbon emissions in higher education in the Netherlands. *Current Opinion in Environmental Sustainability*, *28*, 80–89. https://doi.org/10.1016/j.cosust.2017.09.004

Wang, D., Hu, B., Hu, C., Zhu, F., Liu, X., Zhang, J., … Peng, Z. (2020). Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA - Journal of the American Medical Association*, *323*(11), 1061–1069. https://doi.org/10.1001/jama.2020.1585

Wuyep, S. Z., & Rampedi, I. T. (2018). Urban fish farming in Jos, Nigeria: Contributions towards employment opportunities, income generation, and poverty alleviation for improved livelihoods. *Agriculture (Switzerland)*, *8*(7). https://doi.org/10.3390/agriculture8070110

Xia, Y., Liu, D., Liu, Y., He, J., & Hong, X. (2014). Alternative zoning scenarios for regional sustainable land use controls in china: a knowledge-based multiobjective optimisation model. *International Journal of Environmental Research and Public Health*, *11*(9), 8839–8866. https://doi.org/10.3390/ijerph110908839

Xydis, G., & Nanaki, E. (2015). Wind Energy Based Electric Vehicle Charging Stations Sitting. A GIS/Wind Resource Assessment Approach. *Challenges*, *6*(2), 258–270. https://doi.org/10.3390/challe6020258

Yegon, E. K., Kabanya, P. M., Echoka, E., & Osur, J. (2016). Understanding abortion-related stigma and incidence of unsafe abortion: Experiences from community members in machakos and trans Nzoia counties Kenya. *Pan African Medical Journal*, *24*. https://doi.org/10.11604/pamj.2016.24.258.7567

Yin, J., Su, B., Fan, C., & Li, Q. (2020). Location of the public service facilities in an urban comprehensive park using a multi-hierarchy and multi-constrained configuration model. *Journal of Urban Management*, *9*(2), 205–215. https://doi.org/10.1016/j.jum.2020.04.001

Zahedi, L., Sizemore, E., Malcolm, S., Grossniklaus, E., & Nwosu, O. (2014). Knowledge, Attitudes and Practices Regarding Cervical Cancer and Screening among Haitian Health Care Workers. *International Journal of Environmental Research and Public Health*, *11*(11), 11541–11552. https://doi.org/10.3390/ijerph111111541

APPENDIX I

SAMPLE SIZE DETERMINATION/CALCULATIONS

The Cochran formula, Cochran (1977)

n = Z^2PG/E^2

where p = the proportion of occurrence or rate of access to PHC service (51.9%)

Q = is equal to (1-P)

Z = confidence level (95%)

E = accuracy level (4.0%)

n= the required sample size

In this study, p figure represents the rate of access to PHC service in the Chanchaga LGA

Applying the formula:

n= (0.95) ^ 2(0.519*0.481)/0.04^2

n=0.9025*0.25/0.0016

n=0.226/0.0016

n= 141.25

This is rounded up to 141 respondents.

APPENDIX II

QUESTIONNAIRE FOR HEALTH FACILITY OPERATORS/OWNER

CENTRE FOR HUMAN SETTLEMENTS AND URBAN DEVELOPMENT

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

QUESTIONNAIRE ON ACCESSIBILITY OF PRIMARY HEALTHCARE FACILITIES IN CHANCHAGA LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

Dear Respondent,

This research field work is part of requirement leading to the award of Master in Sustainable Urban Development (M.SUD). All information supplied will be used purely for this academic purpose and shall be treated with utmost confidentiality. You are therefore kindly requested to tick ( ) from the options provided or fill in the spaces provided. **Thank You Sir/ Ma**

QUESTIONNAIRE FOR HEALTH FACILITY OPERATORS/OWNER

Types and characteristics of healthcare facilities present in the area of study

1. Type of health facility: a. Maternity Home __ **b.** Health Clinic __ **c.** General Hospital __ **d.** Dispensary __ **e.** Private hospital/Clinic __ **f.** Pharmaceutical Chemist __ **g.** Others (Specify) _____.

2. Location of the health facility: a. Limawa A __ **b.** Limawa __ **c.** Makera __ **d.** Minna central __ **e.** Minna South __ **f.** Nassarawa A __ **g.** Nassarawa B __ **h.** Nassarawa C__ **i.** Anguwan Daji __ **j.** Sabon gari __ **k.** Tudun wada north __ **l.** Tudun wada South __.

3. Main function of this facility: a. Antenatal services __ **b.** Emergency health services __ **c.** Paediatric services __ **d.** General health services __ **e.**

4. Main diseases treated: a. Malaria Fever __ **b.** Typhoid fever __ **c.** Others (Specify) _____

5. Manpower of the facility (number of): a. Doctors __ **b.** Nurses __ **c.** Lab attendants __ **d.** Cleaners __ **e.** Others (Specify) _____

6. Number of patients: a. Admitted __ **b.** Out-patients __ **c.** Others (Specify) _____

7. Areas/Neighbourhood patients are coming from: a. Limawa A __ **b.** Limawa __ **c.** Makera __ **d.** Minna central __ **e.** Minna South __ **f.** Nassarawa A __ **g.** Nassarawa B __ **h.** Nassarawa C__ **i.** Anguwan Daji __ **j.** Sabon gari __ **k.** Tudun wada north __ **l.** Tudun wada South __ **j.** Others (Specify) _____

8. Area linked to the NHIS? a. Yes __ **b.** No __ **c.** Never heard of NHIS __ **d.** We don't have the capacity __ .

9. Is the facility registered with: a. Local Gov't Council __ **b.** State Gov't __ **c.** Federal Gov't __ **d.** National healthcare regulators ___ **e.** None __

Assistance to the facility

10. Where do the facility get assistance from? a. Local Gov't Council __ **b.** State Gov't __ **c.** Federal Gov't __ **d.** People in the Neighbourhood __ **e.** Neighbourhood organizations ___ **f.** The patients __ **g.** National heathcare regulators ___ **e.** None __

11. Types of assistance given to the facility: a. Medical equipment __ **b.** Machineries __ **c.** Water supply __ **d.** Stable electricity __ **e.** Loan from Gov't __ **f.** Subsidy from Gov't __ **g.** Others (Specify) _____

Problems or Challenges of the Facility

12. List problems of the facility:
Manpower: **a.** Shortage of doctors __ **b.** Shortage of nurses __ **c.** Shortage of technicians __

Patient relations: **d.** High number of patients __ **e.** Poverty of patients __ **f.** None payment of fees and charges__

Facilities and services: **g.** Lack of electricity __ **h.** Inadequate water supply __ **i.** Lack of waste disposal __ **j.** High vehicular traffic __ **k.** Lack of sanitation __

Insecurity**: l.** Stealing __ **m.** Burglary __ **n.** Fighting __ **o.** Others (Specify)_____.

Solution to the Challenges

13. Gov't Assistance to supply: a. Doctors __ **b.** Nurses __ **c.** Lab technicians __ **d.** Cleaners __ **e.** payment for poor patience __ **f.** Enrolment in NHIS __ **g.** Enforce environmental sanitation on the neighbourhood __ **h.** Others (Specify) _____

14. Community assistance: a. Enlightenment campaign __ **b.** Calling Gov't attention __ **c.** Donate to the facility __ **d.** Assist in manpower training __ **e.** To see health facility maintenance as community servvices __

Thank you

APPENDIX III

QUESTIONNAIRE FOR USERS OF HEALTH FACILITY

CENTRE FOR HUMAN SETTLEMENTS AND URBAN DEVELOPMENT

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

QUESTIONNAIRE ON ACCESSIBILITY OF PRIMARY HEALTHCARE FACILITIES IN CHANCHAGA LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

Dear Respondent,

This research field work is part of requirement leading to the award of Master in Sustainable Urban Development (M.SUD). All information supplied will be used purely for this academic purpose and shall be treated with utmost confidentiality. You are therefore kindly requested to tick (✓) from the options provided or fill in the spaces provided. **Thank You Sir/ Ma**

QUESTIONNAIRE FOR USERS OF HEALTH FACILITY

1. **Place of residence of respondent a.** Limawa A __ **b.** Limawa __ **c.** Makera __ **d.** Minna central __ **e.** Minna South __ **f.** Nassarawa A __ **g.** Nassarawa B __ **h.** Nassarawa C__ **i.** Anguwan Daji__ **j.** Sabon gari __ **k.** Tudun wada north __ **l.** Tudun wada South __ **m.** Others (Specify) _____.

2. **Gender of repondent: a.** Male_____ **b.** Female____

3. **Age of respondent (years**): **a.** 18-20__ **b.** 21-25___ **c.** 26-30__ **d.** 31-35__ **e.** 36-40__ **f.** 41-45__ **g.** 46-50__ **h.** 51-55__ **i.** 56-60__ **k.** Above 60 ___.

4. **Marital Status** (a) Single_ (b) Married_ (c) Divorced_ (d) Separated_ (e) Widowed_.

5. **Highest level of educational qualification of respondent** (a) Primary_____ (b) Secondary_____ (c) OND/NCE____ (d)HND/B.Sc._____ (e) Higher Degree_____ (f) No formal education_____ (g) Qur'anic school_____.

6. **Occupation of respondent** (a) Student/ apprentice_____ (b) Artisan_____ (c) Trader_____ (d) Civil Servant_____ (e) Farmer_____ (f) Unemployed_____ (g) Retired_____ **h.** Others (Specify) _____.

7. **Income Per Month (in Naira)** (a) less than 20,000_____ (b) 20001-25,000_____ (c) 25001-30000_____ (d) 30,001-35,000_____ (e) 35001-40,000_____ (f) 40,001-45,000_____ (g) 45,001-50,000_____ (h)50,001-55,000_____ (i) 55,001-60,000_____ (j) above 60000___

8. **Years of domicile in the Neighbourhood** (a) Less than a year__ (b) 1__ (c) 2__ (d) 3__ (e) 4__ (f) 5__ (g) Above 5__

9. **What health facility do you have in your Neighbourhood? a.** Birth Centre / Maternity Home __ **b.** Health Clinic __ **c.** General Hospital __ **d.** Dispensary __ **e.** Private

hospital/Clinic __ **f.** Pharmaceutical Chemist __ **g.** Others (Specify) _____ _____.

10. **Where is the health facility located? a.** Limawa A __ **b.** Limawa __ **c.** Makera __ **d.** Minna central __ **e.** Minna South __ **f.** Nassarawa A __ **g.** Nassarawa B __ **h.** Nassarawa C__ **i.** Anguwan Daji__ **j.** Sabon gari __ **k.** Tudun wada north __ **l.** Tudun wada South __ **m.** Others (Specify) _____.

11. **What is the distance from your home to the Health facility you use (Km)? a.** Less than 0.5__ **b.** 0.5-1.0__ **c.** 1-1.5__ **d.** 1.5 – 2__ **e.** Above 2 __.

12. **What is your mode of transport to the health facilities?** (a) Foot____ (b) Bike_____ (c) Taxi_____ (d) Bus_____ (e) Commercial motorcycle __ **f.** Personal vehicle_____.

13. **What is cost of transport TO the Health facility you use (Naira)? a.** Less than 50__ **b.** 50-100__ **c.** 100-150__ **d.** 150 – 200__ **e.** Above 200 __.

14. **Where is your preferred location of the health facility? a.** Limawa A __ **b.** Limawa __ **c.** Makera __ **d.** Minna central __ **e.** Minna South __ **f.** Nassarawa A __ **g.** Nassarawa B __ **h.** Nassarawa C__ **i.** Anguwan Daji__ **j.** Sabon gari __ **k.** Tudun wada north __ **l.** Tudun wada South __ **m.** Others (Specify) _____.

15. **Why do you prefer that health facility? a.** There is manpower __ **b.** The doctors are good __ **c.** The nurses are good__ **d.** Low charges__ **e.** Good environment __ **f.** Others (Specify) _____.

16. **What is cost of transport TO your preferred Health facility** (Naira)? **a.** Less than 20__ **b.** 20-50__ **c.** 50__ **d.** 50–100__ **e. 1**00-150 __ **f.** 150-200 __ **g.** Above ___.

17. **What are the challenges in accessing health facilities in your Neighbourhood**? List_____

18. What challenges do you encounter in receiving healthcare services within the health facilities in your Neighbourhood? List_____

19. **What is major the problems of the health facilities in your neighbourhood?** (a) Inadequate staff_____ (b) Lack of adequate equipment_____ (c) Mismanagement of the facilities_____ (d) Presence of quacks/fake drugs_____ (e) Lack of drugs **f.** Specify others _____

Thank You

APPENDIX IV

FIELD SURVEY CHECKLIST

CENTRE FOR HUMAN SETTLEMENTS AND URBAN DEVELOPMENT
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

QUESTIONNAIRE ON ACCESSIBILITY OF PRIMARY HEALTHCARE FACILITIES IN CHANCHAGA LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

1. **Area: a.** Limawa A __ **b.** Limawa __ **c.** Makera __ **d.** Minna central __ **e.** Minna South __ **f.** Nassarawa A __ **g.** Nassarawa B __ **h.** Nassarawa C__ **i.** Anguwan Daji__ **j.** Sabon gari __ **k.** Tudun wada north __ **l.** Tudun wada South __.
2. **Name of health facility: _____**
3. **GPS Reading _____**
4. **Pictures**
    a. **The buildings**
    b. **Roads**
    c. **Facilities**
        i. **Water pipe**
        ii. **Electricity supply**
        iii. **Waste disposal**
        iv. **Open space**
5. **Administer questionnaires**