FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA

HOUSING AND INFRASTRUCTURE: TWO SIDES OF THE SAME COIN

BY:
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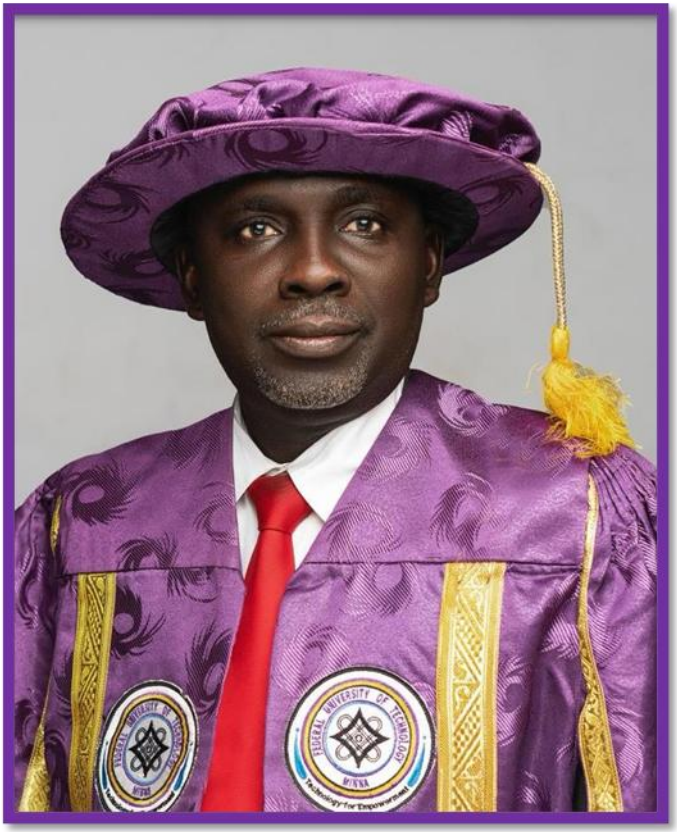

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Courtesies

The Vice Chancellor, Deputy Vice Chancellors, Registrar and Other Principal Officers of the University, Deans of Postgraduate School and Student Affairs, Dean of School of Environmental Technology and Other Deans of Schools, Directors of Units and Centres, Professors and Other members of Senate, Head of Department of Urban and Regional Planning and Other HODs, Other members of Academic staff, Members of administrative and technical staff, my lords spiritual and temporal, distinguished invited guests, gentlemen of the press, Great FUT Minna Students, Ladies and Gentlemen.

1.0 PREAMBLE

It is with great pleasure and gratitude to Almighty Allah that I stand before you(my audience) to present this inaugural lecture which is the 5th from the Department of Urban and Regional Planning. It can also be regarded as a valedictory lecture because by the end of May, I shall be retiring having clocked the mandatory retirement age of 70 years for the academics. The Vice-Chancellor sir, an inaugural lecture is an occasion of significance in an academic staff member's career often used to mark an individual's elevation to the status of a full professor and consequently offers a unique opportunity to hear first-hand about their research. It provides newly appointed professors with the opportunity to inform colleagues, the campus and the general public of their work to date, including current research and future plans. It is also a public celebration of the intellectual and scholarly achievements of an academic by peers, students, family, friends and the wider public. Such lectures are therefore expected to highlight the individual's contribution to knowledge, emphasizing the depth of research, knowledge gaps and showing the way to further research. Today's inaugural lecture gives me the first rare opportunity to present before eminent scholars, my various contributions to Housing and Infrastructure studies. Hence, this inaugural lecture titled **"Housing and Infrastructure: Two sides of the same coin"** will follow the conventional approach of highlighting some the significant aspects of my work to date.

2.0 INTRODUCTION

Mr Vice-Chancellor, sir it should be noted that one of the physical components of the human environment in which planners operate and one which catches the most significant and sensitive attention of the public is housing component. This is because in land use classification of cities or any major settlement, housing occupies 50% and above. Consequently, as a result

of the complex linkage which housing has with other land uses as the basic origin of most urban interactions and because of its ability to evolve, grow, age, decay and possibly rejuvenate, it's planning and continuous analysis is central to the evolvement of a virile, liveable and sustainable urban and rural environment (Agbola, 2005). On the other hand, infrastructure facilities such as roads, water, electricity, telecommunications and safe disposal of waste play a key role in achieving societal welfare as well as socio-economic and political growth of urban and rural areas (World Bank, 1994). Infrastructure serves as the cornerstone of socio-economic development, facilitating economic activities, enabling trade, and improving access to essential services such as healthcare, education, and utilities. It plays a critical role in enhancing the quality of life for populations, providing the necessary foundations for livelihoods in both rural and urban settings across the globe (World Bank, 2022). In addition, and to be specific, it has been noted that provision of infrastructure can increase values of assets and properties in the neighbourhood. For example, Fawehinmi (2003) noted that an increase of 28% on property values was due to provision of infrastructure and that in several cases, apart from location, the presence of infrastructure is a major determinant of property values between similar properties.

Mr. Vice-chancellor, sir, it is important at this juncture to clarify some conceptual issues in **Housing** and **Infrastructure.**

2.1 What is Housing?

Housing is more than provision of houses, therefore to understand the concept of housing, it is necessary to distinguish between **shelter, house** and **housing** (Sulyman, 2015a). **Shelter** is a physical structure with covering which originally is meant for protection of human beings from harsh elements of climate such as rain, wind and sun. It should be noted that shelter was provided by man in the pre-historic ages in caves, later in tent made from animal skins as the first conscious attempt to shelter him from natural phenomenal like rain, sun, storm and dangerous animals. **House**, on the other hand, is a physical structure which human beings use for shelter but in addition it has facilities, equipment, services and devices needed or desired for healthy living (Oluwande,1983). The difference between a house and a shelter is that shelter is used as protection from elements of weather but lacks facilities. Thus, all houses are shelters but not all shelters are houses, because a shelter which does not have all facilities is not a house but a mere shelter. **Housing** according to World Health Organization (1961) is the residential environment, neighbourhood, micro district, or the physical structure which

mankind uses for shelter and the environs of that structure including all necessary facilities, equipment and devices neede for the physical and social well-being of the individual (World Health Organization, 1961).

Mr. Vice-Chancellor, sir, however it should be noted that a broad-based conceptualization of housing and the one that has endured overtime is the one that looks at housing as both a **product** and a **process.** Consequently, **housing** can be regarded as a **product** and a **process** (Mandelker and Montgomery, 1973; Olatubara, 2018; and Sanni,1918).

As a **product,** housing refers, to

"*the shell or structure of dwelling, their design and basic built in equipment (such as the amount and location of space, the heating, lighting, sanitary and similar facilities). It includes the layout and equipment of neighborhood such as open space, playground, street, the walkways, basic utilities nursery and elementary schools, shops and other neighborhood facilities. In most cases, the location of these housing services in relation to transit and transportation, places of work and recreation, to hospitals and medical centres, to educational and religious institutions, to open countryside and specialized urban services and so on are vital. Thus, housing is the totality of the immediate physical environment, largely man made in which families live, grow and decline"* (Mandelker and Montgomery, 1973).

As a **process** housing is

"more than construction, but includes the dwelling design, the neighborhood layout, material manufactured and distribution, mortgage finance, city and regional planning, public controls, aids and enterprise through such things as building and housing codes, mortgage insurance, housing and redevelopment authorities. It includes maintenance, repair, remodeling, neighborhood services and conservation. It requires technical and social research, fact finding and analyzing, individual family, business and public decision" (Mandelker and Montgomery, 1973). Nigeria National Housing Policy (2012) also conceptualizes housing as a process and defines it as

"the process of providing safe, comfortable, attractive, functional, affordable and identifiable shelter in proper setting within a neighborhood, supported by continuous maintenance of the built environment for the daily living activities of individual, families within the community, while reflecting their socio-economic, cultural aspirations and preference."

The Vice- Chancellor Sir, please permit me to briefly explain the functional characteristics of housing. It should be noted that as a product, housing

performs certain functions which make it unique. These functions according to Mandelker and Montgomery (1973) include the following:

(i) **Shelter:** The basic function of housing is to provide shelter against climatic elements like rain, sun, and like wild animal and man. This is in agreement with Jinadu (2007) which noted that the basic meaning of housing is shelter, which is referred to as a dwelling or house that features enclosing walls and a roof to protect man against precipitation, wind, heat, cold and external attack.The function of housing as shelter or protection against climatic elements and wild animals is just a part of what is meant by housing because housing provides other functions apart from serving as a shelter.

(ii) **Privacy:** This is one of the functions that housing must perform because people deserve separate shelter which is expected to prevent outsiders from intruding into their privacy. However, privacy is a social concept rather than a physical one that concerns issues such as households or families that should share the same roof, activities that should take place within the dwelling units, facilities within the dwelling units, as well as intensity of the environment (Aribigbola,2019). Consequently in physical planning, privacy may be achieved for a household by separating each household with open spaces, or walls or by the combination.

(iii) **Location**: A good location is one of the functional characteristics of housing because a household requires a specific housing which can provide not only shelter or privacy but also the one which is reasonably close to the place of work and urban activities. It should be noted that urban households derived their income from employments which require daily trips between homes and Working places. In addition, the urban households must also make regular trips to schools, commercial centers, recreational centres, health centres and so on. Consequently, housing does not mean much to an urban family until the vocation and the transportation systems that are available for such housing are known.

(iv) **Environmental Amenities:** It is an established fact that the neighbourhood in which a house is located influences the demand for that house (Sulyman, 2015). In other words, the urban household is not only concerned with the distance of the house to urban, activities but also the quality of neighbourhood where an urban household is seeking housing. Consequently, consideration is given by urban household to the quality of neighourhood facilities (i.e amenities) such as police protection, hospitals, parks and playing grounds as well as physical appearance of the neighbourhood (Mandelker and Montgomery, 1973). In addition, Aribigbola

(2019) notes that often, the social desirability of neighbourhood is significantly, influenced by the past history of the area.

(v) **Investment:**It is an established fact that housing serves as an investment to the owner of the house especially owner occupier, this is because housing is not only a form of investment but the only savings, which a family can boast of throughout the life span of the household. Similarly, Aribigbola (2019) notes that housing to the small but influential segment of urban population is an investment as well as a place to live. Mandelker and Montgomery (1973) views housing as a form of investment both psychological and financially. This is because psychological ownership of a house gives members of the household the confidence that their house cannot be forcefully entered into except by invitation. On the other hand, financially, ownership of a house is not only a symbol of wealth but a significant asset which many families could manage to accumulate in their life span.

2.2 What is Infrastructure ?

Infrastructure on a broad basis refers to all basic inputs into and requirements for proper functioning of the economy (Jerome and Ariyo, 2004). Fox (1994) defines **Infrastructure** as those services derived from the set of public sector to enhance private sector product and to allow for household consumption. Infrastructure includes all essential systems and facilities that facilitate the smooth flow of an economy's day-to-day activities and enhance the living standard of people. It includes basic facilities such as roads, water supply, electricity, telecommunications and many more. The major features in the above definition of **Infrastructure i**s that it consist of facilities and utilities which are provided for the public to enhance living standards of the people.

Schubeler (1996) differentiates between **urban infrastructure** and **social infrastructure**. **Urban infrastructure** refers to services traditionally provided by the public work, transport sector and utilities. These includes roads, mass transportation, water supply, drainage, and flood protection, sewage, solid waste system and disposal, power distribution street lighting and telecommunications. The **social infrastructure**, on the other hand, refers to health, educational, recreational and cultural facilities. Obateru (2003) distinguishes between **physical infrastructure** comprising transportation facilities and public utilities, and **social infrastructur** comprising social (community) facilities and services. Examples of public utilities include electricity, water and gas supply, sewage, storm water drainage and telephone

services, while examples of social or community facilities include police and fire protection.

A distinction has also been made between **urban infrastructure** and **rural infrastructure**. For example, Jacobson and Tarr (1995) define **urban infrastructure** as the structures and networks that frame and bind modern cities and metropolitan areas and make it possible to undertake social and economic activities. On the other hand, Idachaba (1985) defines **rural infrastructure** as physical, social and institutional forms of capital which aid rural residents in their production, distribution and consumption activities as well as enhancing the quality of rural life. According to Bhalla (2000) **rural infrastructure** are basic public services and facilities which provide an environment for productive activities of individual and groups in the society.

Mr. Vice Chancellor sir, the type of infrastructure which I have focused my research on is **rural infrastructure**. However, it should be noted that infrastructure possesses certain attributes which make them unique and which have been identified by various authors (Ugwu, 1993; Zubairu, 2005; Idachaba ,1985; Abumere *et. al,* 2002). Ugwu (1993) for example, identifies three typical characteristics of infrastructure. These include technical characteristics which are indivisibility and long life span among others; economic characteristics that are external effects and economies of scale, high fixed capital and social cost, high risk investment; and institutional characteristics which include absence from market prices, central planning and allocation, control among others. Similarly, Zubairu (2005) reports that infrastructure is essentially social overhead capital, which needs to be distinguished from directly productive activities. According to the scholar, as social overhead capital it exhibits the following three characteristics: the services they provide facilitate, or are in some sense basic to, the carrying out a great variety of economic activities; these services are provided practically in all countries by public agencies or by private agencies subject to some public control (i.e. they are provided, either free of charge or at rates regulated by public agencies) and; the services provided cannot be imported.

On the other hand, Idachaba (1985) reports that the salient characteristics of rural infrastructure include: lumpiness of expenditures that are beyond the reach of ordinary individuals; the divergence between infrastructural benefits that accrue to an individual sponsor and those benefits that accrue to the rest of society; infrastructure are durable stocks of capital that yield future income streams and which therefore require regular stock maintenance costs and finally, the provision of infrastructure cuts across ministries and disciplines. The implications of the above features of rural infrastructure which are of

immediate policy relevance have also been noted by the author. Consequently, government funding is often required to provide the necessary infrastructure. The author is of the opinion that when benefits of infrastructure to the rest of society exceed those accruing to the individual sponsor, there tends to be under investment and under-provision of infrastructure when left in the hands of individuals (private sector) alone. Similarly, when benefits to the whole society from an infrastructural facility funded by a state government within the federation exceed the benefits realized by the residents within that state, there will be under-provision of such facilities from the nation's point of view. Therefore, federal government funding is recommended in such circumstances.

According to Abumere *et al* (2002), rural infrastructure possesses certain attributes which impede their availability in rural areas. These include problems of non-excludability, free-rider, determining preferences, finance, subtractability, measurement and economies of scale. Infrastructure is characterized by non-excludability when the benefits are available to all users whether or not they pay. For example, the use of rural roads. It is difficult or costly to exclude anybody from enjoying it. Therefore, profit seeking entrepreneurs will hardly provide it and therefore only the public sector will be interested in providing such infrastructure. Free-riding occurs when potential beneficiaries can not be excluded for failing to contribute to provision of an infrastructure and therefore there will be very high incentive for free-riding. Thus, where free-riding is high only the public sector can provide such services and finance. In such a situation user-free scheme (charges) will hardly work. Ascertaining beneficiaries' preferences and willingness to pay is difficult and this is peculiar to rural infrastructure. This is also due to the fact that exclusion is either not feasible or it is costly. This again inhibits the private sector participation. In the provision, only the public sector will be interested in the provision because it is concerned with maximizing the aggregate use rather than profit. The preferences can usually be established through voting or referendums.

It is also difficult to raise private finance for a service where users-fees are not feasible. For example, construction of erosion or flood checks for rural areas. The difficulty of recouping investments therefore, will surely drive private entrepreneurs away and makes it difficult to raise finance. Measurement problems exist in all phases of infrastructural development particularly during design, construction, operation, use and maintenance phase. There is no doubt that without adequate measurement, it is impossible to relate costs to benefits. The low threshold in rural areas means that economies of scale can not be

reaped. The low threshold in the rural areas distinguishes it from urban areas and largely accounts for paucity of infrastructure in the rural areas. Consequently, private entrepreneurs will not be interested in providing infrastructure because of high costs that will be involved in the provision.

3.0 HOUSING AND INFRASTRUCTURE AS TWO SIDES OF THE SAME COIN

Mr Vice Chancellor sir, it is necessary to explain the relationship between **Housing** and **Infrastructure** as two sides of the same coin. What is a **Coin**? A coin is a flat round piece of metal with special designs on it used as money (Macmillan English Dictionary, 2007). Similarly, according to http://en.wikipedia.org(2025), a **Coin** is a small object,usually round and flat,used primarily as a medium of exchange or legal tender. They are standardized in weight ,and produced in large quantities at a mint in order to facilitate trade. They are most often issued by a government. What does two sides of the same coin mean? Two sides of the same coin means two things are different but intrinsically aspects of a single idea, problem or a situation.They are so closely connected that they can not exist without each other,even if they seem to be opposites or unrerlated on the surface. In other words,two sides of the same coin refers to two things that are interconnected and inseperable, often appearing opposite but ultimately being part of the same whole. So also is the relationship between **Housing** and **Infrastructure. Infrastructure** and **Housing** are closely connected, forming a crucial base for both urban development and economic advancement. Their relationship functions on various levels, with each aspect shaping and supporting the other (Diene, 2024).

Mr Vice- Chancellor sir, there is a link between housing and infrastructure. Consequently, **Housing** and **Infrastructure** are closely interconnected, relying on one another to achieve sustainable urban development, economic advancement, and a better quality of life. Their links is characterized by several significant dimensions which are outlined according to Diene (2024) as follows:

1. Infrastructure as the support system for Housing: Infrastructure forms the backbone of housing developments by delivering essential utilities such as water, electricity, roads, and sewage systems. Housing projects cannot thrive without these critical facilities. For instance, in Nigeria, inadequate infrastructure has led to the failure of certain housing schemes, emphasizing its indispensable role.

2. Improving living standards and boosting property value: Access to well-maintained infrastructure directly improves residents' living conditions, making housing more desirable and valuable. The proximity to facilities like schools, healthcare services, and efficient public transport elevates both living standards and property prices.

3. Housing drives infrastructure expansion: The rising demand for housing in urbanizing areas often drives infrastructure investments. Governments and private developers channel resources into utilities like roads, energy, and water to support emerging residential zones.

4. Mutual Contribution to Economic advancement: Housing and infrastructure are significant drivers of economic progress. The construction of housing creates employment opportunities and supports related industries, while infrastructure development enhances productivity and further fuels economic expansion.

5. Supporting urban expansion and Population Growth: Infrastructure is pivotal in accommodating growing populations by enabling the extension of housing into previously undeveloped areas. This interdependence is particularly important in managing rapid urban growth, especially in nations like Nigeria.

It should therefore be noted that the connection between **housing and infrastructure** is a dynamic, mutually beneficial relationship. Infrastructure improves housing by enhancing its functionality, accessibility, and overall value, while the demand for housing stimulates infrastructure development. In other words, both **housing and infrastructure** are critical for achieving sustainable urban development, fostering economic growth, and enhancing living conditions. Table 1.0 outlines the relationship between housing and infrastructure at micro and macro levels. At the micro level, housing and infrastructure interplay to enhance quality of life and property value. At the macro level, they collectively drive economic growth, urbanization, and policy development. Coordinated investment in both is essential for sustainable development.

Table 1.0: Relationship between housing and infrastructure at Micro and Macro levels

Level	Key Aspects	Description
Micro Level	**Infrastructure as a bedrock for housing development**	Infrastructure, including water, electricity, and roads, plays a vital role in ensuring the functionality and habitability of individual housing units.
	Impact on Property Value and Living standards	Close access to infrastructure services such as schools and transportation greatly boosts property values and enhances residents' overall satisfaction.
	Sustainability and Urban Planning	Efficiently planned infrastructure enables sustainable, high-density housing projects, reducing costs and minimizing environmental effects.
Macro Level	**Economic development and employment opportunities**	Housing construction and infrastructure development are crucial contributors to national GDP growth and serve as catalysts for expanding related industries.
	Regulation and Financial resilience	Housing markets and infrastructure development are shaped by and play a role in macroeconomic policies, impacting overall financial stability.
	City growth and Development	Infrastructure development promotes urbanization by enabling housing expansion into new regions, addressing the demands of an increasing population.

4.0 MY CONTRIBUTIONS TO HOUSING AND INFRASTRUCTURE STUDIES

Mr. Vice Chancelor sir, my contributions to Housing and Infrastructure studies are as follows:

4.1 Housing and Informal Settlements

Informal settlements in developing countries like Nigeria are marked by substandard housing and inadequate access to essential services. Rapid urbanization has led to their expansion, resulting in poor living conditions that significantly impact residents' health. As a result, the incidence of informal settlements has risen and their long-term viability has become a difficult but important consideration in planning discourse.

In a study by **Sulyman** and Ajala, (2021) which examined the major factors influencing the incidence of informal settlements, the vulnerable groups alongside their dynamics and impact across cities in Nigeria's North-Central region. Two states in the north- central region (Benue and Plateau) and Abuja,

the Federal Capital Territory, were purposively chosen. The focus was on capital cities whose rban nucleus is driven by the expansion of more informal communities. The findings show that migration, poverty, the informal economy, affordability and urbanisation are the primary factors leading to the emergence of informal settlements. Women, workers, disabled people, migrants and unskilled youths as well as teenagers were found to be among the most vulnerable groups in informal settlements, which are often clustered near hazardous areas such as riverbanks, flood zones and dumps.

Table 2.0 gives a synopsis of factors influencing informal settlements and their impact in Nigeria's North-Central region while, Plates 1-6 show some of the existing situations observed in informal settlements of the F.C.T., Benue and Platue states.

Table 2.0: **Some major factors influencing Informal Settlements and their Impacts**

S/N	Factors influencing informal settlements	Impact
1	Proximity to work and cost of living	It produces an unpleasant environment.
2	Easy land acquisition/ affordable land	It provides an environment in which diseases can easily thrive and spread, particularly in congested, overcrowded rooms.
3	Indigenous language concentration and Marriage	Sites with poor waste management become breeding grounds for diseases.
4	Additional room for various purposes and market sales/commercial activities	It lowers the living standard
5	Privacy and low-cost housing	It has an impact on the residents' personal hygiene and health.
6	Rural-urban migration, inexpensive service and desire to reside in the area	It influences the residents' preference and style well as their notion of decent housing owing to constant repairs and replacement of structures and decaying elements of the building.
7	Relocation and employment opportunities, etc.	Inadequate infrastructural facilities, etc.

Source: Researchers' compilation, 2021

The existing situations of informal settlements in north-central Nigeria are depicted in Plates I to VI

Plate I: Unauthorised building subdivision, building materials and building conditions in Gaadi area, Makurdi, Benue State (Source: Researchers' field survey, 2021)

Plate II: The scenarios of informal settlements in Logo area, Makurdi, Benue State (Source: Researchers' field survey, 2021).

Plate III: The state of the buildings and the environment of informal settlements in Jenta-Adamu area, Jos, Plateau State (Source: Researchers' field survey, 2021).

Plate IV: Building arrangements and the surroundings of informal settlements on Rukuba Road, Jos, Plateau State (Source: Researchers' field survey, 2021).

Plate V: Building condition of kitchen and dwellings in informal settlements of Utan area, Jos, Plateau State (Source: Researchers' field survey, 2021).

Plate VI: Dwelling conditions, bathroom location and their materials in informal settlements of Tunga-Maje area, Abuja (Source: Researchers' field survey, 2021).

In another study by Ajala *et al* (2025), which examined the link between informal settlements and residents' health in North-central Nigeria, focusing on selected settlements in Abuja, Benue, Plateau, and Kogi states. Data were gathered through surveys and medical record reviews from primary healthcare centres. The findings reveal a high prevalence of diseases such as malaria, typhoid, and fever, which are closely linked to poor housing conditions and inadequate healthcare access.

Table 3.0 outlines the perceived factors influencing illness/disease incidence in North-central Nigeria. Using principal component analysis, factors showing multicollinearity ($r>0.8$) were removed. The remaining factors were rotated using the varimax method to simplify interpretation, resulting in six principal components accounting for 84.5% of the total variance: (1) **Hygiene, Living, and Building Conditions** with the highest loading factor of 0.863 (Overcrowding); (2) **Pollution**: "Noise pollution (0.899)"; (3) **Affordability**: "Lack of finance (0.802)"; (4) **Health-related Issue (I)**: "Hereditary disease (0.835)"; (5) **Health-related Issue (II)**: "Cost of health center (0.823)"; (6) **Environmental Condition**: The highest loading factor is "Weather condition (0.920)". However, informal settlements in North-central Nigeria are linked to rapid population growth outpacing economic growth, leading to overcrowding and strained infrastructure. Low-income earners primarily inhabit these areas due to affordable housing, resulting in poor living conditions and limited access to social and medical services.

Table 3.0: Description of factors influencing the occurrence of diseases/illnesses in north-central, Nigeria

Factors	Loading Power	Eigen values	% of Variance	Cumulative %
1. Hygiene, living and building conditions		9.314	44.35	44.35
Overcrowding	0.863			
Malnourishment	0.816			
Unhygienic environment	0.834			

Unclean toilet	0.788			
Unclean kitchen	0.785			
Inappropriate land use	0.786			
Natural ageing of building	0.650			
Lack of building maintenance	0.686			
2. Pollution		2.397	11.42	55.77
Air pollution	0.774			
Noise pollution	0.899			
3. Affordability		1.893	9.01	64.78
Self-medication	0.617			
Lack of finance	0.802			
Hazardous land	0.748			
4. Health-related issue (I)		1.670	7.95	72.74
Poor access to health care	0.829			
Hereditary disease	0.835			
5.Health-related issue (II)		1.340	6.38	79.12
Cost of health center	0.823			
Poor source of water	-0.582			
Fear of medical attention	0.675			
6. Environmental condition		1.140	5.43	84.54
Weather condition	0.920			
Poor ventilation	0.653			

Source: Author's field work, 2022

Table 4.0 summarizes health records from selected states in North-central Nigeria for individuals aged 18 to 80 from 2013 to 2022. Major diagnoses in primary health care centres include malaria and typhoid: (i) Benue State: 92.5% malaria, 99.8% typhoid; (ii) FCT: 85% malaria, 81.8% typhoid; (iii) Kogi State: 88.8% malaria, 93.8% typhoid and (iv) Plateau State: 83.9% malaria, 78.5% typhoid. Benue State has the highest incidence of malaria and typhoid, likely due to poor environmental conditions and reliance on untreated river water. High rates of these diseases across North-central states indicate poor sanitation and lack of basic amenities like potable water and proper waste management. Other observed illnesses include ulcer, gastroenteritis, hypertension, diabetes, tuberculosis, PUD, asthma, rheumatism, ear pain, hepatitis, URT, fungal infections, dermatitis, and LRTI. FCT has the highest records for many illnesses, followed by Plateau State, likely due to better accessibility and functionality of primary care facilities.

Table 4.0: **Summary of medical record on occurrence of Illnesses across the Selected States**

Illnesses	Benue (n=3100)		FCT(n=6934)		Kogi(n=706)		Plateau(n=3417)	
	N	%	N	%	N	%	N	%
Malaria	2868	92.5	5896	85.0	627	88.8	2867	83.9
Typhoid	3093	99.7	5669	81.8	662	93.8	2682	78.5
Ulcer	16	0.5	69	1.0	5	0.7	33	1.0
Gastroenteritis	6	0.2	67	1.0	8	1.1	25	0.7
Hypertension	2	0.1	109	1.6	6	0.8	35	1.0
Diabetes	6	0.2	76	1.1	0	0.0	16	0.5
Tuberculosis	1	0.0	3	0.0	0	0.0	0	0.0
PUD	3	0.1	104	1.5	0	0.0	21	0.6
Asthma	0	0.0	14	0.2	0	0.0	3	0.1
Boil	0	0.0	3	0.0	1	0.1	6	0.2
Wound	3	0.1	0	0.0	3	0.4	3	0.1
Rheumatism	1	0.0	0	0.0	0	0.0	0	0.0
Ear Pain	0	0.0	1	0.01	0	0.0	0	0.0
Hepatitis	0	0.0	25	0.4	0	0.0	14	0.4
URT	0	0.0	34	0.5	1	0.1	21	0.6
Fungal Infections	1	0.03	25	0.4	0	0.0	9	0.3
Dermatitis	0	0.0	4	0.1	0	0.0	0	0.0
LRTI	0	0.0	16	0.2	1	0.1	7	0.2

Source: OPD Register of Primary Health Care Centres in Benue, FCT, Kogi, and Plateau State; Author's compilation, 2022

Table 5.0 reveals a strong correlation (0.531 at 0.01 level) between the perceived incidence of diseases and factors influencing their occurrence. As these factors increase, so does the incidence of diseases. Factors include overcrowding, poor water sources, poor ventilation, and sub-standard housing, leading to diseases such as malaria, typhoid, cough, and abdominal pain. This indicates that each type of illness is closely linked to the factors causing disease in informal settlements in North-central Nigeria.

Table 5.0 : Correlation Analysis on the incidence of diseases and factors influencing the occurrence.

Correlations				
			Perception of Incidence of Diseases	**Perception of factors influencing occurrence of diseases**
Perception of Incidence of Diseases		Pearson Correlation	1	0.531**
		Sig. (2-tailed)		0.000
		N	872	867
Perception of factors influencing occurrence of diseases		Pearson Correlation	0.531**	1
		Sig. (2-tailed)	0.000	
		N	867	867

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's field survey, 2022

In study by Ajala *et al* (2024) which examined the spatial variations of informal settlements in the North-central, Nigeria. The study showed that most of the informal communities selected in North-central had a tremendous increase in the rate of built-up development, while the amount of vegetated land declined. The study concluded that there is an increasing trend in the amount of land utilized in the informal areas, which calls for a capable regional landuse policy, public involvement, and a viable management of the informal settlements, among other things.

The analysis in Table 6.0 shows the statistics of LULC distribution of informal settlements from 2005-2022 in Kogi state.

1) Adankolo informal area: The result in Table 6.0 reveals that Adankolo informal area has a total land area of 276.38 hectares. However, the result obtained from 2005-2022 implies that Adakolo area has experienced a significant change in the built-up land in 2005 and 2022 while it reduces a little in 2015. This could be the consequence of the 2015 flood, which increased the water body, destroyed a few houses, and inevitably ate up some bare ground as well. On the other hand, the vegetation and bareground recorded a significant decrease in 2005 and 2022 respectively. Thus, the classified LULC map of Adankolo from 2005-2022 is presented in Figures 1, 2 and 3.

Table 6.0: Land use/land cover of informal settlements area in Kogi state

Informal settlements	Landuse/cover	2005		2015		2022	
		Area (Ha)	(%)	Area (Ha)	(%)	Area (Ha)	(%)
Adankolo	Water body	106.97	38.7	109.66	39.68	105.08	38.02
	Vegetation	3.50	1.20	12.00	4.34	3.28	1.19
	Bare Ground	2.30	0.80	-	-	1.49	0.54
	Built-up area	163.61	59.30	154.72	55.98	166.53	60.25
	Total	**276.38**	**100**	**276.38**	**100**	**276.38**	**100**
Lokongoma	Marshy Area	23.0	10.0	27.6	12.0	16.1	7.0
	Vegetation	115.0	50.0	50.6	22.0	6.9	3.0
	Bare Ground	11.5	5.0	13.8	6.0	4.6	2.0
	Built-up area	80.5	35.0	138	60.0	202.4	88.0
	Total	**230.0**	**100**	**230.0**	**100**	**230.0**	**100**

Source: Authors' fieldwork, 2023

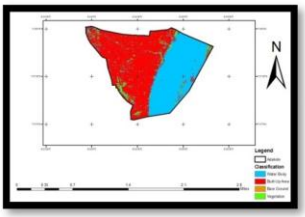


Figure 1.0: Adankolo 2005

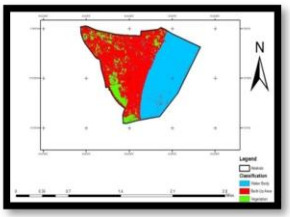


Figure 2.0: Adankolo 2015

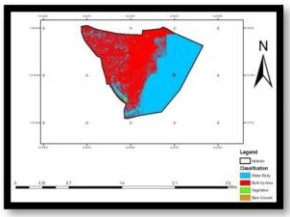


Figure 3.0: Adankolo 2022

Source: Authors' field survey, 2023

2) Lokongoma area: The result from Table 6.0 shows that Lokongoma area has a total land area of 230 hectares. The obtained result indicates that there is an increase in the built-up land from 2005-2022 while there is a reduction in vegetation land. Equally, there is an increase of bareground and marshy land between 2005-2015 (10 years) but decreases in year 2022. Consequently, the classified LULC map of Lokongoma from 2005-2015-2022 is presented in Figures 4, 5 and 6.

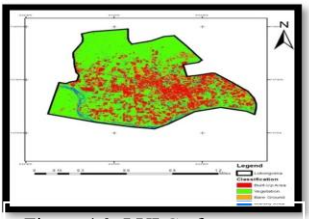


Figure 4.0: LULC of Lokongoma, 2005

Figure 5.0: LULC of Lokongoma, 2015

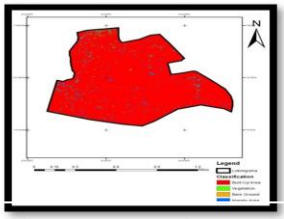


Figure 6.0: LULC of Lokongoma, 2022.

Source: Authors' field survey, 2023

The analysis in Table 7.0 shows the statistics of LULC distribution of informal settlements from 2004-2022 in Benue state.

i) Gaadi Area: Table 7.0 shows the result of LULC in Gaadi area at the spatio-temporal period of (2004-2014-2022) with a total land area of 58.5hectares. The result reveals that in 2004, the Bare ground recorded the highest class with 38.61 hectares (66%) while in 2014, the built-up area is the major land use class with 38.02 hectares (65%) of the total area. In 2022, the result shows that the built-up is still the predominant land use with 40.95 hectares (70%) of the total area.

The classified landuse/landcover maps of Gaadi area at the stated periods are presented in Figures 7, 8 and 9 respectively. The statistics of LULC (2004-2014-2022) in Gaadi area generally implies that the built-up area has significantly increased from 12% in 2004 to 70% in 2022. It demonstrates a notable decline in the area covered by bare ground between 2004 (60%) and 2014 (5%), whereas vegetative land showed a relative expansion between 2004 (22%) and 2014 (30%), but experienced a decline in 2022 (20%).

Table 7.0: Land use/land cover of informal settlements area in Benue state

Informal settlements	Landuse/cover	2004		2014		2022	
		Area (Ha)	(%)	Area (Ha)	(%)	Area (Ha)	(%)
	Vegetation	12.87	22	17.55	30	11.7	20
	Bare Ground	38.61	66	2.93	5	5.85	10
	Built-up area	7.02	12	38.61	65	40.95	70
Gaadi	**Total**	**58.5**	**100**	**58.5**	**100**	**58.5**	**100**
	Marshy Area	8.8	8	16.5	15	6.2	5.64
	Vegetation	73.7	67	20.9	19	27.5	25
Fiidi	Bare Ground	22.0	20	11	10	19.45	17.68
	Built-up area	5.5	5	61.6	56	56.85	51.68
	Total	**110**	**100**	**110**	**100**	**110**	**100**

Source: Authors' field survey, 2023

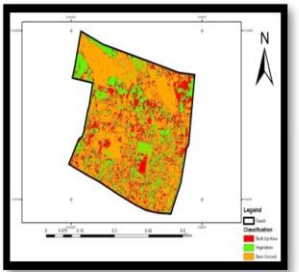


Figure 7.0: Gaadi 2004

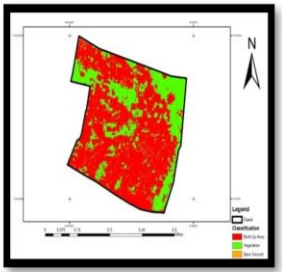


Figure 8.0: Gaadi 2014.

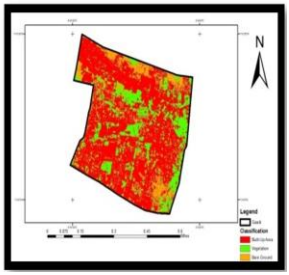


Figure 9.0: Gaadi 2014.

Source: Authors' field survey, 2023

ii) Fiidi Area: The result of LULC (2004-2014-2022) in Fiidi area is presented in Table 7.0 with a total land area of 110 hectares. The derived result in 2004 revealed that the vegetation land occupied the highest class with 73.7 hectares (67%). In 2014, the built-up area is the predominant land use category which accounted for 61.6 hectares (56%) of the total area. In 2022, the built-up land is still the highest class with 56.85 hectares (51.68%). Therefore, the categorized landuse/landcover maps of the specific periods in Fiidi area are presented in Figures 10, 11 and 12 respectively. The LULC result for the years 2004–2014–2022, however, signifies that the built-up area expanded by 56.1 hectares between 2004 and 2014 and slightly decreased by 4.75 hectares between 2014 and 2022. As such, the size of vegetation decreased between 2004 and 2022, while the extent of bare ground decreased between 2004 and 2014 but increased in 2022. The size of marshland increased by 7.7 hectares between 2004 and 2014, but it declined in 2022.

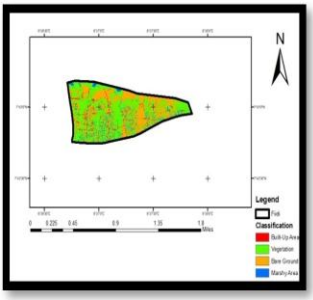


Figure 10.0: LULC of Fiidi 2004

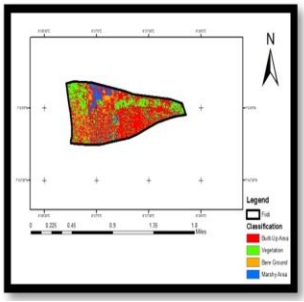


Figure 11.0: LULC of Fiidi 2014.

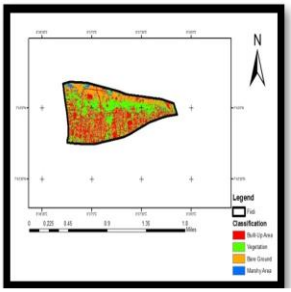


Figure 12.0: Classified land use/land cover map of Fiidi area, 2022.

Source: Authors' field survey, 2023

i) Jenta-Adamu area: The result in Table 5.3 shows that Jenta-Adamu settlement has a total land area of 177 hectares. The derived result reveals that the built-up area in 2001 occupied the main landuse class with 115.05 hectares (65%). In 2011, the major landuse category is built-up land which accounted for 127.44 hectares (72%) of the total area. In 2022, the built-up area is still the dominant use with 164.61 hectares (93%) of the total area. This implies that the built-up area has experienced a magnitude rise from 115.05 hectares in 2001 to 164.61 hectares in 2022 while there is a significant decline of Bare ground from 2001 (61.95 hectares) to 2022 (8.85 hectares). Likewise, there is a reduction of vegetation area from 2011 (14.16 hectares) to 2022 (3.54 hectares).

Table 8.0: Land use/land cover of informal settlements area in Plateau state

Informal settlements	Landuse/cover	2001		2011		2022	
		Area (Ha)	(%)	Area (Ha)	(%)	Area (Ha)	(%)
Jenta-Adamu	Vegetation	-	-	14.16	8	3.54	2
	Bare Ground	61.95	35	35.4	20	8.85	5
	Built-up area	115.05	65	127.44	72	164.61	93
	Total	**177**	**100**	**177**	**100**	**177**	**100**
Utan	Vegetation	-	-	-		9.9	2
	Bare Ground	173.25	35	99	20	138.6	28
	Built-up area	321.75	65	396	80	346.5	70
	Total	**495**	**100**	**495**	**100**	**495**	**100**

Source: Authors' field survey, 2022

Therefore, the classified landuse/landcover map of Jenta-Adumu area at the specified periods is presented in Figure 13, 14 and 15 accordingly.

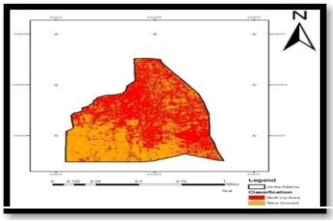


Figure 13: LULC of Jenta-Adamu 2001.

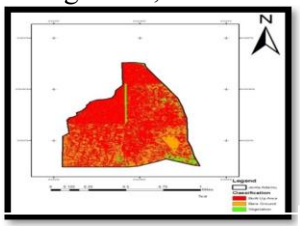


Figure 14: Jenta-Adamu 2011.

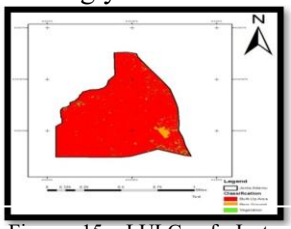


Figure 15: LULC of Jenta-Adamu area, 2022

Source: Authors' field survey, 2023.

ii) Utan area: The same Table 8.0 presents the LULC of Utan area at a period of 2001, 2011 and 2022 with a total land area of 495 hectares. The derived results shows that the dominant landuse category in 2001and 2022 is built-up area with 321.75 hectares (65%) and 346.5 hectares (70%) respectively. This implies that the built-up area decreased by 49.5 hectares between 2011 and 2022 and increased by 74.25 hectares between 2001 and 2011. Thus, the classified landuse/landcover map of Utan area at the identified periods is presented in Figures 16, 17 and 18.

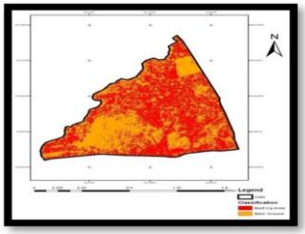


Figure 16: Utan 2001

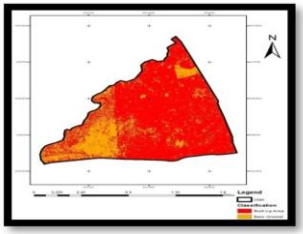


Figure 17: Utan 2011

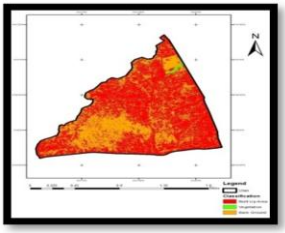


Figure 18: Utan 2022

Source: Authors' field survey, 2023

1.Zuba: Table 9.0 shows the statistics of LULC at Zuba informal settlement with a total land area of 192 hectares. The obtained result reveals that the built-up land is the highest landuse class in 2005 and 2016 with 163.2 hectares (85%) and 159.36 hectares (83%) respectively. Likewise, the LULC in 2022 shows that the built-up area is still the predominant landuse class which accounted for 167.04 hectares (87%) of the total area.

Table 9.0: Land use/land cover of informal settlements area in FCT

Informal settlements	Landuse/cover	2006		2016		2022	
		Area (Ha)	(%)	Area (Ha)	(%)	Area (Ha)	(%)
Zuba	Vegetation	19.2	10	3.84	2	5.76	3
	Bare Ground	9.6	5	28.8	15	19.2	10
	Built-up area	163.2	85	159.36	83	167.04	87
	Total	**192**	**100**	**192**	**100**	**192**	**100**
Tungan-maje	Vegetation	1051.56	69	76.2	5	45.72	3
	Bare Ground	15.4	1	1066.8	70	944.88	62
	Built-up area	457.2	30	381	25	533.4	35
	Total	**1524**	**100**	**1524**	**100**	**1524**	**100**

Source: Authors' field survey, 2022

The categorized maps for Zuba are presented in Figures 19, 20 and 21. This infers that the built-up land increases between 2006 and 2022 (16years) with 3.84 hectares. Also, the vegetation declined between 2006 and 2022 by 13.44 hectares while the Bareground witnessed a significant increase between 2006 and 2022.

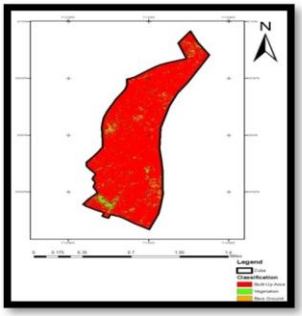


Figure 19.0: Zuba, 2006

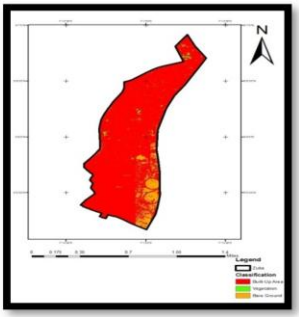


Figure 20.0: Zuba, 2016

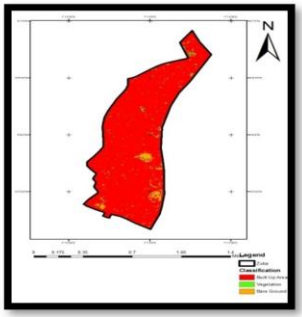
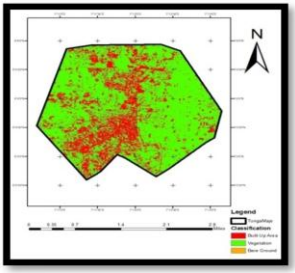


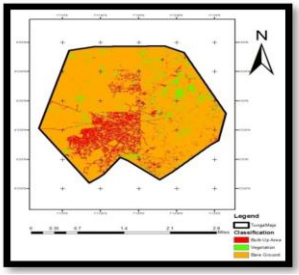
Figure 21.0: Zuba 2022

Source: Authors' field survey, 2023.

ii) Tungan-maje area: The same Table 9.0 reveals the LULC (2006-2016-2022) in Tungan-maje settlement with a total land area of 1524 hectares. The result shows that in 2006, vegetation is the predominant landuse category at this period and their occupation then was probably be farming and other

primary activities. While in 2016 and 2022, the Bareground is the dominant class which covered 944.88 hectares (62%) and 944.88 hectares (62%) respectively. Generally, the LULC distribution between 2006 and 20022 infers that there is a relative increase of built-up area in Tungan-maje which covered 457.2 hectares (30%) in 2006 to 533.4 hectares (35%) in 2022 respectively. The vegetation land declined from 1051.56 hectares (69%) in 2006 to 45.72 hectares (3%) in 2022. Hence, the classified LULC maps for Tungan-maje area according to the specified period are presented in Figures 22, 23 and 24.





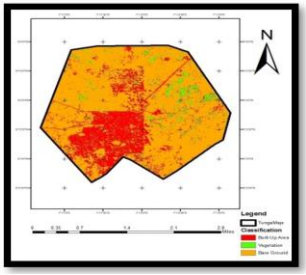


Figure 22.0: Tungan-maje 2006 Figure 23.0: Tungan-maje2016 Figure 24.0: Tunga-maje 2022

Source: Authors' field survey, 2023

4.2 Housing Market and Urban Densification

In a study by Mohammed, *et al* (2021), which investigated the spatial pattern of residential densification in housing submarkets of Bida, an ancient traditional town in Nigeria. The findings revealed that in 2008 Town housing submarket has the highest area coverage, followed by the Project Quarters and then GRA, However, in terms of residential density, four housing submarkets of Town, Rahmatu Dangana, Gbazhi and Wadata have high densities above the other seven submarkets. The study further revealed that in the year 2013, additional eight housing submarkets had high residential densities, GRA medium density while Eyagi and Project Quarters had low densities respectively.

It was found out that Town housing submarket have highest area coverage with 1,214.97ha. This is followed by Project Quarters with 984.31ha; Poly Area and GRA had area coverage of 823.13ha and 800.08ha respectively (Tables 10, 11 and 12)

Table 10.0: Residential Density Level and Building Units Per Hectares by Housing Submarkets 2008

Submarket	Area Coverage (Ha)	No. of Buildings	Occupancy Rate	Density Level
Kangi	457.52	661	1.44	Low Density
Rahmatu Dangana	14.5	83	5.72	High Density
Town	1214.97	25945	21.35	High Density
Poly Area	823.13	787	0.96	Low Density
Eyagi	725.34	165	0.23	Low Density
Gbazhi	215.81	489	2.27	High Density
Wadata	398.51	1020	2.56	High Density
Avenue	417.08	524	1.26	Low Density
Ndazabo	692.99	605	0.87	Low Density
Project Qtrs	984.31	358	0.36	Low Density
GRA	800.08	773	0.97	Low Density

Source: Authors' field survey, 2019

The study revealed in Figure 25 that in the year 2008 four housing submarkets i.e., Town, Rahmatu Dangana, Gbazhi and Wadata were of high residential density respectively, where the remaining seven submarkets were of low residential densities in that year. The implication of this result is that residential density pattern was classified in to two i.e. low residential densities and high residential densities for the year 2008.

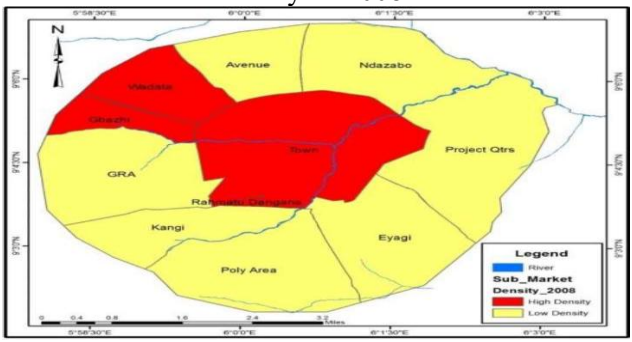


Figure 25. Level of Residential Density by Housing Submarkets in the Year 2008
Source: Authors' field survey, 2019

This implies that more people live in the Town housing submarket than any other submarkets in the study area. The Town housing submarket is also the traditional city centre where major commercial and cultural activities take place. The result also implies that Rahmatu Dangana with smallest area coverage is highly developed.

The result in Table 11.0 shows that in the year 2013 Town housing submarket had highest number of building units with 34,242. This is followed by Gbazhi with 2,077, Ndazabo 1,758, Wadata 1,707 building units respectively. During this period, the study reveals that Rahmatu Dangana had smallest number of building units. The result also shows that Town submarket recorded highest number of building to area ratio with 28.18, followed by Gbazhi with 9.62, Rahmatu Dangana 9.10 and Wadata4.28 respectively. The lowest building to area ratio is recorded for Eyagi with 0.42.

Table 11.0: Residential Density Level and Building Units Per Hectares by Housing Submarkets 2013

Submarket	Area Coverage (Ha)	No. of Buildings	Occupancy Level	Rate Density
Kangi	457.52	1103	2.41	High Density
Rahmatu	14.5	132	9.10	High Density
Dangana Town	1214.97	34242	28.18	High Density
Poly Area	823.13	1648	2.00	High Density
Eyagi	725.34	304	0.42	Low Density
Gbazhi	215.81	2077	9.62	High Density
Wadata	398.51	1707	4.28	High Density
Avenue	417.08	1283	3.08	High Density
Ndazabo	692.99	1758	2.54	High Density
Project Qtrs	984.31	793	0.81	Low Density
GRA	800.08	1442	1.80	Medium Density

Source: Authors' field survey, 2019

The study further revealed in Fig 26 that in the year 2013, eight housing submarkets have their residential densities to be high while GRA had medium residential density and Eyagi and Project Quarters had low residential densities respectively. The pattern of the residential density implies that there is tremendous shift in the residential density changes in the study area in that year.

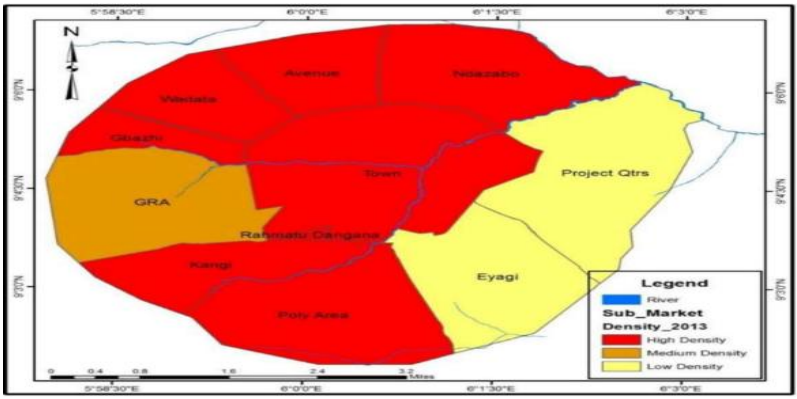


Figure 26. Level of Residential Density by Housing Submarkets in the Year 2013
Source: Authors' field survey, 2019

The study revealed in Table 12 that in the year 2018 Town submarket had highest number of buildings with 29,985 followed by Poly Area with 2,450, Ndazabo 2,346, Gbazhi 2,331, Wadata 2,300 and Kangi 2,134 building units respectively. The lowest number of building units recorded was in Rahmatu Dangana with 124. The Table also revealed that Town submarket had highest building to area ratio with 24.68. This is followed by Gbazhi with 10.80 and Rahmatu Dangana 8.55. The lowest building to area ratio was recorded for Eyagi with 0.54.

Table 12.0 Residential Density Level and Building Units Per Hectares by Housing Submarkets 2018

Submarket	Area Coverage (Ha)	No. of Buildings	Occupancy Rate	Density Level
Kangi	457.52	2134	4.66	High Density
Rahmatu Dangana	14.5	124	8.55	High Density
Town	1214.97	29985	24.68	High Density
Poly Area	823.13	2450	2.98	High Density
Eyagi	725.34	393	0.54	Low Density
Gbazhi	215.81	2331	10.80	High Density
Wadata	398.51	2300	5.77	High Density
Avenue	417.08	1976	4.74	High Density
Ndazabo	692.99	2346	3.39	High Density
Project Qtrs	984.31	1466	1.49	Low Density
GRA	800.08	1889	2.36	High Density

Source: Authors' field survey, 2019

In the year 2018, urbanisation effects have a great impact on the urban form. The study in Fig. 4 shows that all the housing submarkets in the study area are of high residential densities except for Eyagi and Project Quarters who were of low residential densities respectively. This implies that there is transition from low residential density areas to high residential density areas in the study area. The entire housing market is becoming more developed as built-up areas increases in all dimensions.

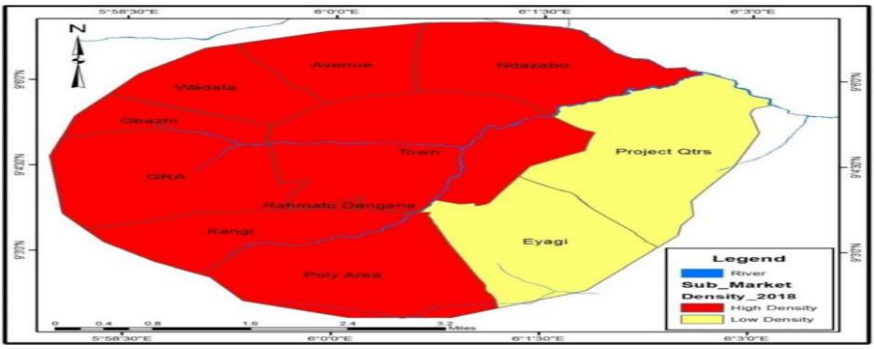


Figure 27. Level of Residential Density by Housing Submarkets in the Year 2018
Source: Authors' field survey, 2019

4.3 Private and Public Housing

In a study by **Sulyman** and Oke (2020), which assessed the private housing estate development and planning standard in Abuja municipal area council, with a view to providing decent, safe, healthy and affordable housing environment. The result of the study revealed that majority of the residents in the selected estates were medium income earners. The identified difficulties experienced by the developers includes lack of secure access to land, limited access to finance, high cost of construction, high cost of land registration and titling, development control, affordability gap, slow bureaucratic producers and lack of awareness programmes. Also, the level of conformity to local plan and planning standard was moderate.

Similarly, in a study by **Sulyman,** *et al* (2017), which investigated residents' perception of satisfaction with regards to Police Barracks' Housing Condition in Abuja. Respondents' satisfaction levels showed that in Garki Barracks 52.4% were dissatisfied, 27% were just satisfied, 19% indicated satisfaction for the electrical component of their dwelling; In Nyanya Barracks, 10.2% were very dissatisfied 42.4% were dissatisfied, 42.4% were just satisfied while 3.4% were satisfied while in MD Abubakar Barracks, 3.2% were very dissatisfied 46.5% were dissatisfied, 8% were just satisfied and 76.2% of the

respondents were satisfied while 7% were very satisfied.The investigation revealed that Resident Police Officers were generally dissatisfied with the Housing in Barracks in Abuja. Respondents' satisfaction levels showed that in Garki Barracks, 52.4% of the respondents were dissatisfied, 27% of the respondents were just satisfied, 19% of the respondents indicated satisfaction for the electrical component of their dwelling; In Nyanya Barracks, 10.2% of the respondents were very dissatisfied, 42.4% of the respondents were dissatisfied, 42.4% of the respondents were just satisfied while 3.4% of the respondents were satisfied. While in MD Abubakar Barracks, 3.2% of the respondents were very dissatisfied 46.5% of the respondents were dissatisfied, 8% of the respondents were just satisfied and 76.2% of the respondents were satisfied while 7% of the respondents were very satisfied.

Table 13.0: Residents Satisfaction with Electrical Component

Electrical Component	Nyanya	Garki	MD Abubakar
Very Dissatisfied	6 (10.3)	1 (1.6)	12 (3.2)
Dissatisfied	25 (43.1)	33 (52.4)	30 (8.0)
Neutral	25 (43.1)	17 (27.0)	21 (5.6)
Satisfied	2 (3.4)	12 (19.0)	285 (76.2)
Very Satisfied	-	-	26 (7.0)
Total	**58 (100)**	**63 (100.0)**	**374 (100.0)**

Source: Fieldwork, 2016

Respondents across the three barracks expressed high levels of dissatisfaction with the Roof Condition of their dwelling, in Garki 28.6% of the respondents were very dissatisfied, 46% of the respondents were dissatisfied, 11.1% of the respondents were neutral, and 14.3% of the respondents were satisfied. In Nyanya, 35.6% of the respondents were very dissatisfied, 44.1% of the respondents expressed dissatisfaction, while 11.9% of the respondents were indifferent; 8.5% of the respondents were satisfied. In MD Abubakar Barracks, 58.8% of the respondents were dissatisfied, 8.3% of the respondents were indifferent, 32.1% of the respondents were satisfied while 0.8% of the respondents were very satisfied.

Table 14.0: Residents' Satisfaction with Roof Condition

Roof Condition	Nyanya	Garki	MD Abubakar
Very Dissatisfied	21 (35.6)	18 (28.6)	-
Dissatisfied	26 (44.1)	29 (46.0)	220 (58.8)
Neutral	7 (11.9)	7 (11.1)	31 (8.3)
Satisfied	5 (8.5)	9 (14.3)	120 (32.1)
Very Satisfied	-	-	3 (0.8)
Total	**59 (100)**	**63 (100.0)**	**374 (100.0)**

Source: Fieldwork, 2016

In another study by Santali, *et. al* (2023), which developed a comprehensive housing quality assessment tool tailored specifically for police barracks in the North-Central region of Nigeria.

Table 15 presents the aggregate quality of housing in the police barracks. The table provides various indicators and their corresponding Housing Quality Index (HQI) along with remarks. The indicators include Physical Characteristics, Infrastructure/Utilities, Outdoor Performance, Functionality, Indoor Performance, Sustainability, and User's Satisfaction. The HQI values range from 0.52 to 0.73, and the aggregate HQI is 0.60, with corresponding remarks ranging from Fair to Good. The HQI value of 0.57 for Physical Characteristics being rated as "Fair" suggests that there may be room for improvement in these aspects of the housing facilities.

Table 15.0: Aggregate Quality of Housing in the Police Barracks

Indicators	HQI	Remarks
Physical characteristics	0.57	Fair
Infrastructure/Utilities	0.52	Fair
Outdoor performance	0.73	Good
Functionality	0.63	Good
Indoor Performance	0.59	Fair
Sustainability	0.55	Fair
User's Satisfaction	0.64	Good
Aggregate	**0.60**	**Good**

Moreover, Outdoor Performance and Functionality are important dimensions of housing quality that contribute to residents' overall satisfaction and well-being. The HQI values of 0.73 and 0.63 for Outdoor Performance and Functionality being rated as "Good" corroborate the positive aspects of the housing facilities in these domains.

Indoor Performance and Sustainability are also critical considerations in assessing housing quality. The HQI values of 0.59 and 0.55 for Indoor Performance and Sustainability being rated as "Fair" suggest areas that may require attention to enhance the overall quality of the housing facilities.

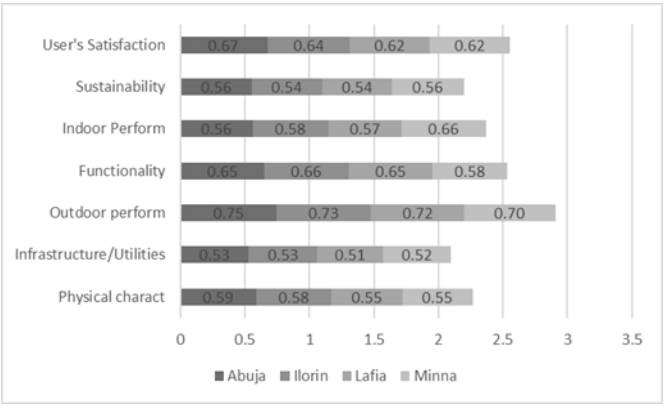


Figure 28: Housing Quality Index of the Police Barracks

4.4 Infrastructure Provisions and Development

In a study by Adedayo and **Sulyman** (2013), which analysed the variation in infrastructure – induced pattern of socio – economic development among some selected rural settlements in Niger state of Nigeria. The results revealed variation in infrastructure – induced pattern of development. Factor analysis revealed five factors that account for 85.82% of the total variance. Factor 1 which is Institutional infrastructure indicated high positive scores on four settlements namely Paiko, Agwara, Wushishi and Maikunkele. Factor 2 which is the Households' infrastructure loaded positively high in six settlements namely Enagi, Gawu Babangida, Lemu, Sabo Wuse, Doko and Nasko. Factor 3 is Welfare infrastructure shows high positive scores on three settlements namely Kuta, Bangi and Doko. Accessibility factor is indicated in factor 4 with high positive scores on four settlements namely Gbajibo, Enagi, Paiko and Rafin Gora. Lastly, Factor 5, which has been termed Road density, shows high positive scores on three settlements. These are Tunga Magajiya, Doko and Maikunkele.

Altogether, five factors with Eigen values greater than one were extracted, which together account for 85.821% of the total variance in the input matrix in the original twenty (20) variables.The factors encompass all the variables instrumental to variation in the pattern of infrastructural-induced socio-economic development of the settlements. The most important loading for each factor is indicated in Table 16.0. Factor 1 which accounts for 25.109% of the total variance loads highly in a positive direction on availability of communication facilities (0.879), financial (0.869) and social institutions (0.859). Other variables that load positively on this factor are availability of

administrative facilities (0.550) and households with formal education (0.769). The availability of infrastructure that are generally regarded as Institutional infrastructure in the selected settlements is articulated by this factor and can therefore be termed
Institutional infrastructure.
Factor 2 on the other hand, accounts for 23.373% of the total variance and exhibits high positive loadings on households' ownership of electric fan (0.859), electric iron (0.855), radio (0.796), television set (0.734), refrigerator (0.691) and availability of electricity (0.773). This factor emphasized ownership of electrical appliances for the welfare of the households. The relationship between the households with these electrical appliances and availability of electricity is also articulated by this factor. Consequently, this factor has been termed Households' infrastructure. Factor 3 explains 17.610% of total variance and with significant positive loadings on recreational (0.895), water (0.840), health (0.838) and educational (0.707) facilities. The availability of these infrastructures which can be classified as welfare infrastructure in the selected settlement is also articulated by this factor and is therefore labeled as Welfare infrastructure.
Factor 4 accounting for 13.741% of total variance is basically emphasizing distances covered by households to reach locations of basic infrastructure such as health, education and water facilities. It loads highly positive on three variables namely distance in kilometers covered to reach educational (0.928), health (0.910) and water (0.853) facilities. This factor can be termed Accessibility factor. Factor 5 which accounts for 5.988% of total variance has high positive loading on road density. It has the highest factor loading of 0.944 among the variables indicating the importance of road facilities in the selected settlements. This factor can therefore be labeled as Road density.

Table 16.0 Substantial Factor Loadings (Varimax)

Factor	Variable	Description	Loadings
Factor 1	X_{13}	Number of communication facilities per settlement	0.879
	X_{19}	Number of financial institutions per settlement	0.869
	X_{12}	Number of social institutions per settlement	0.859
	X_{9}	Percentage of households with formal education	0.769
	X_{14}	Percentage of households with non-formal education	-0.729
	X_{11}	Number of administrative facilities per settlement	0.550
Factor 2	X_{18}	Percentage of households with electric fan	0.859
	X_{17}	Percentage of households with electric iron	0.855
	X_{15}	Percentage of households with radio	0.796
	X_{8}	Number of settlements connected to National Grid (electricity)	0.773

	X_{16}	Percentage of households with TV set	0.734
	X_{10}	Percentage of households with refrigerator	0.691
Factor 3	X_{20}	Number of recreational facilities per settlement	0.895
	X_6	Number of water facilities per settlement	0.840
	X_2	Number of health facilities per settlement	0.838
	X_4	Number of educational facilities per settlement	0.707
Factor 4	X_5	Distance in Km travelled to reach the educational facilities	0.928
	X_3	Distance in Km travelled to reach the health facilities	0.910
	X_7	Distance in Km travelled reach the water facilities	0.853
Factor 5	X_1	Road density in Km^2	0.944

Source: Authors' fieldwork 2011.

This analysis has established five dimensions on which the twenty-two rural settlements in Niger State may be classified namely Institutional infrastructure, Households infrastructure, Welfare infrastructure, Accessibility factor and Road density.

Similarly, in a study by **Sulyman** (2018), which assessed the relationship between infrastructure provision and level of socio-economic development in rural settlements of Niger state of Nigeria. The result of multiple regression revealed that four factors were found to be significant in determining the level of socio-economic development in the selected twenty- two (22) settlements. These factors in order of importance were institutional infrastructure (71%), Households' infrastructure (20%), Accessibility factors (3.4%) and welfare infrastructure (0.1%). All these were found to have explained 94.5% level of socio-economic development in the study area. An examination of Table 17.0 revealed that variable (factor) X1 which is Institutional infrastructure is an important factor influencing socio-economic development in the study area. The components of this factor namely communication facilities, financial institutions, social institutions and administrative facilities have been found to influence the level of socio-economic development of the selected settlements in the study area. The correlation co-efficient of this variable (X1) is 0.842 with co-efficient of determination (r^2) of 0.710, signifying that about 71.0% of the variance is associated with the Institutional Infrastructure.

Households' infrastructure which is variable X2 is another important factor that can be used to explain the level of socio- economic development of the selected settlements in the study area. The components of this factor include households with electric fan, electric iron, radio, television set and refrigerator. These variables which loaded positively high on the factor and together with the availability of electricity serve the welfare of the households in the selected settlements and thus influence the level of socio-economic development in the study area. The correlation co-efficient is found to be

0.954 with co-efficient of determination (r^2) of 0.910, indicating that 20.0% of its variance is associated with Households' infrastructure.

The third important factor is variable X4 which is Accessibility factor. The component variables of the factor namely distance in kilometers covered to reach health, educational and water facilities which all loaded positively high on the factor are all significant in influencing the level of socio-economic development in the selected settlements. The correlation co-efficient of this factor is found to be 0.972 with co-efficient of determination (r^2) of 0.944 indicating 3.4% of the variance is associated with Accessibility factor.

Welfare infrastructure which is variable X3 factor is also important in explaining the level of socio-economic development of the selected settlements in the study area. The component variables of the factor are recreational, health, educational and water facilities. There is no doubt that the presence of all these in any settlements is an indication of socio-economic development. Consequently, the factor has been identified to influence the level of socio-economic development of the selected settlements in the study area. The factor has a correlation co-efficient of 0.972 with co-efficient of determination (r^2) of 0.944 indicating that 0.1% of the variance is associated with the Welfare infrastructure. In all, four variables (factors) together accounted for about 94.5% of the total variance in the explanation of factors responsible for road density development which has been used as a measure of socio-economic development in the study area. The explanatory regression equation can thus be written as:

$$Y = 13816.516 + 1865.305X1 + 991.740X2 + 405.20X3 + 43.948X4 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$R^2 = 94.5\% \quad \mathrm{SE} = 523.51374$$

Table 17.0: Summary of the result of Regression Analysis

Independent Variables	Regression Coefficient	Standard Error	R	r^2	% of Contribution	T Value	P Value
Intercept	13816.516	12..367				1117.22	0.000
X1	1865.305	12.370	0.842	0.710	71%	150.789	0.000
X2	991.740	12.370	0.954	0.910	20%	81.171	0.000
X4	-405.250	12.370	0.972	0.944	3.4%	-32.760	0.000
X3	43.948	12.370	0.972	0.944	0.1%	3.553	0.000

Source: Computer Output from Author's fieldwork, 2011

Y represents Socio-economic development (Road density)

X1represents Institutional infrastructure

X2 represents Households infrastructure

X3 represents Welfare infrastructure

X4 represents Accessibility factor

4.5 Infrastructure and Settlement Classification/Ranking

In a study by **Sulyman** (2014), which classified the selected rural settlements on the basis of available infrastructure. The study revealed that three groups of settlements labelled A, B and C was produced by the hierarchical clustering technique based on availability of infrastructure. It was observed that although the quantity of infrastructure varied among the settlements, group B settlements consisting of Doko, Enagi, Kuta, Maikunkele, Paiko, Sabon Wuse, Sarkin Pawa and Wawa seem to have more infrastructur than group A and C settlements. Group A settlements consisting of Agwara, Gawu Babangida, Gulu, Lemu, Nasko, Tegina and Tunga Magajiya appear to have more provision of infrastructure compared to group C settlements. On the other hand, group C settlements consisting of Baddegi, Bangi, Gbajibo, Kutiriko, Mashegu, Rafin Gora and Wushishi appear to be the least in terms of provision of infrastructure.

Settlements clustering with corresponding infrastructural scores are shown in Table 18.0. The study revealed that Type B settlements had a total infrastructural score of 687, while Type A settlements and Type C settlements had total of 316 and 307 infrastructural scores respectively.

Table 18.0: Settlements Clustering and Infrastructural Scores

Type A Settlements		Type B Settlements		Type C Settlements	
Settlement	Score	Settlement	Score	Settlement	Score
Agwara	53	Doko	102	Baddegi	79
Gawu Babangida	70	Enagi	53	Bangi	39
Gulu	38	Kuta	150	Gbajibo	18
Lemu	46	Maikunkele	85	Kutiriko	34
Nasko	29	Paiko	139	Mashegu	27
Tegina	42	Sabon Wuse	68	Rafin Gora	22
Tunga Magajiya	38	Sarkin Pawa	48	Wushishi	88
		Wawa	42		
Total	**316**	**Total**	**687**	**Total**	**307**

Source: Author‘s fieldwork, 2011.

Similarly, in a study by **Sulyman** (2021), which ranked some selected rural settlements according to available infrastructures in Niger state of Nigeria. The study discovered that availability of infrastructure in selected rural settlements in Niger State seems to be related to the population size of the rural settlements. For instance, Paiko, Kuta, Wushishi and Gawu Babangida ranked high in both population size and infrastructural score. Spearman Ranks Correlation (rs) of r = 0.553 indicates a positive correlation between population size and infrastructure.

The study revealed a pattern of rural settlements grouping. The first group consists of settlements that ranked high in population size as well as infrastructural score. These settlements include Paiko, Kuta, Doko, Wushishi and Gawu Babangida. An important characteristic of these settlements were their large population size and corresponding high number of infrastructure. In this group, Paiko with a population of 18,436 and a rank of 1^{st} has an infrastructural score of 139 and a rank of 2^{nd}.

The second group consists of settlements that ranked high population size but low infrastructural scores. These settlements include Tunga Magajiya, Sarkin Pawa, Rafin Gora, Wawa and Gbajibo. These settlements were characterized by large population but with corresponding few number of infrastructure. An example is Tunga Magajiya with population size of 12,171 with a rank of 5^{th} and a corresponding infrastructural score of 38 with a rank of 14^{th}.

The third groups of settlements are those that ranked low in population size but high in infrastructural scores. These settlements include Agwara, Baddegi, Enagi, Maikunkele, Lemu, Sabon Wuse, Gulu and Tegina. These settlements were characterized by small population size but corresponding large number of infrastructure. A typical example is Agwara with a population of 3,743 with a rank of 17^{th} and a corresponding infrastructural score of 53 and a rank of 9^{th}.

The fourth groups are settlements that have more or less the same rank in terms of both population size and infrastructural score of 29 with a rank of 17^{th}. The rural settlements ranked by the population size and infrastructural scores are shown in Table 19.

Table 19: Settlements' Rank by Population Size and Infrastructural Scores

S/No.	Settlements	Population	Rank	Score	Rank
i.	Agwara	3,743	17	53	9
ii.	Baddegi	6,700	14	79	6
iii.	Bangi	7,177	12	39	13
iv.	Doko	14,774	3	102	3
v.	Enagi	7,557	11	53	9
vi.	Gawu	10,859	6	70	7
vii.	Gbajibo	7,083	13	18	20
viii.	Gulu	4,411	16	38	14
ix.	Kuta	15,966	2	150	1
x.	Kutiriko	3,973	16	34	16
xi.	Lemu	3,743	17	46	11
xii.	Maikunkele	6,680	15	85	5

xiii.	Mashegu	1,675	19	27	18
xiv.	Nasko	3,015	18	29	17
xv.	Paiko	18,436	1	139	2
xvi.	Rafin Gora	8,787	7	22	19
xvii.	Sabon Wuse	7,614	10	68	8
xviii.	Sarkin Pawa	7,984	8	48	10
xix	Tegina	5,981	15	42	12
xx.	Tunga Magajiya	12,171	5	38	14
xxi.	Wawa	7,942	9	42	12
xxii.	Wushishi	13,243	4	88	4

Source: Authors' fieldwork, 2011

Table 20 shows the scores of the settlements in terms of availability of infrastructure and the corresponding values of the LQ. It can be seen from the Table that disparity exists among the rural settlements. The study revealed that in terms of infrastructural scores (i.e Availability of infrastructure) Kuta, Paiko, Doko, Wushishi, Maikunkele and Baddegi were the leading settlement while Tunga Magajiya, Rafin Gora and Gbajibo were the least developed settlements. However, in terms of the values of Location Quotient (LQ), eleven settlements have LQ value of 1 and above while eleven settlements have LQ value of less than 1. These are shown in Table 20.

The study as shown in Table 20 revealed that the eight settlements out of eleven settlements with LQ value of 1 and above, were administrative headquarters of their local government areas. These include Mashegu, Agwara, Maikunkele, Lemu, Nasko, Kuta, Sabon Wuse, and Paiko. The likely reason for this many nots be unconnected with investments in infrastructure such as schools, clinics, boreholes, roads, banks, markets and so on in these settlements. An interesting revelation from study has shown in Table 20 is the settlements of Mashegu with LQ of 2.20 which indicates that the settlement has more than its fair share of the facilities. However, a closer examination shows that its corresponding infrastructural score of 27 is low.

Another important revelation from the study as shown in Table 19 is that out of the eleven settlements that have LQ value of less than 1, there were five settlements that were headquarters of their local government areas. These include Enagi, Wushishi, Gawu Babangida, Sarkin Pawa, and Bangi. This indicates that these settlements had large population sizes compared to the number of available infrastructure. Other settlements with LQ value of less than 1 include Tegina, Doko, Wawa, Tunga Magajiya, Rafin Gora and Gbajibo. For example, Doko with population of 14,774 and infrastructural score of 102 as shown in Table 19.

Table 20: Location Quotient (LQ) values of the Selected Settlements Arranged in Descending Order

S/No.	Settlements	LQ
i.	Agwara	1.94
ii.	Baddegi	1.61
iii.	Bangi	0.74
iv.	Doko	0.94
v.	Enagi	0.96
vi.	Gawu	0.88
vii.	Gbajibo	0.34
viii.	Gulu	1.18
ix.	Kuta	1.28
x.	Kutiriko	1.17
xi.	Lemu	1.68
xii.	Maikunkele	1.74
xiii.	Mashegu	2.20
xiv.	Nasko	1.31
xv.	Paiko	1.03
xvi.	Rafin Gora	0.34
xvii.	Sabon Wuse	1.25
xviii.	Sarkin Pawa	0.82
Xix	Tegina	0.96
xx.	Tunga Magajiya	0.42
xxi.	Wawa	0.72
xxii.	Wushishi	0.91

Source: Authors' fieldwork, 2011

4.6 Quality of Infrastructure Provision

In a study by Adedayo and **Sulyman** (2014), which evaluated the responses of rural dwellers to an aspect of their environment, the quality attributes of the infrastructure provided for their use. The findings revealed that the quality attributes of the infrastructure such as availability of personnel, drugs and equipment, distance to facilities, cost, regularity and maintenance of facilities as well as quality of infrastructure were perceived by the rural dwellers to be generally unsatisfactory.

The responses on quality attributes of health facilities are shown in Table 22. The variables considered as quality attributes were the location of health facilities, availability of health personnel, availability of drugs, availability of equipment, distance travelled to the facilities and cost of treatment received. The study revealed that 1,051 (58.60%) of the respondents perceived the location of the health facilities to be satisfactory while 830 (46.30%) of the

respondents perceived availability of health personnel as fairly satisfactory. Availability of drugs was considered by 785 (43.80%) of the respondents as fairly satisfactory, while 825 (46.00%) of respondents perceived availability of equipment to be fairly satisfactory. Distance travelled to facilities and cost of treatment received were perceived to be fairly satisfactory by 718 (40.10%) and 894 (49.90%) of the respondents respectively.

The conclusion that can be drawn from the above is that the quality attributes of health facilities namely availability of health personnel, drugs, equipment, distances travelled to facilities and cost of treatment received were perceived to be unsatisfactory by the rural dwellers except the location of the facilities.

Table 22: Respondents' Satisfaction with Health Infrastructure

Quality Atrributes	Highly Unsatisfactory		Unsatisfactory		Fairly satisfactory		Satisfactory		Highly satisfactory	
	No.	%	No.	%	No.	%	No.	%	No.	%
Location of facilities	20	1.1	122	6.8	425	23.7	1051	58.6	174	9.7
Availability of health Personnel	28	1.6	229	12.8	830	46.3	665	37.1	40	2.2
Availability of Drugs	70	3.9	592	33	785	43.8	332	18.5	13	0.7
Availability of Equipment	92	5.1	587	32.8	825	46	275	15.3	13	0.7
Distances travelled to facilities	17	0.9	235	13.1	71.8	40.1	683	38.1	139	7.8
Cost of treatment received	87	4.9	492	27.4	894	49.9	296	16.5	23	1.3

Source: Author's fieldwork 2011

The responses on quality attributes of educational facilities are shown in Table 23. The quality attributes considered were the location of facilities, number of teachers, availability of books, availability of classroom furniture, availability of classrooms, distance travelled to facilities, and school fees payable. The study revealed that 1,045 (58.30%) of the respondents perceived the locations of educational facilities to be satisfactory, while the number of teachers is perceived to be fairly satisfactory by 816 (45.50%) of the respondents. The study further revealed that availability of books, availability of classrooms and distance travelled to the facilities were perceived to be fairly satisfactory by 695 (38.8%), 806 (45.0%) and 867 (48.4%) of the respondents respectively.

Distance travelled to the facilities and schools fees payable were perceived to be satisfactory by 906 (50.6%) and 683 (38.1%) of the respondents respectively.

It can be inferred from the above that the quality attributes of educational facilities namely number of teachers, availability of books, classrooms furniture, classrooms were perceived to be unsatisfactory by rural residents except location of facilities, distance travelled to facilities and school fees payable.

Table 23: Respondents' Satisfaction with Educational Infrastructure

Quality Attributes	Highly Unsatisfactory		Unsatisfactory		Fairly Satisfactory		Satisfactory		Highly Satisfactory	
	No	%	No	%	No	%	No	%	No	%
Location of Facilities	5	0.3	51	2.8	424	23.7	1.045	58.3	267	14.9
Number of Teachers	25	1.4	119	6.6	816	45.5	741	41.4	91	5.1
Availability of Books	239	13.3	669	37.3	695	38.8	176	9.8	13	0.7
Availability of Classroom Furniture	145	8.1	621	34.7	806	45.0	200	11.2	20	1.1
Availability of Classrooms	47	2.6	228	12.7	867	48.4	601	33.5	49	2.7
Distance Travelled to Facilities	8	0.4	71	4.0	570	31.8	906	50.6	237	13.2
School Fees Payable	14	0.8	34	1.9	352	19.6	683	38.1	709	39.6

Source: Author's fieldwork 2011

The responses on quality attributes of water supply are shown in Table 24. The attributes that were considered are location of facilities, quality of water supplied, quality of available water, maintenance of water supply facilities, distance travelled to facilities and cost of services received by the respondents. The study revealed that the location of facilities, quantity of water and quality of water were perceived to be satisfactory by 804 (44.90%), 638 (35.60%), and 639 (35.70%) of the respondents respectively. Similarly, distances travelled to facilities were also perceived to be satisfactory by 702 (39.20%) of the respondents. However, maintenance of facilities and cost of

services received were perceived to be fairly satisfactory by 706 (39.40%) and 697 (38.90%) of the respondents respectively.

The inference that can be drawn from the above is that the quality attributes of water supply namely quantity and quality of water, maintenance of facilities and cost of service were perceived to be unsatisfactory by the respondents except location and distance travelled to facilities.

Table 24: Respondents Satisfaction with Water Supply

Quality Attributes	Highly Unsatisfactory		Unsatisfactory		Fairly Satisfactory		Satisfactory		Highly Satisfactory	
	No	%	No	%	No	%	No	%	No	%
Location of Facilities	132	7.4	256	14.3	418	23.3	804	44.9	182	10.2
Quantity of Water	169	9.4	328	18.3	534	29.8	638	35.6	123	6.9
Quality of Water	160	8.9	324	18.1	554	30.9	639	35.7	115	6.4
Maintenance of Facilities	179	10.0	371	20.7	706	39.4	422	23.5	114	6.4
Distance Travelled to Facilities	153	8.5	218	12.2	499	27.8	702	39.2	220	12.3
Cost of Service	150	8.4	363	20.3	697	38.9	426	23.8	156	8.7

Source: Author's fieldwork 2011

The responses on quality attributes of electricity supply are shown in Table 25. The quality attributes considered were regularity of electricity supply, cost of services received and regular maintenance of the facilities. The study revealed that 593 (33.10%) of the respondents perceived regularity of electricity supply to be fairly satisfactory. However, the cost of services received (i.e electricity tariff) and maintenance of facilities were perceived to be fairly satisfactory by 631 (35.20%) and 744 (41.50%) of the respondents respectively. When the scores were subjected to Chi-square statistics to determine if there is significant difference between the perceived levels of satisfaction (which was collapsed into unsatisfactory and satisfactory) and the quality attributes of electricity supply, it is found out to be significant as shown in Table 8. This is because the table value of 5.991 is less than calculated x^2 value of 93.2777. It can be concluded from the above that all the quality attributes of electricity supply namely regularity of supply, cost of services and maintenance of facilities were perceived to be unsatisfactory by the respondents.

Table 25: Respondents' Satisfaction with Electricity Supply

Quality Attributes	Highly Unsatisfactory		Unsatisfactory		Fairly Satisfactory		Satisfactory		Highly Satisfactory	
	No	%	No	%	No	%	No	%	No	%
Regularity of Supply	285	15.9	219	12.3	557	31.1	593	33.1	138	7.7
Cost of Service	283	15.8	389	21.7	631	35.2	377	21.0	112	6.2
Maintenance of Facilities	300	16.7	302	16.9	744	41.5	339	18.9	107	6.0

Source: Authors' fieldwork 2011

The responses on quality attributes of road infrastructure are shown in Table 26. The attributes considered were quality of the roads, availability of vehicles, cost of transportation and regular maintenance of roads. The study revealed that quality of the roads, cost of transportation and maintenance of roads were perceived to be fairly satisfactory by 722 (40.60%), 782 (43.60%), and 699 (39.00%) of the respondents respectively. However, only availability of vehicles was considered as satisfactory by 726 (40.50%) of the respondents. The inference that can be drawn from the above is that the quality attributes of road infrastructure namely quality of road, availability of vehicles, cost of transportation and maintenance of road were perceived to be unsatisfactory by the respondents.

Table 26: Respondents' Satisfaction with Road Infrastructure

Quality Attributes	Highly Unsatisfactory		Unsatisfactory		Fairly Satisfactory		Satisfactory		Highly Satisfactory	
	No	%	No	%	No	%	No	%	No	%
Quality of Roads	180	10.0	309	17.2	727	40.6	538	30.0	38	2.1
Availability of Vehicles	114	6.4	220	12.3	665	37.1	726	40.5	67	3.7
Cost of Transportation	237	13.2	449	25.1	782	43.6	310	17.3	14	0.8
Maintenance of Road	371	20.7	468	26.1	699	39.0	239	13.3	15	0.8

Source: Authors' fieldwork 2011

Another study by Toyobo *et al* (2016), which is focuses on residents' perception of the effectiveness of public facilities and services in Ogbomoso South Local Government, Oyo State. Table 27 revealed the residents' perception on factors that hindered the effectiveness of public facilities and services in the area. Table 28 further revealed that (30.9%) of the respondents indicated no public participation, inadequate funds (26.8%), inferior materials (12.4%) and vandalism 4.1%. Effectiveness of public facility and services was

therefore anchored on sufficient funding, public enlightment on the use of the same. However, the poor maintenance cultures of the people have left some of the facilities in a state of disrepair and vandalism of facilities during political campaigns by opponent parties and vice versa.

Table 27: Factors hindering effectiveness of facilities and services

Political Wards	Factors hindering effectiveness of facilities and services				
	Inadequate fund	No public participation	Lack of maintenance	Inferior materials	Vandalism
Akata	12(46.2%)	8(30.8%)	3(11.5%)	3(11.5%)	0(0%)
Alapata	6(21.4%)	6(21.4%)	10 (35.7%)	6(21.4%)	0(0%)
Arowomole	12(28.6%)	6(14.3%)	9(21.4%)	9(21.4%)	6(14.3%)
Ibapon	8(22.9%)	8(22.9%)	12(34.3%)	3(8.6%)	4(11.4%)
Ijeru I	3(11.5%)	9(34.6%)	8(30.8%)	3(11.5%)	3(11.5%)
Ijeru II	3(9.1%)	12(27.3%)	12(36.4%)	6(18.2%)	0(0%)
Ilogbo	15(38.5%)	15(38.5%)	6(15.4%)	3(7.7%)	0(0%)
Isoko	15(31.3%)	18(37.5%)	9(18.8%)	6(12.5%)	0(0%)
Lagbedu	12(26.1%)	19(41.3%)	15(32.6%)	0(0%)	0(0%)
Okeola	11(28.2%)	11(28.2%)	9(23.1%)	6(15.4%)	2(5.1%)
Total	97(26.8%)	112(30.9%)	93(25.7%)	45(12.4%)	15(4.1%)

Source: Fieldwork, (2014).

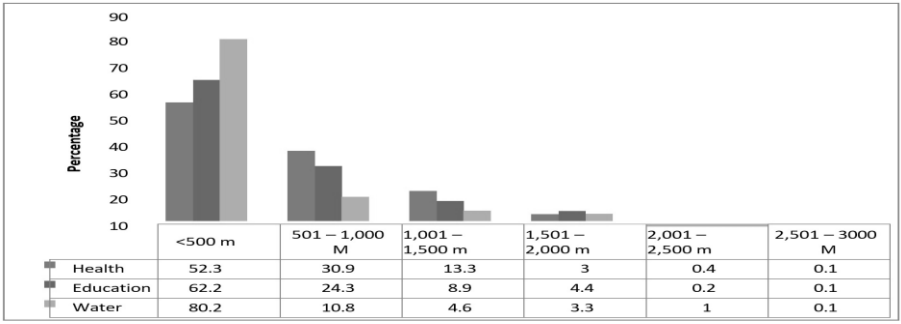
4.7 Infrastructure and Accessibility

In a study by **Sulyman,** et al (2016), which examined accessibility of elderly persons to urban infrastructure in developing countries especially in Ibadan North local government of Nigeria. Out of the four infrastructural facilities examined namely: health, recreation, religious and shopping facilities, the study revealed that recreational and health facilities which are mostly needed by the aged are considered inadequate in terms of availability, adequacy and accessibility. 66.3% of the respondents agreed that health facilities were available but not within their easy reach in terms of distance and cost while 59.1% claimed not to enjoy recreational facilities.

In assessing the accessibility of the elderly to urban facilities and services, distances and mode of transport were considered. The study revealed that the respondents had shopping and religious facilities within reach while health and recreational facilities which are most needed were not easily accessible due to distance and cost. 43.6% of the respondents had their health facilities located above the distance of 1km while 31.6% of the respondents had their health facilities located below 500km, 24.8% had it located between 500m and 1km. the majority of the respondents (48.2%) reported to the distance covered to enjoy recreational facilities was above 1km. 25.9% had it between 500m and 1km while the remaining 25.9% had below 500m. in the case of religious centres, the study shows that majority of aged of 61.1% enjoyed

religious activities which they had located below 500m and only 13.4% had it located above 1km. the planning standards recommended for a neighborhood park, shopping, place of worship and health facilities are maximum service radius between 400 – 800km. this pattern of responses reviewed clearly that in spite of the availability of these facilities, recreation facilities could not be easily reached.

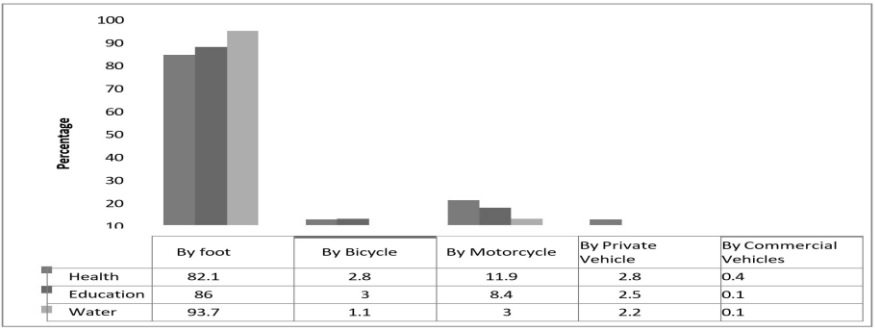
In a similar study, **Sulyman** (2018) assessed rural dwellers' satisfaction with accessibility to some selected infrastructure, namely health, education and water, in rural settlements of Niger state of Nigeria. The study revealed that 1,437 (80.2%)of the respondents travelled less than ½ km to enjoy water facilities, while 1,115 (62.2%) travelled the same distance to access educational facilities. Only 937 (52.3%) of the respondents admitted travelling a distance of less than ½ km to get to the locations of health facilities. The responses on distance travelled to enjoy services of health, educational and water facilities are shown in Figure 28. The study revealed that 1,437 (80.2%) of respondents travelled a distance of less than ½ km to enjoy water facilities, while 1,115 (62.2%) travelled the same distance to access educational facilities. Only 937 (52.3%) of the respondents admitted travelling a distance of less than ½ km to get to the locations of health facilities. The study further revealed that for a distance of between ½ km and 1 km, 194 (10.8%) of the respondents admitted travelling that distance to get to locations of water facilities, while for educational facilities only 435 (24.3%) of the respondents travelled that distance, only 554 (30.9%) of respondents travelled the distance to the locations of health facilities. This pattern of responses is repeated by the respondents for the distance between 1 km and ½ km. For distance between 1 ½ km and 2km, 59 (3.3%) – 79 (4.4%) of the respondents travelled the distance to access water, educational and health facilities.



	<500 m	501 – 1,000 M	1,001 – 1,500 m	1,501 – 2,000 m	2,001 – 2,500 m	2,501 – 3000 M
Health	52.3	30.9	13.3	3	0.4	0.1
Education	62.2	24.3	8.9	4.4	0.2	0.1
Water	80.2	10.8	4.6	3.3	1	0.1

Figure 28: Distance travelled to enjoy the services of the facilities
Source: Author's fieldwork, 2011

The responses on the mode of transportation used to get to health, educational and water facilities are show in Figure 29. The study revealed that 1,679 (93.7%) of respondents travelled by foot to get to the location of water facilities, 1,541 (86.1%) go to the location of educational facility, while 1,471 (82.1%) go to the location of health facility by foot. Those respondents who used Bicycle to facilities were 20 (1.1%) to water facilities, 54 (3%) to educational facilities and 50 (2.8%) to health facilities. The study also revealed that 213 (11.9%), 151 (8.4%) and 54 (3.0%) of the respondents used motorcycle to reach health, educational and water facilities respectively. The respondents that used private vehicles were 50 (2.8%) to health facilities, 45 (2.5%) to educational facilities and 39 (2.2%) to water facilities. A very significant proportion of respondents used commercial vehicles to get to the facilities especially health facilities.



	By foot	By Bicycle	By Motorcycle	By Private Vehicle	By Commercial Vehicles
Health	82.1	2.8	11.9	2.8	0.4
Education	86	3	8.4	2.5	0.1
Water	93.7	1.1	3	2.2	0.1

Figure 30: Mode of transportation used to get to the facilities
Source: Author's fieldwork, 2011

The responses on satisfaction rating on the locations of health, educational and water facilities are shown in Figure 31. The study revealed that 805 (44.9%) of the respondents were satisfied with the location of water facilities, 1,045 (58.3%) with educational facilities and 1,050 (58.6%) with health facilities. The study further revealed that 418 (23.3%) of the respondents were fairly satisfied with the locations of water facilities, 425 (23.7%) with health facilities. The inference that can be drawn from this observation is that, comparatively, more respondents were satisfied with the location of health and educational facilities compared to water facilities.

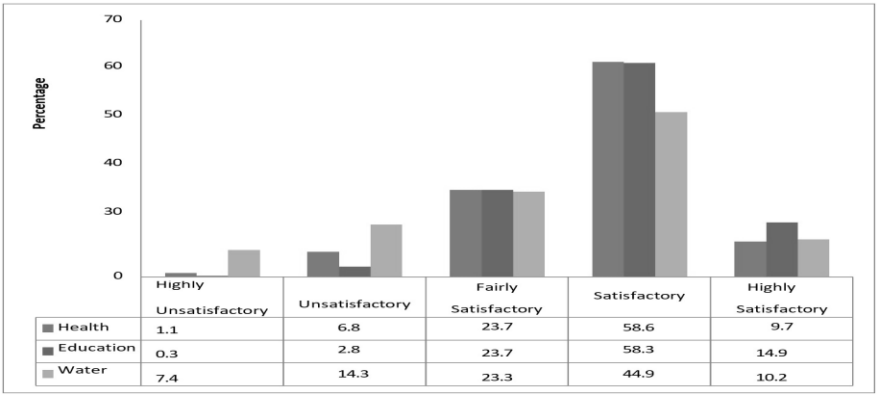


Figure 31: satisfaction rating on the locations of the facilities
Source: Author's fieldwork, 2011

Similarly, in another study Usman and **Sulyman** (2015), investigated the role of rural road transport in determining physical access to primary health centres in Ilorin East Local Government Area of Kwara State, Nigeria. About 49% of the respondents were found to travel to health centre by foot, while 23% travelled by commercial motorcycle. The result further indicated that travel time to health facilities was generally low in the areas as 55.6% of the sample spends less than 40 minutes to seek medical services. By jointly explaining 75.5% of variance in access; distance, means of transportation, road distance to Local Government Headquarter and level of income can be used to predict the level of access to the health centres in the area.
The result of the principal component analysis after varimax rotation yielded four components that accounted for 65.5% of the variance in the selected variables is shown in Table 28.

Table 28: Component loadings on determinants of access to rural primary health centres in Ilorin East LGA

	Components			
	1	2	3	4
Road Category	-.108	.787	-.085	-.245
Means of Transport	.145	.823	-.115	-.074
Nature of Transport Services	-.049	.756	.194	.243
Distance to Health Facility	.960	-.105	-.074	.174
Transport Cost	.911	-.073	-.016	-.025
Total Income	-.001	-.204	.750	.147
Ownership of Intermediate Means of Transport	-.044	.029	.643	.114

Road Distance to LGA Headquarters	.264	-.293	-.073	.856
Education Level	-.042	.138	.610	-.335
Sex	.206	-.149	-.227	-.335
Eigen Values	**2.581**	**2.011**	**1.468**	**1.146**
% Variance	**23.468**	**18.280**	**13.350**	**10.418**
% Cumulative Variance	**23.468**	**41.748**	**55.097**	**65.515**

Source: Computed from field data, 2011

As indicated in Table 28, the first component which accounts for 23.5 of the total variance has the strongest loading on Distance to Health Centres (DS) and Transport Cost (TC). This is understandable as transport cost often varies directly with distance travelled. So this component is labelled 'Transport Cost'. The second component labelled 'Transport Facilities' has strong positive loading on Means Transport (MTR). Category of Road (RDCR) connecting the settlements and Nature of Transport Service (NTSR). The third component has the strongest loading on Total Income (TICM). It also has a strong loading on Ownership of Intermediate Means of Transport (IMT) and Education Level (EDL). This component is labelled 'Demography' because it embraces the demographic characteristics of the people. The fourth component has a strong positive loading on Road Distance to Local Government Headquarters (RDLG). It is named 'Remoteness' because it is a measure of level of isolation from the centre of administration or decision making. In other to establish the role of transport in determining access to basic health centre in Ilorin East LGA, the component scores in Table 28 were used as independent variables. The result of the stepwise multiple regression analysis indicates that all the four variables are important in explaining access to health centres in rural areas of the LGA. The summary of the statistics reveal that the combined influence of the four variables could explain just 75.5% of the total variation in access to rural primary health centres in Ilorin East Local Government Area of Kwara State. Some other factors not considered in this study could be responsible for the unexplained variance (24.5%). As shown in Table 29, 'Transport Cost' (x_1) is the best predictor of access to health centres in the study area because 72.1% of its variance is associated with the variation in access to health centres. This implies that proximity to health centres is very important in terms of using health facilities in the study area. Those who live far away from health centres require more time and efforts to reach these facilities. Longer distance will also most likely translate into higher cost of transportation.

Next in importance is 'Transport Facilities' (x_2) which is responsible for an additional 1.9% explanation of variance in access. 'Remoteness' (x_4) also contributes an additional of 1.0% while 'Demography' (x_3) added another 0.5% to the other three variables. Those who earn higher incomes spend less time to reach the health centres because they are more likely to be able to afford higher transport charges if necessary. Ability to seek timely health services may be limited by high transport cost. For instance, households in Budo Are have to cover about 16Kms to obtain service from the nearest functional health centre at Oke Oyi. This is a journey of about 40 minutes to one hour with motorized transport and at a cost of at least ₦ 300 round trip.
From the results of the regression analysis the relationship between access to primary health centres and road transport variables in the area can be predicted with the following equation:

$$Y = 10.099 + 5.791x_1 - 0.938x_2 - 0.466x_3 + 0.699x_4 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$R^2 = 0.755 \quad \text{SE} = 0.107$$

The equation implies that the higher the cost of transport to the health centre, the less the access to health services. Also, the better the transport facilities available, the less the time required to travel and the greater the access to health services. Furthermore, people living in remote areas have poor access since they require more time and efforts to travel to obtain health services. On the other hand, higher incomes and greater personal mobility enable people have greater access to health service.

Table 29: Road transport variables controlling access to rural primary health centres in Ilorin East LGA

List of variables	Parameter estimate	Standard error	R	R^2	% Contribution	% Cumulative contribution
Intercept	10.099	0.107				
x_1	5.791	0.108	0.849	0.721	72.1	72.1
x_2	-0.938	0.108	0.860	0.740	1.9	74.0
x_3	-0.446	0.108	0.869	0755	0.5	75.5
x_4	0.699	0.108	0.866	0.750	1.0	75.0

x_1 = Transport Cost, x_2 = Transport Facilities, x_3 = Demography, x_4 = Remoteness.
Source: Computed from field data, 2011

5.0 RECOMMENDATIONS

1. Amending the Land Use Act is an essential first measure to facilitate access to affordable land for residential construction. The onerous procedure for acquiring property titles and obtaining Certificates of Occupancy (C of O) needs streamlining to mitigate bottlenecks and decrease transaction expenses. Streamlining land acquisition processes will promote investment in affordable housing, particularly in neglected urban areas.

2. Housing financing should be made more accessible to obtain for low- and middle-income earners in the country. The government needs to encourage financial companies to provide more advantageous mortgage conditions, such as reduced interest rates and prolonged repayment durations, customized for lower-income consumers. Microfinance initiatives, cooperative housing financing, and innovative financing channels, have to be advocated as feasible options for persons who may not meet the criteria for conventional bank loans.

3. Nigeria needs to establish a national green building code that delineates baseline guidelines for sustainable construction techniques, ensuring compliance by both public and private builders with ecologically conscious criteria. The legislation would require the adoption of energy-efficient equipment, renewable energy sources such as solar power, and water conservation systems in residential structures.

4.The government needs to actively include commercial developers, non-governmental organizations (NGOs), and foreign funders in collaboration for financing and executing sustainable housing initiatives. These collaborations might address the fiscal and technological deficiencies that currently hinder large-scale housing projects in Nigeria.

5. Investment in capacity development for housing professionals is crucial for the effective execution of sustainable and affordable housing initiatives. The government needs to priorities training initiatives for architects, engineers, urban planners, and builders about best practices in sustainable building, housing financing, and community involvement. These training efforts may be established in partnership with institutions of learning, professional groups, and international organisations.

6. Modular construction, which involves the prefabrication of building components off-site for on-site assembly, markedly accelerates construction schedules and reduces labour expenses .This technology enhances the construction process while reducing waste, allowing producers to optimise material utilisation in controlled settings. This novel methodology may

diminish the expenses linked to conventional building techniques and enhance home accessibility for low-income earners.

7. Geographic Information Systems (GIS) and other data-centric technologies are essential for improving housing planning and resource distribution. Utilizing geographical data enables policymakers and urban planners to make informed decisions on land use, site selection, and infrastructure development Incorporating GIS technologies into housing planning in Nigeria would ensure that affordable housing developments are strategically situated and efficiently address the demands of urban populations.

healthcare services to reduce health risks in these areas.

8. There is the need for a capable regional landuse policy, public involvement, and a viable management of the informal settlements, among other things.

9. There is also the need for rational densification (planned densification) for urban development in order to check the increasing unplanned residential density that reduces the green and open spaces in urban environment.

10. There is a need for provision of rural infrastructure and their proper maintenance to improve the standard and quality of life of rural residents in the state. Consequently, the Ward Development Projects which was introduced in 2008 by the Niger State government should be sustained. It is suggested that the monthly allocation to the wards be increased, while more community participation in project initiation, identification, monitoring, implementation and evaluation should be encouraged.

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Brief Profile of Inaugural Lecturer

Prof. Sulyman, Aremu Olanrewaju was born on 1st June, 1956 to the family of Late Prince Aremu Sulyman (aka Elmo) of Shitta-Alimi Royal House of Ilorin and Late Madam Suliat Agbeke Sulyman. He had his early education at both Okesuna and Afon Primary Schools between 1962 and 1970 in Ilorin and Afon respectively. He attended Mount Carmel College for his secondary school between 1971 and 1975 and the famous Kwara State College of Technology in Ilorin between 1975 and 1977 for his 'A' level Cambridge GCE. He had his Bachelor Degree in Geography from Ahmadu Bello University, Zaria between 1977and 1980. His Master Degree in Urban and Regional Planning was from University of Ibadan, Ibadan between 1987 and 1990, while he bagged his Ph.D in Geography in 2013 from University of Ilorin, Nigeria.

He started his academic career with the then Kwara State College of Technology, Ilorin (now Kwara State Polytechnic) in 1981 as an Assistant Lecturer and rose to the peak of his career as a chief Lecturer in the Department of Town and Regional Planning in 2006. During his 26 years stay with Kwara State Polytechnic, Ilorin, he held many positions which include, Head of Department of Town and Regional Planning, Director, School of Environmental Studies (SES) and Director, Industrial Liaison Office. He was a member of the Academic Board and served in many of the Polytechnic's Ad-hoc and Standing committees.

He was a two-term member of the Board of Kwara State Town Planning and Development Authority (TPDA) in 1992 and 1999 respectively, and was later appointed as the substantive Executive Secretary (Chief Executive Officer) of the organization in 2002.

Prof Sulyman transferred his service to Federal University of Technology, Minna in August 2007 as a Senior Lecturer and has served in many of the University's Committees. He was the Representative of School of Environmental Technology (SET) in the Senate and later appointed Deputy Director, Centre for Human Settlements and Urban Development (CHSUD) from 2011 to 2016 as well as Post-Graduate Coordinator for the department of Urban and Regional Planning. He also served as the Head of Department of Urban and Regional Planning in the School of Environmental Technology of the University between 2016 and 2018.

He has supervised many undergraduates B.Tech projects, M.Tech Projects and has successfully supervised two Ph.D students and co-supervised two Ph.D students and currently co-supervising three post-graduate students in the Department of Urban and Regional Planning and Department of Geography of the University.

Prof. Sulyman is a member of editorial board of many National and International Journals notably; Centre for Human Settlements and Urban Development (CHSUD) Journal, Environmental Technology and Science Journal (ETSJ), Environmental Spectrum and Journal of Geographical Research. He has also reviewed many National and International journals which includes British Journal of Education, Society and Behavioural Science, Journal of Disaster Risk Management (JDRM), Earth and Environmental Sciences conference (UTM, Malaysia) and Unilag Journal of

Humanities. He is currently serving as a member of Board of Trustee of Institute of Climate Safety and Adaptability.

He was External Examiner to many Polytechnics and Universities which include Federal Polytechnic, Idah;Kaduna Polytechnic, Kaduna; Ahmadu Bello University, Zaria ; Nasarawa State University Keffi and Bells University,Ota among others. He was also a member of National Board for Technical Education (NBTE) Accreditation teams to Federal Polytechnic, Idah, Federal Polytechnic, Ilaro and Yaba College of Technology, Lagos. Similarly, he was a member of National Universities Commission (NUC) Accreditation teams to Bells of University, Ota; Benue State University, Markudi; Nasarawa State University, Keffi; Baze University, Abuja; University of Abuja and Abubakar Tafawa Balewa University, Bauchi among others.

Professionally, Prof. Sulyman is a Fellow of the Nigerian Institute of Town Planners (NITP) and a Registered Town Planner (RTP) with the Town Planners Registration Council (TOPREC). He has been involved in some activities of these organizations. For example, he was a two-term member of Nigerian Institute of Town Planners (NITP)/Town Planners Registration Council (TOPREC) Examination Board between 2000 and 2010.

Prof. Sulyman is happily married to Hajia Falilat Abimbola Sulyman and the union is blessed with children and grand children. His hobbies include golfing, playing table tennis, traveling and reading medical literature.

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