IMPACT OF THE DEVELOPMENT OF FEDERAL CAPITAL CITY, ABUJA, ON SELECTED SETTLEMENTS IN KARU LOCAL GOVERNMENT AREA, NASSARAWA STATE, NIGERIA

BY

UDEH, Augustine Nkem

M.TECH./SSSE/2007/1824

DEPARTMENT OF GEOGRAPHY,

FEDERAL UNIVERSITY OF TECHNOLOGY,

MINNA, NIGER STATE

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A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF TECHNOLOGY (M.TECH) DEGREE IN GEOGRAPHY (ENVIRONMENTAL MANAGEMENT)

DECEMBER, 2010

DECLARATION

I hereby declare that this thesis titled: Impact of the Development of Federal Capital City, Abuja, on Selected Settlements of Karu Local Government Area, Nasarawa State, Nigeria was carried out by: Udeh, Augustine Nkem, and has not been submitted to any institution at anytime for the award of any degree. Information derived from published and unpublished work of others have been acknowledged in the text.

UDEH, AUGUSTINE NKEM

DATE: 03/02/2011

CERTIFICATION

This thesis titled: Impact of the Development of Federal Capital City, Abuja, on Selected Settlements of Karu Local Government Area, Nasarawa State, Nigeria by: UDEH, Augustine Nkem, (M.Tech/SSSE/2007/1824) meets the regulations governing the award of the degree of M.Tech. of the Federal University of Technology, Minna and is approved for its contribution to scientific knowledge and literary presentation.

Dr. A. S. Abubakar
Name of Supervisor

04/04/2011
Signature & Date

Dr. A. S. Abubakar
Name of Head of Department

04/04/2011
Signature & Date

Prof. M. Galadima
Name of Dean,
School of Science and Science Education

8/4/2011
Signature & Date

Prof. (Mrs.) S. N. Zubairu
Name of Dean,
Postgraduate School

Signature & Date 5/7/2011

DEDICATION

This inspiring work is dedicated to the families of **ANYALECHI UDEUKPABI**

and **MBACHUKWU HYCENT**

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To all the lecturers in the Department of Geography, Federal University of Technology, Minna, I bestow my immeasurable gratitude especially my Supervisor, Late Dr. Peter S. Akinyeye, Director, Disaster Risk Management and Development Studies, Federal University of Technology, Minna for his inspiration, understanding and support which remains indelible in my heart. It will be complete injustice if I fail to attest to the companionship of my course mates and friends whose contributions boosted my success. Ikechuckwu, Stella, Segun and Adams, I am indebted to you all. I appreciate the objectivity and benevolence of my family members, Mrs. Chinenye Justina Udeh, my wife, Amarachi Emmanuella Udeh and Nnayelugo Donald Udeh, my children for their understanding and support. My ultimate gratitude is to God Almighty for His Guidance and protection during this remarkable period.

ABSTRACT

The location of the first built phases of the Federal Capital City is at the extreme eastern side of the Federal Capital Territory. Easy transportation of the required labour forces from this location to the construction site resulted in the large number of low-grade formal and informal housing developments at various places within and outside the Federal Capital Territory borders, some of which are in the Karu Local Government Area of Nassarawa State. Among the neighbouring towns of Abuja right from its inception, Karu experiences the highest influx of Abuja immigrants. This is due to its close proximity and high accessibility to the new Federal Capital City. Consequently, a large number of workers in the public and private sectors of Abuja reside in Karu and commute daily for work in the Federal Capital City. This study has assessed the impact of the creation of Abuja on the environmental conditions of Karu and its environs. It achieved this through analysis of the spatial expressions of the consequences stemming from the need for alternative residential area away from the FCC which has necessitated the upsurge of these unplanned residential developments, absence of adequate infrastructural facilities and institutional lapses in enforcing the development control standards in the study area. The study concluded by drawing relevant recommendations based on the findings from all the surveys and analysis carried out and this is thus believed is pertinent to the improvement of the environmental condition of Karu and its environs to make them sustainable for the residents and intending migrants.

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ABBREVIATIONS

AGIS - Abuja Geographic Information System

FCC - Federal Capital City

FCT - Federal Capital Territory

LGA - Local Government Area

generally unsuited to the rapidly growing population, many of whom were drawn from low income groups.

On the other hand, the development of the Federal Capital City is associated with more problems among which are:

1. The implementation of the Abuja master plan was at a pace much slower than its population increase, consequent upon rapid immigration.
2. Tenement houses which are the abode of the Nigerian low income earners in cities were virtually absent among the houses so far completed. Thus, available accommodation for rent within the Federal Capital City is particularly unaffordable to both the low and medium income group.
3. The administrative bottlenecks on the process of acquisition of land for developing the Federal Capital City in the face of very high demand sky-rocketed the market value of land.
4. High standard and stringent measures on development control is such that developing and owning a house in the Federal Capital City for low income earners is not feasible.

More so, the location of the first built phases of the Federal Capital City is at the extreme eastern side of the Federal Capital Territory, easy transport of the required labour forces from this location to the construction site resulted in the large number of low-grade formal and informal housing developments at various places within and outside the Federal Capital Territory borders, some of which are in the Karu Local Government Area of Nassarawa state.

The scale and use of land started informally and this uncontrolled development continued unabated, resulting today in a "ribbon" development which has established itself over about a 12-13 km length of the main artery road heading east-wards out of the Federal Capital Territory itself, and it now encompasses the township of New Nyanya, Maraba, New Karu, Ado and Masaka.

Due to the rapid expansion, the quality of the accommodation, community facilities and basic engineering services is generally very low, and often negligible. The

continuing expansion of this largely unplanned development, currently without adequate water supply, sanitation, drainage or waste management, electricity, good access, lead to a further decline in the welfare and general standard of living for the inhabitants.

It becomes imperative to make the best use of the opportunities created by the proximity of Karu, and the negative consequences accompanying such relationship. However, the pursuit of a well articulated impact study of the development resulting from such relationship will generate that the working and living condition in Karu be greatly improved.

1.3 Aim and Objectives

The aim of this study is to assess the thesis Impact of the Development of the Federal Capital City (FCC) on selected settlements of Karu L.G.A., Nassarawa State, Nigeria. Within this broad aim, the specific objectives are to:

i. Examine the development problems in the Federal Capital City (FCC) i.e. resettlement, demolition exercise etc;
ii. Examine the development progress in Karu Local Government Area;
iii. Examine the environmental conditions of Karu Local Government Area before Abuja project;
iv. Examine the Impact of the Development of the Federal Capital City (FCC) on the environmental conditions of Karu L.G.A.;
v. Assess the implications of this trend on the growth of other settlement\towns.

1.4 Significance of the Study

The study is borne out of the dire need to providing answers to the problems identified and is considered to be important for a number of reasons.

1. Conducting a survey into the various environmental infrastructures is a necessary antecedent to the development of intervention programme.

2. Such a study would facilitate the assessment of whether obstacle to interventions is attributed to natural behavior or lack of infrastructure.
3. Findings will confirm whether the environmental conditions are responses to the level of adequacies/inadequacies of infrastructure.
4. Finally the information gathered will serve as guide to design environmental enlightenment programme for the residents.

1.5 Scope and Limitations

The whole of Karu urban settlement has within its geographic extent settlements as Mararaba, New Karu, Ado, New Nyanya, and Masaka. However, two of these aforementioned settlements namely Mararaba and Ado will be focused upon because they have a higher impact on their respective environmental conditions. While the year 1979 is considered as the period of commencement of the impact of Abuja on the study area, the study period thus is between 1979 to 2008. Although various aspects of the impact will be addressed, this work will dwell more on the impact of the Federal Capital City on the population, land use and their resultant consequences on the environmental condition of the Karu settlements.

1.6 Background of the Study Area

1.6.1 Location

Federal Capital Territory (Abuja) is located at the geographical centre of the nation. It occupies an area of 8,000 square kilometer. It is bounded to the north by Kaduna and Nassarawa State to the East and South-East by Plateau state, to the South-West by Kogi state and to the west by Niger State (Plate I).

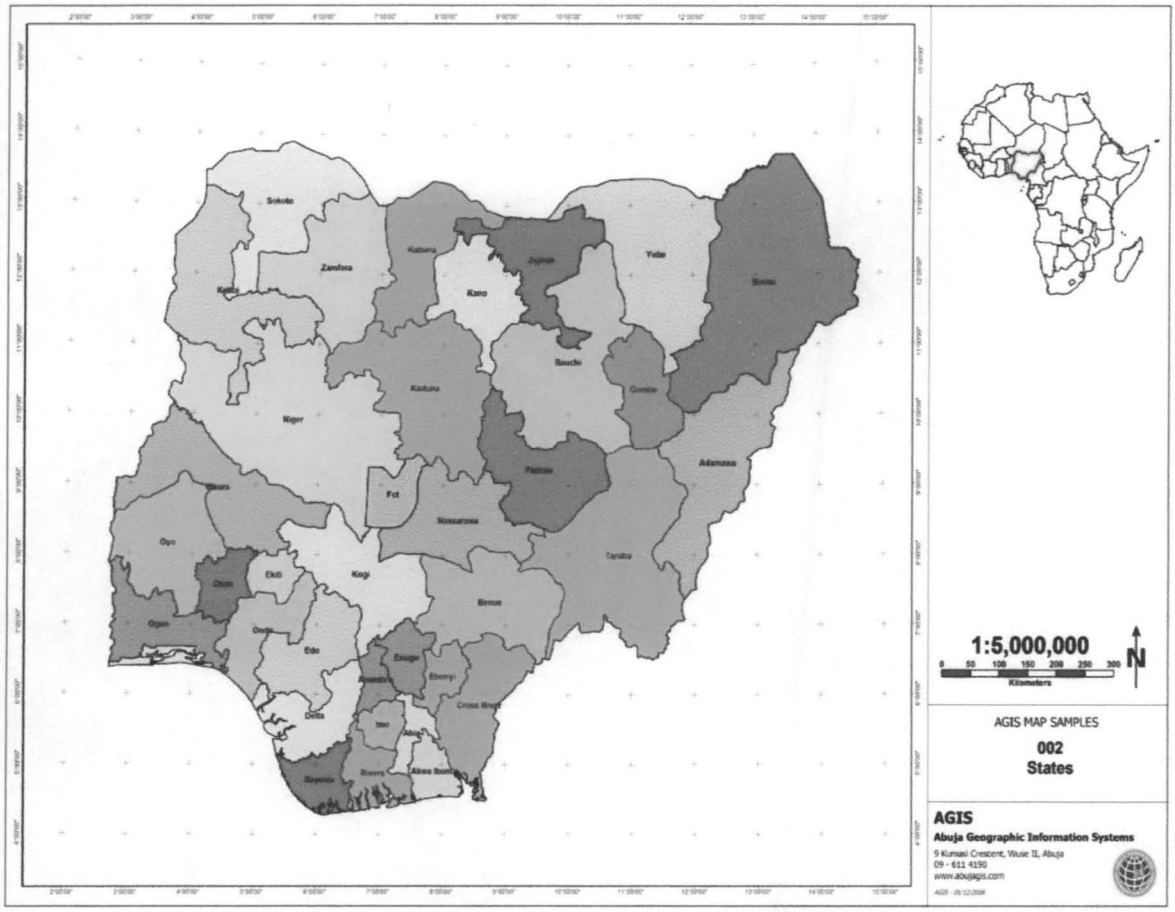

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Figure 1.1 Nigeria showing the Federal Capital Territory and Nasarawa State

Source: AGIS, 2007.

The site for the Federal Capital City (FCC) Abuja and the seat of Government has been selected from the North Eastern quadrant of the Federal Capital Territory and it occupies an area of about 250 square kilometers. It is designed in a crescent-shape centrally oriented and placed on a prominent position emphasized by an aerial focus on the highest point of the Aso hill. The city of Abuja is also almost geographically central to the continent of Africa.

In the same light, Karu Local Government area of Nasarawa state is located in the North Central region of Nigeria. It shares boundaries with Abuja, the Federal Capital Territory to the west, Keffi Local Government Area to the south and Jaba Local Government in Kaduna state to the North. The proximity of the major urban

settlement of Karu to Abuja make them part of the developmental corridors of the Federal Capital. See plates II and III.

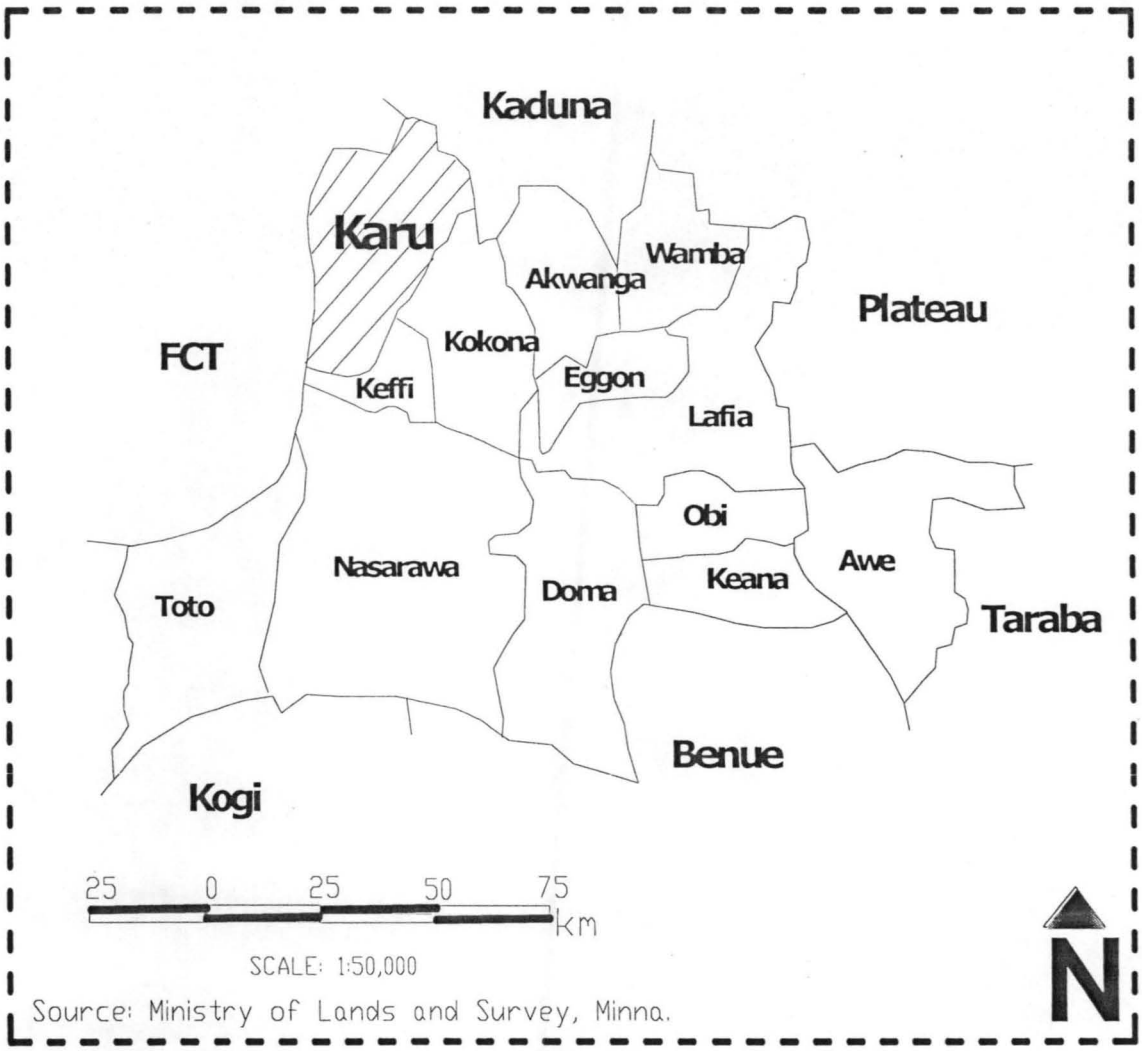

Fig. 1.2: Nasarawa showing Karu Local Government Area

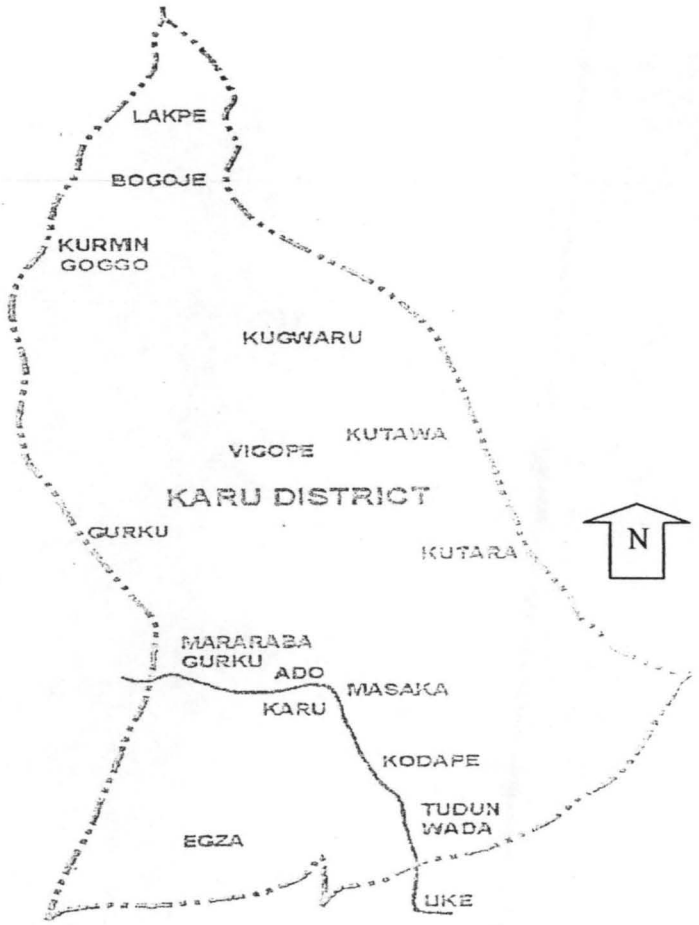

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Figure 1.3: Administrative Wards within Karu Local Government Area

This brings both opportunities and constraints to the development of the area. It brought improved business activities and the creation of employment, largely in the informal sector. It also brought a lot of pressure on urban growth, housing, land and infrastructure facilities.

1.6.2 Accessibility

Being centrally located, Abuja is easily accessible from all parts of Nigeria and indeed the principal cities of Africa. It is linked to the A-2 Kaduna - Okene road running north/south, by the A-124 Bida - Suleja road running East-West by the A-234 Keffi-Abuja road running East-West, and by the F-126 Minna - Suleja road running North-West /South-West.

A railway line that will run from Gudi -Keffi (Plateau) – Karshi - Kuje -Gwagwalada (Federal Capital Territory)-Gulu-Baro (Niger), is being planned to link the territory with the existing National Railway Network. Efforts are also underway to provide navigational inland water ways to the Territory through dredging of river Niger from the coast to Baro. In Karu, the dominant traffic corridor is the Abuja-Keffi Federal highway. (See Plate I)

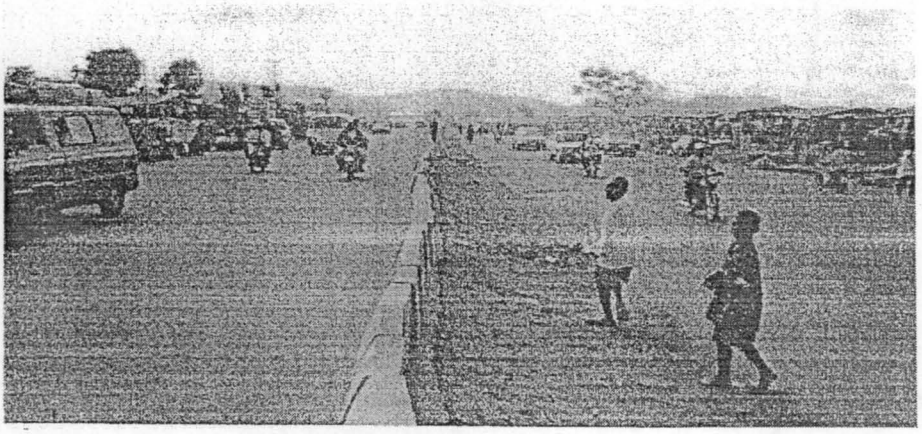

Plate I: Abuja-Keffi Highway

This road provides a gateway to the Federal Capital Territory from the eastern part of the country as well as the central states such as Benue, Plateau and Nassarawa. Most of the new rapid development in Karu tends to sprawl along this highway, which stretches a distance of about 20 kilometers from Federal Capital Territory boundary towards Keffi. Hitherto small settlement along the highway- namely Mararaba, Ado and Masaka have now grown in size to accommodate a very large population of workers from Abuja and other migrants.

Traffic flow through the Abuja-Keffi highway is "tidal" with heavy movements towards the Federal Capital Territory during the morning peak periods and in the reverse direction in the early evening. A snapshot traffic count carried out at the Federal Capital Territory border in year 2000 suggests that an excess of 20,000 people enter the capital through Karu during the morning peak period (Karu Preliminary Master Plan Report 2000).

1.6.3 Climate

The climate of Abuja is characterized by a dry season from November to March and wet season from April to October. The duration of the raining season is between 180 days to 190 days. The average annual rainfall is 1,632mm, with the highest recorded in the months of July August and September (Dawam, 2000).

The Federal Capital Territory records its highest temperature during the dry season when there is few if any cloud cover. It has an annual temperature range between 21°C and 32°C. During the raining season, the maximum temperature is lower due to the dense cloud cover. Diurnal annual range is also much lower, sometimes not more than 7 degree centigrade in July and August.

Relative humidity ranges between 20 percent in the dry season, to 95% in wet season. The tropical continental air mass which is associated with the north-east trade wind is the dominant air mass in the mass in the dry season, while the tropical maritime air mass associated with the south -west monsoon winds is dominant in the wet season.

Another significant phenomenon associated with the wet season is not only the occurrence of lightening but also thunderstorm, severe wind and intensive rainfalls both at the on set and the cessation. The thunder storm and the high speed easterly - winds originates from the Jos plateau squal lines or the sudden up-draft of wind due to the Bwari-Aso ranges enclosing the city.

Similarly, the climate of Karu is not so different from what is obtainable in the Federal capital Territory. However, Karu has two distinct seasons, wet (rainy) and dry seasons. The temperature, rainfall and humidity patterns follow closely, the pattern of two dominant tropical air masses, leading to the emergence of distinct climatic regimes as follows.

Hot and humid period:	April -June.
Cool and humid period;	July -October
Cool and dry period:	November to January.
[illegible]d dry period;	February -March.

1.6.4 Temperature

Temperature during the dry season (Nov-April) can be as high as 27.5^{0}C and 37^{0}C (80^{0}F-98^{0}F), divinely range could rise up to 17^{0}C (32^{0}F) thereby greatly affecting comfort levels. March is a critical month during which temperatures are usually highest. The maximum temperature ranges from 23.5^{0}C - 36^{0}C (72^0-96^{0}F) and is registered in the wet season (May-October), (See Figure 1.1). Daily range is reduced to about 7^{0}C (13^{0}F) illustrating the moderating influence of cloud cover. These patterns however vary with elevation.

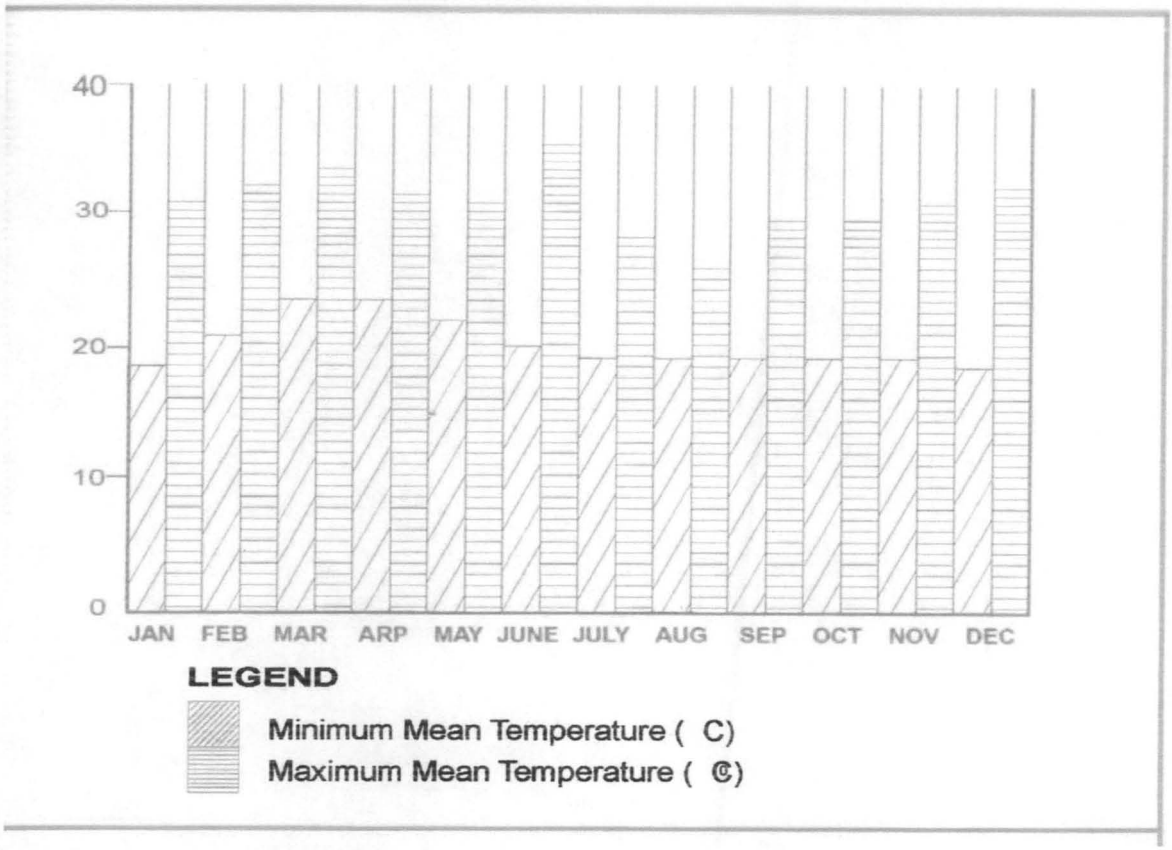

Fig. 1.4 Maximum and Minimum Temperatures of the FCT
Source: AGIS, 2007

Similarly, the temperature of Karu is not so different from what is obtainable in the Federal capital Territory. By this, the average daily range of temperature is practically same.

1.6.5 Relative Humidity

Relative humidity during the dry season at higher elevation is about 20% while at lower elevation it is 30%. In the rainy season, it could be as high as 90% in the morning and 50% in the afternoon. At the valleys and plains the combination of relative humidity and temperature could be oppressive in terms of reduction of comfort level. In the same light, the relative humidity of Karu is not so different from what is obtainable in the Federal Capital Territory.

1.6.6 Rainfall

The start of rainy season in north-eastern Federal Capital Territory is around the 10th of April. The rain tapers off, very rapidly after the 20th of October. Thus, the duration of the rainy season is between 180 days to 240 days in the year and total rainfall received during this period is between 1,145.55mm-1, 631.7mm. In the Abuja area 60 percent of the annual rainfall is in the months, July, August and September. (See Figure 1.2). This concentration of rainfall shows the needs for drainage system that can handle large volumes of water very quickly.

Another weather phenomenon is associated with the presence of inselbergs; these features exert an influence on local weather greater than their size. These inselbergs induce convectional activity and cause intense relief rain in their immediate surroundings.

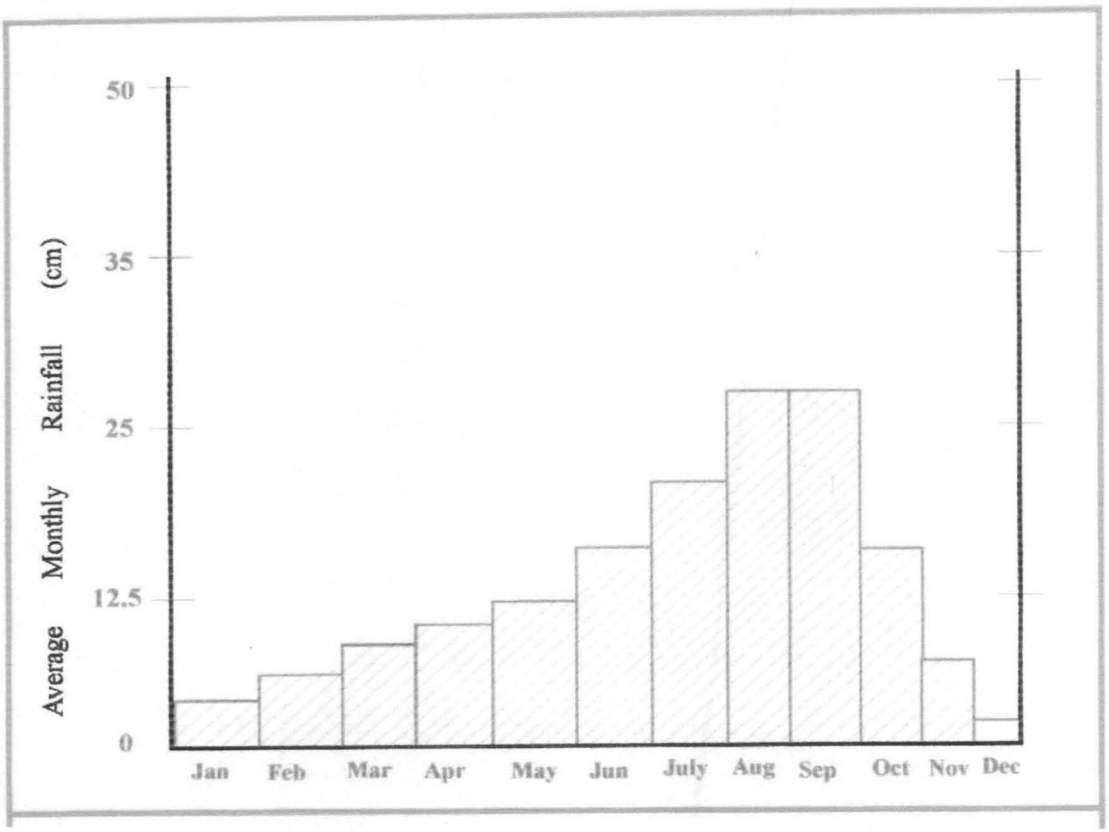

Fig. 1.5: Mean Monthly Rainfall in Abuja
Source: AGIS, 2007

In the same vein, the rainfall of Karu is not different from what is obtainable in the Federal capital Territory. The mean annual rainfall remain same.

1.6.7 Relief/Bedrock Geology

The relief of the FCT consists of a number of distinct physiographic regions which are basically of two types; hills and plains. The hills occur in clusters or in ranges (form of ridges) and are found mainly along the eastern boundary region, the north-east and north-central part of the territory, where an extension from Suleja (Niger State) protrude into the Territory. Relief within these hills is above 100m and it increases to 300m in the more rugged areas.

Slope gradient are generally over $10^{0,}$ although much steeper in areas of solid rock hills and escarpment. Within these areas of rough topography however, some extensive areas of gently sloping terrain occur (especially within the Bwari-Aso hills and Zuba hills). The drainage texture of the hills is generally fine, and valley densities of 4 / km^2 are common. The major hills include gawu, Zuba, Bwari-Aso and Agwai-Karu hills. The extensive plains include, Iku-Gurara plains, Kau plains, Gwagwa plains, Bada plains, Bobo plains and Rubochi plains (see Fig. 1.6).

The bedrock geology is basically basement complex of Precambrian igneous rocks, made up largely of schist, gneiss and maluetities. Much of the plains and terraces are covered by sedimentary rocks of cretaceous age. A combination of geology and relief reveals topographic constraints value or hazard rating which is a useful index for building development and for identifying developable areas.

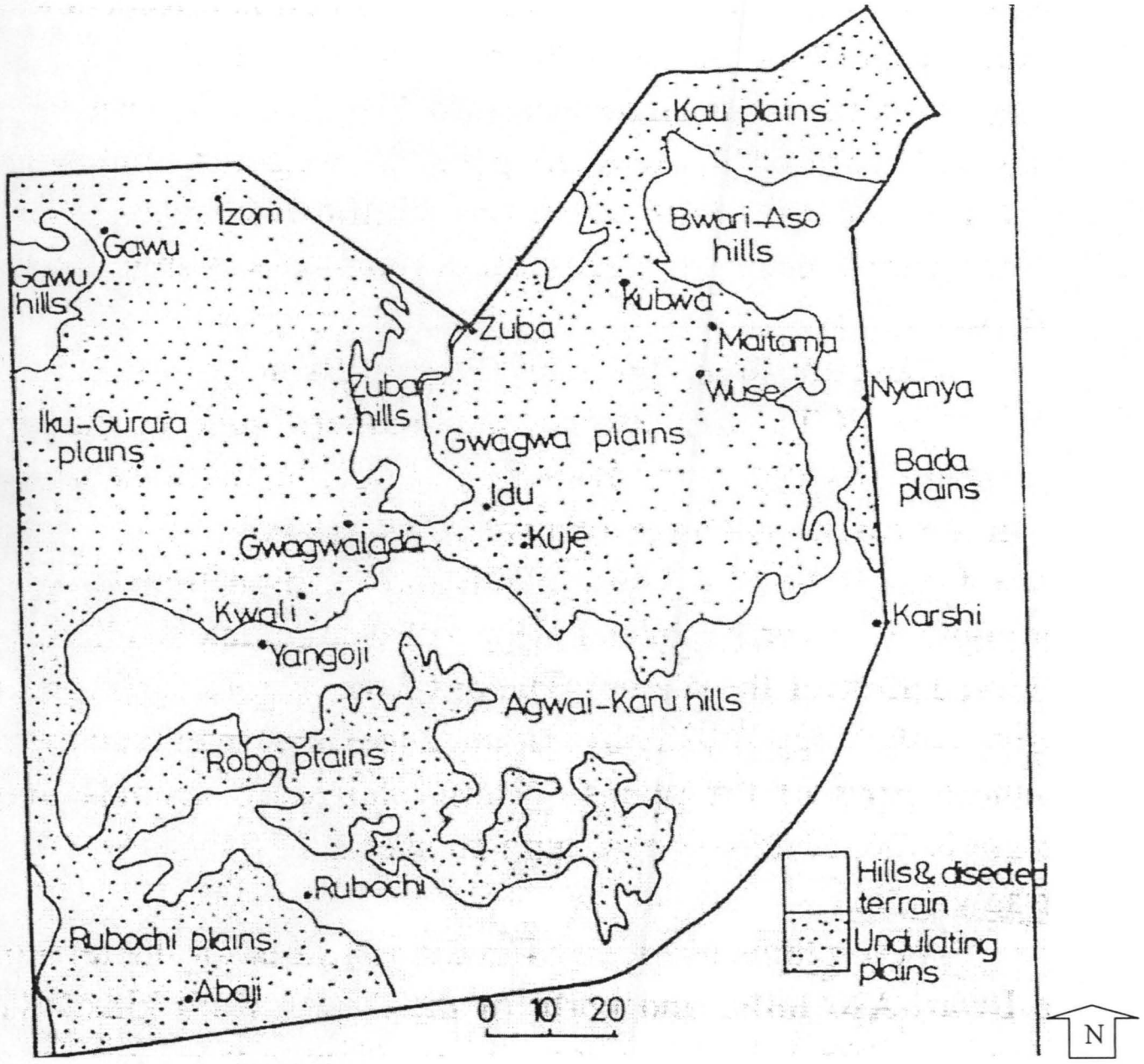

Figure 1.6 Physiographic regions of the FCT

Source: Dawam P. D. (2000)

The geologic features in Karu and the Abuja area in general are founded on basement complex structures that characterize much of the country. The major formation constituting the bedrock includes the combination of different metamorphic and igneous rock formations especially migmatites and muscovite -biotitic schist having occasional outcrop bands.

The rock formation occurs in varying forms throughout the Karu-Abuja region. The soils derived from this bedrock structure are generally deep and well drained with high fertility rating and variable run-off potential. Variations in the soil composition occur mainly along the streambeds where the soils are higher in clay content.

1.6.8 Hydrology and Drainage

In terms of hydrology and drainage, the FCT is considered to have potential ground water sources, because of the extent of faulting within the underlying metamorphic geologic structure. Most of the streams exhibit flash floods during rainy period because of torrential rains and high run-off characteristics of the plains. The territory has a run-off co-efficient of between 40% and 60%.

However, some of these streams remain dry throughout the dry season. In the valley bottom, the water table may be very close to the surface and water logging occurs e.g in Kwali and West of Abaji e.g around Pandagi and Yewuni. (See Plate 1.6).

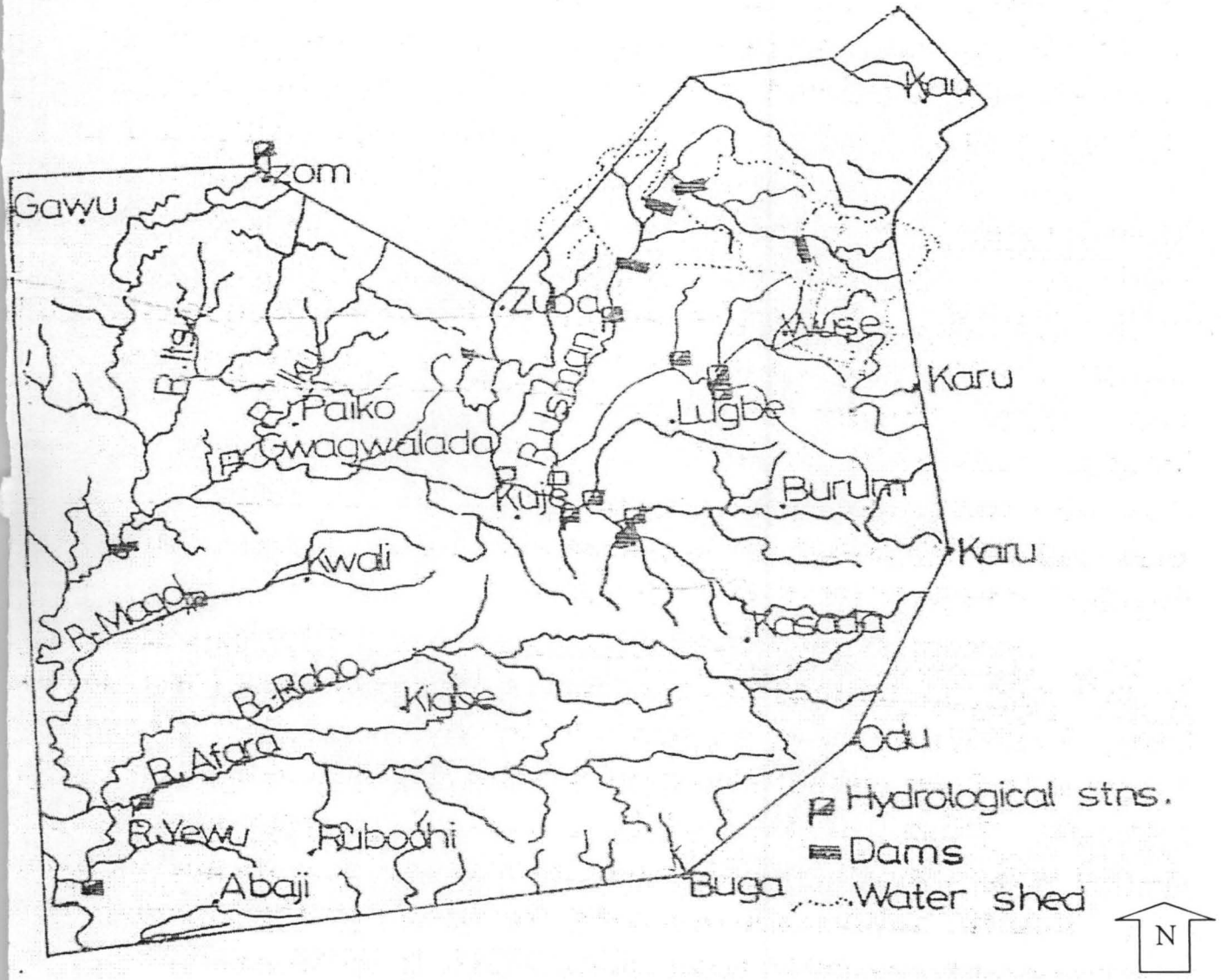

Figure 1.7: Rivers and Drainage pattern of the FCT

Source: Dawam P. D. (2000)

In Karu, there exists the prevalence of network of streams and rivers. Many of these streams are small and seasonal. The major ones like Uke and Ado Rivers flow all the year round.(see figure on hydrology of Karu)

1.6.9 Soil and Vegetation

Soils derived from granites gneiss magmata under-lay the Gwagwa plains. Their suitability for developed land uses varies with depth, occurrence of iron pan, texture,

readability run-off potential and drainage. It contains large amount of humus which makes it considerably fertile and hence suitable for farming. The vegetation could best be described as park land savanna with scattered trees. Riverine depressions are typically skirted by fringes of thickets and high trees. There are occasional patches of forest or heavily wooded area.

In Karu, the natural vegetation is of the park savannah type, featuring dense tropical woodland with shrubs and grasses. There is substantial wildlife population in the bushes of Karu Local Government Area comprising grass cutters, Monkeys and Antelopes. The number and composition of the wild animals is being threatened by human activities, mainly deforestation and hunting.

1.6.10 Socio-Cultural Characteristics

The original inhabitants of the Federal Capital Territory and Karu are the Gwari, Gade, Gwandara, Gana-gana, Koro and the Basa tribes, with a little Hausa community. However, Abuja is now inhabited by people from across the country. It is a city owned not by one individual, group or persons, ethnic group or state (s) but by all citizens of Nigeria. In other words it is referred to as 'A no-man's land".

In order to allay the fears expressed by contain indigene of the territory (original settlers) that they run the risk of being submerged by the impending movement of people into the territory, a local interim administration has been set up to administer the Federal Capital Territory excluding the Federal Capital City.

The manifestation of various activities, alongside those participating in them, point to the fact that it is a socio-cultural melting pot devoid of one distinct custom or tradition. For the fact that Abuja was carved out of the three states of Niger, Nasarawa and Kogi (Formally Kwara) states, it is obvious that apart from English the official language, Hausa, Ibo and Yoruba and several other languages are spoken in various communities in the territory

1.6.11 Administrative Units

The decree No. 12 of 1985 entrusted executive powers and responsibilities of administering the territory vested in the president to an appointed Minister. Prior to 1985 the Federal Capital Territory was divided into 9 development areas namely; Abaji, Bwari, Karshi, kuje, Kwali, Rubochi, Yaba, Gwagwalada and the Abuja Municipal. For more effective administration, development and co-ordination the development areas were later on merged to make 6 Area councils. These are: Abaji, Abuja Municipal, Gwagwalada, Kuje, Bwari and Kwali Area councils.

1.6.12 Demography

According to the Abuja Master plan, the city is to have a permanent population of 150,000 persons in residence upon inauguration in 1986, and will be permitted to grow to a maximum population of approximately 3.1 million, after which population growth will be accommodated in satellite towns. A break down of the targeted population of the city in phases is shown in the table below.

Table 1.1: Projected Target Population of Abuja according to Phases of Development

PHASES	PROJECTED TARGET POPULATION
I	230,000
II	585,000
III	640,000
IV	1.7Million

Source: Abuja Master Plan (IPA Report 1979).

The population of the Federal Capital Territory in 1977 was estimated at 124,674 (Federal Office of Statistics). This figure includes those that have now been resettled out side the city. However the scheduled final movement of the seat of government could not take place until

five years later in 1991. This affected the projection of the population according to the phases of the city's development

Meanwhile the 2006 National Population Census recorded a total population of 1,406,239 for the Federal Capital Territory. As at 1995 the city alone comprising of Garki, Maitama, Asokoro, Wuse, Gwarimpa, Nyanya and Karu had a figure of about 165,000 persons. The sex structure of the Federal Capital Territory was made up of 52.39% males, 47.61% female, while that of the Municipal Area council which includes the city and some surrounding villages is 57.27 male and 42.73 female (FCT Digest of Statistics,1993).

Table 1.2: Population of FCT by Area Council

S/NO	AREA COUNCIL	MALE	FEMALE	TOTAL
1.	Abaji	28,860	29,782	58,642
2.	Abuja Municipal Area Council (AMAC)	415,951	360,347	776,298
3.	Bwari	115,346	113,928	229,274
4.	Gwagwalada	80,182	78,436	158,618
5.	Kuje	49,420	47,813	97,233
6.	Kwali	43,413	42,761	86,174
	TOTAL	**733,172**	**673,067**	**1,406,239**

Source: National population Commission 2006 Census.

Table 1.3: Sex Structure of FCT Population

S/NO	AREA COUNCIL	MALE (%)	FEMALE (%)
1.	Abaji	49.20	50.80
2.	Abuja Municipal Area Council (AMAC)	53.60	46.40
3.	Bwari	50.30	49.70
4.	Gwagwalada	50.60	49.40
5.	Kuje	50.80	49.20
6.	Kwali	50.40	49.60
	TOTAL	**100**	**100**

Source: National population Commission 2006 Census.

Table 1.4: Population of Nasarawa State by Area Councils

S/NO	AREA COUNCIL	MALE	FEMALE	TOTAL
1.	Akwanga	56,135	55,767	111.902
2.	Awe	57,326	55,757	113,083
3.	Doma	71,395	67,596	138,991
4.	Karu	109,515	106,715	216,230
5.	Keana	40,873	40,928	81,801
6.	Keffi	47,527	45,023	92,550
7.	Kokona	54,379	54,179	108,558
8.	Lafia	165,631	164,291	329,922
9.	Nasarawa	95,105	92,115	187,220
10.	Nasarawa-Eggon	74,543	73,862	148,405
11.	Obi	74,675	74,302	148,977
12.	Toto	59,884	59,167	119,051
13.	Wamba	36,813	35,874	72,687
	TOTAL	**943,801**	**925,576**	**1,869,377**

Source: National population Commission 2006 Census.

During the National Census in 2006, the Population of the entire Karu Local Government Area was 106,715 people. As at the time of this research, the National Population Commission are yet to do a break down of this figure by districts.

The population of Karu has been growing due to migration of people from other parts of the country. In Karu Urban Area as a whole, about 20% of the total population came to the area between (2000-2002) in the last 3-5 years, 37% between 1996 to 1999 and 43% were resident before 1996 (Frischman, May 2001).

However, it is noteworthy to say that Karu has a cosmopolitan outlook with many different ethnic and tribal groups living together in harmony. The major indigenous ethnic groups in the area are the Gbagyi, Koro, Yeskwa, Gwandara and Gade. There are many settlers like Mada, Eggon, Hausa, Fulani, Ibo, Tiv, Yoruba, and other

Nigerian ethnic groups who migrated to Karu to take advantage of its economic potentials.

1.7 Evolution of Karu

The creation of the new Federal Capital in 1975 brought the amalgamation of parts of the former Kwara, Plateau and Niger State to form the New Federal Capital Territory (FCT). Some parts of the present Karu Local Government namely old Karu, old Nyanya and several small villages fell under the jurisdiction of the new Federal Capital Territory. The people of these settlements were given the option to either remain in the new Federal Capital Territory or be relocated outside the Territory. The people opted to stay in the former Plateau State, now Nassarawa state. They were resettled to the new Karu, New Nyanya and many other small settlements.

The two settlements of New Karu and New Nyanya have been planned from the onset and have well laid out streets and organized open spaces. Other parts of the urban Area, like Mararaba and Masaka developed form small village settlements.

1.7.1 Land Use in Karu

1.7.2 Service Industries

The economy of Karu is dominated by the informal sector. The sector consists of activities designed to service the residential population of Karu and provide certain goods and services for the use of Federal Capital Territory.

These service industries play an important role in the economy of Karu. These services have grown in response to the population growth and the fact that Karu has emerged as a dormitory town for works in Abuja, Federal Capital Territory. They include 8 petrol stations, 42 officially registered restaurants, and several services in the building industry such as metal fabrication, carpentry, brick making, tailoring, hotels, and bakeries.

In line with this, a recent study established six main clusters in trade and commerce (31%), artisans (29%), construction (11%), manufacturing and fabrication (16%), Hotel and restaurants (9%) and other (4%) (CASSOD, 2001).

However, most of the "small -scale formal establishments" in Karu, could really be categorized as an "intermediate sector" rather than a formal sector. The establishments ranged from hospitals and pharmacy shops accounting for 35% to Hotels with 5%, private Schools, Poultry Farming, Automobile Engineering, Law Firm and Banking. Moreover, the general services account for 42.4% of the activities. Maraba has the largest concentration with twenty- five out of the 44 activities surveyed. It has 4 out of the 5 hotels, 3 out of the 5 pharmacies and 7 of the 12 general services. It also accommodates two out of the three banks in Karu. The remaining fifteen establishments were distributed almost evenly between the other five settlements (CASSOD, 2001).

1.7.3 Agriculture

Agriculture used to be the predominant occupation of the people of Karu Local Government Area that has rich fertile soil. Yam, rice, beans and groundnuts are produced mostly on small scale or subsistence levels. Recently with the growing level of urbanization, the status of farming, as a major source of employment has declined with commercial and service activities gaining more prominence. Most farmlands near the large settlements have been taken over by new urban development.

1.8 Occupational Types and Household Income

The household income ranges between N501 and N10,000 and above per month. Over 79% earned above N10,000 per month. Households with large family size tend to have higher income. For example, 41,4% of Households with over N10,000 per month falls into the household size of 6-10. This is because most household members in the working age-cohort engage in one economic activity or the other (CASSOD 2001).

A substantial number of people in Karu are engaged in construction, lumbering transport and small-scale informal businesses -such as commerce, fabrication of building materials, furniture works etc.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 The Concept of New Town

The population and physical sizes of urban areas in development countries have been growing since the industrial revolution. Urban growth by natural increase and migration of rural population seeking industrial jobs has been associated with costly municipal services, physical and mental illness, unemployment, cultural conflict and social segregation.

The concomitant physical expansion has been manifested both inside and outside the cities of such countries. Within these cities housing is insufficient, density and congestion have increased and environments have deteriorated. As these conditions worsened, people moved from the cities and create sprawling suburban. It becomes necessary therefore to embark on policy of re-organization of congested urban areas, the establishment of a policy of decentralization and decongestion of industries, and the search for a balance between different regions with respect to the size and variety of industrial activities.

Specifically, there is the need to institute increase in industrial employment, reduction in total population of metropolitan areas and resettling part of the existing population outside the limit of the metropolises. Therefore the need for the development of new towns the world over, with the aim of arresting the pattern of unplanned agglomeration that has been gaining momentum for decades, and which is considered as a national urban growth policy that will implore the quality of urban community life cannot thus be over-emphasized. "During 1960`s and 70`s the significance of new towns and the need for urban growth policies have become internationally recognized. Moreover, the rapid growth of new towns has spawned the concept of new cities" (Golany 1978). The act of development of new town therefore is an inspired individual attempt of creating a new planned settlement using acceptable standard to improve the living and working condition of its inhabitants from the

earlier unplanned agglomeration and congestion in the older cities or impoverished rural life.

The idea of conceiving a new form of city which utilize the facilities of modern technology without sacrificing the social advantages of the historic city was pioneered by Ebenezer Howard in 1898. Four fundamental principles governed Howard's concept of the new town these are:-

a) Limitation of numbers and area
b) Growth by colonization
c) Variety and sufficiency of economic opportunities and
d) Social advantages and control of the land in the Public interest.

Out of these a new kind of city would emerge in a balanced, many sided interrelated organic unit.

Howard's first great contribution to the new towns movement was his conception that, the part of a city where inorganic relation to each other and that there was a functional limit to the growth of any one element as to the growth of the whole urban system. He took London as a classical example of disorganized over -growth city, and then sought to relieve the pressure of congestion by colonizing its excess population in new centre's, first the Letch worth and later the Selwyn garden cities by applying his principles of limitation of area and population.

Howard didn't suppose that a single garden city, or even a scattering of such cities would be able to handle this problem of city, over growth and disorganization. He called rather for the creation of a regional unit that would bring into a single organized system, at least ten cities with a total population of three hundred thousand, bound together by a rapid public transportation system that would unify the cities and make them as a single unit. He outlines a new type of municipality called later the regional city: a city whose articulated spatial organization, whose direct union of urban and regional facilities, whose social and economic balance, would be the rational equivalent of the sprawl and cluster and heedless confusion of the existing metropolitan areas and conurbation.

Bailey (1973) also stated that "Each new town can and should have its unique personality, but there are attributes common to all of them within the physical system, that is the new community''. He further stated that "no matter where these communities are situated, and no matter what their size, they inevitably are connected to the larger external system whether this is the industrial economic system, or the physical transportation skeleton at the national scale. Thus down grading the idea of self-sufficient new town".

Osborn and Whittick (1969) on their part concretized this argument with the observation that " In practice the public developer do not have power to influence regional growth trend, because forces that have little concern for city life foster most of its growth.

2.2 Type of New Towns

According to Merlin (1971) New town could be differentiated based on the choice of sites for their location in relation to their surrounding areas. Accordingly, he classified them into three. These are:

1. **New towns built near but separate from large cities**:- These are those established within an urban area but not in continuity with the existing built - up area. The purpose of which is usually to provide against the concentration of men and jobs in a single built up area of unwieldy size and whose increased development would be at the expense of other towns in the country.

2. **New towns continuous with built -up areas**. These areas are those established as continuations of existing build -up areas. This is born out of the desire to develop areas between the original build up area and the new towns. They constitute new sector planned as extensions of a city or as its satellite.

3. **Independent new towns**: - These are new towns established outside urban areas. They result from an official development policy, aiming at ensuring the

economic and or political balance in development of all regions within a country. New capital cities like Abuja fall within this category.

It was against this background that Merlin (1971) further observed that the development of new capital cities in general are done either to accelerate the economic growth of the region where they are cited or to side step political rivalry between several large cities or regions of the country.

Typical examples of other new capital cities built away from large urban centers around the world are Canberra in Australia and Brasilia in Brazil.

The inhabitants of one population centre will interact with those of another centre base on their respective population and the distance between them. The Central Place by Walter Chris taller explained that central place renders services to the surrounding settlements. Its emphasis also is on size and spacing of settlement within a region. It explains that there is a minimum distance that people are willing to travel to secure access to service at a point. Different services and settlement have different market ranges. This determines partial setting within a region and explains the relationship between settlements and their hinterland.

In the growth pole and growth centre theory introduced by Francois Perroux, he states that growth does not appear everywhere at the same time but is manifested at the areas where growth poles are more intensive, and that it also responds through diverse corridors with variable terminal effect for the whole economy" Thus growth poles are conceived at existing in relation to space as a field of centers (poles or focii) from which centrifugal forces are attracted. Each centre being a centre of attraction and repulsion has its proper field which is set in the field of all other centers" (Darwent 1975)

These poles are likely to be firm or industries or group of firms or industries, or new towns of cities, which are all centre's of attraction. It is within these poles that growth and change is initiated, while the connections between the poles, in terms of the flows of inputs and out puts, transmit the forces generated.

Growth in the pole (town or city) is directly related to the activity of the poles themselves, and also to the degree of inter-connection between them. "A condition of dominance of many towns by one city is an important feature of the growth pole notion" (Darwent 1975).

Dominance is said to occur when the flow of goods and services from town 'S' to town 'A' is a greater proportion of S'S out put than is the flow A to S of A'S out put. In this case town A is said to be "dominant" and towns "dependent" A typical example of such a relationship is the primacy of Paris over the other cities in the whole of France, or at the local level, Kano over its surrounding towns e.g. Gwarzo, Rano Danbatta, Gaya,and even beyond. In which Kano is serving as the dominant city in the region while the rest as dependents.

A further feather of the notion is the emphasis placed on the size of the pole (city). The rate of growth or change is supposedly directly related to the size of the city, since the bigger it is the large will be its field of dominance over other towns which sell to it or buy from it.

A firm or industry characterized by a high interaction with many other firms, a high degree of dominance and great size, it said to be "propulsive" and the firms or industries dominates other town surrounding it.

Scitovsky (1954) formulated the concept of external economic where he distinguishes between 'technological external economies' and ' pecuniary external economies' "The first arises when the out put of a firm depends not only on its own factor utilization of other firms for instance, a firm benefiting form a lab our pool generated by others. While the second which is pecuniary external economies arise in economic development of other firms" (Darwent 1975).

In a similar manner it could be argued that the output or efficiency of city 'A' as a growth pole, which depends on lab our force generated by growth centers 'S' and 'K' will be affected by actions emanating from the growth centers. Conversely, a new policy on employment or transportation in city 'A' will affect the efficiencies of growth centers 'S' and 'K'. This analogy could be applied to the working relationship

between Abuja and its neighboring towns, in which the former as the growth pole derive its lab our force from the later especially Karu town.

From the foregoing it thus follows that the impact of town A on others could occur in a wide variety of physical and socio-economic conditions, and the constraints of dominance, high inter connectivity and large scale merely ensure that the effects will be felt be powerfully by other towns in the region.

In an attempt to identify the limit of influence of a polarized region, Darwent 1975 stated that polarizes region are defined to be that collection of geographic spaces in which connection and flows of for instance, goods, services and political allegiance are predominantly in one direction towards a central point or pole which dominates the region. The boundary of a polarized region is therefore that line which flows and connections are predominantly in some other direction, towards some other pole"

In another attempt, Gokhan et al (1972) tried to distinguish growth poles from growth centers, where they contended that growth poles (or better referred to as growth nodes or areas) are of national significance, in as much as their development affects not only the structure of regions in which they are located, but also inter-regional correlations and the country as a whole. It should be noted that growth centers are basically intra-regional in character.

Thus the differences in function in the above assertion are closely associated to differences in scale. The attainment of development targets, as Gokhan et al; further explain, is decisively conditioned by growth poles (areas) in which, large capital investments are made, where as growth centers have an accessory significances, in that they promote local (sometimes secondary) goals. Even so, the successful development of growth centers is closely connected as a rule with that of corresponding growth poles (areas).

The economic aspects of this problem were examined by Klaassen (1971) who emphasized the close relationship between the problem of economic development and urbanization, and revealed the possibility of using the urbanization process as an incentive to economic growth. He also agreed that big cities have an undoubted

advantages over medium sized cities as growth poles, and still more over small towns, and that these circumstances when growth pole spring up for one reason or another on a new site (e.g Abuja), they should be regarded as potential large cities from the on set. The choice of growth poles and centre's depends to an appreciable extent on the development aims assigned.

Finally one cannot help but to agree with the views expressed by Gokhan et al (1972) that "The creation of growth pole (or centre) in the backward region may also have different consequences. In certain circumstances it may serve as an incentive to the economic development of the region as a whole or a significant part of it" - Just as is the case with Abuja and its regions "... Again it may cause part of the population to shift from outlying area into the zone of the growth pole and thus adversely affect conditions in the main part of the regional territory (momentarily or for a longer period.)"

2.3 New Capital Cities and their Neighbouring Towns

According to Bena (1974) "A capital city is a dominant focus of cultural transmission and dissemination as well as a hot bed for political fermentation". It thus follows that capital cities have to attract heavy population from all nooks and corners of their countries and even abroad.

Just as there are centripetal pull to capital cities there are also centrifugal propulsion from the capital cities to their neighboring towns. This is the case with the new capital cities around the world, such as, Washington, Canberra, Brasília and Abuja.

2.3.1 Abuja

Abuja is one of the newest capital cities of the world created by the Federal Capital Territory Act no.6 of 1976, Abuja is the new Federal Capital of Nigeria. Located in the geographical center of the nation, the city occupies an area of about 250 square kilometers, and has an ultimate population of 3.1 million inhabitants when fully developed.

It has been acknowledged in the Abuja master plan, that the demand for goods and services will by far exceed the capability of the Federal Capital Territory to supply them. It further observed that ''... Even though the Federal Capital Territory is very large making it seemingly possible to control the direction of growth easily, the fact is that condition already exist in both Federal Capital Territory and the immediately adjoining states which will eventually induce development to occur in ways not likely to be specified in the plan (IPA 1979).

The principle of zoning of land uses into low, medium and high density residential was used to represent high medium and low income socio-economic groups respectively, with the reduction of the density from the core to the periphery of the city. While the underlying principle was designed to cut across the socio- economic stratification, the cost of housing acquisition become so expensive that the medium and the low group where marginalized to the surrounding satellite towns from where they commute to work daily. Thus all density developments in Abuja became an exclusive reserve to the high income group. While the underlying principle was designed to cut across the socio-economic stratification , the cost of housing acquisition become so expensive that the medium and the low income group were marginalized to the surrounding satellite towns from where they commute to work daily. Thus all developments in Abuja become an exclusive reserve of the high income group. While the peculiar Geographic and Economic factors took control of the relationship between Abuja and its neighbouring towns.

Among the neighbouring towns of Abuja right from its inception, Karu experiences the highest influx of Abuja immigrants. This is due to its close proximity and high accessibility to the new Federal Capital City. Consequently, a large number of workers in the public and private sectors of Abuja reside in Karu and commute daily for work in the Federal Capital City.

According to Maxlock (1987) Karu today as local government headquarter is an important administrative, commercial and transportation centre in Nasarawa state and the entire central region around the new federal capital city of Abuja. The town is presently playing the role of an informal satellite town to the federal capital".

It was against the above background that one of the objectives of the preparation of Karu urban area master plan was "to plan for a complementary intra-city link between them and in increase the demand for goods and service within Karu urban area (Maxlock 1987).

2.4 Impaction Theory of the New Capital City on its immediate Neighbouring Town

As observed from studies made of the new capital cities of Canberra, Brasilia, Washington and Abuja majority have peculiar factors responsible for their impacts on their neighboring towns. The key factors responsible for this phenomenon are; Geographic, essentially those of proximities of these neighboring towns to the new capital cities and the degree to which they are accessible to each and Economic which has to do with the marginalization of the lower socio-economic group to the cities neighboring towns.

Going by the growth pole theory by François per roux, who defined the pole in relation to abstract economic space as a field of forces and as homogenous aggregate. The manifestation of this assertion could be well demonstrated on the impact which Abuja the new capital city of Nigeria has on Karu its immediate neighbouring town.

Perhaps other countries might have taken measures to mitigate the effects of the impact of their new capital cities on their neighboring towns, there by concealing the actual consequences, in the case of that of Abuja and Karu there was the visual absence of any measure against such an effect. This gives the possibility of an uninterrupted observation of the progressive impact of the Capital city of the immediate neighboring town of Karu with the progressive development of the capital city right from inception.

This study established that there is a direct relationship between the impact of Abuja on Karu consequent from Karu's unplanned absorption of the migrants centrifugally repulsed from the new capital city.

2.5 The Impact Theory

For a new capital city built on a virgin land and removed from any existing urban area, its impact on its immediate neighboring town progress in stages. These stages could be divided into three depending on the progress in the development of the capital city.

Stage One

The first stage is the construction stage. To develop a new capital city which has a great significance, a large labour force is required. Usually, plans to accommodate this initial labor force are inadequate, if not totally neglected. In such a case, the nearest town to the yet to be established capital city is looked upon to provide for at least shelter to the labor force.

This was what necessitated the citing of Federal Capital Development Authority temporary settlement at Nyanya and Karu as the nearest town to Abuja, at the initial stage of its construction. Concentration of labour force within Karu town thus begun at an alarming rate. A permanent inter-communication between the yet to be established new city and its immediate neighboring town had thus been ushered.

This experience is similar to that of Brasilia where the temporary settlements are established for the construction workers, with Cidade Livre as a typical example, where the informal pattern of development together with its inadequate facilities achieved performance, and large number of immigrants attracted to the town even before Brasilia was inaugurated.

Stage Two

This is the stage of the combination of construction and separation. It commences when the new city started to offer its services for which development is made for. There is thus the need to accommodate its construction workers and intended new community.

This is the most critical stage because midway into its construction, the new city is yet to be able to be fully operational, and facilities and infrastructures are yet to be fully provided, or are disjointed. Housing provision for the pioneer settlers are also inadequate. This situation calls for another alternative pending the time enough facilities could be provided. Again the immediate neighboring town is called to task.

In the case of the impact of Abuja on Karu, this stage was reached around 1986, the period of the initial movement of some federal ministries from Lagos to Abuja, while the construction of Abuja was still going on. The unaccommodated population of Abuja due to housing and other related problems was mostly gravitated to Karu. At this stage, the criterion for construction as an alternative in addition to proximity and accessibility to the city is economic convenience. Thus while Karu the neighboring town was still battling with the influx of construction workers, another new population which are the supposed inhabitants of the new city were added to it.

Stage Three

This is the operational stage. It is arrived at when the new city starts to fully perform its function at the presumed completion of the project (this does not mean that the development of the city is completed, because there is no terminal state for building of a town).

However, accommodation and other supportive facilities are usually inadequate due to rapid population influx to the capital city, which is usually much more than the planned estimated population. The original target population is thus reached at a stage shorter than expected. The spill over population once more seeks to be absorbed within the neighboring settlement. The neighboring town which performs the earlier function of accommodating the suppose inhabitants of the city immediately becomes recognized as the best option.

The movement of the seat of the federal government from Lagos to Abuja in 1991 evidenced by the movement of the office of the president of the federal republic marked the beginning of this stage, though there are some Ministries and Federal parastatals still left in Lagos. Meanwhile the neighboring town Karu recognized for

performing the function of absorbing the unaccommodated population of Abuja rages on.

As a result of the continuous recognition of the closest neighboring town as the receiving end throughout the period of development of the capital city, the neighboring town attracts larger population and as such grows along with the growth of the capital city. The intercommunication between the two centers which was initially considered temporary at the initial stage thus becomes permanently rooted at the terminal stage.

Thus while for the capital city the most important terminal effect of the centrifugal repulsion from it, is that of substantially reducing the occurrence of slums and the emergence of sub-standard structures, which would result from uncontrolled immigration, for the immediate neighboring town is that of their occurrence, due to the rapid population increase.

2.6 General Impact of Rapid Population Growth on Cities

The increasing rate of rural-urban and inter urban migration increase the need for more dwellings in urban areas. Dwellings occupy the major parts of the urban area, and they are found everywhere. The World Bank in 1974 estimated that, at the end of this century, 200 million new dwellings would be needed in the urban centre of the developing countries simply to house the additional urban population.

Meanwhile, according to the United Nation's monitoring report of 1981, the world population which had always been largely rural will become pre-dominantly urban. By the year 2000, some 51% of the world population increase on urban areas whether through natural increase or immigration, has both positive and adverse impacts.

2.6.1 Positive Impacts

1. **Economic Development**: This is directly tied to agglomeration to urban population growth increase market size and therefore opportunities for specialization. Increase in technological development consequent from greater

need for goods and services increases industrial activities in the urban areas. This in turn provides greater employment opportunities for the people, hence more per capital income than would have been before the growth of the population. Moreover larger urban areas provide more conducive atmosphere for investment in economic activities.

2. **Increase in the Provision of Services**: The provision of social services especially in the developing countries is concentrated in the larger urban areas than in the smaller ones. Investments in the provision of infrastructural facilities such as electricity, pipe borne water, telecommunications, higher education and recreational facilities increase with the growth of urban population.

2.6.2 Adverse Impacts

By far it could be argued that rapid population growth on urban areas has more adverse than positive impact. Thus although economic development and provision of social services could increase the life span of the available infrastructural facilities are greatly reduced as a result of increase in persons per service some of these adverse impact includes:

1. **Increase in the demand for water supply**:
   Towns require concentration of considerable quantity of water in small areas, and the demand is constantly increasing due to growing demand consequent from rapid increase in the urban population. This could result in insufficiency or poor treatment of the water.

2. **Failure of waste disposal system**: More urban population leads to more absorption, hence more waste disposal. Getting rid of waste whether it be sewage, organic matter or any kind of debris in the larger urban centre is proving to be a difficult task. Thus heap waste are common sights in most of the developing countries large than urban areas. This in turn leads to the blockage of drainage channels which could result in flooding and creation of filthy environments.

3. **Environmental pollution**: Air pollution due to the discharge of exhaust fumes either vehicular or industrial are more with the larger urban areas than the smaller ones. This could result in the reduction of visibility and bronchial diseases.

4. **Decline in Agricultural Activities**: One of the major consequences of rural-urban migration is the decline in agricultural activities. As people move from villages to the larger urban areas and as the smaller urban areas increase in size, there is a shift from primary activities like farming and hunting to secondary activities like industrialization and commercialization. This leads to increase in prices of agricultural products.

5. **Social Problems**: The alarming rate of juvenile delinquency in cities due to rapid population growth produce grave implications especially as regards to crime and prostitution, divorce, murder, arson, suicide and armed robbery.

Other adverse consequences of rapid population growth include, over crowdedness, traffic congestions, uncontrolled developments and inaccessibility. The increase in land use intensity as a result of rapid population increase requires more investment and up to date the existing public utilities and services, like electricity, telecommunication, urban roads and other social facilities to ensure the smooth running of the urban system.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Data Collection

Achieving the stated objectives of this study depends on the level of success attained by the researcher in designing effective design methodology and the statistical data sources which will be used to collect the required information for the study. This chapter is therefore focused on the methods and procedures adopted for the collection of data to ensure that the goal and objectives of the study is achieved. The chapter discusses the type and sources of data, population size, sample size, sample technique and statistical tools used in the analysis of data.

3.2 Type and Sources of Data

The data utilized in this research work include primary and secondary data that were collected from various sources, thereby ensuring the effective utilization of existing and generated information.

3.2.1 Secondary Data Sources

They are existing or second hand information which the researcher did not initiate but collected from existing records. Since the focus of this research is on the Impact of Abuja on the Environmental Condition of Karu Settlement of Nassarawa State, the need for documented and existing materials on the subject matter cannot be undermined. As a result, existing documents or records were extensively obtained.
The Secondary sources of data utilized include:

a. Reports on Various aspects of the development of Abuja and Karu
b. Reports on government institutions and their activities
c. Maps and plans from public institutions
d. Unpublished research thesis on Seminar subject matters

3.2.2 Primary Data and Sources

This is unpublished first hand data generated by research through

a) Extensive reconnaissance survey covering the Karu urban Area.
b) Administration of questionnaires in Karu.
c) Interview in both Karu and Abuja.
d) Direct personal observation and photo recording
e) Researcher's personal knowledge and experience on the subject.
f) A sample survey of households at Karu urban Area to support the field investigation on urban services (called ground truthing).

3.2.3 Instruments for Data Collection

To achieve the objectives of the study, the instruments designed to collect information fall under three (3) categories of surveys. These are

a) Reconnaissance and Land use Surveys.
b) Household and Socio-Economic Surveys.
c) Personal Field Survey via direct personal observation.

The first set of questionnaires was directed at resident within Karu settlement. The questions seek to provide insight into the prevailing environmental conditions. The Personal Field Survey also gave insight into direct personal observation which was achieved by identifying the existing condition of facilities in the study area and the level of physical development in line with development control regulations.

However, before producing the final format of questionnaire guide administered particularly under the Household and Socio-Economic Surveys. A pilot survey was carried out to arrive at pertinent questions. This was done through initial contact with prospective respondents to ascertain households' view of satisfaction and resentments about the environmental condition and quality in the study area

3.3 Reconnaissance and Land Use Surveys

The study started with reconnaissance survey to establish the boundary of the study area, the level of infrastructural development of the study area and the land use components After the reconnaissance survey, base maps covering the study area were collected and updated, so as to incorporate the land use changes that had taken place over time and at the time of field survey.

3.3.1 Household and Socio-Economic Surveys

Using the personal interview method for questionnaire administration, information about population, household size, age, sex, tribe, religion, occupational status, income level etc. was collected from sampled households. The head of household was requested to be respondents for respective households. Focus Group Discussions (Informal discussions) were also held with the residents and their representatives.

3.3.2 Personal Field Survey

Using direct personal observation, information was collected on site regarding the availability and quality or otherwise of such infrastructure, facilities, utilities and services as housing condition, potable water supply, roads, accessibility to individual houses, drainage system and solid waste disposal and management etc.

3.4 Population of the study Area

Undoubtedly, population is the basis of any research work without which the reliability of such research will not be guaranteed. Therefore, to ensure that accuracy and desired ends is achieved in this study, the population of Karu settlement was projected to 2008 using the annual growth rate of 2.8%.

With a land area of about 72,500 hectares, the population of the settlements vary, considering the land area and the density of the communities. Using the exponential model formula ($P_n = P_o (1+r/100)^n$, the population was projected to the year 2008 to be 216,351.

Here,

P_n = Projected Population of the study Area.

P_o = Population of the base Year.

r = Population growth rate 2.8% (0.028)

n = Number of years which the population was projected (2006-2008) = 2years.

With the 1991 population figure of 216,230 and the formula above the, 2008 projected population of Karu settlement is 216,351 people.

Generally, the adequacy of various sample sizes has been tested by the United State Public Administration Service, (1957) and Wells, (1975). Results of these tests were compiled to guide in determining the size of sample needed for the research work. (See tables below).

Table 3.1 Guides to Sample Size Determination

Population of Area in (000)	**Recommended Size of Sample**
Under 50, 000	1 in 5 dwelling units
50,000-150,000	1 in 10 " "
150,000-300,000	1 in 15 " "
300,000-500,000	1 in 20 " "
Over 1,000,000	1 in 25 " "

Source: Population Administration Service, (U.S), 1957.

Table 3.2 Recommended Household Samples for given Population

Population of Area in (000)	Recommended Sample Max. % Household	Recommended Sample Min. % Household
Under 50, 000	20	10
50,000-150,000	12	5
150,000-300,000	10	3
300,000-500,000	7	2
500,000-1,000,000	5	1.5
Over 1,000,000	4	1

Source: Well, (1957).

Stemming from the standards above, a 20% sample size was chosen. Thus a 20% percent Systematic-random sample survey was conducted from the 623 and 216 households in Maraba and Ado respectively. By this, 623 and 216 questionnaires will be administered to systematic randomly selected household heads in Maraba and Ado settlements respectively both of Karu local government area.

3.5 Sample Size

In determining the sample size for this work, several factors were considered. Some of these factors are the nature of the variables, population of the study Area and the expected level of precision. To this end 2 out of 5 settlements were chosen and questionnaires administered.

3.6 Sampling Techniques

Considering the size and nature of Karu, settlement as the fastest growing neighbouring settlement to Abuja or Federal Capital Territory, the designed questionnaire was not administered to all the population in the area. However, viable means was utilized to ensure comprehensiveness in the distribution of questionnaires. To achieve this, the questionnaire was randomly distributed to randomly picked households using systematic sampling method.

3.7 Questionnaire Collation.

In the course of this work, 623 questionnaires were distributed to the selected household heads in the settlement. The distribution was carried out using the sampling technique discussed above with the simple random sampling techniques.

3.8 Sampling Procedure

The population of interest with regard to the Mararaba settlement were the household heads who were sampled by means of systematic- random sampling method using the interval of five (5). In the same light, the population of interest with regard to the Ado settlement were the household heads who were sampled by means of systematic-random sampling method using the interval of five (5).

3.9 Method of Data Analysis

The data obtained were analyzed using Chi-Square statistical method. Also employed is the use of simple descriptive and inferential statistical methods. These statistical methods summarize collections of data in a simple and comprehensible manner. The Numerical and graphical methods was used for the data analysis in this study. Descriptive statistics employed includes frequency tables, percentages and pie charts. Also illustrative maps, imagery, charts and plates are to be used for pictorial analysis.

The result and level of acceptance of the research work depends on the statistical tool employed in the research. In the former, analysis and presentation of collected data were carried out using tables and figures.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

In order to achieve key research objectives, this chapter makes analysis of the results of data collected from field surveys on the assessment of the following:

4.2 Marital Status

The analysis shows that in Mararaba, 62.30% are married, 26.40% single, 6.10% widowed and 5.20% divorced while in Ado 63.10% are married, 29.50% single, 4.20% widowed and 3.20% divorced.

Table 4.1 Marital Status

Status	Maraba		Ado	
	No	**%**	**No**	**%**
Single	165	26.40	64	29.50
Married	388	62.30	136	63.10
Divorced	32	5.20	7	3.20
Widowed	38	6.10	9	4.20
Total	**623**	**100**	**216**	**100**

4.3 Age

The survey reveals that 11.30% of the Mararaba and Ado population fall into the category of age group 15-25, 30.24% belongs to age group 26-36, 42.40% for 37-46 while 19.06% of the population are 47 years and above. It can be implied that a larger percentage of the population fall under the age group 37-46 with 42.40 as percentage. This group can thus be regarded as the working class.

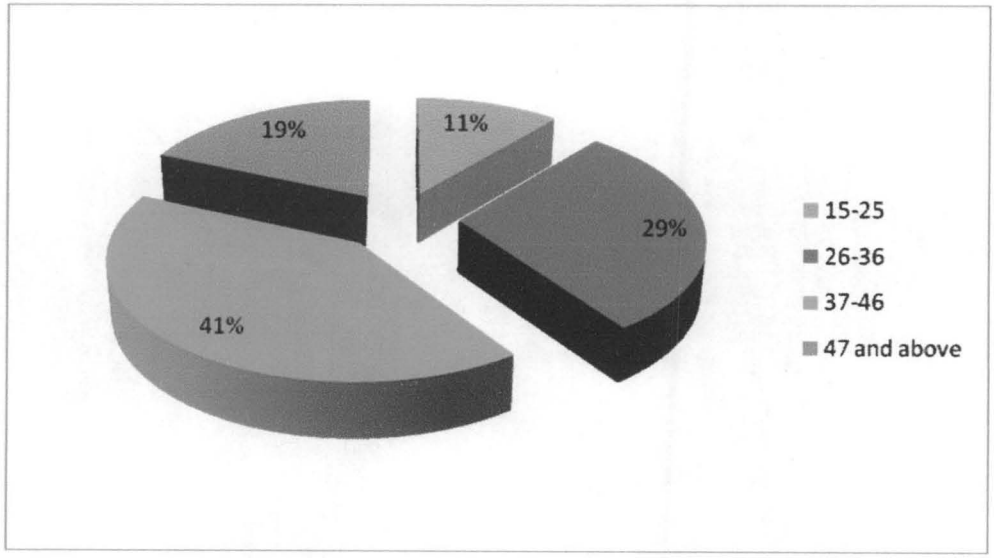

Fig. 4.1 Age Distribution in Mararaba

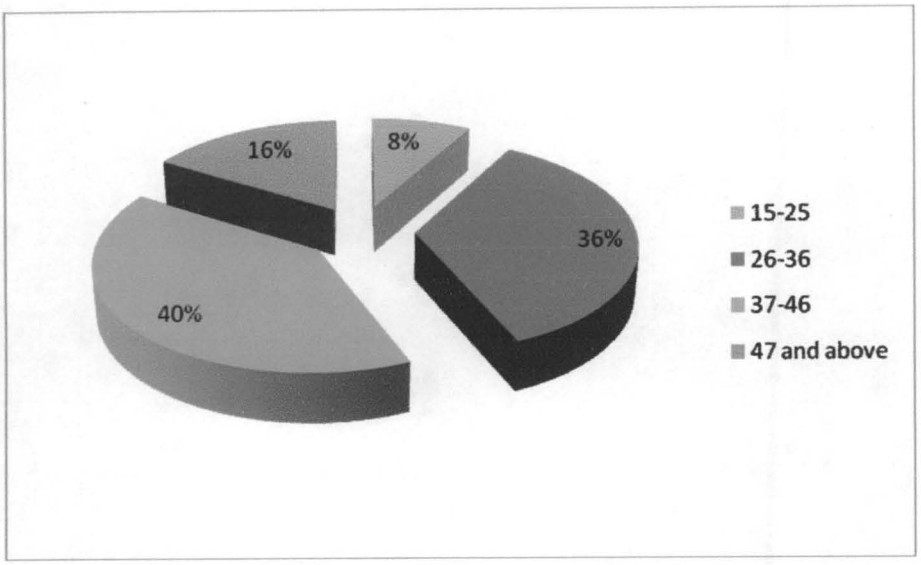

Fig. 4.2 Age distribution in Ado

4.4 Year of Migration/Coming to Abuja

The survey carried out reveals that 12.24% and 14.30% of the Mararaba and Ado population respectively migrated before 1987, 40.53% and 41.44% migrated between 1986-1996, 47.23% and 44.26% of the Maraba and Ado population migrated between 1997-2008. The implication of this is that a larger percentage of the population came to Abuja between 1997-2008 and has resided in these places over the said time period. By this, it meant that people have worked in the FCC and lived in these settlements over a long period of time.

Table 4.2 Year of Migration/Coming to Abuja

Year	Maraba		Ado	
	No	**%**	**No**	**%**
B/f 1979- 87	76	12.24	31	14.30
1986-96	253	40.53	89	41.44
1997-2008	294	47.23	96	44.26
Total	**623**	**100**	**216**	**100**

4.5 House Types

The field survey reveals that 10.25% and 12.08% of the Mararaba and Ado households respectively occupy only a bedroom, 24.25% and 26.22% occupy 2 bedrooms, 14.30% and 12.02% occupy 3 bedrooms, 7.02% and 4.32% occupy 4 bedrooms respectively while 44.18% and 45.36% of the Mararaba and Ado population occupy tenement houses.

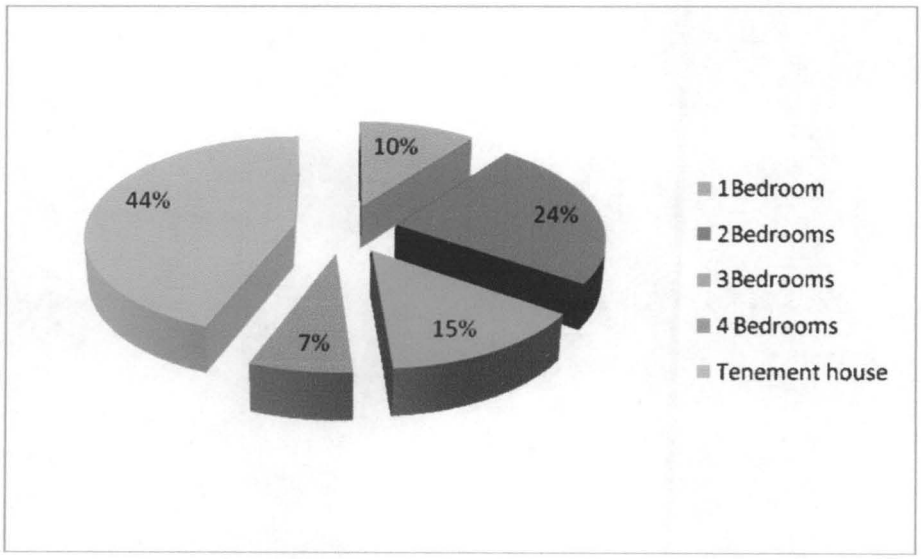

Fig 4.3 House types in Mararaba

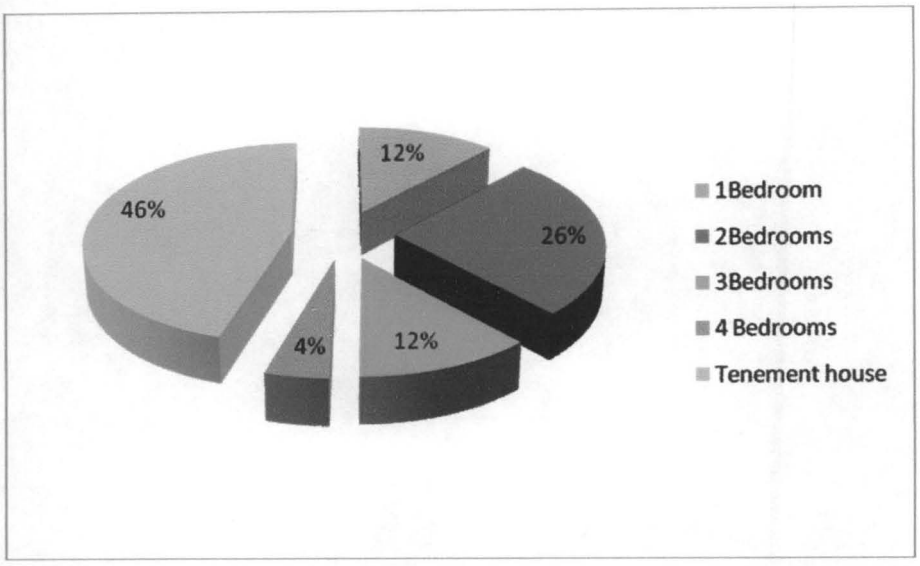

Fig 4.4 House types in Ado

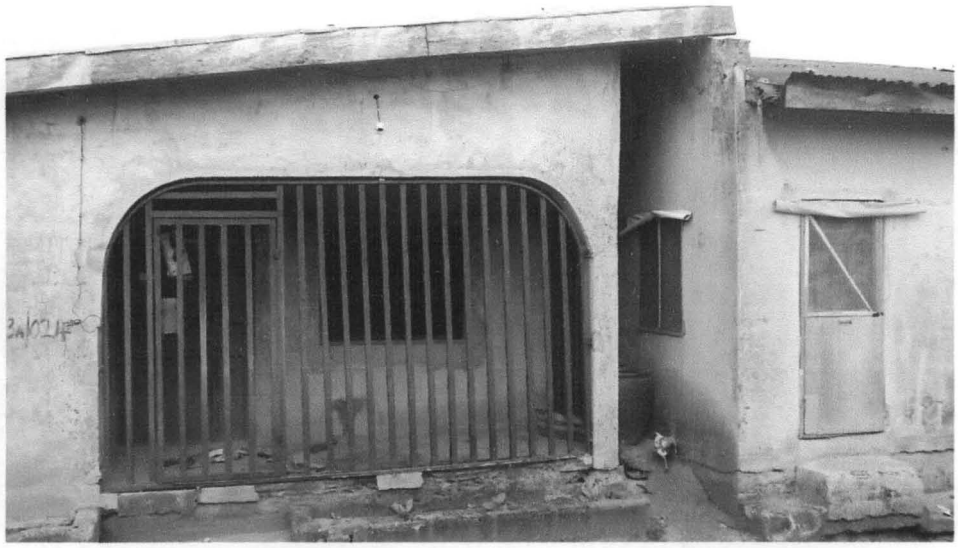

Plate II: One bedroom house type

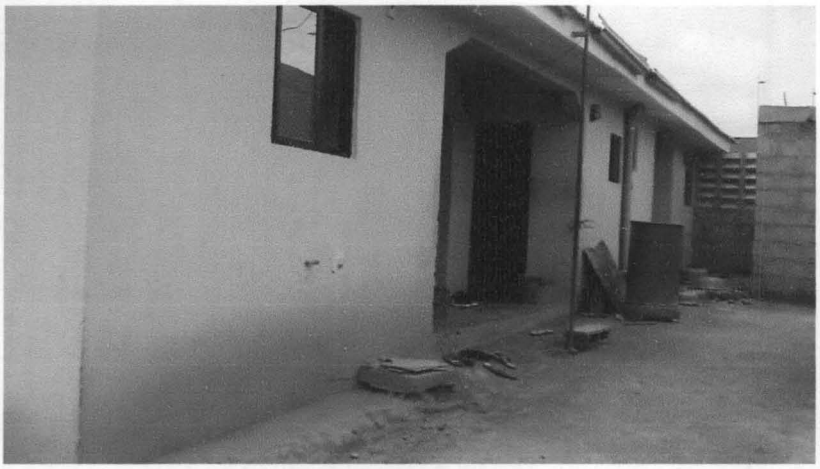

Plate III: Two bedroom house type

Plate IV: Tenement house type

4.6 Average Income per Year

The survey revealed that 14.15% of the Mararaba population earn an average income of N100,000-N150000 per annum, 22.50% earn between N160,000- N200,000, 41.21% earn between N260,000-N300,000, while 22.14% earn above N300,000. Similarly, 15.32% of the Ado population earn between N100,000-N150,000, 23.20% earn between N160,000-N200,000, 43.02% earn between N260,000-N300,000 while 18.46% of the Ado population earn above N300,000 per annum.

Table 4.3 Average Income per year

Amount (N)	**Maraba**		**Ado**	
	No	**%**	**No**	**%**
100,000-150,000	88	14.15	33	15.32
160,000-200,000	140	22.50	50	23.20
260,000-300,000	257	41.21	93	43.02
Above N300,000	138	22.14	40	18.46
Total	**623**	**100**	**216**	**100**

4.7 Rent Charged Per Annum

The statistics in the table above shows that 18.35% of Mararaba households pay between N40,000-N60,000 as rent charged per annum, 44.30% pay between N70,000-N90,000, 19.13% pay between N100,000-N120,000, 11.17% pay between N130,000-N150,000, 7.05% pay above N160,000. Consequently, 17.25% of Ado households pay between N40,000-N60,000 as rent charged per annum, 47.32% pay between N70,000-N90,000, 18.07% pay between N100,000-N120,000, 10.21% pay between N130,000-N150,000, 7.15% pay above N160,000.

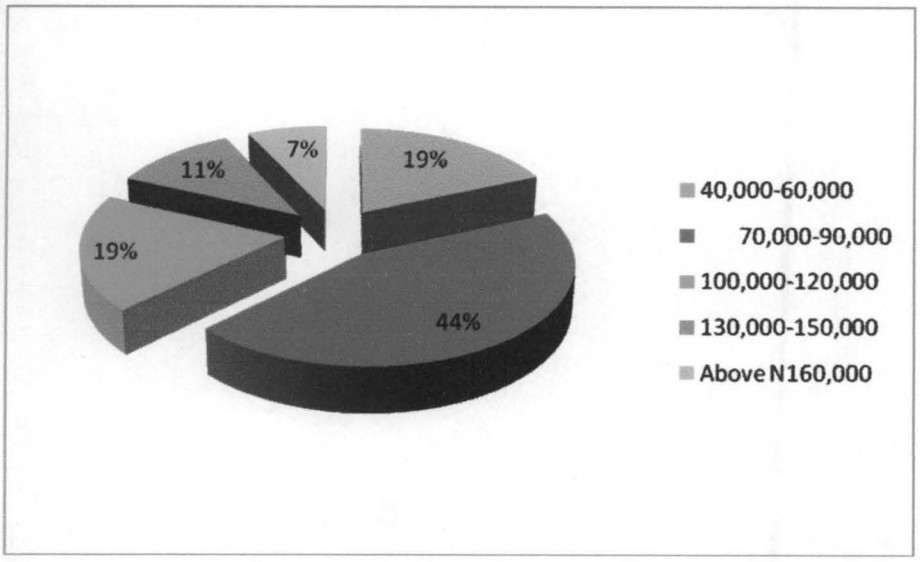

Fig 4.5 Rent charged per annum in Mararaba

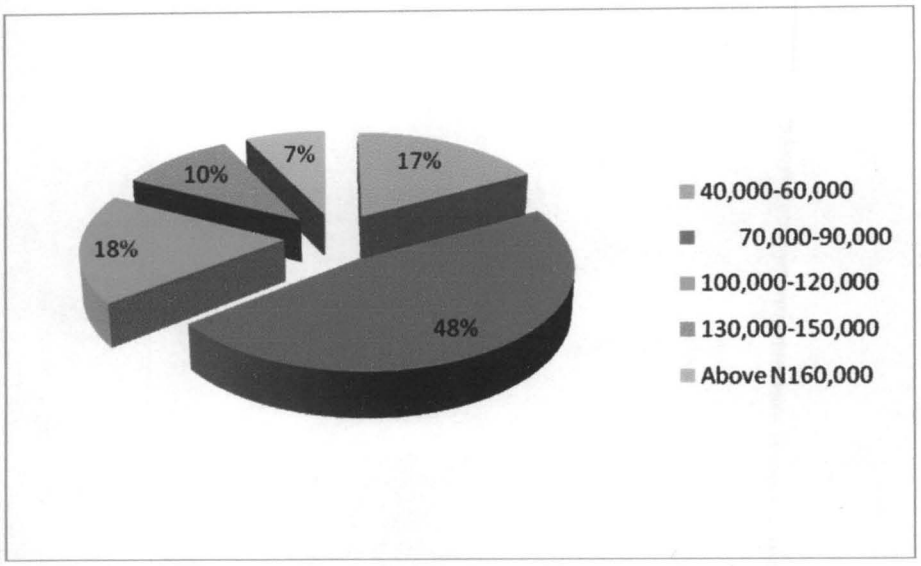

Fig 4.6 Rent charged per annum in Ado

4.8 Occupation

The field survey shows that 49.24% of the Mararaba population are civil servants, 28.30% work in the private sector, 14.06% are traders, 8.25% are contractors while 10.15% are self employed. In the same light, 51.30% of the Ado population are civil servants, 24.23% of the Ado population work in the private sector, 6.20% is traders, 4.17% are contractors while 14.10% are self employed.

Table 4.4 Occupation

Occupation	**Maraba**		**Ado**	
	No	**%**	**No**	**%**
Civil servant	307	49.24	111	51.30
Private sector	176	28.30	52	24.23
Trader	88	14.06	13	6.20
Contractor	51	8.25	9	4.17
Self employed	63	10.15	31	14.10
Total	**623**	**100**	**216**	**100**

Plate V: Traders in Karu market

4.9 Place of Work

The field survey reveals that 18.02% of the Maraba population work in Karu, 76.38% work in the capital city (Abuja), 6.60% work outside Karu and Abuja. Similarly, 16.35% of Ado population work in karu, 78.60% of the population work in Abuja city while 6.60% work outside Karu and Abuja.

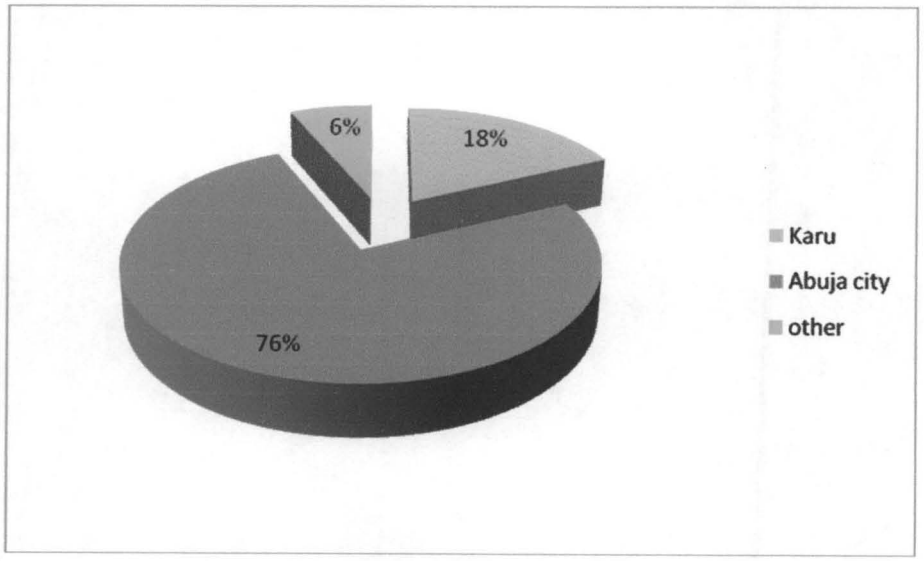

Fig 4.7 Place of work in Mararaba

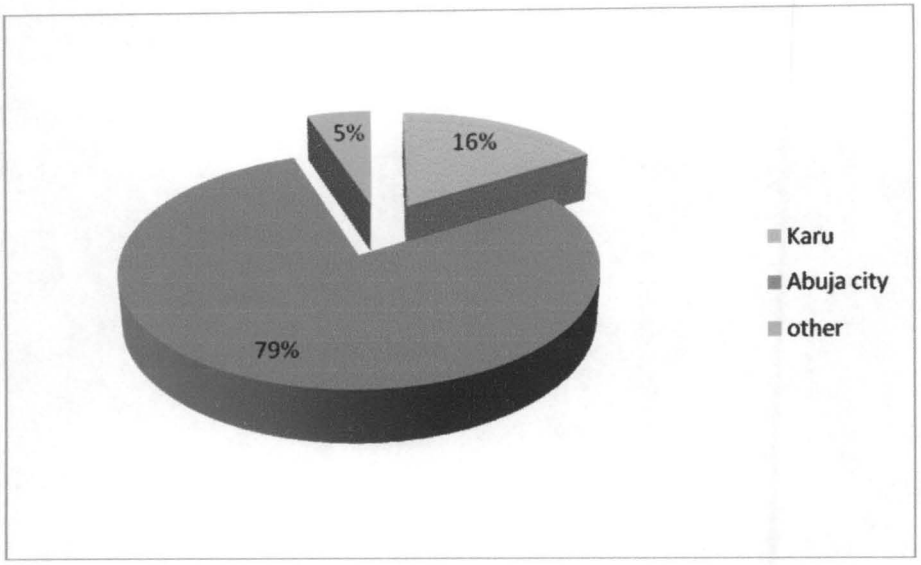

Fig 4.8 Place of work in Ado

4.10 Means of Transportation

From the field survey, 8.60% of the Maraba population move by staff bus only, 68.15% transport themselves by commercial bus, 21.20% move with their personal car while 2.05 move with other mode of transportation. In similar vein, 7.20% of the Ado population move by staff bus only, 70.30% go with commercial bus, 19.40% move in their personal cars while the remaining 3.10% go with other means.

Table 4.5 Means of Transportation

Means of	Maraba		Ado	
Transportation	**No**	**%**	**No**	**%**
Staff Bus only	54	8.60	16	7.20
Commercial Bus	424	68.15	151	70.30
Personal car	132	21.20	42	19.40
Other	13	2.05	67	3.10
Total	**623**	**100**	**216**	**100**

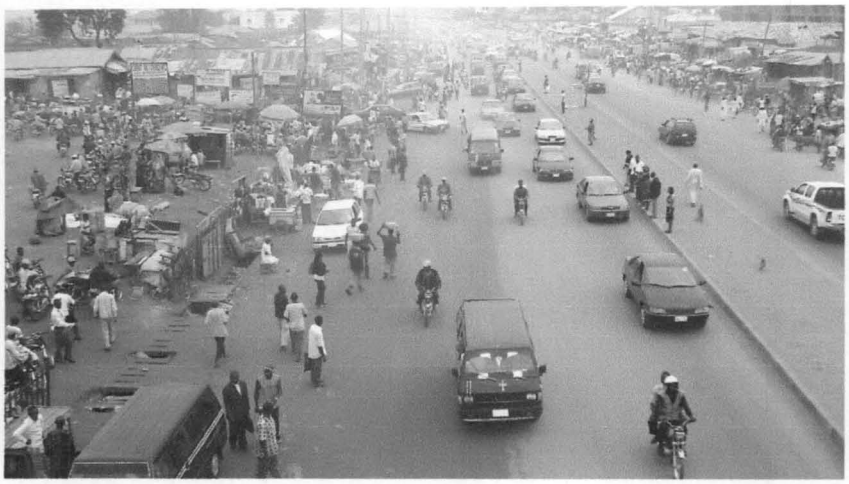

Plate VI: Commuting via Commercial bus

Plate VII: Motor Bikes (Okada) as a means of transportation

4.11 Housing Condition

From the field survey, 36.42% of the Mararaba population have the perception that the housing condition in Mararaba is poor, 42.23% perceive the hosing condition as being fair, 13.24%, believe that the houses are in good condition while 8.11% say the houses are very good. Consequently, 39.40% of the Ado population perceive their houses as being poor, 48.35 have the believe that the housing condition is fair, 16.14% say the housing condition is good while the remaining 6.11% are of the perception that the houses are in very good condition.

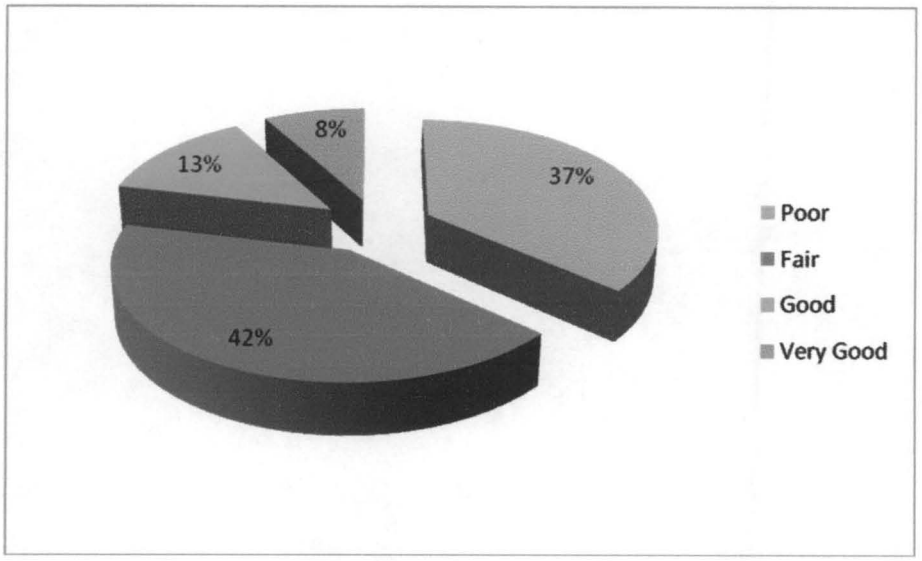

Fig 4.9 Housing Condition in Mararaba

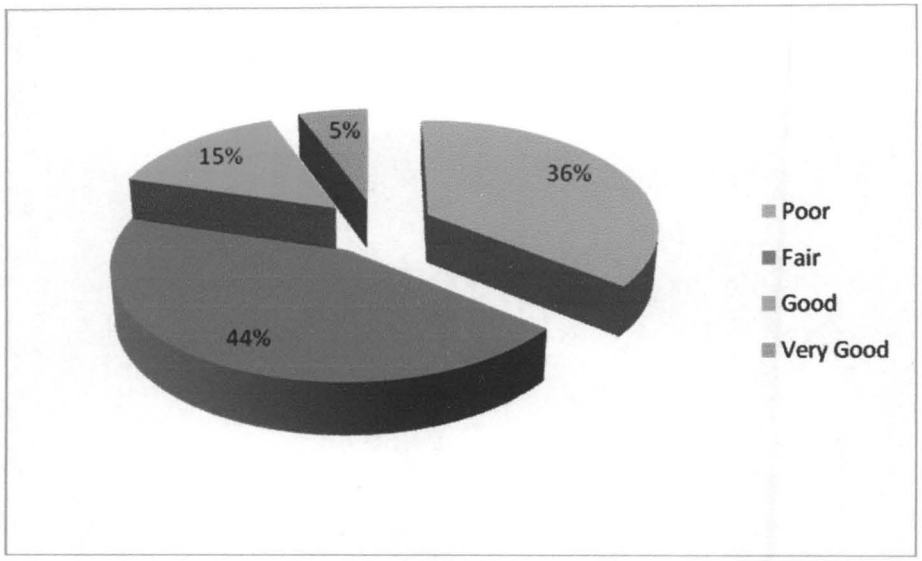

Fig 4.10 Housing Condition in Ado

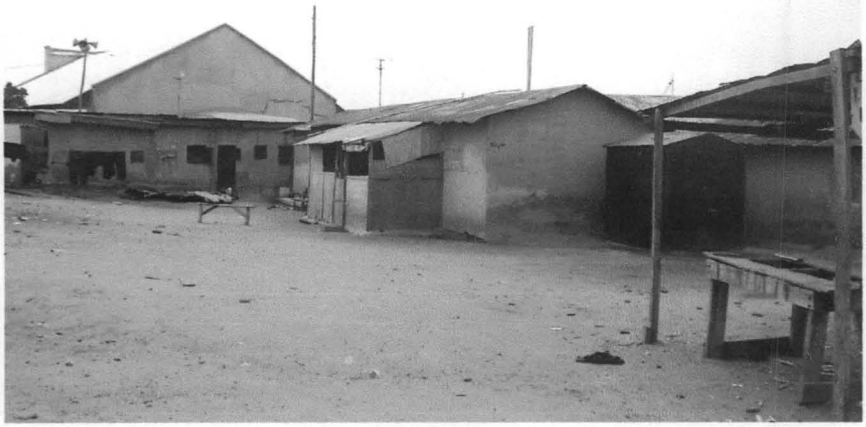

Plate VIII: Housing condition within the study area

4.12 Sources of Water Supply

The survey shows that 10.10% of the Mararaba population get their water from pipe water supply, 14.40% from borehole, 3.30% from well, 71.15% from water vendors while the remaining 1.05% get their water from other sources. In similar vein, 8.40% of the Ado population get water from pipe water supply, 10.20% get water from borehole, 5.15% from wells, 75.21% from water vendors while 1.04% get their water from other sources. {See plates IX and X).

Table 4.6 Sources of water supply

Sources	Maraba		Ado	
	No	%	No	%
Pipe water	63	10.10	18	8.40
Borehole	90	14.40	22	10.20
Well	21	3.30	11	5.15
Water vendor	443	71.15	163	75.21
Others	6	1.05	2	1.04
Total	**623**	**100**	**216**	**100**

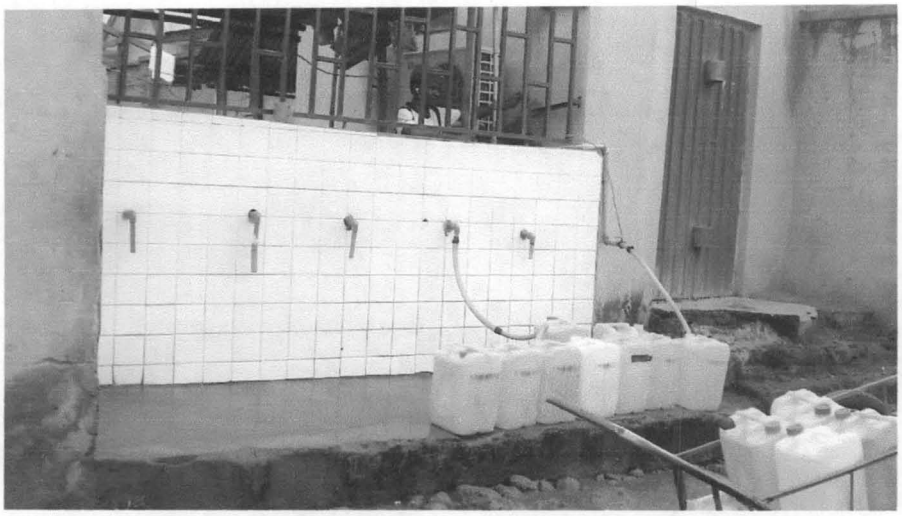

Plate IX: Water vendor as source of water supply

Plate X: Well as a source of water supply

4.12 Drainage System

As revealed in the field survey, 11.40% of Mararaba drainage system is channelled, 88.60% of Mararaba drainage is open. In the same light, 10.60% of the Ado drainage system is channelled, 89.40% of Ado population is open.

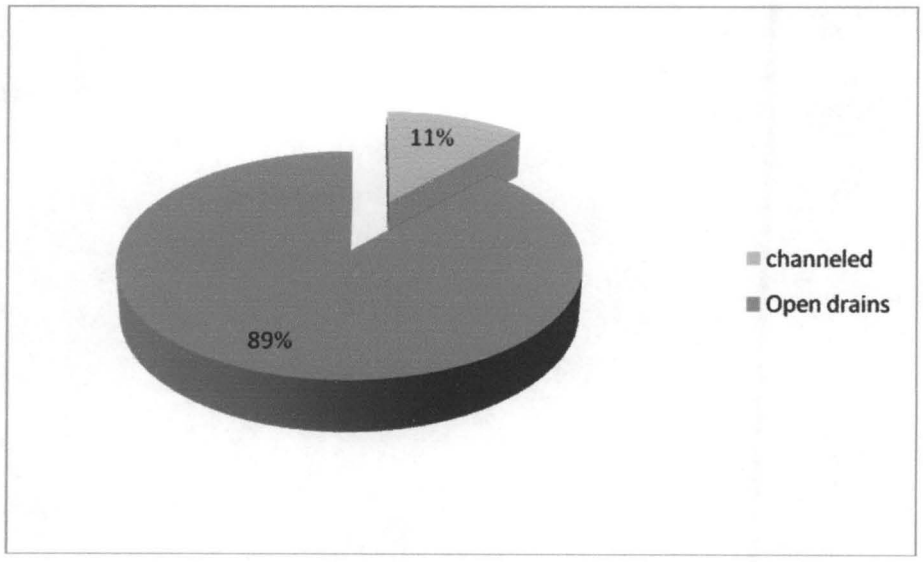

Fig 4.11 Drainage System in Mararaba

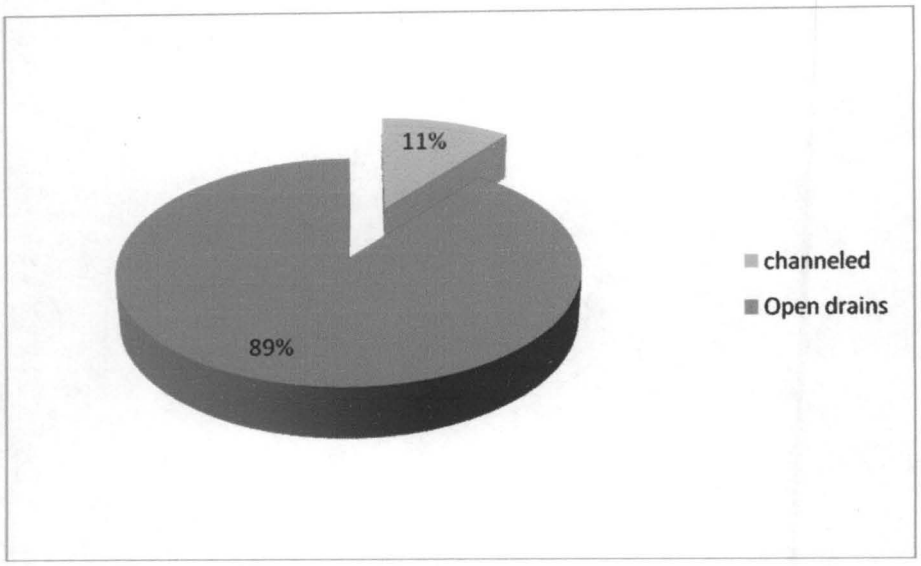

Fig 4.12 Drainage System in Ado

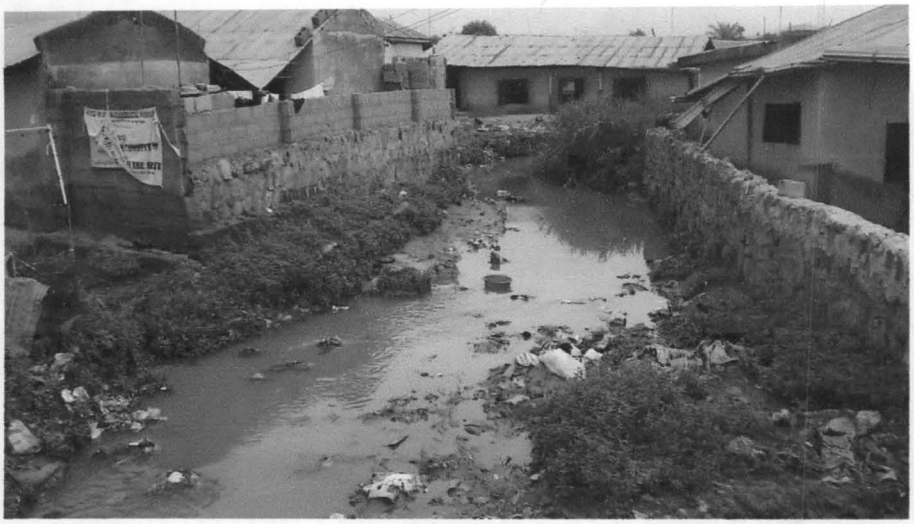

Plate XI: **Picture showing an open drainage**

Plate XII: **Picture showing Poor drainage**

Plate XIII: Channelled but open drain

Plate XIV: Un-channelled open drain

4.14 Drainage Condition

As revealed in the field survey, 51.40% of houses surveyed in Mararaba are assessed to have poor drainage system, 36.80% of the houses have access to fair drainage system, 8.20% of the drainage system in the study area is assessed as being good while 4.10% of the houses surveyed are assessed to have very good drainage system. In the same light, 54.60% of houses surveyed in Ado are assessed to have poor drainage system, 35.30%, of the houses have access to fair drainage system 7.10% of the drainage system in the study area is assessed as being good while 3.00% of the houses surveyed are assessed to have very good drainage system. (See plates XIII and XIV).

Table 4.7 Drainage Condition

Condition	Maraba		Ado	
	No	%	No	%
Poor	320	51.40	118	54.60
Fair	226	36.30	76	35.30
Good	51	8.20	15	7.10
Very Good	26	4.10	7	3.00
Total	**623**	**100**	**216**	**100**

4.15 Solid Waste Disposal and Land Management

The survey carried out reveals that 50.20% of the houses in Mararaba is perceived to have poor solid waste disposal and management, 39.50% is assessed as having fair solid waste disposal and management, 7.20% is perceived as being good while the remaining 3.10% have access to very good solid waste disposal and management. In the same vein, 53.30% of the houses in Ado is perceived as having poor solid waste disposal and management, 38.40% of the houses survey have fair solid waste management, 6.10% % is perceived as being good while the remaining 2.20% of the houses have access to very good solid waste disposal and management.

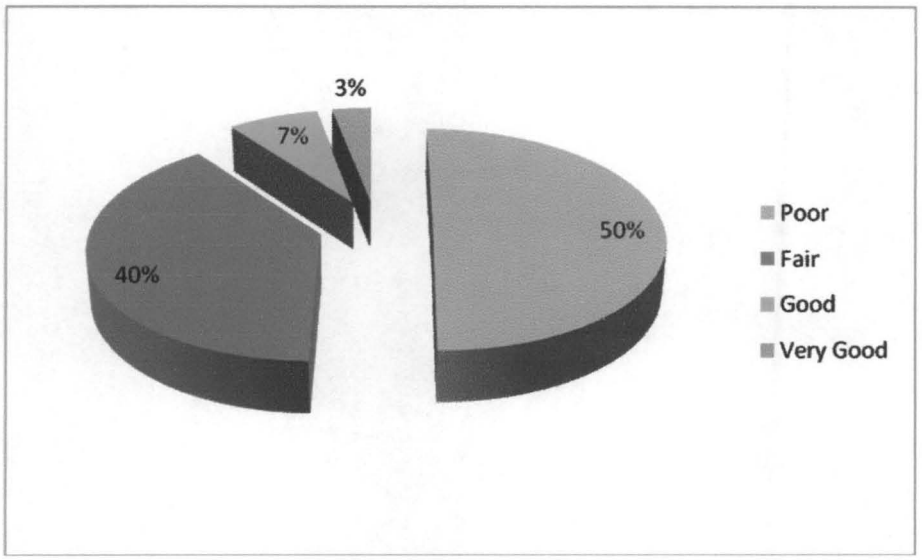

Fig 4.13 Solid waste disposal and management in Mararaba

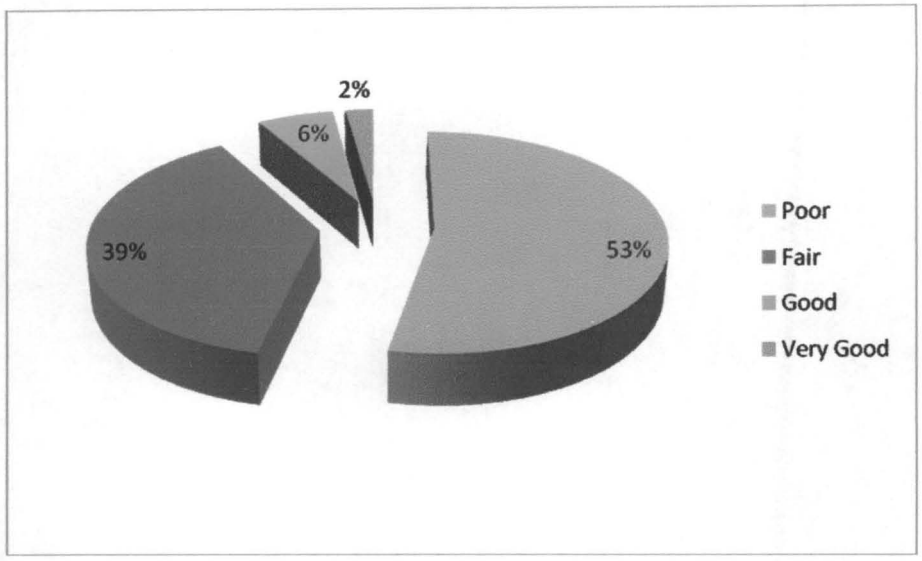

Fig 4.14 Solid waste disposal and management in Ado

Plate XV: Solid waste disposal in Mararaba

Plate XVI: Solid waste disposal in Ado

4.16 Availability of Adequate Spaces for Recreational Activities

From the field survey, 26.20% of the Mararaba population said that there are adequate spaces for recreational activities in Mararaba while73.80% said there are no adequate spaces for recreational activities. In similar vein, 22.60% of the Ado population said that there adequate spaces for recreational activities while 77.40% said that there are no adequate spaces for recreational activities in the study area. (See plates XVII and XVIII)

Table 4.8: Availability of adequate spaces for recreational activities

Status	Maraba		Ado	
	No	**%**	**No**	**%**
Yes	163	26.20	49	22.60
No	460	73.80	167	77.40
Total	**623**	**100**	**216**	**100**

Plate XVII: Built up area

Plate XVIII: Built up area

4.17 Mode of Accessibility to individual dwelling units

The survey reveals that 32.10% of the Mararaba population access their individual houses by vehicular means, 51.60% have access to their dwellings through footpaths, 16.30% access their houses by other means. Similarly, 27.2% of the Ado population access their individual dwellings by vehicular means, 57.5% access their houses through footpaths while 15.3% have access to their houses by other means.

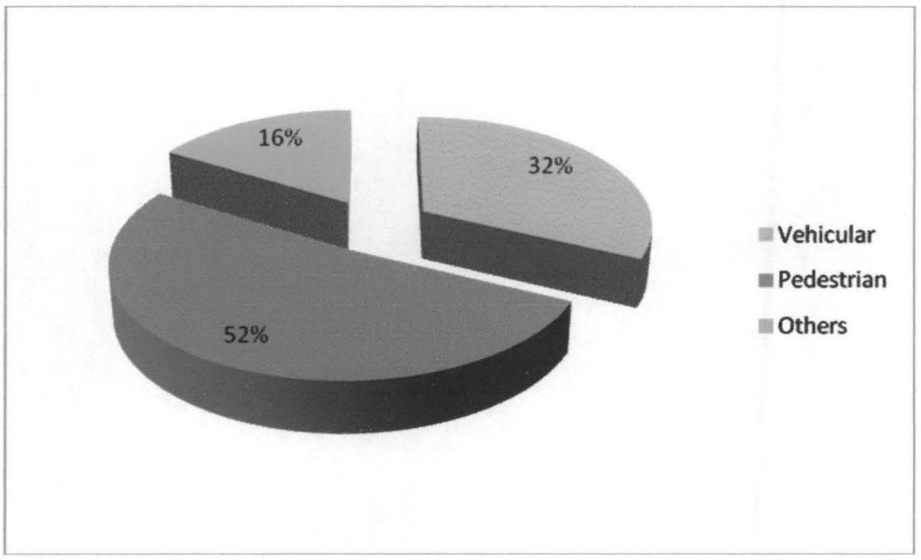

Fig 4.15 Accessibility to individual dwelling units in Mararaba

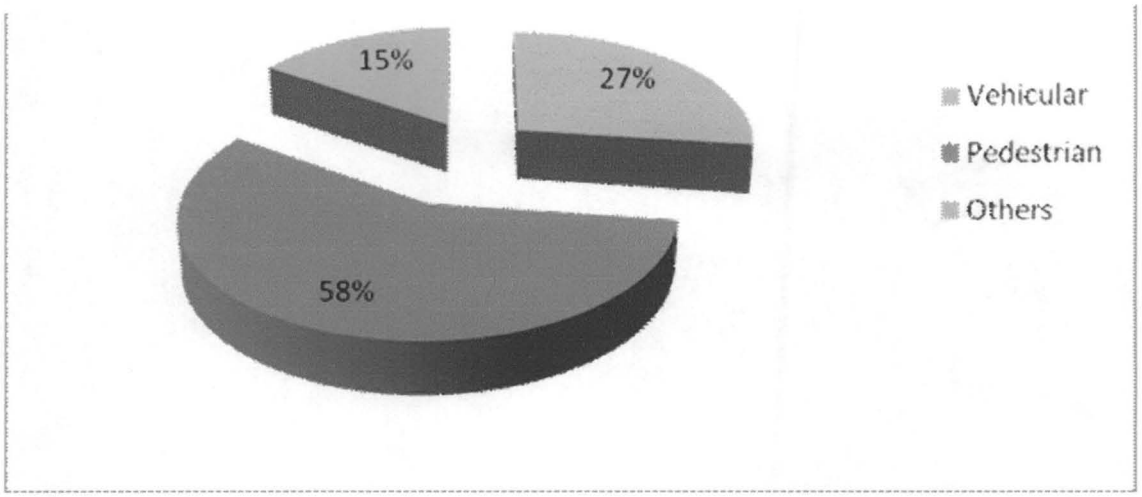

Fig 4.16 Accessibility to individual dwelling units in Ado

Plate XIX: Access by footpath to a residential area in Maraba

4.18 Statistical Analysis of Findings

This section is intended to decide whether the idea hypothesized is supported by the field sample data. This step will aid the research to arrive at correct conclusions as a prelude to proffering appropriate solutions.

4.19 Hypothesis Testing

Chi-Square Test Procedure was used to test the hypothesis. The variables are extracted from the administered questionnaires and the stipulated level of significance value of five (5) percent (0.05) was selected. By this if the P value is less than 0.05 then the Test is significant.

4.19.1 Testing of Hypothesis (Number of drainages with poor condition)

H_0 – There is no statistical significant difference in the number of drainages with poor condition in Maraba and Ado.

H_1– There is statistical significant difference in the number of drainages with poor condition in Maraba and Ado

Table 4.9: Number of drainages with poor condition

	Observed No.	Expected No.	Residual
	320	219	-101
	118	219	101
Total	438	438	

Table 4.10: Test Statistics

	Frequency of number of drainages with poor condition
Chi- square[a]	*168.932*
Df	*1*
Asymp. Sg	*.000*

a. 0 cells (.0%) have expected frequencies less than
5. The minimum expected cell frequency is 103.5.a.

4.19.2 Interpretation

Since the calculated P value is .0001 which is less than the table value of 0.05 alpha levels ($P \leq 0.05$), then Hi is accepted and Ho is rejected. There are significant difference in the number of drainages with poor condition in Maraba and Ado. Hence, this significant difference in the number of drainages with poor condition in the areas is an indication of the deteriorating level of environmental conditions in Maraba and Ado.

4.19.2 Testing of Hypothesis (number of individual dwellings in poor condition)

H_o – There is no statistical significant difference in the number of individual dwellings with poor housing condition Maraba and Ado.

H_1 – There is statistical significant difference in the number of individual dwellings with poor housing condition Maraba and Ado.

Table 4.11: Frequency of Individuals dwelling in poor housing condition in Mararaba and Ado

	Observed No.	Expected No.	Residual
227	227	106.0	-121.0
85	85	106.0	121.0
Total	312	212	

Table 4.12: Test Statistics

	Frequency of Individual Dwellings With Poor Housing Condition in Mararaba and Ado.
Chi-Square[a]	104.037
Df	1
Asymp.sig	.000

a. 0 cells (.0%) have expected frequencies less than
b. 5. The minimum expected cell frequency is 54.0.a.

4.19.4 Interpretation

Since the calculated P value is .0001 which is less than the table value of 0.05 alpha levels ($P \leq 0.05$), then Hi is accepted and Ho is rejected. There are significant difference in the frequency of individual dwellings with poor housing condition Maraba and Ado. Hence, this significant difference in the frequency of individual dwellings with poor housing condition Maraba and Ado is an of the deteriorating level of environmental conditions in Maraba and Ado.

4.19.5 Testing of Hypothesis (poor Solid waste management and disposal)

H_o – There is no statistical significant difference in the poor solid waste management and disposal in Maraba and Ado.

H_1 – There is statistical significant difference in the poor solid waste management and disposal in Maraba and Ado.

Table 4.13: Frequency of poor Solid Waste Management and Disposal in Maraba and Ado

	Observed No.	Expected No.	Residual
313.00	313	214	99
115.00	115	214	-99
Total	428	428	

Table 4.14: Test Statistics

	Frequency of Solid Waste Management and Disposal
Chi-Square[a]	**200.139**
Df	**1**
Asymp.sig	**.000**

a. 0 cells (.0%) have expected frequencies less than
5. The minimum expected cell frequency is 290.5

4.19.6 Interpretation

Since the calculated P value is .0001 which is less than the table value of 0.05 alpha levels ($P \leq 0.05$), then Hi is accepted and Ho is rejected. There are significant difference in the frequency of poor solid waste management and disposal in Maraba and Ado. Hence, this significant difference in the frequency of solid waste management is an indication of the deteriorating level of environmental conditions in Maraba and Ado.

Table 4.16: Test Statistics

	Frequency of Mode of Accessibility to Individual Dwelling Unit in Maraba and Ado
Chi-Square[a]	103.033
Df	1
Asymp.sig	.000

a. 0 cells (.0%) have expected frequencies less than
b. 5. The minimum expected cell frequency is 54.0.a.

4.19.8 Interpretation

Since the calculated P value is .0001 which is less than the table value of 0.05 alpha levels ($P \leq 0.05$), then Hi is accepted and Ho is rejected. There are significant difference in the mode of accessibility to individual dwelling unit in Maraba and Ado. Hence, this significant difference in the frequency of the mode of accessibility to individual dwelling in Maraba and Ado is an indication of the deteriorating level of environmental conditions in Maraba and Ado.

CHAPTER FIVE

5.0 DICUSSION, CONCLUSION AND RCOMMENDATIONS

5.1 Discussion

The present total number of households in Mararaba and Ado both of Karu local government area is 623 and 216 respectively. 62.30% and 63.10% of Mararaba and Ado population respectively are married while 37.7% and 36.9% of Mararaba and Ado population respectively are not married.

The survey reveals that a total of 72.64% and 75.54% of the Mararaba and Ado population respectively are between the ages 26-46. This however reveals that a broad spectrum of the population belongs to the working class while the remaining 27.36% and 24.46% of Mararaba and Ado population respectively depend on the working class for their daily needs.

47.23% and 44.26% of the Mararaba and Ado population respectively came to Abuja between 1997 to 2008. Similarly, 52.77% and 55.74% of Mararaba and Ado population respectively migrated to Abuja before 1997. By this, it means that most of the residents have been living in these areas for a long time.

The house types occupied by residents of Mararaba and Ado vary from 1-4 bedroom houses to tenement houses. This is revealed in the survey as 44.18% and 45.36% of the Mararaba and Ado population respectively occupy tenement houses while 55.82% and 54.64% of the Mararaba and Ado population occupy between 1-4 bedroom houses.

The survey reveals that 41.21% and 43.02% of the populace in Mararaba and Ado respectively earn between N260,000 – N300,000 annually from their economic activities. Similarly, 36.65% and 38.52% of the Mararaba and Ado populace earn below N260,000 per-annum from their economic activities while 22.14% and 18.46% of Mararaba and Ado population respectively earn above N300,000.

The residents of Mararaba and Ado work as civil servants, traders, contractors, some work in the private sector while others are self employed. However, the residents of Mararaba and Ado are majorly the Civil Servants who transport themselves via commercial bus to their respective places of work. From the survey in Mararaba, 49.24% are civil servants, 28.30% work in the private sector, 14.06% are traders, 8.25% are contractors while 10.15% are self employed. In the same light in Ado, 51.30% are civil servants, 24.23% work in the private sector, 6.20% are traders, 4.17% are contractors while 14.10% are self employed.

Such occupational practices as private workers, contractors, trading and Civil servant are a indications that the community is experiencing economic and social transformation, diversification which is indicative of the impact of the creation of Abuja as the Federal Capital Territory.

These occupational practices however, require that the people commute daily to their respective places of work. Aside commuting via commercial bus which is largely predominant in the area, other means of transportation include staff bus, personal vehicle and other means of transportation.

Moreover, the transportation means have been very important as a result of the distance of the place of abode to the places of work which are Karu, Abuja city and other places. The field survey in Mararaba reveals that 18.02% work in Karu, 76.38% work in the capital city (Abuja) while 6.60% work outside Karu and Abuja. Similarly, 16.35% of Ado population work in karu, 78.60% of the population work in Abuja city while 6.60% work outside Karu and Abuja.

The facilities, utilities and services available in Mararaba and Ado reflect the level of infrastructural development of these settlements. However, this is revealed in the field survey which shows that the area is devoid of portable water supply as very large spectrum of the population gets their water from vendors. From the survey, 71.15% and 75.21% of Mararaba and Ado population get their water from water vendors.

The poor drainage condition in the study area shows that the area is susceptible to flood during the rainy season. This is inferred from the fact that 51.40% and 54.60%

of the Mararaba and Ado houses respectively are assessed to have poor drainage conditions.

In the same light, the field survey reveals 50.20% and 53.30% of the houses in Mararaba and Ado are assessed to have poor solid waste disposal and management in these areas.

51.6% and 57.5% of the Mararaba and Ado populace respectively access their individual dwelling units on foot. As such, it can be said that the effect of the accessibility of the houses by labyrinth of footpath will be most felt in the event of fire outbreak. This does not reflect that the environmental condition in the area is good.

With the prevalence of the unplanned residential development and consequent explosion of the population of Mararaba and Ado, this has made the Facilities, Utilities and Services (Access Roads, Portable Water, Drainage system and the solid waste management) where available for these areas to be under pressure and become over-stretched

5.2 Summary of Findings

In this chapter, the preceding discussion of the research findings and analysis revealed all that is summarized here. Premised upon this summary, recommendations are made to ameliorate all problems identified in the findings of the study and conclusions are drawn from the recommendations so made. The above explains that the spectrum of the population that earn between N260,000 – N300,000 per annum belong to the low and middle income groups. By this, the disposable income is restrictive

5.3 Conclusion

This study has assessed the impact of the creation of Abuja on the environmental conditions of Karu and its environs. It achieved this through analysis of the spatial expressions of the consequences stemming from the need for alternative residential

area away from the FCC which has necessitated the upsurge of these unplanned residential developments, absence of adequate infrastructural facilities and institutional lapses in enforcing the development control standards in the study area.

The impact was also assessed through the analysis of researcher's perception of the sanitary condition of the area ranging from the solid waste disposal and management system to the condition of the drainage system.

The study concluded by drawing relevant pragmatic recommendations based on the findings from all the surveys and analysis carried out.

It is thus believed that the findings and recommendations of this research are pertinent to the improvement of the environmental condition of Karu and its environs to make them sustainable for the residents and intending migrants.

5.4 Recommendations

To achieve efficiency and sustainability in Mararaba and Ado both of Karu local government area and its environs and make these settlements serve as sustainable model for sub-urban settlements around the Federal Capital Territory, the following are needful to be in place

1 There is need for the Nassarawa state government to organise public enlightenment programme to sensitize the residents of Mararaba and Ado on the importance of environmental sanitation. This is to change the people's perception and attitude to their environment. The essence of this is to involve all stakeholders and more importantly to greatly inform the people about the benefits of living in a well sanitized environment. By this, an aesthetically pleasing and hygienic environment for human habitation is achieved.

2 The physical planning department of Karu local development in collaboration with the residents' representatives should evolve plan/design for structural upgrading of houses within these settlements (Mararaba and Ado) where necessary. Development control standards should be enforced to avoid and

correct the haphazard layout of structures in the area. The owners of houses are to be encouraged to comply with the laid down plan while intending developers should be made to adhere strictly to the process of building development in the area.

3 Each house owner should be made responsible for the way the dispose of and manage their waste. Similarly, drainages should be provided in houses where they are absent. Each house owner should be encouraged to pave the drain that pass in front of his or her dwelling. The government should provide central drainage system where all the individual drainage from different households will discharge into.

4 Portable water supply should be made available to the residents of Karu local government area in collaboration with the Nassarawa state water board. This will help in reducing the difficulties faced by the residents in getting portable water for their domestic use.

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