ASSESSMENT OF URBAN SPRAWL IN BENIN CITY, NIGERIA

BY

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APPROVAL PAGE

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2018

CERTIFICATION

(a) (By the student)

This work has not been presented elsewhere for award of a degree, or any other purpose.

Candidate's Name: **ALASA, Aruna**

Matric number: **ARC/12/2895**

Signature …… Date…….

(b) (By the Supervisor):

I certify that this work has been carried out by **Mr. ALASA, Aruna** in the Department of Architecture of the Federal University of Technology, Akure.

Supervisor's Name: **Dr. T.O. Odeyale**

Signature …… Date…….

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DEDICATION

To my parents and to my wife

ABSTRACT

The ancient city of Benin is one of the fastest growing cities in Nigeria that exemplifies some of the problems resulting from the processes of rapid urbanization and unplanned urban growth. One of such problem is the rise of urban sprawl. Urban sprawl is seen by most researchers as an un-aesthetic and unplanned urban form that determines changes in both settlement patterns and processes in urban areas. Urban sprawl is considered an interesting spatial and socio-economic phenomenon due to its unpredictable nature. This has created challenges to governance and management of cities growth in the areas of sustainable development of the natural and built environments as well as human well-being. This thesis seeks to assess the concept of urban sprawl by highlighting the drivers, characteristics, cost and measurement in order to address its problems with particular reference to Obe-Utesi axis of Benin City, Nigeria. Questionnaires, review of existing documents and Thematic Landsat Images of Benin City are the data collection methods employed in this paper. This research is expected to serve as a reference database for further researches into the incidence of sprawl in urban centres in Nigeria. This thesis reveals amongst others that rapid urbanisation and technological advancement in the form of automobiles are some of the causes of urban sprawl. Further examination reveals that the rise of urban sprawl increases the size of the non-agricultural population. This thesis concludes by proposing the Compact City model as the sustainable alternative to urban sprawl.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Cities, like living organisms undergo the processes of birth, growth, development and even death. Cities in both developing and developed countries of the world have been experiencing rapid transformation in their economies, environments and societies in the last three decades. While some cities change for the better, others have been known to deteriorate in a process known as urban transformation (Bosselman, 2010).

Urban transformation is an age-old phenomenon that has been sweeping through the world, shaping cities since the beginning of time. In the developed countries in Europe and America, transformations have contributed to an increasing urban identity crisis which transformed cities into heterogeneous units (Gbadegesin et. al., 2012). The mutation in interpersonal relationships and intergeneration gaps, technological development, mass migrations and globalization have transformed to spaces in the urban landscape, as new types of places have arisen and the utilization of existing spaces have been modified (Sepe, 2006; Gospodim, 2002; Gospodim, 2004). The rapid processes of globalization and urbanization influenced unprecedented transformation of cities both in scale and nature as witnessed from the mid-1980s.

Urbanization is the outcome of social, economic and political developments that led to urban concentration and growths of large cities, changes in land use and transformation from rural to metropolitan pattern of organization and governance. Urbanization also finds expression principally in the outward expansion of the built up area and conversion of prime agricultural lands into residential, commercial and industrial uses. This process usually occurs when a nation is still developing (Opoko and Oluwatayo, 2014).

In Nigeria, the last four decades have been characterized by rapid urbanization. From a total of less than six million people in 1960, the urban population in Nigeria rose to over 19 million people in 1982 and, to over 140 million people in 2006 (NPC, 2008). Settlements grew in size and became more complex with the passage of time. This is due to the perverted economic activities in cities. The growth

in population leads directly to the areal expansion of cities. Ogunbodede and Balogun (2013), states that these rapidly growing cities spread into the sub-urban areas and extend along the main roads that lead into the cities thereby, increasing the total areas occupied by such settlements. Rural-urban migration and natural population increase are responsible for the spatial expansion in Benin City (Ogunbodede and Balogun, 2013).

Urbanization has led to high population densities in Nigerian cities. As a consequence, urban centers are characterized by shortfalls in housing and portable water supply, traffic congestion, pollution, poverty and social unrest, making governance a difficult task. The strain on the natural environment is compounded by the unplanned or uncontrolled growth of the city. This can be viewed in the context of rising consumption levels in terms of increasing demand for land for urban uses vis-à-vis industrial, institutional, commercial, recreational and other urban based uses. This is the position of Mohammed (2007), that the resultant effects of urbanization is that land hitherto used for primary production activities are now encroached upon for urban uses.

Urban centers in developing countries have shown developments and distribution of new settlements at the fringe of the urban areas as a result of urbanization process (Wapwera, 2012). The continuous increase in urban phenomenon has led to the spatial expansion of the boundaries of cities; thus urban planning is experiencing a crisis. The reality in big cities in Nigeria such as Benin City presents a number of problems that are worthy of mention. These problems include urban decay, slum, overcrowding, lawlessness, invasion of peri-urban spaces and the growth of sprawl.

Sprawl is the physical expansion of the built environments of cities that uses up surrounding rural areas. It is generally characterized by low-density settlements that are car dependent and often lack access to adequate public infrastructure and services (Duany, 2000; Hayden, 2004; Arbury, 2005). Sprawls are viewed as inefficient urban developments that are unaesthetic and uneconomic in nature. Urban sprawl occurs in both developed and developing countries of the world but its growth and strategies put in place for its management and control differ significantly. The manifestation of urban sprawl as a development is characterized by several land use patterns which is usually evidenced by poor housing, poor transportation services, poor environmental quality, physical dereliction of basic infrastructure, inadequate social amenities, extreme poverty amongst others, around the outskirts of cities and towns in urban areas (Wapwera, 2013).

The publication of "Our Common Future" by the Brundtland Commission in 1987 (WCED, 1987), defined sustainable development as one that meets the needs of the present without compromising the ability of future generations to meet their own needs. Since this publication, the concept of sustainable development has become increasingly significant as a target for creating a better future for cities of the world, economically, socially and environmentally. Factors such as an ever-increasing population, and more importantly, an almost exponential growth in the use of resources many of them non-renewable are operating in contradiction with efforts to create a more sustainable future for cities (Elkin et. al., 1991). Due to this situation, the role of the world's urban areas in determining whether sustainable development is an achievable goal is becoming increasingly significant, with the world's urban population more than doubling since 1950, and being expected to double again to reach 6.2 billion by 2050 (Rodrigue, 2005). Although most future urban population growth will come in developing world cities, especially in Asia and Africa, per-capita resource consumption rates of these cities pale into insignificance compared with the developed world cities, particularly low-density sprawled cities in North America, parts of Europe and Australasia (Haughton and Hunter, 1994). Of particular concern in these sprawled cities is both the loss of surrounding natural land, as urban development spreads rapidly into previously productive or environmentally significant land, as well as increasing concerns about the environmental effects of automobile emissions, particularly in relation to climate change (Arbury, 2005). Moving from urban sprawl which is the resultant effect of spatial expansion to a compact city has been proposed as one way urban sustainability can be improved upon through good urban design strategies. The compact city paradigm looks to limit peripheral urban development by focusing on the use of land within the existing city in a more efficient manner.

Agenda 52 of the declaration of the United Nations Conference on Housing and Sustainable Urban Development held in Quitto, Equador in 2016, encourage spatial development strategies that take into account, as appropriate, the need to guide urban extension, prioritizing urban renewal by planning for the provision of accessible and well-connected infrastructure and services, sustainable population densities and compact design and integration of new neighbourhoods into the urban fabric, preventing urban sprawl and marginalization (UN- HABITAT 3, 2017). This agenda provided a paradigm shift based on the science of cities laying out standards and principle for the planning, construction, development, management and the improvement of urban areas. It also incorporates the recognition of the correlation between good urbanization and development.

This thesis focuses on Benin City, Nigeria as an example of a developing world city that is characterized by many of the problems associated with urban sprawl brought about by the unplanned and uncontrolled spatial expansion of the city. This thesis, also look at ways in which compact city approaches to urban development can be implemented in an acceptable and feasible manner while making a difference to the sustainability of Benin City.

1.1.1. Statement of Problem

Oyesiku (2002), emphasizes that the forms and pattern of distribution of structures to promote good health, accessibility, convenience and harmonious land use in an environment are a function of the rights and methods of dealing with land. With an urban growth rate of 5.5 percent (Ogunbodede and Abiodun, 2013) and population growth rate of 3.5 percent (Onokerhoraye, 1986), Benin City is an area with rapid urban sprawl. The effective control of land and the management of spatial activities within Benin City is crucial to tackling land use problems and the creation of a sustainable urban environment.

Jiboye (2005), observes that most major Nigerian cities have been developing with conventional land use approach, which includes Benin City. This has generated different urban problems in the form of pollution of the environment, transportation problems, unsanitary condition and epidemics among others. Aluko (2000) and Agbola (2002), identified Nigerian cities to be among the dirtiest, least aesthetically pleasing and dangerously unsafe for living, most poorly governed and intensively dotted with illegal structures. This is because the physical growth and development of these cities have not been properly managed in terms of planning, infrastructural development, development control, governance and management.

Dating back to pre-colonial era, Benin City was acknowledged the world over to be a well-developed and planned city with well-laid out streets and hierarchical urban organization leading to the Oba’s palace at its peak. All roads from the hinterland led to the Palace within a radial concentric layout and good compact system of town development, surrounded by the military defense system of the moat. This world-class contribution to planning has been relegated to the background since the advent of colonization by the Europeans. The introduction of technology, especially the motor car has reduced the efficiency of the city resulting in noise pollution, traffic congestion and unemployment. The situation

has been made worse by the lack of interest in planning the city especially at the peripheries by successive administration. Nothing comprehensive and inter-related has been done by the government to stem this tide. This has resulted in the ad-hoc and fire-brigade approach to problems posed by lack of proper development of the peripheries. Today, the trend and growth pattern of Benin City can be described as haphazard particularly along the major roads leading into and out of the City. This has increased the incidence of sprawl at the city fringe area.

The spatial expansion of Benin City has destroyed and absorbed fertile agricultural land which cannot be recovered. Residential land use continues to spread to and beyond the hitherto distant location relative to the city core. This has created the incidence of sprawl which is not pleasing aesthetically and unsustainable.

1.2 Research Outline

1.2.1. Research Questions

The following are the questions that the present study will seek to answer/investigate;

1. What are the socio-economic characteristics responsible for urban sprawl development in Benin City?
2. What are the physical and spatial patterns responsible for urban sprawl development in Benin City?
3. What are the implications of urban sprawl in Benin City?
4. How can the compact city development be achieved in Benin City?

1.2.2. Aim and Objectives of Study

The aim of this research is to study the incidence of sprawl resulting from the unplanned spatial expansion of Benin City at the periphery, and propose a sustainable approach to the City's urban development.

The objectives of this research are to examine:

i. the socio-economic characteristics responsible for urban sprawl development in the study area;

ii. the Spatio-physical patterns responsible for urban sprawl development in the study area; and

iii. the implications of urban sprawl development in the study area.

1.2.3. Research Hypothesis

The following hypotheses will be tested using the appropriate statistical instruments in the course of this study:

Hypothesis 1

$H_{0:}$ There is no significant relationship between the socio-economic characteristics and urban sprawl in Benin City.

$H_{1:}$ There is significant relationship between the socio-economic characteristics and urban sprawl in Benin City.

Hypothesis 2

$H_{0:}$ There is no significant relationship between the Spatio-physical patterns and urban sprawl in Benin City.

$H_{1:}$ There is significant relationship between the Spatio-physical patterns and urban sprawl in Benin City.

Hypothesis 3

$H_{0:}$ There is no significant correlation between urban sprawl and its implications in Benin City.

$H_{1:}$ There is significant correlation between urban sprawl and its implications in Benin City.

1.3 Justification of Study

Cities in most developing countries like Nigeria have been undergoing unprecedented changes both in population and territorial coverage (Adeboyejo and Abolade, 2006). As a result are faced with a variety of problems such as uncoordinated land development, conflicting land uses, high densities in certain parts of the urban area and the absence of adequate road networks which could ensure intra-urban mobility within the city. In most cases, these processes occur so fast that it overtakes the capacity of most planning authorities to deal with. Monitoring this expansion and planning for its control have been made more difficult by the expanse of time involved in the production of reliable and up-to-date materials needed for such exercise.

In spite of the rapid rate of urban growth in sub-Saharan African cities, the dearth of relevant data for urban planning and management has remained a major challenge (Onokerhoraye, 1995). The consequences of uncontrolled urban expansion include overcrowding, housing shortages, inadequate or sometimes non-existing infrastructures, environmental degradation, pollution and other ecological and environmental problems (Ayedun et al., 2011 and Jiboye, 2011). These problems need consistent monitoring, management and control. The need for relevant and up-to-date data, therefore calls for thorough studies using modern technologies, for the acquisition of data and other information necessary for planning and monitoring of urban growth and environmental conditions.

Though studies have examined urban growth patterns in several cities in Nigeria (Fabiyi, 2006; Balogun et. al., 2011; Oriye, 2008; Olayiwola and Igbavboa, 2014), it appears, however, that unplanned and unmanaged urban growth at the periphery of the city has not received adequate attention of researchers in this study area. In view of this, this study attempts to look at the incidence of urban sprawl resulting from the spatial expansion and the urban transformation of Benin City.

1.4 Scope of Study

As earlier stated this study will focus on the incidence of urban sprawl occasioned by the uncontrolled and unplanned spatial expansion in the periphery of Benin City, Nigeria. The study will look at the factors responsible for the spatial expansion as well as the rate and pattern of growth of the city from pre-colonial era to the present, while proposing a sustainable alternative to the growth of sprawl in the urban design of the city.

1.5 Expected Contribution of Research to Knowledge

The major contribution expected of research activities in Nigeria is the increased awareness of the consequences of uncontrolled, unplanned and poorly managed environment and natural resource utilization (NISER, 2002). A study of the issues of urban sprawl occasioned by the rapid spatial expansion of Benin City is imperative for the achievement of an organized, planned, orderly and sustainable environment.

This study therefore, is expected to contribute to knowledge as it will provide useful information to the government on the effectiveness, efficiency and the level of compliance and adherence to existing urban planning laws in the study area; provide information to prospective developers on the need to adopt sustainability measures in their developments; the findings of this study will expand the horizon of knowledge, while acting as reference database for further studies on the spatial expansion and incidence of sprawl in urban centers in Nigeria.

1.6 Area of Study

1.6.1 Introduction

The ancient city of Benin was the seat of the most powerful forest kingdom in West Africa whose areas of jurisdiction extended beyond the present day Benin Division (Ogunbodede and Balogun, 2013). Benin City is a pre-colonial city whose origin dates back to the 12th century when it was the seat of the Portuguese foreign mission, the center of slave trade, the focus of international commerce (Ikhuoria, 1984), the capital of the defunct Mid-west and Bendel States, and the present Edo state. The National Population Census of 2006 puts the population of the city at 1,086,882. The metropolis cuts across five local government areas: Egor, Oredo, Ovia North-East, Ikpoba-Okha and Uhunmwode (see Fig. 1.2). The city has witnessed tremendous growth both in population and spatial extent.

1.6.2 Historical Background

The Columbia Encyclopaedia (2007), stated that the Benin Kingdom was founded in the 10th century (about 1180 AD). The Edos, who were the original founders of the empire were initially ruled by the Ogisos, regarded as kings from the sky. Ekhaese (2011), reported that the empire was ruled by about thirty one Ogisos before the reign of the Oba as the paramount power and ruler. The City-state

became an empire in 1440 AD and was renamed Edo Empire. The empire extended from Onitsha in the east, through the forested south-western region of Nigeria and into the present-day nation of Ghana between the 14th and 17th centuries (Ekhaese, 2011). Lang (2003), noted that the Ga people of Ghana trace their ancestry to the ancient Benin Kingdom.

Studies by Ekhaese (2011), revealed that the city was over 25,000 square kilometres in size, noting that some streets in the city were known to have widths of as much as thirty seven metres, with houses laid out in well planned rows. It was noted that a magnificent domestic architecture already existed in the kingdom before the arrival of the Portuguese in the 15th century. The Oba of Benin resided in a very huge and beautiful palace which had wide courtyards and columns decorated with ivory and bronze sculptures for which the Edos where very famous. Walls with beautifully carved doors were decorated with plaques. The Edos believe that their ancestors were intermediaries helping them to communicate with god. This explains the presence of beautifully decorated ancestral shrines in every traditionalEdo homes (Ekhaese, 2011).

The ancient people of Benin Kingdom built moats and walls of huge mound of earth around the city to provide security from invaders. These moats and walls which have today been declared world heritage site, measure 1,200 kilometres in total length and reached up to 20 metres in height (Conah, 1972).The urban design of the city followed the grid-iron pattern of the renaissance city, with the core being the King Square. This core is home to the palace of the Oba, the Museum, the Oba Market and the traditional shrine (Ekhaese, 2011). A noticeable feature of the houses in the kingdom is that as the houses move from the core to the periphery, their ages reduce successively from 300 years to 200 years, 100 years to 10 years and so on.

Omoigui (2005), noted that, Benin City could be described as a collection of people united with diverse identity, who are mostly located in the mid-western part of Nigeria. Many communities in Nigeria trace their ancestry to the ancient Benin Kingdom. This explains the linguistic and cultural affinity among these communities.

Ekhaese (2011), posited that the Edos are very traditional in their perspective and approach to life despite their level of educational background. He noted that the bonding of the Edo people is the strong belief in their traditions and various forms of worship. This has given a spiritual and temporal authority to the royal leadership in the state, but is fast being diluted by modern religious faiths. This

occurrence has influenced Benin domestic architecture, so that contemporary architectural styles are emerging along peripheries and new expansions of the city (Ekhaese and Ediae, 2014). Dmochowski (1990), posited that Benin Kingdom was highly respected for its social organisation. Ekhaese (2014), affirmed that amongst the complex of ancient kingdoms and empires which constitute the present day Nigeria, the Benin Kingdom is foremost in the preservation of its cultural identity. He went further to assert that certain factors have led to changes in some its cultural elements, while other elements are still experiencing continuation.

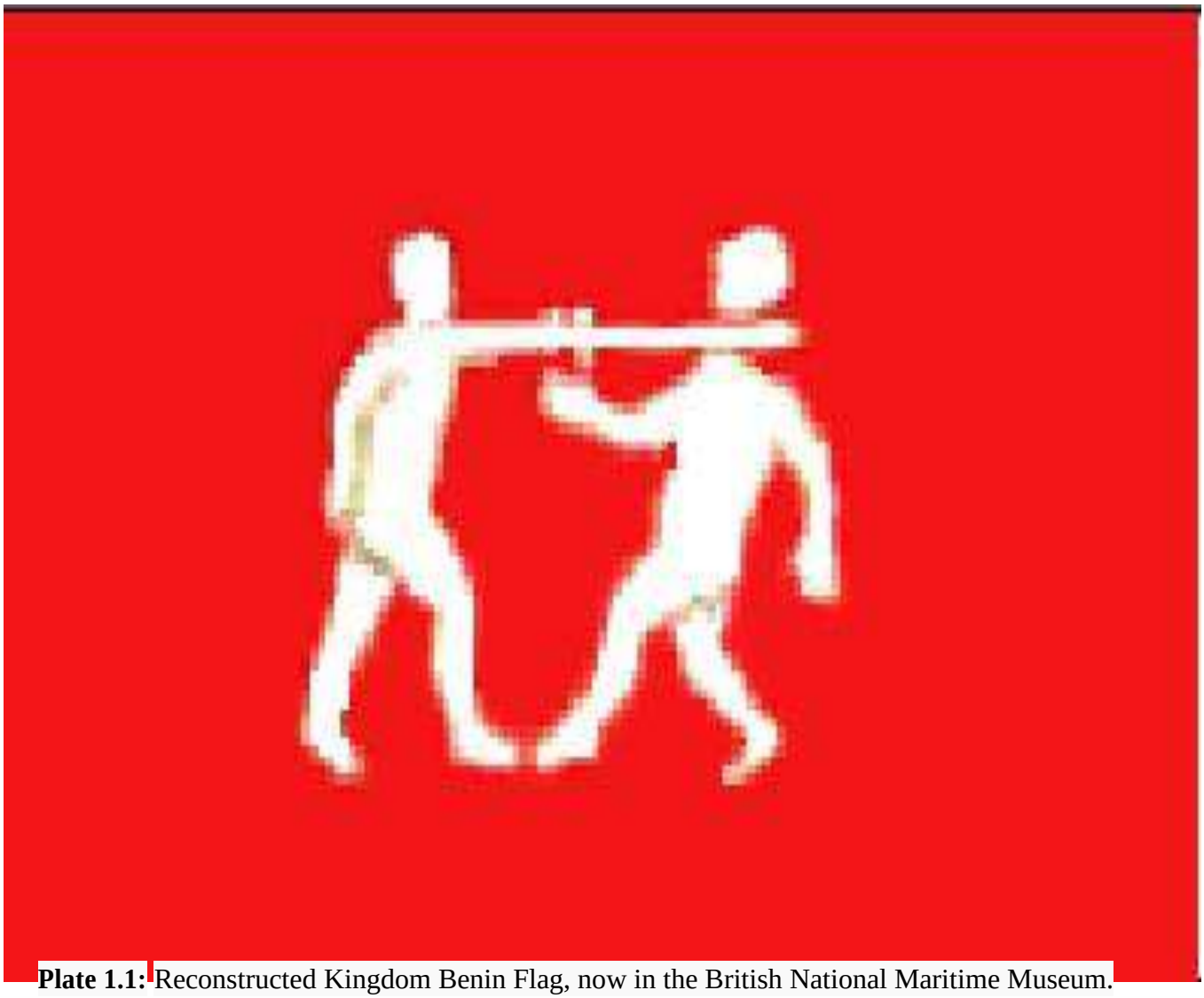

Plate 1.1: Reconstructed Kingdom Benin Flag, now in the British National Maritime Museum.

Source: Wikipedia, Encyclopaedia 2007.

Plate 1.2: Engraving Showing Warriors with Spears and Shields, Drummers and Dancers, during a Ceremony in the Oba Palace

Source: CIA World Fact-book, 2006.

Plate 1.3: Pre-colonial drawing of Benin City, before the British occupation

Source: Wikipedia, Encyclopaedia 2007

1.6.3 Geographic Location

Benin City is the located in the tropical rainforest belt in the mid-western portion of southern Nigeria and is 200 miles by road east of Lagos (Ekhaese, 2011). It is geographically defined by Latitudes 6^0 26^1 and 6^0 34^1 North of the Equator and Longitudes 5^0 35^1 and 5^0 40^1 East of Greenwich Meridian (Ogunbodede and Balogun, 2013). Benin City is a nodal town and a major commercial hub linking the western, eastern, northern and southern parts of Nigeria. The metropolitan region of the Benin City can be described as a "Golden Corridor" as it is strategically located as a gateway to the four corners of the country (Nkeki, 2011). The road network in Benin City is such that the major roads originated in a radial pattern from the city center (King's Square) to different directions in the city. This radial route network from the city center enhanced interconnectivity between the core and the remaining parts of the city.

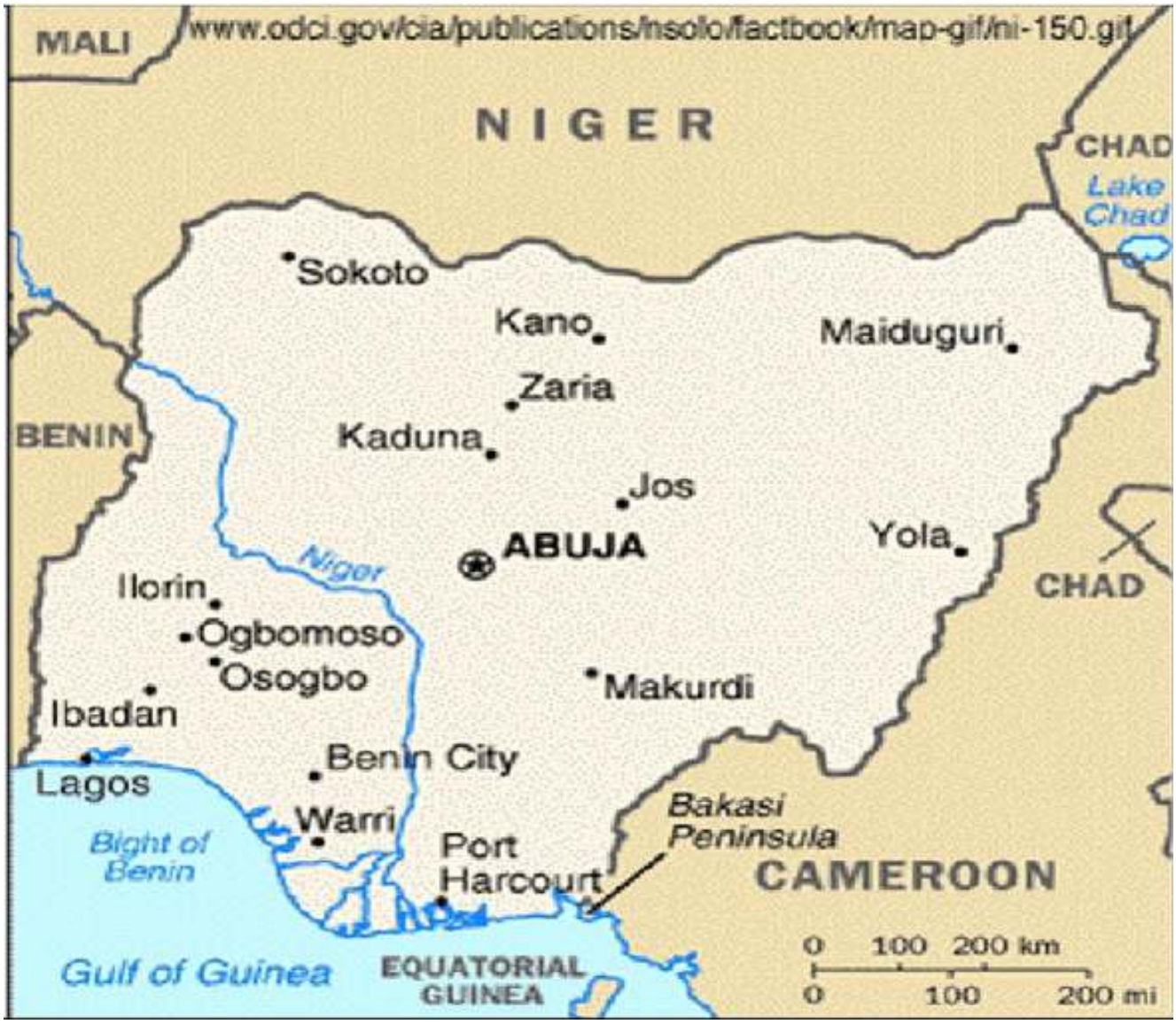

Figure 1.1: Present day Nigeria, showing the Position of Benin City

Source: the CIA World Fact Book

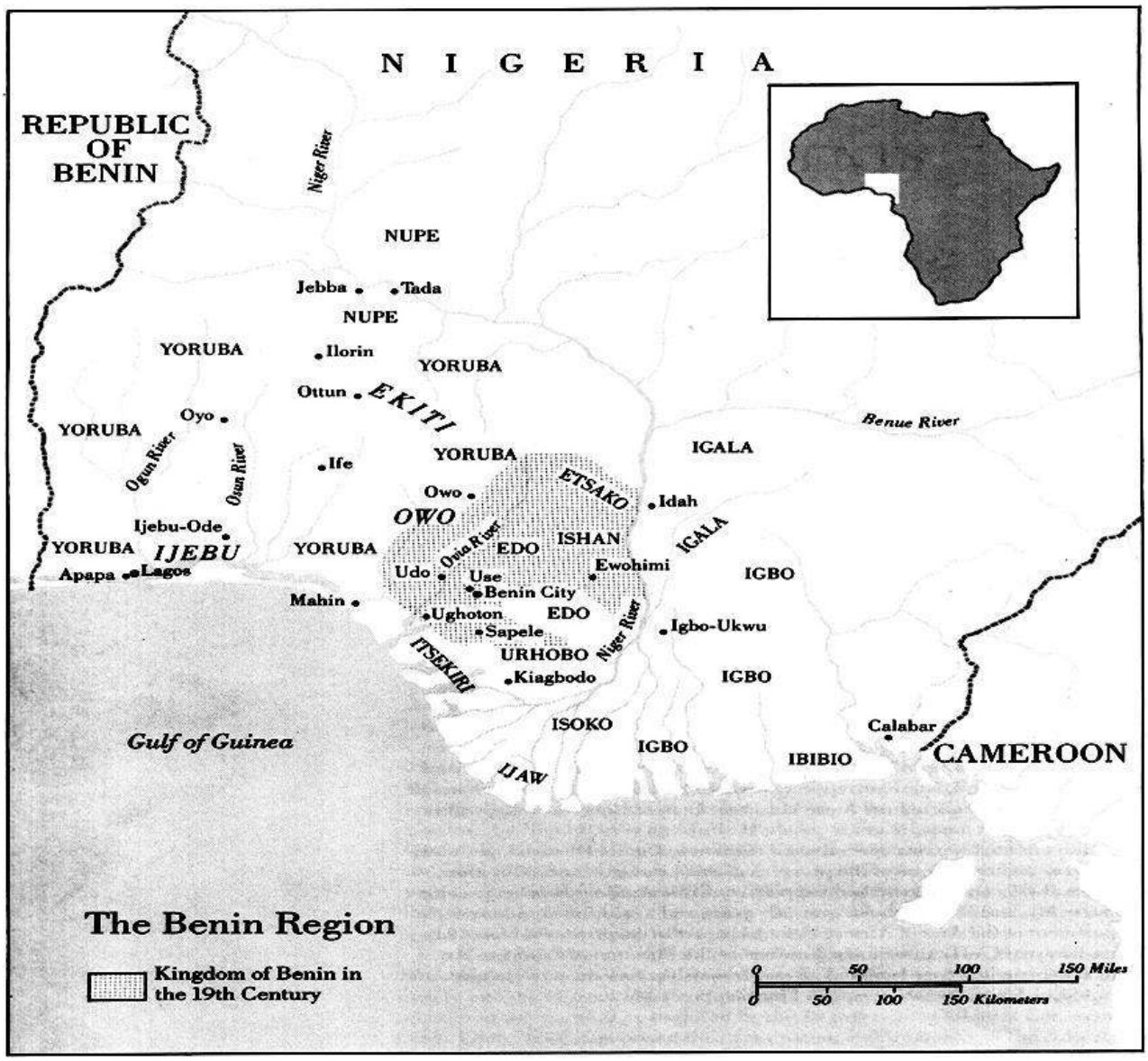

Figure 1.2: Map of the Kingdom of Benin in the Nineteenth Century

Source: Harry, (1992)

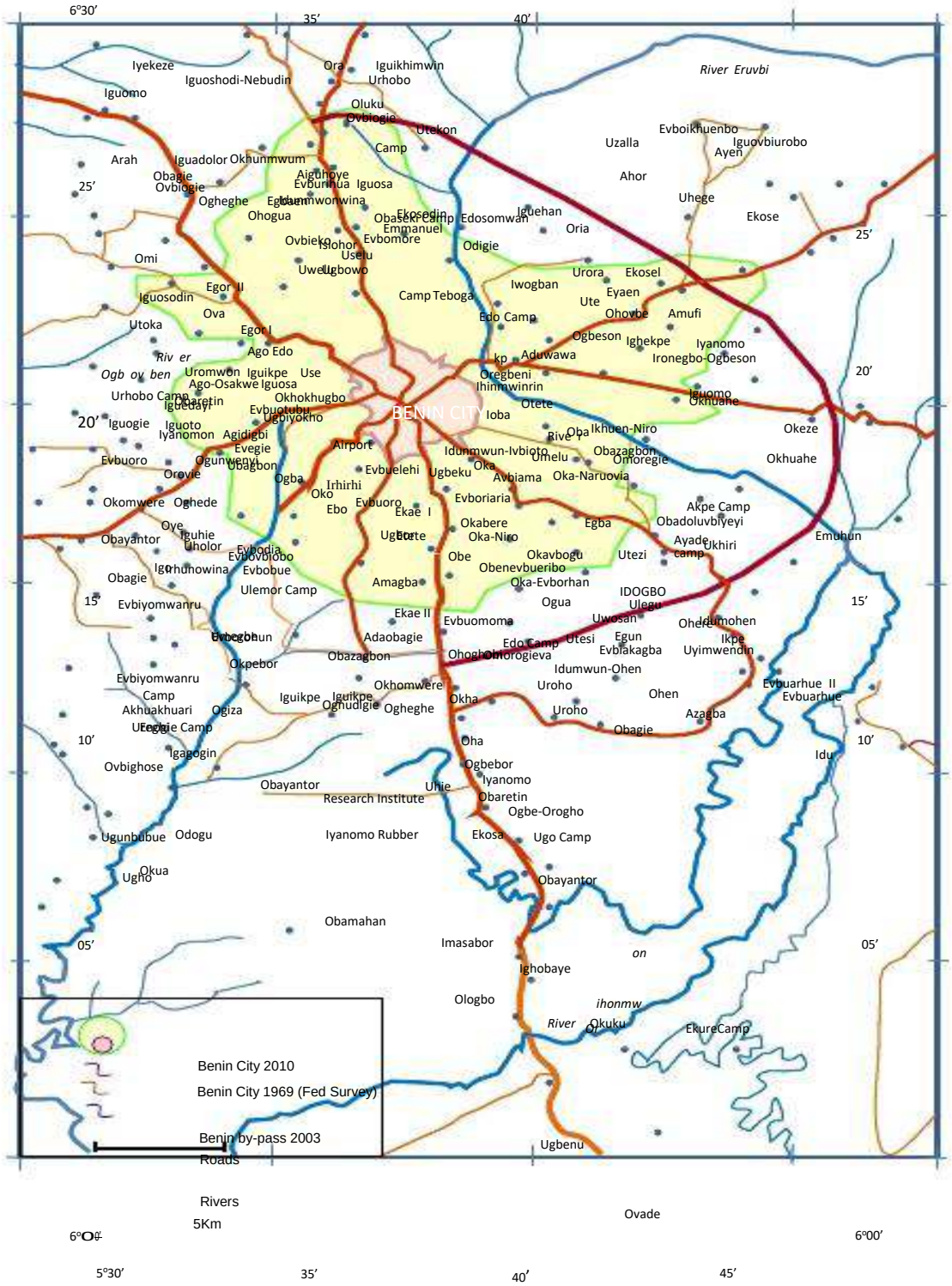

Figure 1.3: Map of Benin City.

Source: Ogunbodede and Balogun (2013)

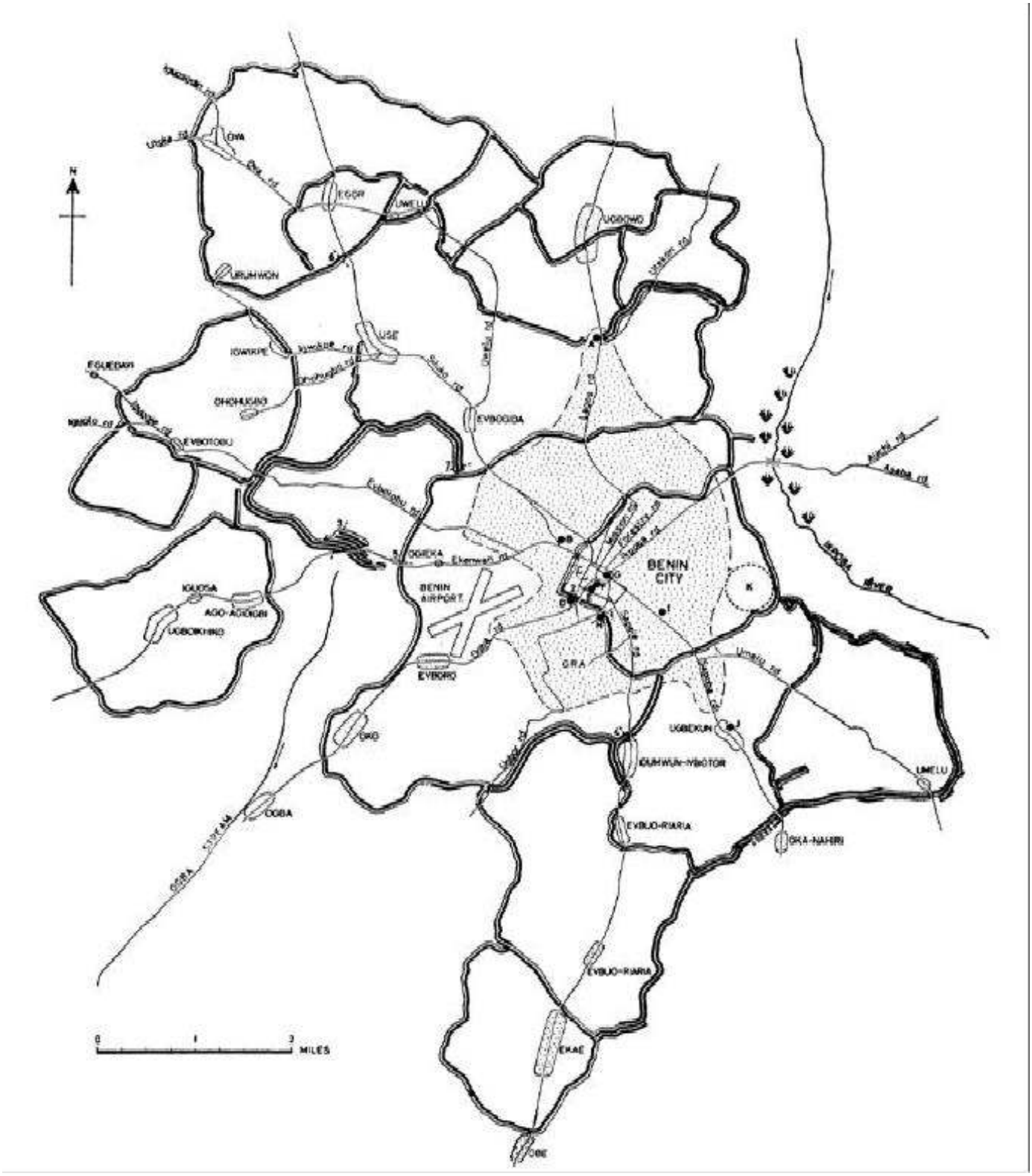

Figure 1.4: Map of Benin and its surrounding villages
Source: Connah (1972)

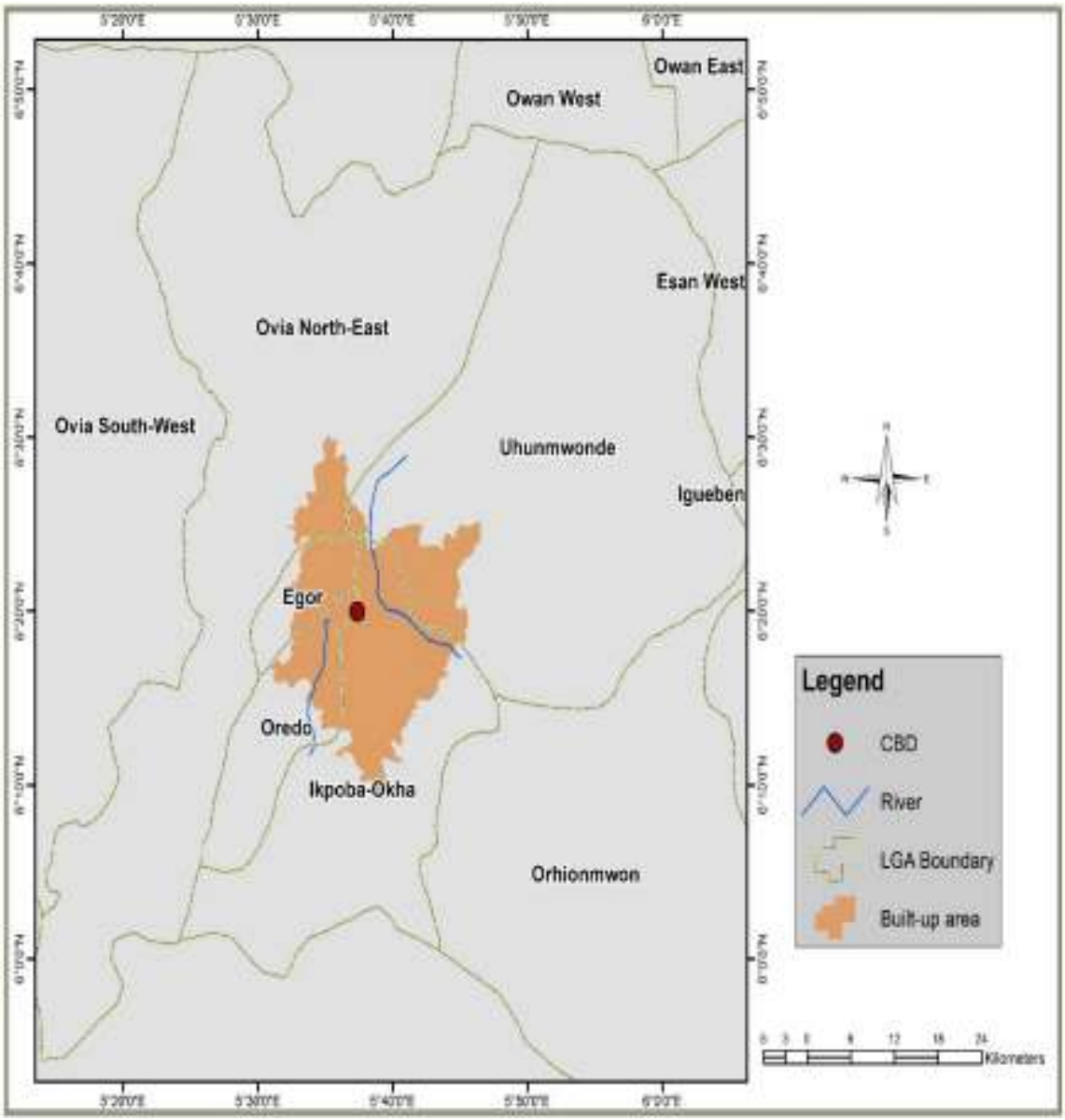

Figure 1.5: Map Showing Benin City Limit by Local Government Areas.

Source: Author's Fieldwork, 2016

Plate 1.4: 2001 Classified Land Use Thematic Map of Benin City

Source: Author's Fieldwork, 2016.

1.6.4 Physiography

Benin region geologically consist of two principal formations (Odemerho and Sada, 1984). These are the crystalline rock of the precambian basement complex and the sedimentarynrock of the Cretaceous tertiary and quarternary formation of Miocene-Pleistocene age often referred to as the Benin formation (Odemerho and Sada, 1984; Odemerho, 1988), which is about 2000 metres deep and non-marine in origin. It extends over a large area beyond the present coastline and consists of over 90 percent Sandstone with Shale, which is of braided stream origin (Nkeki, 2011).

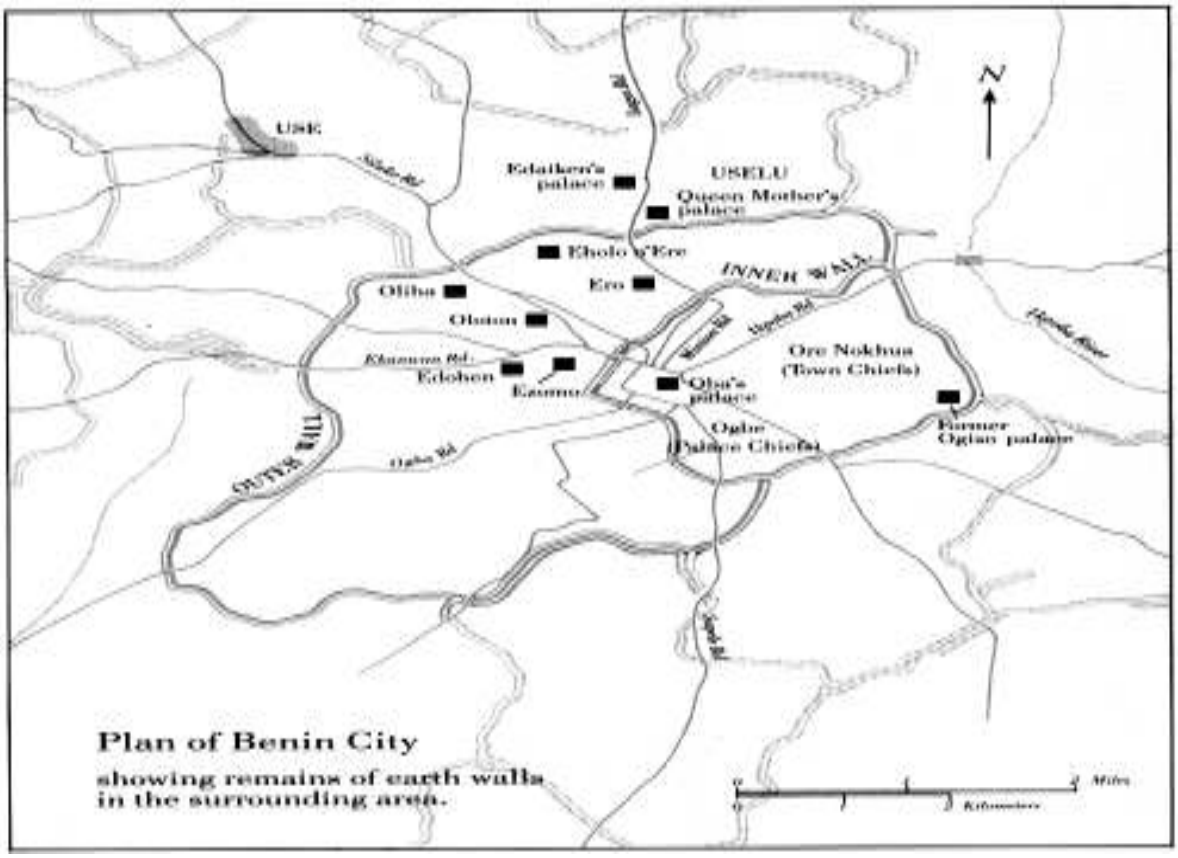

Figure 1.6: Map of Benin showing Remains of Earth Walls

Source: Connah (1972)

Studies by Buchanan and Pugh (1966), in respect of the topographic characteristics of Benin City, revealed that the region lies in the southern-most corner of a dissected margin, a topographic unit lying north of the Niger Delta, west of the lower Niger Valley and south of the Western Plains and Ranges. The city region is a tilted plain sloping in a southwest direction, with the highest elevation occurring around the Esan and Asaba Plateaux (Udo, 1978). These plateau rise steeply from the lower Niger Valley and are bordered on the northern edge by a steep slope. Apart from Ikpoba Hill which is an integral part of the Esan and Asaba Plateaux in the northwest part of the city region in Aduwawa and Iwogban areas, the rest of the city region is a relatively flat terrain (Omiunu, 1988),

The deeply weathered red and yellowish brown ferrasols soil are the major soil types found in Benin City. They have abundant free iron oxides but generally without a lateritic pan layer (Filani,

1995). The soils are mainly loams, sandy-loams and sandy-clay-loams. They suffer from excessive internal drainage and leaching, which gives them a strong acid reaction (Olayiwola and Igbavoa, 2014).

1.6.5 Climate and Vegetation

Benin City belongs to the AF category of the Koppen's Zonal Climatic Classification Scheme (Ekhaese and Ediae, 2014). Benin City falls within the warm humid tropical climate with an annual average temperature of about 28^0 C and a low annual range of 3^0 C (Odjugo et al., 2015). The city experiences two major seasons: the wet season which lasts from March to October, with an annual rainfall of 2000 mm and the dry season which lasts for the remaining part of the year, with a relative humidity of above 80 percent. The Inter-tropical discontinuity (I.T.D.) controls the duration, intensity and spatial spread of rainfall in the region (Ilesanmi, 1969). The influence of the cold, dry dusty harmattan wind, which results in a considerable drop in the atmospheric humidity is felt between the months of October and February.

Although the natural vegetation of the region has been greatly altered by fire and rapid urban spread amongst other factors, there are still traces of equatorial forest vegetation. These can be found along the Ikpoba River Valley (Nkeki, 2011).

1.6.6 Demographic Characteristics of the Area

The present day Benin City region is composed of a heterogeneous population, majority of which are migrants from other parts of the country (Nkeki, 2011). The population of the city was put at 15,000 in 1800 (Ikhuoria, 1984). This increased by 271.69 percent in 1953 to give a population of 55,753. The 2006 Population and Housing Census figure for Benin City was put at 1,086,882 (NPC, 2006), out of which the male accounted for 49.97 percent, while the female 50.03 percent. The population of the city was put at 762,717 in 1991 and 1,086,882 in 2006 (Olayiwola and Igbavboa, 2014). A critical analysis would reveal that for a period of 15 years, the population of Benin City increased by 324,165 representing 42.50 percent.

1.6.7 Socio-economic Background

In the ancient period, Benin City was the centre for the trade in ivory and pepper. Today, the city is regarded as the centre of Nigeria's rubber industry, but the processing of palm nut for oil is still an important traditional industry (Ekhaese, 2014). Benin City lies within the tropical rainforest belt of Nigeria and is therefore home to several forest product including timber. Lumbering and timber processing are major economic activities in the area (Olayiwola and Igbavboa, 2014). Asides the occupations offered by the natural environment, Benin City has a flourishing craft industry which dates back to the twelfth century. The industry consists of craft and ivory carving, weaving and bronze casting. Farming and hunting were also major economic activities. However, today, craft industries are giving way to manufacturing industries, service industries and trading activities. This is as a result of the improvement in education and the diversification of commercial activities which have transformed the city from agro-based to a growth pole of commercial, administrative, educational and corporate activities.

The land use pattern of the city can be classified as traditional, colonial and post-colonial (Ikhuoria, 1988). The radial concentric formation in which the streets are most prominent reflects the traditional land use pattern. Here, the streets emanates from the Oba's Palace in radial pattern routes connecting other parts of the city. This formation is a reflection of the traditional socio-economic activities that dominated the city and this, to a large extent defined the land use system (Nkeki, 2011). The post-colonial land use pattern witnessed the emergence of zonal concentration of government, financial and other commercial and residential estates based on social status. This period also witnessed the development of communication and recreational open space land use with residential buildings in the core given way to commercial and administrative buildings. This has largely accounted for the presence of economic and administrative activities in the core axis.

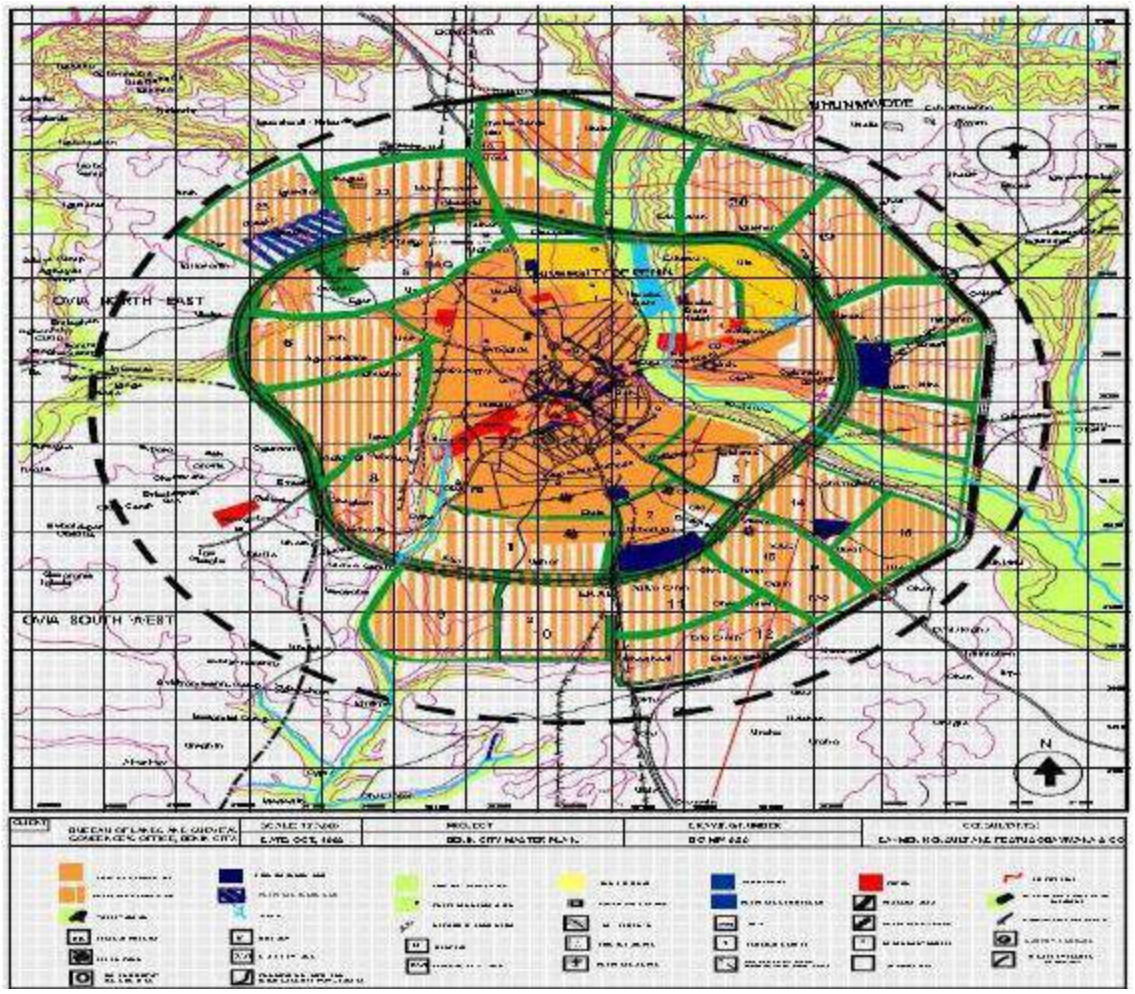

Figure 1.7: Plan of Benin-City Showing the Existing Land use Form

Source: Abakare, (2013)

1.7 Organization of Thesis

This thesis will be structured into four chapters with the breakdown as follows:

Chapter one is the introduction of this thesis. It has the background to the study, statement of problem, statement of the research hypothesis, aims and objectives, research questions, justification of the research, stages of the MPhil research, area of the study and the organization of the thesis.

Chapter Two of this thesis looks at the concept of a city and provides an in-depth literature review of the urban sprawl debate. It outlines how urban sprawl has come to dominate developed cities around the world in the twentieth century, through a combination of societal and technological factors. This chapter also examines what constitute urban sprawl identifying heavy dependence on automobile

and single-use development as aspects that contribute to the unsustainability of urban sprawl. This chapter looks at the compact city hypothesis as the sustainable alternative to urban sprawl development and some of the critiques of this hypothesis.

Chapter Three is the methodology section of this thesis. This chapter presents and examines the data collected in the study area of this research. This chapter discusses the types sources of data, the study population, explains the sample frame, sample size, sampling technique, data collection procedure and the method of data analysis.

Chapter Four presents the analysis of the data collected. This chapter also presents the findings and discussion of results of findings.

Chapter Five presents the conclusion and recommendations of the research as well as suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction

The essence of urban design is the improvement of urban spatial structure, improvement of urban spatial order, spatial logic of the urban form and the improvement of the quality of urban life (Zuziak, 2007). The practice of urban design as a discipline has been going on since the inception of the earliest cities thousands of years ago. However, the evolution of the modern concept of urban design began during the second half of the nineteenth century in Britain. Relph (1787), notes that the evolution of the modern concept was as a reaction against the industrialization process which created great inequalities in living conditions by exploiting for profit whatever did not have to be paid for directly, such as housing, air, water and health of workers. The evolution of urban design in the twentieth century led to great variety of urban forms with little consideration given to their impact on the environment. The rise of urban sprawl as the primary form of urban development in many countries of the developed world is the result of the disregard of the impact of evolved urban forms on the environment. The rise of urban sprawl has come under heavy criticism in recent years due to its many negative environmental, social and economic effects (Newman and ken worthy, 1989; Elkin et. al., 1991; Breheny, 1992; Hillman, 1996; Jenks et. al., 1996; Ewing, 1997; Burton, 2000; de Roo and Miller, 2000). The change in urban forms has been taking place in conjunction with the increase awareness of the impact on the environment by human activities and the emergence of the concept of sustainability which is now of an international significance. The concept of sustainability emerged in urban design literature in the 1970s (Arbury, 2005). The "Brundtland Report" of 1987, brought the concept of sustainability into the mainstream. New urbanism - which is a renewed focus on the importance of urban design, and the promotion of a compact city model for urban growth which is a better alternative to urban sprawl are ways of incorporating sustainability in urban design theory

The Michigan Land use leadership council (2005) stated that no other word spurs more controversy and confusion than sprawl in the field of land use and planning. The term urban sprawl is being widely used in many disciplines related with urban design and urban form. The

term is frequently used in urban politics as well as public discussions about the development and form of cities. The term often leads to confusion and misunderstandings since it is used by many disciplines and carries various meanings.

This chapter is divided into six sections. After this introductory section, the second section deals with the concept of a city by trying to review some related literature on cities generally. The third section deals with the term urban sprawl in general by giving an overview of its definitions, characteristics, causes, methods of measurement and its implications. Section four gives a short insight on the compact city hypothesis as the main sustainable alternative to urban sprawl development by looking at some literature and critiques of this hypothesis. Section five of this chapter is on the trends and growth pattern of Benin City. In section six, some conclusions will be drawn.

2.2.1 The Concept of a City

The concepts of city exist across literature, like most other concepts in research. Cities, for centuries have been the heart, the life-blood of various civilizations, the epicentre of economic, political and artistic activities (Spates and Macionis, 1987). This is similar to the position of Odeyale (2010), who notes that cities are usually the hub of commercial activities in the urban system. This is why Ayedun et. al. (2011), describes the city as a distributional mechanism as it represents a set of human beings and their institutions interacting in a densely settled finite space, producing and distributing economic resources, service and other values. They also note that the city is a mosaic of racial, ethnic, occupational, religious and ideological groups with their differences generating interdependence and conflict.

Glaeser and Kahn (2003), believe that cities can be thought of as the absence of physical space between people and firms. They further explained that cities exist to eliminate the cost of transportation of goods, people and ideas and transportation technologies dictate urban form. Sepe (2006), is of the view that a city is not an artificial construct, but a set of habits, customs and lifestyles that are interrelated. These elements, according to him, should not be viewed individually as they are subsumed in the identity of the place and the identity of the city. The author went further to assert that the contemporary city is characterized by complexity, simultaneity and instability, leading to situations of transience and transformation. In their

submission, Opoko and Oluwatayo (2014), noted that cities, being the hubs of civilisations and culture and with their unquestionable potentials, are expected to provide employment, shelter, stability, prosperity, security, social inclusion and more equitable access to services.

Bertaud (2014), describes a city as an inhabited central place different from a town or village by its size and range of activities like religious, military, political, economic, educational and culture within its boundaries that involve exercise of power over surrounding villages. This position is similar to that of Ekhaese et al. (2007), that acknowledge cities as major centers of economic opportunity, education and cultural life. Cities are seen as engines of cultural life and home to cultural heritage and events and at the same time serve as sources of cultural identity and societal transformation. Further studies by Ekhaese et.al. (2014), reveals that the dominant characteristics of cities include, relatively dense and heterogeneous human population, social distance, regular lifestyle/living conditions and overcrowding.

According to Ekhaese and Adeboye (2014), most traditional cities shared certain common features especially high walls and the core, usually home to places of worship, royal palace, government/commercial buildings and public squares. They note that the ruling classes tend to be concentrated near the core area, with the other groups around the city perimeter or outside the city. Adeoye (2012), explains that the increase in population growth particularly in the developing countries of the world has resulted in the increase in the rate of urbanization and a corresponding growth of cities the world over. However, Giuliano and Small (1991), believe that employment, and not population is the key to understanding the formation and growth of cities. Using Ado-Ekiti as a case study, Oriye (2013), cites population growth as well as inflow of goods and services as being responsible for the growth of cities.

Gbadegesin et al. (2011), notes that every city has its own history marked by the way it extended and grew. Cities, as seen today exert an increasing attraction on people worldwide as population tends to concentrate in big cities. Cities occupy only about two percent of the earth's surface but are home to more than half of the world's population (Gomes and Salvador, 2006; Terradas, 2001; Olayiwola and Igbavboa, 2014).

2.2.2. Urban Sprawl

Dispersed urban expansion, a phenomenon known worldwide, with the term "urban

sprawl", determines change in both urban pattern of settlement morphology and urban form, and processes of spatial distribution of economic functions, socio-spatial disparities, political and cultural factors, consolidating the role of peri-urban areas (Tombolini et. al., 2015). It is a phenomenon of increasingly large urban areas taking up a greater proportion of the available land area (Queslati et al., 2015). This is the form of spatial development created by the interaction and translation of the processes of urbanisation, creating a multi-faceted phenomenon with its root causes resulting from several sources (Wapwera, 2012). Physical elements related to space has been extensively evaluated in order to analyze how sprawl has manifested and taken place in metropolitan regions (South worth and Owens, 1993; Tsai, 2005; Kazepov, 2005; Couch et. al., 2007).

Urban sprawl is identifiable in outskirts of cities where low-density residential settlements have progressively replaced the traditional agricultural and forest mosaic creating a mixed and undefined landscape, disseminated of detached family houses, with a population that depend on private transportation (Ewing et al.,2002: Tsai, 2005: Torrens, 2008.). It is viewed as a multifaceted phenomenon, because its roots causes come from different sources (Wapwera, 2012).

Urban sprawl is not a recent phenomenon as it dates back to ancient times. Bruegmann (2005), asserts that urban sprawl has always been with us as low-density, unplanned residential areas have been found around most cities from the Urban Revolution to the present. He asserted further that urban sprawl can also be traced as far back as the Ming dynasty in the 14th century in China.

Urban sprawl has come to dominate cities of developed world during the twentieth century, through a combination of societal and technological factors (Arbury, 2005). It is associated low density settlements composed of individual houses, in contrast to urban realities in which population density is high and buildings having several households together (Tombolini et al., 2015).

Urban sprawl is common to both developing and developed countries of the world, but its development and management vary (Wapwera, 2012; Queslati, 2015). This is because, in developed countries, mechanisms are put in place to monitor and control its development using physical planning approaches that help manage the situation in addition to support from

the government. The scenario is very different in developing countries. Hence, the situation is prevalent in developing countries.

Nechyba and Walsh (2004), noted that urban sprawl can take different forms. They stated that urban sprawl may involve low-density residential developments with clusters of population and economic activity at the urban fringe that give rise to business activities. They also stated that urban sprawl can take the form of planned communities that have their own “downtown” or are aligned to a lake or park. They are also of the view that urban sprawl can occur as individual houses are constructed across formerly rural landscape.

Urban sprawl may comprise of two very different types within the same city. The first, as observed by Fulton (1996), is largely inhabited by the low income group is characterized by large peri-urban areas with informal and illegal land use patterns, coupled with the absence of infrastructure, public facilities, basic services, poor public transportation and inadequate access roads. This type of development is known to occur because very little or no attention is paid to slums, lands, services and transportation at all levels. The other form of urban sprawl as described by Ewing (1994), is the one which consists of residential zones for high income and middle income groups highly valued commercial and retail complexes with well-laid out roads connected by individual rather than public transport.

Plate 2.1: An Urban Sprawl Example in Lancaster County, PA

Source: The Lancaster County Planning Commission

Plate 2.2: An Urban Sprawl Example in Former Farmland North of Albany, New York

(Source: Earth Imagery, Photography of John Mckeith)

Urban sprawl is different from urban slum. Slums are heavily populated informal urban settlement characterized by substandard housing and squalor with no tenure security (UN-Habitat, 2007). Slum residences vary from shanty houses to professionally built dwellings that have deteriorated due to poor-quality construction or provision of services. They are wild run-down areas considered to be developments inside towns and city centres (Rakodi, 2004).

Urban sprawl is considered an intriguing spatial model involving social, economic and environmental issues and reflecting the inter play between urban pattern and development processes (Burchell et. al., 1998; Galster et. al., 2011; Frenkel and Ashkenazi, 2008; Orenstein et. al., 2013). Since sprawl is based on a number of interacting factors, it is difficult to understand how urban dispersion is structured over time and scale (Kazepov, 2005; Couch et.

al., 2007; Cassier and Kesteloot, 2012). This has made it difficult to implement appropriate strategies of urban containment and sustainable land-use management policies (Bruegman, 2005; Hall and Pain, 2006; Angel et. al., 2011).From these premises, urban sprawl appears to be a key issue for contemporary cities, due to the overpowering degrees of laissez-faire policies (Costa et. al, 1991).

Till date, there remains debate in urban design literature with regards to the development of an exact definition for the term urban sprawl. Gillham (2002), notes that, there is still no single, clear and succinct definition of urban sprawl acceptable to everyone despite the availability of very powerful imagery and growing national concern. He is also of the opinion that the general idea of what constitute sprawl is known to change with time. This is also the position of Wilson et al. (2003) and Siendentop (2003), that though quite a number of definitions have been suggested, there is no general agreement about the definition of urban sprawl.

Calthorpe and Fulton (2001), note that urban sprawl means different things to diferent people. Brueckner (2000), shares a similar position. He explained that urban sprawl means different things to different people, stating that the dispersion of views has impeded useful discussions on the subject. A major reason for this confusion in the definition of urban sprawl is that the term is used in many studies to encompass the causes, consequences and the different types of urban sprawl (Jaeger et al., 2010). This is in line with the submission of Queslati et al. (2015), that the literature on urban sprawl incorporates the works of economists, geographers and planners. Hayden (2004), is of the opinion that each area of specialization has its own "language" of the term, stating that while professionals from different specializations shed lights on various aspects of urban sprawl, the differences in language and perspectives contributes to the lack of cohesive definition. There is also a general disagreement as to the classification of particular urban forms of development that should be categorized as urban sprawl or not.

Franz et al. (2013), in their submission, gave seven reasons responsible for these difficulties in the definition of urban sprawl. First, the term is used in a scientific context as well as in public and political discussions. Second, it is used by various scientific disciplines in different manners and from different perspectives. Third, the term is so broad, that it leaves much room for misinterpretations. The fourth is that causes, characteristics and consequences of sprawl are often confused. Fifth, it is hard to differentiate sprawl from other related terms

like suburbanization, urban growth or suburban development. Sixth, the absence of a generally accepted definition of the term has created different ways of measurement of the concept. Lastly, there is further confusion as the term is used for characterizing a situation as well as a process.

Small (2000), argues that sprawl is a term often used as a medical analogy by the public and policy-makers. He describes sprawl as a disease that is detected by its many undesirable symptoms. In the views of Audirac et al. (1990), the term is too general a concept and a definition has become a methodological quagmires since it is so abused and lacks a precise meaning. In the understanding of Galster (2001), sprawl is seen as a condition of land use with aesthetics, efficiency, equity and environmental aspects as the general approaches to sprawl.

2.2.2.1 Definitions of Urban Sprawl

Although there are debates over the precise definition of urban sprawl, Queslati et al. (2015), posited that a general consensus seems to be emerging that characterizes urban sprawl as a multidimensional phenomenon, typified by an unplanned and uneven pattern of urban development that is driven by a multitude of process and which leads to the inefficient utilization of land resources.

Hayden (2004), defines sprawl as a process of large-scale real estate development resulting in low-density, scattered, discontinuous, car-dependent construction usually on the periphery of declining older suburbs and shrinking city centers. Bourne (2001), defined urban sprawl as any extension of the suburban margin, the spread of development into sensitive green fields and agricultural soils, increases in highway congestion, the proliferation of new subdivisions of homogeneous and low density single-family housing. Brueckner (2000), defined urban sprawl as the excessive spatial growth of cities.

Galster et al. (2001), defined urban sprawl as the low levels of some combination of density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity in a so called urban area rather than a metropolitan region. Urban sprawl is defined by Queslati et al. (2015), as the phenomenon of increasingly large urban areas taking up a greater proportion of the available land area. Stan (2013), defined urban sprawl as a phenomenon of geographical expansion of urban areas due to peripheral implantation of sparse types of

functions-mostly residential-at the expense of large areas mainly agricultural. The author posited that urban sprawl is correlated with a reduction in the density of urban areas by the increase in territorial spread that is faster than the growth of urban population.

According to Ewing et al. (2002), urban sprawl is the process in which the spread of development across the landscape far outpaces population growth. The landscape created by sprawl has four dimensions: a population that is widely dispersed in low-density development; rigidly separated homes, shops and workplaces: a network of roads marked by huge blocks and poor access: and a lack of thriving activity centers, such as downtowns and town centers.

Jaeger et al. (2010), defined urban sprawl as a phenomenon that can be visually perceived. Wapwera (2012), defined urban sprawl as an unplanned outgrowth, little planning control of land subdivision of urban centers along the periphery that is physically expanding with a pattern of low-density expansion of large urban areas, along highways, along the road connecting a city, mainly into the surrounding agricultural areas, around the fringes of cities, towns and urban areas. This definition is exemplified by the growth of urban sprawl along the major exit corridors in Benin City.

The Sierra Club (1998), defined urban sprawl as low-density development beyond the edge of services and employment which separates where people live from where they work and therefore requiring cars. The European Environmental Agency (EEA, 2000), defined urban sprawl as the physical pattern of low density expansion of large urban areas under market conditions into the surrounding ones. Stan (2013), defined urban sprawl as a phenomenon of geographical expansion of urban areas due to peripheral implantation of sparse types functions, at the expense of large areas mainly agricultural.

Travisi and Camagni (2005), defined urban sprawl as the uncontrolled spreading out of a given city and its suburbs over more and more semirural land at the periphery of an urban area. They further stated that the sprawling process of expansion is disordered, unplanned, leading to inefficient and unsustainable urban expansion patterns. The UN-HABITAT (2015), defined urban sprawl as the physical expansion of the city's built environment, which usually uses up surrounding rural areas, generally characterized by low-density settlements that are car dependent and often lack access to public infrastructure and services.

From the definitions given above, it is observed that a universally accepted definition of urban sprawl does not exist. One of the fundamental ability of all the definition is to capture uncontrolled and inefficient urban dispersion, accompanied by low building and population density, over rural or semi-rural areas, likely to be mainly found in peripheral areas of cities most recent and changing sectors (Altieri et ai., 2013).

In an attempt to create a working definition of the concept, Nelson et al. (1995), summarizes the various definition of urban sprawl in the planning literature as unplanned, uncontrolled and uncoordinated single use development that does not provide for a functional mix of uses and/or not functionally related to the surrounding land uses and which variously appears as low-density ribbon or strip, scattered, leapfrog or isolated development.

For the purpose of this study, urban sprawl is defined as the uncoordinated and inefficient low-density outward expansion of a city's built-up area usually around the outskirts and along major roads into such cities having haphazard layout, resulting in the conversion of fertile agricultural land into residential and other commercial uses occurring over a period of time.

2.2.2.2 Characteristics of Urban Sprawl

Gillham (2002), notes that there are four main characteristics of urban sprawl. These characteristics are leapfrog or scattered development, commercial strip-development, low density, and large expanse of single-use development. These characteristics give a reflection to the definition of urban sprawl given by Nelson et al, (1995). Further explanation by Gillham (2002), shows that urban sprawl can be distinguished by the unbroken fabric of privately owned properties that are separated by public roads.

Plate 2.3: Land Expanse of Open Land in Study Area

Source: Author's Fieldwork, 2016.

Burchell et al. (1998), presented what could be regarded as the most comprehensive literature synthesis of the characteristics of urban sprawl. They characterise sprawl as residential low-density scattered development and non-residential scattered development. They listed three distinct defining characteristics of urban sprawl. These characteristics are spatial patterns, root causes and main consequences of urban sprawl. Under spatial patterns on the list are low density, unlimited outward expansion, spatially segregated land uses, leapfrog development and widespread commercial strip development. Under root causes of urban sprawl are lack of central ownership or planning and highly fragmented land-use governance. Transport dominance by motor vehicles, great variance in local fiscal capability and reliance on filtering for low-income housing made up the list under main consequences of urban.

Ewing (1997), in his review, finds poor accessibility as the most common characteristic of urban sprawl. He also noted that other characteristics of urban sprawl include scattered or leapfrog development, commercial strip development, uniform low-density development, or single-use development having different land uses separated from one another.

Plate 2.4: Poor Access Road in Study Area

Source: Author's Fieldwork, 2016.

Galster et al. (2001), gave one of the most elaborated characterization of urban sprawl. They submitted that urban sprawl is characterized by eight dimensions. The first of these dimensions as presented by them is density, which is regarded as the most widely used characteristic of urban sprawl that describes different types of density. The second of these dimensions is continuity, which is the degree to which the unused land has been built densely in an unbroken fashion. Sprawl can be observed to be continuous in one place and dis-continuous in other places. Concentration, which describes the degree to which development is located disproportionately rather than evenly distributed is the third of these dimensions. Clustering, which states that urban sprawl is frequently clustered, meaning that it only occupies a small portion of the respective land area is the fourth dimension. The fifth of these dimensions is referred to as centrality, the loss of which is one of the most serious concerns about urban sprawl. Nuclearity, which describes the extent to which an urban area is characterized by a mononuclear pattern of development is the sixth. The seventh of these dimensions is mixed uses in land subdivision as urban sprawl is seen as a process that separates the different kinds of land uses. This means the separation of homes, workplaces, conveniences and income

segregation along residential communities. Proximity, which is the degree to which land uses are close to each other is the eight and last of these dimensions. The lack of proximity contributes to many of the externalities attributed to urban sprawl.

Plate 2.5: Large House in Large Expanse of Land

Source: Author's Fieldwork, 2016.

Although the above characteristics of urban sprawl appear to be on the negative side, it is believed by some researchers that there are positive aspects of urban sprawl. Burchell and Mukherji (2003), are of the opinion that urban sprawl has made it possible for people to have access to cheap, single family homes on large expanse of land situated away from the ever-busy urban centers with very high crime rate and poverty. Carruthers and Ulfarsson (2002), lay credence to this view when they note that urban sprawl is very attractive to developers because it is generally more profitable than inner-city redevelopment as developers do not have to bear the cost of removal of existing structures on site nor upgrading surrounding infrastructure.

Plate 2.6: Large Single Dwelling House in Study Area

Source: Author's Fieldwork, 2016.

It is important to note the characteristics of urban sprawl stated above are observed within the study area with proximity, leapfrog or scattered development and low-density development, being the most prominent of these characteristics.

2.2.2.3 Causes of Urban Sprawl

Gargiulo-Morelli and Salvati (2010), believe that urban sprawl could be caused by a complex system of interacting agents at the base of the dispersed expansion of cities and metropolitan regions. In the view of Gibelli and Salzano (2006), lack of efficient planning at the urban scale is responsible for the rise of urban sprawl. Giannakourou (2005), explains that urban sprawl can be caused by a generalized misuse of non-urban land, determined by polices regulating growth of cities and the development of peri-urban regions. Snyder and Bird (1998), assert that urban sprawl has been facilitated by many interrelated factors, such as significantly cheaper land and cheaper cost of construction at the periphery, lower property taxes, and the increasing employment opportunity at the outskirts of cities.

Gordon and Richardson (1997), defend the growth of urban sprawl on the premise of its being the choice of the consumer. They note that people prefer living in sprawled settlements on the outskirts than living in compact urban centers that are usually overcrowded. Siedentrop (2005), identifies the demand for urban land and specific regulation patterns as two rivalling explanation patterns for the causes of urban sprawl.

Glaeser and Kahn (2003), are of the believe, that sprawl is caused by government policies such as highway subsidies, the deduction of interest in home mortgage and the poor funding of urban public services. They also include the technological superiority of the automobile as the major cause of sprawl. Their argument is based on the fact that public transportation has made it possible for consumers to be residing in places far from their places of work. Cars have two distinct effects on the decentralization of population. The first of these, as noted by Alonso (1964), Jackson (1985), and Brueckner (2000), is that it increase the possible distance between residences and job locations by reduction of transportation cost. The second effect put forward by these authors is that cars eliminate the scale of economies associated with older transportation technologies.

Carruthers and Ulfarsson (2002), noted that urban sprawl is particularly attractive to developers as it is generally more profitable than inner-city redevelopment. This is because developers do not have to bear the costs of removing existing structures on site and that of upgrading surrounding infrastructure as the costs are usually borne by the general public through the payment of public rates and infrastructural costs. Gordon and Richardson (1997), defended the growth of urban sprawl on the ground that it is the consumers' preference that is preferred by people over the crowded and more compact urban environment. These submissions are usually applicable in western and developed countries of the world.

Glaeser and Khan (2003), are of the view that the major factor that has contributed to the growth of urban sprawl is the demand for larger suburban lots. They explained that people who move into the suburbs are motivated to a significant degree by the desire for more living space. Siedentop (2005), submitted that the demand for urban land and specific regulation patterns are the two rivalling explanation patterns for causes of urban sprawl. Mills and Lubebe (1991) and Jackson (1985), argued that the central city problems may have led people to leave and seek solace in bucolic, socially controlled suburbs.

Glaeser and Khan (2003), are of the view that the advent of the automobile and the accompanying lower cost of transportation are the primary catalyst of sprawling cities through much of the twentieth century. This is also the position of Arbury (2005), when he noted that the development and popularization of the automobile in the early twentieth century, which more than any other technological development, made possible the dispersed urban development pattern that characterizes most North American, Australian and New Zealand Cities.

Burchell and Mukherji (2003), are of the view that market, policy and personal choices support conventional development of sprawl because resources are relatively much and society's needs are not advocated for. Burchell et al. (1998), stated that urban sprawl would be possible under a variety of political, economic and cultural conditions which occurred worldwide.

Lower land prices at the outskirts is a major cause of the development of urban sprawl. This is the observation of Olayiwola and Igbavboa (2014), who stated that land and rent values are high around the city core and decreases towards the outskirts. Bhatta (2010), noted that lack of consistent and well-experimented planning policies may lead to the development of urban sprawl, explaining that completely separate zoning creates isolated islands of different type of development. Duany et al. (2007), opined that urban sprawl is the direct result of a number of policies that conspired to encourage urban dispersal. Barnes et al. (2001), submitted that restrictive land-use policies in one political jurisdiction may cause development to move to another jurisdiction that is favourably disposed towards development or is less able to control or prevent it.

Figure 2.1: Causes and effects of the urban sprawl

Wapwera (2012), noted that urban sprawl results from the urbanization of towns and cities. He went further to define urbanization as a key process and a complex set of socio-economic, political, cultural, demographic and environmental development that have resulted into an increase in the proportion of and density of population and resource consumption in towns and cities within urban areas.

In Benin City, the construction of a by-pass road from Obe community in the south, through Eyaen community in the eastern axis to Ovbiogie community in the northern axis, coupled with the lack of effective land use planning have allowed the movement to the outskirts to occur virtually uncontrolled.

Plate 2.8: Chinese-owned Steel Industry in the Study Area

Source: Author's Fieldwork, 2016.

Plate 2.9: Agbor Road End of the Benin By-pass

Source: Author's Fieldwork, 2016.

Plate 2.10: Sapele Road End of the Benin By-pass

Source: Author's Fieldwork, 2016.

Plate 2.11: Oluku End of the Benin By-pass.

Source: Author's Fieldwork, 2016.

Plate 2.13: Mass Transit Bus Linking the City Core and the Suburbs

Source: Author's Fieldwork, 2016.

2.2.2.4 Implication of Urban Sprawl on the Study Area

The impact of urban sprawl may be positive or negative. However, the negative impacts are usually highlighted because urban sprawl is usually uncontrolled and uncoordinated form of development. Bhatt (2010), noted that the consequences and significance of urban sprawl, good or ill, are evaluated based on socio-economic and environmental impacts. These impacts may be overlapping or one may have several indirect impacts.

A lot of negative urban consequences can be attributed to the rise of sprawl. Wassmer (2005), lists some negative consequences of sprawl to include the car and its polluting effects, non-functional open space, air and water pollution, a loss of agricultural land, cost of duplicating infrastructure, concentrated poverty, segregation along racial and economic lines and, absence of employment opportunities. Glaeser et. al. (2003), agrees with this position, by analyzing the impacts of sprawl on the environment in the form of traffic congestion, infrastructure costs, environmental and social consequences. Seidentop (2005), takes a similar position as he identifies ecological, traffic, social and health impacts as the negative impacts of urban sprawl. He noted the destruction of agricultural land, the endangering plant and animal species, the time cost of commuting and the erosion of functioning urban core are the results of urban sprawl. Gillham (2002), noted that urban sprawl leads to the destruction of the natural habitat of many species, resulting in their becoming endangered or putting them on the brink of extinction.

Findings from researches (Guiliano and Narayan, 2003; Garcia and Reira, 2003; Williams. 1999; Anderson et al., 1996; Kenworthy and Newman, 1990; Newman and Kenworthy, 1989; Owens, 1986; Keyes, 1982), show that the rate at which urban sprawl is consuming the landscape and the air pollution created by the high level of automobile reliance are the two main environmental concerns related to urban sprawl.

Arbury (2005), noted that researches have shown reduced social equity, negative health impact, loss of communal life, segregation, polarization and the inability to adapt to changing lifestyles and family structures are some of the evidence of the negative societal consequences of urban sprawl. He also asserted that sprawl may be attractive to homeowners and developers at the individual level, but it does create severe economic, environmental and social problems, stating that economically, urban sprawl is highly inefficient, especially in the provision of services and infrastructure by local authorities. Brueckner (2000), opined that the cost of

providing community infrastructure and public services in sprawled areas increase because people are more dispersed and no longer residing in centralized cities.

Rong (2006), noted that in terms of energy consumption, single-family detached housing, which is a characteristic of urban sprawl, is known to consume more energy than multi-family or single-family attached housing. She also asserted that residents of sprawled communities consume more energy than residents of compact communities.

Although the negative characteristics of urban sprawl are usually highlighted, there are many positive aspects which have contributed to its growth. Burchell and Mukherji (2003), stated that urban sprawl has made it possible for people to have access to cheap, single family homes on large expanse of lands situated far away from city centers that are characterized by crime and poverty, while still enjoying great freedom of movement, as large highway systems have been constructed to accommodate their vehicles.

Arbury (2005), is of the view that there are many benefits of living in sprawled community at the individual level, stating that ownership of large houses, large expanses of land, exclusive neighbourhood multiple vehicles are regarded as signs of success in many cultures. He further asserted that urban sprawl have enabled the fulfilment of many key goals of both at the individual and societal levels, such as the freedom to participate in a democratic government at both the local and national levels. This assertion is shared by Gillham (2002), when he stated that suburbanization, in many ways, is a celebration of individual wealth and freedom.

The major direct implication of urban sprawl in the study area is the change in land use and land cover due to excessive land consumption. Urban sprawl leads to considerable land consumption that results in the increase in the size of the non-agricultural population exceeding the increase in meaningful non-agricultural employment opportunities (2012). This is also the position of the UN-HABITAT (2010/2011), that urban sprawl creates fiscal problems for cities, as it takes place outside of urban administrative boundaries and its encouragement of new developments causes significant loss of prime agricultural farmland. The loss of agricultural land to urban sprawl means not only the loss of fresh food sources but also the loss of habitat and species diversity. The presence of farms on the rural landscape provides benefits such as greenspace, rural economic stability and the preservation of rural lifestyle (Bhatta, 2010).

Another major implication of urban sprawl in the study area is the haphazard development and the poor management of urban planning processes. Since urban sprawl takes place outside urban administrative boundaries as earlier stated, there is the capacity constraints of planning authorities to maintain effective monitoring of the level of compliance to town planning regulations by developers. This leads to a situation whereby developers erect structures on any available space irrespective of the type of structures that are meant for such areas.

2.2.2.5 Measurement of Urban Sprawl

Rong (2006), noted that urban sprawl is as difficult to quantify as much as it is difficult to define. Several researchers have placed emphasis on density as the only indicator of urban sprawl (Fulton et al. 2001). Using data from surveys of the United States National Resource Inventory that estimated the amount of developed land in counties, Fulton, Pendall et al. (2001), defined density as the population of a metropolitan area divided by the amount of urbanized land in that metropolitan area. Their measurement of urban sprawl is based on the assumption that the lower the density of a county, the greater is the amount of urban sprawl.

The method of measurement of urban sprawl proposed by Lopez and Hynes (2003), is based on both the residential density and concentration dimension of urban sprawl. Using data from the 1990 and 2000 United States Census, they calculated the population density of each population tract by dividing its population by its land area. A sprawl index (SI) score defined as $SI_i = [((S\%_i - D\%_i)/100) + 1)] * 50$, is computed for each metropolitan area and transformed with given constants to produce a final score on a scale of 0 – 100. From the above formula, SI_i, is sprawl index for metropolitan area I, $D\%_i$, is percentage of the total population in high-density census tract I (Rong, 2006). They concluded that the size of a metropolitan area is greatly associated with its degree of sprawl, as small metropolitan areas are much more likely to record incidences of urban sprawl.

USA Today (2001), developed the sprawl index to receive the most attention, despite its limitations. This index assigned a score to metropolitan areas based on two density-related measures. The first measure is the percentage of a metropolitan areas' population living in urbanized areas, while the second is the change in the percentage of metropolitan population

living in urbanized areas between 1990 and 1999. Metropolitan areas were ranked on each measurement, with lower numbers representing less sprawl. The two rankings were summed to produce each metropolitan areas' sprawl score.

The Sierra Club (1998), subjectively rated metropolitan areas as more or less sprawling based on population shifts from cities to suburbs, growth of land area against growth of population, time wasted in traffic, and loss of open spaces.

Ewing et al. (2003), county sprawl index incorporated six variables from the United States Census and the Department of Agriculture's Natural Resource Inventory to account for residential density and street accessibility of counties. They include gross population density, percentage of the county population living at low suburban densities, percentage of the county population living at moderate or high urban densities, population density in urban areas, average block size and percentage of blocks with areas less than 1/100 square miles. These variables were combined via principal component analysis into one factor representing the degree of sprawl within the county, and normalizing the factor such that the mean value is 100, and the standard deviation is 25 (Rong, 2006). The bigger the value of the county sprawl index, the more compact the county.

2.2.3 The Compact City

The main proposed alternative to urban sprawl has been termed the compact city model. This model differs greatly from conventional urban development as it focuses on urban intensification, creating limits to urban growth, encouraging mixed-use development and placing a greater focus on the role of public transportation and quality urban design.

During the early 1990s, compact cities policies where enthusiastically implemented by many planning authorities, particularly in the United Kingdom and throughout Europe, as they were linked to the goal of sustainable development, popularized by the 1987 Brundtland Report (Arbury, 2005).

Much of the planning literature from 1990 onward, focuses on the compact city, a concept designed to implement sustainable development within the urban environment and to counteract the perceived social, economic and environmental impacts of urban sprawl. Much of literature on urban design and planning in the 1990s discuss the design of the urban

environment in a more sustainable way, and have proposed the compact city model as the main alternative to sprawl.

Plate 2.14: Amsterdam-Zuidas, created following the strategy of the Compact City.
Source: www.img.photobucket.com

There have been many attempts to define exactly what a compact city is, and how a great variety of urban forms have been promoted as being compact has proliferated throughout literature concerned with urban sustainability over the past few years. Burton (2000), states that the compact city in general, is taken to mean a relatively high density mixed use city, based on an efficient public transport system and dimensions that encourage walking and cycling. Through intensification of development within the city, many problems related to urban sprawl have the potentials to be overcome, reversing the unsustainability of sprawl type developments.

Plate 2.15: Angered's blocks, City of Göthenborg,

Source: www.en.wikipedia.org/wiki/Angered

Williams et al. (1996), believes that more compact cities can be achieved through the process of making existing cities more dense, encouraging people to live in urban areas and of building at higher densities. Williams (1999), is of the opinion that most future urban growth will need to take place within existing city boundaries, since the major goal of the compact city model is to reduce the effect of urban development on the periphery of cities.

Compact city policies have often been designed primarily to reduce the use of private cars and to minimize the loss of open countryside. Thomas and cousins (1996), states that the initial impression of the compact city invokes an intense medieval city, whose limits are clearly visible, and where the hubbub of activity is confined within the city's wall. Lock (1995), defines the compact city as the process of ensuring that the fullest use is made of land in urbanized areas before developing green fields.

However, proponents of the concept claim more than just environmental benefits can be gained from intensifying urban areas. William (1999), posited that higher density settlements are more socially sustainable because local facilities and services can be maintained due to higher population densities, and therefore accessibility to goods and services is more equitably distributed. Furthermore, higher density urban living is seen as a prerequisite for vitality, vibrancy, cultural activities and social interaction.

Williams (1998), believes that more benefit can be gained from the intensification of urban areas. He is of the opinion that higher density settlements are more socially sustainable because it is easier to maintain local facilities and services. Naess' (1993), defines the compact city as encouraging development in areas where technical encroachment on nature have already taken place.

In spite of the many positive aspects of the compact city, Pratt and Larkham (1996), are of the view that a key problem with this hypothesis is that it merges very diverse concepts together under a potentially misleading banner. Williams (1999), is of the view that intensification policies are fraught with contradictions and difficulties. McLaren (1992), believe that intensification of cities lead to high rise apartment buildings that are often associated with crime, overcrowding and other failure of "tower block living".

McLaren (1992), notes that most local population in the United Kingdom continue to express a preference for spacious low density living. Goodchild (1994), argues by identifying survey reports by the United Kingdom government suggesting that residential dissatisfaction only appears to increase when density levels exceeds 200 beds spaces per hectare. Elkin et al. (1991), claimed that the benefits of urban compaction are at the very least romantic and dangerous, and do not reflect the hard reality of economic demands, environmental sustainability and social expectations. Gordon and Richardson (1997), opine that plans to rejuvenate downtown areas through intensification have frequently recorded failures and that there has been little empirical evidence showing that higher population densities lead to economic growth.

Breheny (1992, 1996), Stretton (1996) and, Gordon and Richardson (1997), have questioned the feasibility and acceptable implementation of the compact city approach. Their skepticism to this approach is rooted to the realization of how entrenched urban sprawl has become over the years and consumers preference for bigger homes on large expanse of land. This is also the views of Williams (1999), Burton (2000), Jenks et. al. (1996) and, de Roo and Miller (2000). These researchers questioned the implementation of the radical changes that the compact city will bring about in the urban design of most cities especially in the United States, Australia and New Zealand (Arbury, 2005).

Burton (2000), is of the view that reductions in dwelling sizes due to increased densities, health risks associated with residential overcrowding or the close proximity of residential areas

to industrial areas are some undesirable social outcomes of the compact city model. He also listed higher crime rates commonly linked with high density living, the potentially negative impacts on social segregation and housing affordability as some of the negative outcomes arising from the compact city model. Critiques of the feasibility of the compact city are based on the grounds that such policies would have far-reaching consequences on the very nature of Western-Cities and as such may be difficult to implement (Arbury, 2005).

The traditional land-use pattern which has been adopted since the pre-colonial era makes the application of the compact city model easy in Benin City. This is because the compact city concept has evident relations with traditional urban planning workshops referring to the composition of spatial form and city-forming factors (Sawicker, 2017). For a successful application of the compact city model, future growth of the Benin City will need to occur within the existing metropolitan area in the form of urban intensification. The existing metropolitan area of the city is defined by the areas that fall within the by-pass road which will form an outer ring-road.

Using Figure 2.5 below as a guide, a radius of about 13 kilometers, stretching from the core which is also the Central Business District of the city to the by-pass road will be taken. The areas falling within this radius could be described as the area of growth of the city. The five major roads linking the city's core to the by-pass road are connected by three circular roads commencing from Uselu Lagos Road and Akpakpava Road terminating at Sapele Road. Other circular roads connecting these major roads should be constructed particularly around the Ramat Park area of the city. These outer circular roads should be linked with the existing circular roads at intervals to create easy accessibility for future developers. The unused spaces within this radius should be filled through the process of intensification and re-intensification with areas provided for recreation.

Single-use buildings within the core and Third East Circular road radius should be remodeled and converted to multi-use buildings serving both residential and commercial purposes. This practice is presently in existence around the core area but the buildings are usually bungalows and low-rise buildings. These buildings are to be upgraded to high-rise, higher density buildings with variety of housing, jobs and other uses.

2.2.4 Trends and Urban Growth Pattern of Benin City

Urban sprawl and urban growth are both age-old phenomenon. Urban sprawl is directly identified with urban growth as cities are known to expand around their peripheries as they get bigger. However, urban sprawl is the uncoordinated expansion of cities with disregard for its consequences and its impact on the environment.

Urban growth could be regarded as the meeting ground for urbanization and urban sprawl. It is the increase in the population of a city resulting from the large movement of people into urban areas from suburban and rural areas. Urban growth could result from natural increase in population, migration and redefinition of boundaries of cities through annexation of surrounding villages or rural areas.

It has been observed that rapid urban growth is the leading cause of social, economic and environmental problems which include loss of biodiversity, climate change and other problems resulting from the concentration of human activities (Enaruvbe and Isibor, 2015). Rapid urban growth is the major cause of urbanization, which contributes largely to the development of urban sprawl in cities across the world (Oloukoi, Oyinloye and Yadjemi, 2014). Ojiefo and Eseigbe (2012), noted that urban growth has been one of the most significant socio-economic developments that have taken place in the last fifty years in africa, leading to the unprecedented transformation of many rural settlements into urban centres.

Odjugo et al. (2015), observed that the urban growth pattern of Benin City did not follow any single theory of urban growth. It is rather a combination of features of the major theories of urban growth- Concentric zone, Sector and Multiple nuclei theories. This is also the position of Olayiwola and Igbavboa (2014), when they submitted that the nature and spatial pattern of urban sprawl in Benin City clearly fit into the models of urban structure such as the concentric zone, Sector and the Multiple-nuclei theories.

The Concentric zone theory propounded by Burgess in 1925, is one of the earliest theoretical model to explain urban social structures. This model depicts urban land usage in concentric rings. The model proposed that cities grow in zones outwards of the center. The growth of Benin City radiates from the City Center and extends in different directions following the major roads engulfing the surrounding villages in the process (Odjugo et al., 2015). This growth pattern follows the concentric theory.

The Sector theory proposed by Hoyt in 1936, states that cities grow in sectors rather than in concentric zones (Odjugo et al., 2015). This model is a modification of the concentric zone model of city development. The benefit of the application of this model include the fact that it allows for the outward progression of growth, though its validity is limited as with all simple models of such complex phenomena (Smith, 1962). This model states that development tends to grow along transportation corridors outward from the city, forming wedge-shaped areas that follow the path of least resistance and most economy (Evans, 2007).

The Multiple-nuclei theory advanced by Harris and Ullman in 1945, shows that the growth of cities are not always in zones and sectors, but similar activities are grouped together in certain districts that leads to the growth of such districts (Odjugo et al., 2015). This is a model of urban land-use in which a city grows from several independent points rather than from one central business district, with each point acting as a growth centre from a particular kind of land use.

The development of urban sprawl in Benin City is believed to have started from the Oluku/Ovbiogie village axis of the city. This is as a result of the massive commercial opportunities provided in that area being a major gateway into the city. Also, this axis has the major tertiary institutions such as the University of Benin and its teaching hospital; and the Seven-Up Bottling Company, Iguosa. This area is also preferable for workers commuting from Benin City to the College of Education, Ekiadolor; Edo State Institute of Technology and Management, Usen and Igbinedion University, Okada. From this axis, urban sprawl development in Benin City has spread through Eyaen community in the eastern axis to Obe community in the southern axis. It should be noted that all these communities are located around the by-pass road that ran from Ovbiogie/Oluku communities to Obe community.

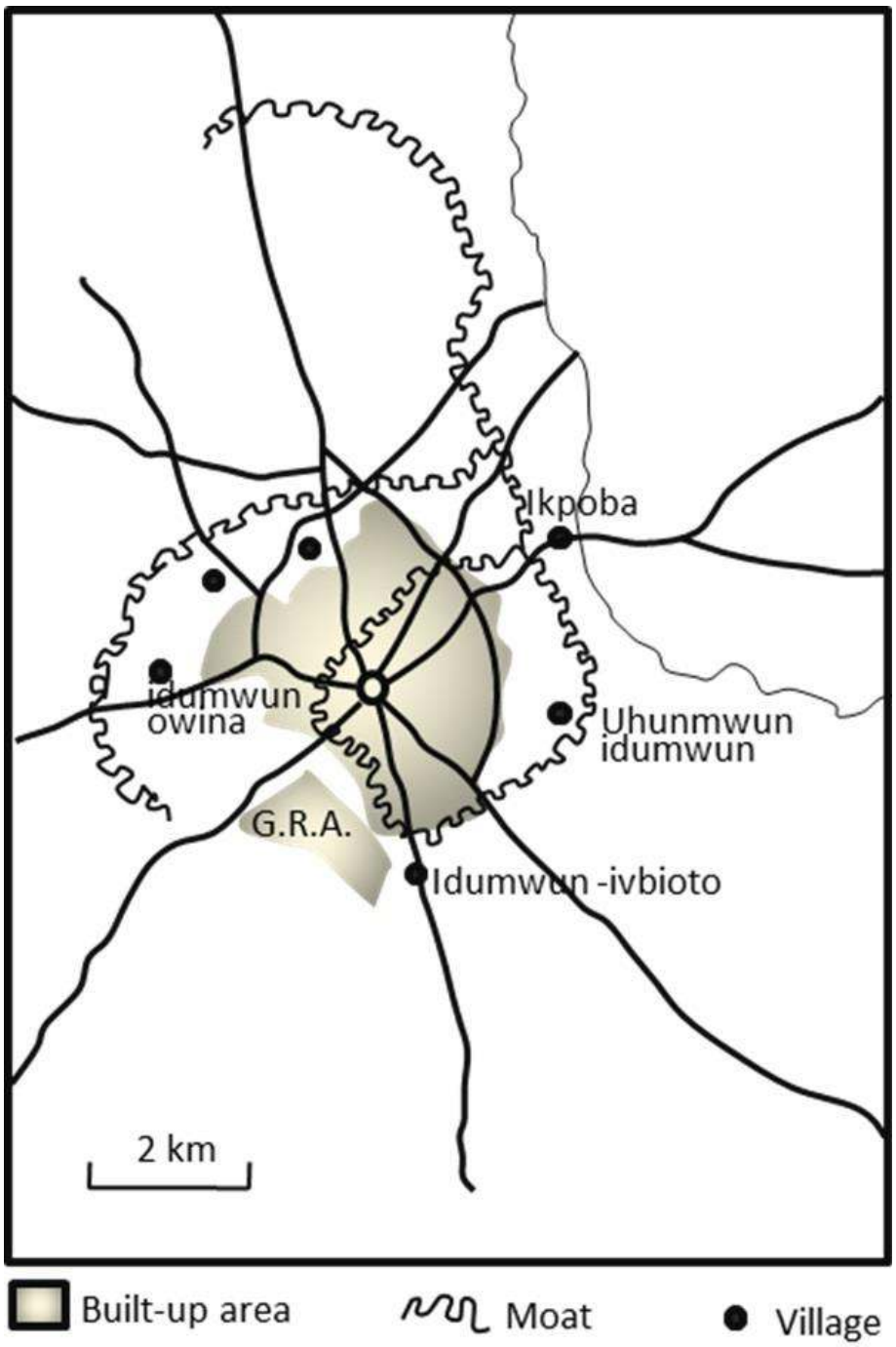

Figure 2.2: Phases of Urban Growth in Benin City Region in 1952

Source: Onokerhoraye, 1977.

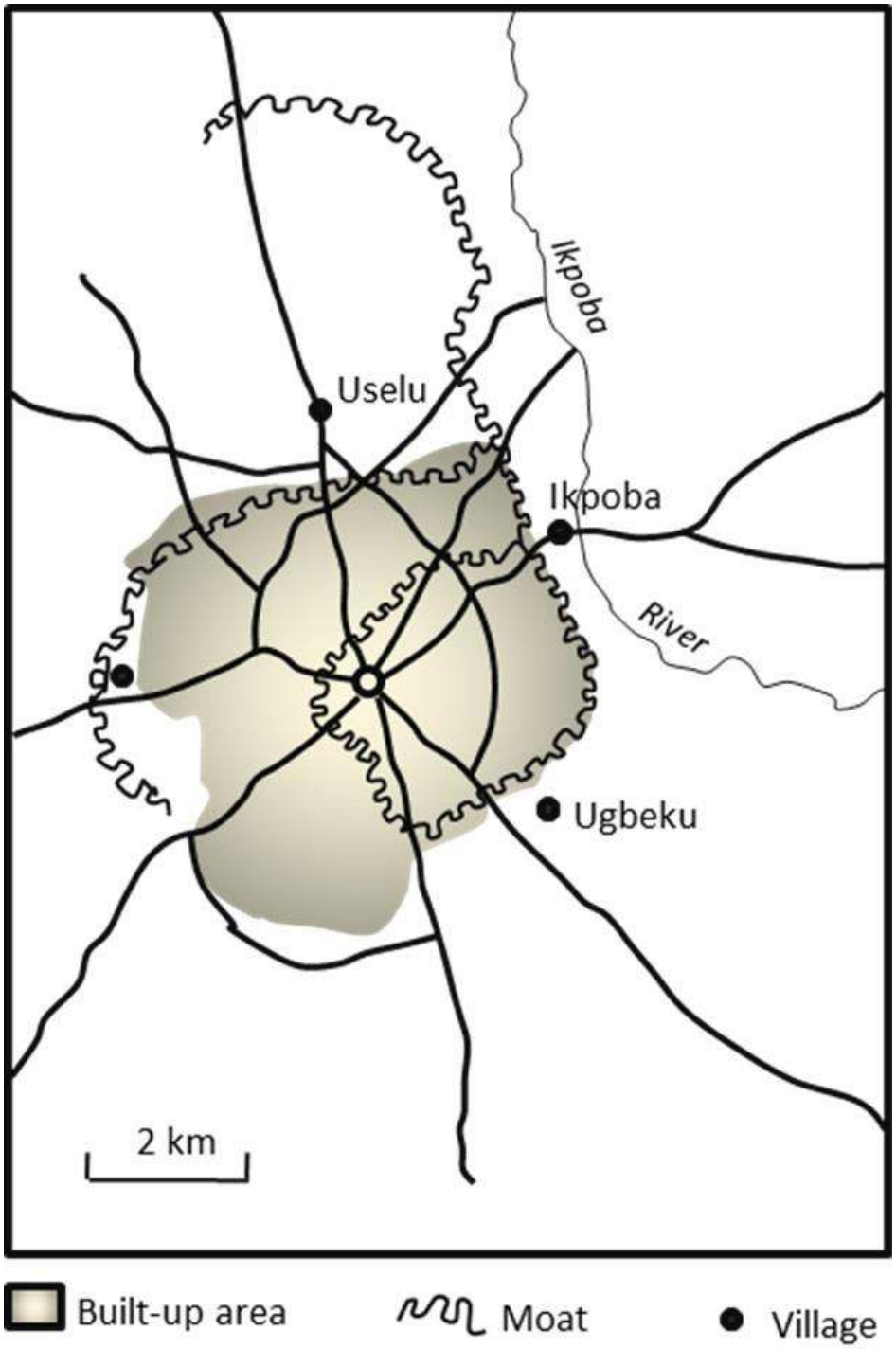

Figure 2.3: Phases of Urban Growth in Benin City Region in 1972

Source: Ministry of Lands and Housing, Benin City.

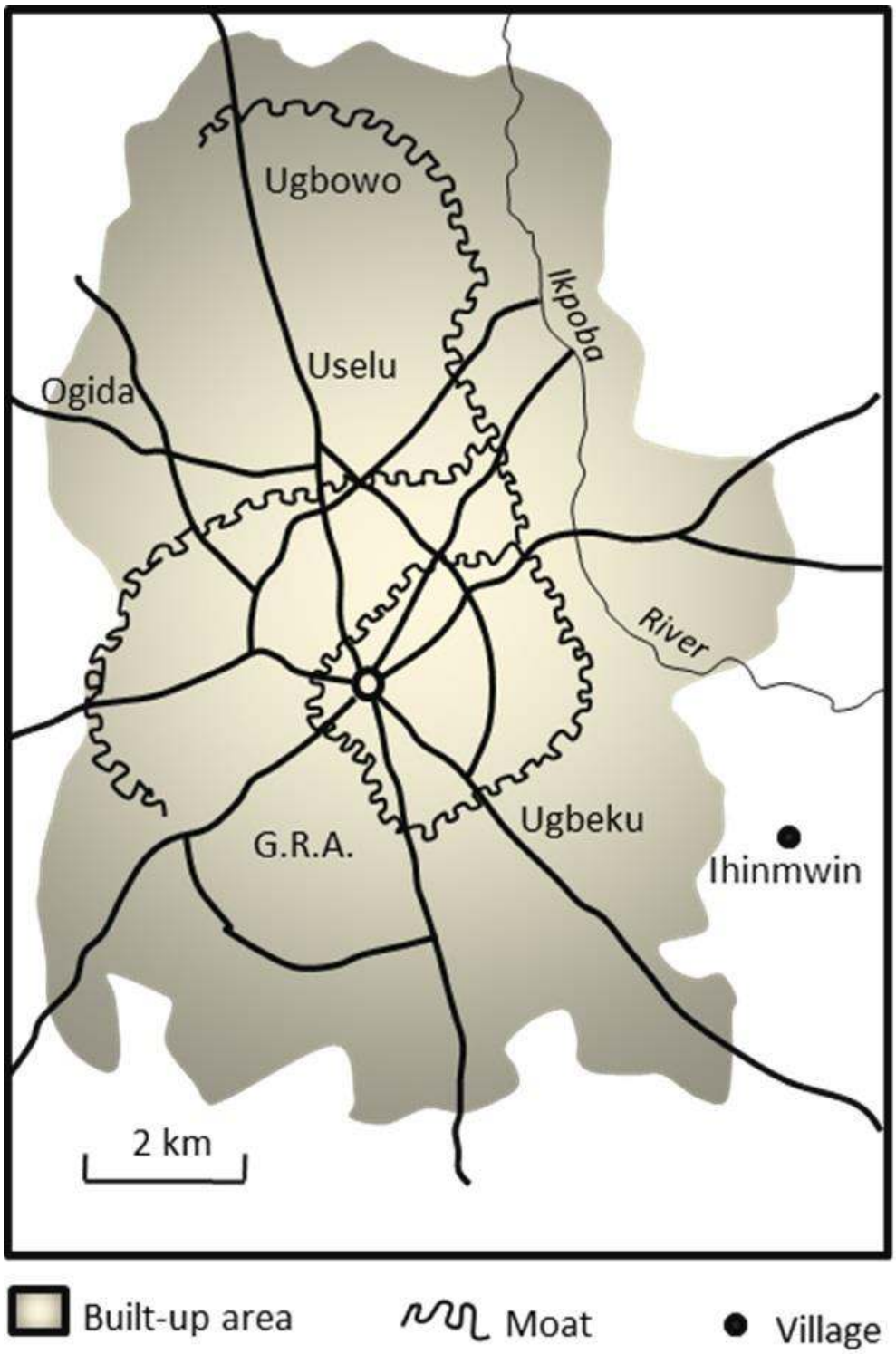

Figure 2.4: Phases of Urban Growth in Benin City Region in 1982

Source: Ikhuoria, 1981.

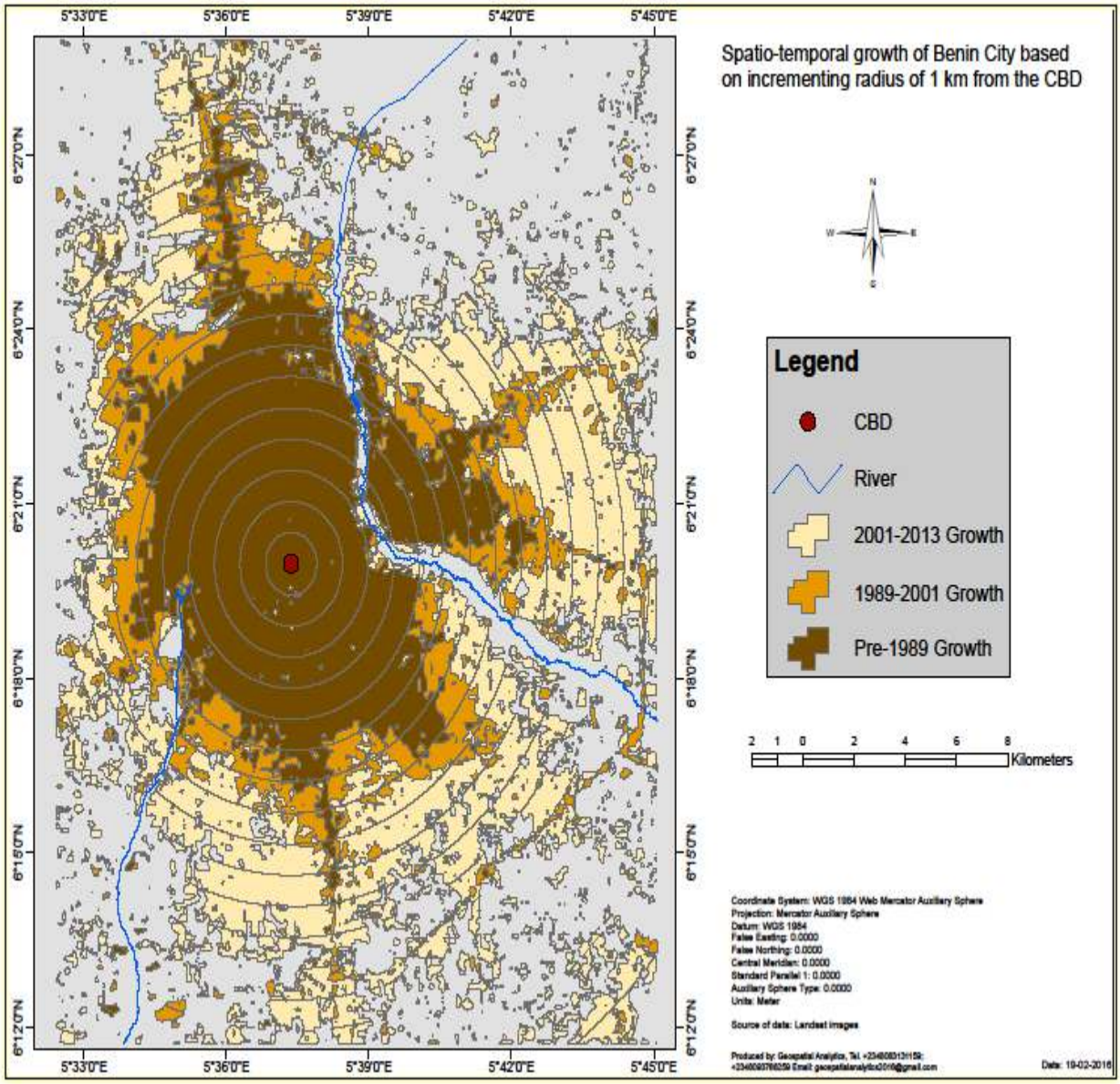

Figure 2.5: Spatio-temporal Growth of Benin City Based on Incrementing Radius of 1 km from the CBD

Source: Author's Fieldwork, 2016.

Olayiwola and Igbavboa (2014), stated that the concentration of economic activities at the center of the city attracted traders at the peripheries to the core. They also asserted that the spatial spread of the different commercial centers for the sale of specialized goods is responsible for the growth of such areas. They also listed four factors responsible for the growth pattern of Benin City to include accessibility, low cost of land, the nature of land in Benin City and the influence of urban sprawl.

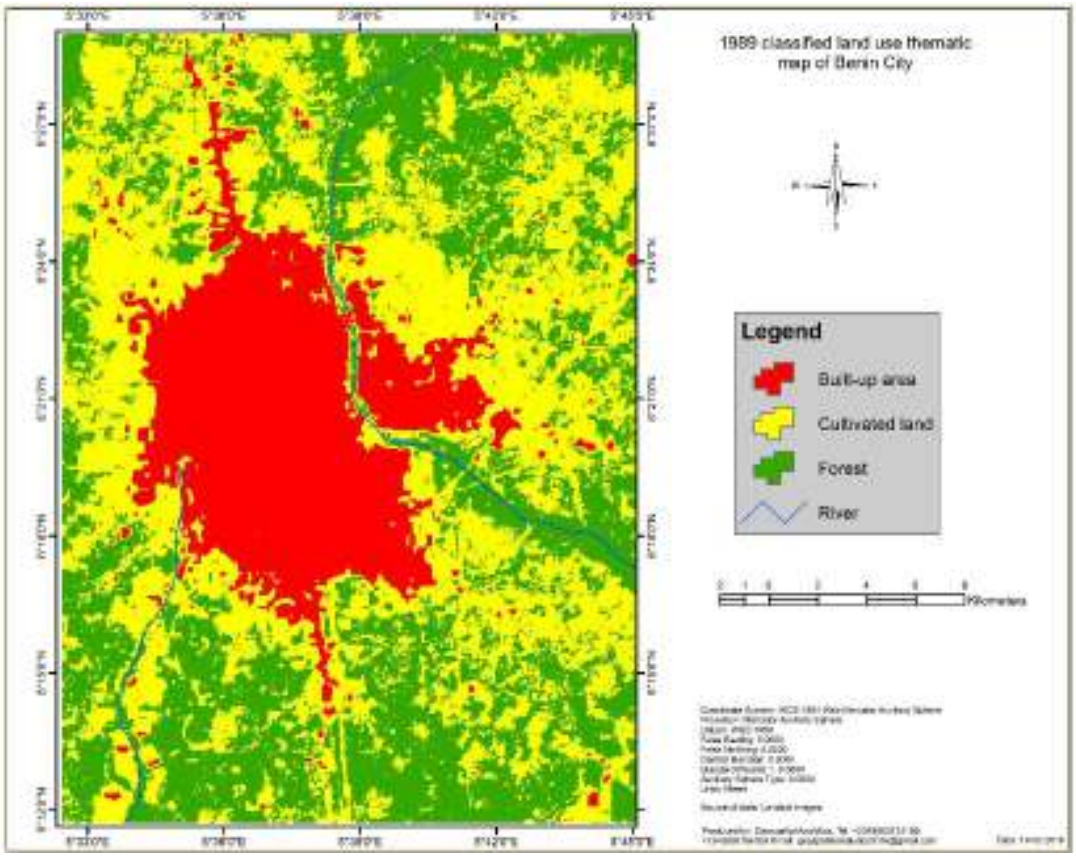

Figure 2.6: 1986 Classified Land Use Thematic Map of Benin City

Source: Author's Fieldwork, 2016.

According to Odjugo et al. (2015), the high rate of urban growth of Benin City could be attributed to the increasing in the demand for socio-economic infrastructure and housing resulting from the influx of people from different parts of the surrounding countryside.

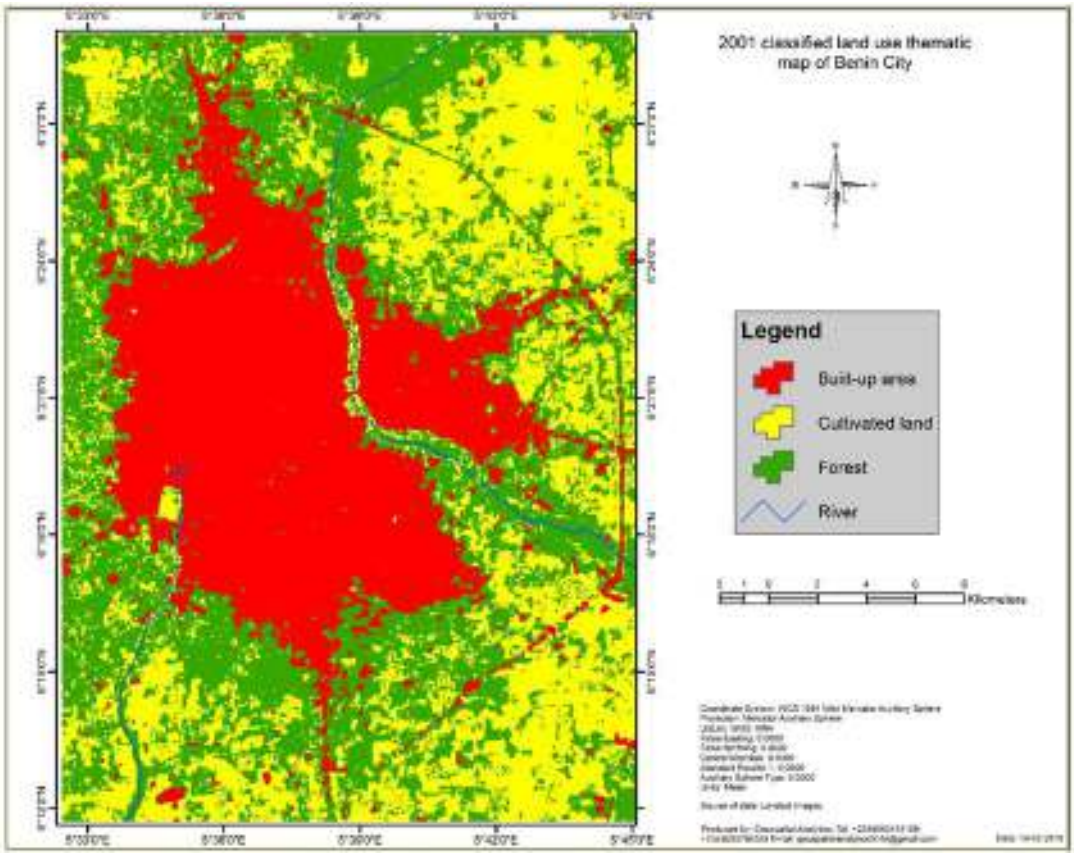

Figure 2.7: 2001 Classified Land Use Thematic Map of Benin City

Source: Author's Fieldwork, 2016.

This is in line with the observation of Onokerhoraye (1995) and de Jong et al. (2000), that rural-urban migration is a key factor that influences the rate and pattern of urban growth in many cities across Africa. Studies by Odjugo et al. (2015), showed that by 1987, the land use pattern of Benin City was a rather compact and radial pattern from the City center, with growth occurring mostly in a north-south direction. They noted that the city grew at about 0.2% per year between 2002 and 2013, expanding from 339 square kilometers to 359 square kilometers. Studies by Olayiwola and Igbavboa (2014), identified three distinct growth phases in Benin City. Their findings were based on studies by Ikhuoria (1984), that traced the growth and development of Benin City between 1900 and 1987. Their findings revealed that the built-up area of Benin City was about 14.79% of the total land use in the period between 1980 and1987. They observed that by the period between 1988-2000, the built-up area of Benin City has increased to 22.53% of the total land area, representing an increase of 7.74% over that of the period between 1980-1987. The period between 2001 and 2008 shows an

increase of the built-up area of Benin City to 50.51% of the total land area. This shows a greater expansion of the built-up area and the increase in the incidence of sprawl at the peripheries.

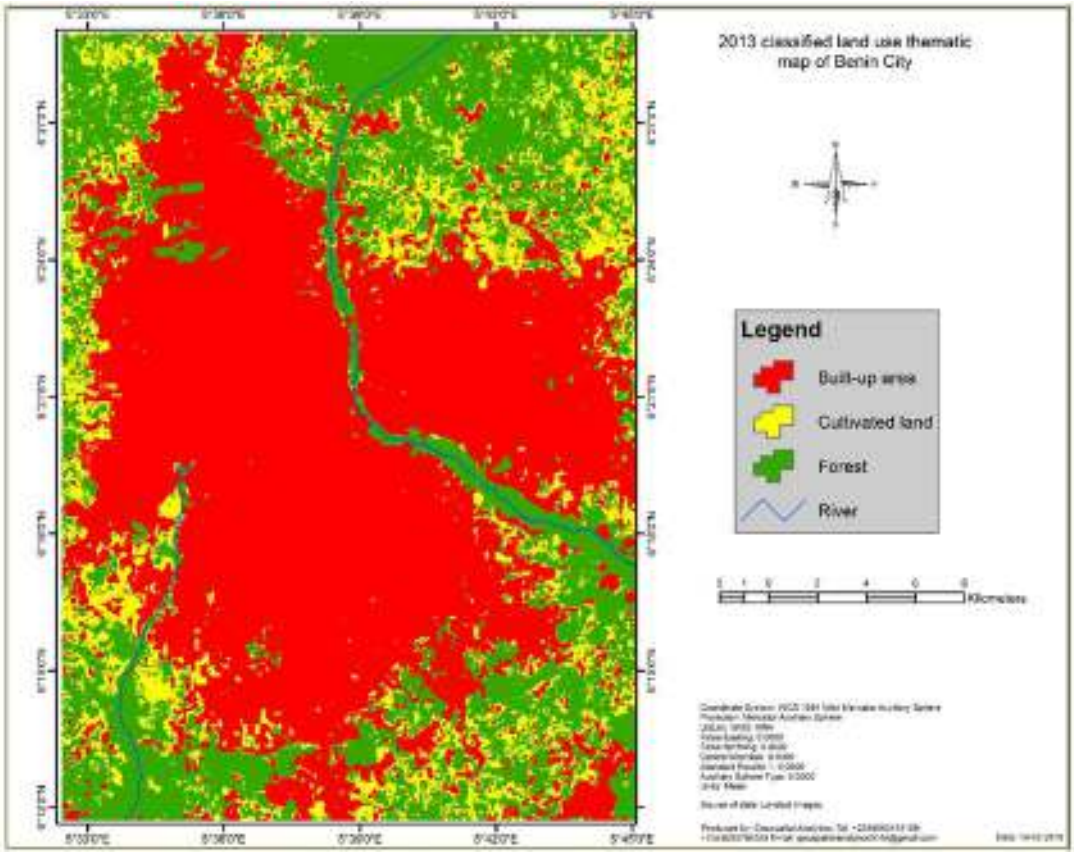

Figure 2.8: 2013 Classified Land Use Thematic Map of Benin City

Source: Author's Fieldwork, 2016.

2.3 Theoretical Framework

Agenda 44 of the New Urban Agenda report recognized that urban form, infrastructural and building design are among the greatest drivers of cost and resource efficiencies, through the benefits of economy of scale and agglomeration and by fostering energy efficiency, renewable energy, resilience, productivity, environmental protection and sustainable growth in the urban economy (UN-HABITAT III, 2016). As it is being observed, one major challenge facing the contemporary cities is the determination of priorities of spatial development and the creation of a uniform approach in urban development (Sawicka, 2017). In the past two decades, the compact city development has been seen by many researchers as the preferred response to

the achievement of the goals of sustainable development. The concept of the compact city is focused on the efficient use of urban spaces as against the ever increasing phenomenon of suburbanization (Jenks, Burton and Williams, 1996; Williams, Burton and Jenks, 1996).

The theoretical framework discussed in this section consists of a proposed definition of the compact city, development principle for guiding its planning and establishment, design elements of the compact city and lastly, a number of pre-conditions for the planning and development of the compact city.

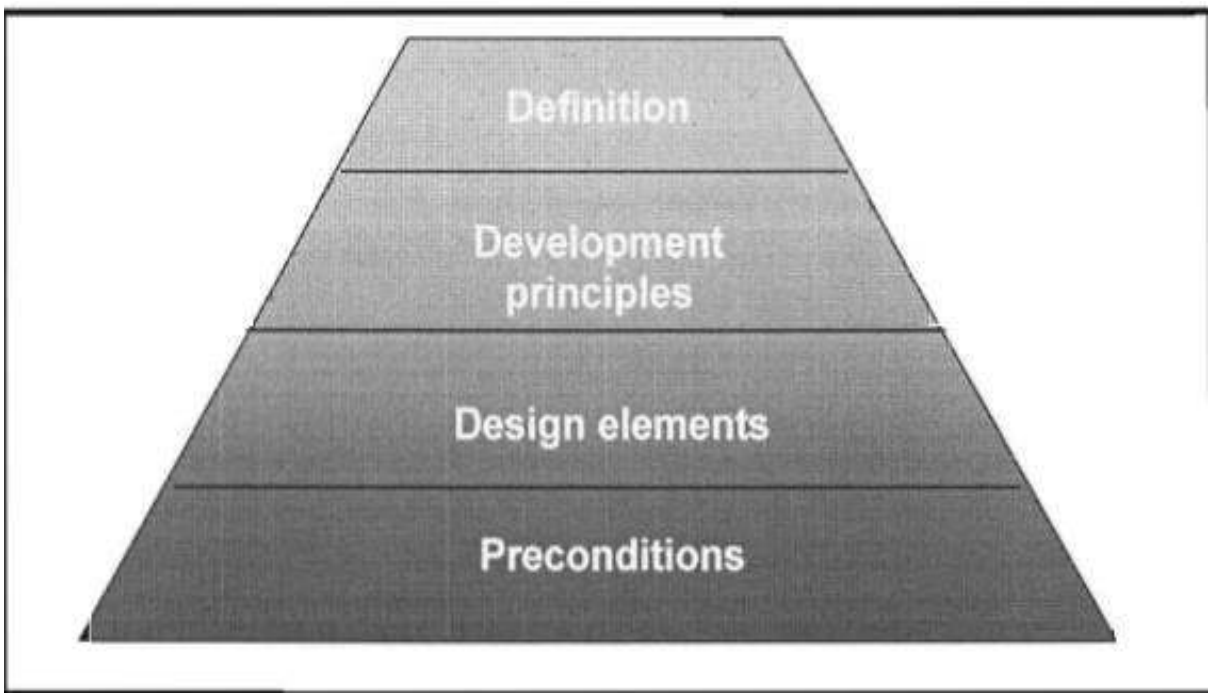

Figure 2.9: A Schematic Representation of the Theoretical Framework Components.

2.3.1 Compact City Definition

The compact city concept is seen as a very complex urban strategy involving different dimensions acting together, resulting in many definitions being put forward by different researchers. Williams et al. (1996), opined that the concept does not have a common definition but is usually associated with the term urban intensification that relates to a range of processes that make an area more compact. Burton (2002), stated that the compact city has a variety of definitions but is generally taken to imply a relatively high-density, mixed-use city that is based

on an efficient public transportation system with dimensions that encourage walking and cycling. In his definition, Lock (1995), states that the compact city is a process of ensuring that the fullest use is made of urbanized land before taking green fields. This definition is similar to that put forward by Naess (1993), that sees the compact city as the encouragement of development to where technical encroachments on nature have already taken place.

From the definitions above, it could be noted that through the intensification of developments within the city, many problems emanating from urban sprawl development could be overcome, thereby reversing its unsustainability. Compact city policies are primarily designed to reduce the use of private cars and minimise the loss of open countryside (Arbury, 2005). Three processes were identified by Burton (2002) as being involved in the task of measuring urban compactness. The first of these is the identification and definition of the different aspects of compactness. The second process involves the development of indicators for the measurement of each of these aspects; while the third process is calculating and reviewing the measure of indicators for a range of towns and cities.

2.3.2 Development Principles of a Compact City

It should be noted that no two compact city models could be similar. Therefore, defining a single set of principles to be used for the planning and implementation of compact city developments does not exist. What is obtainable is the identification of a number of generally acceptable principles found in the planning and implementation of the process. However, one or more of these principles found in the development of a compact city will vary for different city and may not be relevant to or be found in all compact city developments. The major principles identified by Planners are grouped under four broad-based groupings for easy reference. The broad-based groupings are transportation, land-use, economic and social principles.

2.3.3 Elements of a Compact City

The typical design elements incorporated into any compact design model include amongst others, economic activity nodes, public transportation links between economic activity nodes, activity links, mixed land-use, higher density residential development, mobility links, accessible public facilities and open spaces.

2.3.4 Preconditions for Compact City Establishment

A number of preconditions for the successful planning and implementation of the compact city model have been identified by different researchers. The identified preconditions are given as transportation-related preconditions, land-use related preconditions, economic-related precondition, social issue-related precondition and locational preconditions. Others are environmental-related preconditions, infrastructure-related preconditions, participatory preconditions, institutional requirement preconditions and policy-related preconditions.

2.4 Chapter Summary

This chapter looked at the phenomenon of urban sprawl as the main form of urban development in the twentieth century. The chapter began with the concept of a city by reviewing some existing literature on cities. This provided a link to the second section of this chapter which is on urban sprawl. This section discusses the definitions of urban sprawl that exist in some literature. Most of the definitions given were vague as they combine the causes, characteristics and implications of urban sprawl. Reviews of different scholars have been able to establish the fact that urban sprawl is a multi-dimensional phenomenon that is clearly economically unsustainable for many businesses, particularly those at the city core that have been affected by the spread of investment towards the outskirts. Urban sprawl, which is the most dominant form of urban development since the beginning of the twentieth century has come under heavy criticisms as it has led to the growth of unsustainable cities socially, economically and environmentally.

This chapter also discussed the compact city model as a sustainable alternative to urban sprawl. This model involves the intensification and re-intensification of urban areas will reduce

car dependency by residents, revive derelict sites and reduce the outward expansion of urban areas. However, the compact city model has come under severe criticisms by many researchers in the areas of its sustainability, its feasible implementation as well as its acceptability by the local populations.

Section five dealt with the trends and pattern of growth of Benin City. This section revealed that the growth pattern of Benin City is a combination of features of the major theories of urban growth- Concentric zone, Sector and Multiple nuclei theories, with the major pattern of growth towards the roads network leading into and out of the city.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

Research is a systematic inquiry into any given subject matter (usually) with the aim of acquiring more knowledge (Uji, 2009). Research is carried out to discover a particular aspect of an issue in an orderly manner (Agbola, Alabi and Emeahara, 2013). Adesoji and Babatunde (2014), posited that the essence of research is to solve problems.

Research methodology is described by Fasakin (2000), as a process, procedure, principle, method and instrumentality to source, specify, define, collect, process and analyze data and information with a view to presenting the overall information on the research population. Egunjobi, Olatubara and Ajide (2013), described research methodology as the procedure to follow to achieve the research objectives that enables a scientific assessment of the proposal.

To have adequate and appreciable knowledge of the research that will be responsive to human welfare, there is a need to develop a research methodology for the collection and analysis of data. The procedures by which data and other information required for this study were sourced and collected, processed, analyzed and interpreted are explained in this chapter. The study will employ the design of questionnaire which will be used to elicit responses on pertinent issues within the research variables. The variables will be specified and operationally defined.

Many empirical studies exist on the development of urban sprawl in Benin City. More studies are however required to increase available on this area of study. The major source of data acquisition in Nigeria is results from census survey. The data from this source is not very regular as they are known to focus mainly on head count, housing characteristics and housing demand. As a result of this, data on the development of urban sprawl in the suburbs of Benin City relied on data sample acquired from field survey.

3.1 Types and Sources of Data

The focus of this research is to study the incidence of urban sprawl resulting from the unplanned and uncoordinated special expansion at the periphery of Benin City. The data that will be used in this study to achieve the stated objective will be from two sources, viz; primary and secondary.

For the primary information, copies of questionnaire were administered to elicit information mainly on urban expansion and infrastructural provision. Random sampling techniques were adopted in the administration of the questionnaire. The data needed included demographic characteristics of respondents, factors influencing spatial expansion of Benin City and the impact of growth of Benin City on the environment. The sample size of 201 was selected using the systematic random sampling techniques. The city was stratified based on the five local government areas and the major areas with cases of urban sprawl development were identified. The administration of questionnaires was based on the population size of the identified locations. More locations were selected from Ikpoba-Okha local government area for the purpose of questionnaire administration as it has the largest percentage of the land area constituting Benin City (Fig. 1.5). Respondents were randomly selected in the identified locations. The retrieved copies of the administered questionnaires were analyzed by methods described in section 3.8. The questionnaire administered was analyzed to;

i. Determine the driving force behind the growth of Benin City.
ii. Identify areas that have been absorbed by the urban expansion and those that would be absorbed in the future if the rate of expansion continues.
iii. Examine if adequate infrastructural provision was keeping pace with the spatial expansion and provide planning implications.

The secondary group of data included;

i. Topographical map of Benin City with the scale of 1:50,000 produced in 1964 by the Federal Survey Department, which will be used as a base information to identify the areas that were absorbed at different periods.
ii. Population figure of Benin City in 1952, 1963, 1991 and 2006 which were collected from the Edo State Office of the National Population Commission (NPC), Benin City, to support the attribute data of the study area.
iii. Cloud free multi-temporal and multi-spectral Landsat images of Benin City, categorized into three temporal periods of 12 years interval (1989, 2001 and 2013). This classification is based on urban footprint analysis, and with respect to the overall land use change detection, utilizing two periods (1989-2001 and 2001-2013). The spectral characteristics of the multi-temporal satellite data are as follows: 2013 Landsat image was resolved with Landsat 8 (which recently became operational in April 11, 2013) optical sensor-OLI (operational land imager) and

TIRS (thermal infrared sensor); the 2001 image was captured with Landsat 7 ETM+ (enhanced thematic mapper); and the 1989 image was resolved with Landsat 5 TM (thematic mapper). All the images have 30 meter (m) spatial resolution. They were downloaded from the U.S. Geological Survey website.

3.2 Research Design

This study utilized the survey research method for the collection of required qualitative and quantitative data from residents in selected parts of the study area. Qualitative research places emphasis on what people say and their actions while quantitative research is concerned with measurement and is usually characterized by a more structured and standardized procedure of data collection (Gilham, 2000). Hutchinson (2004) defined the survey method simply as a means of information gathering through self-report using questionnaires conducting interview. The survey research design has come under heavy criticism in social science literature as superficial in approach as it narrowly surveys the characteristics of the overall population (Nkeki, 2011). The survey design has been shown to be one of the most appropriate methods for quantitative researches.

Osula (2001), emphasized that beside the fact that survey provides a framework for an unbiased and accurate representation of the larger population, it interprete, synthesize and integrate data and point to implications and interrelationship and above all, investigate phenomena in their natural setting. Owens (2002), noted that the survey design is unique as it gather information that are not available from other sources and the same information is usually collected from every respondent.

3.3 Research Population

Research population is the audience to which a research question is administered (Adetoro, 1999). It is a domain of all elements of interest in a particular research. Ogundipe et al (2006) described research population as the totality of all elements, subjects or members that possess a specified set of one or more definite attributes. Similarly, Asika (1991) defined population of a study as a census of all items or subjects that have the same characteristics, or have knowledge of the phenomenon being studied.

From a physical count of the houses in the study area, the research population for this

study was put at 10,503 houses. This figure was discovered to be too large to be analysed within the allotted time for the study. The systematic random sampling technique was therefore adopted for the selection of a required sample for the study.

3.4 Sample Frame

This is the list containing records of the members of the population of the study from which samples can be drawn (Morenikeji, 2006). For the purpose of this study, the total number of houses in one-third of the wards of the Local Government Areas that make up Benin City were be randomly selected and identified in order to have a fair result on which conclusions can be drawn. This gave a total of 10,503 houses.

3.5 Sample Size

Research sample is the representation of the population audience enabling generalization to be made on the results obtained. Kitchen and Tate (2000), emphasize that sample size depends on the variability of the sampling population. The sample size for this study is the total number of houses obtained from a physical count of houses in the study area. The total number of houses obtained was put at 10,503. 2.5% of this total number of houses were considered for this study.

3.6 Sampling Technique

According to Morenikeji (2006), sampling technique helps in the selection of elements in the population. The systematic random sampling technique was used to select respondents for the administration of questionnaires. This was because the number of residential houses in the study area were discovered to be very large to be surveyed within the time frame for the study. This was done by selecting respondents of varying demographic characteristics in the selected wards within the study area.

3.7 Data Collection Procedure

The researcher along with trained students from the department of architectural technology, Auchi Polytechnic, Auchi, were engaged in the administration and data collection of data in the study area. Data was collected at specific period to ensure that the targeted respondents were met.

Five (5) assistants were assigned to each of the five Local Government Areas that make up Benin City. Questionnaires were administered to household heads in the evenings when the respondents have returned from their daily engagements (between 4pm and 6pm).

3.8 Method of Data Analysis

Data collected from the field was processed and analyzed using the Statistical Package for Social Sciences Version 20 (SPSS-20). The data analysis was carried out at three levels, namely: the single factor analysis which describes the population characteristic, otherwise known as univariate analysis using chats, tables and figures. The second level was carried out using the bivariate analysis method to test the hypotheses set in the null format using Chi-Square, Spearman rho and Pearson moment correlation coefficient tests to examine the level of rejection or acceptance. The third level was the multivariate analysis, where multiple linear regression model was used to test the influence of the dependent variables on the independent variables.

Map interpolation and interpretation was used to show the expansion of the study area over the years.

CHAPTER FOUR

ANALYSIS, FINDINGS AND DISCUSSION OF RESULTS

4.1 Analysis and Discussion of Objective One

This objective addresses the first research question which seeks to find out if there is any significant relationship among the socio-economic characteristic of residents and urban sprawl in Benin City. In other words, the objectives seeks to answer the question of whether or not the socio-economic characteristic of residents is responsible for urban sprawl in Benin City. Findings on this objective are presented and discussed using descriptive, correlation (bivariate) and regression (multivariate) analytical methods.

4.1.1 Socio- Economic Characteristics of Residents in the Study Area

According to Engel (1978) and Moughalu (1982), socio-economic class is a relatively permanent and homogeneous divisions in a society into which individuals or families sharing similar values, life styles, interests and behaviours can be categorized.

Tables 4.1 to 4.6 present descriptive analysis of socio-economic characteristics of residents in the study area.

4.1.1.1 Gender of Respondents

The majority of the respondents in the sample population are males as shown in Table 4.1. They accounted for 187, representing 90.0% and the 14 females accounted for 7.0%

Table 4.1: Gender of Respondents

Gender	Frequency	Percentage
Male	187	93.0
Female	14	7.0
Total	201	100

Source: Author's Fieldwork, 2016

4.1.1.2 Age of Respondents

The age structure in the study area indicates a working age population, with high tendencies for productivity and a corresponding high propensity for work. Table 4.2 revealed that 9 respondents (4.5%) are in the age bracket of 16-30years. 82 respondents (40.8%) and 65 respondents (32.8%), respectively are in the age brackets of 31-45years and 46-60years. 45 respondents (22.4%) of the sample population are above the of 61years.

Table 4.2: Age of Respondents

Age	Frequency	Percentage
16-30	9	4.5
31-45	82	40.8
46-60	65	32.3
Above 61	45	22.4
Total	201	100

Source: Author's Fieldwork, 2016

4.1.1.3 Marital Status of Respondents

Table 4.3: Marital Status of Respondents

Marital	Frequency	Percentage
Single	9	4.5
Married	171	85.1
Divorced	5	2.5
Separated	2	1.0
Widow	10	5.0
Widower	4	2.0
Total	201	100

Source: Author's Fieldwork, 2016.

Married people have the highest tendency to build/occupy residential houses of their own than single individuals. This is because married people are more socially responsible as

validated by Ekhaese (2014). Analysis of the marital status of our sample population revealed that single respondents were 9, representing 4.5%. Married respondents were 171, representing 85.1% and divorced respondents were 5, representing 2.5%. Separated respondents were 2, representing1.0%, while widows are widowers were 10 and 4 respondents, representing 5.0% and 2.0% respectively.

Table 4.3: Marital Status of Respondents

4.1.1.4 Educational Background of Respondents

Table 4.4 showing the educational background of respondents reveals a high level of literacy in the study area. A total of 142 respondents have attained different level of formal education. Specifically, 51 respondents (25.4%) have no formal education, while 30 respondents (14.9%) have been educated at the primary school level. 26 respondents (12.9%) have secondary school education, while 86 residents (42.8%) are educated to the tertiary level. 8 respondents (4.0%) have other form of education.

Table 4.4: Educational Background of Respondents

Age	Frequency	Percentage
No Formal Education	51	25.4
Primary School	30	14.9
Secondary School	26	12.9
Tertiary Institution	86	42.8
Others Specify	8	4.0
Total	201	100.0

Source: Author's Fieldwork, 2016

4.1.1.5 Occupation of Respondents

Occupation status is a fundamental reason that determines where people reside and work. Table 4.5 shows that Artisans/Professionals and respondents engaged in farming had the highest percentage of 26.4 each. This is closely followed by respondents engaged in business/trade with 23.9%. Civil Servants made up 14.6% of respondents, while Teaching took up 8.5%.

Table 4.5: Occupation of Respondents

Age	Frequency	Percentage
Civil Servant	30	14.9
Teacher	17	8.5
Business/ Trade	48	23.9
Artisan/ Professionals	53	26.4
Farming	53	26.4
Total	201	100.0

Source: Author's Fieldwork, 2016

4.1.1.6 Monthly Income of Respondents

Income is one of the determinants of socio-economic status. This provides the basis of which individuals are grouped into class levels and categories. However, taking into account other variables of gender, age, marital status, educational background and occupation, income is likely to motivate the necessity to own properties. Income also influence the type and location of such properties. The monthly income of respondents shown in Table 4.6 reveals that 40.3% of the 201 respondents earned below N50,000. 27.7%, earned between N50,001 andN100,000, while 12.1% earned between N100,001 and N150,000. Residents earning between N150,001 and N200,000, and N200,001 are 10.2% and 7.3% respectively.

Table 4.6: Monthly Income of Respondents

Age	Frequency	Percentage
Below 50,000	83	41.3
50,001-100,000	57	28.4
100,001-150,000	25	12.4
150,001-200,000	21	10.4
Above 200,001	15	7.5
Total	201	100.0

Source: Author's Fieldwork, 2016

4.1.1.7 Correlation Analysis of Socio-Economic Characteristics of Residents

To identify the relationship between socio-economic characteristics of residents and socio-economic variables, Pearson product moment correlation, Point-biserial correlation and Chi-square Test presented in Tables 4.7 and 4.8 were derived because of heterogeneous characteristics of the variables. Van acker, Witlox and Wee (2007), identified socio-economic dimensions to include: gender (GENDER), age of respondents (AGE), marital status (MARITAL), education (EDU), occupation (OCCU), and income (INCOME) of respondents.

The results of the correlation analysis socio-economic characteristics of respondents are presented in Table 4.7. Using the Pearson moment correlation test, a positive coefficient ($r = 0.897$) statistically significant at $p \leq 0.01$ alpha level was calculated between age and income of respondents.

From Table 4.7 below, Point-biserial correlation test between occupation and income of respondents calculated was $r_{pb} = 0.815$ statistically significant at $p \leq 0.01$. The strong positive correlation coefficient between occupation and income of respondents ($n = 201$) suggests that, increased occupational engagement (employment) improves income. Similarly, the correlation coefficient between education and income variables was $r_{pb} = 0.813$ statistically significant at $p \leq 0.01$. The positive relationship indicates that more educational activity increases income. Furthermore, a positive correlation $r_{pb} = 0.617$ statistically significant at $p \leq 0.01$ was found to exist between income and gender variables. In addition, the correlation between income and marital status revealed a positive relationship of $r_{pb} = 0.604$ statistically significant at $p \leq 0.01$.

Table 4.7: Correlation Results of Socio-Economic Characteristics' Variables

Socio-Economic Characteristics	Pearson Product Moment Correlation Test	
	AGE	INCOME
AGE	1.000	0.897**
INCOME		1.000
	Point-Biserial Correlation Test	
GENDER	0.406**	0.617**
MARITA	0.547**	0.604**
EDU	0.859**	0.813**
OCCU	0.888**	0.815**

** Correlation is significant at the 0.01 Alpha level.

Source: *Author's Fieldwork, 2016*

Table 4.8: Chi-Square Test Relationship of Socio-Economic Characteristics' Variables

Socio-Economic Characteristics	MARITA			EDU			OCCU		
	Pearson Chi-Square Value	df	Asump. Sig.	Pearson Chi-Square Value	df	Asump. Sig.	Pearson Chi-Square Value	df	Asump. Sig.
GENDER	201.000[a]	5	0.000	114.868[b]	4	0.000	42.021[c]	4	0.000
MARITA				179.262[d]	20	.000	117.633[e]	20	.000
EDU							357.514[f]	16	.000

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .14.
b. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .56.
c. 5 cells (50.0%) have expected count less than 5. The minimum expected count is 1.18.
d. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .43.
e. 25 cells (83.3%) have expected count less than 5. The minimum expected count is .08.
f. 10 cells (40.0%) have expected count less than 5. The minimum expected count is .68.
Source: *Author's Fieldwork, 2016*

The Chi-square test in Table, reveals a statistically significant association ($p \leq 0.01$) among the socio-economic characteristics variables necessitating the rejection of the null hypothesis on the relationship between the two. There is, therefore, no significant correlation between the socio-economic characteristics of the variables leading to the acceptance of H_1, if p-value is less than 0.01 alpha level.

4.1.1.8 Regression Analysis of Socio-Economic Characteristics of Respondents

Multiple regression analysis carried out to predict the relationships between the socio-economic characteristics of respondents is presented in Tables 4.9, 4.10 and 4.11. The independent variable ($x_i \ldots x_n$) selected for the model is the monthly income of respondents

(y). The dependent variable is the age of respondents. The general linear regression model for the analysis is as shown below:

$y = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + \ldots\ldots b_n x_n + e$ …… (1)

y = dependent variable (age of respondent)

a = y intercept; that is, the point at which the regression cuts across the y axis

b_n = the b coefficients

x_n = independent variables (monthly income of respondents)

e = error term

Table 4.9: Regression Coefficient of Relationship between Variables of Socio-Economic Characteristics

Model		Coefficients			t	Sig.
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1.425	0.053		26.913	0.000
	Monthly Income of Respondents	0.607	0.021	0.897	28.554	0.000

a. Dependent Variable: AGE

Source: *Author's Fieldwork, 2016*

Investigating the influence of age on the monthly income of respondents, the empirical model estimates:

AGE = 1.425 + 0.607 (INCOME) …… (2)

The unstandardized regression coefficient for income (INCOME) is 0.607, statistically significant at $p \leq 0.05$. This implies that for an additional unit to income of respondents in the study area, an increased variation of .0607 is predicted on age. Therefore,

for every unit increase in income (0.0607), a correspondent increase in age by 60.7% coefficient of determination (r^2) is predicted, while other individual variables are held constant in the study area. This shows that as age increases, income improves.

Table 4.10: ANOVA of Socio-Economic Characteristics of Variables

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	118.924	1	118.924	815.337	0.000[b]
Residual	29.026	199	0.146		
Total	147.950	200			

a. Dependent Variable: AGE

b. Predictors: (Constant), INCOME

Source: *Author's Fieldwork, 2016*

The analysis of variance (ANOVA) presented in Table 4.10 reveals that the prediction model was statistically significant at $p \leq 0.05$ with F (1.199) = 815.337.

Table 4.11: Model Summary of Socio-Economic Characteristics Variables

Model	R	R Square	Adjusted R Square	Std. Error of th
1	0.897[a]	0.804	0.803	

a. Predictors: (Constant), INCOME

Source: *Author's Fieldwork, 2016*

The summary of the model presented in Table 4.11 indicates that the significant socio-economic variable included in the model was able to predict the variation in socio-economic characteristics. It is moderately strong predictors for R-Square as 0.804 (80.4%) and the adjusted R-Square value as 0.803. This shows that the independent variable (INCOME) in the model accounted for 80.3% variance in the dependent variable (AGE) statistically significant

at $p \leq 0.01$. This indicates moderate model fit of 19.7% left for other unexplained factors in the study area.

Arising from the above analysis, H_1 1 is accepted: there is a significant relationship between age and income of respondents in the study area.

4.2 Analysis and Discussion of Objective Two

Objective two addresses the research question which seeks to find out if there is a significant relationship between the physical and spatial patterns and urban sprawl development in the study area. In other words, the objectives seeks to answer the research question of whether or not the Spatio-physical patterns in the study area are responsible for the development of urban sprawl. Findings on this objective are presented and discussed using descriptive and correlation analytical methods.

4.2.1 Spatio-Physical Characteristics of the Study Area

The Spatio-Physical characteristics of the study area describes the availability, accessibility and spatial distribution of physical infrastructure as well as the physical terrain of Benin City. This is one of the major factor responsible for the large influx of people into the city from surrounding villages and other parts of the country.

Tables 4.12 to 4.15 present descriptive analysis of Spatio-physical characteristics of the study area.

4.2.1.1 Distance between Buildings

The distance between buildings of respondents in Table 4.12 shows that 54 respondents representing 26.9% of the total respondents have their buildings situated less than 50m apart. 52 respondents, representing 25.9% of the total population have their buildings at between 51-100m apart. This is closely followed by 51 respondents that have their buildings situated more than 201m apart, representing 25.4%. 12.9% (26) of respondents have their buildings between 151-200m apart. Making up the rear, is 18 respondents (9.0%), with their buildings between 101-150m apart.

Table 4.12: Distance between Buildings

Building Distance	Frequency	Percentage
Less than 50m	54	26.9
51-100m	52	25.9
101-150m	18	9.0
151-200m	26	12.9
Above 201m	51	25.4
Total	201	100

Source: Author's Fieldwork, 2016

4.2.1.2 Distance between Neighbourhood

Table 4.13 shows the distance between the neighbourhoods in the study area. One hundred and ninety-one respondents (95.0%) live in a neighbourhood that is between 1 and 2km away from the closest neighbourhood. five respondents (2.5%) live in a neighbourhood that is in a distance between 3 and4km away from their nearest neighbourhood. Four respondents (2.0%) live 5-6km away from their nearest neighbourhood.

Table 4.13: Distance between Neighbourhoods

Neighbourhood Distance	Frequency	Percentage
1-2km	191	95.0
3-4km	5	2.5
5-6km	4	2.0
Above 7km	1	.5
Total	201	100

Source: Author's Fieldwork, 2016

4.2.1.3 Distance from City Center

Table 4.13 shows the distance of respondents' home from the City Center. Thirty respondents, representing 14.9% of the total number of respondents have their homes at a distance of 1-2 km away from the city center. Eighty respondents (39.8%) have their homes

between 6 and10km from the center of the city. Ninety respondents (44.8%) live between 11 and 15km outside the City Center. One respondent (0.5%) lives a distance of more than 16km outside the City Center.

Table 4.14: Distance from City Center

City Center Distance	Frequency	Percentage
1-5km	30	14.9
6-10km	80	39.8
11-15km	90	44.8
Above 16km	1	.5
Total	201	100

Source: Author's Fieldwork, 2016

4.2.1.5 Travel Distance from Home to Place of Work

Table 4.15: Travel Distance from Home to Work Place

Travel Distance	Frequency	Percentage
1-2km	5	2.5
3-4km	8	4.0
5-6km	17	8.5
7-8km	30	14.9
9-10km	50	24.9
Above 11km	91	45.3
Total	201	100

Source: Author's Fieldwork, 2016

Table 4.15 shows the travel distance of respondents from their respective homes to their places of work. Ninety-one respondents (45.3%), travel a distance of more than 11km to work daily, while fifty respondents (24.9%) travel a distance of between 9 and10km to get to work. A total of thirty respondents (14.9%) travel a distance of between 7 and 8km to get to

their places of work. Seventeen respondents (8.5%) have their places of work at between 5-6km from their homes. 8 respondents (4.0%) travel a distance of between 3 and 4km to get to work, while five respondents (2.5%) have their places work at between 1 and 2km from their homes.

Table 4.16: Pearson Correlation Results of Spatio-Physical Variables

Spatio-Physical Variables	DIST	HOOD	HOME	TRAVEL
DIST	1.000	0.290**	0.879**	0.820**
HOOD		1.000	0.256**	0.176*
HOME			1.000	0.929**
TRAVEL				1.000

** Correlation is significant at the 0.01 Alpha level.

Source: *Author's Fieldwork, 2016*

The correlation results of the Spatio-physical characteristics of respondents are presented in Table 4.16. Using the Pearson moment correlation test, a positive coefficient, r = 0.929 statistically significant at $p \leq 0.01$alpha level, was calculated for the relationship between distance from homes to the city center (HOME) and distance to work places (TRAVEL).

A positive coefficient r = 0.879 statistically significant at $p \leq 0.01$ alpha level, was calculated between distance of buildings (DIST) and distance of homes from the city center (TRAVEL). The correlation between the distance of buildings (DIST) and homes from the city center (TRAVEL) gave a positive coefficient of r = 0.820 statistically significant at $p \leq 0.01$ alpha level. Similarly, a weak positive coefficient of r = 0.290 statistically significant at $p \leq 0.01$ alpha level was calculated from the correlation between distance of buildings (DIST) and distance between the neighbourhoods (HOOD).

Table 4.17: ANOVA of Spatio-Physical Pattern

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	383.355	3	127.785	229.791	0.000[b]
Residual	109.550	197	0.556		
Total	492.905	200			

a. Dependent Variable: DIST

b. Predictors: (Constant), TRAVEL, HOOD, HOME

The analysis of variance (ANOVA) presented in Table 4.18 reveals that the prediction model was statistically significant at $p \leq 0.05$ with $F(3, 197) = 229.791$.

Table 4.18: Regression Analysis of Spatio-Physical Pattern

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.865	0.249		0-7.490	0.000
	HOOD	0.304	0.146	0.073	2.081	0.039
	HOME	1.751	0.203	0.808	8.627	0.000
	TRAVEL	0.068	0.111	0.057	0.615	0.539

a. Dependent Variable: DIST

Investigating the influence of HOOD, HOME and TRAVEL on DIST of respondents, the empirical model estimate using equation (1) where $y = a_1\ b_1x_1 + b_2x_2 + b_3x_3 \ldots\ldots\ bnx_n + e$

DIST = -1.865 + 0.304(HOOD) + 1.751(HOME) + e …… (3)

The unstandardized coefficient for HOOD is 0.304 statistically significant at $p \leq 0.05$. This implies that for an additional unit to HOOD of respondents in the study area, an increase of 0.304 variation is predicted on DIST. Therefore, for every unit increase in HOOD (0.304), a correspondent increase in DIST by 30.4% coefficient of determination (r^2) is predicted. Similarly, HOME predicted an increase of 1.751 statistically significant at $p \leq 0.01$ is predicted on DIST. This means that a rise in HOME causes an increase in distance travelled within the study area.

Table 4.19: Model Summary of Spatio-Physical Pattern

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.882[a]	0.778	0.774	0.74572

a. Predictors: (Constant), TRAVEL, HOOD, HOME

The summary of the model presented in Table 4.19 indicates that TRAVEL, HOOD and HOME included in the model were able to predict variation in distance travelled as a Spatio-physical characteristic. It is a strong predictor for R-Square as 0.778 (77.8%) and the adjusted R-Square value of 0.774. This shows that the independent variables (TRAVEL, HOOD and HOME) in the model accounted for 77.4% variance in the dependent variable, statistically significant at $p \leq 0.01$. This indicates a moderately fit model of 22.6% left for other unexplained factors in the study area.

Arising from the above analysis, Alternate hypothesis (H_1 2), is accepted because there is a significant relationship ($p \leq 0.01$) between the Spatio-physical characteristics and urban sprawl in the study area.

4.3 Analysis and Discussion of Objective Three

Objective three addresses the third research question which seeks to find out if there is significant correlation between urban sprawl development and its implications in the study area.

4.3.1 Implication of Urban Sprawl in the Study Area

Tables 4.19 to 4.24 present descriptive analysis of the implication of urban sprawl in Benin City.

4.3.1.1 Accessibility to Respondents Home

This is the ease with which respondents find access to their respective homes. Table 4.19 shows the level of accessibility to respondents home. A critical study of the respondents' accessibility to their homes shows that one hundred and eighty respondents (89.6%) can easily access their homes, while five respondents (2.5%) have very access to their homes. Thirteen respondents (6.5%) can access their homes with some difficulties, while three respondents (1.5%) can hardly have access to their homes.

Table 4.19: Accessibility to Respondent's Home

Accessibility	Frequency	Percentage
Inaccessible	3	1.5
Fairly Accessible	13	6.5
Accessible	180	89.6
Very Accessible	5	2.5
Total	201	100

Source: Author's Fieldwork, 2016

4.3.1.2 Level of Energy Consumption of Respondents

People demand goods and services that require energy: heating and cooling of homes, storage of perishable food, accessing the internet, television and for other appliances (Rong, 2006). Table 4.20 shows the monthly level of electricity and other fossil energy consumption of respondents' homes. An analysis of the energy consumption level of respondents' buildings shows that forty seven respondents (23.4%) have very low energy consumption, while thirty respondents (14.9%) have low energy consumption level. Fifty respondents (24.9%) use what could be described as average level of energy consumption. Forty four respondents (21.9%) have high level of energy consumption, and thirty respondents (14.9%) have very high energy consumption.

Table 4.20: Level of Energy Consumption

Energy Consumption	Frequency	Percentage
Very Low	47	23.4
Low	30	14.9
Average	50	24.9
High	44	21.9
Very High	30	14.9
Total	201	100

Source: Author's Fieldwork, 2016

4.3.1.3 Type of Respondents Housing

Table 4.21 shows the housing type of respondents. The Table reveals that majority of the population of respondents live in detached bungalows, as eighty two respondents (40.8%) occupy this type of housing. Thirty nine respondents (19.4%) live in duplexes, closely followed by thirty six respondents (17.9%), occupying rooming type of housing. Thirty one respondents (15.4%) live in semi-detached bungalows, while 13 respondents (6.5%) are housed in mansionetes.

Table 4.21: Type of Respondents Housing

Types of Housing	Frequency	Percentage
Rooming	36	17.9
Semi-detached Bungalow	31	15.4
Detached Bungalow	82	40.8
Duplex	39	19.4
Mansionete	13	6.5
Total	201	100

Source: Author's Fieldwork, 2016

4.3.1.4 Respondents' Attraction to Study Area

Table 4.22 shows what attracted the sampled population to the study area. A critical look at the table shows that one hundred and eighty- five respondents representing 92.0% of the total population were attracted to the study area because of the availability of affordable housing. Seven respondents, representing 3.5% of the population moved into the area because of the presence of good schools for their children to attend. Three respondents, representing 1.5% of the population, got attracted to the study area because of easy access to their places of work. The level of security attracted six respondents, representing 3.0% of the population, to the study area.

Table 4.22: Attraction to Study Area

Attraction	Frequency	Percentage
Affordable Housing	185	92.0
Good Schools	7	3.5
Easy Access to Work Place	3	1.5
Security	6	3.0
Total	201	100

Source: Author's Fieldwork, 2016

4.3.1.5 Respondents' Level of Satisfaction

Table 4.23 shows the level of satisfaction of respondents' living in the study area. The Table reveals that one hundred and eighty-eight respondents, representing 93.5% of the total population are not satisfied living in the area. Eight respondents, representing 4.0% of the population, are fairly satisfied with the study area, while five respondents, representing 2.5% of the population are satisfied with the area.

Table 4.23: Respondent's Level of Satisfaction

Level of Satisfaction	Frequency	Percentage
Dissatisfied	188	93.5
Fairly Satisfied	8	4.0
Satisfied	5	2.5
Total	201	100

Source: Author's Fieldwork, 2016

4.3.1.6 Possession Valid Development Permit

Table 4.24: Possession of Valid Development Permit

Development Permit	Frequency	Percentage
Yes	31	15.4
No	170	84.6
Total	201	100

Source: Author's Fieldwork, 2016

Table 4.24 shows the number of respondents that obtained valid development permit before commencement of their building project. An analysis of the Table shows that one hundred and seventy respondents (84.6%) did not obtain valid development permit before

embarking on the construction of their buildings. Thirty one respondents (15.4%) have valid development permit.

Table 4.24: Spearman's Rho Correlation Results of Urban Sprawl Variables

Urban Sprawl Variables	ACCESS	ENERGY	TYPE	ATTRACT	SATIS	DEVEL	TRAFFIC
ACCESS	1.000	0.457**	0.503**	0.342**	0.363**	0.625**	0.286**
ENERGY		1.000	0.932**	0.443**	0.396**	0.580**	0.619**
TYPE			1.000	0.473**	0.445**	0.635**	0.589**
ATTRACT				1.000	0.904**	0.125	0.716**
SATIS					1.000	0.112	0.640**
DEVEL						1.000	0.175*
TRAFFIC							1.000

** Correlation is significant at the 0.01 Alpha level.
* Correlation is significant at the 0.05 Alpha level.

Source: *Author's Fieldwork, 2016*

Table 4.24 presents the coefficients of relationship between urban sprawl variables in Benin City. A Spearman rho correlation test conducted shows that, the coefficient between the variables of energy consumption of respondents and type of housing accounted for $r_s = 0.932$, which is statistically significant at $p \leq 0.01$. This shows that the type of house of respondents determines the level of energy consumed. The coefficient of the relationship between attraction of respondents to the study area and their level of satisfaction was found to be $r_s = 0.904$, statistically significant at $p \leq 0.01$. Therefore, the level of satisfaction of a place influence its attraction. Similarly, the relationship between attraction of respondents and traffic congestion in the study area shows $r_s = 0.716$, statistically significant at $p \leq 0.01$ alpha level. This indicates that the higher the attraction, the higher the tendency to cause traffic congestion. The coefficient of the relationship between the level of satisfaction of respondents and traffic congestion witnessed in the study area gave a correlation of $r_s = 0.640$, statistically significant at $p \leq 0.01$ alpha level.

The coefficient of the relationship between type of housing and possession of valid development permit reveals that $r_s = 0.635$ is statistically significant at $p \leq 0.01$ alpha level. The relationship between accessibility to homes and possession of valid development permit was found to have a positive coefficient of $r_s = 0.625$ statistically significant at $p \leq 0.01$ alpha level. This indicates that accessibility to homes by officials of the town planning agencies guarantees assessment and possessions of development permit. The relationship between the level of energy usage and traffic congestion in the study area gave a coefficient of $r_s = 0.619$, statistically significant at $p \leq 0.01$ alpha level. The coefficient of the relationship between the type of respondents' housing and traffic congestion reports that $r_s = 0589$, statistically significant at $p \leq 0.01$ alpha level. The relationship between the level of energy consumption and possession of valid development permit has a coefficient of $r_s = 0.580$, statistically significant at $p \leq 0.01$.Finally, the coefficient of the relationship between accessibility to homes and type of homes reveals that $r_s = 0.503$, statistically significant at $p \leq 0.01$ alpha level.

CHAPTER FIVE

SAMMARY, RECOMMENDATIONS AND CONCLUSIONS

5.1 Summary

This study examined the incidence of urban sprawl in the outskirts of Benin City with particular focus on the socio-economic characteristics of residence that are responsible for this development. Efforts were made to examine the causes, characteristics and implications of urban sprawl in Benin City. The study also looked at the growth pattern of Benin City from the pre-colonial era till date.

Detailed investigations and rigorous analyses of data collected from the field are evident in this study. The research hypotheses formulated to address critical issues under study were tested using the appropriate statistical techniques and the findings of these investigations were presented and discussed. For a better understanding, the summary of findings which are meant to be objective-based and hypotheses-related is presented below.

5.1.1 Socio-Economic Characteristics of Residents

The socio-economic characteristics of residents of Benin City examined in objective one comprised of gender, age, marital status, educational background, occupation and monthly income of respondents.

5.1.1.1 Gender of Respondents

Table 4.1 shows that the majority of the respondents in the sample were males. They accounted for 187 representing 90% and are more likely to own houses,

5.1.1.2 Age of Respondents

The age structure of the respondents in the sample indicates a very active population, with a high tendency for productivity and an equally high propensity for work. Table 4.2 shows that 40.8% of respondents in the study are between ages 31- 45.

5.1.1.3 Marital Status of Respondents

An analysis of the marital status of the sample population shows that 171 representing 85.1% are married and are more socially responsible to build/occupy houses of their own.

5.1.1.4 Educational Background of Respondents

Table 4.4 that shows the educational background of respondents in the sample

population reveals a very high level of literacy.142 respondents, representing 70.6% have been educated above the primary school level.

5.1.1.5 Occupation of Respondents

Table 4.5 shows that the majority of the respondents are gainfully employed which necessitated their desire to own houses of their own.

5.1.1.6 Monthly Income of Respondents

Table 4.6 shows that all the respondents in the sample population earn above the N18.000 minimum wage of workers in the Federal Civil Service of Nigeria. This indicates that they are likely to own properties.

5.1.1.7 Relationship between Socio-Economic Characteristics of Respondents

Key variables of the socio-economic characteristics of residents significant to objective one were identified and isolated. These variables were paired to show any operational relationship. As a result of the heterogeneous characteristics of these variables, Pearson product moment correlation, Point-biserial correlation and Chi-square Test at 0.05 significant level were used as shown in Tables 4.7 and 4.8. Using the Pearson moment correlation test, a positive coefficient ($r = 0.897$) statistically significant at $p \leq 0.01$ alpha level was calculated between age and income of respondents.

Point-biserial correlation test between occupation and income of respondents calculated was $r_{pb} = 0.815$ statistically significant at $p \leq 0.01$. The strong positive correlation coefficient between occupation and income of respondents ($n = 201$) suggests that, increased occupational engagement (employment) improves income. Similarly, the correlation coefficient between education and income variables was $r_{pb} = 0.813$ statistically significant at $p \leq 0.01$. A positive correlation $r_{pb} = 0.617$ statistically significant at $p \leq 0.01$ was found to exist between income and gender variables. The correlation between income and marital status revealed a positive relationship of $r_{pb} = 0.604$ statistically significant at $p \leq 0.01$.

5.1.1.8 Regression Analysis

Tables 4.9, 4.10 and 4.11 show summary of the explanatory variables used in the

regression model. Among the two variables (INCOME and AGE) selected to explain the influences of socio-economic characteristics of residents on the study area, the unstandardized regression coefficient for income (INCOME) is 0.607, statistically significant at $p \leq 0.05$, implying that for an additional unit to income of respondents in the study area, an increased variation of .0607 is predicted on age. Therefore, for every unit increase in income (0.0607), a correspondent increase in age by 60.7% coefficient of determination (r^2) is predicted, while other individual variables are held constant in the study area. This shows that as age increases, income improves.

5.2 Recommendations

To improve the urban landscape and ensure the creation of a sustainable urban future in Benin City, this research recommends the following policy guidelines:

I. The implementation of improved land-use planning, such as more compact land use development and mixed use developments served by efficient transport network.

II. The urban growth and expansion of the city should be monitored periodically by employing the use of modern geospatial technologies as this will help in the collection of data needed for efficient urban planning and management of the city.

III. The Edo State ministry of Housing and Urban Development, should as a matter of urgency, develop a master plan that will be responsive to the changes being experienced in the city's urban design.

IV. The registration of land titles and building designs should be made compulsory. This is due to the fact that more than 93% of the building owners in the study area do not possess valid development permits. This is known to create difficulties in the monitoring of buildings' compliance with planning regulations.

V. The provision of infrastructure and social services by the government should be extended to the outskirts.

VI. The prime agricultural lands on the outskirts of the city should be preserved by for the maintenance of open spaces and protection of the quality of the environment. This can be done by the adoption of policies that have positive impacts on agricultural incomes on the outskirts of the city.

VII. The government should ensure the provision of an enabling environment for legislation on land use and urban planning to function effectively.

VIII. The adoption of urban compact forms that prevent the growth of urban sprawl by intensification of urban areas should be encouraged.

IX. Price mechanisms should be introduced by the government to discourage people and developers from erecting structures in the outskirts.

X. There should be careful selection of sites for the location of facilities that have the capacity to attract growth and development around such facilities.

5.3 Conclusions

The continuous growth and spread of residential land use to and beyond the hitherto distant locations relative to the City core has created the incidence of urban sprawl which is aesthetically unpleasing and environmentally unsustainable. The development of urban sprawl is dramatically changing the urban design of Benin City. Urban sprawl development has come under heavy criticism because it has created cities that are environmentally, socially and economically unsustainable. It absorbs and destroys fertile agricultural land which cannot be recovered. From this study, it was observed that the most significant driver of urban sprawl in Benin City is the migration of people from rural areas desirous of the economic prospect offered by the urban areas. This has further compounded the existing problems created by the development of urban sprawl. A way out of this problem is the overall economic development of Benin City and its surrounding villages.

Various literature on urban planning has stressed the need for concerted action to be taken to create more sustainable urban areas (Elkin et al., 1991; Jenks et al., 1996; Ewing, 1997; Williams, 1999; Burton, 2000). It is a known fact that cities in developed countries consume large amount of resources than any other human environment, hence offering several opportunities for improvements in the quest to achieving sustainable development (Arbury, 2005).

Urban sprawl is identifiable in the outskirts of cities where low-density residential settlements have progressively replaced the traditional agricultural and forest mosaic creating a mixed and undefined landscape, disseminated of detached family houses, with a population that depend on private transportation. Urban sprawl is not a recent phenomenon as it dates back to ancient times.

This research has dealt with the concept of urban sprawl by looking at the various

definitions of the term that exist in the literature and the various problems associated with it. Most of the definitions of the concept are vague as they are observed to combine the causes, characteristics and the impact of urban sprawl. As it is usually common with multidimensional phenomena, the measurement of urban sprawl is faced with the problems of what indicators to use and the methods to be adopted in the provision of an index.

In this research, it was observed that residents of sprawled communities are more likely to live in single-family detached housing rather than attached or multi-family housing and are also expected to live in big houses. The process of sprawling as experienced in most urbanized areas of the world in past decades. The urbanized area in Benin City increased at an alarming rate in the period between 1979 and 2013, with most of the growth and expansion taking place around the major transport routes leading into and out of the city. The extra space required for this growth was associated extra energy consumption and more cost for the provision of social amenities and infrastructures.

A major problem that emanated from the development of urban sprawl in Benin City is the uncontrolled land use development especially in areas such as Obe, Eyaen and Ovbiogie communities that are located in the peripheries. Some of the problems associated with this form of development include inadequate transportation facilities, increased traffic congestion and poor access to newly developed areas. The development of urban sprawl is dramatically changing the urban design of Benin City, as it is absorbing and destroying fertile agricultural land which cannot be recovered. Urban sprawl development in Benin City also has a number of implications for the government. The most significant of these implications is the need to meet the increasing demand for urban infrastructure.

The proposed sustainable alternative to urban sprawl is the compact city hypothesis. This looks to limit the outward growth of cities by encouraging urban intensification and the revival of derelict areas of cities. The compact city model is considered by many researchers as a planning strategy that can contain the growth of urban sprawl thereby developing more sustainable cities. It is considered as an urban form capable of minimizing energy consumption and the over dependence on private automobile, thus reviving the life around the core area of cities and preservation of green areas.

In spite of the many benefits, the compact city hypothesis has come under heavy criticisms from many researchers. Much of the criticisms of this model is based on the fact that it does not reflect the realities of economic demands, environmental sustainability and social expectations. The compact city model has been questioned as to its feasible application in a

way that will be generally accepted by the public.

The growth pattern of Benin City could be very well be described as haphazard as it does not follow any of the theory of urban planning, and usually occurring around major roads in the city. Such growth has been observed to occur in a north-south direction. The growth pattern of the city could be attributed to easy accessibility, low cost of land, the nature of the terrain in the city and the influence of urban sprawl.

5.3 Areas for Further Research

The subject area of study is broad, multidisciplinary, multidimensional and multifaceted. This thesis covers only the assessment of urban sprawl in the suburbs of Benin City by looking at the definitions by different scholars, causes and implication of urban sprawl. There will be several benefits if future research is carried out linking residential energy use to the degree of sprawling within cities in the country. This will assist public utility policymakers in the areas of planning and the provision energy to such areas.

There will also be beneficial if further research is carried out in the intensification and re-intensification of land within the existing study area in a more efficient manner. This will involve the redevelopment of unused areas or the conversion of low-density areas to areas of higher-densities.

Another area for further research is in the socio-cultural characteristics of residents of Benin City and its implication on urban sprawl development and management.

REFERENCE

Adeboyejo, A. and Abolade, O. (2006).Analysis of Spatial Changes in Ogbomoso City. Journal of the NITP, 19(1), 40th Anniversary Issue.

Alonso, W. (1964). Location and Land Use. Harvard University Press, Cambridge.

Altieri, L.; Cocchi, D.; Pezzi, G.; Scott, E. and Ventrucci, M. (2013). Urban Sprawl Scatterplots for Urban Morphological Zones Data. Journal of Ecological Indicators, 36.

Angel, S.; Parent, J.; Civco, D.; Blei, A. and Potere, D. (2011). The dimensions of global urban expansion: Estimates and Projection for all Countries, 2000 – 2050. Program Planning Journal, 75.

Arbury, J. (2005). From Urban Sprawl to Compact City: An analysis of urban growth management in Auckland. PhD Thesis, University of Auckland, New Zealand.

Asika, M. O. (1991). Research Methodology in the Behavioural Sciences. Longman Press, Ikeja, Lagos, Nigeria.

Audirac, I, Shermyen, A. and Smith, M. (1990). Ideal Urban Form and Visions of the Good Life" Journal of the American Planning Association. Series 47083.

Ayedun, C.;Durodola, O. and Akinjare, O. (2011). Towards Ensuring Sustainable Urban Growth and Development in Nigeria. Challenges and Strategies. Business Management Dynamics. 1(2).

Balogun, I.; Adeyewa, D.; Balogun, A. and Morakinyo, T. (2011). Analysis of Urban Expansion and Land Use Change in Akure, Nigeria, Using Remote Sensing and Geographic Information System (GIS) Techniques. International Journal of Geography and Regional Planning, 4(9).

Bertaud, A. (2004). "The Spatial Organization of Cities: Deliberate Outcome or Unforeseen Consequences?" Barcelona, Spain.

Bhatta, B. (2010), Analysis of Urban Growth and Sprawl from Remote Sensing Data, Advances in Geographic Information Sciences. Springer-Verlag, Berlin.

Breheny, M. (1992). Sustainable Development and Urban Form, (Introduction). Pion, London.

Breheny, M. (1996). Centrist, Decentrists and Compromisers: Views on the Future of Urban Form. In: Jenks, M., Burton, E. and William, K. (eds.) The Compact City: a sustainable urban form? E and FN Spoon, London. 13-35

Brueckner, J. (2000). Urban Sprawl, Diagnosis and Remedies. International Regional Science Review. 23, 17-171

Bruegmann, R. (2005). Sprawl: A Compact History. University of Chicago Press: Chicago.

Bruegmann, R. (2006) Sprawl: A compact History. University of Chicago Press: Chicago.

Burchell, R. and Mukherji, S. (2003) conventional development versus managed growth: the costs of sprawl. American Journal of public health 93(9), 1534-1540

Burchell, R.; Shad, N.; Listokin, D.; Philips, H.; Downs, A.; Seskin, S.; Davis, J.; Moore, T.; Helton, D. and Gall, M.(1998). The Costs of Sprawl: Transportation Research Board, National Research Council, National Academy Press, Washington DC.

Burton, E. (2002). Measuring Urban Compactness in UK Towns and Cities. Environment and Planning B. Planning and Design. 29. 219-250.

Carruthers, J. and Ulfarsson, G. (2002). Fragmentation and Sprawl: evidence from interregional analysis. Journal of Growth and Change. 33 (3). 312-340.

Cassiers, T. and Kesteloot, C. (2012). Socio- Spatial Inequalities and Social Cohesion in European Cities. Journal of Urban Studies. 49.

Costa, F.; Noble, A. and Pendleton, G. (1991). Evolving Planning Systems in Madrid, Rome and Anthens. Geo-Journal. 24.

Couch, C.; Petschel-held, G. and Leontidou, L. (2007). Urban Sprawl in Europe: Landscapes, Landuse Change and Policy; Blackwell: London, UK.

deRoo, G. and Miller, D. (2000). Compact Cities and Sustainable Urban Development. Ashgate, Hampshire.

Dmochowski, Z. (1990). An Introduction to Nigerian Traditional Architecture. Ethnographica, 2. 1-3.

Ekhaese, E. and Adeboye, A. (2014). Go-ahead Elements of Domestic Architecture: socio-Economic and Cultural Characteristics of Residents in Benin. IMPACT: International Journal of Research in Humanities, Arts and Literature. 2(5).

Ekhaese, E. N. and Ediae, O. J. (2014). From Home Owners Perspective, "Ikun Concept" of Design in Benin, Nigeria: Some Like It Some Don't, Journal of Architecture Research. 4(1).

Elkin, T. Mclaren, D. and Hillman, M. (1991). Reviving the City towards Sustainable Urban Development. Friends of the Earth. 8.

Ewing, R. (1994). Characteristics, Causes and Effect of Sprawl: A Literature Review. Environ Urban Issues. 21 (2).

Ewing, R. (1997). Is Los Angeles-style sprawl desirable? Journal of the American Planning Association. 63 (1).

Ewing, R., Schmid, et al (2003). Relationship between Urban Sprawl and Physical Activity, Obesity and Morbidity. The American Journal of Health Promotion. 18 (1).

Ewing, R.; Pendall, R. and Chen, D. (2002). Measuring Sprawl and Its Impacts; Smart Growth. America, Washington DC.

Fabiyi, O. (2006). Urban Land Use Change Analysis of a Traditional City from Remote Sensing Data: the case of Ibadan Metropolitan area, Nigeria. Human Social Sciences Journal, 1 (1).

Fanah, U.; Dlama, K. andOluseyi, I. (2011). Urban Expansion and Generational Cover Loss in and Around Nigeria's Federal Capital City. Journal of Ecology and Natural Environment, 3(1).

Frenkel, A. and Ashkenazi, M. (2008). Measuring Urban Sprawl: How can we deal with it? Environmental and Planning Bureau, 35.

Fulton, W., Pendall, R., Nguyen, M. and Harrison, A. (2001). Who Sprawls Most? How Growth Patterns Differ Across the U.S., Center for Urban Metropolitan Policy. The Brookings Institution, Washington, D.C.

GargiuloMorell, Y. and Salvati, L. (2010). Ad Hoc Urban Sprawl in the Mediterranean City: Dispersing a Compact Tradition? NuovaCultura: Rome, Italy.

Gbadegesin, J.; Oladokun, T. and Ayorinde, O. (2011). Urban Renewal as a Tool for Sustainable Urban Development in Nigeria: Issues and challenges. Journal of Sustainable Development and Environmental Protection, 1(1).

Giannakourou, G. (2005). Transforming Spatial Planning Policy in Mediterranean Countries: Europeanization and domestic change. Journal of European Planning studies, 13.

Gibelli, M. and Salzano, E. (2006). No Sprawl; Alinea. Firenze, Italy.

Gillham, O. (2002). The Limitless City: A Primer on the Urban Sprawl Debate. Island Press. Washington D.C.

Giuliano, G. and Small, K. (1991). Sub-centers in the Los Angeles Region. Regional Science and Urban Economics, 21(2), 163-182.

Glaeser, E. and Kahn, M. (2003). Sprawl and Urban Growth. National Bureau of Economic Research, Cambridge, Massachusetts.

Glaster, G.; Hanson, R.; Ratcliffe, M.; Wolman, H.; Coleman, S.; Freichage, J. (2001). Wrestling Sprawl to the ground: Defining and measuring an elusive concept. Housing policy Debate, 12.

Gomez, F. and Salvador, P. (2006). “A proposal for Green Planning in Cities.” International of Journal Sustainable Development Planning, 1(1).

Goodchild, B. (1994). Housing Design, Urban Form and Sustainable Development; reflections on the future residential landscape. Town Planning Review, 65(2), 143-157.

Gordon, P. and Richardson, H. (1997). Are Compact City a Desirable Planning Goal? Journal of the American Planning Association. 63(1), 95-106

Gospodim, A. (2002). “European cities and place-Identity”. Discussion Paper Series, 8(2).

Gospodim, A. (2004) “Urban Space Morphology and Place-Identity in European Cities; built heritage and innovative design.” Journal of Urban Design, 9(2).

Hall, P. and Pain, K. (2006). The Polycentric Metropolis. Learning from Mega-city Regions in Europe. Earthscan: London.

Haughton, G. and Hunter, C. (1994) Sustainable Cities. Jessica Kingsley publishers: London.

Hayden, D. (2004). A Field Guide to Sprawl. W. W. Norton Company: New York.

Hillman, M. (1996). In Favour of Compact City, in Jenks, M.; Burton, E. and Williams, K. (eds). The Compact City: a sustainable urban form? E and FN Spoon: London.

Ikhuoria, I. A. (1984). Rapid Urban Growth and Urban Landuse Pattern in Benin City. In P.O. Sada and A.B.Osirike (ed), Case Studies in Migration and Urbanization in Nigeria: Perspectives in Policy Issues, Benin City.

Jackson, K. (1985). Crabgrass Frontier: The suburbanisation of the United States. Oxford University Press: U.S.A.

Jaeger, J., Bertiller, R., Schwick, C., and Kienast, F. (2010), Suitability Criteria for Measures of Urban Sprawl. Ecological Indicators, 10.

Jenks, M.; Burton, E. and Williams, K. (1996). Compact Cities and Sustainability: An introduction: in Jenks, M.; Burton, E. and Williams K. (eds). The Compact City: a sustainable urban form? E and FN Spoon: London.

Jiboye, A. (2011). Sustainable Urbanization: Issues and Challenges for Effective Urban Governance in Nigeria. Journal of Sustainable Development. 4.

Kazepov, Y. (2005). Cities of Europe: Changing Contexts, Local Arrangement, and Challenge to Urban Cohesion. Blackwell: Oxford, UK.

Kitchen, R. and Tate, N. (2000). Conducting Research in Human Geography: Methodology and Practice. Prentice Hall: UK.

Lock, D. (1995). Room for More within City Limits? Town and Country Planning. 64(7),

173-176.

McLaren, D. (1992): Compact or Dispersed? Dilution is no solution. Journal of Built Environment. Vol, 18, No. 4. Pp 268-284.

Mohammed, N. (2007). Urbanization and Land Use Changes in Sharada and Wailari, Kano. Paper presented at the 49th Annual Conference of the Association of the Nigerian Geographers held at the University of Abuja, Nigeria. 15th - 19th October.

Morenikeji, W. (2006). Research and Analytical Methods for Social Scientists; Planners and Environmentalists. Jos University Press. Jos, Nigeria.

N.P.C. (2008). National Population Commission, Abuja, Nigeria.

Naess, P. (1995). Can Urban Development be Made Environmentally Sound? Journal of Environmental Planning and Management. Vol. 36, pp 309-33.

Nechyba, T. and Walsh, R. (2004). Urban Sprawl. Journal of Economic Perspectives, vol. 18 (4).

Neighbourhood, and Street Form at the Urban Edge. Journal of American Planning Association. Vol 59.

Newman, P. and Kenworthy, J. (1989). Cities and Automobile Dependence: a sourcebook. Aldershot, Hants, England.

Nkeki, F. O. (2011). Journey to Work Pattern in Benin Metropolitan Region. Unpublished M.Sc Thesis Department of Geography and Regional Planning, University of Benin, Benin City.

Odemerho, F. O. (1988). Benin City: A Case Study of Urban Flood Problems, In Sada, P.O. and Odemerho, F.O. (ed), Environmental Issues and Management in Nigerian Development. Evans Brothers, Ibadan.

Odeyale, T. (2010). Cultural Metamorphosis, Building Traditions and Search for Architectural Identity in Africa. In Deependra Prashad (ed) New Architecture and Urbanism: Development of Indian Traditions. Cambridge Publishing, Newcastle Upon Tyne. 54-59.

Odjugo, P., Enaruvbe, G. and Isibor, H. (2015). Geospatial Approach to Spatio-temporal Pattern of Urban Growth in Benin City, Nigeria. African Journal of environmental Science and technology. 9(3)

Ogunbodede. E.F., and Balogun, T.F. (2013). An Integrated Remote Sensing and GIS Approach in Monitoring Urban Expansion in Benin City, Nigeria. International Journal of Scientific and Engineering Research. 4(5).

Ogundipe, O. O. (2009). Evaluation of Analytical Methods of Tungsten Speciation. Global NEST Journal. 11(3), 308-317. Global NEST Press, Greece.

Ojeifo, M. and Eseigbe, J. (2012). Categorisation of Urban Centres in Edo State, Nigeria. IOSR Journal of Business and Management.

Olayiwola, A. and Igbavboa, O. (2014). Land Use Dynamics and Expansion of the Built-Up Area in Benin City, Nigeria. Mediterranean Journal of Social Sciences. MCSER Publishing, Rome-Italy.

Oloukoi, J., Oyinlola, R. and Yadjemi, H. (2014). Goespatial Analysis of Urban Sprawl in Ile-Ife City, Nigeria. South African Journal of Geomatics, Vol. 3, No. 2.

Onokerhoraye, A. (1995). Benin: A Traditional African City in Transition. University of Benin, Benin City. Benin Social Sciences Series for Africa.

Orenstein, D.; Frenkel, A.; Jahshan, F. (2014). Methodology Matters: Measuring urban spatial development using alternative methods. Environment and Planning B. 41.

Oriye, O. (2013). Urban Expansion and Urban Land use in Ado-Ekiti, Nigeria. American Journal of Research Communication. 1(2)

Oyesiku, O. K. (2002). From Womb to Tomb: 24th Inaugural Lecture, Olabisi Onabanjo university, Ago-Iwoye, Ogun State.

Oyinoloye, M.A. (2010). Spatial Analysis of Urban Growth in Akure, Nigeria. PhD Thesis, Department of Urban and Region Planning, Federal University of Technology, Akure.

Pratt, R. and Larkham, P. (1996). Who Will Care for Compact Cities? In: Jenks, Burton and

Williams (Eds.) The Compact City: A Sustainable Urban Form? E and FN spoon London: 277-288.

Queslati, W., Alvanides, S. and Garrod, G. (2015). Determinants of Urban Sprawl in European Cities. Urban Studies Journal, 52 (9), 1594-1614.

Rakodi, C. (2004). African Towns and Cities: Power Houses of Economic Growth or Slums of Dispair. City Futures Conference. University of Illinois, U.S.A.

Relph, E. (1987). The Modern Urban Landscape. Croom Helm, London.

Rodrigue, J-P. (2005). Transportation and Urban Form. http://people hofstra.edu/geotrans/ch6en/conc6en/ch6clen.html. accessed: 8/11/2005.

Rong, F. (2006). Impact of Urban Sprawl on U. S. Residential Energy Use. Unpublished Ph.D Thesis. School of Public Policy, University of Maryland, U. S. A.

Sepe, M. (2006). "Complex Analysis for the Sustainable Planning and Construction of the Place Identify". The Sensitive Relief Method. Journal of Sustainable Development Planning. 1(1).

Siedentop, S. (2005). Urban Sprawl – verstehen, messen, steuern. DISP 160. Zurich, 23-35.

Small, K. (2000).Urban Sprawl: A Non-Diagnosis of Real Problems. In: Metropolitan Development Patterns: 2000 Annual Roundtable, Cambridge, Massachusetts.

Smith, P. (1962). "Calgary: A Study in Urban Pattern". Economic Geography. 38(4)

Southworth, M. and Owens, P. (1993). The evolving metropolis: Studies of Community,

Spates, J. and Macionis, J. (1987). The Sociology of Cities. 2nd Edition. Wadsworth Inc.

Stan, A. (2013). Morphological Patterns of Urban Sprawl Territories. Journal of Urbanism Architecture, Construction. 4(4).

Stretton, H. (1996). Density, Efficiency and Equality in Australian Cities. in Jenks, Burton and Williams (eds.) The Compact City: a sustainable urban form? E and FN spoon, London.

Terradas, J. (2002). Urban Ecology. Rubes (ed). Barcelona.

The Sierra Club (1999). The Dark Side of the American Dream: The Cost and Consequences of Surburban Sprawl (http:/www.sierraclub.org/transportation/sprawl-report).

Thomas, L. and cousins, W. (1996). The Compact City: a successful, desirable and achievable urban form? Jenks, Burton and Williams (Eds.) The Compact City: a sustainable urban form? E and FN spoon London: 53-65.

Tombolini, I.; Zambon, I.; Ippolito, A.; Grigoriadis, S.; Serra, P.; Salvati, L. (2015). Revisiting "Southern" Sprawl: Urban Growth, Socio-Spatial Structure and the Influence of Local Economic Contexts. Journal of Economic. 3

Torrens, P. (2008). A toolkit for measuring sprawl. Applied Spatial Analysis Policy. 1.

Tsai, Y. H. (2005). Quantifying Urban Forms: Compactness Versus "Sprawl". Urban Studies Journal. 43.

Uji, Z. (2009). Tools and Instrument of Research in Design and Allied Disciplines.

UN-HABITAT (2010/2011). Urban Trends: Urban Sprawl now a Global problem: State of the World Cities, Bridging the Urban divide.

UN-HABITAT, (2007). Press Release on its Report *"The Challenges of Slums: Global Report on Human Settlements 2003".*

UN-HABITAT, (2015). Habitat 3 Issue Papers: 8 – Urban and Spatial Planning and Design. New York.

UN-HABITAT, (2017). Habitat 3– Report on the New Urban Agenda; United Nations Conference on Housing and Sustainable Urban Development. Quito, Ecuador.

Wapwera, S. (2012). Spatial Planning Framework for Urban Development and Management in Jos Metropolis, Nigeria. Ph. D Thesis, School of Built Environment, College of Science and Technology, Salford University, Salford, Greater Manchester, United Kingdom.

Wassmer, R. W. (2005). Causes of Urban Sprawl (Decentralization) in the United States: Natural Evolution, Flight from Blight and the Fiscalization of Land Use, Working Paper, 1-34.

Williams, K. (1999). Urban Intensification Policies in England: Problems and Contradictions.

Land Use Policy. 16 (13).

Williams, K., Burton, E. and Jenks, M. (1996). Achieving the Compact City through Intensification; an acceptable option? in Jenks, M., Burton, E. and Williams, K. (eds.) The Compact City: a sustainable urban form? E & FN Spoon, London.

Wilson, E., Hurd, J., Civco, D., Prisloe, M., and Arnold, C. (2003). Development of a Geospatial Model to Quantity, Describe and Map Urban Growth. Remote Sensing of Environment. 8 (3).

World Commission on Environment and Development (1987). *"Our Common Future".* Oxford University Press, Oxford, New York.

APPENDIX

FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

P.M.B. 704, AKURE, ONDO STATE NIGERIA

SCHOOL OF ENVIRONMENTAL TECHNOLOGY,

DEPARTMENT OF ARCHITECTURE

ASSESSMENT OF URBAN SPRAWL IN THE SUBURBS OF BENIN CITY, NIGERIA.

Dear respondent,

Urban sprawl is the uncoordinated and uncontrolled spatial expansion of a city's built environment into rural land at the periphery of an urban area. In view of the problems and negative impact of sprawl on the environment, the following questions are designed to obtain information from you in respect to your views and facts about the **Assessment of Urban Sprawl in the Suburbs of Benin City, Nigeria**. The information is required as part of an academic programme leading to the award of an MPhil degree in Architecture of the Federal University of Technology, Akure. You are kindly required to answer the questions truthfully. All information supplied will be treated as strictly confidential. **Thank you**.

Section A – General Questions

1. Gender: a) male ( ) b) Female ( )
2. Age: a)26 – 35 ( ) b)36 – 45 ( ) c)46 – 55 ( ) d)56 and above ( )
3. Marital status: a) single ( ) b) married ( ) c) divorced ( ) d) separated ( ) e) widow ( ) f) widower ( )
4. Educational background: a) no formal education ( ) b) primary school ( ) c) secondary school ( ) d) tertiary institution ( ) e) others (specify) .....
5. Occupation: a) Civil Servant ( ) b)Teacher ( ) c) Business/Trade ( ) d)Artisans/Professionals ( )
6. Monthly Income; a)below 50,000 ( ) b)50,001 – 100,000 ( ) c)100,001 – 150,000 ( ) d)150,001-200,000 ( ) e) above 200,001 ( ) f)no regular income ( )

7. Religion: a)Christianity ( ) b)Muslim ( ) c)traditional religion ( ) d)free-thinker ( ) e)others (specify)…….
8. Ethnicity: a)Benin ( ) b)Esan ( ) c) Afemai ( ) d)Others ( )
9. No. of persons in the household: a)1-5 ( ) b)6-10 ( ) c)11-15 ( ) d)above 16 ( )
10. No of households in the building: a)1-2 ( ) b)3-4 ( ) c)5-6 ( ) above 7 ( )
11. How long have you lived in this area? a)1-5yrs ( ) b)6-10yrs ( ) c)11 – 15yrs ( ) d)above 16yrs ( )
12. Is this area different from the one you lived in before or is it just the same? a)Yes ( ) b)No ( ) c)Uncertain ( )
13. What attracted you to this area? a)Affordable housing ( ) b)Good schools ( ) c)Easy access to work ( ) d)Security ( )
14. Are you satisfied living in this area? a)Yes ( ) b)No ( ) c)Uncertain ( )
15. Where would you prefer to live? a)City Center ( ) b)Outskirts ( ) c)Any place ( )
16. Is your home easily accessible? a)Inaccessible ( ) b) Fairly accessible ( ) c)Accessible ( ) d)Very accessible ( )
17. What is the approximate distance between this building and the next? a)Below 50m ( ) b)51 – 100m ( ) c)101 – 150m ( ) d)151 – 200m ( ) e)Above 200m ( )
18. What is the approximate distance between this neighbourhood and the next? a)1-2km ( ) b)3-4km ( ) c)5-6km ( ) d)7-8km ( ) e)Above 9km ( )
19. How far is your home from the City Center? a)1-5km ( ) b)6-10km ( ) c)11-16km ( ) d)Above 17km ( )
20. What is the approximate distance from this place to your work place? a)1-2km ( ) b)3-4km ( ) c)5-6km ( ) d)7-8km ( ) e)9-10km ( ) f)Above 11km ( )
21. What is your mode of transportation to work? a)Foot ( ) b)Bicycle ( ) c)Motorcycle ( ) d)Bus ( ) e)Taxi ( ) f)Private vehicle ( ) g)Others (specify)…….
22. How many drops (if any) do you take before getting to work? a)1-2 ( ) b)3-4 ( ) c)Above 5 ( )
23. Do you experience any traffic problem around this area? a)Yes ( ) b)No ( )

24. What type of house do you live in? a)Rooming ( ) b)Semi-detached bungalow ( ) c)Detached bungalow ( ) d)Duplex ( ) e)Mansionette ( )
25. What is the size of this plot? a)465m^2 ( ) b)930m^2 ( ) c)1395m^2 ( ) d)1860m^2 ( ) e)Above 3721m^2 ( )
26. How would you rate energy consumption level in this building? a)Very low ( ) b)Low ( ) c)Average ( ) d)High ( ) e)Very high ( )
27. Are you aware of any development programme by the government in this area? a)Yes ( ) b)No ( )
28. Does this building have approved building permit? a)Yes ( ) b)No ( )
29. Does this building have modern facilities? a)Yes ( ) b)No ( )
30. What is your residential status in this building? a)Landlord ( ) b)Tenant ( ) c)Guest ( )