INTERNATIONAL CONFERENCE ON URBANISATION AND THE BUILT ENVIRONMENT

VIRTUAL & PHYSICAL

BOOK of PROCEEDINGS

Theme

Urbanisation and The Built Environment

INTERNATIONAL
CONFERENCE CENTRE
UNIVERSITY OF IBADAN

Edited by
Dr U. U. Jimoh
Dr S. K. Ojolowo
Dr S. A. Adejumo
Dr F. A. Balogun

The Department of Urban and Regional Planning
FACULTY OF ENVIRONMENTAL DESIGN & MANAGEMENT
UNIVERSITY OF IBADAN

22-23 MAY 2024

URBANISATION AND THE BUILT ENVIRONMENT

Book of Proceedings

INTERNATIONAL CONFERENCE ON URBANISATION AND THE BUILT ENVIRONMENT | 2024

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UNIVERSITY OF IBADAN

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FOREWORD

It is with great pleasure that we present these conference book of proceedings on the pressing topic of Urbanisation and the Built Environment. This international gathering of leading experts, researchers, and policymakers provides a timely and critical platform to explore the multifaceted challenges and innovative solutions surrounding the rapid urbanisation occurring globally.

The transformation of our world into an increasingly urban landscape has profound implications for sustainable development, social equity, environmental stewardship, and human wellbeing. As more people migrate to cities in search of economic opportunities and improved quality of life, the strain on urban infrastructure, resources, and communities has intensified. Addressing the complex interplay between the built environment, population growth, and climate change has become an urgent priority for nations, cities, and citizens worldwide.

This conference aims to facilitate interdisciplinary dialogue, knowledge sharing, and collaborative action to navigate the path towards more liveable, resilient, and equitable urban centres. Prominent scholars, policymakers, urban planners, architects, and community leaders gathered to explore innovative approaches to urban design, sustainable urban development, inclusive housing policies, green infrastructure, and the integration of technology to enhance the lived experience of urban residents.

By convening this distinguished assembly of global experts, we seek to catalyze innovative solutions, strengthen international cooperation, and inspire transformative change in the way we conceptualise, plan, and manage our built environments. The insights and recommendations emerged from this conference has undoubtedly contributed to the ongoing efforts to achieve the Sustainable Development Goals and foster a more sustainable, equitable, and prosperous urban future for all.

We extend our sincere gratitude to all the participants, sponsors, and organisers who have made this conference possible. I am confident that your collective wisdom, dedication, and passion has shaped the critical discussions and outcomes that will help guide the path towards a more sustainable and liveable urban world.

Local Organising Committee
Department of Urban and Regional Planning
University of Ibadan, Ibadan, Nigeria

CONFERENCE COMMUNIQUE

Introduction

The Department of Urban and Regional Planning, Faculty of Environmental Design and Management, University of Ibadan, Nigeria, hosted the Urbanization and the Built Environment International Conference on May 22 & 23, 2024, held at International Conference Centre, University of Ibadan. The conference aimed to provide a platform for researchers, policymakers, and practitioners to discuss the challenges and opportunities associated with urbanization and the built environment.

Conference Highlights:

1. Keynote Speakers:

The conference featured two renowned keynote speakers who shared their expertise and insights on the topic. Tpl. Prof. Kayode Oyesiku, a renowned urban planner, transportation expert and author, delivered a thought-provoking keynote address on [insert the topic of his paper here]. Emeritus Prof. Layi Egunjobi, Prof. Olusola Olufemi and Prof. Samuel Babatunde Agbola who are leading expert in sustainable urban planning, discussed a commissioned paper in line with the focus of the conference.

2. *Parallel Sessions*:

The conference hosted several parallel sessions covering a wide range of topics, including urban planning and design, sustainable infrastructure, housing, smart cities and transportation. The sessions provided an opportunity for participants to share their research findings and engage in constructive discussions.

3. *Networking and Collaboration*:

The conference facilitated numerous networking opportunities, allowing participants to connect with peers from different backgrounds and disciplines. Several research collaborations and potential partnerships were identified during the event.

4. *Policy Recommendations*:

The conference concluded with a panel discussion that synthesized the key insights and recommendations emerging from the various sessions. The panel highlighted the need for more inclusive and sustainable urban development policies in Nigeria and the broader African continent.

Outcomes and Impact

1. Knowledge Sharing:

The conference successfully facilitated the exchange of knowledge and best practices among participants, contributing to the advancement of research and understanding in the field of urbanization and the built environment.

2. *Capacity Building*:

The conference provided a valuable learning opportunity for early-career researchers, urban planners, and policymakers, helping to build their skills and knowledge in addressing the challenges of urbanization.

3. Policy Influence:

The policy recommendations formulated during the conference are expected to inform the development of urban planning and development policies in Nigeria and the surrounding region.

4. Strengthened Partnerships:

The conference resulted in the establishment of new research collaborations and the strengthening of existing partnerships among academic institutions, government agencies, and industry stakeholders.

Conclusion:

The Urbanization and the Built Environment International Conference organized by the Department of Urban and Regional Planning, Faculty of Environmental Design and Management, University of Ibadan, Nigeria, was a resounding success. The event brought together a diverse group of participants, fostered knowledge sharing, and contributed to the development of more sustainable and inclusive urban planning policies in the region. The conference's impact is expected to be felt in the years to come as the insights and recommendations generated during the event are implemented and further explored.

Professor Lekan **Sanni**
Chairman, Communique

The Department of Urban and Regional Planning
FACULTY OF ENVIRONMENTAL DESIGN & MANAGEMENT
UNIVERSITY OF IBADAN

CALL FOR PAPERS

INTERNATIONAL CONFERENCE ON URBANISATION & THE BUILT ENVIRONMENT (VIRTUAL & PHYSICAL)

1

22-23 May, 2024

International Conference Center,
University of Ibadan

- **Keynote Speaker:**
  Prof. K. Oyesiku
  Dept of Urban & Regional Planning,
  Olabisi Onabanjo University.

- **Guest Speaker:**
  Mr Abdul Mojeed Mogbonjubola
  Commissioner for Environment &
  Natural Resources, Oyo State, Nigeria.

- **Chief Host:**
  Prof. Kayode Adebowale
  Vice Chancellor, University of Ibadan.

- **Host:**
  Dr U.U. Jimoh
  Ag Head of the Dept, University of Ibadan.

Introduction

Rapid urbanisation that is not well managed poses great challenges to the built environment. The wide range effects of rapid urbanisation in the built environment varies but not limited to urbanisation of poverty, inadequate public infrastructure and spaces, climate change, slum development, environmental pollution, flooding and many others. As cities and urban areas grow, there are physical and socio economic challenges that come with it. Such challenges are capable of increasing the environmental health risks of urban residents. For this purpose, planners, and other related professionals across border are called to submit paper for the international conference organised by the Department of Urban and Regional Planning, Faculty of Environmental Design and Management, University of Ibadan with possible publication of high quality articles.

Submission Guideline

Abstract that is not more than 250 words is expected to be submitted to intconurpui@gmail.com on or before April 15, 2024 . The submitted abstract shall be reviewed by the committee of experts and thereafter requested the submission of full papers of the abstracts that are of requisite quality and relevance to the thematic areas

Registration Guideline:

Registration Fee: Domestic: ₦35,000/Foreign: 100 USD
Account Name: Unibadan Microfinance Bank Ltd
Account Number: 2020527642
Bank Name: First Bank of Nigeria
Narration: 105-7300 (International Conference)
Send your receipt to:
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Sub-Themes:

1. The built environment discipline, research and practice
2. Intelligent urbanism and smart cities
3. Urbanisation of poverty and divided cities
4. Vernacular and sustainable built environments
5. Opportunities in the sustainable built environment
6. Urban design and the built environment
7. Urbanisation and climate change
8. The built environment and the planning system
9. Public infrastructure and spaces
10. Challenges ahead for the built environments
11. Urban renewal and the built environment
12. Sustainable solutions to a better built environment

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CONTENTS

DIVIDED CITIES: A COMPARATIVE ANALYSIS OF SPATIAL DISTRIBUTION OF PUBLIC HEALTH INFRASTRUCTURE IN URBAN AND SUBURBAN SPACE OF OYO STATE, NIGERIA

Samuel Olubunmi Alausa
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ABSTRACT

A city as a monolithic system should provide symmetrical public infrastructure between urban and suburban space. It was noted that there existed a great divide in the provision of public infrastructure between the urban and suburban settlements in Oyo State. This paper examined the spatial distribution of public healthcare infrastructure in Oyo state and noted a wide disparity in the distribution in terms of quantity and location of the facilities. Four local government were systematically selected based on the four senatorial districts in Oyo state and studied. Data were collected from the Oyo state Ministry of Health, Hospital Management Board, and the Primary Health Centers (PHC) in the selected local governments. The results of findings revealed that Afijio local government (Jobele) has 34 PHCs (5.7 center per 1000 people); Ibarapa North (Ayete) has 21 PHCs (5.9 center per 1000); Kajola has 25 PHCs (11.8 per 1000) and Oluyole has 16 PHCs (5.4 per1000). It was also noted that 71.1% of the suburban population had to travel more than 2km to access healthcare from the facilities in contrast to urban settlement in Yemetu area of Ibadan North local government which will take 2.6km (7 minutes) to access tertiary health care at the University College Hospital, Ibadan. It was recommended that more PHCs and secondary health facilities be provided in the suburban areas; location decision of facilities be based on spatial location theories such as Distance Decay Theory; and Urban and Regional Planners be employed to serve in government health ministry to advise on best location principle to use for healthcare infrastructure planning rather than political exigencies.

Keywords: Divided Cities, Spatial distribution, Suburban space, Health Infrastructure

INTRODUCTION

The world is the totality of entities and it is made up of settlements from clans to villages, cities, regions, continents and the globe. The cities in turn grow and expand to form suburban settlements; the totality of which constitutes the urban or city environment. The growth of human settlements into urban and suburban centers have imposed some challenges such as overcrowding, traffic congestion, environmental pollution, unemployment and many health related issues (Olatubara, 2019). The growth of urban centers has been attributed to increased population mobility as a result of continuous search by rural dwellers for economic, educational, infrastructure and sociological opportunities (University of California Regent, 2024). Scholars have noted a great inequality in the distribution of healthcare facilities between the urban and rural settlements, and that the size of healthcare resources is inversely proportional to the size of rural population (Egunjobi, 1983; Okafor, 2008). It has been observed that urban growth leads to rapid and unplanned developments which often results into suburban settlements or sprawls. These suburban areas are also informal settlements lacking necessary socio-physical infrastructure, people living in non-standard quarters and spiral or ribbon developments. The need by urban centers to expand and create space for excess population of people brings about which may have health related risks. The emergence of these health risk factors and high cost of urban land may adduce for the reasons for the emergence of suburban areas. These suburban areas are also confronted with lack of basic socio- economic and physical infrastructure which may form the basis of division between the existing urban areas and the emerging suburban. This paper examined the factors responsible for the inequalities in healthcare facilities distribution between the urban and suburban settlements using Oyo state as a case study.

2. Definition of Basic Terms

(a). Cities/Urban Settlements. Cities are organized bodies of human settlement with distinct revolution of philosophy, science, technology and power sharing machinery (Olatubara, 2019; UN-Habitat, 2020).
(b). Suburban Settlements. Suburban settlements are human agglomeration characterized by low-density single-family dwellings, dependence on public transport or motorcycles, haphazard growth from the existing urban areas, irregular and uncoordinated pattern of development and existence of undefined edge between the urban and rural areas (Alausa, 2023).
c). Public Health Infrastructure. These are healthcare centers, clinics, hospitals and maternity centers set up by the government to attend to the peoples' health needs
(d). The Environment. This is the totality (man-made or natural) of physical, cultural, natural, political, economic, technological, features that surround the living and non-living organisms (Oloukoi, 2020).

3. Conceptual Review

Health Inequality. Differences in health condition are determined by quality, accessibility, affordability, and health care system The complex interaction of these health care determinants defines the health inequalities of the people. (Tugwell, Robinson & Morris, 2007). Health inequalities are commonly examined across the global population between countries or states; and between urban and suburban settlements. There are also inequalities within geographical locations or neighbourhood as epitomized by distribution of health facilities between regions, between urban and rural areas, between rural areas, and between urban and suburban areas.

. There are also variations in health status between group of people which are classified by factors such as race/ethnicity, gender, education, income, and occupation (Arcaya, Alyssa & Subramaniam, 2015).

The simplest measure of health inequality is to compare the health status of those in the lowest socio-economic groups with those in the higher economic group. Comparison can be in absolute or relative terms. Health inequality can also be measured by the fundamental structures of social and economic hierarchy in which people grow, live, work and age (Marmot, 2007). This constitute the health determinants which are the socio-economic and physical environment, individual behaviours, genetics, and health care system. Health inequalities do not occur randomly but are socially determined by social circumstances beyond the control of individual or groups. The social circumstances can be from bad health care delivery or inaccessibility of the people to the health care services. It was observed that in advanced country particularly Scotland, the people in rich areas; men experience 23.8 more years of good health and women experience 22.6 more years when compared to the most deprived areas like the suburban areas.

There is the opinion that there exists a wide gap in health inequality between the rich and the poor as observed between the rich and the poor in Nigeria; and that focus of health care providers both at the regional and international level have been on health inequality especially between the rich and the poor, the haves and the have-nots ((Nwokoro, 2008). It was submitted that although the most traditional method of measuring inequality is using economic parameter; that other approaches have been considered as more important to measure health differentials. It was opined that gender inequality is also a major determinant of poverty and ill-health; and that poor women and girls are more vulnerable to access health resources, especially the widows and elderly women. It was also observed that socio-economic factors have significant impact on the health status of women; and the age of women also affect their health status. The attention was more on gender as a factor of health inequality particularly among the low income group in Lagos metropolis.

A research carried out in 1999 emphasized two sets of health determinants and the roles they play in influencing socio-economic inequalities. The first is the physical or natural geography which means the location and its influence in child and adult mortality in developing countries; and the second is the manmade features such as roads, infrastructures as they affect peoples' health (Picket and Pearl, 2001). Health inequalities are systematic differences in the health status of different population groups, and differences in the distribution of health resources between different population groups (WHO, 2018). The wider environment within which people live and work result to low income, poor housing, discrimination and poor access to health services (Public Health Scotland, 2020). A tool for health inequality was suggested and acronym as "PROGRESS". The full meaning is as stated below: (Tugwell et al, 2007).

P= Place of residence.

R= Race/ethnicity/culture.

O=Occupation.

G=Gender.

R=Religion.

E= Education.

S= Social status.

S=Social capital

The "P" can be interpreted to mean 'Accessibility' in the acronym which is a significant factor in reduction of health inequality between settlements.

Accessibility To Healthcare Services

Accessibility to health care services is the ability of the people to get medical care and services when needed (MedicineNet, 2017). It is the relative ease or comfort of getting healthcare services at a certain location in a particular time frame. It is the determination of the number of the people in a region of population that can reach the appropriate healthcare services such as diagnosis, treatment, prevention, management of diseases and illnesses. Accessibility to healthcare services is premised on affordability and convenience, and it is essential to the planning and allocation of resources. The factors that influence accessibility to health services include the price of health products, the stigma attached to the product by the people, discrimination, availability of the services, physical (location), attitude and information communication. It was emphasized that screening is a means to catch health problems at the early stage particularly among women. It was also noted that the type of tests a woman needs is dependent on her age, personal and family health history and specific risk factor. Diseases that need early detection in women include breast cancer, cervical cancer, pregnancy threats, Osteoporosis (fragile bone), skin cancer and so on.

It was noted that in America in the early part of this decade, 1 in 4 Americans do not have a primary care provider (PCP), and 1 in 5 Americans (children and adults below age 65) do not have medical insurance. The effect of lack of medical insurance is reflected on the peoples' lack of source to medical care, and more possibility of skipping routine medical care due to costs. This may lead to increased health risks and disabling health condition. This is part of accessibility determinants to be considered among other ones in this project.

The relationship in the concepts of availability, accessibility, quality, and acceptability were examined in the issue of health care service delivery. Quality is considered when health workforce competencies, skills, knowledge and behavior are assessed according to professional norms and standard as perceived by the users of the services. When the health workers are available and accessible, without acceptability, the health services may be left unused.

Access to health services is a complex concept and requires the consideration of four aspects: adequate supply of services, utilization of services, relevancy of services to the need of the people, acceptability of services provided by the people based on their socio-cultural perspective (Gulliford et al, 2002). Thus, the capacity of healthcare provided, the volume of demand for the services and the geographic impedance are important factors to be considered in the measurement of spatial accessibility to healthcare services (Ma, Luo and Peng, 2018).

In Nigeria, 90 percent of households were reported to have access to maternal as well as pregnancy health care when needed. 85 percent of adults and 88 percent of children were medically taken care of when needed (Sasu, 2022). A further breakdown of accessibility to selected medical services in Nigeria in 2021 is as stated below:

Characteristics	Accessibility	Inaccessibility
Adult health	85.5%	14.6%
Child health	88.3%	11.7%
Maternal health	90.5%	9.5%
Vaccination	77.5%	22.5%

In area of accessibility to health personnel, in 2019, Nigeria has 24,600 doctors for a population of 206 million people. This indicated that Nigeria has 0.11 doctor to 1000 people. The situation may even be worse the more it gets to suburban and rural areas of the country. 16,000 of the doctors were males while 8,600 were females (Statista.com, 2022).

There is also an inter-connectivity between accessibility of the people (i.e location/place) and other health indicators such as the environment, Life style, Health care system, accessibility indicators and health inequality measurement tools. The accessibility indicators have varying impacts on the rate at which the people are able to use health resources at a particular location. The totality of the impacts is reflected in the total health inequality in various settlements on local government basis; and variation can be intra or inter.

There are five dimensions to accessibility which are approachability, acceptability, availability and accommodation, affordability, and appropriateness (Lan, Nianxue, Taili, Chunchun & Mingjun, 2022). These are the five As of accessibility measurement. Spatial accessibility of healthcare services is a primary deciding factor for healthcare utilization and overall access determination. In the process of measuring healthcare accessibility, it is essential to consider these three factors of healthcare capacity, population demand and geographic impedance. Geographic impedance is usually represented with a function of travel time the people use to enjoy the health care services. This is shown in the Figure 1:

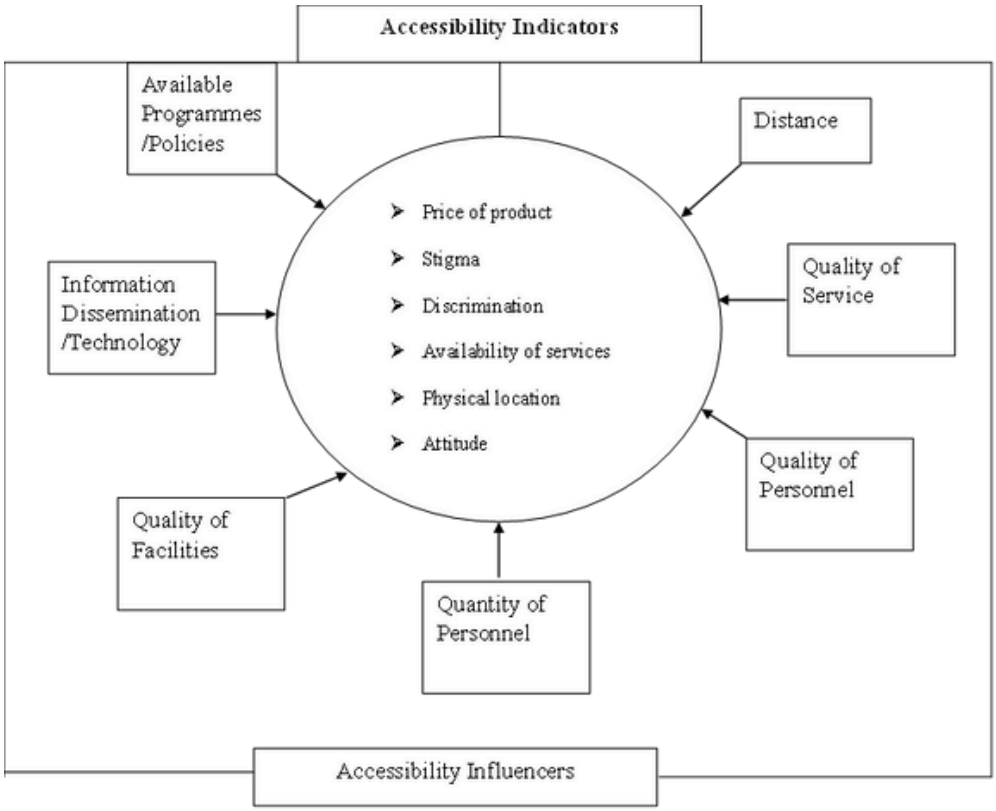


Fig 1: Relationship between Accessibility Indicators and Accessibility Influencers
Source: Alausa's Conceptualization, 2022

Mathematically, the relationship between Accessibility, Distance to health facilities and accessibility indicators is presented below:

$A_i = \frac{d(a+b+c...n)(K)}{Dt}$

Where:

$_{Ai}$, is the degree of accessibility of the people in a settlement

d, is the distance of the people to the facilities and the distance is usually characterized by travel time or cost.

*Using Mcgrail and Humphreys' continous impedance function. The function assigned the value 1 for the first 10 min (i.e lowest impedance); while the value 0 for more than 60 min, and a gradual decay for the time between 10 and 60 min (McGrail & Humphrey, 2009). These factors create division between cities and within cities.

Healthcare Delivery Health care delivery is concerned with the flow of patients and the organization of services in areas of diagnosis and treatment of disease, or the promotion and restoration of health (Pona, 2021). The control of the flow may bring division between cities or settlements. Health care delivery constitutes the most visible function of the health system for the patients and the general public. Health care delivery covers areas of service provision such as public health, primary care, specialized care, urgent and emergency care, pharmaceutical care and rehabilitation care. Other types include the long-term care, service care, palliative care, mental health care and dental care. It was noted that comparison of health services across European nations is not only challenging but notorious due to differences in jurisdictions, range of services attributed to each type of health care and the place where the services are rendered. It was also observed in America environment that there is no standard way to describe health care delivery system that will capture the breadth of health providers from individual units to integrated systems (WHO, 2021). This prevents the ability to generalize health care measurements among nations and groups.

4. Theories Adopted

Theory of Cause and Effect (Causality) The theory of Cause and Effect depicts a relationship between two different variables where one variable is the reason for the occurrence of the other. The concept of effect has been frequently used in scientific research (Fortheringham, 2001). A cause is the thing that makes other thing to happen; while effect shows the result of the relationship.

The theory of causality was first introduced by Aristotle (384 B.C -322 B.C), and states that " there is a fundamental source of becoming in everything, and that everything tends towards some end or form. Aristotle argued that change is not an illusion but a deliberate human action and experience. He submitted that reality is not externally driven but through individual experience one perceives. The theory as postulated by Aristotle helps to understand human experience of physical nature and its impacts on human life. Aristotle believed that there are multiple causes of an event, but there will be a fundamental cause. The four types of cause are Formal, Efficient, Material and Final cause.

Causality is the influence which one event, process, state or object contributes to the production of another event, process or object. This depicts a situation where the cause is partly responsible for the effect and the effect is dependent on the cause. The law of causality is an abstraction of how the world progresses. The law of causality in modern sense is restricted to Material and Efficient or to Efficient causality alone.

Distance Decay Theory.

This is a geographical concept which states that the interaction between two objects declines as the distance between them increases. The concept posited that between locations or ethnic groups, the more the distance between them, the less the rate or regularity of interaction between the two objects of phenomenon. The distance decay model stated that distance and interaction are inversely proportional; and that the shorter the distance the more likely the rate of interaction. It also stated that the "friction of distance" increases with distance; and relative distance is measured in terms of time and cost of travel and transferability (Philarchive.org, 2021).

The distance decay concept can be further explained by Waldo Tobbler's First Law of Geography. The law stated that "Everything is related to everything else, but near things are more related than distant things". This law is applicable to various phenomena relationships ranging from human settlements to geo-linguistics or ecology. Distance decay happens in the city centers, suburban and rural areas. In the city, there are likely to be more businesses, better public transit, sanitation services and roads networks. The more you move further from the city center, these services begin to break-down; businesses give way to residential areas, public transit runs less frequently, septic tanks and wells replace central sewage system and municipal water and roads are poorly maintained. The outskirt of an area may have few small businesses, no transit system, rudimentary sanitation and dirt roads. All these features exist in the suburban areas which creates disparity in the provision of healthcare facilities between cities and suburban settlements. The effect of the distance between the city center and the suburban may affect the distribution of health care facilities and consequently affect the accessibility of the people to the supposed health care services.

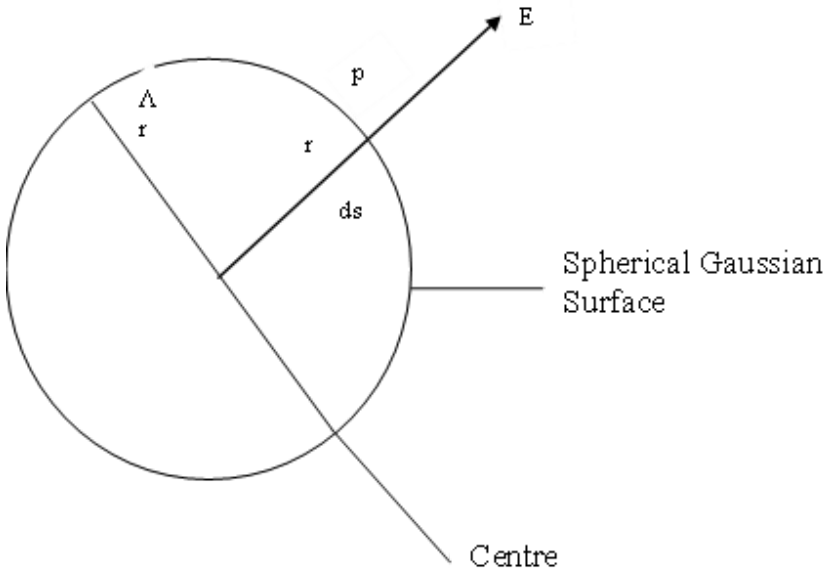
The Gaussian Law

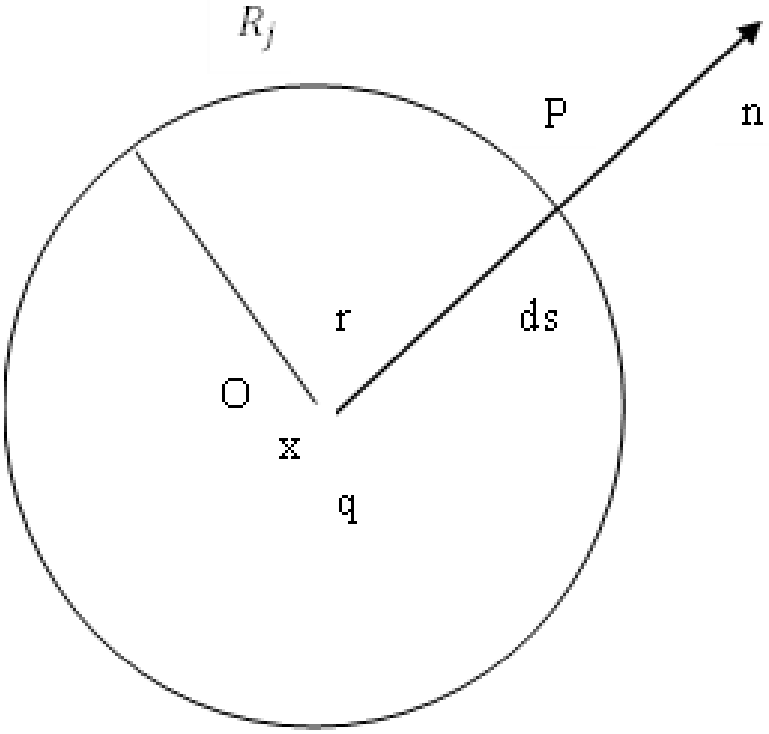
This law was developed by Carl Friedrich Gauss (1777-1855). He was a German mathematician and a physicist who made great contribution to many fields in mathematics and science. He was one of the greatest mathematicians and was acknowledged as a man with a great mathematical mind. He invented an early type of magnetometer which was a device for measuring the direction and strength of a magnetic field. He came up with a law of magnetic flux which explains the distribution of electro-magnetic current over a plane surface. The law states that the total flux of the electric field E over any closed surface is equal to 1/e0 times the net charge enclosed by the surface. The law shows the relationship between the flux and the net charge enclosed within the surface[120, 121] When the charge is at the center of the sphere, the electric field is everywhere normal to the surface and constant in magnitude. This means the farther the charge is moving away from the center to the surface of the object, the electric field will no more be normal and the magnitude (intensity) will be reducing.[122]

Figure 2

Source : [122]

$$E = \left(\frac{q}{4\pi\varepsilon_0} \cdot \frac{r}{r^2}\right)$$





$$d\emptyset_E = E.dS = \left(\frac{q}{4\Lambda\,\epsilon_0}.\frac{\hat{r}}{r^2}\right).(\hat{n}.ds)$$

This is represented mathematically below:

$$:Gw \;\_\; E.dS \quad \left(\frac{q}{4\Lambda\epsilon_0}.\frac{\hat{r}}{r^2}\right).(\hat{n}.ds)$$

Where r^ is the unit vector directed from O to P. Consider a small area element dS of the sphere around P. Let it be represented by the vector dS

When n^ is the unit vector along outdrawn normal to the area element; r^ is the imaginary line to complete the sector of the circle which can be taken as impedance factors or accessibility influencers; n^ is the peoples population in the settlements; q =1, where the flux is the greatest at the origin O. eO is the permittivity of free space and equals 8.85x 10^{-12} C^2/Nm^2 . The area in question is an imaginary surface, a Gaussian surface. It does not have to coincide with the surface of a physical object.[123]

In a simpler way, Gauss Law states that the charge enclosed divided by the permittivity equals the total electric flux out of a closed surface. The electric flux on the other hand is determined by calculating the area of the surface projected in a plane parallel to the field.[124, 125,126] This is the area of the enclosed cone which is determined by the formula.

In this study "r" (radius of the cone) is representing the distance of the people to the site of the healthcare facility; while " h" (the height of the cone) is representing the quantity of the facility per a thousand population of the people.

The Newton Law of Universal Gravitation This law was propounded by Isaac Newton in 1687 and was used to explain the observed movement of the planets. The Newton's law was further developed by Albert Eistein in 1915. The law was later reduced to mathematical form by Johannes Kepler. The law states that every particle is attracted to every other

particles in the universe with a force that is proportional to the product of their mass and inversely proportional to the square of the distance between their centers. The law states that gravitational force between two bodies is dependent on the massiveness of one to the other object and the distance between the two objects (BYJUS, 2023).This is represented by the formula below:

$F = G\ m_1\ m_{2/}\ R^2$where F is the force; G is the gravitational constant; m_1 is the mass of object 1; m_2 is the mass of object 2; and R is the distance between centers of the masses.[128] In the equation F is equal to G which is the gravitational constant which is a universal constant figure. The gravitational constant is $9.81g/S^2$. The law can further be simplified by the formula $E= mc^2$,

where m is the mass of the object times the speed of light (c) squared (^{2}). The theory is relevant in this context since it explains the importance of "pull" factors that influence the choice of the people in using a particular facility in their region or locality. The theory presumes that an invisible force pulls the people to a particular location as gravitational force pulls an object down to the ground when thrown up. These pull factors are entrenched in the perceived benefits or utility people will derive from the consumption of the facility.

Both Newton law of gravitation and Gaussian law are relevant to this study in two ways:

i.Both laws explained the principle of attraction or force of attraction between two objects A and B.

ii.The rate of attraction or magnetism is inversely proportional to the distance between the two distant objects A and B.

Thus, the laws complement the theories of Spatial Interaction (Gravity model) by Huff in 1963 and Distance Decay theory which was a further development of Waldo Tobler's First Law of Geography. The Newton Gravity law explained the forces that will draw suburban residents to the healthcare facilities from their homes to receive healthcare.

5. Analysis of Public Health Infrastructure Distribution in Oyo State.

Health care delivery in Oyo state is carried out by the three tiers of government- the federal, state and local governments. Thus, health care provision is divided into Tertiary, Secondary and Primary health care institutions. In Oyo state, the tertiary health institution consists of two teaching hospitals located in Ibadan and Ogbomoso. The one in Ibadan is the University Teaching Hospital (UCH), and the one in Ogbomoso is Ladoke Akintola Teaching Hospital. The state government also has 1 State Hospital at Adeoyo road, Ring Road, 1, Maternity Hospital at Yemetu Adeoyo, Chest Hospital at Jericho road.

In Oyo State, the following health institution and their quantity can be found:

Facility Type	No of Health Facilities
Basic Health Centre/Primary Health	209
Clinic/ Hospital	39
Dispensary	7
Health Post	94
District/General Hospital	48
Regional Health Centre	14
Teaching/Specialized Hospital	2

Source: Field Data from Oyo State Ministry of Health, 2022

The health facilities are spread all over the local governments in the state. The distribution of the health facilities on local government basis is shown in Table 4.5

S/N	Local Government	No of Health facilities
1	Afijio	34
2	Akinyele	68
3	Atiba	34
4	Atisbo	26
5	Egbeda	59
6	Ibadan North East	46
7	Ibadan North	54
8	Ibadan North West	38
9	Ibadan South East	50
10	Ibadan South West	75
11	Ibarapa Central	27
12	Ibarapa East	25
13	Ibarapa North	21

14	Ido	31
15	Irepo	29
16	Iseyin	51
17	Itesiwaju	25
18	Iwajowa	25
19	Kajola	25
20	Lagelu	40
21	Ogbomosho	34
22	Ogbomosho	44
23	Ogo Oluwa	34
24	Olorunsogo	30
25	Oluyole	51
26	Oorelope	16
27	Ona-Ara	65
28	Oriire	43
29	Oyo East	35
30	Oyo West	35
31	Saki East	16
32	Saki West	57
33	Surulere	46

Source: Oyo state Ministry of Health, 2022

S/N	Local Governmer	Population Proje	No. of Health Fac	No. of Facilities P
1	Afijio	193,782	34	5.7
2	Akinyele	310,515	68	4.57
3	Atiba	246,649	34	7.25
4	Atisbo	161,209	26	6.2
5	Egbeda	415,820	59	7.04
6	Ibadan North East	485, 897	46	10.56
7	Ibadan North	451, 702	54	8.36
8	Ibadan North Wes	225, 804	38	5.94
9	Ibadan South East	390, 626	50	7.81
10	Ibadan South Wes	415, 022	75	5.53
11	Ibarapa Central	151, 354	27	5.61
12	Ibarapa East	171, 789	25	6.87
13	Ibarapa North	147, 030	21	7
14	Ido	152, 592	31	4.92
15	Irepo	177, 738	29	6.13
16	Iseyin	374, 738	51	7.35
17	Itesiwaju	186, 755	25	7.5
18	Iwajowa	150, 774	25	6.03
19	Kajola	293, 974	25	11.76
20	Lagelu	217, 163	40	5.43
21	Ogbomoso North	291, 527	34	8.57
22	Ogbomoso South	147, 156	44	3.34
23	Ogo Oluwa	95, 580	34	2.81

24	Olorunsogo	119, 243	30	3.97
25	Oluyole	298, 274	51	5.85
26	Ona- Ara	389, 327	16	24.33
27	Ore lope	152, 470	65	2.34
28	Oriire	219, 032	43	5.09
29	Oyo East	181, 923	35	5.2
30	Oyo West	200, 046	35	5.72
31	Saki East	159, 731	16	9.98
32	Saki West	400, 611	57	7.03
33	Surulere	205, 737	46	4.5

Source: Alausa's Field Analysis as Extracted from the records of Oyo State Hospital Management Board, 2023.

Figure 3. Map of Oyo State showing the Distribution of Primary Healthcare Facilities
Source: Alausa's Fieldwork, 2023

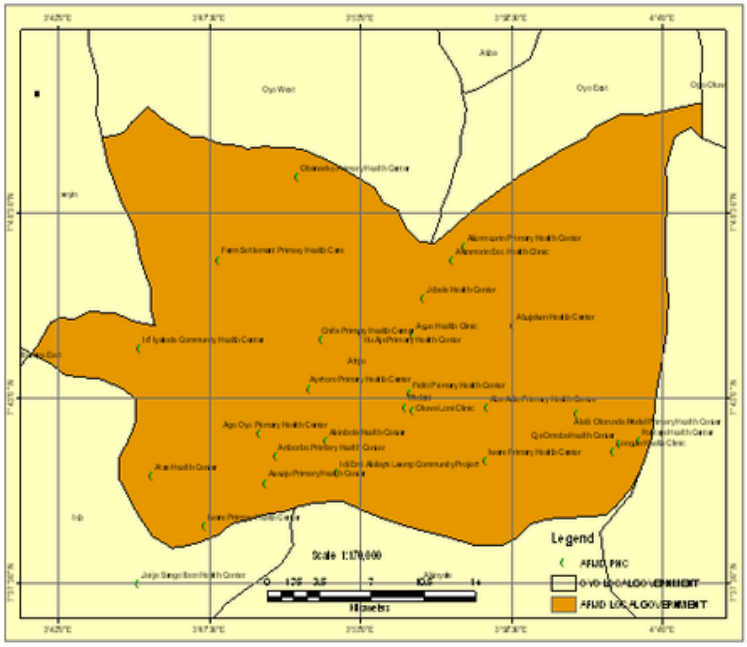


Figure 4. Map of Afijio Local Government showing the PHC Distribution
Source: Alausa's Fieldwork, 2023.

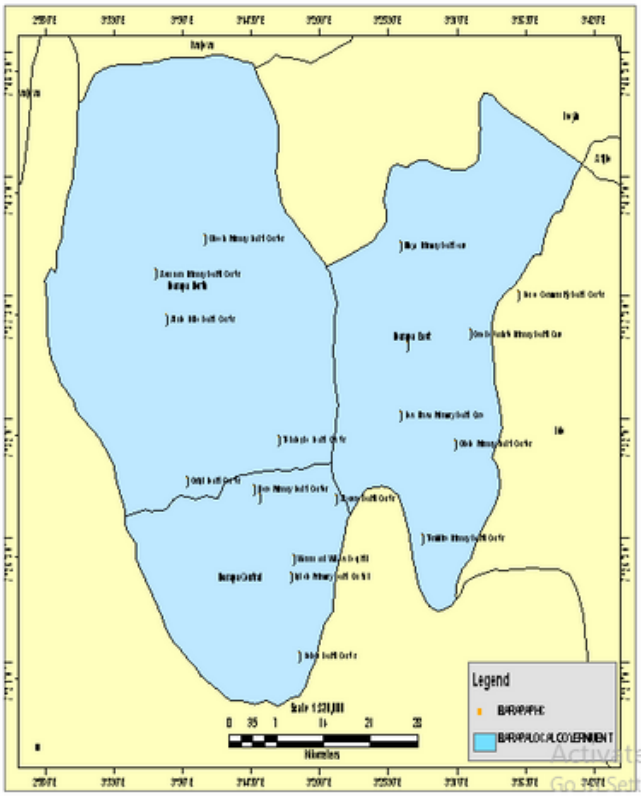


Figure 5. Map of Ibarapa North showing the Distribution of PHCs
Source: Alausa's Fieldwork, 2023

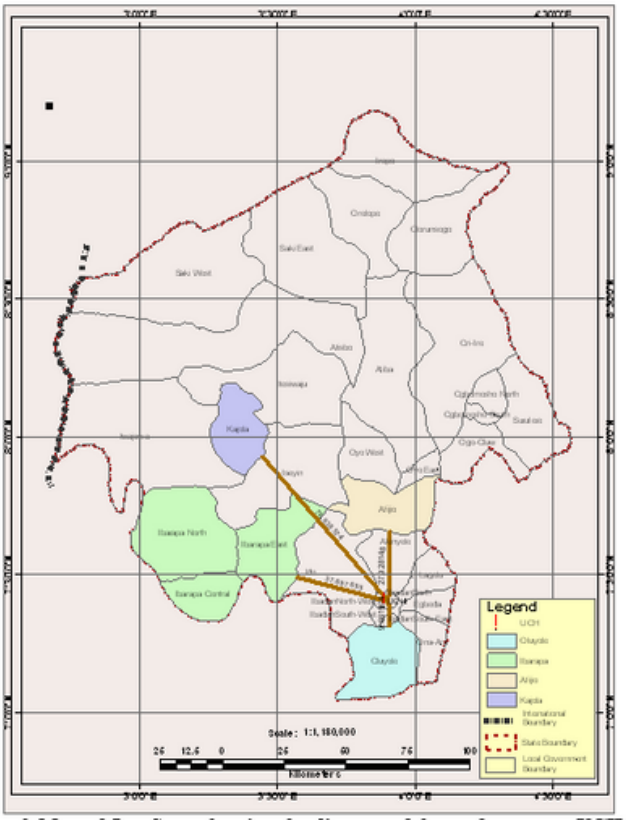


Figure 6. Map of Oyo State showing the distance of the study areas to UCH, Ibadan Source: Alausa's Fieldwork, 2023

Table 4. Estimated Primary Health Facility per suburban population of the study areas.

Local Governme	No. of Houses Id	Estimated Popul	PHC facility prov
Afijio	8,074	48,444	0 4.8
Ibarapa North	5,193	31,158	0 3.1
Kajola	5,975	35,850	0 3.6
Oluyole	27,527	165,162	0 16.5

Table 5. The problems encountered in getting adequate medical care

Respons	Afijio	Ibarapa N	Kajola	Oluyole	Total	Percentage of t
Lack of fu	42	40	41	45	168	11
Discrimina	69	66	68	72	275	18
Non- avail	74	68	71	78	291	19
Work envi	74	68	71	78	291	19
Poor Hous	74	68	71	77	290	19
Lack of pu	54	50	52	58	214	14
Transport	48	43	45	52	188	18.8

Source: Field Survey, 2023 Table 5.35:

Table 6. Rating of factors according to their impact on peoples' accessibility to health care services provided

Accessibility factors	Very Great (5) (100%)	Great (4) (100%)	Average (3) (100%)	None (2) (100%)	Total (100%)
Place	365 (23.9)	555 (36.3)	470 (30.7)	141 (9.2)	**1531 (100%)**
Race/Ethnicity	450 (29.4)	431 (28.2)	600 (39.2)	50 (3.3)	**1531 (100%)**
Occupation	365 (23.9)	555 (36.3)	470 (30.7)	141 (9.2)	**1531 (100%)**
Gender	555 (36.3)	470 (30.7)	141 (9.2)	365 (23.9)	**1531 (100%)**
Religion	350 (22.9)	731 (47.7)	450 (29.4)	-	**1531 (100%)**
Education (information)	800 (52.3)	650 (42.5)	50 (3.3)	31 (2.0)	**1531 (100%)**
Social Status (Rich or poor)	650 (42.5)	481 (31.4)	400 (26.1)	-	**1531 (100%)**
Social Capital	450 (29.4)	431 (28.2)	600 (39.2)	50 (3.3)	**1531 (100%)**
Price	400 (16.3)	620 (40.5)	450 (29.4)	61 (3.9)	**1531 (100%)**
Stigma (Acceptability)	350 (22.9)	700 (45.7)	450 (29.4)	31 (2.0)	**1531 (100%)**
Quantity of services	450 (29.4)	431 (28.2)	550 (35.9)	100 (6.5)	**1531 (100%)**
Quality of services	831 (54.2)	600 (39.2)	50 (3.3)	50 (3.3)	**1531 (100%)**

Source: Alausa's Field Survey, 2023

Summary of Findings and Recommendations.

The result of the data analysis revealed that 71.1% of the suburban residents travelled more than 2km to receive healthcare and the suburban has no primary healthcare facilities allocated to her as against the proposed 6 per 1000 people. This has brought a great disparity and inequality in healthcare infrastructure between the urban and suburban areas of Oyo state. Hence the following suggestions are made which will enhance healthcare delivery in Oyo state in general and suburban settlements in particular:

- There should be a paradigm shift in the planning, policy, strategy of delivery and location of healthcare facilities in Oyo state. This should reflect dominant disease spread, settlement pattern and climatic variations in the various regions in the state based on Hippocrate the father of medicine philosophy.
- The location of the healthcare facilities should be determined by the suburban residents' location and some theoretical principles such as distance decay theory, spatial interaction theory, gravitational theory, regional availability model amongst others should be explored.
- There should be as a matter of urgency the preparation and implementation of Physical Development Plan for Oyo State which will be a legal document to control the use of land for various purposes including healthcare service delivery. This document should cover Urban, Suburban and Rural land space in Oyo State.
- There should be re-organization of the Oyo State Health Management Board to have a resident Urban and Regional Planner to guide in the preparation of Master or Subject Plan for healthcare service facilities in Oyo State.
- There should be introduction of Mobile Clinic (MB) address the scattered spatial nature of the suburban settlements that prevents their maximum access to healthcare. The clinic should attend to primary health needs of the suburban settlements as contained in the discussion.
- Urban growth and expansion should be controlled and monitored to prevent slum settlement development that may compound problem for healthcare planning and delivery.
- There is the need to establish zonal or regional tertiary and secondary healthcare institutions that will take care of the specialized health needs of the people. This will be more relevant to suburban settlements. The case of one in the study areas where patients will have to travel for 2hrs 48min (Ibarapa North Settlements) to receive healthcare attention at University College Hospital, Ibadan is unacceptable. This is at variance to the 30 minutes recommended.
- The government and private sector should collaborate to increase the number and quality of Primary Healthcare facilities provided in the suburban areas. There should be a synergy between the private and public sectors in healthcare facility provision.
- The communities and Non-Governmental Organizations (NGOs) should be organized and empowered to embark on self-help healthcare facility projects development. This will reduce the distance the suburban residents will have to cover to get healthcare attention
- There should be provision of economic activities in the suburban areas to improve on the income capacity of the people. This will have a great impact on the affordability of the people to the services provided by either the public or private health institutions.

- There should be a working plan to make healthcare consultation free while basic drugs should be provided in the primary health centers without cost or at least affordable cost to the suburban residents.
- The health insurance scheme should be emphasized and be given wider publicity among the residents to take care of the health needs
- The Town Planning Authorities and Environmental health officers should enforce provision of facilities and Water Sanitation and Hygiene (WASH) in public markets and public education institutions in the suburban settlements. This will improve the safe health habits of the suburban residents.
- Research should be conducted, financed and result implemented by the governments and Non-Governmental Organizations in areas of healthcare accessibility factors and general health needs of the people in the suburban individual community racial/ethnic composition.

Conclusion

This paper has observed that suburban areas were not provided with public health infrastructure and 71.1% of residents would have to travel more than 2km to receive healthcare in their environment. It was suggested that public health infrastructure distribution should be based on established location theories and more public health infrastructure be provided in the suburban areas in collaboration with Non-Governmental Organizations.

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ANALYSIS OF FACTORS INFLUENCING RESIDENTS' CHOICE OF HOUSING IN THE OTTO-AWORI LOCAL COUNCIL DEVELOPMENT AREA

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ABSTRACT

Sustainable housing development has been a widely discoursed topic in urban planning, previous research has largely explored various aspects of housing, with sparse research effort on factors influencing housing choice. Hence, this study analyzed factors influencing residents' choice of housing in Otto-Awori LCDA. It examines the socio-economic characteristics of residents, factors determining residents' choice of housing and the relationship between respondents' socio-economic characteristics and the factors for housing choice in the study area. Primary data was collected through administration of questionnaire to residents in Otto-Awori LCDA using a systematic random sampling technique. Out of 191 questionnaires administered, 173 were returned and analysed using frequency tables, spearman rank correlation and factor analysis. Housing Choice Determinant Index (HCI) was developed from variables measured using a Likert scale. The study observed that 56.6% of the respondents were males and below 30 years of age. It was further observed that significant proportions (49.1%) of the respondents were married and earned below ₦50,000 monthly. The study revealed that ventilation (3.36), household size (3.19), and nearness to place of work (3.18) were the major factors influencing housing choice in the study area. The study established a weak negative correlation between the size of the room and marital status (p-value 0.003 and r-value -0.225) at 0.05 level of significance. The study concludes that the significant socio-economic predictors for housing choice are marital status and the primary factor predicting housing choice is ventilation. Therefore, marital status and ventilation should be considered in housing development and housing choice.

INTRODUCTION

Housing is required to provide comfort, safety, satisfaction, experience, and convenience for its occupants. Hence, it is one of the essential social conditions which define the living standard of a country's citizens (Olarenwaju et al., 2017 and Gan et al., 2019). If the housing quality is adequate and available, the citizens and government will spend less on health care, crime prevention, recreation, and pollution; leading to increased productivity and prosperity (Olarenwaju et al., 2017 and Gan et al., 2019). Housing in any society is one of the basic human needs. It is expected to satisfy certain biological, psychological, social, cultural, and economic needs of the people (Toyobo, Muili and Ige, 2011). A deficiency in housing can profoundly affect the health, welfare, and productivity of man (Aderamo and Ayobolu, 2011). Thus, it is an indispensable necessity without which man's survival is impossible (Aderamo and Ayobolu, 2011).

The house an individual lives in is a symbol of his status, a measure of his achievement and social acceptance, an expression of his personality, and the barometer that seems to indicate in a large measure, the way the individual perceives himself and how he is perceived by the larger society (Nubi, 2008). It is the measure of all the good (or bad) things in life that will come to him and his family (Agbola, 1995). The importance of housing in human development has been established in the existing literature. The view of scholars varies according to the aspect of housing each one delves into. For instance, Aybike, Mehmet and Samet (2012) described housing as an expressional means that reflects an environment's primary and secondary functions as the world view, value, norms, and lifestyles of a culture. Similarly, Sami (2007) perceived housing as a determining triangulation point in carrying out privacy conception, defending the domination borders, defining the personal space, keeping away from the crowd, taking the interaction level under control, finding direction, defining a place. Housing is a basic need for a family; it is a phenomenon having economic and spatial content for the society (Tavukoğlu, 2008). However, due to rapid rates of urbanization reported worldwide by Demographia World Urban Areas (2017), housing supply has always failed to satisfy demand (Gan et al., 2019). Therefore, exploring the reasons why households pay or choose what they pay for housing, would help to sustain housing delivery (Hancock, 1993), which can eliminate or reduce artificial restrictions (Olarenwaju et al., 2017) and prevent housing abandonment (Maina, 2013).

A study on factors determining the choice of residential location in Ilorin, Nigeria by Usman et al. (2015) revealed that geographical, social, and economic factors determine residents' location choice as related to housing. Similarly, cultural factors such as preferences and values or social status, taste, and financial resources, also influence a home's physical characteristics. The housing environment should improve the general health of individuals/society as well meeting the needs of the inhabitants (Aybike, Mehmet and Samet, 2012). The various housing needs resulting from dwelling and dwelling-environment, taking place in the physical, psychological, and socio-cultural environment, and the environment they take place affect the user satisfaction (Kellekçi and Berköz, 2006).

The features of the dwelling environment are one of the most important indicators of life quality. The dwelling environments which are well arranged and planned both enhance the quality of life and persuade people to choose them to live there.

As a result, the better a dwelling environment is planned, the more satisfaction about that environment arises (Türkoğlu et al., 2008). Housing choice is a topic of interest amongst researchers of diverse disciplines and has been studied from different theoretical perspectives (Boumeester, 2002). For instance, economists focus primarily on housing prices and how housing costs determine the choice between owning and renting. Sociologists and geographers study the housing choices individual households make and examining housing distribution in a given population. They focus on socioeconomic and demographic aspects, dwelling, and the neighborhood features that influence housing choice (Coolen et al., 2002 and Tao et al., 2015). The fact that housing serves as one of the best indicators of a person's standard of living and his or her place in society (Nubi, 2008) shows that a resident's choice plays a prominent role in selecting housing. Several studies on housing in the past have shown that taste, fashion and income determine housing choice (Ozdemir 2002; Aribigbola, 2008; Agbodike and Anifowose 2015).

Choice may be defined as the ability to choose between two or more competing things or objects (Opaluwa and Aribigbola, 2015). It is the ability to select from among several alternatives. It is believed that human beings do not have a fixed nature or essence as animals and plants do, each human being makes his own choice that creates his or her nature. Choice is central to human existence as even the refusal to choose is a choice (Michelson, 1975). Choice is not a one-time phenomenon but an ongoing concern (Michelson, 1975). According to Olanrewaju and woon (2017), the most likely problem triggering the imbalance between the demand and supply of affordable housing is the inability to reconcile household's choice and supply. Housing choice, therefore, involves continuous decisions of the people about where to reside, based existing bundle of services, facilities, and housing goods (Opaluwa and Aribigbola, 2015). The varying degree of factors within and outside the housing domain and personal attributes of the residents can influence residents' choice of housing. It is clear from the foregoing that there is a linkage between housing and residents' choice which studies have been able to establish but literature has not been fully able to identify the factor(s) that influence the individual choice of housing. It is against this backdrop that this study analyzed the factor(s) influencing the resident choice of housing in Otto-Awori Local Council Development Area with a view to formulate visible strategies that will promote sustainable housing development. The study examine the socio-economic characteristics of the residents, analyze the factors determining resident's choice for housing and examine the relationship between socio-economic characteristics of respondents and the factors for housing choice in the study area

Study Area.

Otto-Awori enjoys an equatorial climatic condition, located on the latitude 4^0 North of the equator and longitude 15.4^0 East of the Greenwich meridian. This location makes it feasible for the town to enjoy rainfall throughout the year. Rainfall is heavy in the months of May through July and September through November with a break in August and short dry spell in the months of December through February. The average annual rainfall is about 1020 mm However; nearness to oceanic influence enables rain to fall any time of the day. The vegetation of Otto-Awori consists of grass and thick mangrove forest, which can be seen, in patches in several areas of the land. Grass-reed can be found in the lagoon areas of the town. Stretches of tidal mud along the shores of Otto-Awori land are often covered with the tangle of branches and exposed roots of various trees and shrubs, with large leaves, related to the common mangrove. Otto-Awori land is a unique geographical area.

It is built on the sedimentary rock of the late Eocene geological rock formation. The sedimentary rock comprises of loamy and sandy soil compacted in some area and loose in many other areas of Otto-Awori land. The areas close to the lagoon are made of muddy clay depositional soil. Within this area is the ever-wet loose sandy soil covered by both brackish and fresh water mangrove forest. In other areas, the soil is covered by reed type grass, suitable for mat making; the major occupation of the Otto-Awori people, especially the women. Otto-Awori is now the headquarters of the newly created local government; Otto-Awori Local Council development area. This has therefore contributed to the town's quick growth rate. A flurry of activities is ongoing in the area with efforts at repositioning the city for greater roles at the present and in the future. Furthermore, the new status acquired by the city is making it a beehive of activities coupled with visible government infrastructures. The population is increasing rapidly, with more influx of people attracted by its new status and the presence of an institute of higher learning with over 30,000 students and numerous service providers. The town, which was not more than a fishing village way back in the early '60s now houses a populace of over 500,000 individuals. This has further contributed to the choice of residence in the town.

Fig. 1.2: Otto-Awori LCDA
Source: Google Earth Imagery

RESEARCH METHODS

The research utilized primary data, acquired through direct observation, personal interviews, and the distribution of questionnaires among residents within the study area. The primary data encompassed information on socio-economic characteristics of residents, factors determining resident's choice of housing and the relationship between socio-economic characteristics of respondents and the factors for housing choice in the study area. All the 14,995 housing units currently occupied constituted the sampling frame for the study. Using a Systematic random sampling technique, the sample size (191) of this research was derived using Kothari's (2004) formula. The study developed Housing Choice Determinant index to determine Factors Influencing Housing Choice in Otto-Awori Local Council Development Area using a Likert scale. Twenty seven variables were rated by residents on Housing Choice Determinant index. 173 questionnaires were returned and properly filled which is approximately 91% response rate. According to Mugenda and Mugenda (1999), this is satisfactory since a response rate of 70% above is acceptable.

DATA ANALYSIS AND INTERPRETATION

The findings are discussed under various headings as presented below. Except otherwise indicated the results presented in tables and figures are products of the survey carried out by the Authors in 2024.

Socioeconomic Characteristics of Respondents

The socio-economic characteristics considered to have very strong contributions to the central theme of the study are examined. These include the gender, age, marital, educational status, employment status, occupation, average monthly income, household size, employment type, occupation of respondents.

The study revealed that there were more male respondents (56.6%) in the study area as against the female (43.4%) (Table 1). This implies the majority of the respondents in the study area were male. It was revealed that 34.7% of the respondents were below 30 years, 32.9% were between 30-39 years, (19.1%) of the respondents were aged between 40-49 years. While 8.7% of the respondents were aged between 50-60 years, 4.6% were above 60 years of age in the study area. The study reveals 43.9% of the respondents were single, 49.1% were married, and 6.9% were separated. This implies that majority of the respondents 49.1% in the study area were married adults. As further shown Table 1; the study found out that 4% of the respondents had primary education, 20.8% had secondary education, while 75% had tertiary education. The data revealed that majority of the respondents 59% of the respondents were employed; 18.5% were unemployed, 8.1% were retired, 11.6% were undergoing apprenticeship and 2.9 recognized others as their employment status. As revealed in Table 1, 17.3% of the respondents were students, 35.8% were business owner or trader, 15.6% were civil servants, 26. % worked with the private sector, while 5.2% were unemployed. The study also revealed that 34.7% of the respondents earned below ₦50,000, while 27.7% earned between ₦100,000-₦150,000. Also, 4.6% earned between ₦150,000-₦200,000 and 2.9% earned a monthly income of ₦200,000 and above in the study area. This may influence the housing choice since it has been found that higher-income households consume more housing, both in quality and quantity, than low-income households. As shown in Table 1, the study revealed that 11% of the respondents had less than 2 persons per household, 37.6% had 3-5 persons, 30.1% had between 6-8 persons in their household, while 21.4% had above 9 persons in their household. The predominant household type in the study area was between 3-5 persons. The data revealed that 81.5% of the respondents didn't own cars, 13.9% owned one car while 4.6% owned at least two cars (Table 1). It can be inferred from this finding that majority 81.5% of the respondents in the study area didn't own any cars.

Table 1: Socioeconomic Characteristics of Respondents

		Frequency	Percent
Gender	Male	98	56.6
	Female	75	43.4
	Total	173	100
Age	low 30 yea	34.7	34.7
	30-39 years	57	32.9
	40-49 years	33	19.1
	50-60 years	15	8.7
	60 years and al	8	4.6
	Total	173	100
arital Statu	Single	76	43.9
	Married	85	49.1
	Separated/Divorced/	12	6.9
	Total	173	100
ducationa	nary educa	7	4
	Secondary educ	36	20.8
	Tertiary educa	130	75.1
	Total	173	100
loyment S	Employed	102	59
	Unemployed	32	18.5
	Retired	14	8.1
	Apprenticesh	20	11.6
	Others	5	2.9
	Total	173	100
	Business owner/t	62	35.8
	Government worker/c	27	15.6
	Private Sector W	45	26
	Unemployed	9	5.2
	Total	173	100
Income	elow ₦50,0(	60	34.7
	₦50,00 – ₦100	48	27.7
	₦100,000 – ₦15(	52	30.1
	₦150,000 – ₦20(	8	4.6
	₦200,000 and al	5	2.9
	Total	173	100
ousehold si	than 2 per	19	11
	3-5 persons	65	37.6
	6-8 persons	52	30.1
	9 persons and a	37	21.4
	Total	173	100
ar ownersh	None	141	81.5
	1	24	13.9
	2	8	4.6
	Total	173	100

Source: Author's Field Survey, 2024

Factors Influencing Housing Choice in Otto-Awori Local Council Development Area

Presented in Table 4.54 is the aggregate residents' view on how they agreed with each of identified Housing choice variables in the selected study area. The nearer the HCI to 5, the higher the level of agreement the residents are with the Housing Choice variable as they infer on their work-life balance within the organizations they work. HCI for the Organizations is 2.78. From this analysis, the level of agreement lies between disagree and moderately agree. The figure is closer to the latter than the than the former. Furthermore, all variables having an index equal to and above 2.78 are the major determinants that contributes to housing choice of respondents in Otto-Awori. While those below 2.78 do not constitute major determinants influencing respondents' choice of housing in the study area. Thus, the major determinants influencing housing choice of respondents is Level of Ventilation, which has an index of 3.36; Household Size (Number of Persons Living with Respondent) (3.19); Nearness to Place of Work (3.18), Space (3.10); Rental Cost (3.04); Income (3.00); Size of Rooms (2.96); Availability of Potable Water (2.93); Accessibility to Transport Terminals and Means (2.89); Maintenance (2.82); Proximity to Children School (2.82); and Location (2.79).

Table 2: Factors Influencing Housing Choice in Otto-Awori LCDA

			Opinion						
S/n	**Housir**	1	2	3	4	5	**SWV**	**HCI**	**SDV**
1	Level o	22	30	23	59	39	582	3.36	1.34
2	Housel	24	44	22	40	43	553	3.19	1.41
3	Nearne	43	13	17	69	31	551	3.18	1.47
4	Space	23	43	30	47	30	537	3.1	1.32
5	Rental	35	22	53	27	36	526	3.04	1.39
6	Income	30	42	36	28	37	519	3	1.4
7	Size of	34	40	30	36	33	513	2.96	1.41
8	Availab	41	27	42	28	35	508	2.93	1.44
9	Access	25	42	47	44	15	501	2.89	1.19
10	Mainter	40	40	28	40	25	489	2.82	1.39
11	Proxim	41	36	38	29	29	488	2.82	1.4

12	Locatior	28	66	33	30	16	484	2.79	1.43	
13	Security	44	43	37	15	34	471	2.72	1.44	
14	Stable e	36	48	33	43	13	468	2.7	1.25	
15	Beauty	43	35	38	44	13	468	2.7	1.29	
16	Nearnes	42	37	44	33	17	465	2.68	1.29	
17	Availabi	38	43	43	33	16	465	2.68	1.26	
18	Design	28	66	33	30	16	459	2.65	1.2	
19	Privacy	50	30	48	29	18	454	2.62	1.33	
20	Availabi	37	66	25	24	21	445	2.57	1.29	
21	Quality	38	55	42	20	18	444	2.56	1.24	
22	Social n	40	51	41	31	10	439	2.53	1.19	
23	Structur	43	47	41	33	9	437	2.52	1.2	
24	Waste r	41	54	38	27	13	436	2.52	1.22	
25	Nearnes	55	39	32	30	17	434	2.5	1.35	
26	Your ag	43	54	34	32	10	431	2.49	1.21	
27	Level of	49	49	43	15	17	421	2.43	1.25	
	Mean of Σ*HCI/N* = 74.95/27 = 2.78						481	**Σ= 2.78**		

Strongly disagree (1), Disagree (2), Moderately agree (3), Agree (4), Strongly agree (5)
Source: Author's Field Survey, 2021

Factor Analysis for Factors Influencing Housing Choice in Otto-Awori LCDA

Factor analysis is a statistical data reduction and analysis technique and it's used to categorize the information contained in a number of original variables into smaller sets of composite variates (factors) with a minimum loss of information (Hair, Anderson, Tatham and Black, 1998). Factor analysis operates on the conception that measurable and observable variables can reduced to fewer latent variables that share a common variance and are unobservable, which is known as reducing dimensionality (Bartholomew, Knott and Moustaki, 2011).

It was applied in this study to lessen the total number of housing choice determinants (variables) in Otto-Awori. Since the assumption of factor analysis is that variables should be metric and normally distributed (Hair et al., 1998); Agreement variables were assumed to be metric, using the Likert five (5) scale levels.

Kaiser-Meyer-Olkin (KMO) test is a measure of how suited data is for factor analysis. It measures sampling adequacy for each variable in the model and for the complete model. Result in shows important parts of the output: The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity. The KMO statistics varies between 0 and 1; a value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion in the pattern of correlations (hence, factor analysis is likely to be inappropriate). A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis can yield distinct and reliable factors. Kaiser (1974) recommends accepting values greater than 0.5 as acceptable (values below this should lead to one either collecting more data or rethinking which variables to include). Furthermore, values between 0.5 and 0.7 are regarded as mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb (Hucheson and Sofroniou, 1999). For this data, the value is 0.88 which falls in the range of great; hence, factor analysis is appropriate for the data. Bartlett's test of significance is 0.000 at 351 degree of freedom. This also indicates that the data is suitable for factor analysis. The tests further indicate that the correlation matrix is not an identity matrix.

Table 3: KMO and Bartlett's Test of Determinants of Housing Choice in Otto-Awori LCDA

Kaiser-Meyer-Olkin Measure of Sam		0.881
Bartlett's Test of S	Approx. Chi-Squa	3417.844
	Degree of Freedo	351
	Significant level	0

Source: Author's Field Survey, 2021

The result of Table 4.56 reveals the initial communalities which are the estimate of variance in each variable as one (1) in all components or factors. This is because principal component analysis works on the initial assumption that all variance is common. The communalities after extraction reflect the common variable in the data structure. Another way to look at these communalities is in term of proportion of variance explained by the underlying factors. The lowest factor in this regard is Availability of Parking Space, where only (52.5%) of the variance associated with this variable is common or shared across the communities. Similarly, the variable with the highest level of is Level of Ventilation in the communities at (80.6%) after extraction. For a reasonable representation of any variable, it is expected that the communalities after extraction must be high. The average communalities as calculated with first five (5) factors explaining 71.54% of the total variance.

Table 4: Communalities

Variables	Initial	Extraction
Space	1	0.69
Size of Rooms	1	0.664
Level of Ventilati	1	0.806
Household Size (	1	0.813
Nearness to Plac	1	0.604
Nearness to Hea	1	0.616
Beauty of the Bui	1	0.621
Rental Cost	1	0.679
Proximity to Child	1	0.768
Accessibility to T	1	0.602
Security of Neigh	1	0.703
Income	1	0.648
Quality of the Ne	1	0.645
Your Age	1	0.745
Nearness to Marl	1	0.597
Privacy	1	0.466
Availability of Tile	1	0.589
Availability of Pot	1	0.768
Stable Electricity	1	0.615
Availability of Par	1	0.525
Structure /Type c	1	0.734
Waste Manage	1	0.606
Level of Urban	1	0.671
Social Needs	1	0.688
Location	1	0.741
Design of the H	1	0.786
Maintenance	1	0.776

Extraction method: Principal Component Analysis
Rotation method: Varimax with Kaiser Normalization
Rotation converged in 6 iterations
Source: Author's Field Survey, 2021

Correlation Between Socio-economic Characteristics of Otto-Awori LCDA and Housing Choice

As shown in the Correlation matrix in Table 4; the strongest positive correlation was between ventilation (VT) and size of room (RS) with (p value 0.000 and r value 0.723**). There is also a strong correlation between ventilation (VT) and space (SP) with (p value 0.000 and r value 0.720**); size of room (RS) moderately correlated positively with space (SP) with (p value 0.000 and r value 0.654**); there was a moderate positive correlation between respondents' rental cos (RC) and ventilation (VT) with (p value 0.000 and r value 0.591); respondents' nearness to place of work (NP) correlated moderately with ventilation (VT) with (p value of 0.000 and r value of 0.582**); and rental cost (RC) and space (SP) with (p value of 0.529** and r value 0.000). The data revealed that; there was a weak positive correlation between proximity to children's school (PS) and nearness to place of work (NPP with (p value of 0.000 and r value 0.484**); a weak correlation existed between proximity to Children's school (PS) and rental cost (RC) of respondents at (p value of 0.00 and r value 0.457**).

A weak correlation existed between proximity to children's school (PS) and ventilation (VT) with (p value 0.000 and r value 0.447**). A weak positive correlation was established between rental cost (RC) and size of room (RS) with (p value 0.000 and r value 0.419**). Nearness of respondents to place of work also correlated weakly with space with (p value 0.000 and r value of 0.413**) There was also a weak correlation between size of room (RS) and proximity to Children's school (PS) with (p value 0.000 and r value of 0.360**). The study also revealed that there was a weak positive correlation between nearness to place of work (NP) and room size of Room (RS) with (p value 0.000 and r value 0.344**); a weak positive correlation also existed between proximity to children's school (PS) and space (SP) with (p value 0.000 and r value 3.42**). At a significant level of 0.05; space (SP) positively correlated weakly with income (INC) of respondents in the study area with correlation coefficient and significance values (p=0.000 and r=0.299**); there was a very weak positive correlation between proximity to school (PS) and age (AGE) of respondents with (p value 0.001 and r value 0.253**); a very weak correlation is also found to exist between car ownership (CO) and age (AGE) with (p value 0.003 and r value 0.224**). At 0.05 level of significance, the study revealed in Table 4.59 that ventilation (VT) weakly correlated with marital status (MAR) with (p value 0.009 and r value 0.999**); there was a very weak positive correlation between car ownership (CO) also weakly correlated with marital status (MAR) with (p value 0.000 and r value 0.158**).

It was revealed that there was a weak negative correlation between size of room (RS) and marital status (MAR) with (p value 0.003 and r value -0.225) at 0.05 level of significance; while space (SP) and marital status (MAR) of respondents also weakly correlated negatively with (p value 0.000 and r value -0.277**). It can thus be inferred from these findings that the relationship between socioeconomic characteristics of the respondents and their housing choice was a positive relationship. This means that socioeconomic characteristics such as age, income, marital status, and household size, influenced their decision in making housing choice in the study area.

Table 5: Matrices of Correlation between Socio-Economic Characteristics of Respondents' and Factors of Housing Choice

		GEN	AGE	MAR	INC	HH	CO	SP	RS	VT	NP	RC	PS
GEN	Correlation Coeffi	1											
	Sig. (2-tailed)												
AGE	Correlation Coeffi	-0.011	1										
	Sig. (2-tailed)	0.890											
MAR	Correlation Coeffi	0.077	0.553**	1									
	Sig. (2-tailed)	0.317	0.000										
INC	Correlation Coeffi	-0.177*	0.197**	0.161*	1								
	Sig. (2-tailed)	0.20	0.009	0.034									
HH	Correlation Coeffi	-0.026	0.236**	0.159*	0.014	1							
	Sig. (2-tailed)	0.734	0.002	0.036	0.859								
	N	173	173	173	173	173							
CO	Correlation Coeffi	-0.044	0.086	0.158**	0.458**	0.224**	1						
	Sig. (2-tailed)	0.564	0.262	0.000	0.000	0.003							
SP	Correlation Coeffi	-0.164*	-0.108	-0.277**	0.299**	0.046	0.050	1					
	Sig. (2-tailed)	0.031	0.158	0.000	0.000	0.546	0.515						
RS	Correlation Coeffi	-0.096	-0.069	-0.225**	0.117	0.007	-0.104	0.654**	1				
	Sig. (2-tailed)	0.210	0.369	0.003	0.124	0.929	0.173	0.000					
VT	Correlation Coeffi	-0.129	-0.061	0.199**	0.176*	-0.023	-0.004	0.720**	0.723**	1			
	Sig. (2-tailed)	0.092	0.423	0.009	0.020	0.764	0.962	0.000	0.000				
NP	Correlation Coeffi	-0.107	0.105	0.065	0.048	-0.108	0.047	0.413**	0.344**	0.582**	1		
	Sig. (2-tailed)	0.160	0.169	0.399	0.530	0.158	0.539	0.000	0.000	0.000			
RC	Correlation Coeffi	0.028	0.015	-0.160	0.090	-0.095	-0.102	0.529**	0.419**	0.591**	-0.442*	1	
	Sig. (2-tailed)	0.716	0.843	0.036	0.238	0.212	0.184	0.000	0.000	0.000	0.000		
PS	Correlation Coeffi	0.079	0.253**	0.121	0.098	-0.188*	0.006	0.342**	0.360**	0.447**	0.484**	0.457**	1
	Sig. (2-tailed)	0.299	0.001	0.114	0.198	0.013	0.933	0.000	0.000	0.000	0.000	0.000	

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Definition of Variables

GEN: Gender HH: Household size VT: Ventilation
AGE: Age CO: Car ownership NP: Nearness to place of work
MAR: Marital status SP: Space RC: Rental cost
INC: Income RS: Size of room PS: Proximity to children's school

Conclusion

The study concludes that the significant socio-economic predictors for housing choice are marital status. The primary factor predicting housing choice is ventilation. Therefore, marital status and ventilation should be considered in housing development and housing choice preferences. No doubt, housing choice can be a tedious task as consumers of the housing stock find it difficult to get access to viable alternative housing with the proper environment, designs, utility facilities, and services that meet their most basic needs. Policymakers have a responsibility of making living, working, and leisure enjoyable rather than endurable for residents and therefore must make inclusive housing sector decisions that favor all income earners, age groups, and particularly the environment. The need for a sustainable environment and sustainable housing cannot be overemphasized, hence, enforcement of housing and environment-friendly policies when made will improve housing choice decision making as housing consumers will be able to access the most beneficial housing stocks in their locality such as Otto-Awori. There is a need to reduce the cost of a house by providing housing near public transport, infrastructure, and community facilities; this will reduce energy demand and expenditure on energy for low and medium-income earners. Code enforcement can help to ensure that existing housing remains safe and habitable.

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ASSESSMENT OF STORMWATER DRAINAGE SYSTEMS IN LAGOS, NIGERIA

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ABSTRACT

This study focused on the assessment of storm water drainage systems in Lagos State Nigeria. The work was necessitated due to the great danger posed by flooding on the lives and property of citizens living in Lagos state and the need to put it under control. Hypotheses were formulated, investigated and tested statistically with the use of chi-square and at the end it was confirmed that there is a significant relationship between the climatological factors and flooding in Lagos State, there is a significant relationship between the anthropogenic factors and flooding in Lagos State, there is a significant relationship between inadequate drainage systems and flooding in Lagos State. Sensitization of people who live in flood prone areas should be regularly done to keep them informed on how they can manage the flood problem or give them the alternative of moving to other areas.

Keywords: Storm water, drainage, flood, environment, rainfall

INTRODUCTION

Storm water is the water which runs off the land's surface after a rainfall or flood event. Urban development affects the ability of the ground surface to soak up water as new roads, driveways, rooftops are built (Bergstan., 2004). As urbanisation continues, there is an increase in impervious surfaces (surfaces that cannot hold water) and this in turn increases the amount of water that runs off the landscape (Nkwunowo, Baily & Whitworth, 2016). In Lagos, some of this water is discharged into receiving waters like the sea and lagoons but a large mass of water remains in the streets and roads, seeping into houses and buildings and causing irreparable damage before being gradually drained away, either manually, mechanically or naturally (International Federation of Red Cross, 2011).

Ministry of Environment, Toronto, wrote that storm water is rainfall and snow melt that seeps into the ground or runs off the land into storm sewers, streams and lakes (Ogunbambi, 2010). It may also include run-off from activities such as watering lawns, washing cars and draining pools. Agbonkhese & Daudu (2013) described storm water as water resulting from precipitation (including rain and snow) that runs off the land's surface, is transmitted to the subsurface or is captured by separate storm sewers or other sewages or drainage.

According to Michael (2012), urban storm water runoff results from rain, snow, sleet and other precipitation that lands on rooftops, parking lots, streets, sidewalks, and other surfaces of specific concern are impervious surfaces as they do not allow water to infiltrate into the ground or be utilized by plants, both of which are key elements of the natural water cycle. Rather, impervious surfaces shed water, which they becomes runoff that eventually enters the city sewer system or is discharged directly to adjacent water bodies (James, 1980). Flooding on the other hand can be seen as the inundation of land and property in a built up environment caused by storm water overwhelming the capacity of drainage systems. Nelson (2001) has the opinion that "flood is a natural consequence of stream flow in a continually changing environment". Sada (1988) on his own account also reveals that flooding is an "unusually high rates of discharging: often leading to inundation of land adjacent to streams, and it is usually caused by intense or prolonged rainfall".

Aderogba, Oredipe, Oderinde & Afelumo (2012), states that floods, usually very large body of water covering the land that were usually dry and beyond its banks, destroying farm lands, property, industrial installations, roads, railways, residences and carries people away. In other words, it is usually abrupt, accidental, destructive and harmful. It may be very devastating to any community and or nation that it might affect economically and socially. When storm water does not soak into the ground, it becomes surface run-off which flows into available drainage channels or remain stagnant in the cases of non-existent drainage and inadequate drainage. Storm water carries with it many pollutants such as water from overflowing sewers, dirt from along its path of movement, household wastes, industrial wastes as well as soil and sand particles (Odunuga, 2008).

However, urban and Regional Planning covers a wide range of sectors and parastatals which include infrastructure, communication links, estate management, transportation, land and housing issues as well as social, economic, cultural and health sectors (Elias, 2010). This study is very relevant to Urban and Regional Planning because the topic under consideration is one of the issues discussed and addressed in Urban and Regional Planning. Therefore, discussing this topic at this time enriched the existing works of scholars in the field (Nwagwu & Oni, 2015).

Storm water drainage is an infrastructure that has been provided to increase the quality of life of the people and without adequate planning for its provision, then the whole thing will be a mess. Planning on the other hand is at the centre of every project and it is cyclic in nature as planning problems keep arising, the need to search for planning solutions never stops. The issue of flooding in Lagos State has therefore necessitated the need for a well-planned drainage system in Lagos State. Storm water drainage channels need to be planned to ensure its effectiveness as the inability to properly plan the siting of channels will result in flooding, loss of lives and property and the degradation of the environment. The Urban Planner comes in to ensure that the storm water channels would be duly situated without causing undue inconveniences to surrounding developments. The Urban Planner also ensures that illegal developments do not take place along or on storm water drainage channels to minimise the risk of flooding and loss of lives and property. Therefore, this study examined storm water drainage system in Lagos, Nigeria.

2. Methodology

2.1 Study area

Lagos State has a land mass of about 3,577 square kilometres and it is located between latitudes 6° 23' N and 6° 41' and longitudes 2° 42'E and 3° 42'E on the Greenwich Meridian. It is bounded on the West by the Republic of Benin and bound at the South by the Atlantic Ocean. It is regarded as the smallest state in the country; however, it has the highest population density in the nation. According to a 2006 census, the state is considered the second most populous state in the federation, with the population status placed at nine million, one hundred and thirteen thousand, six hundred and five (9,113,605).

Lagos State is a low-lying coastal region with 180km coastline on the most South-western part of the country. Lagos State has about 279,000 hectares of low-lying wetland, which constitutes about 78% of its entire land mass and 22% of Lagos consists of lagoons and creeks. Lagos State has two main seasons which are the dry season and the rainy season. The dry season usually lasts from October to March while the rainy season lasts from April to October. The rainy season has two peak periods which are May to July and September to October, with rainfall being the heaviest during the first peak period. Floods usually results during these periods, which are aggravated by poor surface drainage systems on the coastal lowland. Lagos is also blessed with a littoral type of climate with highest mean monthly annual rainfall recorded amounting to 450mm and annual mean rainfall around 1850mm. The mean annual rainfall varies from one location to another. For instance, Ebute-Meta, Yaba and Bariga on the Mainland areas record 1750mm while Agege in the North West records 1567.2mm. (Omojola and Peter, 2010)

Lagos State has an extremely flat terrain with an average height of 0.8m above Mean Sea Level. Ajeromi/ifelodun, Apapa, Amuwo-Odofin, Badagry, Eti-Osa, Epe, Ibeju-Lekki, Kosofe, Lagos Island, Lagos Mainland, Ojo, Shomolu and Ikorodu Local Governments all have flat terrains and are naturally liable to coastal flooding because of the inability to rapidly evacuate run-off due to high water in lagoons and creeks, resulting from tidal levels and sea-level rise. Areas around Ikeja, Ifako/Ijaiye which have average elevation of over 25m above Mean Sea Level are not usually affected by topography.

In the Köppen climate classification system, Lagos has a tropical wet and dry climate that borders on a tropical monsoon climate. Lagos experiences two rainy seasons, with the heaviest rains falling from April to July and a weaker rainy season in October and November. There is a brief relatively dry spell in August and September and a longer dry season from December to March.

Mon	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yea
Aver	31	32	32	32	31	29	28	28	28	29	31	31	30.2
Aver	23	25	26	25	24	23	23	23	23	23	24	24	23.8
Prec	28	46	102	150	269	460	279	64	140	206	69	25	1838
Avg.	2	3	7	10	16	20	16	10	14	16	7	2	123
Suns	186	196	186	180	186	120	93	93	90	155	210	217	1912

Source: BBC Weather, 2011

2.2 Participants and Procedures

Survey research design was adopted in this study to obtain a general overview on the causes of flooding in Lagos State. The work is designed in such a way that it explains the process that lead to the emergence of storm water and how it turns to flood. The target population of this study comprises all residents of Lagos State. However, since it is difficult to cover everybody in the state, the targets of this study shall include only the residents of Lagos Mainland and Surulere Local Government Areas. The sample frame used for this study is the combined population of Lagos Mainland and Surulere Local Government Area. According to the National Bureau of Statistics on the 2006 census, Lagos Mainland population statistic is 326,700 and Surulere population is 502,865. To get the population for 2016, the following formula would be used:

$Pt = Po \times (1 + r)^t$

Where Pt = Population in t years

Po = initial population

r = growth rate (3.2%)

t = number of years

Lagos mainland 2016 population projection

Po = 326700

t = 2016 - 2006 = 10 years

$Pt = 326700 \times (1 + 0.032)^{10}$

$Pt = 326700 \times 1.37$

Pt = 447579

Surulere 2016 population projection

Po = 502865

t = 2016 - 2006 = 10 years

$Pt = 502865 \times (1 + 0.032)^{10}$

$Pt = 503865 \times 1.37$

Pt = 688925.05

Pt = 688925

The combined projected population of the two local government areas is shown below

Population = 447579 + 688925

= 1136504

To get the sample size, Morris model would be used to determine the number. The formula is given below:

$$n = \frac{Nz2pq}{E^2(N-1) + z^2pq}$$

Where n = required sample size

N = the population size (sample frame)

P and q = the population proportions (usually set to 0.5)

Z = level of confidence (set to 85%), which is 1.44

E = margin of error (set to 9%)

The confidence level is a constant, which is

CONFIDENCE LEVEL	Z-SCORE
80%	1.28
***85%**	1.44
90%	1.65
95%	1.96
99%	2.58

$$n = \frac{1136504 \times 1.44 \times 1.44 \times 0.5}{0.09^2 (1136504-1) + 1.44^2 \times 0.5}$$

$$n = \frac{1136504 \times 1.0368}{0.0081 \times 1136503 + 1.0368}$$

$$n = \frac{1178327.3472}{9206.7111}$$

$$n = 127.98$$

$$n = 128$$

From the sample size above, which was derived with Morris Model, the number of questionnaires to be administered to the study area is 128. Out of the 128 questionnaires sent out, 124 were received back from the field.

Finally, in testing the hypotheses in section 'E', chi-square method was adopted with the use of the formula.

$$X^2 = \frac{E^1 (O-E)^2}{E}$$

3. DATA ANALYSIS AND RESULTS

3.1 Operationalization/Coding

The various weights attached to the responses collected are as follows:

Strongly Agreed 4

Agree 3

Disagree 2

Strongly Disagree 1

Table 1 Operationalization/Coding

	SA	OP Y_4	A	OP Y_3	D	OP Y_2	SD	OP Y_1	Total Responses
16	75	300	46	138	3	6	4	4	100
17	4	16	4	12	56	112	64	64	100
18	56	224	48	144	14	28	10	10	100
19	77	308	42	126	5	10	4	4	100
20	6	24	5	15	55	110	62	62	100
21	49	196	59	177	10	20	10	10	100
22	8	32	5	15	37	74	78	78	100
23	69	276	49	147	5	10	5	5	100
24	54	216	68	204	3	6	3	3	100
Total	398	1592	326	978	188	376	240	240	

3.2 Testing of Hypotheses

Three hypotheses were formulated. These hypotheses were drawn up in order to examine the various factors causing flooding in Lagos State and for the purpose of testing them here, they are brought forward:

H_0 There is no significant relationship between the climatological factors (i.e. prolonged rainfall, increase in sea level, strong winds) and flooding in Lagos State.
H_1There is a significant relationship between the climatological factors (i.e. prolonged rainfall, increase in sea level, strong winds) and flooding in Lagos State.

H_0 There is no significant relationship between the anthropogenic factors (i.e. urbanization, dam breaking, improper waste disposal, development of buildings on waterways) and flooding in Lagos State
H_1 There is a significant relationship between the anthropogenic factors (i.e. urbanization, dam breaking, improper waste disposal, development of buildings on waterways) and flooding in Lagos State

H_0 There is no significant relationship between inadequate drainage systems and flooding in Lagos State.
H_1 There is a significant relationship between inadequate drainage systems and flooding in Lagos State.
These hypotheses were tasted using chi-square formula $x^2 = E(0-E)2E$
Where: x^2 = chi-square

E = expected frequency = rtxctgt

O = observed frequency

Other symbols used in this analysis

X^2 tab = critical value (cv)

Df = degree of freedom

Rt = row total

Ct = column total

Gr = grand total

H_0 = null hypothesis

H_1 = alterative hypothesis

Decision Rule: Compare the calculated value of x^2 with 5% level of confidence with appropriate degree of freedom

If the value of chi-square (x^2) is greater than the critical vale (x^2tab), reject the null hypothesis (H_0) and accept the alterative hypothesis (H_1), and vice versa.

To get the critical value, calculate the value of the degree of freedom (Df) and use the value to check critical value (x^2tab) in the statistical tables

Df=(r-1) (c-1), Where r = row, C = column.

Df= (r-1) (c-1)

(2-1) (4-1)

1 x 3 = 3

Therefore X^2tab = 3 under 0.05

7.81

Hypothesis One

H_0 There is no significant relationship between the climatological factors (i.e. prolonged rainfall, increase in sea level, strong winds) and flooding in Lagos State.

H_1There is a significant relationship between the climatological factors (i.e. prolonged rainfall, increase in sea level, strong winds) and flooding in Lagos State.

Table 2 X^2 Contingency Table

Variables	SA	A	D	SD	Total (RT)
16	300	138	6	4	448
17	16	12	112	64	204
Total (CT)	316	150	118	68	**652(GT)**

Table 3 X^2 Table for Hypothesis One

O	E RTXCTGT	**O-E**	**(O-E)2**	(0-E)2E
300	217.13	82.87	6867.44	31.63
138	103.07	34.93	1220.1	11.84
6	81.08	-75.08	5637.01	69.52
4	46.72	-42.72	1824.1	39.06
16	98.87	-82.87	6867.44	69.46
12	46.93	-34.93	1220.1	25.1
112	36.92	75.08	5637.01	152.68
64	21.28	42.72	1824.1	85.76
			X2=	485.05

Decision

Having subjected hypothesis one to statistical test, the result shows that the value of x^2 calculated (485.05) is greater than the x^2tab (7.81). Then the null hypothesis (H_0) is rejected. Going by this result, we conclude there is a significant relationship between the climatological factors (i.e. prolonged rainfall, increase in sea level, strong winds) and flooding in Lagos State.

Hypothesis Two

H_0 There is no significant relationship between the anthropogenic factors (i.e. urbanization, dam breaking, improper waste disposal, development of buildings on waterways) and flooding in Lagos State

H_1 There is a significant relationship between the anthropogenic factors (i.e. urbanization, dam breaking, improper waste disposal, development of buildings on waterways) and flooding in Lagos State

Table 4 X^2 Contingency

Variables	**SA**	**A**	**D**	**SD**	**Total (RT)**
19	308	126	10	4	448
20	24	15	110	62	211
Total (CT)	332	141	120	66	**659(GT)**

Table 5 X^2 Table for Hypothesis Two

0	ERTXCTGT	**0-E**	**(0-E)2**	(0-E)2E
308	225.7	82.3	6773.29	30.01
126	95.85	30.15	909.02	9.48
10	81.58	-71.58	5123.7	62.81
4	44.87	-40.87	1670.36	37.23
24	106.3	-82.3	6773.29	63.72
15	45.15	-30.15	909.02	20.13
110	38.42	71.58	5123.7	133.36
62	21.13	40.87	1670.36	79.05
			X2=	435.79

Decision

Having tested hypothesis two statistically, the calculated value of X^2 (435.79) is greater than X^2 (7.81). Hence, H_0 is rejected and H_1 is accepted. We can therefore conclude that there is a significant relationship between the anthropogenic factors (such as urbanization, dam breaking, improper waste disposal, and development of buildings on waterways) and flooding in Lagos State

Hypothesis Three

H_0 There is no significant relationship between inadequate drainage systems and flooding in Lagos State.

H_1 There is a significant relationship between inadequate drainage systems and flooding in Lagos State.

Table 6 X^2Contingency Table

Variables	**SA**	**A**	**D**	**SD**	**Total (RT)**
22	32	15	74	78	199
23	276	147	10	5	438
Total (CT)	308	162	84	83	637

Table 7 X^2Table for Hypothesis Three

0	**E=** RTXCTC	**0-E**	**(0-E)2**	(0-E)2E
32	96.3	-64.3	4134.49	42.93
15	50.61	-35.61	1268.07	25.06
74	26.24	47.76	2281.02	86.93
78	25.93	52.07	2711.28	104.56
276	211.78	64.22	4124.21	19.47
147	111.39	35.61	1268.07	11.38
10	57.76	-47.76	2281.02	39.49
5	57.07	-52.07	2711.28	47.51
			X2=	377.34

Decision

Having tested hypothesis three statistically, the value of X^2 calculated (377.34) is greater than the value of X^2 tab. (7.81). We can then conclude that there is a significant relationship between inadequate drainage systems and flooding in Lagos State

4. Discussion

This work was carried out to examine the various factors responsible for flooding in Lagos State in order to proffer possible suggestions on how to control them.

Having gathered reliable data through the existing literature, the researcher proceeded to formulate hypotheses to make the work more empirical. At the end of the study, it was confirmed that:

- There is a significant relationship between the climatological factors (i.e. prolonged rainfall, increase in sea level, strong winds) and flooding in Lagos State.
- There is a significant relationship between the anthropogenic factors (i.e. urbanization, dam breaking, improper waste disposal, development of buildings on waterways) and flooding in Lagos State
- There is a significant relationship between inadequate drainage systems and flooding in Lagos State

The first finding bothers on the relationship between the climatological factors (i.e. prolonged rainfall, increase in sea level, strong winds) and flooding in Lagos State. Prolonged rainfall, increase in the sea level and strong winds have a direct effect on flooding in Lagos State.

Starting with the problem of prolonged rain, the study shows that if it rains continuously, the resulting storm water becomes more than what the existing drainage can take and also more than the earth can infiltrate at that particular period of time and the water which cannot flow away, due to overflowing drainage and over saturation of the earth, results in flooding and thereby destroying lives and properties.

More so, the study reveals that increase in sea level sometimes causes flooding in Lagos State. Due to the fact that Lagos is a low-lying State, flooding often results when rivers and lagoon within and around Lagos overflow their banks. This happens when there is more water upstream than usual and as it flows downstream to adjacent low-lying areas (floodplains) water overflows its boundaries and flows into the land. Plains and low-lying areas which are adjacent to rivers or lagoons are likely to experience flood anytime water level rises as sea water can be easily swept inland by strong winds and high tides.

The second finding shows the relationship between the anthropogenic factors (i.e. urbanization, dam breaking, improper waste disposal, development of buildings on waterways) and flooding in Lagos State. The challenge of urbanization in relation to flooding is common with every city in Lagos. Development brings people from other places that are less developed and this often brings overpopulation as one of it characteristics. Consequently people begin to erect houses, pave their compounds, road are tarred, motor parks are created; the whole city becomes industrialized, etc. All these make infiltration rate to reduce as the larger part of the available land has become impervious. Storm water which cannot be absorbed into the ground then becomes runoff and eventually results in flood due to lack of controlled.

Dam breaking was also confirmed as one of the causes of flooding in Lagos State although not in all parts of the state. Cases of flooding due to dam breaking include the flooding of Ikorodu area of Lagos in 2006, 2010 when the Ogun State authorities open the Oyan Dam in order to reduce pressure on it. The latest case of this occurred on the 6th of October 2016 following the opening of this same dam and no fewer than 300 houses were flooded and 860 households displaced. The affected areas include Agiliti/Maidan, Orile, Owode, Agboyi and Araromi communities in Ketu and Mile 12 areas in Lagos; and Akute and Warewa communities, as well as estates in and around OPIC in Ogun State.

This study also reveals improper waste disposal as a major cause of flooding almost in every part of Lagos. It disheartening to discover that in this era of enlightenments some people are still ignorant of the fact that dumping of refuse into drainage facilities is injurious to people's health. Some also ignorantly engage the services of truck pushers in the disposal of their refuse who eventually empty them into water bodies and canals. Consequently, this results in waste materials such as plastics, polythene materials and the likes blocking drainage channels and hindering the free flow of storm water and flood water.

Lastly, this study has also confirmed that erection of buildings on water ways causes flooding in Lagos State. In many part Lagos, buildings are being erected illegally in places where they have not been authorized to do so. Some of these buildings are erected on waterways and causes a blockage to the path of moving water, thereby resulting in water causing damages to buildings and properties because the water has nowhere to pass through.

Starting with the problem of prolonged rain, the study shows that if it rains continuously, the resulting storm water becomes more than what the existing drainage can take and also more than the earth can infiltrate at that particular period of time and the water which cannot flow away, due to overflowing drainage and over saturation of the earth, results in flooding and thereby destroying lives and properties.

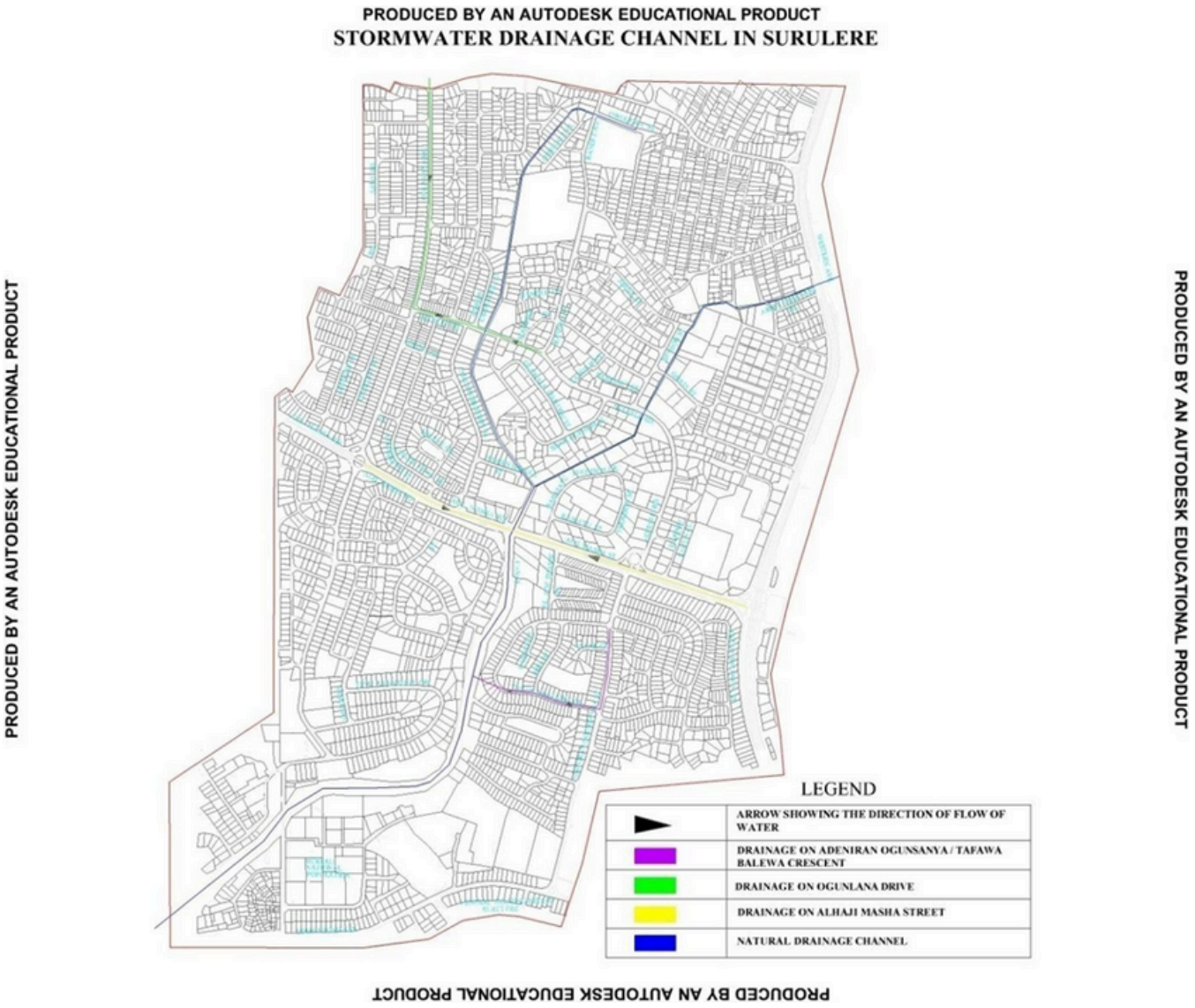

Figure 2 Storm Water Drainage in Surulere, Lagos

5. Conclusion and Implications

It is not out of place to say that flooding is a global phenomenon, but the impacts in many urban areas in developing countries can be overwhelming. It is easier to understand the threats of flooding in Lagos State by the attention generated by the media and the academic world, especially in literature relating to social and environmental sciences. However, due to development that is on-going in an urban city like Lagos, most of our lands that should absorb the water have been made impervious surfaces and becomes unable to complement evaporation, hence resulting in

excess runoff. So, to retain the process of infiltration in this era of rapid development, in addition to other suggestions preferred in this work, i will like to suggest a replacement of pavements with interlocking blocks to be used in residential areas, industries, government offices, garages etc. This will allow for a measure of infiltration and help to reduce excess runoff so as to reduce the incidence of flooding.

The following recommendations were made:

- The National Inland Waterways Authority (NIWA) of Nigeria should urgently take steps to desilt waterways and tributaries which are silted and taken over by shrubs to allow for channels and easy flow of water to help minimize the flood in the coastal communities.
- Town planning laws should be properly enforced and strictly adhered to as this will go a long way to curbing the menace of floods. The Government should discourage the development of structures on natural storm water channels to avoid the problem of flooding. Stormwater which is not properly channelled and has nowhere to go would enter into buildings and destroy lives and property.
- Proper maintenance of drainage systems should be carried out by residents in whose area the drains are located and in an instance where the drainage needs majorrepair, the government should be alerted.
- Sensitization of people who live in flood prone areas should be regularly done to keep them informed on how they can manage the flood problem or give them the alternative of moving to other areas. There should be continual creation of awareness on the importance of proper waste disposal from the lowest level to the highest level in the community. This is to minimise the incidence of blockage of storm water drainage channels.
- Concerted efforts must be geared towards adequate city planning, policy formulation, enhanced public enlightenment programs, integration of environmental planning and education to curriculum of schools at all levels, capacity building towards adaptation and mitigation of climate change.
- National disaster and emergency policies should be strengthened to facilitate effective disaster preparedness and response. This approach will not only save lives and livelihoods, but it will equally reduce vulnerability to flood menace.
- Development of buildings should be closely monitored by the Government to ensure that they are not being built on the natural water drainage channels, thereby minimizing the effects of flood and storm water.
- Policies that will encourage the planting of trees, shrubs and grasses should be formulated by the Lagos State Government. This will help in breaking the power of moving water and also help to reduce erosion.

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ASSESSMENT OF INFRASTRUCTURE AS AN INDICATOR OF HOUSEHOLD POVERTY IN OSOGBO, OSUN STATE NIGERIA

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ABSTRACT

Infrastructure plays a crucial role in determining household poverty levels. Poverty is a socio-economic scourge raging at varying degrees throughout the African continent. The issue of poverty is a very crucial one due to the prevailing increase in the incidence of poverty in Nigeria. Hence, this study assesses infrastructure as an indicator of household poverty in Osogbo, Osun state Nigeria, Osun State. In an attempt to determine the level of poverty, this research has adopted the analytical tool of the Geographical Information System (GIS). A spatial autocorrelation check was performed on the prepared datasets using Moran's I test; this was necessary in order to determine the method used in the mapping of the indicators. Hence, the indicators with positive correlation were mapped using spatial interpolation in the Geostatistical Analytical Tools of ArcGIS 10.2. For the data analysis, four dimensions of expenditure/income, health, education, and empowerment were captured through seven indicators. The monetary indicators computed and mapped include income and consumption, expenditure on housing, and expenditure on water and power. Nonmonetary indicators are health care conditions, nutrition, education, vocational training, and enrolment in schools. However, the overlay of the monetary and non-monetary indicators gave the composite index of poverty levels in the study area. Based on the composite index, three zones of poverty were identified, namely: low, medium, and high levels of poverty. Results were further disaggregated to decipher the contributions made by each indicator to the overall poverty levels, that is, the influence exerted by every dimension. In the zone where poverty levels are high, expenditure/income, nutrition, and health indicators had a mean percentage of 30%, 31%, and 38%, which is also very low, while education and enrolment are above average. The study therefore concluded that there should be more focus on addressing the indicators with low percentages for poverty alleviation in the areas with low poverty levels. The results of the spatial variation in the level of poverty in different locations in the study area will help policymakers in the selection of infrastructure and amenities.

Keywords: Household, Indicators; Infrastructure; Poverty; Residents

1. INTRODUCTION

Infrastructure plays a crucial role in determining household poverty levels. Infrastructure development is a topic of paramount interest regarding national, regional, and local economic growth. Infrastructure plays a vital role in enabling economic activities in the first place (Chatterjee and Turnovsky, 2012; Daido and Tabata, 2013). During the development period, concerns about infrastructure and its role in poverty reduction have also emerged. In developing countries, infrastructure investments are expanding dramatically to boost economic growth and reduce poverty. Particularly, the development of human capital is closely linked to the global issue of urban poverty. Urban poverty is a complex and multidimensional phenomenon characterised by a lack of income and opportunities to generate income, deprivation of necessities, inadequate infrastructure, and exclusion from social and political decision-making (Bassey, 2023; Adeleke et al., 2023). Urban poverty affects both developed and developing countries, and it is prevalent not only in underdeveloped and developing countries but also in developed countries (Perchinunno et al., 2023). For instance, the United States boasts the highest poverty rate among developed nations, with a strong correlation between poverty and race and ethnicity. African Americans, Hispanic Americans, American Indians, and Alaska natives are three times more likely to live in poverty than white Americans (U.S.) (Brady, 2023). Poverty is a socio-economic scourge raging at varying degrees throughout the African continent. The issue of poverty is a very crucial one due to the prevailing increase in the incidence of poverty in Nigeria (Gambo et al., 2022). Many poor households live in unsatisfactory and overcrowded conditions, lacking proper access to potable water, adequate sanitation facilities, and other basic services (Olatunji et al., 2022). These conditions pose a significant health risk to the poor, resulting in water-borne diseases such as typhoid, cholera, hepatitis, and other environmental hazards (UNICEF and WHO, 2023; Adedeji et al., 2022). Many people, policymakers, and studies by Ali et al. (2015) believe firmly that the poverty reduction effect of infrastructure development passes through economic growth (an indirect channel), mainly because it generates the resources to raise incomes. In the actual sense of the economy, this is disputable because not only do the few appropriate the generated commonwealth to themselves, but also the raised incomes are not well distributed, thus leaving the masses to pine in penury. According to Udo et al. (2016), a link between economic growth and deteriorating income distribution would reduce or negate the impact of economic growth on poverty reduction. Today, Nigeria is one of the fastest-growing developing countries in the world, with a high poverty level and a worsening distribution of income and wealth. That is, the distribution of income or wealth created by many is strictly shared among the few's pockets (Olatunji et al., 2024). There are shreds of empirical evidence on why infrastructure development might be the most revolutionary not only in reducing poverty but also in tackling other development issues. Given the finite commonwealth and many development challenges, there is a need to: substantiate not only the poverty-reduction effect but also the channel to the effect; and make a wise decision on the location of infrastructure. Therefore, the question is not only whether infrastructure scaling up mitigates poverty, but also whether this area of intervention is valid for poverty reduction at the household level. This study aims at assessing infrastructure as an indicator of household poverty in Osogbo, Osun State, Nigeria.

2. Literature Review

2.1 Concept of poverty and infrastructure

Poverty is defined by many scholars in different ways because what is observed as poverty in one society may not be poverty in another society. Poverty, according to the World Bank (2015, 2017), is defined as the inability to meet the bare necessities of life. Thompson and Dahling (2019) define poverty as a lack of employment. According to Musa et al. (2022), poverty has a wide range of characteristics, including a lack of purchasing power, exposure to risk, malnutrition, a high mortality rate, a short life expectancy, a lack of access to social and economic services, etc. Poverty manifests itself in a variety of ways, including hunger, malnutrition, poor health, restricted or no access to education and other basic services, an increase in morbidity and mortality from illness, homelessness, an inadequate, unsafe, and degraded environment, and social exclusion and discrimination (Shaba et al., 2018).

Poverty is thought to be caused primarily by a lack of economic growth, persistent structural imbalances, weak Gross Domestic Product (GDP) growth, high population growth rates, underdevelopment of industries and factors of production, degradation of natural resources, barriers to rural development as the engine of the economy, and limited access for the vast majority of the population to basic social services. People's purchasing power and living conditions are seen as being constrained by poverty (Aluko and Magaji, 2020; Yoade et al., 2023).

Several interconnected elements, including a lack of resources, a need, a pattern of deprivation, a lack of entitlements and fundamental security, dependency, exclusion, social class, economic status, and intolerable hardship, are said to contribute to poverty (Chen et al., 2021). According to Magaji and Adamu (2010), poverty is defined as a notable lack of well-being, including the absence of the necessary skills, resources, opportunities, and security to contribute meaningfully to society.

Infrastructure plays a crucial role in determining household poverty levels. Research indicates that transportation and information and communication technology (ICT) infrastructure enhance households' resilience against shocks, preventing consumption reduction and poverty incidence (Hartwig and Nguyen, 2023). Moreover, ancestral post-marital residence patterns influence resource allocation within households, impacting poverty rates, especially for women (Ulugbek et al., 2023). Studies also highlight the negative correlation between infrastructure supply and income inequality, emphasizing the importance of quality infrastructure in reducing income concentration and poverty (Medeiros et al., 2022). Additionally, infrastructure development affects household consumption differently in rural and urban areas, influencing spending patterns and poverty levels based on income and demographic factors (Cantillon and Moran, 2017). Therefore, improving infrastructure quality and access is vital for alleviating poverty and reducing income inequality at the household level.

2.2 Overview of poverty in the Nigerian context

The challenge of reducing extreme poverty in all its forms has once again taken centre stage in global development discourse, policies, and actions as the 2030 target year for achieving the Sustainable Development Goals (SDGs) approaches. Over the years, different perspectives have rationalised the concept of poverty and its measurement methods. There is no universal definition of poverty, but there is a general understanding that poverty means the lack of income to meet, or access to, basic human needs, which include food, clothing, shelter, basic education, healthcare, electricity, etc. (Akpan and Isihak, 2020).

Depending on their focus and study context, different authors have classified poverty differently. For instance, Zhou and Liu (2019) divide poverty into categories such as "absolute" and "relative," "chronic" and "transient," "regional" and "individual," and "urban" and "rural.". Absolute poverty tends to set a benchmark such that persons who cannot attain the benchmark are considered to be poor, and vice versa, while relative poverty tends to look at the acceptable standard of living within an environment and whether a household meets this standard of living (Orokpo et al., 2018). Chronic poverty refers to a situation where an individual or household is perpetually poor, while transient poverty refers to a phase where an individual becomes poor but has not always been poor and can cease being poor. In terms of measurement, the level of poverty in a country has been estimated using a direct or indirect method.

A direct method of measuring poverty assesses the extent to which people can meet a set of basic needs, while an income method measures whether households' incomes meet a defined threshold set as a poverty line (Alkire and Santos, 2014). Alkire and Santos (2014) have discussed the challenges of using the income approach, which led to the development of the multidimensional poverty index, an attempt to measure poverty using the direct approach (Alkire and Foster, 2011; Alkire and Santos, 2014).

Furthermore, Briggs (2019) observes that narratives such as individual deficiencies, traditional and/or cultural belief systems entrenching certain practices, political-economic system distortions, geographic disparities, or a combination of all these, form the foundation of theories of poverty. The problem of poverty has been present in Nigerian society for a long time, and over the years, the Nigerian government has made numerous efforts to address it.

Runsinarith (2009) examined government investments in irrigation, roads, electricity, and mobile phones in two Cambodian provinces and found that the infrastructure variables directly reduced poverty incidence. Fan, Nyange, and Rao (2007) assessed the poverty-reduction effect of public investment in Tanzania using microdata and concluded that access to road networks and other public services such as electricity has a valuable effect on a household's income.
Similarly, a study by Dercon et al. (2009) on 15 Ethiopian villages showed that access to all-weather roads mitigated poverty by 6.9 percentage points and increased consumption by 16.3 percentage points. Moreover, another study on 20 developing countries revealed different confusing pathways to urban absolute poverty reduction through infrastructure. However, the direct channel proxy with length of paved roads appears statistically significant from a macroeconomic perspective (Bello-Schünemann and Porter, 2017).
Lately, Ali et al.'s (2015) study on road transport infrastructure and welfare in Nigeria showed that lessening transport costs would yield significant multi-dimensional gains through the source of income and location, on the one hand. It also decreased the likelihood of being multi-dimensionally poor.

3.0Research Methodology

3.1 Study area

3.1.1 Geographical location

Osogbo city seats the headquarters of both the Osogbo Local Government Area (situated in the Oke Baale area of the city) and the Olorunda Local Government Area (situated in the Igbonna area of the city). The area of study is the Osogbo Local Government Area of Osun State. It is located in the forest zone and grassland of south-western Nigeria,

and it is the administrative seat of Osun State. It is located at latitude 7.7°N and longitude 1.05°E at the equator. It is about 237 kilometres away from Lagos by direct route. (Falade, 2000; Osun IDF, 1995; www.osogbocity.com). Osogbo Local Government Area is divided into fifteen political wards, namely: Ataoja A, Ataoja B, Ataoja C, Ogooluwa Area, Alekuwodo, Popo, Ibokun Road, Ayepe, Jakun A, Jagun B, Baba Kekere A and B, Akogun A and B, Akepe, Otunbalogun, and Olugun. The total population of Osogbo Local Government as of 1991 was 106386, and that of 2006 was 155507. Figure 1 shows the map of the study area in a national and state context

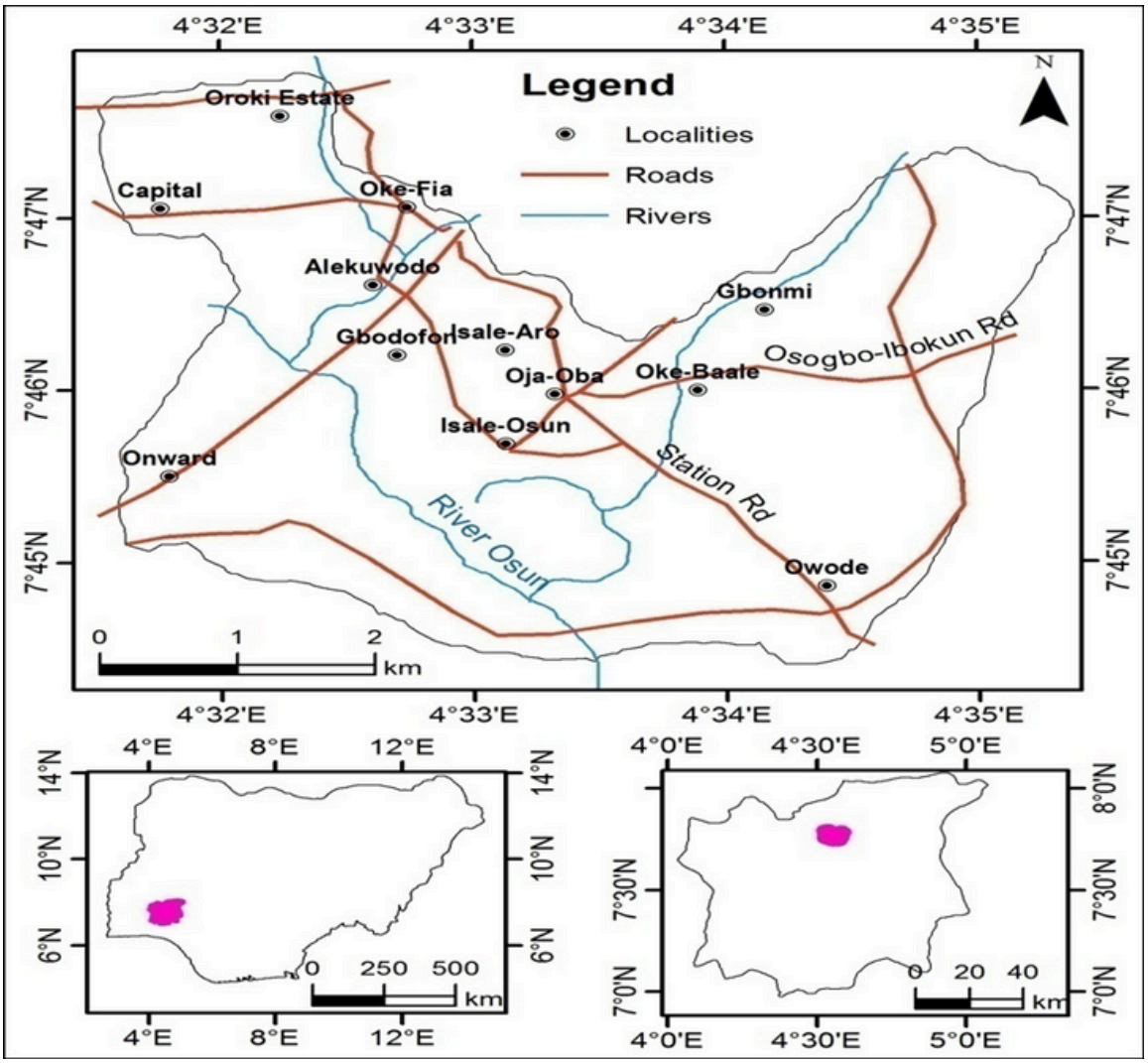

Figure 1: Map of the study area

Source: Author's Field work, (2022).

3.2 Description of Data and Sources

This study made use of both primary and secondary data. The primary data were obtained through questionnaire administration in households and direct observation. The questionnaire was designed to obtain information on the quality-of-life attributes of the residents and their housing and environmental conditions.

The data obtained during the reconnaissance survey of the study area are primary data. Direct field observation involves the process of a reconnaissance survey for the purpose of familiarising oneself with the study area so as to know the existing situation and how the research will be carried out. Observable features include the major land uses, the cleanliness of the environment, the condition of buildings, and other features that are relevant to this research work.

The Global Positioning System was used to obtain the spatial location of the sampled households. This was used for the spatial location of the households and the production of maps, which would be achieved through field work.

The secondary data used for this study include relevant documents on development planning and poverty reduction. They were sought from various journals, books, the Federal Office of Statistics, and World Bank publications in libraries and on the internet.

An administrative map was obtained from the Osun State Ministry of Land and Urban Development and was scanned and digitised to produce a map of the study area, which includes roads, the river, and settlements. High-resolution satellite image of Osogbo Local Government: It was sourced from Google Earth to locate sample points. Table 1 shows the characteristics of the data.

Table 1: Data Sources and Characteristics

S/N	Name	Format	Date	Source	Relevance
1	GPS Data	Digital	2015	Field work in Study area	Spatial location of the sample households
2	Questionnaire	Analogue	2015	Author	To obtain information on the quality-of-life attributes of the residents and their housing
3	Administrative map of Osogbo LGA	Digital	1975	Osun State Ministry of Land and Urban Development	To produce study area map
5	High Resolution Satellite image Osogbo LGA	Digital	2013	Google Earth	to locate sample points

Source: Author's Field work, (2022).

3.2 Data Analysis

3.2.1 Determination of the level of poverty in the study area

Using the GIS-based procedure, an assessment of poverty in Osogbo was determined. The poverty level was determined by the overlay of all the indicators mapped. These indicators are monetary, such as income expenditure, or non-monetary, such as education and health.

The study created a corresponding spatial layer for each chosen indicator. These layers were overlaid to generate a composite index of poverty. For the overlay, the weighted sum overlay tool was used, which provides the ability to weight and combine multiple inputs to create an integrated analysis, but a uniform weight was used for all indicators. The variation in poverty indicators is better interpreted when equated to the poverty level. Where the result is low, then poverty is high, and vice versa. The result is a spatial layer showing variations in the distribution of poverty levels in Osogbo.

A common scale from 0 to 100 was used for the cell values for combining the layers of indicators. Since these cell values also connote percentages, this composite layer of household living conditions was reclassified into three categories of poverty for ease of interpretation; that is, high poverty levels equate to low household living. Generally, 65% and above is a low poverty level, 50–65% is a medium poverty level, and less than 50 is a high poverty level.

4.0 RESULTS

Indicators of Poverty in Osogbo LGA

Income Dimension

A person is considered poor if his or her consumption or income level falls below some minimum level necessary to meet basic needs. What is necessary to satisfy basic needs varies across localities.

Income/Consumption

Information on consumption and income obtained through the survey conducted in this research work with which respondents were asked to answer questions on their perception of the balance between their spending habits and sources of income are reclassified (Table 2) and map out (Figure 2). The result revealed that satisfaction within the spatial coverage area of Capital, Oroki Estate, Oke-fia, Alekuwodo, Obalende are poor, Abere, Garage Ilesa are fair while Owode and Isale-Osun are good, St.Chales and Matanmi very good. Areas such as Iso Pako, Asubiaro, Ogo-Oluwa, Oke-Baale, Iludun and Gbodofon are very poor.

Table 2: Satisfaction with Balance in Spending and Income

Responses	Interval
Very poor	≤40
Poor	41 - 45
Fair	46 - 50
Good	51 - 55
Very good	56≥

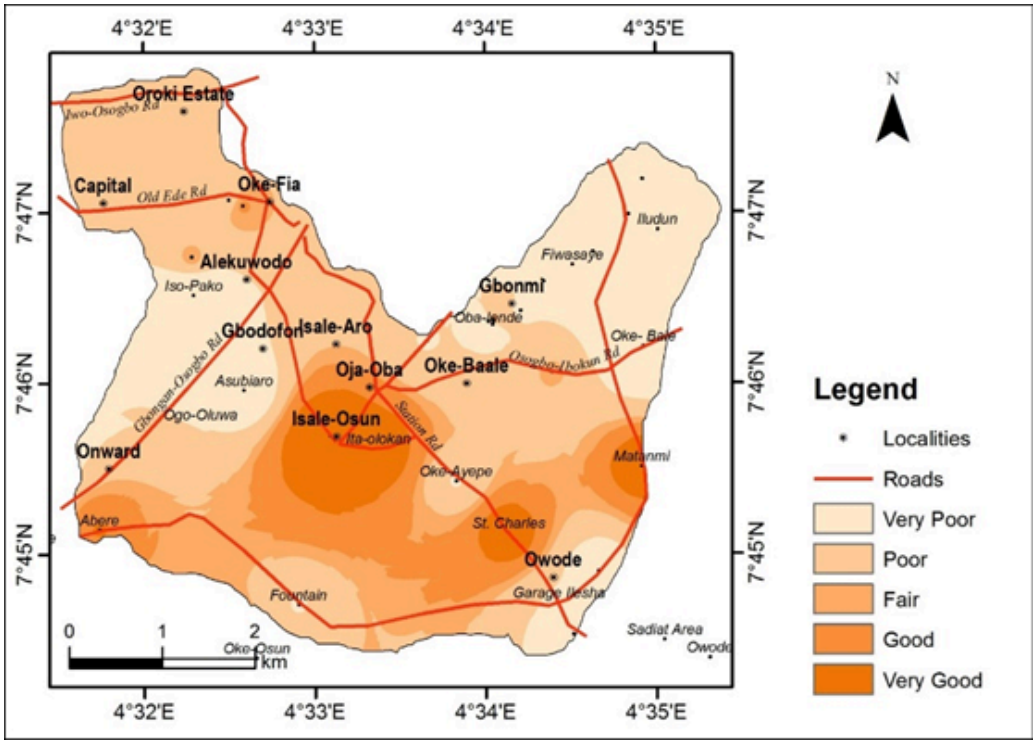

Fig 2: Map of Satisfaction with balance between spending and income.

E**xpenditures for Access to Power and Water Provisions**

This refers to the situation of large numbers of people that their well-being is negatively affected by very low consumption of energy and access to water because of their income levels. It also includes use of fuels (e.g kerosene, fire wood) and excessive time spent on getting water to meet basic needs. Survey conducted revealed that satisfaction within the spatial coverage area of Capital, Oroki Estate, Oke-fia, Alekuwodo, Obalende are poor, Abere and Garage Ilesa are fair while Owode and Isale-Osun, St.Chales, Matanmi are good, Isale-Aro, Oja-Oba, Isale-Osun,Gbodofon and Gbonmi are very good. Places such as St. Charles, Iludun, Oke-Baale and Garage-Ilesa are very poor. (Table 3 and Figure 3).

Table 3: Satisfaction with Access to Power and Water Provisions

Responses	Interval
Very poor	≤56
Poor	57-59
Fair	60-63
Good	64-67
Very good	68≥

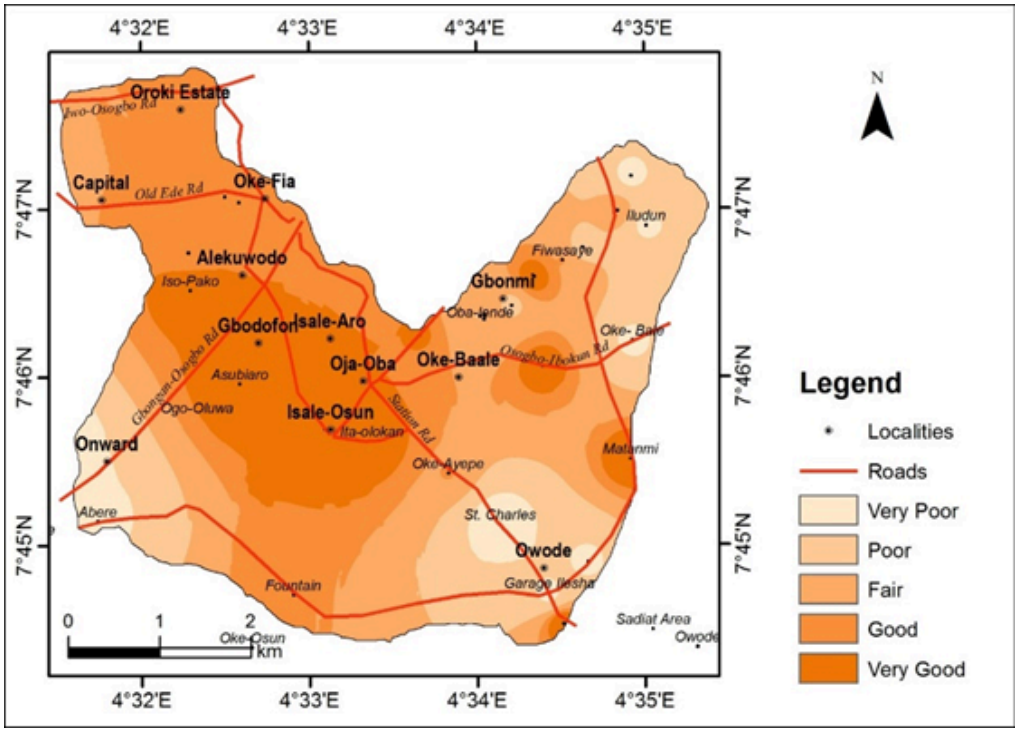

Fig 3. Map of Satisfaction with Access to Power and Water Provisions.

Expenditures on Housing

The map of the spatial pattern of satisfaction with expenditures on housing reveals those areas of Alekuwodo, Isale- Aro, and Oke- Baale, are poor, Gbonmi is fair while Owode, Fountain, Onward are good, Oke-Fia, Capital and Oroki Estate are very good. Places or areas such as Iludun, St. Charles, Ita-Olookan, Iso-pako and Obalende are very poor.

Table 4: Satisfaction with Expenditures on Housing

Responses	Interval
Very poor	≥30
Poor	31-35
Fair	36-40
Good	41-45
Very good	46-50

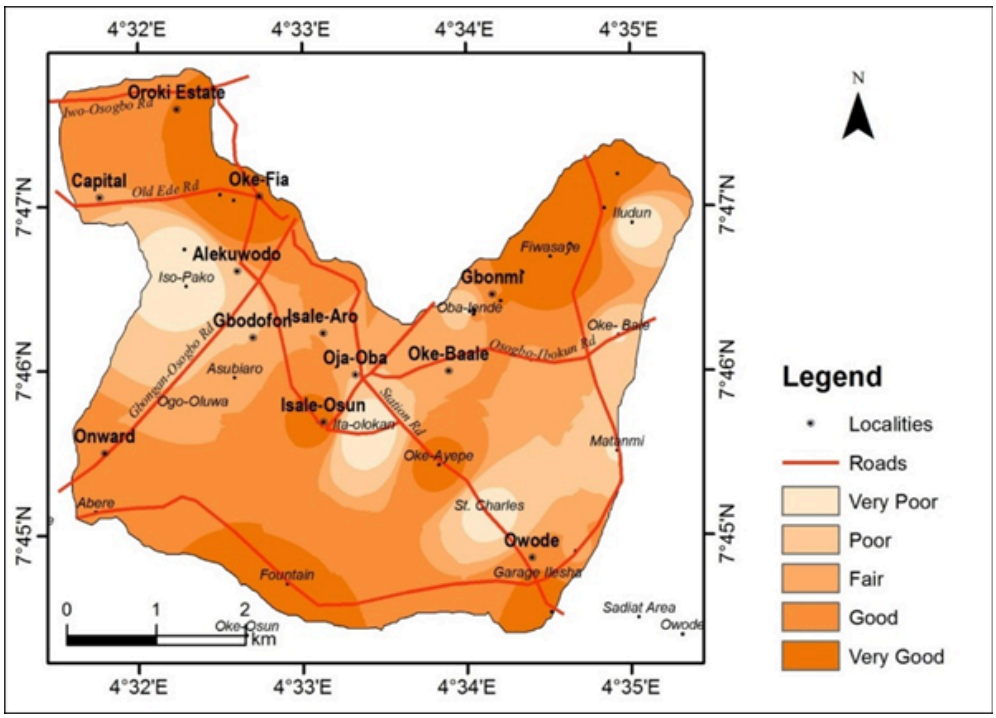

Fig 4 Map of Satisfaction with Expenditures on Housing

Health Dimension

Poverty and poor health worldwide are inextricably linked. Infectious and neglected tropical diseases kill and weaken millions of the poorest and most vulnerable people each year.

Healthcare Condition

During the survey, when asked about their satisfaction/living standard of their health, it was revealed that satisfaction within the spatial coverage area of St. Charles, Oke-Ayepe, Garage-Ilesa are poor, Matanmi and Oroki Estate are fair Oke-Baale, Gbonmi, Okefia are good, Isale-Osun, Iludun, Oke-Baale and Fiwasaye are very good. Places or areas such as Ogo-Oluwa, Asubiaro, Gbodofon, Iso-Pako, Owode, Obalende and Capital are very poor.

Table 5: Satisfaction with conditions of Health

Responses	Interval
Very poor	39-43
Poor	44-49
Fair	50-54
Good	55-59
Very good	60-64

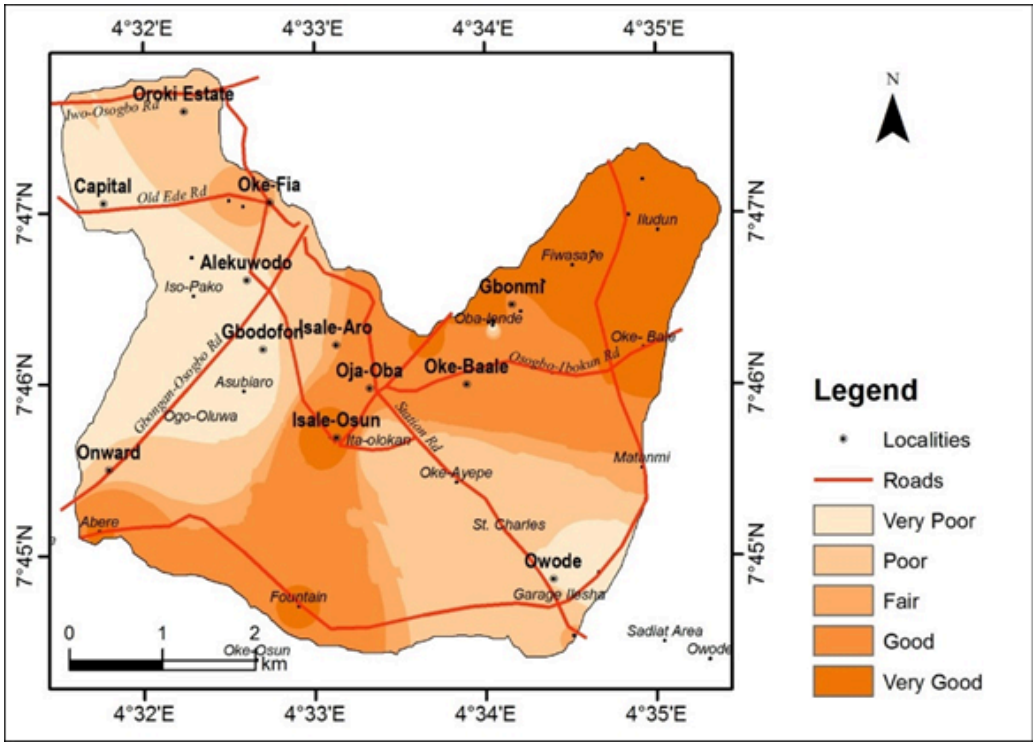

Fig 5 Map of Satisfaction with Conditions of Health

Nutrition

During the survey, when asked about their satisfaction as far as their nutrition is concerned, it was revealed that satisfaction within the spatial coverage area of Oke-Ayepe, Owode and Onward are poor, Capital, Alekuwodo, and Fountain are fair, St. Charles and Oroki Estate are good, Oke-Baale, Oke-Fia, Asubiaro Matanmi and Fiwasaye are very good. Places or areas such as Itaolookan, Garage Ilesa, and Iso- Pako Ogo-Oluwa, Asubiaro, Gbodofon, are very poor.

Table 6: Satisfaction with Nutrition

Responses	Interval
Very poor	20-30
Poor	31-40
Fair	41-50
Good	51-60
Very good	61-70

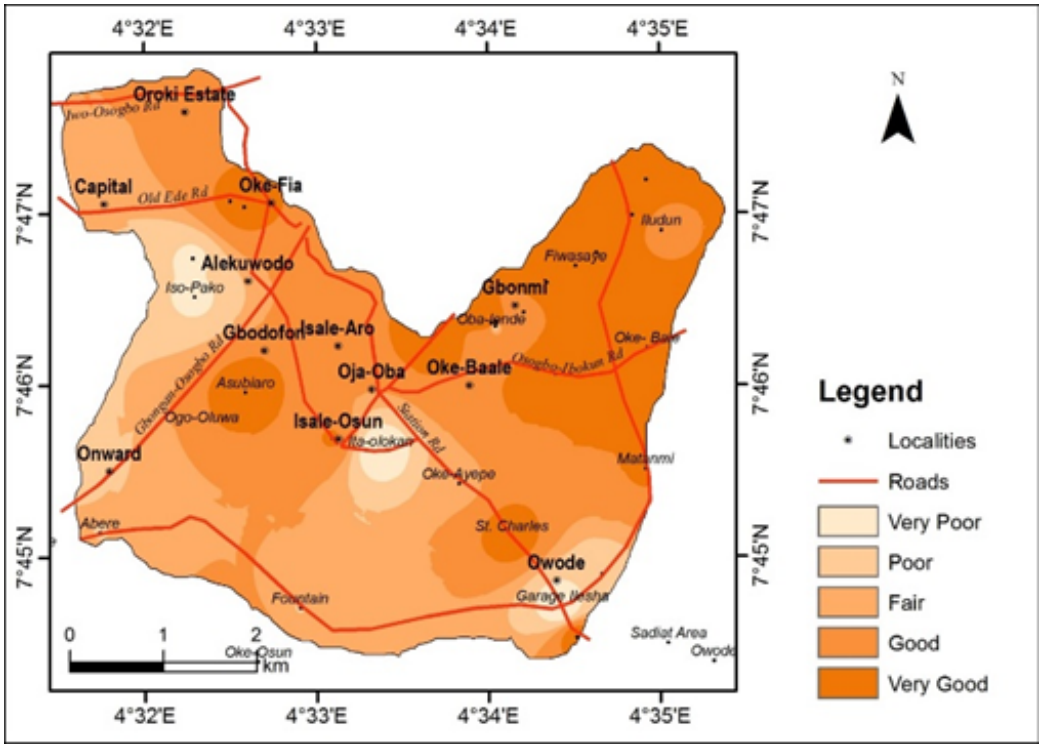

Fig 6 Map of Satisfaction with Nutrition

Education Dimension

Education/Vocational Training

The survey shows that satisfaction within the spatial coverage area of St. Charles, Oke-Ayepe, Garage-Ilesa are poor, Matanmi and Oroki Estate are fair Oke-Baale, Gbonmi, Okefia are good, Isale-Osun, Iludun, Oke-Baale and Fiwasaye are very good. Places or areas such as Ogo-Oluwa, Asubiaro, Gbodofon, Iso-Pako, Owode, Obalende and Capital are very poor.

Table 7: Satisfaction with Education/Vocational Training

Responses	Interval
Very poor	≥60
Poor	61-65
Fair	66-70
Good	71-75
Very good	76≥

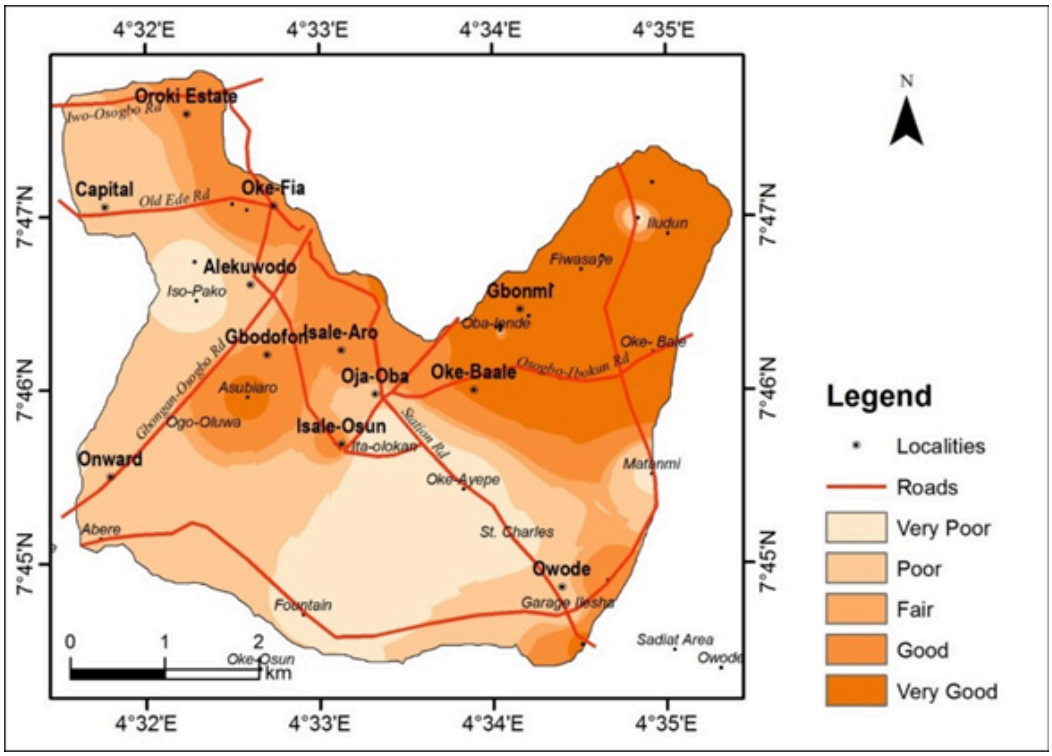

Fig 7 Map of satisfaction with education/achievements

Enrolment

The result revealed that satisfaction within the spatial coverage area of Fountain and Ogooluwa, are poor, St. Charles, Obalende, and Alekuwodo are fair Asubiaro, Isalearo, and Gbodofon are good, Oroki Estate, Okebaale, Isaleosun, Ojaoba and Okefia are very good, areas such as Garage Ilesa, Okeayepe, Onward and are very poor.

Table 8: Satisfaction with enrolment

Responses	Interval
Very poor	50-55
Poor	56-60
Fair	61-65
Good	66-70
Very good	71-75

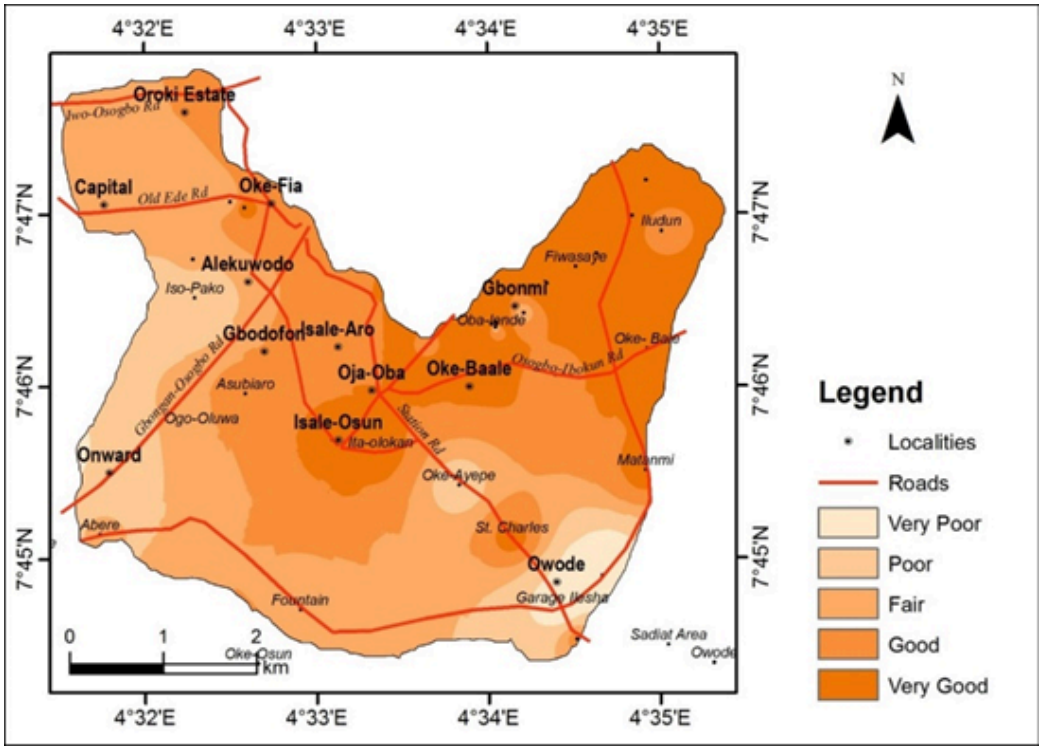

Figure 8 Map of satisfaction with enrolment

6.0 Conclusion and Recommendations

This study examined infrastructure as an indicator of household poverty in Osogbo, Osun State, Nigeria. Seven indicators captured the four dimensions of expenditure/income, health, education, and empowerment for the data analysis. The monetary indicators computed and mapped include income and consumption, expenditure on housing, and expenditure on water and power. Nonmonetary indicators are health care conditions, nutrition, education, vocational training, and enrolment in schools. However, the overlay of the monetary and non-monetary indicators gave the composite index of poverty levels in the study area. The composite index identified three zones of poverty: low, medium, and high levels. The results were further disaggregated to decipher the contributions made by each indicator to the overall poverty levels, that is, the influence exerted by every dimension. In developing countries characterised by market failure, the government has an active role to play in the development of infrastructure in urban areas. In this respect, fiscal policy aimed at massive investment in infrastructure in urban areas is crucial to poverty reduction. The situation in Nigeria is such that, though expenditure on infrastructure has increased in absolute terms, real expenditure on infrastructure has declined over the years. Therefore, the focus should be on the quantity of infrastructure in urban areas, specifically the number of kilometers of built roads and the hourly generation of megawatts of electricity, rather than on the nominal expenditure on infrastructure.

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CATEGORISATION OF PRUDENCE PRACTICE IN CONSTRUCTION PROJECT MANAGEMENT IN LAGOS STATE, NIGERIA

Morakinyo, A., Akeredolu, T.B. and Onabanjo, A.A.

ABSTRACT

Prudence presupposes prioritising to achieve the balance ideal in the presence of constraints. The cardinal constraints of budget, duration, and quality are ever-present in construction project delivery. Therefore, project managers are expected to avail themselves of practices that can enhance the construction project performance. However, there is limited literature on adopting prudence practices in construction project management. Therefore, this study aims to empirically categorise the prudence practices (PP) in the management of construction projects in Lagos State, Nigeria. A quantitative method was adopted for the study. Primary data were collected and analysed through the use of questionnaires and statistical tools respectively. Further, a prudence practice scale was constructed. Where, between a lower and an upper end of a six-point scale, and dividing five by six gave 0.83. This established the extent of each range for the categorisation of the prudent practice scale; yielding from "Not Prudent" to "Very Highly Prudent". A predictable, to meet the client's construction objectives in terms of budget and completion date, was identified. This ranged between $> 3.49 \leq 4.32$, that is, "typically prudent". In conclusion, project managers are yet to attain the very desirable prudence practices in terms of being "Highly and Very Highly prudent. Therefore, project managers should embrace prudence practices that enhance budget and completion date.

Keywords: categorisation, prudent practice, construction project management, Nigeria

1.0 INTRODUCTION

Innovations are welcome phenomena in all parts of life and the construction sector (CS) is no exception. It is vital for fresh strategies to be regularly established to deal with challenges in the construction sector. The CS is dynamic in nature, and the dynamism is needed to respond to new technology, size of budgets, and development processes (Babu, 2015). Ogunsemi, Oyediran, Rotimi, and Ekundayo (2008a) also noted that the dynamism of the CS has brought unparalleled growth and developments in the sector's practice. Through dynamism, CS has played an essential role in establishing the infrastructure required for socio-economic development and contributing directly to economic progress (Abdullah, 2004). As Vilinus (2008) opined that the CS constitutes the major employer of labour, Babatunde (2018) also found that a substantial amount of government money goes towards construction. Because of the close relationship between construction and the national economy that is supposedly present, any disruption in the CS (in the form of innovations that enhance its operations) is likely to have an immediate impact on the national economy, if not the entire world economy (Hillebrandt, 2000). The ability to adapt innovation is one of the characteristics for determining a capable project manager (PM).

A capable PM who is competent to carry out this comparatively new and expanding role of project management based on competence in the relevant discipline is very crucial to project activities in CS. This is because projects in the CS cover a variety of specialised areas (Ogunsemi, Oyediran, & Ekundayo, 2008b). According to Devi (2013), project managers are saddled with the responsibility of completing the owner's physical development successfully while adhering to budget, schedule, quality, and safety standards. This suggests that project managers are crucial to the development of infrastructure, worldwide, as well as to the operational processes of architectural cum engineering construction firms. As a result, the PM is easier to blame for any construction mishap.

The above construction mishap raises important question. "What are the new expanding roles required of project managers to tackle the challenges posed by the CS?" Identifying these roles and the knowledge, skills, and mechanisms by which consultant project managers may perform such requisite roles is very vital. As such, this could provide options for addressing the training of future consultant project managers that will ensure their continued relevance in the sector. One way to do this is through the idea of "prudence of construction project managers."

According to the Conceptual Framework for Financial Reporting (2001), being prudent involves using some prudence when generating estimates under uncertain circumstances so that assets, income, or liabilities are not overestimated or underestimated (Hoogervorst, 2012). However, the classification that will help in the selection of construction project managers in line with peculiar prudence practice risks of construction projects is very scarce in the literature. Therefore, this study aims to empirically categorise the prudence practices (PP) in the management of construction projects in Lagos State, Nigeria. The rest of the paper covers a review of the literature, the method adopted for the study, the findings, and the conclusion.

2.0 LITERATURE REVIEW

2.1 Brief view of project management and the construction sector

The employment of project management consultant (PMC) services, has been noted to be one of the management solutions which aims at increasing a project's efficiency (Ismail, Zin, and Latif (2006). Although, the literature is replete with definitions of project management, but hardly is the concept defined without referring to one offered by the project management body of knowledge (PMI, 2004). The body aptly defines the concept as the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder demands and expectations. The project is supposed to fulfill its aim and then come to an end. Constantly, achieving or surpassing stakeholder requirements and expectations entails reconciling opposing demands. Such requirements and expectations cover cardinal construction project objectives (time, cost, quality, and scope), the dynamism of stakeholders, and both the identified and potential needs of stakeholders (PMI, 2004).

Andawei and King (2001) defined the construction sector (CS) by its characteristics. According to the authors CS refers to a series of loosely related sub-sections that jointly create, change, and repair structures, as well as civil, industrial, or process engineering processes. Also, Salleh (2009) described CS by its scope of activities. Thus, the planning, design, building, upkeep, and eventual disposal of structures and works fall within the scope of the construction business, a sector of the economy. The CS is a service business that obtains its contributions and products from a range of monetary sectors with which it is frequently associated in complicated ways (Salleh, 2009). The significance of construction is derived from its contribution to the establishment of built physical facilities and the employment of workers, both of which are crucial and highly visible to a nation's development process (Salleh, 2009). Also, Tanzania's National Construction Council (NCC, 2005) further defined the assemblage industry as a section of the economy that translates diverse resources into the physical economic and social infrastructure to stimulate growth. The growth is the contribution of the organisation of multi-disciplines and diverse trades and other stakeholders' inputs.

Organisations and individuals working come in the form of consultants, main contractors, and other vendors which include: subcontractors, manufacturers of materials and components, suppliers of machinery and equipment, builders, and merchants. All these have a close relationship to clients and financiers are also included in the industry (NCC, 2005). The government in most situations, is one of the parties that interact, influence, and decide the volume of operations in the business be it as buyer (client), sponsor, or regulator, to mention but few. Due to the importance of CS to any nation's economy, Ogunsemi et al. (2008b) maintained that its management must be set out in detail and assigned to specialists with the requisite education and qualifications.

2.2 The complexity and uncertainty of the construction sector

According to earlier research, the construction sector is marked by specific complexity aspects because of its distinctive uncertainties, interdependencies, and operational inefficiencies (Dubois & Gadde, 2001). The sector is one of the fastest and most complicated industrial advances in the whole globe (Henry, Jackson, and Bengt, 2009).

The intricacy of construction operations and the accompanying necessity for problem-solving abilities are both challenging (Dubois and Gadde. 2001). Shamas-Thoma, Seymour, and Clark's (1998) study on mechanisms that enable the construction process to operate, echoed similar views. Construction undertakings are among the most difficult efforts, according to Winch (1987). This viewpoint is reinforced in Gidado (1996), on the steady increase in the complexity of construction projects. Due to the complexity and unpredictability of the construction sector, the "prudence of project managers" is vital because in such a situation, judgments must be taken with utmost prudence and thorough assessment of risks.

2.3 Project Manager

On construction projects, construction project managers serve as the project owners' knowledgeable representatives (Ogunsemi et al., 2008a). To ensure timely delivery within the constraints of time, cost, and performance criteria, they coordinate the entire development process (Moneke, 2001). The primary duties of project managers are to produce the project's final product within the set budget, time constraints, and quality standards and also meet profit goals (Odusami and Ameh, 2006). For a comprehensive categorisation of construction project managers' duties see Odusami and Ameh (2006) and Roman (1998) in Seymour (2014). It is important to note that the duties of project managers are enhanced through the construction sector's adoption of other industries' processes.

2.4 The construction sector and adoption of other industries' processes

There are reasons to believe that construction has succeeded in adopting strategies that have enhanced performance in other economic sectors. Such as total quality management (Shammas-Thoma et al., 1998), just-in-time delivery (Low & Mok 1999), supplier collaboration (Cox 1996), the supply chain principle, and the "industrialisation" of manufacturing processes (Gann 1996). The consensus among these authors was that the building industry ought to be permitted to change on its own. As a result of the aforementioned, the built environment can benefit from the "concept of prudence," which was initially an accounting term.

2.5 The concept of prudence in the accounting world

Prudence is defined as using a certain amount of judiciousness when establishing estimates under uncertain circumstances so that assets, income, or liabilities are not overstated or understated (Hoogervorst, 2012). Prudence is one of the factors that should guide the management's choice and implementation of the proper accounting practices (International Accounting Standards (IAS, 1995). The Accounting Standard Board (ASB) of the United Kingdom further states that prudence is to be understood as a state of mind, signifying the meticulous appraisal of all reservations and attentiveness to potential hazards rather than a systematic measuring bias (IAS, 1995). Prudence varies across member states for historical, cultural, and economic reasons. Furthermore, prudence is important among the many qualitative characteristics that make the information provided in financial statements useful to users (International Accounting Standards Committee (IASC) Framework, Financial Accounting Standards Board (FASB) Concept No.2, and The United Kingdom (UK) Statement of Principles), whereas other argument holds that prudence takes precedence over all other principles, a foundational principle.

2.6 Bringing Prudence from the Accounting Sector to the Construction Sector

Prudence as defined in section 2.10 is in line with the International Accounting Standards Board's (IASB) 2001 Conceptual Framework; Hoogervorst, 2012). According to Dubois and Gadde (2001), Oyewobi, Oke, Ganiyu, Shittu, Isa and Nwokobia (2011), Ochieng, Price, Ruan, Egbu, and Moore (2013), the CS has been linked to complexity and uncertainty, and project managers are frequently called upon to make decisions and exercise judgment in this field and this is a reflection of some recommendation (Gunning & Harker, 2004).

Thus, the recommendation and edition by Foundation for Fiduciary Studies (FFS) in 2003 and the American Institute of Certified Public Accountants respectively are shown in Table 2.1. Regardless of size or intended usage, these practices are easily adaptable to all types of portfolios and are used to gauge the fiduciaries' level of prudence (FFS, 2003). The project manager in this scenario, who is a fiduciary, is put to the test using these cautious practices as variables (Bello and Andenyang, 2015). They served as the foundation for the research questionnaire and were revised to meet the building sector.

Table 2.1 Prudent Practice

PRUDENT PRACTICE FOR FIDUCIARIES IN ACCOUNTING INDUSTRY	PRUDENT PRACTICE REDRAFTED TO SUIT CONSTRUCTION INDUSTRY
Practice No 1 Investments are managed in accordance with applic	1. The Project is managed in accordance with applicable statutory laws, construction documents, and the client's brief.
Practice No. 2 Fiduciaries are aware of their duties and responsibili **Note:** A fiduciary is defined as someone acting in a	2. The Project manager is aware of his/her duties and responsibilities.
Practice No. 3 Fiduciaries and parties in interest are not involved in	3. The Project manager and other service providers are not involved in self- dealing.
Practice No. 4 Service agreements and contracts are in writing, and	4. Contract provisions and contract are in writing, and do not contain provisions that conflict with the project manager's professional standards of work.
Practice No. 5 There is documentation to show timing and distributi	5. There is documentation to show timing (programme of works) and distribution of cash flows (cash flow analysis) and the payments of valuations e.g. ∫curve forecast

Practice No. 6 Assets are within the jurisdiction of U.S. courts, and are protected from theft and embezzlement. **Note:** Asset here means capital.	1. Project funds are within the jurisdiction of a legal court, and are protected from theft and embezzlement e.g. Client's designated bank account for a project.
Practice No. 7 A risk level has been identified.	2. The risk in a project has been identified E.g. adequacy of contingency fund.
Practice No. 8 An expected, modeled return to meet investment objectives has been identified	8. An expected, modeled return to meet client's construction objectives has been identified (in regards to budget and completion date).
Practice No. 9 An investment time horizon has been identified.	9. The construction contract duration has been identified.
Practice No. 10 Selected asset classes are consistent with the identified risk, return, and time horizon	10. The division of the project (Work Breakdown Structure (WBS) or elements) is consistent with the identified risk, return, and contract duration.
Practice No. 11 The number of asset classes is consistent with portfolio size.	11. The WBS or elemental breakdown is consistent with the size of the subcontract.
Practice No. 12 There is detail to implement a specific investment strategy.	12. There are details to implement different stages of the project e.g. construction methodology/ method statement.

Practice No. 13 The investment policy statement defines the duties and responsibilities of all parties involved.	13. The contract defines the duties and responsibilities of all parties involved in a project.
Practice No. 14 The investment policy statement defines diversifi	14. The contract defines guidelines that ensure that the project is not deviated from achieving the client's objectives.
Practice No. 15 The investment policy statement defines due dilig	15. The contract conditions define due Diligence criteria for selecting construction methodology in regards to the method of construction procurement.
Practice No. 16 The investment policy statement defines monitori	16. The project management is clear in defining the procurement route/method. The project's procurement method is clear in defining the type of contract and the choice of contractor.
Practice No. 17 The investment policy statement defines procedu	17. The procurement method clearly defines procedures for controlling and accounting for construction cost.
Practice No. 18 The investment policy statement defines appropri	18. The project management strategy defines appropriately structured, environmentally friendly and socially responsible construction methods in regards to Health, Safety, Environment and Quality (HSEQ)
Practice No. 19 The investment strategy is implemented in compl prudence.	19. The project management of the contract is implemented in compliance with the required level of prudence (project manager is professionally liable for other professionals as though he is the actual professionals).

Practice No. 20 The fiduciary is following applicable "Safe Harbor" provisions (when elected). **Note:** Safe harbor rules are voluntary, but when adopted, the fiduciary's liabilities associated with the management of the portfolio's assets may be reduced. If investment decisions are being managed by a committee and/or by an investment advisor, then there are five generally recognized provisions to the safe harbor rules: 1. Use prudent experts to make the investment decisions 2. Demonstrate that the prudent expert was selected by following a due diligence process. 3. Give the prudent expert discretion over the assets. 4. Have the prudent expert acknowledge their co-fiduciary status 5. Monitor the activities of the prudent expert to ensure that the expert is performing the agreed upon tasks.	20. The project manager follows provisions to ensure that only competent professionals are involved in the project (If he is responsible for appointing other professionals).
Practice No. 21 Investment vehicles are appropriate for the portfolio size. **Note:** Investment Vehicle here means mechanism for finance**.**	21. The financing method is appropriate for the project size.
Practice No. 22 A due diligence process is followed in selecting service providers, including the custodian.	22. Due diligence process is followed in selecting the contractor, subcontractors and suppliers; including the project manager.
Practice No. 23 Periodic reports compare investment performance against a (IPS) objectives.	23. Periodic reports (financial statement/ statement report) are used to compare construction performance against an appropriate index, similar project, and past performances.
Practice No. 24 Periodic reviews are made of qualitative and/or organizational changes of investment decision-makers.	24. Periodic reviews are made of qualitative and/or organizational changes of project consultants e.g. adherence to standards and guidelines on the project.

Practice No. 25 Control procedures are in place to periodically review policies for best execution, soft dollars, and proxy voting. **Note:** Soft dollars represent the excess in commission costs; the difference between what a brokerage firm charges for a trade versus the brokerage firm's actual costs. Proxies are voted in a manner most likely to preserve or enhance the value of the subject stock. The fiduciary can either retain the power to vote the proxies, or instruct the money manager to vote on behalf of the fiduciary.	25. Control procedures are in place to periodically review policies for best execution of contract and payments e.g. valuation of actual work done without overpayment for over measured or inapplicable items.
Practice No. 26 Fees for investment management are consistent with agreements and with the law.	26. Fees for the project consultants are consistent with contract agreements and with the law.
Practice No. 27 "Finder's fees," 12b-1 fees, or other forms of compensation that have been paid for asset placement are appropriately applied, utilized, and documented. **Note:** The fiduciary has a duty to account for all dollars spent on investment management services, whether those dollars are paid directly from the account or through soft 12b-1 fees, or other fee-sharing arrangements. In addition, the fiduciary has the responsibility to identify those parties that have been compensated from the fees, and to apply a 'reasonableness' test to the amount of compensation received by any party.	27. All forms of compensation that have been paid for the project is appropriately applied, utilized, and documented (valuations and variations leading to claims).

Bello, and Andenyang, (2015)

The above investment practices are not intended to serve as a 'how to' but are to be used as additional knowledge advice to project management knowledge. It is expected that the practices will guide project managers to make prudent decisions. In that way contributes immensely to reducing the liability of project managers, and failed projects and generally increases the value of construction projects and clients' satisfaction. Furthermore, prudent practices should provide the foundation and framework that will keep project managers from making ad hoc investment decisions influenced by emotions. The seminal work of Bello, and Andenyang, (2015) has provided the foundation and framework for prudent practices' adaptation in construction processes. The next section will focus on the research method adopted in the study.

3.0 Research method

The study focuses solely on building projects in Nigeria's Lagos State. This is because Lagos State is where the great majority of construction projects in the nation are located. This was supported by Wahab and Lawal (2011) and Ajanlekoko (2001), who found that 60% of potential customers for Nigeria's building industry reside in Lagos State.

Utilising stratified random chance sampling, a total of 150 self-administered questionnaires were provided. To get the required minimum sample size, the questionnaires were manually delivered to 150 construction industry professionals. There were 130 completed questionnaires, yielding a 76 percent response rate. Upon closer examination, 8 responses were found to be invalid and were eliminated, leaving 122 valid responses. Descriptive statistics were employed to analyse the data using statistical tools for social sciences (SPSS).

3.1 Data Analysis

Descriptive statistics was used in analysing the data using mean, frequency and percentages and range. The extent of the range as used in performance indicator scale was calculated given that the difference between the lower and upper ends of the five-point scale =4.00, that is 5.00 – 1.00 = 4 and that since there are five points thereon, 4.00 was divided by 5 which gives 0.83, which determines the extent of each range and hence the performance indicator scale (Ajayi, Farinloye, Ogunsanmi, Sanusi, & Mafimidiwo, 2011). This is given in Table 3.1.

RANGE	CATEGORY
> 4.20 ≤ 5.00	Excellent
> 3.40 ≤ 4.20	Good
> 2.60 ≤ 3.40	Average
> 1.80 ≤ 2.60	Poor
> 1.00 ≤ 1.80	Extremely poor

The extent of the range as used in prudence practice scale was calculated given that the difference between the lower and upper ends of the six-point scale =5.00, that is 6.00 – 1.00 = 5 and that since there are six points thereon, 5.00 was divided by 6 which gives 0.83, which determines the extent of each range and hence the prudence practice scale as given in Table 3.2.

RANGE	CATEGORY
> 5.15 ≤ 6.00	Very Highly Prudent
> 4.32 ≤ 5.15	Highly Prudent
> 3.49 ≤ 4.32	Typically Prudent
> 2.66 ≤ 3.49	Averagely Prudent
> 1.83 ≤ 2.66	Poorly Prudent
> 1.00 ≤ 1.83	Not prudent

4.0 Data analysis

4.1 Descriptive Analysis of Data

Table 4.1 indicates a total of 122 valid questionnaires retrieved and used in the descriptive analysis of data. Twenty-eight of the 122 respondents are from architecture background, twenty-seven of the respondents are from quantity surveying background, twelve of the respondents are from civil

Table 4.1 Research respondents

Background	Frequency	Percentage
Architecture	28	23
Quantity Surveying	27	22
Civil Engineering	12	10
Building	17	14
Estate Management	14	12
M & E Services Engineering	11	9
Others	13	11
Total	122	100

engineering background, seventeen of the respondents are from a building background, fourteen of the respondents are from an estate management background, eleven of the respondents are from mechanical/electrical services background, while thirteen of the respondents are from other backgrounds including accountancy, law, and public relations. Furthermore, the designations of the respondents in organisations show that fifty-three are partners of firms, twenty-four of are senior staff of firms, twenty-five are junior staff of firms, while twenty of the respondents fall under the 'others' category which includes Chief Executive Officers, Managing Directors, Directors, and Head of Departments of Institution. Respondents who are partners of firms form the majority. This means a majority of the respondents are well informed to provide the information needed. Similarly, in terms of professional certification, there are twenty-seven registered members of the Nigerian Institute of Architects (NIA), twenty-seven corporate members of the Nigerian Institute of Quantity Surveyors, sixteen are corporate members of the Nigerian Institution of Estate Surveyors and Valuers, twenty-two are corporate members of the Nigerian Society of Engineers, thirteen are corporate members of the Nigerian Institute of Builders, while seventeen of the respondents fall under the 'others category. Again, the respondents are well equipped professionally to be engaged in construction project teams.

In addition, in terms of years of experience, a majority of the respondents had between eleven to twenty years of experience (37%) which represents the modal class that shows that they have enough experience to provide the information required. Also, a majority of the project managers polled were architects (42), civil engineers (36), and quantity surveyors (20), as predicted due to the typical low patronage of other professionals for project management services. This indicates that out of the construction project managers surveyed, the Architect is the most patronized for construction project management services, closely followed by the Civil Engineer, and then Quantity Surveyor, Builder, and Estate Manager respectively.

Finally, the value of the construction projects surveyed shows that sixteen of the projects are worth less than 2.5 million Naira, fourteen of the projects are worth above 2.5 to 10 million Naira, thirteen of the projects are worth above 10 to 25 million Naira, eighteen of the projects are worth above 25 to 100 million Naira, fourteen of the projects are worth above 100 to 250 million Naira, thirteen of the projects are worth above 250 to 500 million Naira, ten of the projects are worth above 0.5 to 1 billion Naira, twenty-four of the projects are worth above 1 billion Naira which takes a majority of the projects surveyed. This variable is useful to evaluate if construction project managers are more diligent and exercise greater caution on projects with higher value.

4.2 Prudence Practice Category

Table 4.2 shows the mean score of prudence practice criteria. The criteria with the highest mean were ranked first and others respectively in this order. The higher the mean of a criterion the higher its level of implementation by the project managers surveyed. The result showed that 'the project manager was aware of his/her duties and responsibilities' was ranked first, 'the contract defined the duties and responsibilities of all parties involved in the project' was ranked second, 'the construction contract duration was identified' was ranked third, 'the project was manage in accordance with applicable statutory laws, construction documents, and the client's brief' was ranked fourth, 'contract provisions and the contract were in writing, and do not contain provisions that conflict with the project manager's professional standards of work' was ranked fifth, 'the contract defined guidelines that ensured that the project is not deviated from achieving the client's objectives' was ranked sixth, while 'an expected, modeled return to meet client's construction objectives was identified (in regards to budget and completion date)' was ranked twenty-sixth and 'the project manager and other service providers were not involved in self-dealing' was ranked twenty-seventh.

	Rank	Mean	Std.Deviation
Contract provisions and the contract were in writing, and do not contain provisions that conflict with the project manager's professional standards of work.	1	5.6	0.55
There was documentation to show timing (programme of works) and distribution of cash flows (cash flow analysis) and the payments of valuations.	2	5.2	0.45
The project was manage in accordance with applicable statutory laws, construction documents, and the client's brief.	2	5.2	0.45
The construction contract duration was identified.	4	5	0.71
The risk level in the project was identified. E.g. Adequacy of contingency fund.	5	4.8	0.45
The contract defined the duties and responsibilities of all parties involved in the project.	6	4.6	1.52
The project manager was aware of his/her duties and responsibilities.	6	4.6	1.14
The procurement method clearly defined procedures for controlling and accounting for construction cost	8	4.4	1.34
The contract conditions defined due diligence criteria for selecting construction methodology in regards to the methods of construction procurement.	8	4.4	1.34
There were details to implement different stages of the project e.g. construction methodology/method statement.	8	4.4	0.89
Periodic reviews were made of qualitative and/or organizational changes of project consultants e. g adherence to standards and guidelines on the project.	11	4.2	0.84
The project management strategy defined appropriately structured, environmentally friendly and socially responsible construction methods in regards to Health, Safety, Environment and Quality (HSEQ)	11	4.2	0.84
The contract defined guidelines that ensured that the project is not deviated from achieving the client's objectives.	11	4.2	1.3
The division of the project (WBS or elemental breakdown) was consistent with size of the subcontract.	11	4.2	1.3
Project funds were within the jurisdiction of a legal court, and are protected from theft embezzlement e.g. client's designated bank/account for the project.	11	4.2	1.1
Periodic reports (financial statement/ statement report) were used to compare construction performance against an appropriate index, similar project, and past performances.	16	4	1
The project manager followed provisions to ensure that only competent professionals are involved in the project (If he is responsible for appointing other professionals).	17	4	0
The project management was clear in defining the procurement route/method. The project's	18	4	1
The financing method was appropriate for the project size.	20	3.8	1.79
The project manager and other service providers were not involved in self-dealing.	20	3.8	1.64
Due diligence process was followed in selecting the contractor, subcontractors and suppliers; including the project manager.	21	3.6	2.41
The project management of the contract was implemented in compliance with the required level of prudence (project manager is professionally liable for other	21	3.6	0.89
The division of the project (Work Breakdown Structure (WBS) or elements) was consistent with	21	3.6	0.89
An expected, modeled return to meet client's construction objectives was identified (in regards to	21	3.6	1.52
Fees for the project consultants were consistent with contract agreements and with the law.	25	3.6	1.52
All forms of compensation that had been paid for the project was appropriately applied, utilized, and documented (valuations and variations leading to claims).	26	3.6	2.05
Control procedures were in place to periodically review policies for best execution of contract and payments e.g. valuation of actual work done without overpayment for over measu	27	3.6	1.64

4.4 Discussion of Findings

The study empirically categorises the prudence practices in the management of construction projects. Out of the twenty – seven prudence criteria examined, construction project managers were very highly prudent in three; highly prudent in seven, and typically prudent in seventeen.This means, that more than fifty percent of construction project managers' prudent practice is in the typically prudent category. Particularly, an expected, modeled return to meet the client's construction objectives was identified (in regards to budget and completion date) ranging between > 3.49 ≤ 4.32, that is, "typically prudent". Both budget and completion date are very critical to construction project success.

Conclusions

About sixty -three percent of construction project managers' prudence practice falls within 'typically prudent'. That is, project managers are yet to attain the very desirable prudence practices in terms of being "Highly and Very Highly prudent.

Recommendations

Project managers should embrace prudence practices that enhances budget and completion date.

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INFLUENCE OF URBAN ROAD ENVIRONMENT ON ROAD TRAFFIC CRASHES

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ABSTRACT

Road traffic crash occurrence and fatality rates have been on the increase, and there is global and local attention on the possible causes and measures to reduce its effects. This study aims to examine the influence of the urban road environment on road traffic crashes, assessing the road environmental parameters and crash situation within the Ikeja local government area. Road Traffic data were obtained from the Lagos State Command of Federal Road Safety Corps and an observational survey of the road environment to obtain primary data on land use, setbacks, street furniture, street trading, and bus stops. Data were analyzed using a frequency distribution table and a Multinomial regression model. Results revealed that 50% of crashes are caused by speeding, categorical analysis of road environment parameters revealed that land use, setback, and street trading were significant predictors of road crashes, and concluded that the road environment is generally porous and uncontrolled. The study recommends a traffic calming scheme and effective development control along road setbacks.

K**eywords**: Road crashes, road environment, traffic calming, development control

INTRODUCTION

Road traffic deaths and injuries have become a global threat, it is estimated to become the fifth leading cause of death by 2030, if the current trend is unabated (WHO, 2018). Since the first global report in 2009, UN General Assembly has adopted two resolutions, targeted at declaring actions on the road safety situation. Resolution 64/255[1] of 2010 proclaimed 2011 – 2020 as the Decade of Action for Road Safety, and resolution 74/299[2] of 2022 also proclaimed 2021 – 2030 as the second Decade of Action for Road Safety. These resolutions are in furtherance to the achievement of target 3.6 of the Sustainable Development Agenda 2030 for road safety, to halve road traffic deaths and injuries globally (WHO, 2018).

Both action plans (2011-2020; and 2021-2030), were based on the principle of reduction in road fatality by 50% at the end of the target periods (WHO, 2018; UN, 2020). The first action plan did not meet this target (Job, Truong, & Sakashita, 2022), and road traffic fatalities were also on the increase during the period (WHO, 2018).

In the last three years road traffic crashes have been on the increase in Nigeria, this was revealed by the Road Transport Data report published by NBS (2020). The data revealed an increase in road fatality between 2017 and 2019, specifically in 2017 there was an increase of 1.35 percent in road fatalities, in 2018 it was 1.17 percent and by 2019 it was 5.83 percent. Similarly, in 2020 a total death of 41,693 giving a road fatality rate of 27.25 per 100,000 population amounting to 2.82 percent of deaths in the country (WHO, 2020). This figure revealed that an average of 114 people died daily on the road in Nigeria in 2020.

Every state of the federation contributed to the frightening road traffic crash record, and among the leading regions in Lagos state, when the number of occurrences and total causality are considered, however, the severity and fatality of the crash in Lagos are relatively low compare to some northern states and the like of Oyo, Osun, Ondo, and Ogun in the southwestern zone of Nigeria (Iyanda, 2018; Bombom et al 2022).

Road transport data published by NBS (2020) revealed a total of 542 road traffic crash cases in Lagos state, with 1031 causalities of which 117 deaths were recorded in 2019. In the year, Lagos state was the 4th leading region in the country, while FCT Abuja, Kaduna, and Ogun were leading respectively. Subsequent years have also shown a continuous increase in the number of cases except the year 2020 which was affected by the restriction of movement imposed by the Covid-19 pandemic. The FRSC, (2017) attributed the leading causes of increased road traffic crashes in the state to overspeeding, brake failure, and dangerous driving.

Researchers have investigated the traffic situation in Nigeria and in Lagos state in particular, Iyanda (2018) investigated the distribution of accident severity in Nigeria, the study found that between 2012 and 2016, Lagos state was one of the states with low (0.2339-0.3722) road crashes severity rate. Similarly, Daniel, Adejumo, & Oritogun, (2017) studied the spatial epidemiology of road traffic crashes and mortality in Nigeria for a period of nine years (2007-2015) and found

out that Lagos state has 3.4/100,000 population of road traffic crashes and mortality rate of 2.7/100,000 population during the period. Bombom et al (2022) in a study of the underlying pattern in road traffic fatality rate in Nigeria between 2005 and 2018, discovered that Lagos state has a 0.52 fatality rate per crash which is the lowest among the states of the federation. The study further established that for 14 years Lagos is the second to Abuja in the number of recorded crashes with 10128 cases. During the period Lagos recorded an average death of 5270 deaths, which is below the mean rate of 8900 per year, and came to a distant 7th position in the ranking of states with road fatality.

Olusina and Ajanaku (2017) found that accidents in Lagos are caused by the smoothness of the road especially the expressway where the largest number of crashes are recorded. The study added that 3.6% of accidents are caused by pedestrian refusal to use the pedestrian facilities e.g. the bridges. Umar, Rana, & Lodhi (2022) studied the impact of urban design and the built environment on road traffic crashes in Rawalpindi, Pakistan, the study categorized built environment factors into four, namely land use, street furniture, buildings, and landscape, and conduct a spatial analysis using kernel density function to determine the hot spots which were later evaluated based on environment characteristics around the hot spots locations.

Multiple linear and Tobit regression models were used to confirm the variables influencing the frequency of road crash occurrence and density, in the result, the model found that land use classes: commercial, residential, recreational, and open spaces were statistically significant predators of road crashes with positive relationship with hotspot density. Similarly, street furniture also has a significant relationship to crash density, most of the variables i.e. road condition, road width, traffic signs, traffic calming - and speed breakers present a negative relationship, which means with an increase in the number of lanes and improvement in road condition the crash density will be less.

Hovenden and Liu (2020) used spatial statistical methods to examine road traffic crash clusters in metropolitan Melbourne. The authors used Global Moran's I, Kernel Density Estimation, and Getis-Ord Gi* statistics to identify the hot spots and test for the statistical significance of the crash locations. The study revealed that 15.7% of crashes in the study area were found to be clustered, the result of crash clusters was overlaid with land use and road classification maps, and it was discovered that hot spot clusters were in areas dominated by commercial land use and concentrated on arterial and sub-arterial roads. The study suggests further investigation on network-based hot spot analysis to examine the relationship between crash clusters and the influencing factors.

Ajala (2024) in a study of road traffic crashes in metropolitan Lagos, conducted a spatial analysis of crash blackspot. The study revealed that the Ikeja local government area of Lagos metropolis recorded the highest number of crashes, which are clustered along major arterial roads. This study therefore investigates the road network to examine the influence of the urban road environment parameters on road traffic crashes within the Ikeja local government area

Materials and Methods

Ikeja local government area is one of the twenty-one local government areas of Lagos state in southwest Nigeria. The state is situated within latitudes 6°27'N and 6°40'N with longitude 3° 28' E. Ikeja is the state capital with national and international presence such as government offices, and international airports to mention a few. Ikeja is a network of arterial roads of national importance such as the Lagos-Ibadan expressway, Lagos-Abeokuta expressway, and other secondary highways. Thus its location at the border of Ogun state with the linking arterial road (Lagos-Ibadan expressway) makes it the gateway local government to another part of the country (See figure 1 location of Ikeja local government within Lagos state).

This study is based on quantitative research methods, secondary data were obtained from a previous study and the lead agency in road safety (FRSC Lagos Command), complimented with an observational survey of the road environment to obtain primary data on land use, setbacks, street furniture, street trading, and bus stops. Data were analyzed using a frequency distribution table and a Multinomial regression model.

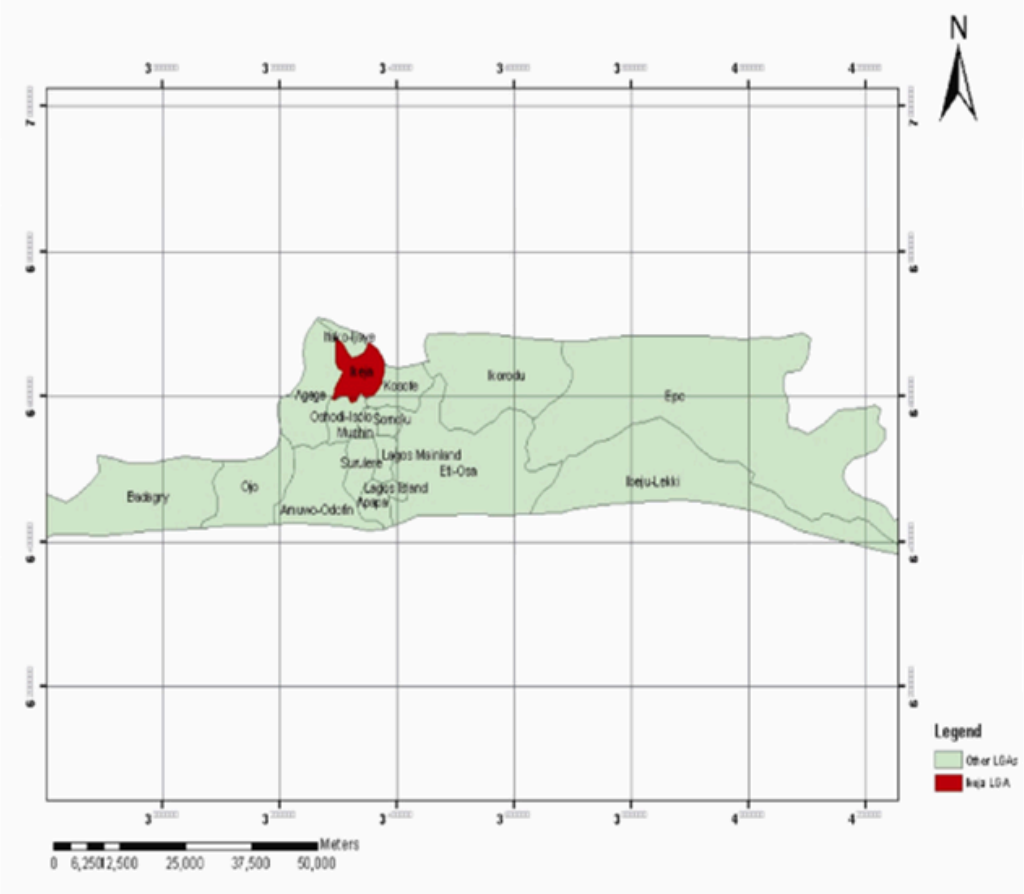

Figure 1: Ikeja Local Government within Lagos State (Oyinloye and Olamiju, 2013)

Results and Discussion

Descriptive Statistics of the Study Variables

Table 1 present the marginal percentage distribution of the study variables. The analysis indicates that the most common (50.6%) cause of crashes is "speed violation" (SPV), followed by "mechanical defect of the vehicle" (MDV) at 14.9%. This suggests that efforts to control vehicle speed could be critical in reducing crash rates, as there is a need for vehicle maintenance to also reduce the incidence of crashes occasioned by vehicle defects. Other significant rates are attributed to brake failure (BFL) at 9.8%, and wrongful overtaken (WOV) at 6.9%.

More so, most crashes (96%) resulted in no fatalities, which means no deaths were recorded. While 3.4% resulted in a single death, and a mere 0.6% resulted in two deaths. The land use analysis revealed that the majority of crashes (51.7%) occurred in Residential areas, followed by Commercial areas (31.0%), and Public areas (17.2%). This implies that residential areas are the most common locations for crashes, possibly due to higher traffic volumes or a mix of pedestrian and vehicular traffic. It can also be seen that a greater number of crashes occurred in areas with “Not Adequate setbacks” to the road (59.2%) compared to Adequate setbacks (40.8%), indicating that enforcement of road setbacks through development control and road design could be contributing to crash occurrence.

The street trading variable revealed that most crashes (75.3%) occurred in areas without street trading, while a smaller proportion occurred where street trading was present (24.7%). In addition, Crashes more frequently (64.4%) occurred in areas without bus stops compared to areas with bus stops (35.6%). This implies a less significant factor but is noticeable, indicating the need for controlled urban road environments appropriate planning of bus stops, and control of street trading to minimize disruption and potential road crashes.

Variables		Frequency	Marginal Percentage
ses of c	BFL	17	9.80%
	DAD	1	0.60%
	DGD	6	3.40%
	FATIGUE	1	0.60%
	FIRE	1	0.60%
	FTQ	1	0.60%
	HIT & RUN	2	1.10%
	HIT AND RUN	7	4.00%
	HIT&RUN	1	0.60%
	MDV	26	14.90%
	OVL	1	0.60%
	RTV	4	2.30%
	SPV	88	50.60%
	TBT	5	2.90%
	WOT	1	0.60%
	WOV	12	6.90%
Number Killed	0	167	96.00%
	1	6	3.40%
	2	1	0.60%
Land use type	Commercial	54	31.00%
	Public	30	17.20%
	Residential	90	51.70%
pacKs to the R	Adequate	71	40.80%
	Not Adequate	103	59.20%
Street trading	No	131	75.30%
	Yes	43	24.70%
Bus stops	No	112	64.40%
	Yes	62	35.60%
Total		174	100.00%

Multinomial Regression Analysis of Study Variables

Table 2 provides the model fitting information, and shows the significant results for both dependent variables. The likelihood ratio tests for the "causes of crash" model (Chi-Square = 116.532, df = 75, p = .002 < 0.05) and the "number killed" model (Chi-Square = 16.873, df = 10, p = .077 < 0.1) indicate that the final models with urban road environment characteristics (land use type, setbacks to the road, street trading and bus stops) fit the data considerably better than the intercept-only models in each case. However, the fatality variable "number killed" is significant at a 10% level of significance.

Table 2: Model Fitting Information

Dependents	Model	Model Fitting Crite	Likelihood Ratio Tests		
		-2 Log Likelihood	Chi-Square	df	Sig.
Road Crash Caus	Intercept Onl	305.269			
	Final	188.737	116.532	75	0.002
Number killed	Intercept Onl	35.47			
	Final	18.597	16.873	10	0.077

Source: Extracted from SPSS Outputs

The goodness-of-fit tests in Table 3 reveal that both models fit the data well, with high p-values (p = 1.000 for all tests), indicating no significant difference between observed and predicted road crash causes and the number killed

Table 3: Goodness of Fit Test of Road Traffic Crashes and Urban Road Environments

Dependents		Chi-Square	df	Sig.
Road Crash Causes	Pearson	95.187	240	1
	Deviance	87.95	240	1
Number killed	Pearson	10.952	32	1
	Deviance	8.673	32	1

Source: Extracted from SPSS Outputs

The Pseudo R-squared values offer insight into how well the independent variables (urban environment characteristics) explain the variation in the dependent variables (causes of crashes and number of fatalities). Based on the fact that Nagelkerke possesses the highest explanatory power, our interpretation is based on it. Taking road crash causes into consideration, the Nagelkerke R^2 value of 0.504 indicated that about 50.4% variation in the urban environment characteristics is influenced by road crash causes. It cannot be overemphasized that these predictors only contributed to 29.9% of the number killed as compared to road crash causes, indicating a minor impact. This generally implies that urban environment characteristics are significant predictors of crash causes and can be considered in urban planning and road traffic safety strategies and measures to mitigate causes of crashes and fatalities.

Table 4: Variables coefficient of determination

Dependents	Pseudo R-Square	
Road Crash Causes	Cox and Snell	0.488
	Nagelkerke	0.504
	McFadden	0.193
Number killed	Cox and Snell	0.092
	Nagelkerke	0.299
	McFadden	0.262

Table 5 presents the individual significance of the predictor variables. On the causes of the crash model, the land use type predictor is statistically significant (Chi-square = 48.631, p-value 0.017 < 0.05), suggesting that different types of land use have a noticeable impact on crash causes. This is in addition to setbacks to the road (Chi-square = 25.160, p-value 0.048 < 0.05), implying that the distance of buildings from the road impacts the likelihood of crashes and street trading (Chi-square = 32.050, p-value 0.006 < 0.05), suggesting that the presence and type of street trading activities significantly affect the likelihood of a crash. However, bus stops do not significantly impact the causes of crashes (Chi-square = 12.522, p-value 0.639 > 0.05), an indication that their presence or absence does not significantly affect the likelihood of crashes in the model.

Contrary to the number killed model, only land use type is a significant predictor (Chi-square = 28.260, p-value 0.047 < 0.05), while setbacks to the road, street trading, and bus stops are not significant. This suggests that urban planning and land use management should focus more on the type of land use to reduce both crash frequency and fatalities, while the other factors have varied influence on these outcomes.

Table 4: Variables coefficient of determination

Dependents		Model Fittin	Likelihood Ratio Tests		
		-2 Log Likeli	Chi-Square	df	Sig.
Road Crash Causes	Intercept	188.737a	0	0	.
	Land use type	237.368	48.631	30	0.017
	Setbacks to the Road	213.898	25.16	15	0.048
	Street trading	220.787b	32.05	15	0.006
	Bus stops	201.260b	12.522	15	0.639
Number killed	Intercept	18.597a	0	0	.
	Land use type	28.26	9.663	4	0.047
	Setbacks to the Road	21.538	2.941	2	0.23
	Street trading	19.277	0.68	2	0.712
	Bus stops	21.435	2.838	2	0.242

Source: Extracted from SPSS Outputs

Discussion

This study revealed that speeding is the single most common contributor to crash causes and fatalities, it justifies the need for safe speed as advocated by the safe system approach to road safety, and it also drives home the introduction of speed-limiting devices in vehicles, especially the public transport vehicles. Commercial and residential land use presents higher rates of crashes this is not unconnected with the volume of traffic and intensity of human activities in the areas, the focus of urban planners and traffic engineers should be on appropriate control measures and traffic calming strategies to minimize the likely traffic implications of the areas.

The surrounding road environment is very key to safe motoring, road setbacks and the activities within such as street trading and bus stops also influence driving behavior and the overall safety of the road users, Umar, Rana, & Lodhi (2022) identified building, open space and land scalping of surrounding road environment has having a positive significant relationship with road crashes.

Interestingly, urban road environment characteristics are identified in this study as a predictor of road crash causes, factors such as land use, road setback, and street trading are significant at 0.05 level of significance. Similarly, Umar, Rana, & Lodhi (2022), Hovenden and Liu (2020), and Ajala, (2024) had earlier found that land use is a significant predictor of road crashes.

Contrarily, street trading and bus stops usually create hindrances to traffic flow, and the possibility of hit-and-run pedestrians cannot be ruled out, however, Olusina and Ajanaku (2017) attributed crash occurrence to the smoothness and free flow of the traffic which could induce speed.

The multinomial regression models for the prediction of road crash causes and fatalities were both significant, the models revealed that road parameters explained 50.4% variation in road crash causes and 29.9% variation in road fatality. This therefore means that the factors of land use, street trading, and road setback were significant predictors of road crash risk factors and fatality.

Conclusion and Recommendation

Land use planning, setbacks enforcement, and street trading control are significant urban management programmes that will ensure urban order, functionality, and efficient urban movement and safety. If urban movement will still rely largely on road mode the following recommendations are made to improve road safety and urban movement.

1. Designing of Traffic calming scheme on major arterial roads and motorways.
2. Effective development control of road setbacks.
3. Integrating land use planning and measures in road safety interventions

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URBAN POVERTY AND MANIFESTATION OF DIVIDED CITIES IN NIGERIA

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ABSTRACT

In Nigeria, the challenges of urban poverty and divided cities are deeply intertwined with the rapid urbanization and pervasive socioeconomic inequalities prevalent across the nation. This study explores the complex interplay between urban poverty and divided cities, placing a strong emphasis on the multifaceted nature of poverty and the segregation observed within urban landscapes. The paper explored existing information to examine the underlying causes and manifestations of urban poverty and city divide. Rural-urban migration has fueled urbanization in Nigeria resulting to exponential rise in population and the consequent expansion of urban centers, bewitched by poverty and inequality. Poverty, in its broadest sense, casts shadow over Nigerian society, with a substantial segment of the population grappling with economic deprivation and limited access to basic necessities. Furthermore, the increase of homelessness and street beggars underscore the acute housing insecurity and social exclusion faced by vulnerable populations. The spatial dimension of poverty within certain urban neighborhoods further exacerbates social exclusion and divided cities which are marked by profound socioeconomic disparities, and marginalization within specific urban enclaves. These disparities are further deepened by socioeconomic inequity, delineated along ethnic, religious, and economic fault lines, leading to social fragmentation which polarised major cities. Development of slum areas and the creation of Government Reservation Areas (GRA) in major cities present divided cities. The study recommended holistic and integrated planning approach that will emphasis inclusive urban planning that prioritize equitable distribution of resources, investment in social infrastructure and services.

Keywords: Urbanization, Urban Poverty, Divided Cities, Socioeconomic Inequity, Poverty Manifestation

INTRODUCTION

The growth of cities in Nigeria reflects a complex interplay of socio-economic, demographic, and political factors. Over the past few decades, Nigeria has undergone rapid urbanization, with cities experiencing substantial expansion in both population size and geographical footprint (NPC, 2020). This growth is primarily driven by rural-urban migration, as individuals and families seek better economic opportunities and an improved quality of life in urban centers (Aderinto, 2017). Pull factors such as access to education, healthcare, and employment opportunities attract migrants, while push factors like poverty, limited infrastructure, and insecurity in rural areas propel them towards urban areas. The process of cities' growth in Nigeria is characterized by the phenomenon of spontaneous and unplanned urbanization, leading to the emergence of informal settlements and slums in major cities (Oduwaye, 2017).

The growth of cities in Nigeria has had significant implications for poverty, urban poverty. Poverty manifests in various forms and is influenced by spatial dimensions and divisions within cities, reflecting disparities in income, access to resources, and opportunities. Urban poverty is particularly prevalent in informal settlements and slums, where residents face inadequate housing, limited access to clean water and sanitation, and substandard living conditions (World Bank, 2019). The spatial division of poverty in Nigerian cities reflects historical patterns of urban development, land use policies, and social segregation, leading to spatial inequalities and exclusion of marginalized communities (Nigerian Statistical Office, 2022). Government policies and interventions are essential for addressing poverty in Nigerian cities, yet efforts often fall short of addressing the root causes of urban deprivation.

The lack of inclusive cities, along with segregation and separation, represents a significant challenge to equitable development and social cohesion in Nigeria. Urban planning and development practices often perpetuate spatial segregation and social exclusion, with distinct neighborhoods characterized by socio-economic disparities (Ola, 2014). Addressing these challenges requires holistic and collaborative planning approaches that prioritize inclusivity, social justice, and community empowerment in urban planning and governance (World Bank, 2019). The research question guiding this study focuses on comprehending the complexities of urban challenges, their diverse manifestations, and strategies for effective mitigation. To achieve this objective, the study explored existing literature that have provided a wide spectrum of information on physical and social landscape of cities which reveal divided picture of our cities. The information has highlighted the landscape of major cities revealing the gap between the poor and the rich, segregation along social stratification and provided fundamental causes and effects of city division.

Review of perspectives of urbansation and poverty in cities

i. Urbanization and its effect

Urbanization involves the process of population migration from rural to urban areas, has been a central focus in the study of urban poverty and divided cities. As Nigeria undergoes rapid urbanization, its consequences become increasingly evident. Davis (2018) observed that urbanization brings both opportunities and challenges, affecting economic activities and putting pressure on infrastructure, leading to an unequal allocation of resources in cities.

However, this concentration often exacerbates social and economic inequalities, contributing to the manifestation of urban poverty and divided cities. Khan and Salman (2020) highlight that the consequences of urbanization are multifaceted, resulting not only in economic growth but also in spatial and social restructuring of cities. The unequal distribution of resources and services often leads to the creation of marginalized communities, characterized by inadequate housing, limited access to education, and insufficient healthcare facilities. This spatial dimension of poverty becomes a critical element in understanding the challenges faced by residents in divided cities.

Aja and Smith (2019) emphasize the role of employment discrimination as a significant challenge in many urban settings. Discrimination in hiring practices often confines certain communities to low-paying and informal jobs, perpetuating cycles of poverty. The spatial separation of affluent and impoverished neighborhoods creates visible disparities in living conditions and access to essential services. Inequities in public services, particularly in education and healthcare, have also been documented. Okeke and Nwachukwu (2018) report disparities in educational infrastructure and its low quality which contribute to the perpetuation of poverty, limiting opportunities for upward social mobility. Similarly, inadequate healthcare services in marginalized urban communities compound health challenges, creating a cycle of poverty and ill health (Adewale & Adelekan, 2017).

ii. Understanding Poverty

The definition of poverty has evolved over time, reflecting changing socio-economic contexts and ideological perspectives. Poverty has been conceptualized as a situation or condition experienced by a person or group of people who are unable to conduct their lives to a level that is considered human (Parwoto, 2001). Such conditions lead to non-fulfillment of basic human needs such as clothing, food, shelter, affection, security, cultural identity, protection, freedom, and leisure (Fernandez, 2000). Traditionally, poverty has been understood primarily in economic terms, equating it with a lack of material resources and income (Sen, 1999). However, this narrow definition fails to capture the full extent of poverty's impact on human well-being and social inclusion. Therefore, poverty is a multidimensional phenomenon encompassing various aspects of deprivation, including access to education, healthcare, housing, and social participation (Alkire & Foster, 2011). By assessing poverty based on indicators related to health, education, and living standards, it provides a more holistic understanding of poverty dynamics and informs targeted interventions. Moreover, Poverty, rooted in systemic injustices, results from unequal resource distribution and limited opportunities. It spans generations due to economic factors like scarce job access and inadequate social support (Cornia, 2014). Its impacts extend to health, education, and social mobility, perpetuating marginalization and hindering societal participation.

Poverty in Cities

Urbanization has led to the rapid growth of cities, becoming both hubs of economic opportunity and epicenters of poverty. According to the United Nations, over half of the world's population resides in urban areas, and this proportion is expected to rise to nearly 70% by 2050 (United Nations, 2018). Despite the perception of cities as centers of opportunity, a substantial number of urban residents live in poverty, facing deprivation and exclusion from essential

resources and services. The later refers to the condition of deprivation and marginalization experienced by individuals and families living in some urban areas. It defined the inability of individuals or households to meet basic needs, including food, shelter, education, and healthcare, due to insufficient income or resources (World Bank, 2020). It is characterized by a concentration of economic, social, and environmental challenges within urban areas. Urban poverty is exacerbated by environmental hazards which include pollution, poor sanitation, vulnerability to flooding, social fragmentation, and spatial inequalities, and poor sanitation among others. Social fragmentation, inadequate housing and instability of social networks further exacerbate the marginalization of vulnerable urban populations (Winchester, 2008). These experiences encourage social demarcation in the urban setting resulting into spatial segregation of poverty. One defining feature of urban poverty is its spatial concentration in specific neighborhoods such as slums or informal settlements areas within cities. These areas, often characterized by inadequate housing, lack of basic infrastructure, and limited access to social services. The spatial segregation of affluent and impoverished neighborhoods exacerbates socio-economic inequalities, with marginalized communities facing barriers to social mobility and opportunities for economic advancement (Hernandez & Hoff, 2017).

3. Dimensions of Urban Poverty

Understanding urban poverty requires an exploration of its multifaceted nature, which spans across various dimensions, each contributing to its complexity and impact on communities. From economic deprivation to social exclusion, urban poverty manifests in diverse forms, highlighting the interconnectedness of factors shaping the lives of urban residents. The manifestation of poverty span across economic, social, health, psychological and spatial areas of human life.

i.Economic Poverty

Economic poverty in urban settings manifests as insufficient income to meet basic needs, perpetuating a cycle of deprivation and exclusion (Smith, 2019). Urban poverty is often characterized by precarious and informal employment, with a significant portion of the urban poor working in low-wage, unstable jobs in the informal sector (Winchester, 2008). Recent research underscores the prevalence of informal employment in urban areas, characterized by unstable hours, low wages, and minimal job security, leading to economic vulnerability and perpetuating poverty cycles (World Bank, 2021). Urban poverty is further compounded by widespread unemployment and underemployment, evident in statistics revealing significant job scarcity and economic instability (Jones et al., 2020; United Nations, 2021). These economic challenges not only impact individual well-being but also strain social cohesion, exacerbate inequalities, and impede sustainable urban development efforts (OECD, 2020).

i.Social Poverty

Beyond economic deprivation, social poverty is a range of challenges affecting individuals' social well-being, relationships, and community interactions (Jackson, 2020). It involves exclusion from social networks, inadequate access to social services, and limited participation in civic life. Social poverty refers to the lack of social integration and community support experienced by individuals in urban areas. Marginalized neighborhoods and fragmented social networks increases social poverty, hindering social cohesion and community resilience (Smith, 2019).

Individuals living in impoverished urban areas often experience limited opportunities for social interaction and participation in community activities. The lack of cohesive social networks further isolates residents and undermines their ability to access support systems and resources. Many urban poor communities confront significant barriers in accessing essential services, including education, healthcare, clean water, sanitation, and other basic amenities, exacerbating social poverty (World Health Organization, 2021).

iii. Psychological Poverty

Psychological poverty pertains to the mental and emotional well-being of urban residents. It covers feelings of hopelessness, despair, and low self-worth, which can result from prolonged exposure to adverse living conditions and social marginalization (Brown & Harris, 2020). Factors such as stress, anxiety, and depression are prevalent among the urban poor, influenced by the challenges of urban life, including economic uncertainties, social pressures, and environmental stressors (Jones et al., 2020). Psychological poverty often manifests as emotional distress and mental strain, stemming from the daily struggles and challenges faced by individuals living in poverty. The constant pressure to make ends meet, coupled with limited opportunities for social and economic advancement, can take a significant toll on mental well-being (Smith, 2018).

iv. Health Poverty

Health poverty describes the inadequate access to healthcare services, poor health outcomes, and the disproportionate burden of disease faced by individuals living in impoverished conditions. It reflects the intersection of socioeconomic disparities and health inequalities, contributing to a cycle of deprivation and ill-health (World Health Organization, 2021). Individuals living in impoverished urban areas often face barriers such as lack of health insurance, high out-of-pocket costs, and inadequate healthcare infrastructure (Smith & Brown, 2019). This limited access to healthcare increases health inequalities and contributes to preventable morbidity and mortality. It offers the prevalence of communicable diseases, non-communicable diseases, and mental health disorders in impoverished urban communities (Jones et al., 2020). Factors such as overcrowded living conditions, poor sanitation, and limited access to nutritious food contribute to the poor health status of individuals living in health poverty.

v. Spatial Poverty

Spatial poverty defines the uneven distribution of resources, opportunities, and services within urban environments, leading to disparities in living conditions and quality of life among residents (Jones & Smith, 2020). This form of poverty is characterized by spatial segregation, where marginalized communities are concentrated in specific geographic areas with limited access to essential services and amenities. Urban poverty exhibits a distinct spatial dimension, often concentrated in informal settlements, slums, and marginalized neighborhoods, where residents endure inadequate infrastructure, substandard housing, and exposure to environmental hazards (Jones & Smith, 2020). Informal settlements and slums serve as epicenters of urban poverty, characterized by overcrowded living conditions, insufficient sanitation facilities, and a lack of basic services (Brown & Johnson, 2019). This spatial concentration intensifies the challenges faced by urban poor communities, exacerbating social inequalities and constraining access to opportunities.

4. Nexus between dimensions of poverty

Noticeably, the multidimensional nature of urban poverty involves a complex interplay among economic, social, psychological, health, and spatial factors. These interconnected dimensions profoundly shape the experiences of urban residents and influence the dynamics of cities. Economic poverty intertwines with social poverty, as economic deprivation can lead to social exclusion and marginalization, hindering individuals' ability to participate fully in society and access essential services. These two dimensions can have significant psychological implications, contributing to feelings of hopelessness, despair, and low self-worth among urban residents. Mental health issues, such as anxiety and depression, are prevalent among those experiencing poverty, further exacerbating their socio-economic challenges. Additionally, the spatial dimension of poverty, characterized by inadequate housing, infrastructure, and exposure to environmental hazards, interacts with economic, social, and psychological factors, amplifying the challenges faced by urban residents. Limited access to healthcare services and health education exacerbates health inequities, perpetuating social marginalization and hindering efforts to achieve equitable health outcomes. Furthermore, the spatial concentration of poverty often correlates with environmental degradation, leading to increased exposure to pollution, inadequate sanitation, and health risks, which in turn exacerbate health disparities among urban populations

5. Manifestations of Poverty in Cities

From a broader policy perspective, poverty comprises primary dimensions related to deficient assets, socio-political structures, and knowledge and skills. These dimensions further extend to include inadequate social networks and financial resources. Tangible indicators of poverty include malnutrition, limited access to clean water, substandard housing, inadequate healthcare, and low educational attainment, among others. In urban environments, poverty manifests in various forms, including:

i.Emergence of Slum in Nigerian Cities

Slums epitomize urban poverty in cities like Lagos, Kano, and Port Harcourt (UN-Habitat, 2006). They feature inadequate housing, overcrowding, poor infrastructure, and substandard living conditions. For instance, in Lagos' Ajegunle area, residents dwell in makeshift shelters made from salvaged materials like corrugated iron sheets and wooden planks. Similarly, neighborhoods like Sabon Gari in Kano face housing and infrastructure challenges amid high population densities and limited services. Several factors contribute to the proliferation of slums, including rapid urbanization, rural-urban migration, and socio-economic disparities (UN-Habitat, 2006). As rural dwellers flock to cities for better prospects, urban centers strain to accommodate them. Insufficient affordable housing and services force many into informal settlements. Socio-economic gaps worsen slum conditions characterized by limited formal employment, education, and healthcare which perpetuate poverty cycles among residents. In slums, lack of clean water, sanitation, and healthcare facilities encourage high disease rates and mortality.

ii. Homelessness in cities

Homelessness is a pressing issue in major Nigerian cities like Lagos and Abuja, where individuals often reside on the streets or in makeshift shelters due to the scarcity of affordable housing and economic prospects (Shinn et al., 2016).

This problem is exacerbated by high unemployment rates, widespread poverty, and inadequate social safety nets. In Lagos, the Maroko slum clearance in the 1990s illustrates how government-led urban renewal efforts can unintentionally contribute to homelessness, displacing thousands without providing adequate alternatives (Shinn et al., 2016). Similarly, in Abuja, homelessness affects marginalized groups such as street children, internally displaced persons (IDPs), and individuals with mental health issues, due to limited affordable housing and support services. The influence of homelessness has forced some citizen especially migrants to sleep under bridges in Lagos and Mokola, Ibadan.

iii. Menace of street begging

In Nigerian cities such as Lagos, Kano, and Abuja, street begging is prevalent where marginalized individuals, including children and the disabled, resort to soliciting for money from passersby for survival (Begum & Sen, 2017). Areas like Oshodi in Lagos and Mararaba in Abuja witness high levels of street begging, underscoring the pervasive poverty and absence of social safety in urban areas. Socio-economic factors such as unemployment, poverty, and inequality drive individuals to street begging, as many come from impoverished backgrounds with limited education and economic opportunities. The lack of comprehensive social welfare systems further exacerbates the vulnerability of those dependent on street begging for sustenance.

iv. Housing deprivation

In Nigerian cities like Lagos, housing deprivation is common, especially in informal settlements lacking amenities (Huchzermeyer, 2011). Makoko, a Lagos waterfront slum, epitomizes this issue, with residents living in precarious structures over polluted waters, lacking basic facilities. Forced evictions worsen housing insecurity, particularly in informal settlements vulnerable to displacement. Government-led projects like the Makoko waterfront regeneration have faced criticism for neglecting affected communities' rights and needs, and increasing vulnerability (Huchzermeyer, 2011).

v. High Occupancy Ratio

High occupancy ratios are widespread in Nigerian cities due to limited affordable housing (Chiu et al., 2019). Areas like Mushin in Lagos and Sabon Gari in Kano experience significant overcrowding, compromising living standards and straining infrastructure. The high occupancy ratio phenomenon is driven by various factors, including rapid population growth, urbanization, and the lack of affordable housing options. As urban populations continue to expand, the demand for housing outpaces supply, resulting in inflated rents and housing costs. This forces low-income households to share living spaces with multiple families, leading to overcrowding and inadequate living conditions.

vi. Malnutrition among urban residents

In Nigerian cities, malnutrition is a pressing health issue, particularly among children in slum areas with limited access to nutritious food (Kimani-Murage et al., 2014). Neighborhoods like Ajegunle in Lagos and Rijiyar Lemo in Kano report high rates of malnutrition among children due to food insecurity and poor dietary habits. Despite government and NGO efforts, malnutrition persists due to poverty, food insecurity, and inadequate access to water for irrigation. The ongoings

challenges like climate variability and Fulani herdsmen invasion worsen food scarcity, especially in slum areas, leading to nutrient deficiencies among vulnerable populations, notably children.

vii. Income level disparities

Income inequality is stark in Nigerian cities where affluent neighborhoods such as Ikoyi and Victoria Island in Lagos, contrast sharply with low-income areas like Agege and Ajegunle (Sugrue, 2014). The dominance of the informal economy perpetuates this disparity, with informal worker lacking job security and access to formal financial services. Limited education and economic opportunities increase poverty and social exclusion, trapping low-income earners in a cycle of inequality.

6. Picture of divided city

The term "Divided City" underscores the stark contrasts between affluent and impoverished areas within the same urban environment, reflecting pronounced disparities in living conditions, economic opportunities, and access to resources. Affluent districts boast robust infrastructure, high living standards, and secure housing options, whereas impoverished areas often contend with informal settlements and insufficient incomes to meet basic needs (World Bank, 2020). This economic divide perpetuates cycles of poverty and limits opportunities for social mobility among residents of poorer neighborhoods (UN-Habitat, 2016). Social segregation further exacerbates these divisions, with marginalized areas experiencing social exclusion and fragmented networks. Residents in economically disadvantaged neighborhoods frequently face barriers to accessing mainstream social services and participating fully in civic life, leading to social instability (Hernandez & Hoff, 2017).

Spatial inequality is among critical dimension of divided cities. Affluent neighborhoods typically enjoy modern amenities such as well-maintained roads, parks, and recreational facilities, while marginalized areas lack basic infrastructure, including reliable water and sanitation services, which significantly impacts residents' quality of life (Smith, 2018). Disparities in access to essential services such as healthcare and education further highlight the challenges within divided cities. Affluent neighborhoods have access to high-quality healthcare facilities and educational institutions, whereas impoverished areas struggle with limited healthcare resources, overcrowded schools, and inadequate educational opportunities (Ogunbodede, 2013). Environmental factors also contribute to urban divisions, with marginalized neighborhoods disproportionately exposed to hazards like pollution, flooding, and inadequate waste management, exacerbating existing socio-economic disparities (World Bank, 2020).

7. Origin and Implication of Government Residential Area (GRA) in Nigeria

The concept of Government Residential Areas (GRAs) in Nigeria began during the colonial era, influenced by British administrators seeking secluded housing in major cities. Colonial urban planning created distinct areas for Europeans, indigenous elites, and African natives, reflecting entrenched racial and socio-economic disparities. GRAs were designed with modern amenities and infrastructure for the colonial ruling class, further segregating urban spaces (Owolabi, 2017; Ogunbodede, 2013). Furthermore, post-independence urban layout design further encourages the legacy of GRAs. The exclusivity of GRAs perpetuated social inequalities, concentrating wealth and privilege and exacerbating spatial segregation. GRAs, originally designed for the affluent, continued to reflect socio-economic disparities shaped by colonial and post-colonial economic and social structures (Owolabi, 2017).

The proliferation of GRAs accelerated with rapid urbanization and population growth further encouraged divided cities. Demand for exclusive residential spaces among the privileged encourage the expansion and entrenching socio-economic disparities and spatial inequalities. This trend underscores the ongoing challenges of promoting inclusive urban development and social cohesion in Nigerian cities (Ogunbodede, 2013). The historical evolution of GRAs highlights their role in perpetuating urban divisions and socio-economic disparities, reflecting colonial-era urban planning legacies that continue to shape Nigerian cities till date (Owolabi, 2017).

8. Poverty and divided city

The relationship between poverty and urban divide in Nigeria underscores multifaceted factors contributing to profound social, spatial, and economic inequalities. Government Reserved Areas (GRAs) serve as stark symbols of urban division, fostering social stratification and perpetuating hierarchies (Owolabi, 2017). These exclusive zones cater predominantly for the affluent, intensifying social segregation and creating distinct spatial boundaries (Ogunbodede, 2013). Such spatial divisions are palpable across Nigeria, characterized by stark contrasts in infrastructure, services, and living standards between different areas. GRAs exacerbate disparities by relegating marginalized communities to underserved locations (Smith, 2018; Ogunbodede, 2013), while ethnic enclaves further reinforce social segregation, clustering communities based on shared cultural backgrounds (Adedeji, 2016).

Economic disparities compound the urban divide, delineated by profound differences in wealth and income levels (World Bank, 2020). The informal economy perpetuates cycles of poverty, trapping individuals in low-paying jobs with limited prospects for advancement (Aja & Smith, 2019). Concurrently, inadequate access to financial services deepens economic inequalities, impeding equitable development opportunities (Okafor, 2018). Urban poverty exacerbates social and spatial divisions, constraining marginalized communities in their efforts to break free from deprivation (Oladipo, 2016). The concentration of poverty within slums accentuates critical challenges such as substandard housing and inadequate access to basic services, compounding the plight of the urban poor (World Bank, 2019).

9. Contributions of Physical Planning to urban divide

Urban planning in Nigeria, aimed at inclusivity and equity but the principle and practice, often exacerbates urban divides and segregation due to historical perspective and policies. Critical factors contributing to this include the scarcity of trained urban planners, numbering fewer than 4,000 in the country, which limits effective development management (UN-Habitat, 2020). Inadequate monitoring and planning frameworks lead to informal structures like buildings and shops being developed without proper approvals, worsening spatial inequalities by neglecting infrastructure and environmental concerns (World Bank, 2018).

Efforts towards urban renewal and revitalization, while improving urban environments, often result in forced evictions that disproportionately affect marginalized communities (UN-Habitat, 2016). This further deepens the divide between affluent neighborhoods benefiting from renewal projects and impoverished areas facing displacement. The establishment of Government Residential Areas (GRAs) exemplifies planning's role in perpetuating disparities, serving as exclusive enclaves for the affluent with superior amenities, neglecting housing needs of the urban poor (Ogunbodede, 2015). Moreover, the creation of exclusive residential and commercial enclaves worsens social and economic segregation within cities (Owolabi, 2018).

These areas receive preferential infrastructure and services, leaving less affluent neighborhoods underserved and marginalized. In summary, Nigeria's urban planning practice exacerbates socio-economic disparities through professional shortages, informal development, unequal planning benefits distribution, residential disparity and deepened social segregation.

10. Approaches to manage urban divide

In the quest to tackle the intricate challenges posed by urban poverty and division, a holistic and multifaceted approach becomes imperative. Recognizing the multifaceted nature of these issues, effective solutions require a comprehensive strategy that combines diverse approaches and interventions.

i.Community-Driven Initiatives and Grassroots Movements

Community-Driven Initiatives and Grassroots Movements are potent tools in combating urban poverty. Ahmed et al. (2019) emphasize empowering local communities to engage in decision-making, fostering ownership and agency. These movements advocate for improved infrastructure, social services, and inclusive policies to catalyze change and break the cycle of poverty.

In Nigeria, community empowerment through initiatives like the Makoko Floating School in Lagos illustrates significant impacts, initiated by the Makoko Waterfront Community, to provide education services to children in informal settlements. Grassroots movements in cities such as Kano mobilize residents for better governance, resulting in investments in essential services like water supply and healthcare. Similarly, grassroots initiatives advocate for inclusive policies. For example, in Abuja, the Centre for Democracy and Development (CDD) ensures inclusion of internally displaced persons (IDPs) and refugees in urban development decisions. These efforts require support from government, civil society, and international partners to amplify their impact and foster inclusive urban development.

ii.Policy Recommendations for Government Intervention

Government intervention through policy recommendations is crucial in mitigating urban poverty and division. Inclusive urban planning, prioritizing affordable housing, accessible healthcare, and quality education, serves as a cornerstone for addressing spatial inequality (Khan & Rahman, 2022). In Nigeria, these policies are pivotal for sustainable urban development. For instance, Lagos state's Affordable Public Housing (LAPH) program offers subsidized housing units to low-income households and, reducing housing vulnerabilities (Adekunle & Ojo, 2020). Efforts to combat employment discrimination are also vital, promoting a fairer urban environment and enhancing opportunities for marginalized groups. In Abuja, affirmative action programs aim to boost workforce representation among marginalized communities. Government interventions in social welfare, healthcare, and education are equally essential. In Kano, mobile health clinics and community outreach programs improve healthcare access (Khan & Rahman, 2022). Policies promoting sustainable urban development and environmental conservation, such as green infrastructure investments in Port Harcourt, contribute to creating livable urban spaces (Adekunle & Ojo, 2020).

iii. Role of NGOs and Civil Society Organizations

NGOs and Civil Society organizations (CSOs) are vital contributors to addressing urban poverty and division particularly to bridge gaps in service delivery and complementing government efforts (UN-Habitat, 2006). They engaged in activities like service provision, advocacy, community mobilization, and capacity-building, these entities significantly enhance urban residents' well-being and promote inclusive development. In Nigeria, organizations such as Slum Dwellers International (SDI) advocate for slum dwellers' rights and empower communities through participatory development in cities like Lagos and Port Harcourt. They enable local communities to engage in decision-making and advocate for their interests. NGOs like the Society for Family Health (SFH) provide essential services to vulnerable populations, improving healthcare access in urban slums through initiatives like mobile clinics and health awareness campaigns (Ahmed et al., 2019).

NGOs and CSOs also drive advocacy and policy reform to address urban poverty's root causes. For example, the Centre for Housing Rights and Evictions (COHRE) campaigns against forced evictions and advocates for informal settlers' rights through strategic litigation and policy analysis (Ahmed et al., 2019). Collaborative partnerships among NGOs, government agencies, and local communities amplify interventions aimed at alleviating urban poverty. In Lagos, the government partners with NGOs like the Urban Development Institute (UDI) to implement slum upgrading projects, providing infrastructure and services to informal settlements (UN-Habitat, 2006).

iv. Sustainable Urban Planning and Development Strategies

Sustainable urban planning addresses urban poverty and division by prioritizing affordable housing, upgrading informal settlements, and improving infrastructure and services (UN-Habitat, 2006). In Nigerian cities, these strategies aim to combat rapid urbanization, inadequate housing policies, and socio-economic disparities, fostering inclusivity and equity. Affordable housing initiatives like Lagos HOMS cater for low and middle-income earners, facilitated through private sector involvement. Upgrading informal settlements enhances living standards and resilience, exemplified by projects such as NEWMAP, which address erosion and flood risks.

11. Conclusion and Recommendation

The discourse on urban poverty and divided cities in Nigeria underscores the complex interplay of social, spatial, and economic factors contributing to inequality and exclusion. From Government Reserved Areas (GRAs) to ongoing spatial and economic disparities, poverty and segregation remain deeply rooted issues with widespread implications. Addressing these multifaceted challenges requires a comprehensive approach. To this demand, the following recommendations are proposed:

i. Inclusive Urban Planning: Governments should prioritize inclusive urban planning strategies that consider the needs of all residents, regardless of socio-economic status. This entails promoting affordable housing, upgrading informal settlements, and enhancing access to basic services and infrastructure in marginalized areas.

ii. Community Empowerment: Community-driven initiatives and grassroots movements should be supported and encouraged, as they play a vital role in addressing local challenges and fostering resilience among urban residents. Empowering communities to actively participate in decision-making processes can lead to more sustainable and inclusive urban development outcomes.

iii. Government Intervention: Policymakers should implement targeted interventions aimed at reducing spatial, social, and economic inequalities within urban areas. This includes enforcing anti-discrimination policies in employment, promoting inclusive employment practices, and investing in social welfare, healthcare, and education.

iv. NGO and Civil Society Engagement: NGOs and civil society organizations should continue to collaborate with government agencies and local communities to address urban poverty and division. Their involvement in service provision, advocacy, and policy reform efforts is crucial for amplifying the impact of interventions and promoting social justice.

v. Sustainable Urban Development: Sustainable urban planning and development strategies should be prioritized to address the root causes of urban poverty and division. This involves promoting affordable housing, upgrading informal settlements, protecting land tenure rights, and fostering participatory decision-making processes.

Summarily, addressing urban poverty and division in Nigeria demands coordinated efforts from governments, civil society, communities, and international partners. A holistic and inclusive approach is essential to build equitable, resilient, and sustainable cities that prioritize the well-being and prosperity of all residents.

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TRANSFORMATIVE IMPACTS OF URBAN RENEWAL IN LAGOS: A CASE OF ISALE GANGAN PROJECT

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ABSTRACT

The rapid urbanization of Lagos had resulted in a degenerated city with filthy conditions. Over the years, urban renewal has been adopted as a transformative tool to rebrand the city and improve residents' quality of life. A series of urban renewal projects had been executed in Lagos with mixed successes. Using qualitative research method and case study analysis, the study assesses the transformative impacts of the Isale Gangan renewal project. The paper mainly relied on secondary data. Findings revealed that the project utilized a land pooling system for land acquisition, and adequately compensated and resettled the affected 12 families. The renewal project significantly transformed the Isale Gangan area. Upgraded environmental quality, access to modern housing facilities, increase in property value, efficient waste management system, community involvement, and high sense of ownership are prominent positive impacts of the project. The Isale Gangan renewal project became a community under one roof; it effectively houses 48 households on a 2,311.6m^2 space instead of just 12 families. It is adjudged one of the most successful urban renewal exercises in Nigeria based on its efficient use of land. However, the high cost of reconstruction, longer timeframe, and insensitive consideration of the means of livelihood of the affected residents were the most challenging issues with the project. The study recommends some level of integration and rehabilitation instead of total clearance and redevelopment to reduce cost; and also, a more holistic approach to future renewal projects to protect peoples' means of livelihood.

K**eywords**: Urban renewal, regeneration, land pooling and Isale Gangan

1. INTRODUCTION

Unprecedented urbanization has continued to draw the attention of governments and researchers. Over 56 percent of the world's population lives in cities; and by 2050, more than two-thirds population will be urbanized (United Nations, 2018). Cities in developing countries will account for 70% of this growth; and African cities are predicted to accommodate an additional 950 million people by 2050 (OECD, 2020). This brings some daunting challenges; such as high rate of urban decay, difficulties in meeting housing demand, creating jobs, and maintaining the sustainability of cities. Consequently, cities' infrastructure are over-stressed; and are increasingly degenerating. In response, many governments have adopted urban renewal as a tool to transform decaying urban areas to cope with the realities of the 21st century (Yuan et al., 2017; Wolfram, 2018).

Urban renewal concept originated in England in the 19th century to curb the filthy living conditions of the urban poor. It spread to the USA as a strategy for social and economic transformation of cities (UN-Habitat, 2010). Urban renewal has had remarkable transformative impacts on many cities and played important roles in stimulating investment and development. Historically, slums of London were the first that attracted the attention of social reformers and philanthropists for renewal (Chigbu, 2012). In 1850s, a notorious slum- "the Devil's Acre" near Westminster was regenerated. Also, in 1890 the Old Nichol, Shoreditch in East London was declared unfit and rebuilt (Palliser et al., 2000). In the USA, large scale renewal projects started in the inter World Wars period. The reconstruction of Central Park in New York, Pittsburgh, and the greater Chicago plan exemplified regeneration projects (Glasco, 1989).

In developing countries, many cities had undergone regeneration with mixed successes. Porto Maravilha in Rio de Janeiro, Brazil; and Puerto Madero in Buenos Aires, Argentina were rebuilt in 1920s. South Africa witnessed many regenerations such as Alexandra Renewal Project and District Six, Cape Town. Other examples include: Wadala in Mumbai, India; River City, Kinshasa, DR Congo and Malabo, Equatorial Guinea.

In Nigeria, major cities such as Lagos, Ibadan, Kano, and Port Harcourt are witnessing severe degeneration. Lagos, which accommodates 12.8% of Nigeria's population on just 0.4% of the landmass; is most affected (Jelili et al., 2020). The inner parts of Lagos are characterized by overcrowding, derelict houses, high crime rates, inadequate infrastructure, and poor standard of living (Ibem et al., 2013). Accordingly, Fadare and Oduwaye (2009) argued for a comprehensive rebranding of the city through urban renewal. Although, the first attempt started after the outbreak of the bubonic plague in 1924; but it become common after the creation of Lagos Urban Renewal Board in 1991 (Olawepo, 2010).Many projects ranging from slum clearance and redevelopment, city beautification to rehabilitation of infrastructure were executed (Ibem et al., 2013). However, previous researches have focused on the approaches of the renewal exercises without adequate attention to the impacts of such projects. Hence, this paper seeks to assess the transformative impacts of urban renewal projects in Lagos, using Isale Gangan as a case study.

2. LITERATURE REVIEW

2.1 Concept of Urban Renewal

The term urban renewal has been used to refer to redevelopment, regeneration, rehabilitation, revitalization, spot clearance and urban renaissance (Hong Kong Government, 2000). According to Michael et al. (2017), it refers to the redevelopment of older and inner parts of cities, in the USA; while in the UK, it is highly linked to the desire to upgrade or reform housing units of the urban poor. Ibem et al. (2013) see urban renewal as one of the most effective ways of addressing the problems of housing scarcity and infrastructure degeneration; while restoring the social and economic status of cities. Similarly, Grebler (1965) described urban renewal as a concerted attempt to modify the urban environment through planned adjustment of existing city to meet current and future demands for living, working, and recreating.

Urban renewal or regeneration is a process of upgrading substandard dwelling units up to a prescribed standard and improving the natural environmental quality (Jelili et al., 2020). It is a technique of resolving urban problems and bring a lasting improvement in the physical, social, economic and environmental conditions of blighted urban areas. When it is carried out in rural areas, it is termed "village renewal" (Chigbu, 2012). Succinctly, urban renewal is a public effort to revitalize decaying inner cities and suburbs with aim of improving the physical, socio-economic and ecological aspects of cities through various actions; including total clearance and redevelopment, rehabilitation, integration and heritage preservation.

2.2 Rapid Degeneration in Lagos and Justification for Urban Renewal

Lagos, the most populated city in Africa is faced with a dramatic urban transition. On average, 6,000 people move into Lagos daily (George, 2002); and the United Nations estimated its' population to reach 32.6 million by 2050 (UN, 2018). This trend places pressure on the city's critical infrastructure, resulting in deplorable conditions of all urban fabrics, particularly in the city centre (Wolfram et al., 2016). Between 1920 and 1960, most core parts of Lagos degenerated quickly and were characterized by slummy conditions. In 1981, the World Bank Urban Renewal Project identified 42 slum communities in Lagos (Adelekan, 2004).

Despite the economic importance of Lagos, the livability experience of many of its dwellers is poor; and there is a growing inequality. It is estimated that about 65% of Lagos' residents lives in slummy neighbourhoods with poor environmental conditions. This manifested in the city's residential density. On the average, the density for the entire city was 260 person per hectare; while that of the blighted areas ranges between 750 to 1240 persons per hectare. These overcrowded neighbourhoods are often informal, and usually experience floods, fire and disease outbreak (Ogunbiyi, 2023).The filthy experiences of the city justified the need for massive urban renewal project in Lagos. As noted by Jelili et al. (2020), urban renewal is the only realistic option for improving the lives of the poor in Lagos, in addition to policies for preventing future slums.

2.3 A review of urban renewal projects in Lagos

Urban renewal initiatives have had a transformative impact on Lagos. They brought about significant improvements in the economy, infrastructure, housing, and public health. Urban regeneration started in 1928 when the then Lagos Executive Development Board (LEDB) carried out the first slum clearance exercise to curb the spread of the bubonic plague (Sule, 1990). This was followed by slum clearance and renewal of about 28.34 hectares (70 acres) in central Lagos; with the affected areas including Broad Street, Balogun, Martins Streets, Nnamdi Azikwe Street, and Palm Church Street (Amidu and Aluko, 2006 and Jelili et al., 2020). Similarly, in the late 1960s there was a comprehensive redevelopment of the Olaleye-Iponri area of the city. Again, in July 1990, Maroko and Ajegunle slums were regenerated. More recently, Isale Gangan was completed revamped in 2010s.

In spite the successes recorded, some challenges were observed. Maroko project was regrettably labelled as the most controversial and widely criticized urban renewal projects in Nigeria (Sule, 1990 and Ibem et al., 2013). This is because over 300,000 people and 41,776 landlords were reportedly displaced; and only 2,933 of them were comfortably resettled (Agbola and Jinadu, 1997). Generally, urban renewal schemes in Lagos are exposed to the problems of social cost and public resentment.

Table 1: Urban Renewal Projects in Lagos

Project	Approach	Period	Remark
LEDB renewal of Surulere and layout of Ebute Metta	Redevelopment and opening up of new area	1928 to 1940s	High costs and poor relocation
Renewal of central Lagos	Total clearance, comprehensive redevelopment	1950s	Displacement, low-income group priced out
Olaleye-Iponri renewal	Total clearance, comprehensive redevelopment	1960s	Displacement, low-income group priced out
Maroko renewal	Total clearance, comprehensive redevelopment	1990	large scale displacement with little resettlement
Isale Gangan renewal	Housing development	2010s	New housing development, increased property value

3. Case Study of Isale Igangan Urban Renewal Project

Isale Gangan is a predominantly residential neighbourhood on latitude 6°27'24"N and longitude 3°23'30"E. It is located in the heart of Lagos Island and bounded by Isale Gangan and Binuyo streets. The regenerated area covers a space of 2,311.6m^2. The land was obtained through land pooling system whereby 12 families agreed to release their plots for the development of a skyscraper of 11 floors. At the beginning, the team from Lagos State Urban Renewal Agency (LASURA) identified landowners and had meeting with them. According to Jelili et al. (2020), the following contract agreements were reached:

1. Twelve families would pool their land totaling 2,311.6m^2 together to for the project.
2. Affected buildings on the land would be acquired by the government in accordance to Land Use Act of 1978
3. The affected families would be temporarily accommodated at Amuwo-Odofin area for the estimated 2-year construction period or they have the freedom to request for a sum of N400,000 rent in leu of temporary accommodation.
4. Compensation would be paid to the affected families.
5. Upon completion, the affected households would be allocated units in the Towers in accordance to the values of their properties with their names inscribed.

At the end of the exercise, an eleven (11) floor structure consisting of 48 units of condominium was produced comprising of 2 and 3-bedroom flats.

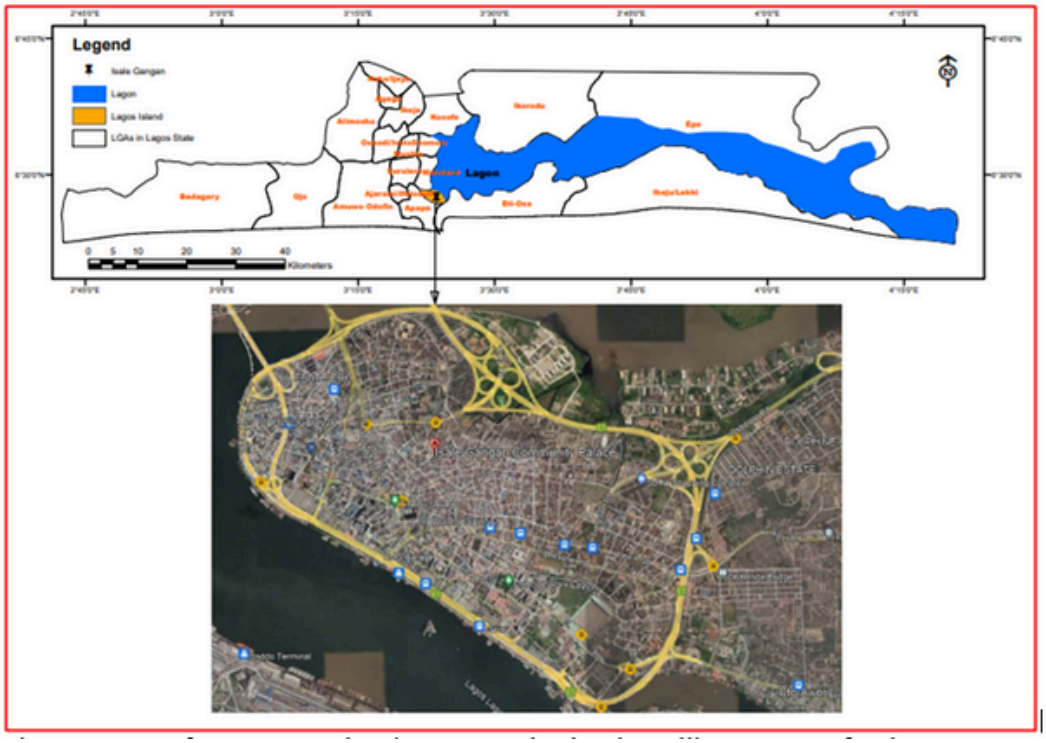

Figure 1: Map of Lagos State showing Lagos Island and Satellite Imagery of Isale Gangan
Sources: Google Earth (2024)

3.1 Pre and post-renewal state of Isale Gangan

The pre-renewal state of Isale Gangan was characterized by poor environmental quality, with overcrowded buildings, narrow streets, blocked drainages, and inadequate greenery. The residents were faced with issues of stagnant ponds, indiscriminate trash disposal, and disease outbreaks. Before the exercise, the space accommodated 12 buildings in a congested manner (see figure 2).

The post-renewal era witnessed a replacement of all old buildings by one skyscraper; primarily designed to maximize land use (Jelili et al., 2020). It expanded the community's housing supply, beautified the environment, improved the residents' quality of life, and also reduced susceptibility to disease outbreaks. The project consists of 36 units of two-bedroom flats and 23 units of three-bedroom flats within 9 residential floors, a big hall for social gatherings on the sixth floor, and a parking space of about 60 cars on the last floor.

The tower also has three industrial boreholes, four units of 120-litres overhead tanks, 23 passenger elevators, water and sewage treatment plants, and a combined 2000-kVA generator. The state government solely financed it; and each of the three-bedroom flats was sold for N50 million, while the two-bedroom went for N38 million.

Pre-renewal (2008) During reconstruction (2012) Post renewal (2024)

Figure 2: Imagery of Isale Gangan renewal site in stages Source: Google Earth (2024)

Plate 1: Isale Gangan urban renewal in stages
Source: The Guardian Newspaper (2017)

4. SWOT analysis of the Lagos state urban renewal approach

The analysis of urban renewal approach in Lagos, reveals the following SWOT features.

Table 2: SWOT analysis of Isale Gangan urban renewal

Strengths and Opportunities	Weaknesses and Threats
· The approach increases housing stocks per square space · It reduces the cost of producing linear infrastructure such as road · It improves land-use efficiency · The land pooling system made acquisition ease · It is profitable to the government · It improves the quality of the environment	· The project was capital intensify · It took long construction period · Government imposed their plan on the residents. · Some of the original landowners were almost priced out as they had to pay more for them to be reallocated space within the tower · Influx of high income will eventually mount pressure on the poor

4.1 Area of possible improvement

Urban renewal approach in Lagos state can be improved through the following recommendations:

1. There should be mass titling to landowners of blighted communities. This will improve their willingness to participate in land pooling and also guarantee them compensation in case of urban renewal
2. The concerned families should be given housing options from project initialization.
3. Adequate attention must be given to the immediate environment and not just the project
4. Means of livelihood of affected residents must be carefully studied and catered for in design and implementation of renewal projects.

5. Conclusion

Rapid urbanization had led to degeneration of many parts of Lagos. The state government adopted urban renewal to rebrand the city and improve the quality of life of residents. The case of Isale Gangan in Lagos Island has had some transformative impacts. It is adjudged one of the most successful urban renewal exercises in Nigeria. It used land pooling system which made acquisition easy, and the affected families were adequately compensated and resettled on their land.However, there need for a more holistic environmental view and proper management of sources of livelihoods of affected families in future exercises.

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NATURE AND PATTERN OF DEMANDING FOR HOUSING IN LAGOS METROPOLIS

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ABSTRACT

The study analyzed the nature and pattern of housing demand in Lagos metropolis. Data for the study was accumulated utilizing questionnaires administered to Estate Surveyors and Valuers with presence in six local governments: Ikeja local government, Surulere local government, Agege local government addressing mainland part of Lagos and Ibeju-Lekki local government, Eti Osa local government and Lagos Island local government addressing Island part of Lagos. Data accumulated were dissected utilizing recurrence conveyance table, weighted mean and raking. Finding from the study uncovered that two room level experience the best change in Lagos mainland with a mean of 4.03 and three room level experience the best change in Lagos Island with a mean of 3.77. Convenience completes positioned first with a mean of 3.74 in Lagos mainland and security positioned first with a mean of 3.84 as element influencing occupant housing demand qualities in Lagos Island. Expansion in populace with a mean of 4.06 and change in conjugal status with a mean of 4.16 positioned first as elements liable for housing demand changes in Lagos Mainland and Lagos Island separately. The study suggested that housing financial backers ought to look for proficient exhortation on practicality and reasonability of their proposed land venture.

K**eywords**: Nature, Pattern, Housing, Demand, Lagos

INTRODUCTION

Urbanization has been on increment side in Nigeria in the beyond couple of years. The quantities of individuals living in urban focus has expanded mathematically over the most recent thirty years. The level of individuals living in the urban focus in Nigeria was 7% in 1930 and this has immensely expanded to 35% in 1990 (Okupe, 2002 refered to in Enisan, 2017). Enisan, (2017) saw that the level of individuals living in urban revolve is around 40%. The deficiency of housing has made issues most particularly in urban focus which are consequence of consistent development of individuals came about into over-populated convenience. FGN (2004), refered to in Enisan (2017), believed that moderately 60% of urban occupants are living without satisfactory safe house. This agglomeration of individuals into urban regions has come about into over-usage of social conveniences and it has come about into high disintegration of these conveniences.

The personal satisfaction of an individual relies upon the nature of housing units such individual is involving. No significant arrangement or satisfaction can occur without admittance to quality and reasonable convenience. This philosophy makes it an issue of significance for each person to endeavor hard to secure or create so as to guarantee elevated expectation of living. Person can't make due without approaching essential need of life (Maslow, 1954). Food is extremely fundamental for human endurance however housing or sanctuary is exceptionally significant. Dzangmah (2012) thought that individual will in general be a disappointment without possessing housing.

Openness to land is serious issue defying the forthcoming financial backers who need to put resources into mass housing creation (Enisa, 2017). Igwe et.al (2017) accepted that housing can't work in seclusion without the help of social conveniences and advantageous. The researchers laid out the significance of cleanliness and security as components of livable housing. Housing is a central social convenience which person should approach regardless of the situation with the individual in the general public (Enisan, 2017). In spite of the different declarations by government to resolve the issue of housing deficiency in Nigeria, her residents are as yet experiencing gross lacking of housing accessibility and moderateness.

The rationale behind the advancement of housing is shifting relying upon the goal of the designers (Erguden, 2017). Jinadu, (2007) trusted that the sort of housing involved by individual upgrades their status in the general public. The persistent expansion in development of individuals into urban focus without satisfactory arrangement of housing to carter for this overflowing populace has come about into 40% of individuals overall living in leased convenience. This has urged financial backers to siphon enormous capital into improvement of housing (Olujimi and Bello, 2009). Thus, the essential goal of each and every financial backer is to draw in esteem into their venture.

The demand for housing and its pattern addresses the kinds of housing that occupants expect in a specific region and how this demand has changed with time. The attributes of families and their housing moderateness assumed significant parts in housing demand pattern which can be connected to pay of the customers and inclination different necessities.

While cover is significant, the demand appears to offset the inventory. Be that as it may, it seems the actual stock isn't the issue however a jumble in the demand and supply. The basic explanation is that why there are void in private allowing in certain areas, for example, the highbrow ones, working class and the down trampled in the mainland are

searching for convenience. It becomes basic to inspect the pattern of demand. We want to be aware, so that stockpile (financial backers' choices) can match the demand. This examination is to look at the pattern and nature of demand for housing in Lagos metropolis. The particular targets of the study are: to look at the qualities of occupants housing demand, to evaluate the elements in inhabitants housing demand in the study region, to analyze factors impacting the nature and the pattern of inhabitants' housing demand in the study area.

LITERATURE REVIEW

Housing needs

Housing need is a course of being destitute or dreaded of living without cover or involving inhabitable and being not able to buy or lease convenience because of its costly nature and the pay of forthcoming tenants can't matched it. Housing need might exist on the grounds of cost, populace and congestion and absence of infrastructural offices. Ward Gathering's Designations Plan (2020) expressed that housing implies corresponding to the Reasonable Leased Units the prerequisite by an individual for social housing portion and the people pay is inadequate to empower them lease or purchase housing accessible locally on the not entirely settled concerning local wages and local house costs. City of Edinburgh Area (2017) expressed that housing needs is families that come up short on own housing or are living in housing which is lacking or unsatisfactory, who are probably not going to have the option to address their issues in the housing market without some help and who are probably going to acquire underneath the pay edge £39,067
Housing is an element of good living and the component of housing is the creation of its en masse or amount of private structure which are straightforwardly appended to land alongside sufficient fundamental social administrations in arranged fair, actual framework, security among others to meet the fundamental necessities of the tenants (Omolabi and Adebayo, 2017).

Nigeria populace is around one hundred and sixty million (160m) (NPC, 2006) with land mass of 923,769 square kilometers and decisively situated in West Africa in sub-locale of Sub-Saharan Africa. Nigeria is viewed as generally dark populated in the entire world. Nigeria populace development is the resultant of high fruitfulness rate, social accepted, religion among others.

Omolabi and Adebayo (2017) analyzed housing needs in Nigeria and stated that urban focus in Nigeria isn't safe from housing lack or shortfall and was accepted to be intensified by various obstruction or variables. The analysts further settled that housing needs for all classes is far above housing supply. Despite truly expanding pace of populace development, there is wide hole in housing need and supply. The elements of housing creations issues in Nigeria are noticeably colossal and complex. These has appeared into urban debasement, over-usage of existing housing and quantitative and subjective kinds of all classifications of housing. Hoelzel (2016) affirmed that consistent expansion in housing need in Nigeria as brought about multiplication of ghettos and spring up of spontaneous convenience advancement most particularly for the low pay class.

World Bank (2016) extended that to kill housing shortfall issue in Nigeria, the nation need to foster 720,000 units every year till 2036 (for the following 20 years). The vision 2020 advancement system of Nigeria government what began in 2012 which incorporates development of 10,398,650 facilities (Housing Money in Africa Yearbook, 2012) upheld the World Bank statement.

Lagos being one of the quickest developing economy and populace in Nigeria and West Africa as a general rule, the data that anyone could hope to find on housing creation shows that 1.4 million livable housing were prescribed to the state in ground breaking strategy which should be built somewhere in the range of 1980 and 2000. Regardless of this suggestion just 140,000 units of housing were developed and provided. The quantities of individuals who approach plunge housing as at year 2011 is 1.2 millions just in spite of tremendous quantities of housing shortage of around 17 million populace. Ugbodaga, (2011) saw the housing shortfall as so gigantic that Lagos State needs a normal 224,000 units consistently in the following fifteen (15) years. Bashorun and Fadairo, (2012) and Jaiyeola, (2012) analyzed housing needs according to moderateness and the study presumed that in any event, while housing is accessible, reasonableness has made it delusion to individuals most particularly low pay bunch. Reasonableness has contributed considerably to developing pace of housing needs.

Nigeria populace is around one hundred and sixty million (160m) (NPC, 2006) with land mass of 923,769 square kilometers and decisively situated in West Africa in sub-locale of Sub-Saharan Africa. Nigeria is viewed as generally dark populated in the entire world. In 2014, Nigeria is viewed as the most quickest developing economy and enormous part (more than 48%) of her populace resided in urban focus where there deficient of respectable and reasonable housing and the occupant involved far under 10% (10%) of all out livable land areas (CBN, 2013). This CBN report reasoned that housing deficiency in Nigeria hopped in 1991 to 7,000,000 (7m); twelve million (12M) in 2007 and fourteen million of every 2010 as an outcome of powerlessness of general society to involved enormous developable land (CBN, 2013). There is quickly developing of development of movement of individuals from rustic to urban focus (Ehimuan, 2018)

Dynamics of housing demand

Africa's countries populace has experience colossally filling over the most recent couple of many years. These increment saw in populace development have a normal of 2.53 percent yearly somewhere in the range of 1950 and 2015 (Bah, et al, 2018). This enormous increment is supposed to go on for the following couple of many years. The new populace projection of Africa countries uncovered that the populace develops will move from 1.18billion in 2015 to 2.44 billion out of 2050. Bigger rate (60%) of the Africans populace lived in the provincial areas and the pace of country urban relocation is assessed at 3.5 percent. And this rate is the most elevated on the planet.

Housing comprises almost 66% of the normal family's portfolio, and more than $18 trillion worth of land is possessed inside the family area (Glaeser and Gyourko, 2007). Regardless of the huge size of this area, business analysts' understanding of many highlights of the housing market stays fragmented. For instance test of 115 metropolitan areas from 1980 to 2005 for which we have Office of Government Housing Endeavor Oversight (OFHEO) consistent quality house cost series, increment of house cost in a year is $1 and this experience a typical increment of 71 penny in the next year. The local market costs over the most recent five years are $1 expansion in convenience costs which is related with a 32 penny decline throughout the following long term period. This consistency of dynamic of changes in housing demand through costs appears to represent a test for an effective business sectors view.

The housing market exchange is to a great extent on the recently evolved convenience and the current housing stocks are presented for deals. Augustyniak Leszczyński, Łaszek, Olszewski, and Waszczuk,. (2014a) thought that inventory of the

current housing stock unbending in the short and medium term, any unnecessary demand makes an interpretation of rapidly into unreasonable demand for new development. Many methodologies can be embraced to investigation the housing dynamic cycles and a portion of these methodology are found underneath.

Housing supply assumed significant parts in powerful of housing demand and pivotal figure housing blast. Bulan, Mayer and Somerville, (2009) thought that advancement of housing in urban areas is complicated which gave space for financial backers to verify change. Augustyniak et al. (2014b) focused on that housing engineer's face virtual and genuine stock bend in Poland. The scientist inferred that designers have the ability to up their creation without adding to their expense. This might be feasible as the financial backers rethink for development administrations in Poland. Moreover, the financial backers rely upon pre-installment of clients. This is profoundly liberated from charges or interest and urges the purchasers to purchase different elements of creation in time. The development of housing can be increment and critical benefits can make. Nonetheless, all things considered, numerous makers of housing have been impacted by development cost, material and land cost. Besides, housing is a heterogeneous decent and permits the designer to utilize a cost segregating technique, by which he offers every loft to the most elevated bidder and raises his benefits (Łaszek and Olszewski, 2014).

Dynamics of Housing Demand in Lagos

Lagos, the most crowded (by number and thickness) and financially dynamic of the country's 36 states has been the hardest hit and has posted the most powerful reaction. The state posted a better spending plan execution of N163Bn in Q1, 2020 contrast with N148Bn in Q1, 2019 (Knight, 2020). Lagos state is one of the main states in Nigeria confronted with overwhelming housing lack. To substantiate this, Adam and Agid (2011) thought that low-pay bunches in Nigeria are individuals who were impacted by this lack of housing supply. Bigger rates of young people were jobless in Nigeria which has expanded the destitution rate.

A significant number of these individuals who are residing in contemptible destitution can't want to possess a house because of significant expense of land procurement and significant expense of building materials (Daramola et.al 2005). The direction of housing market in Nigeria go on with the worldwide oil costs. Insights from Public Agencies of Measurements (2020) showed that Nigeria Genuine GDP (RGDP) is: year 2013 is 20.4% while year 2014 is 12.5%. The development rate in Nigeria is around 9.52% in year 2015 yet in year 2016, it was dropped by 0.61%. This might be because of change in cost of unrefined petroleum. This has shown that buying power Immaculateness (PPP) of each and every individual will be impacted.

The pattern of housing advancement in Lagos mainland has made the housing market inside the area to kept on developing. The mainland feels little of monetary downturn (RAC, 2018). The typical requesting cost from a typical three or four room level expanded by 20.43% and 2.33% in year 2015 and 2016 separately. Disregarding the addition in Mainland, the housing area is likewise impacted by this financial downturn with a decrease of 0.53%. Yet, regardless of colossal improvement in cost in Lagos Mainland the advancement of housing is filling in inverse bearing Moore, (2019) believed that the degree of housing deficiency in Nigeria is at disturbing rate. The study additionally put housing accessibility at 23 of each and every 1,000 required it. This shows that 2.3% at hundred individuals approach fair and reasonable housing in Nigeria Twenty great many housing are expected to connect housing deficiency hole in Nigeria i

n 2018 however sadly the figure has been expanded by fifteen percent in 2019. Definitively, housing market in Lagos metropolis is developing with the degree of expansion and emptying. This has prompted void in numerous properties in certain areas like Lekki, Ajah, Victoria Island and Ikeja GRA because of the powerlessness of the tenants to manage the cost of the lease being charged. To make the matter most obviously terrible, numerous designers neglected to study the nature and pattern of private properties in those areas where there is void prior to leaving on their venture.

Strategy

The study area is Lagos metropolis where 6 Local governments were thought of. The Local governments are: Ikeja local government, Surulere local government and Agege local government on the mainland segment of Lagos State. Additionally, Ibeju-Lekki local government, Eti Osa local government and Lagos Island local government on the Island part of Lagos. The study populace is the enrolled firms of Estate Surveyors and Valuers in Lagos Metropolis.

300 and 88 (388) duplicates of questionnaires were administered to rehearsing Estate Surveyors and Valuers inside Lagos metropolis while 200 and 91 (291) poll were returned which convert into seven-five percent (75%). The breakdowns of the returned questionnaires are as per the following: one hundred and 68 (168) questionnaires were returned in Lagos mainland and one hundred and 23 (123) questionnaires were returned in Lagos Island. Accumulated data were investigated utilizing recurrence dispersion table, mean and positioning.

FINDINGS AND DISCUSSION

Table 1: Characteristics of resident's housing demand in Lagos Mainland

Classes of properties		Greatly Changed	Changed	Static	Rarely Changed	Mean		Ranking
						Statistic	Std.	
Flats	Studio	67	70	9	22	3.08	0.4	4th
	Two beds	60	92	3	13	3.18	0.65	2nd
	Three bed	74	82	8	6	3.35	0.89	1st
Bungalow	Detached	63	51	6	48	2.77	0.23	7th
	Semi-detached	64	67	31	6	3.13	0.63	3rd
Duplex	Semi-detached	60	65	33	10	3.04	0.35	5th
	Detached	57	73	9	29	2.94	0.3	6th
Terrace		32	21	68	47	2.23	0.2	8th
Tenement		29	19	72	48	2.17	0.12	9th

Table 1 portrays the qualities of occupant's housing demand. The table uncovered that three bedroom level encountered the most noteworthy changes among the classes of properties thought about in Lagos mainland. 3 bedroom level has a mean of 3.35 and 2 bedroom level positioned second with a mean of 3.18. Semi-detached bungalow positioned third with a mean of 3.13 and studio level positioned fourth with a mean of 3.08. Semi-detached house positioned fifth with a mean of 3.04 and detached house positioned 6th with a mean of 2.94. Detached bungalow positioned seventh with a mean of 2.77 and porch houses positioned eight with a mean of 2.23. Tenement structure positioned least with a mean of 2.17. The progressions are reasoned from viable demand for the different classes of properties. The table portrays the properties of inhabitants housing demand as at the hour of the study

Table 2: Characteristics of resident's housing demand in Lagos Island

Classes of properties		Greatly Changed	Changed	Static	Rarely Changed	Mean		Ranking
						Statistic	Std. Error	
Flats	Studio	56	59	5	3	3.37	0.25	1st
	Three bed	62	50	4	7	3.36	0.24	2nd
	Two beds	45	66	3	9	3.2	0.11	3rd
Bungalow	Detached	50	51	16	6	3.18	-0.07	4th
	Semi-detached	47	53	9	14	3.08	-0.03	5th
Terrace		45	51	10	17	3.01	-0.04	7th
Duplex	Semi-detached	53	43	6	21	3.04	-0.07	6th
	Detached	40	43	7	33	2.73	-1.09	8th
Tenement		19	9	57	38	2.07	-1.04	9th

Source: Field Survey, 2023

Table 2 portrays attributes of occupant's housing demand in Lagos Island. The table shows changes in housing demand for the different classes of properties present in the study area. Studio level positioned first with a mean of 3.37 and three bedroom level positioned second with a mean of 3.36. Two bedroom level positioned third with a mean of 3.20. Detached bungalow positioned fourth with a mean of 3.18 and semi-detached bungalow positioned fifth with a mean of 3.08. Semi-detached houses positioned 6th with a mean of 3.04. Porch houses positioned seventh with a mean of 3.01.

Detached houses positioned eight with a mean of 2.73 and tenement structure positioned 10th with a mean of 2.07. The table portrays the qualities of occupants housing demand as at the hour of the study.

Table 3: Factors that determined characteristics of resident's housing demand in Lagos Mainland

Factors	Mean		Ranking
	Statistic	Std. Error	
Accommodation finishing	3.74	0.075	1st
Classes of the residents within the neighborhood	3.73	0.069	2nd
Good road network	3.62	0.073	3rd
Business opportunity within the neighborhood	3.52	0.074	4th
Constant power supply	3.49	0.079	5th
Mixed-used of landed property in the neighborhood	3.37	0.077	6th
Security	3.35	0.083	7th
Social activities within the neighborhood	3.31	0.08	8th
Opportunity of recreational facilities	2.79	0.08	9th

Table 3 portrays factors that decided attributes of occupant's housing demand in Lagos mainland. Convenience completing is the most common variable that decided qualities of inhabitant's housing demand with a mean of 3.74. Social class of inhabitant's inside a specific area is the second most common component that decided qualities of occupant's housing demand with a mean of 3.73. Great street network is the third positioned factor that decided the qualities of occupant's housing demand with a mean of 3.62. Accessibility of business opportunity inside the area is the fourth variable that decided qualities of inhabitant's housing demand with a mean of 3.52. Steady power supply, blended land use, security, presence of social exercises and a chance for diversion positioned fifth, 6th, seventh, eighth and ninth factors that decided qualities of inhabitant's housing demand separately. The finding substantiates the finding of Oshodi et al (2017) and Oyedeji (2018) who laid out the effect of property determinants on residential property estimation in Osogbo. The study laid out security as the determinant with the most elevated influence on residential property.

Table 4: Factors that determined attributes of resident's housing demand in Lagos Island

Factors	Mean		Ranking
	Statistic	Std. Error	
Security	3.84	0.085	1st
Accommodation finishes	3.83	0.079	2nd
Good road network	3.72	0.083	3rd
Classes of the residents within the neighborhood	3.62	0.084	4th
Constant power supply	3.59	0.089	5th
Opportunity of recreational facilities	3.47	0.087	6th
Mixed-used of landed property in the neighborhood	3.45	0.093	7th
Business opportunity within the neighborhood	3.41	0.09	8th
Social activities within the neighborhood	2.89	0.09	9th

Table 4 portrays factors that decided characteristics of occupant's housing demand in Lagos Island. Security positioned first with a mean of 3.84. Close to this is convenience wraps up with a mean of 3.83. Great street network is the third positioned factor that decided qualities of occupant's housing demand with a mean of 3.72. Social class of occupant's in the area is the fourth positioned factor with a mean of 3.62. Steady power supply positioned fifth with a mean of 3.59 and chance of sporting offices positioned 6th with a mean of 3.47. Blended utilized land positioned seventh with a mean of 3.45. Accessibility of business opportunity in the area positioned eight and presence of social exercises in the area positioned 10th with a mean of 3.41 and 2.89 separately. The finding supports the finding of Oshodi et al (2017) and Oyedeji (2018) who laid out the effect of property determinants on residential property estimation in Osogbo. The study laid out security as the determinant with the most noteworthy effect on residential property.

Table 5: Dynamics of residents housing demand in Lagos Mainland from year 2016 to 2020

	Classes of properties						
	Two bedroom flat	Studio flat bungalow	Detached house	Three bedroom	Two bedroom	Semi-detached house	Tenement
Changes in year 2020							
Upward	72(43%)	75 (45%)	68 (40%)	67(40%)	67(40%)	71 (43%)	66 (39%)
Downward	57(34%)	59 (35%)	62(37%)	59(35%)	60(36%)	56(33%)	22(13%)
Fluctuation	39(23%)	34 (20%)	26(15%)	42(25%)	41(24%)	41(24%)	80(48%)
Total	168	168	168	168	168	168	168
Changes in year 2019							
Upward	124(74%)	101(60%)	99(59%)	92(55%)	78(47%)	71(42%)	40(24%)
Downward	17(10%)	15(9%)	24(14%)	13(8%)	207(12%)	40(28%)	39(23%)
Fluctuation	27(16%)	52(31%)	45(27%)	62(37%)	69(41%)	50(30%)	89(53%)
Total	168	168	168	168	168	168	168
Changes in year 2018							
Upward	126(75%)	121(72%)	106(63%)	102(51%)	92(55%)	91(54%)	66(39%)
Downward	15(9%)	18(11%)	22(13%)	86(15%)	30(18%)	24(14%)	59(35%)
Fluctuation	27(16%)	29(17%)	40(24%)	40(24%)	45(27%)	54(32%)	44(26%)
Total	168	168	168	168	168	168	168
Changes in year 2017							
Upward	109(65%)	101(60%)	92(54%)	102(61%	87(52%)	71(42%)	50(30%)
Downward	17(10%)	15(9%)	34(20%)	25(15%)	13(8%)	40(24%)	66(39%)
Fluctuation	42(25%)	52(31%)	42(25%)	40(24%)	67(40%)	57(34%)	52(31%)
Total	168	168	168	168	168	168	168
Changes in year 2016							
Upward	124(74%)	117(70%)	113(67%)	104(62%)	101(60%)	79(47%)	52(31%)
Downward	13(8%)	15(9%)	18(11%)	10(6%)	12(7%)	24(14%)	67(40%)
Fluctuation	30(18%)	35(21%)	37(22%)	54(32%)	55(33%)	66(39%)	49(29%)
Total	168	168	168	168	168	168	168

Table 5 uncovers pattern (2016-2020) in the elements of occupant's housing demand for the different classes of properties in Lagos mainland. Two bedrooms level encountered the most elevated vertical changes in 2018 with 75% of the respondents verifying this. Two bedrooms level encountered the most elevated descending changes in year 2020 with 34% of the respondents verifying this and the most elevated vacillation in demand was knowledgeable about year 2017 with 25% of the respondents validating this. Studio level encountered the most elevated vertical changes in year 2018 with 72% of the respondents verifying this. Additionally, studio level had the most elevated descending changes in year 2020 and the most noteworthy vacillation in demand was knowledgeable about year 2017 and 2019 with 35% and 31% of the respondents validating the realities separately. Detached house had the most elevated changes in demand in year 2016 with 67% of the respondents verifying the reality. Additionally, it had the most elevated descending changes in demand in year 2020 with 37% of the respondents authenticating it and the most noteworthy vacillation in 2019 with 27% of the respondents validating it. Three bedrooms level had the most noteworthy vertical changes in year 2016 with 62% of the respondents confirming it and the most noteworthy descending changes in year 2020 with 35% of the respondents authenticating it. Likewise, the most noteworthy changes was capable by three bedrooms level in year 2019 with 37% of the respondents authenticating it. Two bedrooms level had the most noteworthy vertical changes in year 2016 with 60% of the respondents validating this reality. Additionally, two bedrooms level had the most noteworthy descending changes in year 2020 with 36% verifying it. The most elevated vacillation in demand was knowledgeable about 2019 with 41% of the respondents verifying it. Semi-detached house had the most elevated vertical changes in demand in year 2018 with 54% of the respondents authenticating it and the most

elevated descending changes in year 2020 with 33% of the respondents verifying it. The most noteworthy change is in 2016 with 39% confirming it. Tenement structure has the most noteworthy vertical changes in 2020 and 2018 with 39% confirming it. Likewise, the most noteworthy descending change is in 2016 with 40% of the respondents verifying it. Likewise, the most noteworthy variance of demand is in 2019 with 53% of the respondents validating it. This tracking down validated the finding of Abraham and Hendershott (2016) who laid out high dynamism in housing demand in urban areas and Oloke et al (2017) who laid out high housing dynamism in Lagos, Nigeria.

Table 5: Dynamics of residents housing demand in Lagos Island from year 2016 to 2020

	Classes of properties						
Year 2020	Two bedroom flat	Studio flat bungalow	Detached house	Three bedroom flat	Two bedroom	Semi-detached house	Tenement
Changes in year 2020							
Upward	77(63%)	79 (64%)	70 (57%)	67 (54%)	66 (54%)	56 (46%)	42 (34%)
Downward	34 (28%)	24 (20%)	35(28%)	43(35%)	15(12%)	30(24%)	32(26%)
Fluctuation	12 (9%)	20(16%)	18(15%)	13(11%)	42(34%)	37(30%)	49(40%)
Total	123	123	123	123	123	123	123
Changes in year 2019							
Upward	80(65%)	62 (50%)	64(52%)	60(49%)	58(47%)	52(42%)	29(24%)
Downward	11(9%)	15 (13%)	37(30%)	46(37%)	15(12%)	34(28%)	32(26%)
Fluctuation	32(26%)	46(37%)	22(18%)	17(14%)	50(41%)	37(30%)	62(50%)
Total	123	123	123	123	123	123	123
Changes in year 2018							
Upward	33(72%)	84(68%)	68(55%)	63(51%)	63(51%)	54(44%)	36(29%)
Downward	22(18%)	18(15%)	22(18%)	30(25%)	27(22%)	30(24%)	55(45%)
Fluctuation	22(10%)	21(17%)	33(27%)	30(24%)	33(27%)	39(32%)	32(26%)
Total	123	123	123	123	123	123	123
Changes in year 2017							
Upward	80(65%)	73(60%)	63(51%)	68(55%)	60(49%)	52(42%)	37(30%)
Downward	20(16%)	25(20%)	34(28%)	37(30%)	14(11%)	30(24%)	54(44%)
Fluctuation	23(19%)	25(20%)	26(21%)	18(15%)	49(40%)	41(34%)	32(26%)
Total	123	123	123	123	123	123	123
Changes in year 2016							
Upward	90(73%)	83(68%)	76(62%)	70(57%)	68(55%)	52(42%)	30(24%)
Downward	22(18%)	26(21%)	27(22%)	39(32%)	15(12%)	30(24%)	32(26%)
Fluctuation	11(9%)	14(11%)	20(16%)	14(11%)	40(33%)	42(34%)	49(40%)
Total	123	123	123	123	123	123	123

Table 5 portray pattern (2016 - 2020) of elements of occupants housing demand in the thought about areas in Lagos Island. Two bedroom flats had the most noteworthy vertical changes in demand in year 2017 and 2019 with 65% of the respondents validating it and the most noteworthy descending changes in demand in year 2020 with 28% of the respondents authenticating it. It encountered the most elevated vacillation in year 2019 with 26% of the respondents verifying it. Studio level had the most elevated vertical changes in year 2016 and 2018 with 68% of the respondents authenticating it and most elevated descending changes in year 2016 with 21% of the respondents confirming it. The most noteworthy variance in demand for studio level is in year 2019 with 37% of the respondents validating it. Detached house had the most noteworthy vertical changes in year 2016 with 62% of the respondents verifying it and most noteworthy descending changes in year 2019 with 30% of the respondents authenticating it. The most noteworthy change in demand for detached house is in year 2018 with 27% of the respondents authenticating it. Three bedroom level had most noteworthy vertical changes in demand in year 2016 with 57% of the respondents confirming it and the most noteworthy descending changes in demand in year 2019 with 37% of the respondents verifying it. The most elevated change is in year 2018 with 24% of the respondents validating it. Two bedroom had the most elevated vertical changes in year 2016 with 55% of the respondents confirming it and the most noteworthy descending changes in year 2018 with 22% of the respondents authenticating it. Additionally, two bedroom had the most noteworthy vacillation in year 2019 with 41% of the respondents confirming it. Semi-detached house had the most elevated vertical changes in demand in year 2020 with 46% of the respondents authenticating it and the most noteworthy descending changes in 2019 with 28% of the respondents confirming it. The most noteworthy change was knowledgeable about year 2016 and 2017. Tenement structure had the most noteworthy vertical changes in demand in year 2020 with 34% of the respondents confirming it and most elevated descending changes in demand in year 2018 with 45% of the respondents authenticating it. The most elevated variance is in 2019 with half of the respondents authenticating it. This discoveries supported the finding of Abraham and Hendershott (2016) who laid out high dynamism in housing demand in urban areas and Oloke et al (2017) who laid out high housing dynamism in Lagos, Nigeria.

Table 6: Factors influencing housing demand in Lagos Mainland

Factors	Mean		Ranking
	Statistic	Std. Error	
Increase in consumer income	3.03	0.041	10th
Price of accommodation	3.04	0.041	9th
Proximity to work place	3.34	0.05	8th
Building finishes	3.57	0.076	7th
Accessibility	3.59	0.073	6th
Population increase	3.73	0.069	5th
Availability of social amenities	3.76	0.043	4th
Security	3.77	0.043	3rd
Space of the accommodation	3.98	0.036	2nd
Increase in economic activities	4.09	0.033	1st

Source: Field survey, 2023

Table 6 portray factors impacting housing demand in Lagos Mainland. Expansion in monetary exercises is the most common variable impacting housing demand in the study area with a mean of 4.09. This is trailed by space of convenience with a mean of 3.98 and security positioned third with a mean of 3.77. Accessibility of social conveniences positioned fourth with a mean of 3.76 and populace increment with a mean of 3.73 positioned fifth. Openness positioned 6th and building completes positioned seventh with mean of 3.59 and 3.57 separately. Vicinity to work place positioned eight with a mean of 3.34 and cost of convenience positioned 10th with a mean of 3.04. Expansion in customer pay positioned 10th with a mean of 3.03. This finding confirms past examinations Abidoye and Chan (2016), Oloke et al (2017) and Oyedeji (2019) who laid out that the recognized variables influence property estimation because of their effect on property demand. Be that as it may, the past investigations didn't lead observational examinations on the effect of the elements on property demand yet on property estimation. The past examinations just derived the effect of the elements on property demand.

Table 7: Factors influencing housing demand in Lagos Island

Factors	Mean		Ranking
	Statistic	Std. Error	
Proximity to work place	4.24	0.032	1st
Price of accommodation	4.09	0.033	2nd
Space of the accommodation	3.98	0.036	3rd
Building finishes	3.96	0.039	4th
Security	3.9	0.035	5th
Availability of social amenities	3.76	0.042	6th
Accessibility	3.76	0.042	6th
Increase in economic activities	3.33	0.049	8th
Population increase	3.04	0.041	9th
Increase in consumer income	3.03	0.041	10th

Table 7 portray factors impacting housing demand in Lagos Island. Closeness to work place positioned first with a mean of 4.24 and cost of convenience positioned second with a mean of 4.09. Space of convenience positioned third with a mean of 3.96 and Security positioned fifth with a mean of 3.90. Accessibility of social conveniences and Openness positioned 6th with a mean of 3.76 individually. Expansion in financial exercises positioned eight with a mean of 3.33 and populace increment positioned 10th with a mean of 3.04. Expansion in purchaser's pay positioned 10th with a mean of 3.03. This finding certifies past examinations Abidoye and Chan (2016), Oloke et al (2017) and Oyedeji (2019) who laid out that the recognized elements influence property estimation because of their effect on property demand.

Nonetheless, the past examinations didn't direct exact investigations on the effect of the elements on property demand yet on property estimation. The past examinations just surmised the effect of the variables on property demand.

Conclusion

Housing is a fundamental fixing which makes human exercises more straightforward without supposition to financial circumstance. Despite this, housing demand pattern is generally novel. All in all, in light of the discoveries introduced over, the nature and pattern of housing demand in Lagos metropolis showed that there are extraordinary changes in demand for a two bedroom flats, three bedrooms level, studio level, two bedrooms level and three bedrooms level. Housing demand pattern changes either vertically or descending in both Lagos Island and Mainland during the period under explored. There were factors which impact housing demand pattern in Lagos metropolis which incorporates: closeness to work place, space of the convenience, building getting done and security cost of convenience factors accessibility of social conveniences, availability and expansion in financial real factors, populace endlessly expansion in shopper pay. This study inferred that many housing were void because of the failure of the financial backers to complete appropriate plausibility appraisal of the place where they need to contribute their scant asset.

Recommendations

Housing financial backers should who needs to put resources into Lagos Metropolis ought to target place where infrastructural offices, for example, tarred street, consistent power supply and sufficient security are available. Planned tenants are searching for place where there is wellbeing of live and properties. Housing building completing is another variable which draws in many tenants in leasing facilities in both Lagos Mainland and Island. Housing financial backers ought to guarantee building completes are moderates and habitable. This will assist with drawing in occupations at a sensible lease.

Housing cost in Lagos Island pushed most planned occupants to Lagos Mainland. Individuals are searching for facilities which have better vicinity to their functioning spot yet lease in Island is costly. This is the justification for why a great many people dealing with Island came to Mainland for convenience. Assuming that the housing financial backers and Estate Surveyors and Valuers rehearsing in Lagos Island can change their lease charged in the area, it will assist with flooding the rate at which individuals demand for convenience.

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URBAN ECOLOGY, CLIMATE CHANGE, AND CHALLENGE OF SUSTAINABLE CITIES IN AFRICA

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ABSTRACT

The transformation of the built environment and changes in urban forms has been taking place in conjunction with the increasing awareness of the impact of human activities and the emergence of the concept of sustainability which is now of international significance and concern. The concept of sustainability emerged in urban design literature in the 1970s. The "Brundtland Report" of 1987, brought the concept of sustainability into the mainstream development discourse. Sustainability has become one of the key elements in the analysis of the growth and spatial expansion of contemporary cities; it will be of utmost importance to establish exactly what is not sustainable about the current urban environment and its attendant contradictions. The impact of global warming and the depletion of the Ozone layer are becoming everyday realities. This paper conducts a systematic review of the literature to achieve its aim. This research paper contributes to enhancing both the theoretical and practical understanding of the global trends in sustainability and climate change and how this affects the built environment in Nigeria, aiding in the maximization of benefits and the mitigation of risks.

Keywords: Ecology, climate change, sustainable environment, liveable city, urban resilience,

INTRODUCTION

The transformation of the built environment and changes in urban forms has been taking place in conjunction with the increasing awareness of the impact of human activities and the emergence of the concept of sustainability which is now of international significance and concern. 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 development discourse (WCED. 1987). Sustainability has become one of the key elements in the analysis of the growth and spatial expansion of contemporary cities; it will be of utmost importance to establish exactly what is not sustainable about the current urban environment and its attendant contradictions (see figure 1). Sustainability means living a life of dignity in harmony with nature. Sustainability indicates renewing resources at a rate equal to or greater than the rate at which they are consumed. Sustainability means living within the resources of the planet without damaging the environment now or in the future. Sustainability also involves creating an economic system that provides for quality of life while renewing the environment and its resources. Creating a world where everyone can have fulfilling lives and enjoy a rich level of well-being within the limits of what nature can provide. It also means taking a long-term view of how our actions affect future generations and making sure we don't deplete resources or cause pollution at rates faster than the earth can renew them.

Figure 1: Sustainable issues impacting on the life in the city

Researchers over time have concluded that the logical implications of the concept of sustainable development are that buildings should be designed to eliminate the need for non-renewable fuels (Strife, 2010; Gladwin, Kennelly, and Krause, 1995). The need to eliminate the use of non-renewable fuel follows two reasons: First, non-renewable fuels (coal, oil, gas, and uranium) are, by definition, not sustainable, once dug up and used; they are gone and not available for use in future generations. Second, the use of fossil fuels as an energy supply has considerable negative environmental impact. The burning of coal, oil, and gas to provide energy results in the release of carbon dioxide into the atmosphere. This carbon dioxide is leading to an alteration in the global climate (Williams, 2007). Leggett, (2004) pointed out that there is no single issue in contemporary human affairs that is of greater importance than the release of carbon dioxide into the atmosphere. The Intergovernmental Panel on Climate Change (IPCC) set up by the United Nations General Assembly in 1988 has stated that carbon dioxide accounts for 55% of the total global warming effect of all the so-called 'greenhouse gases' (Carbon dioxide, CFCs and related gases, methane, and nitrous oxide).

In 2001, the situation had become clearer and the Panel (IPCC) stated: that there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities. IPCC (2014) observed that each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. The period from 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere.

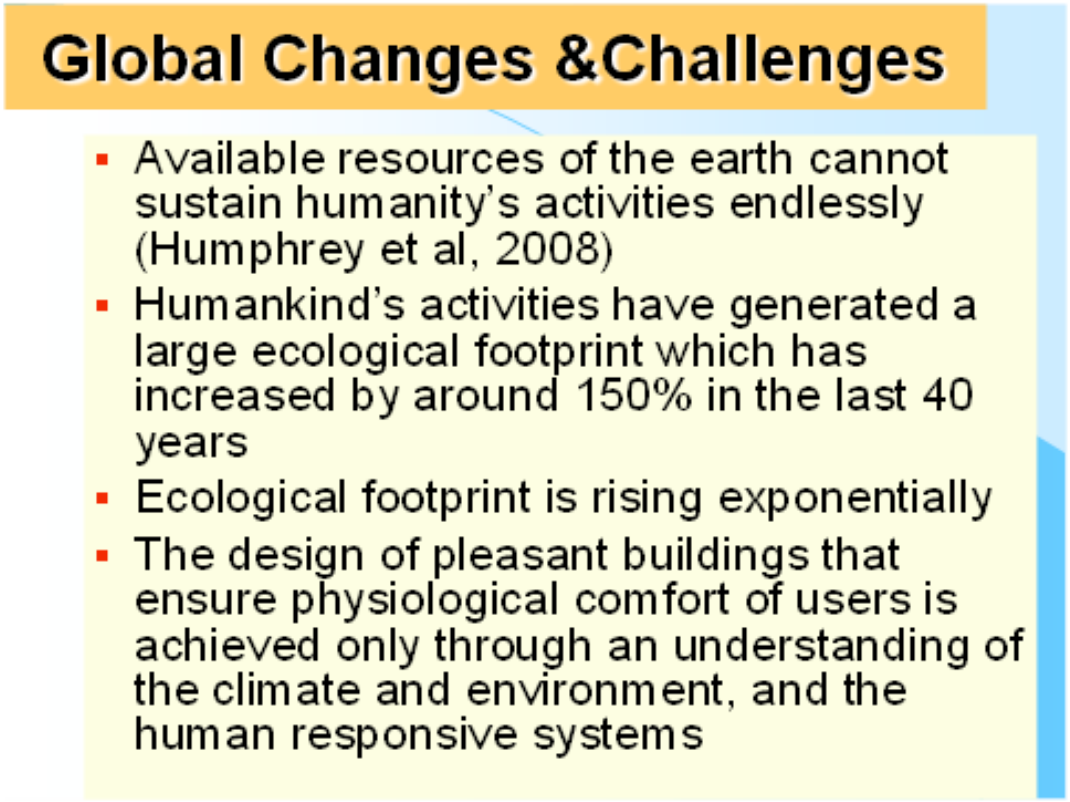

Figure 2: Global changes indicators

The impact of global warming and the depletion of the Ozone layer are becoming everyday realities (see Figures 2 and 3). There has been a consistent rise in sea level forcing inhabitants away from coastlines, rainfall has been increasing slightly on a global average, and in many areas in many areas rain has been falling in shorter but heavier deluges leading to flooding (Ross, 2003; 2004; Sassi, 2006). Changes in the timing of rainfall and runoff have complicated efforts to ensure clean water for the growing population in the developing world and the warming has been facilitating the spread of vector-borne diseases such as malaria and dengue fever. The World Health Organization estimates that in the year 2000 alone, more than 150,000 people died because of direct and indirect climate change impacts (Rotheroe, Keenlysiden, and Coates, 2003; Jucker, 2002; Roberts, 2000; Robertson, 1992). Al Gore stated in a presentation on global warming that won the Oscar in 2006:

"I have learned that beyond death and taxes, there is at least one indisputable fact: Not only does human-caused global warming exist, but it is also growing more and more dangerous, and at a pace that has now made it a planetary emergency."

Recent research emphasizes that there should be no continuous increase in atmospheric carbon dioxide (Advisory Group on Energy and Climate Change, 2010; Adger, Brown, and Tompkins, 2005; Adger and O'Riordan, 2000). Atmospheric carbon dioxide in the northern hemisphere is increasing measurably. How are we going to fulfill a criterion of no increase in atmospheric CO2? Architects and engineers are the groups of people responsible for the design of artifacts that tend to have a prolonged life, since the exploration of fossil fuel, architects have become reliant on mechanical and electrical systems to enable buildings that ignored their natural environment to function (Braungart & McDonough 2006; Bauer, M., M'sle and Schwarz, 2009; Benyus, 1997). More often, architects design buildings abandoning fundamental principles of energy and resource efficiencies while looking to engineers to make these buildings habitable (Guy and Moore, 2005; Steele, 1997; Anderson, 1990; Anderson and Riordan, 1987; Alexander, 1985).

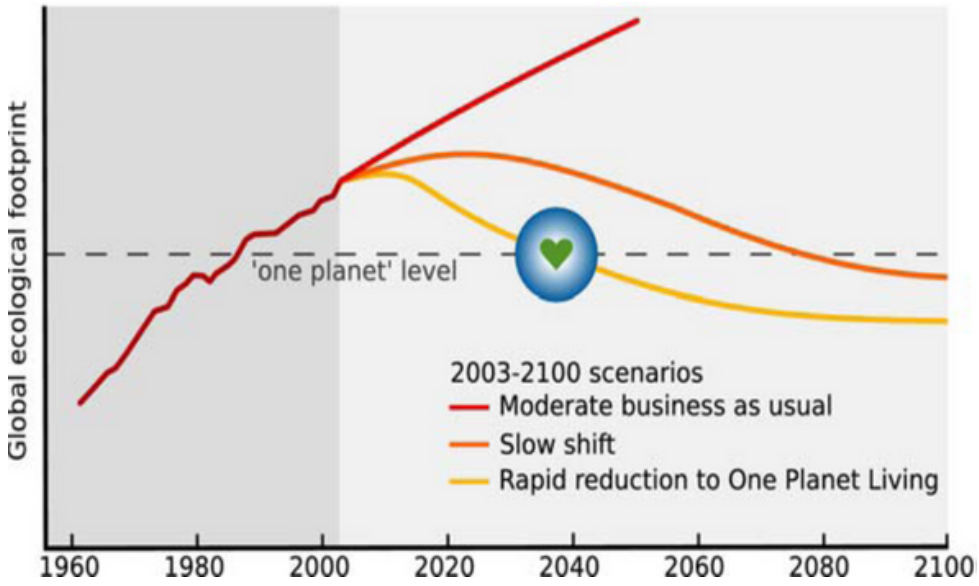

Figure 3: Challenge of Global Climatic Changes. Source: Development Group One Planet Action Plan April 2009/10

Modern Buildings are responsible for more than 40% of global energy consumption and one-third of global greenhouse gas emissions, in both the developed and developing world (UNEP SBCI, 2010; Braungart & McDonough, 1992). Housing, Food, and transport accounted for more than 30 billion vehicle kilometres in 2002 of which 82 percent were in the UK. It accounted for 25 percent of all HGV kilometres in the UK and produced 19 million tons of carbon dioxide, of which 10 million tons were emitted in the UK; almost all from road transport. This represented 1.8 percent of the total annual UK CO2 emissions and 8.7 percent of the total emissions of the UK road sector.

Minimising Climatic Changes and Sustainable Building Solutions

The climatic condition in the southwestern part of Nigeria is characterized by high temperatures and humidity for most of the year. Observation reveals that room conditions during the day are usually unsatisfactory. Hence, most occupants experience thermal displeasure requiring cooling to achieve thermal comfort (Capra, 2005; Drake, 2007; Feireiss, and Feireiss, 2008; Duelli, and Obrist, 2003). But Nigerian designers have often resolved to mechanical means of making internal spaces habitable relying on the erratic and epileptic power supply or more often resolved to self-generation of electricity by the use of fossil-fueled generators thereby compounding issues of climate change (Babatunde and Shuaibu, 2010; Aston-Jones, 1998). The pattern of household energy consumption indicates the state of welfare and economic development of an individual and of a particular country (Arowosoge & Faleyimu, 2011; Shrivastava, 1995 Boukary, 2006; Bruce, Perez Padilla and Albalak, 2000). Building Industry is a major contributor to global atmospheric changes and the earth's ecological footprint, based on the three planet model (see figure 4).

Figure 4: 3 planet model of the unsustainable ecological footprint in the world today

As Nigeria began the pursuit of import-substitution industrialization which has led to the establishment of many light industries, such as food processing, textiles, and fabrication of metal and plastic wares in the !960s, farms and forest reserves began to disappear. Industrialization and deforestation swept away farmlands. Kohlin (2008) argues that while the use of woody biomass as fuel and as construction materials contributes to deforestation and forest degradation, the use of dung as fuel implies that it might not be available for use as fertilizer – thus contributing to land degradation and consequent reduction in agricultural productivity. This view was supported by Sambo (2009), who argues that sourcing fuel wood for domestic and commercial uses is a major cause of desertification in the arid-zone states and erosion in the southern part of Nigeria.

Climate Change and the Challenge of Planning Sustainable Cities

Climate change is one of the greatest challenges facing human society in the 21st century.

A major consequence of climate change is global warming. Global warming is the average increase in the temperature of the atmosphere near the surface of the earth which can contribute to an increase in global climate patterns (such as glacier melting; rising temperature in drought-prone areas, sea level rise, and coral bleaching along the coastlines). Housing, Food, and transport accounted for more than 30 billion vehicle kilometres in 2002 of which 82 percent were in the UK. In Africa, the causes and consequences of climate change are seen in the increased burning of fossil, deforestation, reforestation (fauna & Flora relations/nexus), rapid urbanization, and construction activities. Other factors include (natural factors – changes in the earth orbits and the intensity of the sun; changes in ocean circulation, and volcanic eruptions (earthquakes, earth tremors, landslides, and floods). The challenge of planning sustainable cities lies in considering the following:

1.) Tackling the city dynamics, the exchange of energy and matter, and the function and maintenance of ordered structures directly or indirectly, supplied and maintained by natural systems.

2.) Developing the city's intellectual economy to deepen the ethos of sustainability. This will include learning to keep the balance as well as increase the pace of development by making our building smart and encouraging intelligent building and design.

3.) Addressing socio-cultural concerns in development and locating our place in the globalized world.

4.) Encouraging the use of local building materials as much as possible in mega projects. This calls for the rediscovery of our design roots and special contributions of Indigenous architecture, in terms of space organisation, use of earth materials and ceramics ware.

5.) Reduction in the importation of building products and essentials from abroad thereby reducing carbon footprints or mileage.

6.) Implements lessons from best practices in the design of sustainable communities and integration. This can be done by integrating regional and municipal planning regulations in a way to responds to the sustenance of the city and rural towns.

7.) Encourage the principles of stewardship in the design and construction of sustainable cities in Nigeria.

Conclusion

One of the basic principles of sustainable development is that it should work with and not against nature. It should aim to achieve the maximum use of ambient energy sources in the creation of internal environments that are, as far as possible, naturally sustained. It is important to realize that to achieve a sustainable architecture, an integrated approach to design is required and appropriate design strategies must be formulated at the outset. Sustainable architecture should be logical in its use of technology. For a city to be sustainable, it must respond to the social and economic conditions of the context within which it exists. It also needs to respond to possible future changes in its use which may happen due to different future socio-economic conditions. The built environment therefore should be flexible and adaptable. The use of building materials sourced locally can help lessen the environmental burdens. This would considerably cut transportation costs and provide support to the local economies. At the design stage, the architect should seek to minimize the negative environmental impact of the building by enhancing efficiency and moderation in the use of materials energy and development of space Understanding of current discussions about green architecture, climate-responsive architecture, and high-performance architecture. Learning to apply principles of sustainability that include, the use of renewable materials, design for the lifecycle of a building, and 'cradle to cradle' design from planning to disposal.

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WEB RESOURCES

1.http://www.earthcharterinaction.org/invent/details.php?id=251

2. http://www.littleearthcharter.org/LEC_teachers.html

3. Council for Sustainable Development, Hong Kong

http://www.susdev.gov.hk/html/en/council/index.htm

4. United Nations - Division for Sustainable Development

http://www.un.org/esa/dsd/index.shtml

5. UNESCO – Education for Sustainable Development

http://www.unesco.org/en/esd/

6. The Ecological Footprint (4:59)

www.youtube.com/watch?v=94tYMWz_Ia4

7. Janine Benyus Shares Nature's Design (24:00) www.ted.com/talks/lang/eng/janine_benyus_shares_nature_s_designs.html

8. Al Gore's New Thinking on the Climate Crisis (27:51) www.ted.com/index.php/talks/al_gore_s_new_thinking_on_he_climate_crisis.html

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GEO-SPATIAL ANALYSIS OF WATER BORNE DISEASES IN AKURE SOUTH LOCAL GOVERNMENT AREA, NIGERIA

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ABSTRACT

Waterborne diseases continue to pose a significant challenge to global public health and are a prominent environmental issue, with outbreaks frequently occurring in various African nations. It is on this premise, this article investigates the geo-spatial analysis of waterborne diseases in Akure South LGA, Nigeria. A multi-stage sampling technique was used for data collection, while a secondary data from relevant healthcare facilities was also used for spatial analysis. The findings revealed dominance of waterborne diseases in the urban core area and the rural settlements as a result of poor hygiene practices, inadequate and unsafe water usage, deficient environmental cleanliness including uncontrolled discharge of wastewater, improper methods of waste disposal, utilizing substandard pit latrines, and non-adherence of residents to the WHO standard of 30 meters' distance between the septic tanks and sources of water. Conversely, medical records concerning waterborne diseases in the rural settlements indicated minimal occurrences. This discrepancy may be correlated with the utilization of alternative treatment methods for diseases leading to decreased patronages of healthcare facilities. The improvement of access to qualitative environment, implementation of appropriate sanitation facilities and effective solid waste management methods, establishment of an agency to periodically monitor the location of water sources in relation to septic tanks, are anticipated to remediate waterborne diseases in the study area.

Ke**yword**s: Geo-spatial, Waterborne, Disease, Settlements

INTRODUCTION

Water holds great significance for human existence and the maintenance of public well-being. Nevertheless, a considerable portion of the global populace encounters challenges in obtaining sufficient and uncontaminated drinking water. Presently, the issue of water scarcity poses a widespread dilemma impacting over 40% of the overall global population (Nyagwencha, 2017). Projections indicate that approximately 3 billion individuals will confront a scarcity of fresh water resources by the year 2025, thereby residing in environments characterized by water stress (Tran, 2016). Furthermore, as outlined by the World Health Organization (2016), diseases and fatalities associated with water persist as a substantial burden on a global scale, affecting nations at various stages of development. Despite the prevalence of such cases in less industrialized nations, outbreaks of waterborne illnesses also afflict developed countries.

Waterborne diseases continue to be major contributors to human sickness and death on a global scale. The preventability of over 95% of waterborne diseases has been highlighted by UNICEF (2015). Both developed and developing nations are impacted by diseases and fatalities related to water. The worldwide prevalence of waterborne diseases presents a significant challenge, particularly in less developed regions. Waterborne diseases are characterized by the presence of pathogenic microorganisms like bacteria, protozoa, and viruses that are transmitted through water. Delays in implementing preventive measures against these pathogens can result in negative health outcomes for individuals, including disability, illness, disorders, or even death (Landrigan et al, 2020). The transmission of such pathogens commonly occurs when contaminated water is used for drinking, food preparation, and laundry (WHO, 2022). Nevertheless, the majority of waterborne infections are transmitted through the fecal-oral route, where human feces are ingested through the consumption of contaminated water or food, often due to inadequate sewage systems and sanitation practices. Waterborne pathogens, which contribute to the prevalence of waterborne diseases, have a substantial impact on public health by increasing mortality and morbidity rates (Ferreira et al, 2021). The consequences of waterborne diseases can be fatal and can also lead to a decline in individuals' socioeconomic standing.

Currently, the global scenario concerning water and health exhibits a prominent local dimension, as 1.1 billion individuals still lack access to enhanced drinking water sources and 2.4 billion to sufficient sanitation. There exists a substantial body of evidence indicating that diseases associated with water, sanitation, and hygiene lead to 2.2 million fatalities annually and a yearly toll of 8.2 million disability-adjusted life years (Kiagho et al, 2016). The magnitude of this issue is notably more pronounced in developing nations compared to developed ones. Inadequate sanitation, lack of safe drinking water, and substandard hygiene practices constitute significant contributory factors to the prevalence of waterborne diseases. Furthermore, the World Health Organization (2022) approximates that 6.3% of all mortalities stem from restricted availability of safe drinking water, improved sanitation facilities, appropriate hygiene behaviors, and effective water management strategies aimed at curbing the spread of waterborne illnesses. In Africa, the proportion of the population with proper sanitation facilities is estimated to be only 22% (WHO, 2020).). Furthermore, 28% of individuals in sub-Saharan Africa practice open defecation, while an additional 23% utilize inadequate sanitation facilities that do not ensure hygienic separation of human excreta from human contact (Manetu & Karanja, 2021).

). In addition, in instances where clean water and flush toilets are accessible in Africa, the lack of hygiene awareness persists, leading to the occurrence of waterborne disease outbreaks. The majority of waterborne diseases are commonly spread through the fecal-oral route (Farrow et al, 2019), which occurs when individuals ingest human fecal material by consuming contaminated water or food, primarily due to poor sewage management and improper sanitation practices. Within rural African areas, water contamination by fecal matter is a result of runoff from nearby bushes and forests, which are utilized as defecation areas by rural residents. Consequently, a more profound comprehension of the occurrence of waterborne diseases may potentially contribute to morbidity and mortality rates in Nigeria and Africa. Accordingly, this research aimed at examining the geo-spatial analysis of waterborne diseases in Akure South Local Government Area, Nigeria.

LITERATURE REVIEW

2.1 Waterborne Disease Contributing Factors

Outbreaks of waterborne diseases are more prevalent in regions with low standards of water quality, sanitation, and personal hygiene (Golicha et al, 2018). As noted by Christian (2017), waterborne illnesses are largely linked to the inadequate availability of clean and potable water, deficient sanitation facilities, and poor hygiene practices. Studies have shown that over half of acute illnesses can be attributed to issues related to water quality, sanitation, and hygiene across various age demographics. The incidence of water-related diseases is frequently documented in economically disadvantaged nations where the provision of safe water, adequate sanitation, and proper hygiene practices falls below optimal levels in comparison to more developed countries with greater water resources.

Several studies have highlighted the importance of water quality, sanitation, and hygiene in elucidating the prevalence of waterborne diseases (Kotsiou, 2017; Ogbeyi, 2017; Jeandron, 2018; Collins, 2021; WHO, 2021). For example, a study conducted in Ile-Ife, Nigeria aimed to evaluate and delineate the causal factors contributing to the spread of waterborne diseases (Emmanuel, 2012) discovered that a majority of documented cases of such diseases stemmed from environmental variables like inadequate environmental hygiene, haphazard waste disposal practices, the impact of longstanding communal conflicts, low-lying topography, and waterlogged areas fostering extensive microbial proliferation, elevated water hardness, and increased pH levels of the wells and borehole water within the area.

Transmission of Waterborne Disease

Contaminated water sources function as the principal reservoir for a variety of contaminants, encompassing bacteria, viruses, and chemicals (Murei et al, 2022). As illustrated in Figure 1, the entry of these contaminants into the human body can occur through ingestion, inhalation, or contact with contaminated water. Deficient sanitation and substandard hygiene practices play a role in facilitating the transmission of waterborne diseases. Upon entering the body, these pathogens have the potential to induce a spectrum of illnesses, such as gastroenteritis, cholera, hepatitis, and parasitic infections (Shayo et al, 2023). Essential measures for prevention and control, such as the provision of clean drinking water, appropriate sanitation infrastructures, education regarding hygiene practices, and the utilization of water treatment methods like filtration, are imperative in diminishing the occurrence and consequences of

waterborne diseases. By tackling these determinants, it is feasible to uphold public health and foster a more secure and healthier environment. Moreover, the failure of sewage systems and issues related to overpopulation contribute to the heightened risk of transmitting infectious diseases. This can occur either through the proliferation of bacteria in the surroundings or via the consumption of contaminated drinking water (Mwambete & Tairo, 2018). While access to clean water is somewhat regulated in urban regions of developing nations, the situation remains poor or completely absent in rural areas of these countries (Murei et al, 2022). Rural areas notably exhibit approximately 49% of unimproved water sources, including hand-dug wells, natural springs, and various surface water sources. Globally, cholera is a prevalent disease responsible for 4% of all fatalities and 5% of disability cases. As indicated by the World Health Organization (2022), infections are widespread in low- and middle-income countries with inadequate sanitation and hygiene practices, with infection rates being lower in high-income countries where proper sanitary and hygiene standards are upheld.

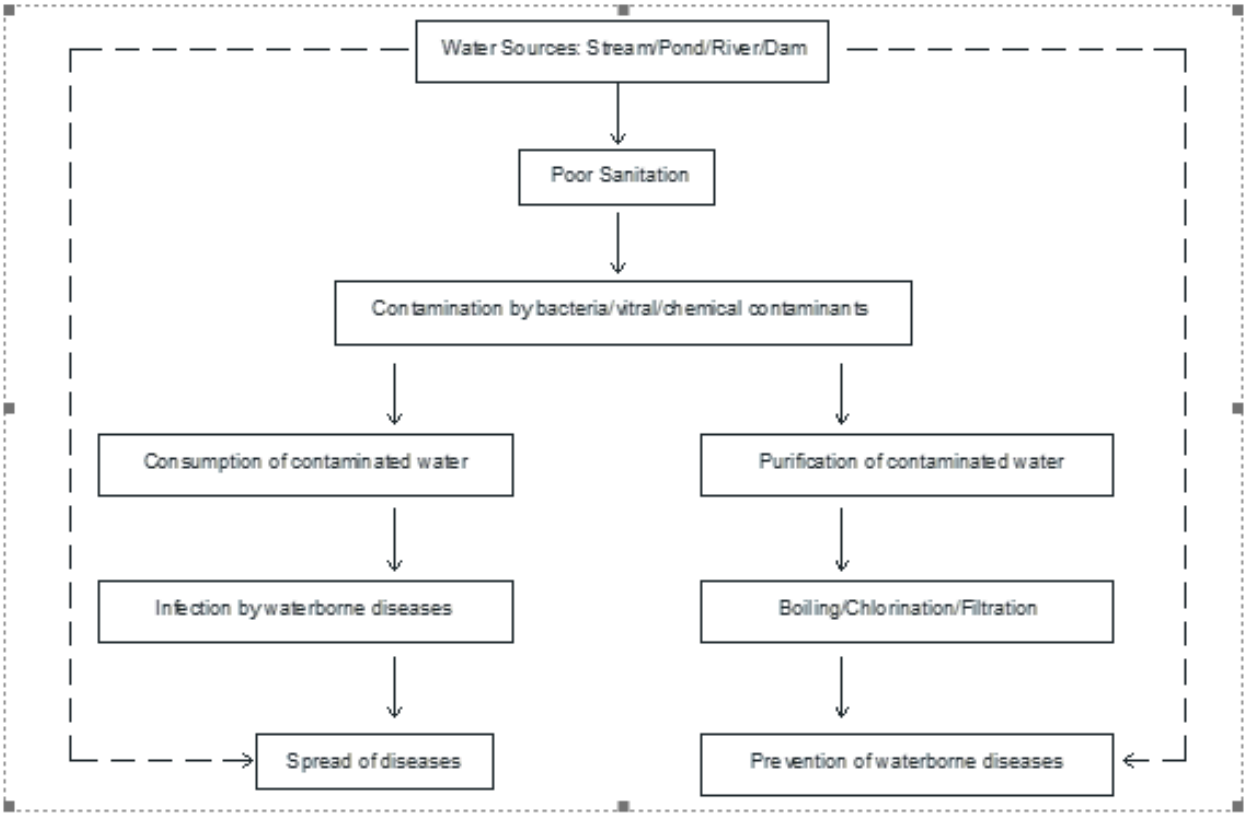

Figure 1: Schematic presentation of waterborne diseases transmission in human being

Source: Adopted from Shayo et al, 2023 pp 3

Spatial Analysis in Epidemiology

Over the past two decades, there has been a significant increase in the utilization of spatial analysis within the domain of epidemiological surveillance and research, exhibiting an exponential trend. The use of geographic information system (GIS) technologies has the potential to contribute to the comprehension of the dynamics of disease incidence and distribution.

Consequently, this can aid in the identification of high-risk areas or locations (Ahmad et al, 2017). Thus, the implementation of geographic information technologies can effectively support the provision of health surveillance services (Joseph et al, 2018). According to Paez et al (2021), spatial epidemiology, a subfield of epidemiology, is dedicated to the exploration of spatial patterns in health outcomes, showcasing a close connection to health geography. More specifically, spatial epidemiology concerns itself with the characterization and analysis of disease and its geographic disparities. Using geographic information systems and spatial analysis technology, spatial epidemiology aims to delineate and scrutinize human diseases, encompassing the spatial distribution characteristics of health and hygiene occurrences, as well as the regularity of alterations and advancements.

3. Materials and Methods

3.1 The Study Area

Akure South Local Government Area is located in Ondo State in the South-Western geopolitical zone of Nigeria. It occupies a land area of 37,134 hectares (35sq.km). It lies between latitude 7^0 17′ 0″ and 7^0 15′ 0″ North on the Equator and longitude 5^0 15' 42″ and 5^0 18′ 42″ East of the Greenwich Meridian; it is about 370m above the sea level (Macmillan, 2006). The study area is bounded by Owo Local Government Area in the East, Akure North and Ifedore Local Government Areas to the North, Ile-Oluji/Okeigbo Local Government Area in the West and Idanre Local Government in the South (Figure 2).

Figure 1: Ondo State in the National Context

Source: Ministry of Physical Planning Urban Development, Ondo State, 2023

Figure 2: Akure South LGA

Figure 1: Ondo State in the National Context

Source: Ministry of Physical Planning Urban Development, Ondo State, 2023

Figure 2: Akure South LGA

Akure South has a population of about 360,268 (National Population Commission, 2006). Using a 3.77% projection rate, it is expected that by 2023, the city population would have risen to about 744,00. The urban core which happens to be the oldest residential area of the city, consists of the city's oldest structures and is bounded by Oba Adesida Road to the North, Oke-Aro Road to the West and Hospital Road to the East.

3.2 Research method

A multi-stage sampling technique was used. The initial stage encompassed the purposeful selection of one local government area (LGA) from the six LGAs present in Ondo Central. Akure South LGA was selected based on the premise of greater number of healthcare facilities and the most urbanized local government area within Ondo Central Senatorial Districts. Akure South LGA consist of 9 urban political wards, 50% of it was selected namely: Gbogi/Isinkan I, Odopetu, Ijomu/Obanla, Oshodi/Isolo. The selected 4 urban areas comprise of 38,606 household heads. Also, 10% of the 40 rural settlements were randomly selected making 4 rural settlements with 2,066 household heads. This according to NPC, (2006), settlements containing a population exceeding 20,000 individuals are categorized as urban, whereas those with a population below 20,000 are designated as rural settlements. In all, 1.5% of the total household heads in both urban and rural areas consisting of 579 and 31 household heads respectively were interviewed using systematic random sampling techniques. This was in order to reduce the population of the identified urban and rural areas to a manageable size and to capture the interest of the population of the different residential areas. However, the first residential building with household head in each settlement was randomly selected, and subsequently, every 50th residential building in the selected settlements was sampled for the study (Table 1).

Table 1: Settlements and number of household heads selected for interview in the study area

LGA (i)	Settlement Category (ii)	No. of Settlement (iii)	Selected Urban Settleme (50% of i (iv)	Selected Rural Settlement (10%of iii) (v)	Househo Populati (vi)	Total No of House hold hea (vii)	Sample Size (1.5%of vii) (viii)
Akure South	**Urban**	9	4		193,030	38,606	579
	Rural	40		4	10,330	2,066	31
TOTAL		49	9		203,360	40,672	610

Source: NPC, 2006; Authors' compilation, 2024

As specified in Table1, a total of 610 individuals in charge of households were subjected to interviews. However, only 578 surveys were collected due to the reluctance of certain participants to reveal the health condition of their families, particularly when the household head was unavoidably absent. Additionally, some individuals perceive such disclosure as taboo and contrary to their beliefs and traditions.

Secondary data on waterborne diseases in the study area were sourced from public and private healthcare facilities such as: UNIMED Teaching Hospital, Mother and Child Hospital, Comprehensive Health Centres, Basic Health Centres and other private owned healthcare facilities among others were utilized. Since the minimum sample size for spatial analysis is 30 (Moran, 1950), therefore, 64 urban and rural residential neighbourhoods were randomly selected for spatial analyses. The selected residential neighbourhoods were used as the input feature class, while the number of waterborne diseases in each residential settlement within the study area during the year under review (2023) serves as the input field for the analyses. For the data analysis, a geospatial tool within the ArcGIS was used to conduct spatial analysis on the data acquired.

4. Results and discussion

4.1 Distance of sources of water to septic tanks

The examination of Table 2 discloses the distance between the sources of water and the septic tanks. In the urban areas of Akure South LGA, the analysis shows that 66.7% had a distance below 30 meters, while 33.3% revealed a distance above 30 meters. Similarly, in the rural areas, 31.5% had a distance below 30 meters and 64.5% revealed a distance above 30 meters. This indicates that 65.1% of the respondents in Akure South LGA did not comply with the WHO recommended standards of 30 meters between sources of water and the septic tanks. The reconnaissance survey conducted in the study areas revealed that the fragmented nature of individual land/plot sizes could impact the proximity of septic tanks to boreholes/hand dug wells (Figure 5). Some boreholes and hand dug wells were located in the study areas without prior investigation to determine their proximity to sources of pollution. This exposes such boreholes and hand dug wells to contamination and increases the risk of disease transmission. The above-mentioned discoveries provide backing to the claim posited by Ugbebor and Ntesat (2022) that water sourced from boreholes and manually excavated wells has the potential to become polluted.

Table 2: Distance of septic tanks to sources of water in the study area

Akure South	Below 30metres	Above 30metres	Total
Urban	365 (66.7%)	182 (33.3%)	**547 (100%)**
Rural	11 (31.5%)	20 (64.5%)	**31 (100%)**
Total	**376 (65.1%)**	**202 (34.9%)**	**578 (100%)**

Source: Author's compilation, 2024

Management of wastewater in the study area

As revealed in Table 3, the management of wastewater in the study areas involved three distinct components: soak-away pits, drains, and open spills. In the urban areas of Akure South LGA, the management of wastewater reveals: soak-away pits accounted for 40.8%, drains (11.3%), and open spills constituted 47.9%. In the rural areas of Akure South LGA, the distribution is as follows: soak-away pits (9.7%), drains (25.8%), and open spills (64.5%). It is evident that the open spills method of wastewater management exhibits dominance in the study area. It is worth noting that the open spills of wastewater pose a significant risk to human health in the study area. Improper disposal of wastewater from bathrooms, laundries, and kitchens results in foul odors, unsanitary environments and creates breeding grounds bacterial contaminants which could cause waterborne diseases (Figure 4).

Table 3: Management of wastewater in the study area

Akure South	Soak-away pit	Drains	Open spills	Total
Urban	223 (40.8%)	62 (11.3%)	262 (47.9%)	**547 (100%)**
Rural	3 (9.7%)	8 (25.8%)	20 (64.5%)	**31 (100%)**
Total	**226 (39.1%)**	**70 (12.1%)**	**282 (48.8%)**	**578 (100%)**

Source: Author's compilation, 2024

Figure 4: Open spills of wastewater at Gbogi, Akure South LGA

Mode of solid waste disposal

The results presented in Table 4 demonstrate that in Akure South LGA, the method utilized for solid waste disposal in the urban areas reveals that open dumping (29.6%), open burning and incineration methods (47.9%), and waste collectors (22.5%). In the rural areas, open dumping (61.3%), open burning and incineration methods (38.7%), and waste collectors (0.0%). The results indicate that 47.436.5% of the respondents in both urban and rural areas practice open dump method of disposing their solid waste. The physical planning implications of this behavior on the environment is that these waste dumps undergo physical and chemical reactions under the intense heat of the sun, decomposing and posing the risk of pollution to the ecosystem. Also, water sources in close proximity to such waste dump sites easily become contaminated, leading to waterborne disease epidemics such as cholera among others

Table 4: Mode of solid waste disposal in the study area

Akure South	Open dump	Open burning/incineration	Waste collector	Total
Urban	192 (35.1%)	232 (42.4%)	123 (22.5%)	**547 (100%)**
Rural	19 (61.3%)	12 (38.7%)	0 (0.0%)	**31 (100%)**
Total	**211 (36.5%)**	**244 (42.2%)**	**123 (21.3%)**	**578 (100%)**

Source: Author's compilation, 2024

Types of toilet facilities use in the study area

The findings from Table 5 reveal the various types of toilet facilities. In the urban area of Akure South LGA, respondents reveal that the improved sources of toilet facilities include flush toilets (33.6%) and ventilated improved pit latrines (9.9%), while the unimproved toilet facilities consist of pit latrines without slabs (52.7%) and open defecation (3.8%). However, in rural areas, the improved toilet facilities are flush toilets (19.4%) and ventilated improved pit latrines (9.7%), while the unimproved toilet facilities are pit latrines without slabs (41.9%) and open defecation (29.0%). It is evident in the study area that the highest respondents 52.1% rely on unimproved pit latrines (Figure 5). Many of the pit latrines discovered exhibit inadequate maintenance, characterized by exposed manholes and disorganized surroundings that have the potential to lure disease-carrying vectors like flies, cockroaches, and rodents. Also, some of the septic tanks were in a deteriorated state and poorly constructed. The consequences of these conditions on human health and the environment are significant. During heavy rainfall, there is a risk of excreta flooding from the septic tanks, thus contaminating the environment with pathogens present in the excreta. This can lead to various health risks, including transferable infectious diseases, diarrhoea, typhoid, cholera, and viral infections.

Mode of solid waste disposal

The results presented in Table 4 demonstrate that in Akure South LGA, the method utilized for solid waste disposal in the urban areas reveals that open dumping (29.6%), open burning and incineration methods (47.9%), and waste collectors (22.5%). In the rural areas, open dumping (61.3%), open burning and incineration methods (38.7%), and waste collectors (0.0%). The results indicate that 47.436.5% of the respondents in both urban and rural areas practice open dump method of disposing their solid waste. The physical planning implications of this behavior on the environment is that these waste dumps undergo physical and chemical reactions under the intense heat of the sun, decomposing and posing the risk of pollution to the ecosystem. Also, water sources in close proximity to such waste dump sites easily become contaminated, leading to waterborne disease epidemics such as cholera among others

Table 5: Improved and unimproved categorization of toilet facilities in the study area

AkureSouth	Improved sources		Unimproved sources		
	Flush toilet	Ventilated improved pit latrine (VIP)	Pit latrine without slab	Open Defecation	Total
Urban	184 (33.6%)	54 (9.9%)	288 (52.7%)	21 (3.8%)	**547 (100%)**
Rural	6 (19.4%)	3 (9.7%)	13 (41.9%)	9 (29.0%)	**31 (100%)**
Total	**190 (32.8%)**	**57 (9.9%)**	**301 (52.1%)**	**30 (5.2%)**	**578 (100%)**

Source: Author's compilation, 2024

Figure 5: A poorly constructed pit latrine and bathroom at Gbogi area, Akure South LGA

Sources of water in the study areas

The data on water sources (improved and unimproved) were presented in Table 6. In Akure South LGA, the improved sources included protected surface water (0.0%), protected hand dug well (20.7%), borehole (7.7%), pipe borne water (2.4%), and rainwater (0.9%). The unimproved water sources were unprotected hand dug wells (68.3%) and unprotected surface water (0.0%). Similarly, in the rural areas, the identified sources were protected surface water (0.0%), protected hand dug well (9.7%), borehole (6.4%), pipe borne water (3.2%), and rainwater (9.7%). The unimproved water sources included unprotected hand dug wells (51.6%) and unprotected surface water (19.4%). It is evident that the highest percentage 67.5% of respondents relied on unprotected hand dug wells (Figure 6).

It was observed that some hand dug wells were not adequately managed and maintained in a hygienic manner. These hand dug wells were left uncovered, while various materials were used to extract water from it. This practice not only contributes to water contamination but also serves as a potential route for the transmission of waterborne diseases.Numerous investigations have documented that approximately 63% of individuals residing in both urban and rural areas in Sub-Saharan Africa are deprived of the opportunity to avail themselves of enhanced water facilities (Ndaw, 2020; Popoola, 2020).

Table 6: Sources of drinking water by improved and unimproved categorization in the study area

	Improved Source					Unimproved Source		
Akure South	**Protected SW**	**Protected HDW**	**Borehole**	**Pipe borne water**	**Rain**	**HDW**	**surface water**	**Total**
Urban	0 (0.0%)	113 (20.7%)	42 (7.7%)	13 (2.4%)	5 (0.9%)	374 (68.3%)	0 (0.0%)	**547 (100%)**
Rural	0 (0.0%)	3 (9.7%)	2 (6.4%)	1 (3.2%)	3 (9.7%)	16 (51.6%)	6 (19.4%)	**31 (100%)**
Total	**0 (0.0%)**	**116 (20.1%)**	**44 (7.6%)**	**14 (2.4%)**	**8 (1.4%)**	**390 (67.5%)**	**6 (1.0%)**	**578 (100%)**

Source: Author's compilation, 2024

Figure 6: An unprotected hand dug well beside unimproved pit latrine at Cash Road Area, Akure South LGA

Pattern of waterborne diseases (malaria cases) in Akure South LGA

The spatial distribution of diseases is often characterized by the presence of spatial patterns, which possess the capability to prognosticate the spatial transmission dynamics. These spatial patterns serve as indicators of broader epidemic trends at which diseases propagate. Hence, this particular section undertakes analyses of the pattern and spread of waterborne diseases with focus on malaria and cholera cases in the study areas.

In the study areas, malaria emerges as the primary prevalent disease spanning the entirety 64 urban and rural residential areas. The results obtained from this study (Figure 7), reveal the predominance of malaria within the urban core residential areas. The quarters identified for the highest occurrences of malaria were situated within the densely populated urban residential areas of Irowo, Ijomu, and Ayedun, where the numbers ranged from 385 to 472 cases per year. Other residential areas, including Oke-Ijebu, Gbogi, and Isolo, are also located within the high-density urban residential areas, where they annually reported between 297 and 384 cases of malaria. Additional high-density residential areas such as Apatapiti, Okuta-Elerinla, Leo, Oke-Aro, Uro, and Ijoka witnessed an annual range of 208 to 296 cases of malaria. The occurrence rate of malaria is comparatively lower in rural residential areas characterized by medium and low population densities. . In areas with medium population density such as Awule, Ipinsa, Oda, Kajola, Ilekun, Oluwatuyi, Oshinle, and several others, the yearly number of malaria cases ranged from 120 to 207, while in Alagbaka and Ijapo, malaria cases ranged between 0 and 119 annually.

In contrast, the incidences of malaria in rural residential areas with low population density like Aponmu, Ita-Oniyan, Ilere, Onigari, Fabunmi, Oke-Odu, and others was found to be very low, with a recorded annual range of 0 to 119 cases. The findings illustrate the heightened occurrence of malaria in urban residential core areas characterized by inadequate environmental management like poor waste disposal methods, and inefficient wastewater management, all of which facilitate waterborne diseases transmission by vectors.

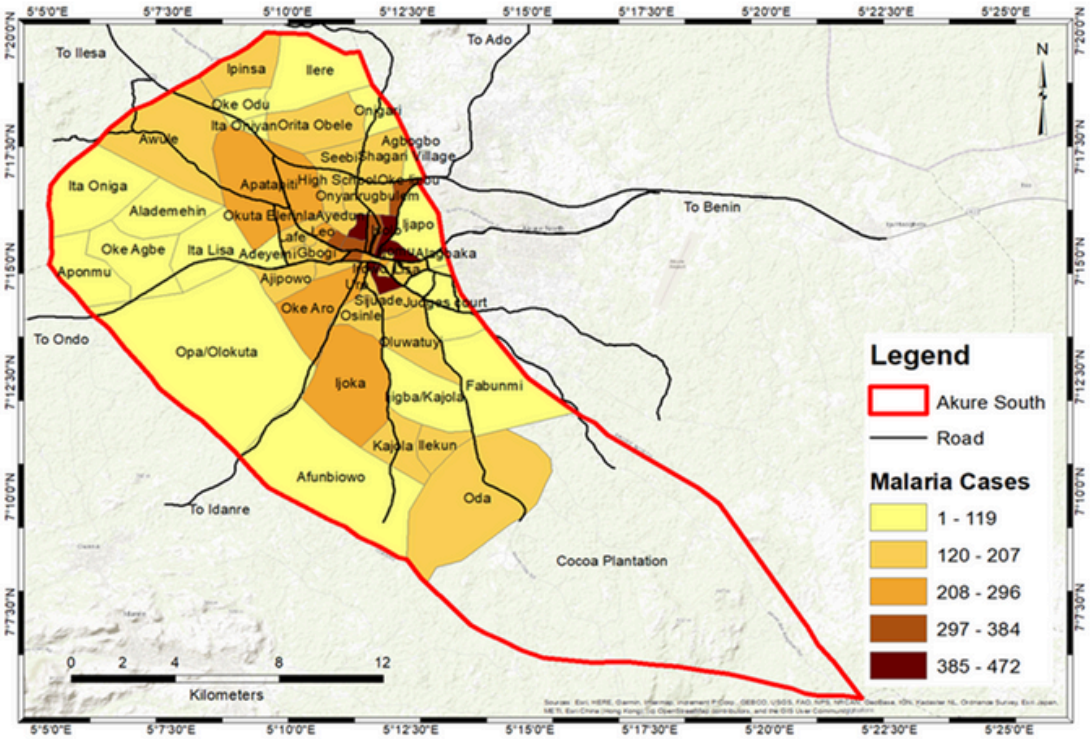

Figure 7: Distribution of malaria cases in Akure South LGA

Pattern of waterborne diseases (cholera cases) in Akure South LGA

The findings from this investigation, as depicted in Figure 8, indicate that cholera is widely prevalent in specific urban residential areas in Akure South LGA. The urban residential areas are characterized by a high concentration of population, namely Oke-Aro, Isolo, and Oke-Ijebu, have the highest incidences of cholera, with an annual range of 54 to 69 cases. Likewise, other residential areas are within the low and medium-density categories, such as Aponmu, Ajipowo, Ijigba/Kajola and Leo respectively, reported annual cases of cholera ranging from 40 to 53. Furthermore, Oda, Ilere, Oke-Agbe, Alademehin, Awule, Oke-Odu, Orita-Obele, Lafe, Gbogi, among others which are additional residential areas with medium-density, recorded 28 to 39 cases of cholera annually. On the contrary, the occurrences of cholera in additional low-density residential areas ranged from 13 to 27 cases, displaying significant occurrences particularly in the rural communities of Ita-Oniga, Ipinsa, Onigari, Ita-Lisa, Fabunmi, and Seebi, as well as Afunbiowo which is considered to be a medium-density residential area. Also, other low and medium-density residential areas, including Opa/Olokuta, Ijapo, and Alagbaka experienced a minimal number of cholera cases, ranging from 0 to 12 per year. These findings demonstrate that cases of cholera are distinctive to both the urban and rural residential areas of Akure

South LGA, but more prevalent in the densely populated urban core residential areas. Also, cholera cases are prevalent in some low-density rural residential areas (Aponmu, Ijigba/Kajola and Ajipowo) as compared to the high-density urban residential areas. These rural residential areas are where cholera is prevalent lack access to improved water sources, primarily depending on unimproved hand-dug wells and surface water, these could serve as transmission pathway of waterborne diseases. Also, environmental factors like unsanitary practices, inadequate waste disposal methods, poverty among residents, lack of environmental awareness, and other variables can influence the transmission pathway of cholera.

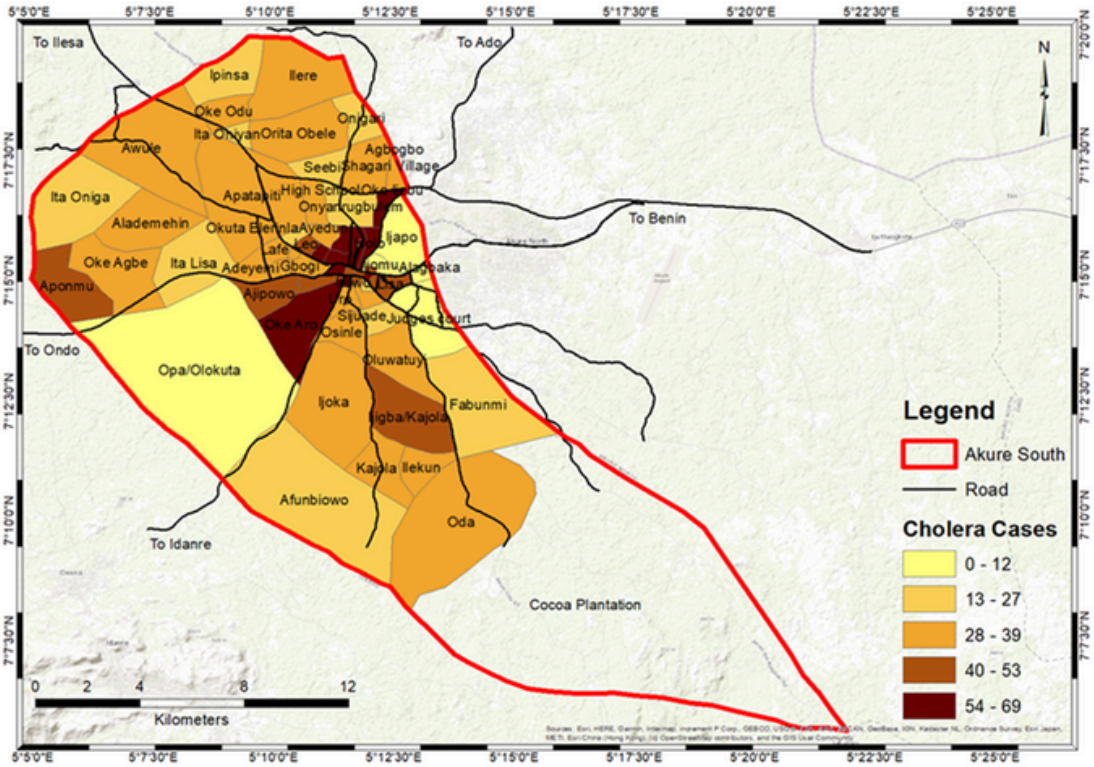

Figure 4a: Distribution of cholera cases in Akure South LGA

In Akure South LGA, the densely populated residential areas, particularly the core area, displayed a notable prevalence of waterborne diseases. This can be attributed to the high population density, which may increase interpersonal contact and facilitate disease transmission by vectors. The prevalence of malaria and cholera were notably high in the urban core residential areas due to inadequate preventive measures, poor hygiene practices, insufficient and unsafe water consumption, as well as inadequate environmental sanitation. The presence of open spills of wastewater from bathrooms, which is a common occurrence in the urban core residential areas, poses a considerable risk to human well-being. Also, it is evident that the utilization of unimproved pit latrines is widespread among urban residents especially in the urban core. Several of these pit latrines were discovered to be poorly maintained, featuring open manholes and littered surroundings. The implications of these conditions on human health and the environment are

significant, potentially leading to various waterborne diseases such as transferable infectious diseases, diarrhea, typhoid, cholera, and malaria, among others. The impoverished urban population resides in underprivileged settings within urban areas, characterized by low income, informal employment, and limited access to public amenities and infrastructure. These conditions explain the prevalence of high numbers of malaria and cholera cases in the central urban residential areas of Akure South LGA.

Findings from Focus Group Discussions (FGDs) with a majority of the rural residents revealed that malaria is a significant health challenge in their communities. The potential cause of malaria is attributed to the rapid increase in the mosquito from stagnant dirty water, buildup of waste, unhygienic environment, close proximity to bodies of water. Also, it is important to highlight that the insufficiency of healthcare facilities and personnel in numerous rural communities played a role in the underutilization of the existing healthcare facilities. However, in the rural settlements with healthcare facilities, the distance travelled and the poor road conditions reduce the patronage of the healthcare facilities. Additionally, the high cost of treatment compared to the income of the rural residents further contributed to the low records on malaria cases in the rural communities.

5.0 Conclusion and Recommendations

Waterborne diseases represent a pressing health issue on a global scale, particularly in regions with restricted access to unpolluted water and sufficient sanitation facilities. The occurrence of waterborne diseases surged in Nigeria in January 2021, with numerous cases and fatalities documented across 33 out of 36 states by January 2022 (NCDC, 2022). Consequently, this research focuses on the geo-spatial assessment of waterborne diseases in Akure South LGA, Nigeria. The results indicate that the majority of waterborne diseases in both urban core and rural areas stem from substandard hygiene practices, inadequate and unsafe water utilization, poor environmental hygiene characterized by uncontrolled wastewater discharge from bathrooms, improper waste disposal techniques, utilization of substandard pit latrines, and failure to adhere to the WHO's recommendation of maintaining a minimum distance of 30 meters between septic tanks and water sources. On the other hand, medical records related to waterborne diseases in rural communities have shown limited occurrences. This disparity could potentially be linked to the adoption of alternative therapeutic approaches for illnesses, resulting in reduced visits to healthcare facilities. Given these results, the following recommendations are proposed: enhancement of access to high-quality environment, implementation of appropriate sanitation facilities and efficient management strategies for solid waste, creation of a regulatory body to regularly oversee the positioning of water sources in proximity to septic tanks, as these measures will aid in addressing waterborne diseases in the study area.

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AN ASSESSMENT OF BUILDING AND LAND USE CHANGE IN IJAPO RESIDENTIAL ESTATE AKURE, NIGERIA.

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ABSTRACT

The conversion or change of use of buildings in cities of the developing nations is often from residential to commercial which mostly affects the functionality and livability of the housing environment resulting in a substandard and unsustainable living atmosphere. This paper assesses the conversion of use of buildings in Ijapo Residential Estate, Akure, Ondo State, Nigeria from 2002 to 2022. Data were collected from both primary and secondary sources. Primary data was annexed through the use of a structured questionnaire. Data from relevant journal articles, textbooks, unpublished theses, mimeographs, internet, the National Population Commission (NPC) and the Ondo State Development and Property Corporation, among others, constituted the secondary sources of data. Out of an estimated total number of households of 3,585, a 10% sample of 358 was adopted as sample size. Data were analyzed using descriptive statistical methods. Empirical analysis shows that about 56 plots of land were converted from residential to mixed uses majorly for personal motive and profit making, Also, 54 plots (7.6%) of mixed uses, not provided at inception, was identified as mixed uses. This paper recommends a periodic public enlightenment program for residents and the general public on the adverse effect of building conversion on the environment in the study area; also, a well-coordinated and intensive enforcement of the Master Plan by the appropriate Planning Agency is canvassed.

K**eywords**: Akure, Building Conversion, Building Use, Ijapo Estate, Housing and Master Plan

INTRODUCTION

Conversion can be defined as a change in function or change in use. Building conversion is a process of adaptation, adjustment or alteration of a building to meet new requirements (AG-Built Environment Consultancy, 2022). Conversion of building use refers to the change in the use of a building from the purpose for which it was originally used or intended to be used (Benedict, Emmanuel, and Samuel, 2016). Change in building use is a global phenomenon occurring over time which could be noticed either on a mild or holistic scale in a particular urban centre (Raharjo, 2005). The current surge in interest in evaluating changes in building usage stems from a concern about the demographic, economic, and environmental elements associated with an urban area's spatial structure (Irwin and Bockstael, 2006). However, the trend of urban growth in developing countries has been on rapid increase with approximately 62 million inhabitants annually requiring about 16 million new accommodation units to be added to meet the existing residential stock (Ujoh, 2011). The issue of building conversion is not a new thing all over the world. This is perhaps why it has become a major problem when development control ministries fail to put an order in place (Jimoh, Omole, and Omosulu, 2013). The conversion of use of buildings in cities of the developing world is often from residential to other uses with the latter having serious impacts or dis-economies on the adjacent residences and their occupants (Angela and Ifeanyi, 2022). Most of the urban residents have resorted to informal businesses which thrive in their thousands in the cities of less developed countries, transforming them into hives of activities as a result of recession-ridden economies (Aluko, 2010). This led to building conversion which can be seen as a change in function or change in use or adjustment and alteration from an existing usage of a building, such as converting a residential building and making it suitable for a hotel which is a commercial use, a church also may be converted into an apartment, an apartment also may be converted into a sachet or bottle water factory to meet new requirement or use (Ademola, 2010). All these businesses are pitched in stiff competition with residential uses for dwindling space in the cities. In Nigeria, evidence abounds in major cities of the country on building conversion in residential areas to other use (Omyebueke, 2006; Jinadu, 2005; Sule, 2008). The rapid pace of urbanization in third-world cities particularly in Nigeria has brought about arbitrary changes in building use which has become evident in most cities to the extent that a piece of land or a building serves many different purposes at the same time thus making it difficult to define a given area as either residential or other uses (Omiunu, 2014). Change in building use has further brought about a new beginning of transformation, change, and new development processes in the built-up urban environment, but such changes make it difficult to define clearly the use for which a particular land is put (Ademola, 2010). Building conversion mostly affects the functionality and livability of the environment leading to a reduction in the standard of living of residents in the area. This paper therefore looks at building conversion in the Ijapo residential estate to examine the level of deviation from the original design and provide empirical-based information that could inform coordinated building use and development in the study area. Specifically, this paper will identify the existing building use pattern within Ijapo Estate; assess the level of building plan deviation on the Ijapo Masterplan; identify and examine the factors responsible for residential building conversion; and assess the effect of building conversion on the existing planning scheme.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

A survey of scholarly sources on building conversion in Nigeria and other developing nations were done for this research as indicated below:

2.1 **Literature Review**: The Great Britain Building Act (2004) viewed change of building as when a building/parcel of land is converted into a new use type which requires modification to certain elements to complement other proximate uses. Tilumanywa, (2013) sees a change in building use as an alteration of residential building use to other uses. (Ogungbemi, 2012) describes building conversion as a particular use that can be changed into other uses, just as land can be changed from farmland to residential use and then later converted for other purposes or other uses. Oluleye (2006) defines change in the use of land/building as any development or use which is different from the use last approved by the planning authority, and he described the material change in use as the physical alteration of existing zoning conforming structure. Nuissl & Siedentop (2020) opined that urbanization is one of the major driving forces behind the formation of today's land use systems, which involves the conversion of land use from non-urban to urban uses. The high incidence of residential conversion is one of the major problems confronting Nigerian cities. However, property owners in most of Nigeria's cities clamor for such conversions of residential buildings to other uses which they see as an avenue for maximizing rents but experts view residential conversion as an aberration to residential stock and alteration to physical planning scheme. Some experts have attributed residential shortages in Nigerian cities to residential conversion, others have blamed it on high rent and inadequate residential supply among others.

The Ijapo residential estate in Akure, Ondo State, Nigeria is a neighborhood that satisfies the normative criteria of being predominantly residential; accessible to quality schools (both public and private); good quality of streets and roads; and homogeneity regarding social class, race and ethnic group (Morris et'al., 1976); these are neighborhood characteristics by which a family evaluates a neighborhood satisfaction. Thus, Lu (1999) contended that neighbourhood satisfaction has been shown to be an important predictor of dwelling satisfaction. Neighbourhood dissatisfaction, however, occurs with regard to distances travelled to school by children, to employment and medical centres and the geographical location of housing estates (Awotona, 1991). Also, accessibility to the public transportation, community and shopping facilities and physical environment variables has been noted as predictors of neighbourhood satisfaction (Ozo, 1990). Mohit and Azim (2012) noted that merely providing housing does not indicate success of housing development and policies, but meeting the actual housing needs, preferences and satisfaction of the residents is crucial to providing adequate and affordable housing for all citizens as stipulated in the constitution. Findings by Ibem et'al (2018) in a study in Ogun State show that residents were most satisfied with the size of main activity areas and privacy in their homes, they were least happy with the economic environment in the estates as around 66% of the residents were dissatisfied with the residential environment in the housing estates. The implication of this is that residential satisfaction does not solely bank on the lodging units but neighbourhood (residential estate) plays an important role at ensuring satisfaction of residents. Alison, et. al. (2002) concluded that although socio-demographic factors were much less important than residential perceptions in helping to predict dissatisfaction, the type of neighbourhood remained a significant independent predictor of dissatisfaction even when residents' views

taken into account. Few studies, however, have examined the relationship between safety from physical accidents (e.g., fire, demolition, traffic accidents, etc.), which might also be very important in housing environments. According to Makinde (2015), residents' subjective evaluations of their living spaces are influenced by personal requirements, expectations, or goals, and their perception of the location's characteristics. This viewpoint is also shared by Lynch and Appleyard (2019), and Aboagye, Nwaoha, & Al-Khafaji (2021).Lawton, et. al. (1984), however, found that safety from crime (e.g., rated risk of crime) was not found to be related to any of the other indices of well-being except for residents' housing satisfaction. Breadvelt et'al (2022) suggests that increasing neighbourhood social cohesion can prevent mental health problems, including depression and anxiety. However, it is unknown whether this is the case for adolescents and young adults. Djebuarni & Al-Abed (2000) observed that the residents of public low-income housing in Sana'a, Yemen, attach great importance to the level of satisfaction with their neighbourhood, particularly, with privacy which reflects the cultural background of Yemeni society. Therefore, it can be deduced that residential satisfaction does not only rely on the dwelling units itself; neighbourhood plays an important role in residential satisfaction (Mohit. & AlKhanbashiRaja, 2014). Therefore, dwelling units (residential) that have been converted to commercial, industrial and mixed uses among others may not offer the desired satisfaction to residents.

2.2 **Theoretical Framework**: Building use conversion actually results in mixed uses which was not originally planned for. A mixed-use building is any structure that serves more than one purpose by hosting a combination of residential, commercial, retail, hotel, parking, medical, entertainment, and/or industrial uses (Cayetano, 2024). The conflicts in the built environment are not only generated by land use but also building use conflicts, such as, the conflict between industrial areas and residential areas in a neighborhood (land use conflict), or between the car repair workshop and the adjacent dental clinics (building use conflict). The conflicts may create inconvenience for building users in terms of environmental pollution. Therefore, these scenarios are in the realization of the principle of highest and best use thus, ascertaining the relevance of the theory to this study. For the purpose of this paper, the Invasion Succession Theory (IST) was adopted. The IST is based on the principle of a particular building use invading an area and dominates it, thereby succeeding the existing building use. This succession process is preceded by "invasion". Barlowe (1978) opined that invasion is the penetration of one use by another owing to economic, social, and cultural deviance between the old and the new which may ultimately lead the invading building use to succeed the old use. He reported further that this phenomenon is usually a result of the characteristics of land resources to move to uses that offer the highest return for the utilization of net income that can accrue to a parcel of land essentially limited. Invasion succession is a common occurrence in Ijapo Estate (the study area). For example, observation reveals that Henry Fajemirokun/Owo Avenue (a street in the study area) which was mainly for residential purposes has given room for the invasion of other uses which now has a domineering effect on the old use (residential. The study by Sui and Zeng (2001), and Xia and Liu (2018) also monitor building use changes, identify driving forces, and map areas experiencing intense building use transformation. Time after time properties have been developed for particular uses only to be redeveloped within a few months or years for other uses that promise a higher net benefit or net return (Barlowe, 1978). There is also the inevitable process of obsolescence and reconstruction. Due to the diversity of human activities, various land uses exist with a particular building use determined by topography, climate (past and present) social and religious, custom,

legislation and legal decisions, demands for goods and services (including varying consumer preferences) and the policy of local and central government in the supply of public utilities and social services (Smits 2019). This practice of invasion and succession results in the highest and best use of land. In Akure, Fawehinmi (2002) observed that shops and offices compete for space, particularly along major transportation routes. However, Ghazali (1999), opines that access to transportation, markets, functional utilities, and business requirements tends to attract new firms to central areas because of the increased cost of doing business out of the Central Business District (CBD) but as these firms mature, they require more space. This development leads to relocation to low-rent areas or causes building use change in the form of property conversion to take place. Also, the existing planning laws have struggled to survive in the face of soaring demand for economic activities but because of the inevitable factor of obsolescence of existing buildings with worth depreciating value, invading prospective economic activities with higher returns succeed existing use and the influence of planning laws thus resulting in property conversion. This is substantiated by Olusina, (2008), that "the conversion of one use to another is due to inadequate enforcement of the existing planning regulations".

3.0 The Study Area

Ijapo Estate is a residential estate located within Akure Metropolis. Akure is a traditional Nigerian city and like other traditional Yoruba towns in the country, it existed long before the advent of British colonial rule in Nigeria (Fasakin, 2018). Akure situates in the South Western part of Nigeria. Akure is situated between Latitude 5^0 14^l and 5^0 15^l East of the Greenwich Meridien Longitude 7^0 17^l North of the Equator. Akure is the state capital of Ondo State and it is located approximately 420 kilometers South West of Abuja, the Federal Capital of Nigeria, and about 350 kilometers to Lagos, the former capital of Nigeria. Akure is bounded by Ondo and Idanre to the South, Owo to the East, Iju/Itaogbolu to the North, and Ile-Oluji to the West. The city's morphology has changed over time to assume its present status with its attendant land problems, as experienced in similar medium-sized urban centers in Nigeria. Ijapo residential Estate is the first residential estate in Ondo State, and well planned to me the environmental, aesthetics and economic needs of residents. It is located northeast of Akure town within longitudes 5°12.307' E and 5°16.552' E and latitudes 7°15.859' N and 7°16.552' N.

Ijapo residential Estate is situated on a gently undulating terrain with an elevation between 330 meters and 364 meters above mean sea level. The area lies in the tropical rainforest with a mean annual rainfall of about 1300mm. The annual mean temperature is between 18^0C and 33°C. River Osisi cut across the estate at the central part and flows southwards into River Ala. The estate hosts some other centers such as petroleum products sales outlets, schools, hotels, guesthouses, and shopping malls which further heightened the demand for accommodation and potable water within the estate. Residents in the estate depend largely on hand-dug wells and motorized boreholes for domestic and other water supplies. The map of Akure in its National, Regional and Local settings is as depicted in Figure 1; while the Master Plan of Ijapo is as shown in Figure 2.

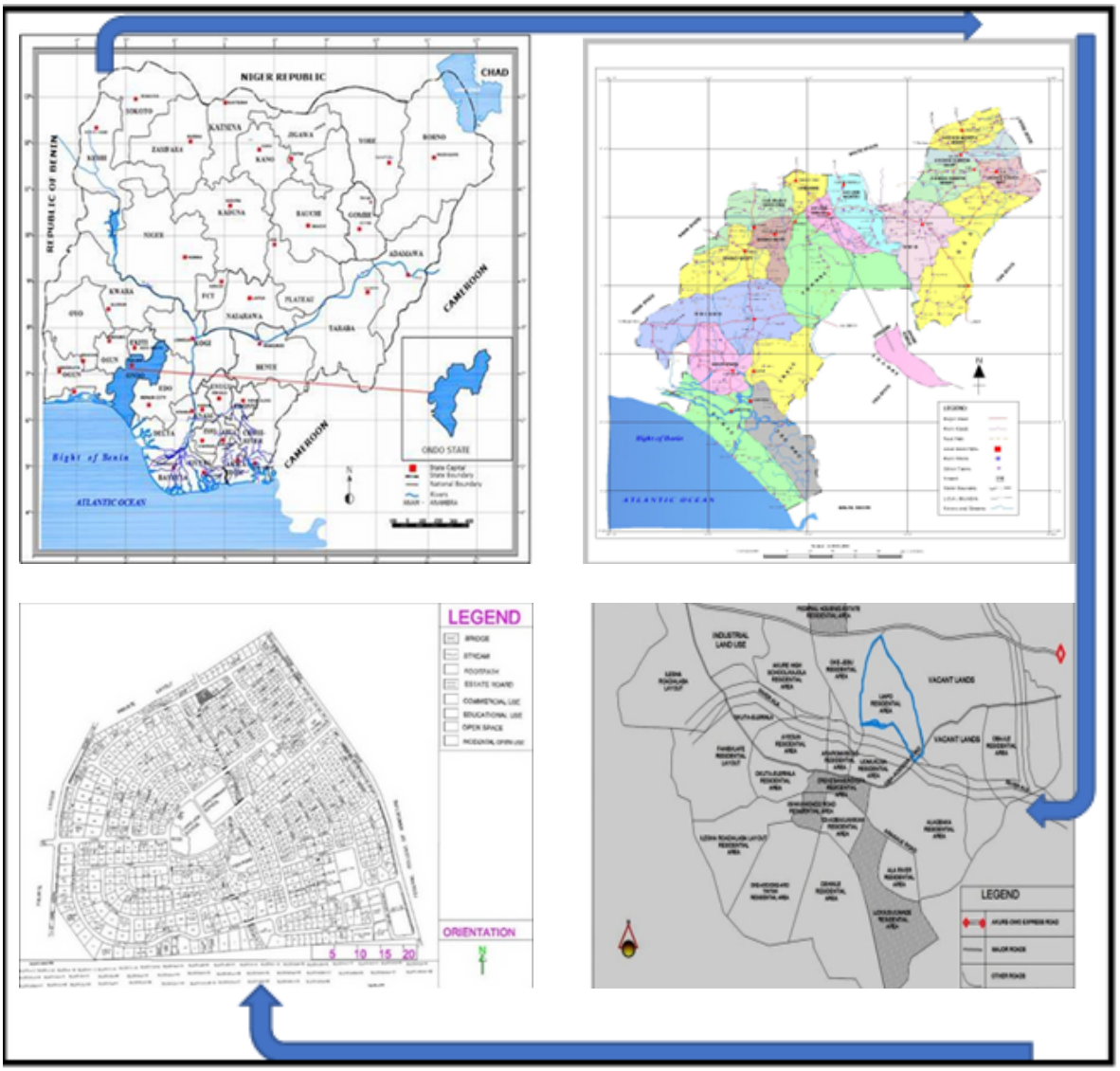

Figure 1: Map of THE Study Area in its National, Regional and Local Settings

Source: Authors' Fieldwork, 2022

Discussion of Results

4.1 Socio-Economic Characteristics of Residents in the Study Area: It is apposite to examine the socio-economic characteristics of Ijapo residents due to the fact that residents' attributes such as sex, level of education and income, length of stay in the estate, occupation and marital status among others have direct impact on the decision to engage in building conversion. Table 1 shows the socio-economic characteristics of respondents. From Table 1, sex of respondents shows that 56.4% are female and 43.6, male. This demonstrates that there are more female household heads which could be as a result of the death of the husbands that naturally transfers the headship of the household to the wife. This scenario implies that more women household heads means more conversions for economic reasons in order to meet up with the household financial obligations. On marital status of respondents, more than half of respondents (50.3%) are married; 24.5%, single; 14.5% divorced and 13.7% widowed. With over 50.0% of respondents married, population is expected to increase with the resultant stress on land use and the environment.

Table 1: Socio-economic Characteristics of Respondents

Variable	Frequency	Percentage
Sex		
Male	156	43.6
Female	202	56.4
Marital Status		
Single	77	21.5
Married	180	50.3
Divorced	52	14.5
Widow/widower	49	13.7
Age		
18-25 years	27	7.5
26-35 years	46	12.8
36-45 years	62	17.3
46-65 years	180	50.3
Above 65 years	43	12.1
Level of Education		
Illiterate	39	11
Primary	66	18.4
Secondary	72	20.1
Tertiary	181	50.5
Monthly income		
Below ₦30,000	26	7.3
₦30,000 – ₦60,00	60	16.7

₦60,000 – ₦120,0	55	15.4
₦120,000- ₦240,0	90	25.1
Above ₦250,000	127	35.5
Household size		
1 May 2025	202	56.4
5 Oct 2025	104	29.1
Above 10	52	14.5

Source: Authors Fieldwork, 2022

On level of education, Table 1 further shows that more than half of the household heads (50.5%) have tertiary education; secondary, 20.1%; primary, 18.4% and illiterate, 11.0%. the higher level of respondents with tertiary education shows that residents in the study area are knowledgeable and understands the negative impact of building conversion; hence, the intentionally contravene the existing planning scheme through illegal conversion of building uses for selfish motive and lack of respect for planning regulations.

Furthermore, the monthly income analysis shows that 35.5% of respondents earn above N250,000 while the remaining 64.5% earn below this amount. Two hundred and fifty thousand naira is approximately $192.0 monthly. This implies that an average resident in Ijapo Estate earn less than six (6) dollars per day; this amount is below the International poverty line of $2.15 per person per day.

4.2 Existing Land and building uses in Ijapo Estate

Figure 3 shows the original layout design of Ijapo residential estate in 1992; while Figure 4 shows the existing situation of land uses in 2022. From Figure 3, empirical analysis shows that over 80 plots in the estate were converted to other uses while some of the buildings were totally converted to another use. Further analysis shows that 56 plots out of the total 717 plots in the estate were converted into mixed-use such as residential/commercial and residential/institutional. Figure 3 shows a proliferation of commercial land uses as compared to the planning scheme at inception (Figure 1).

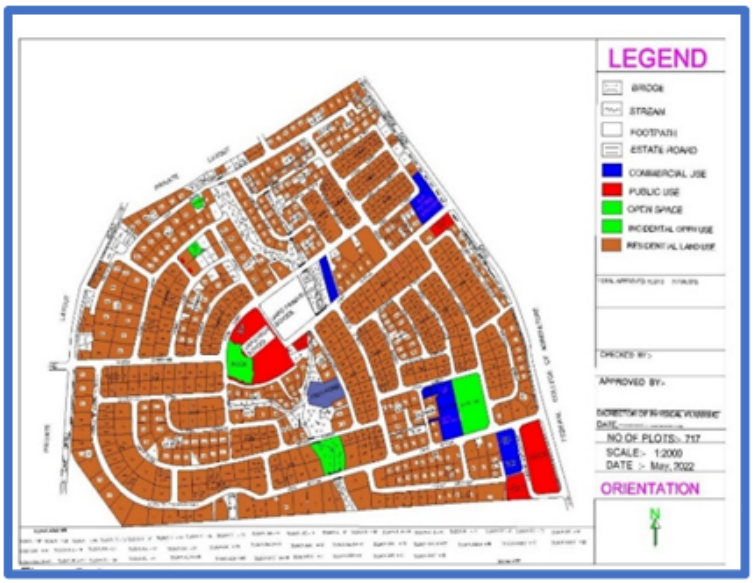

Figure 3: Originally Approved Master Plan/Planning Scheme of Ijapo Estate

Source: Authors' Fieldwork, 2023

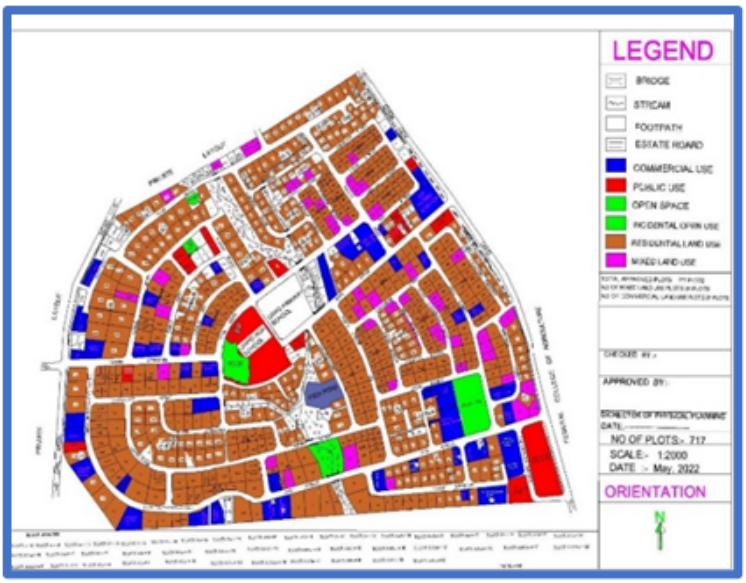

Figure 4: Deviated/Existing Layout Plan of Ijapo Estate

Source: Authors' Fieldwork, 2023

Furthermore, Table 2 shows the proposed building use (2002) and current uses (2022) on approved Ijapo Planning Scheme.

Table 2: Building Plot Analysis in Ijapo for 2002 and 2022

S/No	Building use	2002 no. of plots	%age	2022 no of plots	%age	%age Deviation
(a)	(b)	(c)	(d)	(e)	(f)	(g = d-f)
1	Residential	705	98.326	542	75.593	22.733
2	Commercial	2	0.279	87	12.134	-11.855
3	Institutional	6	0.837	33	4.603	-3.766
4	Recreational	4	0.558	1	0.139	0.005
5	Mixed	0	0	54	7.531	-7.531
Total		717	100	717	100	0.419

Source: Authors' Fieldwork, 2023

From Table 2, it is obvious that residential plots provided in the scheme was reduced from 705 plots in 2002 to 542 plots in 2022 with a percentage deviation of 22.733%. This implies that about 163 plots have been converted from residential to commercial plots. Observation shows that most of these conversions were to hotels, restaurants and laundry hubs. Figure 4 shows a residential building along Ikare Street wholly converted to a laundry hub.

Figure 4: showing residential building completely converted to a laundry hub along Ikale Street.
Source: Authors' Fieldwork, 2023

Also, from Table 2, commercial plots which comprises of two plots at inception, one for petrol station and shopping complex respectively increased from 2 plots (0.28%) to 87 plots (12.13%) with a percentage deviation of -11.855%. In other words, 85 residential plots were converted to commercial concerns in Ijapo Estate between 2002 and 2022. Furthermore, six (6) plots (0.84%) allocated for institutional use, increased to 33 plots (4.60%); this implies that a total of 27 plots were converted from residential to institutional use.

Further revelation from Table 2 is that 4 recreational plots (0.56%) provided as a sports complex and 3 open spaces at inception have reduced to only one (0.56%), signifying a 0.14% decrease. This implies that 3 recreational plots were converted to either commercial or institutional use remaining only the sports complex.

However, there was no provision for mixed uses in the Ijapo Residential Scheme at inception. Presently, about 54 residential plots have been converted to mixed uses. Observation reveals that most mixed uses were residential/commercial and residential/institutional of both. For instance, Figure 5 and 6 show typical mixed uses in the study area.

Figure 5: A Residential building totally converted into mixed use along Eyemoyin Street

Source: Authors' Fieldwork, 2023

Figure 6: Showing residential building converted to office Complex along Moses Orimolade Street

Source: Authors' Fieldwork, 2023

Figures 7 and 8 also show typical building use conversions along Ondo and Eyemoyin streets in the study area.

Figure 7: A Residential story-building totally converted into Institutional use along Ondo Road Street, Ijapo residential Estate.

Source: Authors' Fieldwork, 2023

Figure 8: A Residential building totally converted into mixed use along Eyemoin Street Ijapo residential Estate

Source: Authors' Fieldwork, 2023

Generally, there is a decline in the percentage of residential building use within the estate with its attendant shortage and high cost of accommodation in the study area. The high rate of proliferation of mixed uses implies that there is a difference between the original use and the present use of land neglecting the Planning Scheme of the layout plan. Further comparison of the use of land at inception and the current use of land are obvious in Figures 9 and 10.

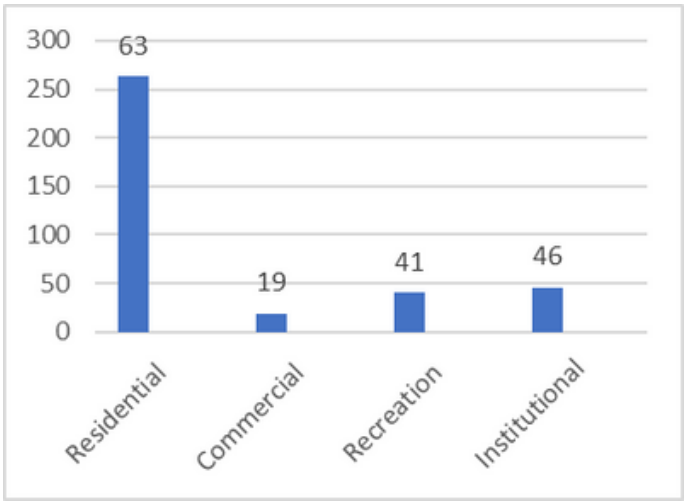

Figure 9: Primary use of the land

Source: Authors' Fieldwork, 2023.

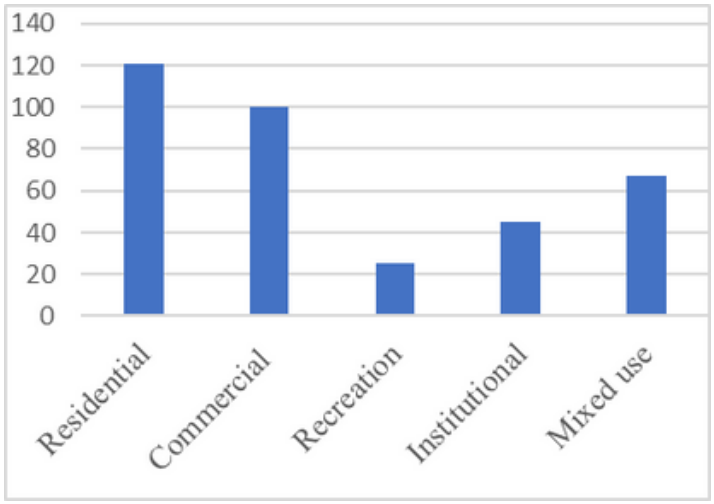

Figure 10: Present use of the land

Source: Authors' Fieldwork, 2023.

Residents' Opinion on building conversion in Ijapo Residential Estate

Figure 11 show residents' opinion on the situation of building conversion in the study area. About 29.6% of residents rated the effect of building conversion in the study area as fair; 29.1% opined the effect to be good; while 21.5% sees building conversion as very good. Only 19.8% of the residents arrogated building conversion to be poor. Cummulatively, over 80.0% of respondents adjudged building conversion to be favorable. This phenomenon could be attributable to benefits derivable from this planning deviation, which includes rent increase among others. The meagre proportion of residents (19.8%) who are not comfortable with building conversion in the study area are the professionally educated elites who understands the backwash effect of this phenomenon on the environment.

Figure 11: Residents' Opinion on building conversion in Ijapo Residential Estate

Source: Authors' Fieldwork, 2023

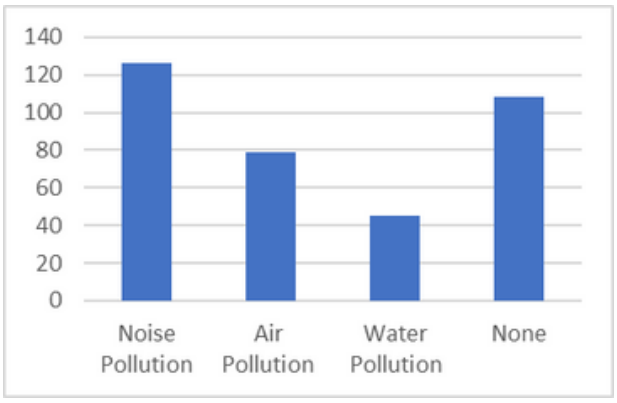

Figure 12: Residents' Opinion on the effect of building conversion in Ijapo Residential Estate

Source: Author field survey, 2023.

Figure 12 shows respondents' opinion on the environmental effect of building conversion in Ijapo Residential Estate. About 34.9% of respondents attributed noise pollution as a major effect of building conversion in the study area. This phenomenon is evident by the increased number of vehicles attracted to the ever increasing commercial, industrial and institutional hubs in the estate on daily basis. In addition, 22.3% and 12.5% ascribed air and water pollution to building conversion respectively; this is evident from the exhausts generated by vehicles and industrial effluents from the industrial concerns respectively. Only 30.2% of the respondents adjudged that building conversion has no effect on the environment in the study area; these are likely to be people living in areas that are not seriously affected by conversion.

Conclusion and Recommendations

This paper has provided some essential baseline information crucial to improving strategic planning in Ijapo Residential Estate which is applicable to most residential estates in Nigeria and in other developing nations. Specifically, this paper assessed the socio-economic characteristics of residents of Ijapo Estate; investigated the existing land and building uses; examined the building plot analysis for 2002 and 2024 and; identified residents' opinion on the positive and negative impacts of building conversion in Ijapo Residential Estate. This paper canvasses a periodic public enlightenment program for residents and the general public on the adverse effect of building conversion on the environment and residents in the study area; a well-coordinated and intensive enforcement of the Master Plan by the appropriate Planning Agency, such as the Ondo State Housing Corporation, is canvassed to ensure adequate monitoring and compliance of new developments or redevelopment comply with the approved Planning Scheme.

Conflict of interest

The authors report no declarations of interest.

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ENHANCING SUSTAINABILITY IN NIGERIAN CORRECTIONAL FACILITIES: A CASE STUDY OF OLOKUTA CORRECTIONAL CENTRE, AKURE, ONDO STATE

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ABSTRACT

Sustainable facilities management (SFM) practices in correctional facilities not only enhance operational efficiency and environmental responsibility but also provide opportunities for rehabilitation and skill development among inmates, fostering a positive impact on both the built environment and society. This study assesses the conditions of the facilities provided at the Olokuta Medium Security Prison in Akure (Olokuta Correctional Centre), Ondo State, and explores the adoption of SFM practices. The research utilizes a survey design, gathering data from 33 members of staff and 18 ex-inmates through structured questionnaires. Data analysis reaffirms the deplorable state of the facility's components, with none of them attaining "excellent" status. Adoption of SFM practices is scarcely evident, with the use of renewable energy sources (solar panels) having the highest mean score of 2.90, indicating "moderate adoption." Aside from this, all other constructs yielded low or no adoption. The major barriers to the adoption of SFM are resistance to change (Mean Score = 4.19), limited access to resources (Mean Score = 4.10), and inadequate regulatory frameworks (Mean Score = 4.08). The study identifies significant barriers to SFM adoption, such as resistance to change, limited access to resources, and inadequate regulatory frameworks. Recommendations include the development of comprehensive sustainability plans, enhanced training and education programs for staff, partnerships with external organizations, and the implementation of policies promoting sustainability. The adoption of these measures is crucial for improving the efficiency, sustainability, and humane conditions of correctional facilities in Nigeria.

Keywords: Sustainable Practices, Facilities Management, Correctional Facilities, Inmates, Olokuta

INTRODUCTION

The global rise in crime rates has led to a proportional increase in the incarcerated population, resulting in overcrowded correctional centers. According to Walmsley (2018), over 10.74 million people are currently held in penal institutions globally. This surge raises critical questions about the adequacy of correctional facilities in fostering inmates' rehabilitation. Prisons are designed for the reformation of individuals whose behaviors deviate from societal norms or violate criminal laws. However, the conditions of many Nigerian correctional service facilities fall short of their intended purpose. Instead of serving as spaces for reformation, they often become sites of deformation, with challenges ranging from overcrowding, facility decay, and poor ventilation to issues like sick building syndrome and inadequate cleanliness (Ajayi, Koleoso, Ajayi & Faremi 2019).

Even amid the curtailment of inmates' freedom, their fundamental human rights must be upheld, as emphasized by the United Nations Standard Minimum Rules for the Treatment of Prisoners, commonly known as the Nelson Mandela Rules (United Nations, 2016). Overcrowding and the resultant poor conditions compromise the living conditions of inmates, posing serious challenges to their safety and security and hindering effective rehabilitation (Kekere, 2021).

Addressing these issues is imperative. Prisons cannot fulfill their role in supporting reformation unless they provide a safe, stable, and secure environment. Substandard conditions potentially contribute to an increased likelihood of offenders returning to criminal activities upon release. Therefore, the role of Facility Management (FM) is crucial in ensuring that correctional facilities evolve beyond punitive measures to ones that actively contribute to the societal reintegration and positive transformation of inmates (Saunders, 2012).

This paper aims to undertake a facilities assessment of the Medium Security Prison Olokuta (a Nigerian Correctional Service – NCoS) in Akure, Ondo State. The objective is to incorporate facility management principles to enhance the efficiency and sustainability of its operations, considering the urgent need for upgrades and improvements in correctional facilities across Nigeria.

LITERATURE REVIEW

In this section, we explored two main threads of literature: an examination of the current state of correctional service facilities in Nigeria and an exploration of sustainable facilities management practices within these facilities. This review aims to assess the existing conditions, establish a baseline for operational practices, and propose a trajectory towards enhanced standards and ideals.

Overview of the Condition of Correctional Service Facilities in Nigeria

The Nigeria Correctional Service (NCoS), formerly the Nigerian Prison Service (NPS), plays a pivotal role in the country's criminal justice sector. Established in 1861, the modern correctional service in Nigeria has evolved, with 134 correctional centers currently distributed across the six geopolitical zones. However, the alarming figures as of October 2022, indicate a concerning situation: a total inmate population of 76,213, with 31% convicted and 69% awaiting trial. Overcrowding and deteriorating facilities have become synonymous with Nigerian prisons, with many structures dating back to the colonial era (Izevbuwa, Ngwoke, & Mbano, 2023). This stagnation in infrastructural development and the lack of new prison construction in over four decades reflects the underdevelopment of the Nigerian correctional system (Ogwezzy, 2011).

Critiques, such as Obioha (2011), question the system's efficacy in positively impacting inmates' lives and vocations. Further, Ajah and Nweke (2017) shed light on the deplorable conditions within NCoS, emphasizing squalid and congested cells, inadequate medical care, and insufficient provisions leading to disease outbreaks and increased mortality rates. The enactment of the Correctional Service Act, 2019, while intended to replace the Prisons Act, 2004, has not significantly elevated correctional facilities to approved standards for rehabilitation and reformation, as noted by Longpoe and Longpoe (2021). Danjuma, Nordin, and Muhamad (2018). highlight the human rights violations resulting from overcrowding, understaffing, and poor maintenance, painting a grim picture of living conditions, limited access to healthcare services, and an increased likelihood of human rights violations.

Despite efforts to address these challenges, as exemplified by the Nigerian Correctional Service Act of 2019, much work remains to be done to ensure that correctional facilities in Nigeria meet international human rights standards (Bello, 2021). The Nigerian Correctional Service itself reports that the prison system operates at about 150% of its capacity, with over 70% of inmates being pre-trial detainees (Akpam, 2024). These conditions result in poor living conditions, limited access to healthcare services, and an increased likelihood of human rights violations.

Furthermore, the lack of resources hinders access to educational and vocational programs, proper sanitation, and adequate facilities for mental health treatment (Nwefoh, Aguocha, Ryan, Ode, Ighagbon, Akinjola, & Eaton, 2020). Reports of physical abuse, torture, and inhumane treatment further exacerbate the human rights situation (Araromi, 2015). The Nigerian government, recognizing the need for reform, signed the Nigerian Correctional Service Act into law in 2019. While this marks a step in the right direction, sustained efforts are essential to meet international human rights standards.

Structurally, the NCoS, headed by the Controller-General, is organized with eight Deputy Controllers-General overseeing specific directorates. These directorates play a crucial role in coordinating various aspects of prison administration. However, Ajayi, Feranmi, and Adenuga (2017) observed that the management of building fabrics and facilities is not prioritized, posing concerns about the maintenance of prisons to acceptable standards.

Sustainable Facilities Management Practices in Correctional Service Facilities

The attention toward the construction and operation of correctional service facilities globally reflects an evolving focus on inmate rehabilitation and societal reintegration. Aldhaheri and Xia (2022) advocate for the development of smart prisons in the United Arab Emirates, aligning with the global trend toward technologically advanced and efficient correctional systems. Similarly, the adoption of public-private partnerships (PPPs) for prison ownership and operation has become prevalent in various countries, emphasizing the evolving landscape of correctional facilities and the imperative for sustainable management practices.

Facilities management (FM) principles have found a meaningful niche in the operation of prisons and correctional centers, encompassing activities crucial for effective built asset management (Amaratunga, Baldry & Sarshar, 2000). Since its inception in the 1980s, the concept of FM, driven by the International Facilities Management Association (IFMA), has prompted organizations to focus on their core business while outsourcing non-core activities (Ogungbile & Oke, 2015).

The multifaceted nature of FM, which involves overseeing all services supporting an organization's core business, is particularly pertinent in correctional facilities. Kuijlenburg and Mobach (2013) explore FM's influence on detainees, emphasizing its capacity to shape behavior. In the Nigerian context, Ikediashi et al. (2012) identify three main barriers to sustainable FM practice: lack of training and tools, absence of relevant laws and regulations, and deficiency in awareness.

Despite the recognition of sustainability's crucial role in organizational operations, evidence of its integration into inmate correctional facilities remains scarce. Sustainability in Facilities Management (FM) extends across economic, environmental, and social dimensions (Hitchcock, AtKisson, & Willard, 2012; Støre-Valen & Buser 2017; Petrini & Pozzebon, 2010). The seamless integration of these dimensions into organizational practices signals a shift toward sustainability. Olaniyi (2017) delineates themes within each sustainability dimension in FM, illustrating the intricate connection between FM and the well-being of both staff and inmates.

Achieving sustainable FM entails addressing critical success factors (CSFs), including proper planning, organizational sustainability policy, legislative support, FM strategy, qualified technical professionals, collaboration integration, and senior management involvement (Ashworth, 2021; Zakaria, Hashim, & Ahzahar, 2018). Legislative backing emerges as a dominant CSF, highlighting the importance of stringent regulations set by the government.

However, despite commendable efforts, several barriers impede the widespread adoption of sustainable FM practices in correctional service facilities. Chief among these is the lack of funding for sustainable initiatives. Most correctional facilities operate within limited budgets that may not accommodate the capital investments required for sustainability (Feldbaum, & Mukamal, 2011). Additionally, the absence of incentives can deter facility administrators from prioritizing sustainability objectives over immediate operational needs. Another critical barrier is the insufficient knowledge and expertise among correctional staff. The complex and specialized nature of correctional facilities demands a good understanding of sustainable practices. Without adequate training and awareness, staff may resist changes to traditional methods, hindering adoption (Coyle,& Fair, 2018).).

The inherent challenges within correctional facilities, characterized by their complex and restrictive nature, pose barriers to sustainable FM. Addressing these barriers requires a concerted effort to overcome financial constraints, enhance staff training, and tailor sustainability solutions to the unique needs of correctional facilities, ultimately promoting the long-term well-being of both staff and inmates.

Methodology

This research adopts a survey design to scrutinize sustainable facilities management practices within the Nigerian correctional services, with a focused investigation on Olokuta Medium Security Prison situated in Ondo State. The rationale for selecting Olokuta Medium Security Prison as the study area stems from its representative nature and the prevalence of challenges echoed in broader literature on Nigerian correctional facilities Additionally, the selection enables a more in-depth understanding of sustainable practices and potential areas for improvement within a specific context.

Participants in this study comprise both staff and ex-inmates of Olokuta Medium Security Prison. The exclusion of current inmates was necessitated by heightened security and privacy concerns. The purposive sampling technique was employed to select participants who demonstrated a willingness to engage in the study. Staff members were approached on-site, given their integral role in facilities management, while ex-inmates were identified through a snowballing method, leveraging referrals to expand the pool of participants.

Data collection centered around a structured questionnaire consisting of three sections. The first section gathered sociodemographic characteristics of respondents, the second section focused on the building survey of the case study facility, and the concluding section sought data on sustainability features of facilities management within the specific context of the case study. A total of 44 questionnaires were administered to Olokuta NCoS staff, yielding 33 (75%) suitable for analysis. Simultaneously, 19 ex-inmates actively participated in the survey, leading to a cumulative dataset of 52 questionnaires for subsequent analysis.

Analytical methods employed are fundamentally descriptive, utilizing tools such as the Weighted Mean Score (WMS) and frequency distribution tables. The questionnaire utilized a 5-point Likert scale without a neutral option, ranging from 5 - "Excellent," 4 - "Very Good," 3 - "Good," 2 - "Fair," to 1 representing "Poor." This approach, advocated by Hassanain (2008) and Sawyerr, and Yusof (2013), aims to solicit precise standpoints from respondents, ensuring a detailed understanding of their perspectives.

Results

4.1 Socio-Demographic Characteristics of Respondents.

The survey was based on data collected from 18 ex-inmates and 33 members of staff of the studied correctional facility as earlier stated. The socio-demographic characteristics of the respondents indicates that, the ex-inmates had an average age of 35 years, with a range from 20 to 60 years. The staff members had an average age of 39 years, with a range from 27 to 58 years. In terms of gender, the ex-inmates were all male, while the staff members included 25 males and 8 females. Education level of the respondents' ex-inmates indicated of 8 had completed secondary education, 7 had incomplete secondary education, and 3 had no formal education. Among the staff members, 9 had completed tertiary education, 21 had completed secondary education, and 2 had incomplete secondary education.

4.2 Conditional assessment of the Olokuta Medium Security Prison

In this section, the respondents assessed the condition of various components of the Medium NCoS based on the respondents' opinions using the 5 Likert scale having "Excellent" as weight 5, "Good" weight 4, "Average" as weight 3, "Poor" as weight 2 and "Very Poor" as weight as 1. The outcome of this inquiry is presented in Table 1.

Table 1 Conditional assessment of the Olokuta Medium Security Prison

Facility Component	Minimum	Maximum	Mean	Std. Deviation	Rank
Worship Centers	1	5z	3.31	1.566	1
Workshop Facilities	1	5	2.79	1.289	2
Counselling Office	1	5	2.75	1.203	2
Laundry Area	1	4	2.62	1.223	4
Kitchen	1	3	2.6	0.603	5
Recreational Facilities	1	5	2.58	1.289	6
Visitation Area	1	4	2.5	1.213	7
Administrative Block	1	5	2.4	1.209	8
Solitary Confinement	1	5	2.15	0.998	9
Education Facility	1	5	2.12	1.215	10
Infirmary/Medical	1	4	2.04	1.236	11
Transportation Service	1	5	1.96	1.252	12
Library Facility	1	5	1.92	1.169	13
Dining Area	1	4	1.85	1.055	14
Cell condition	1	3	1.65	0.764	15
Control/Security	1	3	1.48	0.542	16

The table 1 presents a comprehensive conditional assessment of various facility components within the Olokuta Medium Security Prison, evaluated on a scale from a minimum of 1 to a maximum of 5. The components are ranked based on their mean scores, which indicate the general condition of each facility.

Worship Centers received the highest average score of 3.31, placing them at the top of the ranking. This suggests that the Worship Centers are in relatively better condition compared to other facilities within the prison. The high score in this category may be attributed to the contributions and support from various religious bodies, which often take an active role in the maintenance and enhancement of worship spaces. However, the high standard deviation of 1.566 indicates significant variability in the quality of these centers, implying that while some areas may be well-maintained, others might be lacking.

Workshop Facilities and Counselling Offices follow, with mean scores of 2.79 and 2.75, respectively. Both components share a similar rank and demonstrate moderately good conditions. The standard deviations, 1.289 for Workshop Facilities and 1.203 for Counselling Offices, suggest that while the conditions are generally acceptable, there is still notable variability in their quality across different assessments. The relatively higher scores for these facilities might reflect ongoing vocational training and counseling programs aimed at rehabilitating inmates, but the inconsistencies indicate a need for standardization and better resource allocation.

The Laundry Area and Kitchen have mean scores of 2.62 and 2.60, respectively, indicating slightly above-average conditions. The Kitchen, with a standard deviation of 0.603, shows less variability, suggesting more consistent conditions compared to the Laundry Area, which has a higher standard deviation of 1.223. These scores might reflect the importance of maintaining hygiene and food safety standards, though the variability indicates that not all areas are meeting these standards uniformly. Recreational Facilities are close behind with a mean score of 2.58 and a standard deviation of 1.289, reflecting moderate conditions with considerable variability. This could suggest that while some recreational facilities are well-maintained, others are neglected.

Visitation Areas and the Administrative Block are ranked seventh and eighth, with mean scores of 2.50 and 2.40, respectively. These scores indicate average conditions, though the standard deviations (1.213 for Visitation Areas and 1.209 for the Administrative Block) suggest that the quality of these facilities can vary significantly. The condition of Visitation Areas is crucial as they play a significant role in maintaining inmates' connections with their families and the outside world, which can be vital for their psychological well-being.

Facilities such as Solitary Confinement and the Education Facility have mean scores below 2.5, specifically 2.15 and 2.12, respectively. This indicates that these components are in relatively poorer condition. The standard deviations, 0.998 for Solitary Confinement and 1.215 for the Education Facility, reflect moderate variability in their conditions. Poor conditions in educational facilities are particularly concerning, as education is a key component in the rehabilitation and reintegration of inmates.

The Infirmary/Medical facility, with a mean score of 2.04 and a standard deviation of 1.236, is also in poor condition. This score is troubling, considering the critical importance of adequate medical care for inmate health and safety. Transportation Service and Library Facility score even lower, with mean values of 1.96 and 1.92, respectively, and standard deviations of 1.252 and 1.169. These scores indicate that both facilities are in need of significant improvements. The Library, being a vital resource for educational and recreational purposes, should be prioritized for enhancement.

The Dining Area, Cell Condition, and Control/Security are the lowest-ranked components, with mean scores of 1.85, 1.65, and 1.48, respectively. These scores reveal very poor conditions. The standard deviations for these components (1.055 for Dining Area, 0.764 for Cell Condition, and 0.542 for Control/Security) suggest relatively consistent assessments of poor quality. The particularly low score for Control/Security raises concerns about the overall safety and management within the prison, highlighting an urgent need for intervention.

Level of Sustainable Facilities Management Practice at Olokuta Medium Correctional Service

Certain sustainable facility management (SFM) practices have been established based on literature to positively contribute to the operation of correctional facilities. Respondents, drawing from their knowledge of the study area, were asked to rank the level of SFM practices in the Olokuta Medium Correctional Facility on a five-point Likert scale. The interpretation of mean score ranges, as adapted and modified from Odesola (2012), is shown in Table 2 for ease of understanding.

Table 2: Classification of Sustainable Facilities Management Practice Levels at Olokuta Medium Prisons

Mean Score Rar	Level of Practice	Interpretation
4.00 - 5.00	High Practice Level (HPL)	Practices are consistently and effectively implemented, indicating a high level of sustainability practice.
3.00 - 3.99	Moderate Practice Level (	Practices are implemented to some extent, but there is room for improvement in consistency and effectiveness.
2.00 - 2.99	Low Practice Level (LPL)	Practices are minimally implemented or have limited effectiveness, indicating a low level of sustainability practice.
1.00 - 1.99	Very Low Practice Level (	Practices are not effectively implemented or are entirely lacking, indicating a very low level of sustainability practice.

Table 3 **Level of Sustainable Facility Management Practices in Olokuta Medium Correctional Facility.**

Sustainable Practice in Correctional Facilitie	Mean Score	Rank	Remark
Use of renewable energy sources, such as solar panels, to power the facility	2.02	1	LPL
Adoption of energy-efficient technologies	2	2	LPL
Use of energy-efficient lighting and appliances to reduce energy consumption and costs	1.94	3	VLPL
Implementation of climate control measures to reduce energy consumption	1.92	4	VLPL
Promotion of eco-friendly behavior among staff and inmates	1.88	5	VLPL
Promotion of sustainable transportation practices, such as encouraging the use of bicycle or public transportation among staff members	1.85	6	VLPL
Effective pest control measures	1.83	7	VLPL
Installation of water-saving devices and practices, such as low-flow toilets and showers, and rainwater harvesting systems	1.8	8	VLPL
Efficient water management	1.75	9	VLPL
Use of renewable energy sources	1.69	10	VLPL
Implementation of sustainable transportation practices	1.65	11	VLPL
Use of sustainable materials in construction and renovation	1.63	12	VLPL
Regular maintenance and repair of facilities to prevent deterioration and ensure safe and healthy living conditions for inmates	1.62	13	VLPL

Table 3 Level of Sustainable Facility Management Practices in Olokuta Medium Correctional Facility.

Adoption of green cleaning practices, such as using environmentally friendly cleaning products and minimizing the use of harmful chemicals	1.62	13	VLPL
Implementation of sustainable food practices, such as sourcing food locally and reducing food waste through composting or donations to food banks	1.65	15	VLPL
Implementation of a waste management plan that includes ecycling, composting, and proper disposal of hazardous materials	1.61	16	VLPL
Regular maintenance of prison infrastructure	1.61	16	VLPL
Implementation of green cleaning practices	1.59	18	VLPL
Proper waste management and disposal	1.56	19	VLPL
Use of smart building technologies to optimize energy usage	1.54	20	VLPL

The responses on the constructs of sustainability practice in the operation of the case study facility are presented in Table 3. Correctional facilities, akin to other large institutional settings, significantly impact the environment and consume substantial resources. Hence, it is crucial for them to adopt sustainable practices that curtail their environmental impact, enhance resource efficiency, and potentially save costs in the long term.

Upon scrutiny of the specific constructs in the survey, it becomes apparent that the facility has yet to fully embrace sustainable practices in most areas. For instance, the mean scores for the installation of water-saving devices and practices, efficient water management, and use of sustainable materials in construction and renovation all fall within the "Very Low Practice Level" (VLPL) range of 1.00 - 1.99. This indicates a lack of implementation of sustainable practices in these areas, which could have adverse effects on the environment and resource utilization within the facility.

Similarly, the adoption of sustainable transportation practices, such as encouraging staff to use bicycles or public transportation, also registers relatively low with a mean score of 1.85. This area requires significant improvement, given transportation's significant contribution to greenhouse gas emissions and energy consumption in correctional facilities. Although the mean score for the use of renewable energy sources is relatively higher at 1.69, it still falls within the "Low Practice Level" (LPL) range of 2.00 - 2.99. This suggests some effort towards adopting renewable energy sources like solar panels, yet there is ample room for enhancement to achieve a higher level of adoption.

Regarding maintenance and repair, both regular maintenance of prison infrastructure and facilities to prevent deterioration and ensure safe living conditions for inmates exhibit mean scores within the "Low Practice Level" (LPL) range. This implies the necessity for increased investment in maintenance and repair to ensure a secure and healthy environment for inmates.

From this analysis, there exists substantial potential for improvement in the Olokuta Medium Correctional Facility's adoption of sustainable facility management practices. By integrating more sustainable practices, the facility can curtail its environmental impact, enhance resource efficiency, and potentially realize long-term cost savings. It is imperative for correctional facilities to prioritize sustainability in their operations and management to foster positive environmental impacts and enhance inmate well-being.

4.4 Barriers to Practices of SFM in Olokuta Medium Correctional facility

The perceived barriers to the adoption of sustainable facilities management (SFM) were investigated based on the respondents' perceptions and their levels of significance.

Table 4 Barrier to Sustainable FM practices at the Study Area

Barriers	Mean	Std. Deviation	Interpretation
Resistance to change or ack of buy-in from the management	4.19	1.237	Very High Significant
Limited access to external resources and partnerships for sustainability initiatives	4.1	1.071	Highly Significant
Inadequate regulatory frameworks and policies to promote sustainability in correctional facilities	4.08	1.064	Highly Significant
Limited availability of renewable energy options	4.06	1.127	Highly Significant
Inadequate training and education for staff on sustainable practices	4.04	0.559	Highly Significant
High maintenance costs associated with sustainable infrastructure	3.94	1.056	Highly Significant

Lack of awareness or understanding of sustainable practices	3.92	0.518	Moderately Significant
Limited data and metrics for tracking sustainability performance	3.9	1.107	Moderately Significant
Limited access to green technologies and equipment	3.83	1.2	Moderately Significant
Limited accountability for sustainability goals and targets	3.62	1.316	Moderately Significant
Inadequate communication and coordination between different departments and stakeholders involved in sustainability efforts.	3.6	1.445	Moderately Significant
Limited budget for maintenance and upgrades	3.58	0.977	Moderately Significant
Insufficient training and education of staff on sustainable practices	3.58	1.289	Moderately Significant
Resistance to change and lack of support from management	3.54	1.602	Moderately Significant
Funding constraints and budget limitations	3.35	1.266	Moderately Significant
Regulatory or policy barriers	3.17	1.478	Low Significant
Lack of expertise in sustainable facilities management	2.17	1.232	Low Significant

The Table 4 presents data on the perceived barriers to the adoption of SFM practices in the Olokuta Medium Correctional Facility. Respondents rated different factors that hinder the adoption of sustainable practices on a scale of 1 to 5, where 1 indicates no barrier and 5 indicates a significant barrier. The table shows the mean and standard deviation for each barrier based on survey responses.

The highest-rated barrier is "Resistance to change or lack of buy-in from the management," with a mean rating of 4.19 and a standard deviation of 1.237. This suggests significant resistance to change or a lack of support from the management, potentially due to a lack of understanding of sustainability benefits, fear of additional workloads or costs, or lack of leadership support.

The second highest-rated barrier is "Limited access to external resources and partnerships for sustainability initiatives," with a mean rating of 4.10 and a standard deviation of 1.071. This indicates insufficient resources and partnerships for sustainability initiatives, possibly due to a lack of funding or support from external organizations.

The third highest-rated barrier is "Inadequate regulatory frameworks and policies to promote sustainability in correctional facilities," with a mean rating of 4.08 and a standard deviation of 1.064. This suggests that existing regulatory frameworks and policies are not conducive to promoting sustainability.

Other highly rated barriers include "Limited availability of renewable energy options," "Inadequate training and education for staff on sustainable practices," and "High maintenance costs associated with sustainable infrastructure."

Moderately significant barriers include "Lack of awareness or understanding of sustainable practices," "Limited data and metrics for tracking sustainability performance," "Limited access to green technologies and equipment," and several others. These barriers highlight the presence of some resources and tools for sustainability initiatives, but they may not be effectively utilized due to other challenges.

The data suggests that overcoming these barriers requires increasing awareness of sustainability benefits, providing additional training and resources, and developing supportive policies and infrastructure.

5. Conclusion and Recommendation

This study analyzed the condition of various components of the Olokuta Medium Correctional Facility, the adoption of sustainable facilities management (SFM) practices, and the barriers to SFM practices in the facility. The findings indicate that there is significant room for improvement in the facility's sustainability practices. The data revealed several key barriers to the adoption of SFM practices in the facility. The top barriers identified by respondents (staff and ex-inmates) include resistance to change, limited access to external resources and partnerships, limited availability of renewable energy options, and inadequate regulatory frameworks and policies to promote sustainability. These barriers highlight the need for increased awareness, education, and support for SFM practices within the facility.

Based on these findings, we recommend that the Nigerian Correctional Services (NCoS) prioritize the development and implementation of a comprehensive sustainability plan. This plan should

include measures to address the identified barriers and promote the adoption of SFM practices throughout the facility. Specifically, it should involve strategies to overcome resistance to change, enhance access to external resources and partnerships, and improve the availability of renewable energy options.

Additionally, comprehensive training and education programs for staff on SFM practices are essential. Partnerships with external organizations can provide valuable resources and support for sustainability initiatives. Developing and enforcing policies and regulations that encourage and support sustainability practices in correctional facilities is also crucial. Moreover, the NCoS should explore alternative energy sources such as solar, wind, or biogas, and invest in energy-efficient equipment and infrastructure.

Leveraging technology to track and measure sustainability performance, and setting accountability metrics for sustainability goals and targets, can further support the implementation of SFM practices. The adoption of sustainable facilities management practices in correctional facilities can lead to significant benefits, including reduced costs, increased efficiency, and improved environmental outcomes. Therefore, it is crucial for the Olokuta Medium Correctional Facility to prioritize and invest in SFM practices to ensure a sustainable future for the facility, its staff, and the community it serves.

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