Assessment of Housing Environment Sustainability in the Peri-Urban Precincts of Ibadan, Nigeria

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DOI: https://doi.org/10.51244/IJRSI.2026.1306000250

Received: 11 June 2026; Accepted: 16 June 2026; Published: 03 July 2026

ABSTRACT

Rapid urbanization in Nigeria has resulted in cities expanding into the surrounding rural areas. This has led to the formation of peri-urban settlements characterized by rapid population growth, increasing housing demand and pressure on housing environment systems. Peri-urban areas are strategically important for accommodating urban growth but are often associated with weak development control, environmental degradation and unsustainable housing outcomes.

This study assessed the housing environment in the peri-urban areas of Ibadan, Nigeria, with a view to promoting urban sustainability. Specifically, the study identified the peri-urban areas and their characteristics, assessed the socio-economic characteristics of the residents, evaluated housing environment challenges via a set of indicators and evaluated housing environment sustainability.

The research design was based on survey method. Primary data were collected using structured questionnaires administered to residents in selected peri-urban communities in six Local Government Areas (Akinyele, Egbeda, Ido, Lagelu, Oluyole and Ona Ara).

For data analysis, descriptive statistics, cross-tabulation, Chi-square test and Analysis of Variance (ANOVA) were used.

The findings revealed that the sustainability of housing environment in peri-urban areas of Ibadan is shaped by a complex interaction of physical, socio-economic, institutional and governance factors. The ANOVA results showed significant spatial differences in housing environment sustainability among the six Local Government Areas; reflecting uneven peri-urban development patterns.

The study revealed that inadequate infrastructure, ineffective development control implementation and environmental management challenges in the peri-urban settlements of Ibadan have been constraining sustainable urban outcomes. It recommends strengthening development control institutions, prioritizing investment in infrastructure for peri-urban communities and enhancing community participation in environmental management. The study provides a framework for assessing housing environment sustainability in peri-urban areas, and defining empirical relationships between socio-economic characteristics, housing environment indicators / challenges and housing environment sustainability.

Keywords: Housing Environment, Peri-Urban Development, Urban Sustainability, Ibadan, Nigeria

INTRODUCTION

Housing is one of the basic needs for human life and has been widely recognized as a fundamental human right in international debates (Ersan, 2025; Lucherini, 2025). Housing is not merely shelter, but a complex system consisting of the physical structure, supporting services, and the larger environmental setting in which residential activities take place. Accordingly, the housing concept extends beyond the dwelling unit to include the housing environment, which comprises the physical (natural and built) and social conditions affecting the

health, safety, and quality of life of residents (Schneider-Skalska, 2019; Hegde *et al.*, 2024; Udoh & Essien, 2025).

In particular, urbanization has drastically changed housing development patterns around the world. The rapid growth of urban populations in many developing countries has exacerbated the demand for housing and the expansion of residential development beyond established urban boundaries into transitional zones known as peri-urban areas.

Peri-urban areas are typified by ongoing spatial change, mainly instigated by urban expansion and the pressure of population in city cores. As cities grow, the original urban boundary shifts slowly outwards, creating new peri-urban frontiers by incorporating spill-over residential development (Toku *et al.*, 2024; Ayeni *et al.*, 2025). These transitional zones are therefore important sites for urban growth and have important roles in the future structure of cities.

Thus, the housing environment created through such processes may exhibit various environmental and social deficiencies such as poor road networks, inadequate drainage systems, limited access to basic services and increased susceptibility to environmental hazards such as flooding and erosion (Echendu, 2023). These challenges demonstrate the need to evaluate housing environments beyond housing supply, but also in terms of their sustainability and long-term implications for urban development.

The assessment of housing environment is often undertaken based on sustainability indicators representing various dimensions of residential development such as building characteristics, infrastructure provision, environmental quality, social cohesion, and economic conditions (Poortinga *et al.*, 2021). Such types of assessments have specific significance at the neighborhood level, which is the fundamental building block of urban systems (Rodríguez *et al.*, 2022).

In this context, peri-urban housing environments need to be carefully assessed, as they are emerging urban neighbourhoods with development patterns that will have a strong impact on future urban sustainability. In this regard, investigating the elements that affect housing environments in such transitional zones is important to inform appropriate planning policies and sustainable urban development.

The study therefore assesses the peri-urban housing environment development patterns in Ibadan, Nigeria with a view to identifying the existing challenges and evaluating the sustainability outcome of the housing environment.

Research Problem Statement

Peri-urban areas are emerging as important sites of urban change but are often inadequately integrated into formal urban planning processes. Saxena and Vyas (2015) found that one of the biggest challenges for modern cities is the management of peri-urban transformation into sustainable urban environments. Likewise, Kingsella (2019) noted that housing development policies often do not sufficiently address the environmental consequences of residential expansion.

The peri-urban areas have become attractive for residential development due mainly to the availability of relatively cheap land in Nigeria. These areas often provide housing opportunities for low- and medium-income households outside congested urban centres (Adedire *et al.*, 2017; Adu-Gyamfi *et al.*, 2022). However, such changes are often informal, with little regard to planning regulations and development standards.

For Ibadan, the expansion of housing development into peri-urban areas has been accompanied by major planning and governance challenges. The implementation of existing development control policies seems to be weak, and the institutional capacity to monitor and regulate peri-urban development remains limited (Jimoh & Olagunju, 2022; Adeyemi *et al.*, 2023). Besides, dearth of credible data on land use patterns, provision of infrastructure and demographic characteristics hinders effective planning and management of these areas.

Many studies have explored housing development, urban expansion, and informal settlements (Adaku, 2014; Igwe *et al.*, 2017; Soyebo *et al.*, 2017) but few have specifically examined the sustainability of housing environments in peri-urban areas, particularly in the Nigerian context.

This knowledge gap indicates the need for context-specific studies to investigate peri-urban housing environment dynamics and implications for sustainable urban development. The present study attempts to fill this gap by assessing patterns of development of housing environment in selected peri-urban neighbourhoods of Ibadan and assessing challenges affecting their sustainability.

Aim and Objectives of the Study

The study seeks to assess the challenges and sustainability of housing environment development in the peri-urban areas of Ibadan.

The specific objectives are to:

1. Determine the peri-urban areas and their features in the study area.
2. Evaluate the socio-economic characteristics of the residents in these areas.
3. Evaluate the indicators of the housing environment sustainability.
4. Identify the main problems of the housing environment in the study areas.
5. Assess housing environment outcomes to re-evaluate environmental sustainability.

The Need for this Study

The patterns of development in peri-urban areas are very important for the sustainability of urban environments and these areas are the future expansion zones of the city. Poor coordination of urban development in Ibadan has been linked to a number of environmental problems such as flooding, erosion, inadequate infrastructure and poor residential environments.
The rapid growth of peri-urban areas makes the knowledge of the conditions of the housing environments of increasing importance for sustainable urban growth. Understanding these environments will help to identify the underlying causes of environmental challenges and inform policy interventions to improve development outcomes.

Scope of the Study

The study area is located within the identified peri-urban Local Government Areas, according to Adelekan *et al.*, (2014), outside the Ibadan metropolitan core. This study aims to establish the relationship between housing environment sustainability and sustainable urban development in Ibadan and Nigeria more broadly.

LITERATURE REVIEW

Global concerns about environmental sustainability, climate change and rapid urbanization have raised scholarly interest in the sustainability of human settlements. Housing environments are at the center of these discussions because they are the immediate spatial interface between human activities and the natural environment (Dossa *et al.*, 2025).

But the increasing urban population growth has led to an unprecedented demand for housing, particularly in developing countries. This demand has led to cities expanding into the so-called peri-urban areas.

Peri-urban spaces are becoming critical sites where urban expansion, environmental change and housing development meet. But the rapid rate, and often-unregulated nature of development in these areas raises serious concerns about sustainability, the provision of infrastructure, environmental management and the effectiveness of governance. This study therefore reviews the relevant literature on peri-urbanization, housing environments, sustainability frameworks, socio-economic determinants of housing conditions and development control mechanisms. The aim is to place the current study within the existing literature and to identify areas that need further research.

Peri-Urbanization and Housing Development

Peri-urbanization refers to the spatial and socio-economic change that occurs at the interface between urban and rural areas. The main driver for peri-urban expansion is widely recognized as rapid urbanization. Urbanization is the process of increasing population concentration and growth into urban areas due to both natural increase and migration (Echendu, 2023). Urban growth and the associated development pressures tend to radiate outward into surrounding rural areas, creating transition zones with mixed land uses and dynamic social change (Wandl & Magoni, 2017; Salem *et al.*, 2025).

Peri-urban areas often combine rural livelihood practices with urban economic activities (Haldar *et al.*, 2024; Ayeni *et al.*, 2025). These areas are often subject to rapid land conversion, especially from agricultural uses to residential development.

In peri-urban regions, land use generally revolves around the development of housing. Peri-urban settlements in many developing countries are home to low- and middle-income households looking for affordable land away from the expensive urban centers (Adedire *et al.*, 2017; Adedire & Adegbile, 2018). Such development, however, often happens informally and incrementally with little planning oversight and inadequate provision of infrastructure (Soyebo, 2017).

Housing Standards and Environment

Housing environment refers to the physical and social conditions in which residential life happens. It comprises the dwelling unit, the surrounding infrastructure, neighbourhood facilities and environmental quality (Schneider-Skalska, 2019; Hegde *et al.*, 2024; Udoh & Essien, 2025). A functional housing environment typically includes: adequate road networks, drainage systems, potable water supply, sanitation facilities, open spaces and access to community services such as schools and health centers. All these factors combined impact health, safety and quality of life.

Governments and international organizations have, therefore, developed housing standards to ensure that residential development meets minimum requirements of safety, habitability and environmental sustainability (DIN, 2021; Kim *et al.*, 2023). Such standards are effected through development control instruments, zoning regulations and building codes.

Physical Terrain and Housing Environment

The physical terrain has a great influence on the performance of the housing environment. Landforms characteristics such as slope, elevation and drainage patterns affect land suitability for residential development (Li *et al.*, 2022; Chiaka *et al.*, 2024).

The topography influences various factors in housing development including building stability, infrastructure construction, stormwater management, and micro-climate conditions (Smith & Jones, 2021; Chen & Zhao, 2024; Gao *et al.*, 2022). Neglecting terrain considerations in housing development can increase exposure to environmental hazards such as flooding, erosion and landslides.

The importance of terrain in determining settlement patterns is reflected in the physical landscape of Ibadan. The city is characterized by rolling hills and valleys formed by geological weathering processes (Oladunjoye *et al.*, 2021). The land forms influence the patterns of drainage and the distribution of settlement in the metropolitan region (Areola, 2022).

Urbanization and Housing Problems

Urbanization process is one of the most important socio-economic transformations of the modern era. It provides opportunities for economic development and improved access to services but also has significant challenges of housing and environment (Peerzado *et al.*, 2018; UN-Habitat, 2020).

The rapid increase of urban populations often results in housing shortages, overcrowding, lack of infrastructure and environmental deterioration (Rivas *et al.*, 2023; Somorija, 2025). These challenges are particularly acutely felt in developing countries where urban planning systems are struggling to keep pace with population growth. To address these challenges, governments have employed policy interventions, including housing regulations, development control policies, and environmental impact assessments (Odoyi & Riekkinen, 2022). These policy instruments aim to promote orderly urban development and sustainable housing environments.

Housing Environment Assessment and Sustainability

Sustainability has emerged as a core concept in urban planning and environmental management. It generally refers to the ability of systems to maintain ecological balance while supporting human development over time (Hamman, 2017; Topal *et al.*, 2021).

The most common definition of sustainable development is that which emphasizes the need to meet the needs of the present without compromising the ability of future generations to meet their own needs (Moore *et al.*, 2017; Hamann *et al.*, 2018). Sustainable housing environments therefore need to balance environmental protection, economic viability and social well-being.

A number of sustainability assessment frameworks have been used to assess the environmental performance of housing environments. These include tools such as BREEAM, LEED, and SBTool that assess environmental indicators such as energy efficiency, water management, waste reduction, and environmental impact (Doan *et al.*, 2017; Illankoon *et al.*, 2017; Berardi, 2018).

More recent frameworks consider neighbourhood-level sustainability indicators like infrastructure provision, accessibility, community well-being, and environmental quality (Sharifi *et al.*, 2021) instead of considering individual buildings only. An example is SUCCEED (Sustainable Composite Cities Environmental Evaluation and design Toolkit) Neighborhood Sustainability Assessment Tool (Momoh *et al.*, 2024).

Gap in the Literature

Although a large amount of research has been conducted on urbanization, housing development and environmental sustainability, a number of voids is still apparent in the literature.

First, most studies have primarily concentrated on housing conditions in established urban centers, while relatively little attention has been given to the sustainability of housing environments in peri-urban areas. The peri-urban are rather, the key areas for city expansion in rapidly developing cities.

Second, existing research often focuses on housing quality or environmental conditions in isolation, failing to integrate physical terrain characteristics, socio-economic conditions, and governance mechanisms within a holistic sustainability analytical framework.

Third, existing studies on development control policies have a tendency to focus on regulatory compliance but rarely assess the influence of such governance structures on sustainability outcomes of housing environments in peri-urban contexts.

Finally, there is a dearth of empirical studies in the Nigerian context that have specifically investigated housing environment sustainability in the peri-urban areas of Ibadan. The rapid spatial expansion, demographic and socio-economic conditions, amongst others in the city, require assessment frameworks capable of evaluating the sustainability of the housing environments of the emerging residential areas.

METHODOLOGY OF RESEARCH

The study employs a mixed method research design combining model-based and survey research approaches. This combination of methods enables a comprehensive assessment of complex relations of spatial features, governance structures, socio-economic factors and housing environment sustainability.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

The conceptual framework derived from the literature was applied to delineate peri-urban areas using the model-based approach. This approach guided the spatial identification of the study area and the sampling framework.

The survey method involved administering questionnaires to selected respondents in neighbourhood communities in the study area. Quantitative data were analyzed through the use of descriptive and inferential statistics including frequencies, measures of central tendency, correlation analysis, regression analysis and Analysis of Variance (ANOVA).

The study unit of analysis is the neighbourhood community, a cluster of residential housing units with social and infrastructural facilities. Neighbourhood communities are widely accepted as the basic spatial units of urban settlements and thus are suitable for the assessment of the housing environment conditions.

Study Area

The study area is the peri-urban precincts of Ibadan in six Local Government Areas (LGAs) of Oyo State, Nigeria, namely Akinyele, Egbeda, Ido, Lagelu, Oluyole and Ona-Ara. Ibadan is the capital of Oyo State in southwestern Nigeria, some 119 km northeast of Lagos and about 120 km east of the Nigeria-Benin international border (Figure 1).

Geographically, the city is situated between latitude 7°03′ and 7°45′ North and longitude 3°30′ and 4°08′ East (Figure 2).

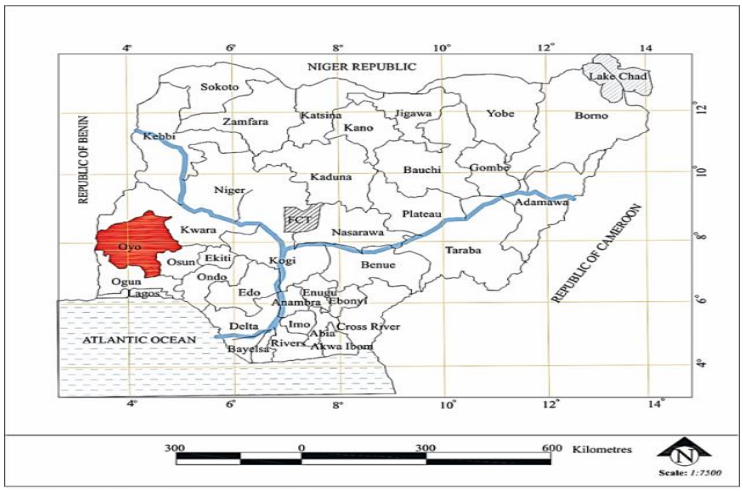

Figure 1: Oyo State in National Context

Source: Ministry of Lands, Housing and Physical Planning, Ibadan (2007)

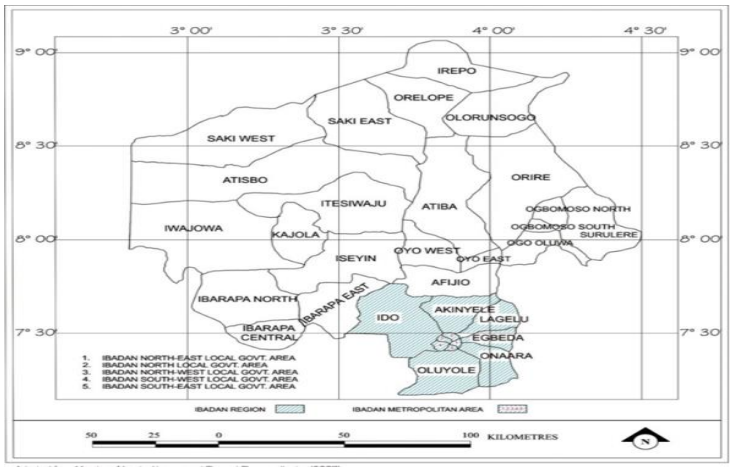

Figure 2: Present-Day Ibadan within Oyo State Context

Source: Adapted from Ministry of Lands, Housing and Physical Planning, Ibadan (2007

Sampling Frame, Sample Size and Sampling Method

The study employed a multi-stage sampling technique.

Stage 1: Selection of the Sampling Frame

The first step was to define the spatial extent of peri-urban areas based on conceptual models from previous studies. Jurgenson *et al.* (2017) and Karg *et al.* (2019) found that peri-urban zones generally lie between 10 km and 30 km from city centers, depending on the spatial growth patterns of cities (Figure 3).

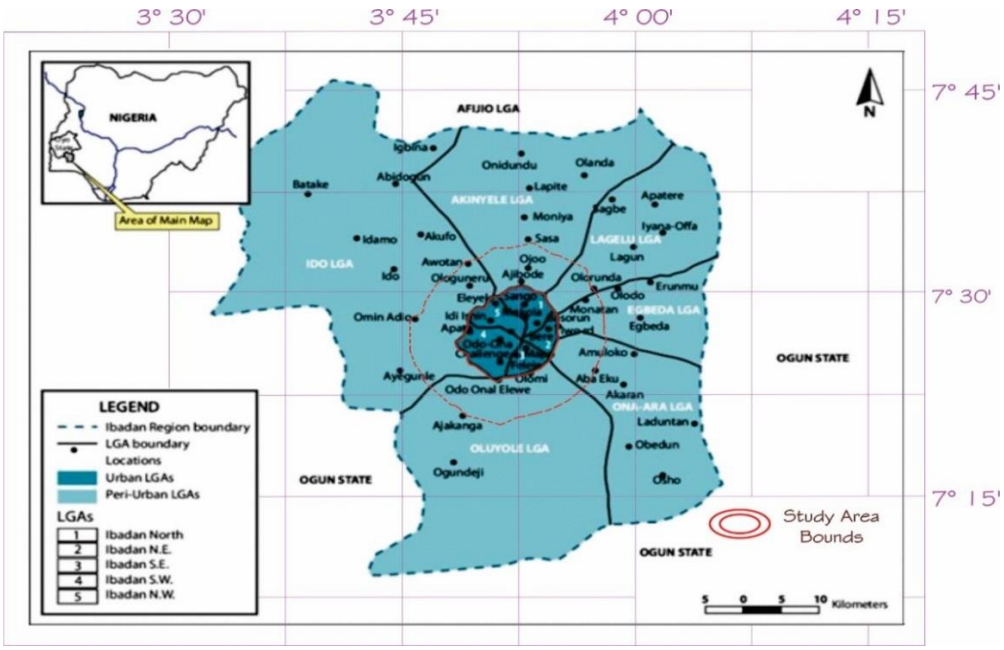

Figure 3: Map of Ibadan Region Showing the limits and bounds of the Study Areas

Source: Adapted from Adelekan *et al.,*2014.

On the basis of this conceptual framework the study defined the peri-urban study area within 10-15 km radius from the city center of Ibadan with Mapo Hall as reference point. The spatial boundaries of the study area were validated using satellite imagery and digital mapping tools (Google Satellite Imagery) (Figure 4 and Figure 5).

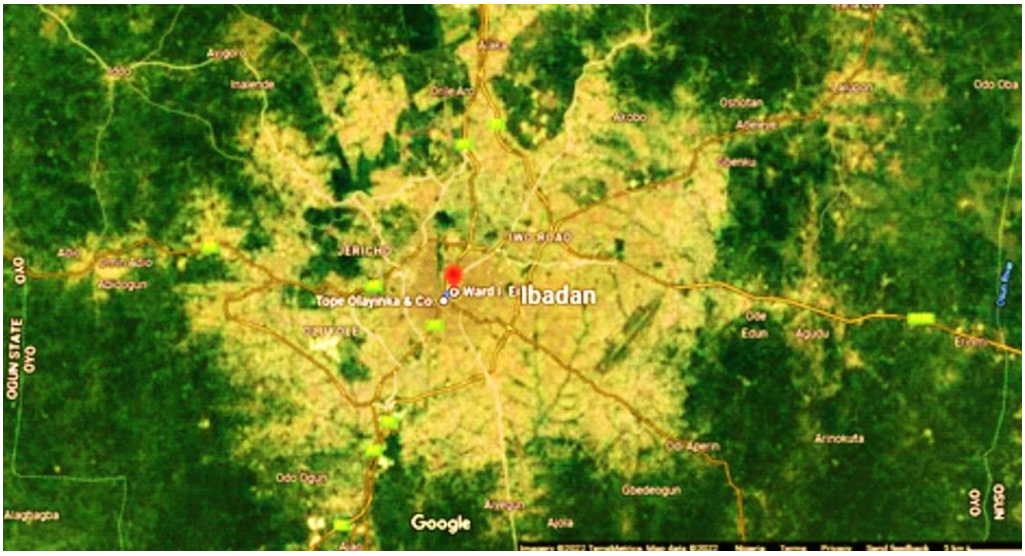

Figure 4: Satellite Map of the Development Areas of Ibadan

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

Source: Google Satellite Imageries 2024.

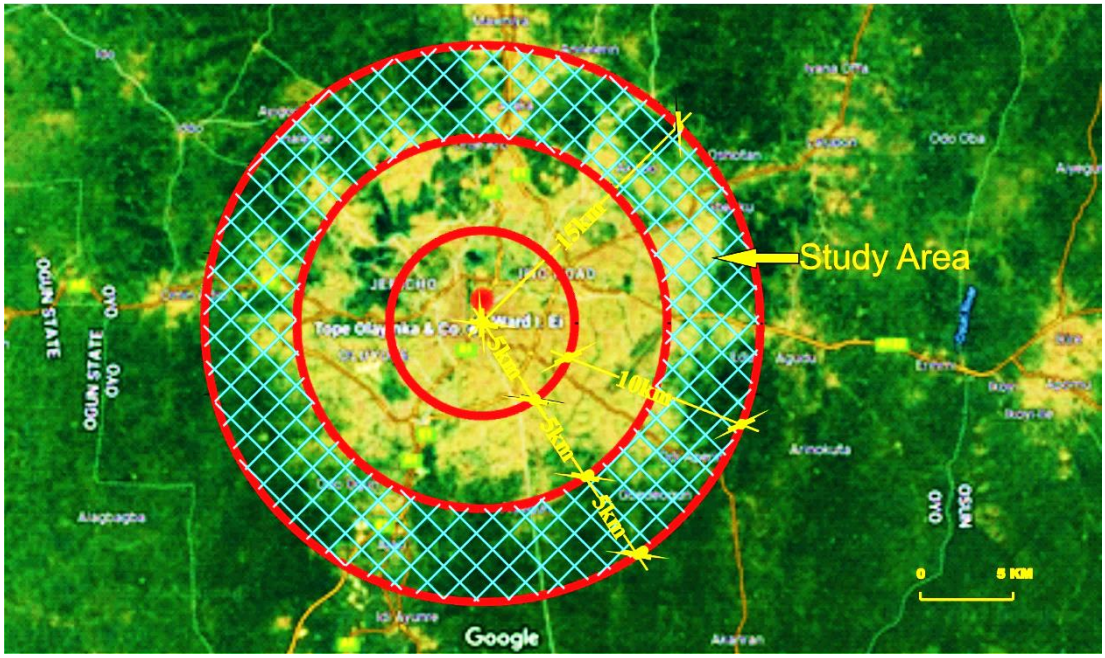

Figure 5: Satellite Map Showing the Radius of Development of Ibadan Relative to Ward I. Ei (Assumed City Center)Source: Adapted from Google Satellite Imageries 2024.

This spatial delineation led to the identification of 10 political wards in the six local government areas within the peri-urban band.

Stage 2: Selection of Local Communities

The second stage was cluster sampling by the number of polling units of INEC (Independent National Electoral Commission) Nigeria, that represent neighbourhood communities in the selected wards. In total 136 communities were identified in the wards selected.

Stage 3: Selection of the Respondents

The third step was the selection of respondent(s) from each of the sampled communities. Community leaders or neighbourhood representatives were selected through purposive sampling and other respondents were selected randomly.

A total of 10 respondents were selected from each community making a total of 670 respondents in the study area (Table 1).

The target sample size was determined using the Cochran formula for cross-sectional surveys: $n_0 = Z^2pq/e^2$, where Z = 1.96 (95% confidence level), p = 0.5 (maximum variability, as the proportion of households with sustainable housing environments is unknown), q = 1-p = 0.5, and e = 0.05 (margin of error). This yielded a minimum sample of 384. To account for non-response and improve precision for subgroup analyses across six Local Government Areas, the sample was inflated to 670 (approximately 1.75 times the minimum). The achieved sample of 647 (96.6% response rate) exceeds the minimum and provides adequate power for detecting moderate effect sizes in subgroup comparisons.

The use of convenience sampling at the final stage (selecting respondents within each neighbourhood) may introduce selection bias, as residents who are more engaged or more dissatisfied with housing conditions may be overrepresented. Future research should employ systematic random sampling from household lists where available.

Table 1: Selected Political Wards and Neighbourhoods across the Study Area (Sample Size: by Cluster and Proportional Sampling respectively)

S/N	LOCAL GOVT. AREA	NUMBER OF SELECTED POLITICAL WARDS	NAME OF SELECTED POLITICAL WARDS	RELATIVE DISTANCE FROM CITY CENTER (KM)	NUMBER OF COMMUNITY NEIGHBOUR-HOOD	NUMBER OF SELECTED NEIGHBOR-HOODS
1	Akinyele	2	1. Ojo-Emo/Moniya	15	18	8
			2. Ojoo/Ajibode/Laniba	11	49	22
2	Egbeda	1	1. Olodo/Kumapayi I	14	15	7
3	Ido	3	1. Apete/Ayegun/Awotan	12	12	5
			2. Fenwa/Oganla/ Elenusonso	13	08	4
			3. Ogundele/Alaho/Siba/ Idi-ahun	15	13	6
4	Lagelu	1	1. Ajara/Opeodu	12	09	4
5	Oluyole	2	1. Idi-Osan/Egbeda-Atuba	10	06	3
			2. Odo-ona Nla	14	10	5
6	Ona Ara	1	1. Odi Odeyale/Odi Aperin	12	06	3
TOTAL		**10**			**136**	**67**

Author's sampling 2025: adapted from INEC Nigeria (2015)

Data Analysis Methods

The Likert scale was used to measure responses and indicators of sustainability of the housing environment. The Statistical Package for the Social Sciences (SPSS) was used for data analysis.
These analytical methods were used by the study to integrate and identify relationships between socio-economic characteristics, identified housing environment indicators, and housing environment sustainability outcomes.

RESULTS AND DISCUSSION

This section presents the empirical findings of the study on housing environment conditions in the peri-urban precincts of Ibadan.
The presentation of results is based on the following study objectives:

- Identification and characteristics of peri-urban areas
- Socio-economic characteristics
- Assessment of sustainability indicators of housing environment
- Challenges of housing environment analysis
- Assessment of sustainability outcomes in the study area

Ibadan Peri-Urban Characteristics

The Ibadan region comprises eleven Local Government Areas out of which five are the metropolitan core and the other six are the peri-urban region. The peri-urban local government areas are Akinyele, Egbeda, Ido, Lagelu, Oluyole and Ona-Ara (Agbola & Alabi, 2010; Adelekan *et al.*,2014).
In the study, peri-urban areas were defined as settlements located around 10 - 15 km from the city center, using criteria based on the conceptual models proposed by Jurgenson *et al.* (2017) and Karg *et al.* (2019). This spatial framework was used to identify and sample neighborhood communities within the study area.
Field observations show that peri-urban settlements are characterized by hybrid spatial characteristics that combine rural land uses, such as agriculture, with expanding residential development. This transitional character is a reflection of the rapid growth of urban areas around Ibadan.

Socio-Economic Profile of the Residents

The socio-economic profile of the respondents is crucial in giving insights into the development dynamics of the peri-urban housing environments.
The survey results indicate that the residents are predominantly low- and middle-income households, traders, artisans, civil servants and small-scale entrepreneurs. Educational background of respondents ranges from primary to tertiary education.
The quality of the housing environment and the provision of infrastructure depended to a large extent on occupation and income levels. Higher income households are more likely to build durable housing structures, providing basic infrastructures and facilitating better housing environment conditions.
Table 2, Table 3, all show frequency distributions of Education Level of Respondents, and Monthly Income Levels.

Table 2: Frequency Table of Education Levels

Education Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No formal Education	23	3.6	3.6	3.6
	Primary School	26	4.0	4.0	7.6
	Secondary School	242	37.4	37.4	45.0
	Tertiary Level	356	55.0	55.0	100.0
	Total	647	100.0	100.0	

Source: Authour's Analysis 2025

Table 3: Frequency Table of Income Levels per Month

Income per month					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	N10,001 - N30,000	5	.8	.8	.8
	N30,001 - N50,000	39	6.0	6.0	6.8
	N50,001 - N100,000	87	13.4	13.4	20.2

	N100,001 - N200,000	220	34.0	34.0	54.3
	N200,001 - N300,000	161	24.9	24.9	79.1
	N300,001 - N400,000	107	16.5	16.5	95.7
	N400,001 - N500,000	23	3.6	3.6	99.2
	Above N500,000	5	.8	.8	100.0
	Total	647	100.0	100.0	

Source: Authour's Analysis 2025

This finding is in line with previous studies which indicate that socio-economic characteristics have a strong influence on housing quality and environmental conditions (Agbola & Kassim, 2007; Daramola *et al.*,2018). The results therefore confirm that housing environment outcomes are closely related to the socio-economic capacity of residents, particularly in terms of infrastructure provision and environmental management.

Composite Sustainability Score Construction

Multiple housing environment indicators were used to develop a composite Sustainability Rounded Mean Score to assess overall sustainability performance of the study area. Table 4 shows the lists of eight indicators composing of sub-variables. For example, sub-variable including surface texture, road bumping, adjoined drainage, road width adequacy, side walkways, etc., were measured and compounded into the main road infrastructure indicator. Other indicators also have sub-variables embedded in them.

Table 4: Indicator Listing and Likert Scale Values

Indicators	**Very Poor** (Scale value 1)	**Poor** (Scale value 2)	**Fair** (Scale value 3)	**Good** (Scale value 4)	**Very Good** (Scale value 5)
Road infrastructure		✓			
Stormwater management		✓			
Waste disposal systems		✓			
Electricity supply	✓				
Water provision		✓			
Environmental pollution		✓			
Security		✓			
Community governance structures			✓		

Source: Authour's Analysis 2025

The measurement scale employed for each indicator is the 5-point Likert scale (from Very Poor to Very Good).

Indicators were transformed to a common scale (1–5). All indicators were weighted equally following the approach of Nardo *et al.*, (2008); Gan *et al.*, (2017); Díaz-Sarachaga *et al.*, (2018), as there is no empirical or

theoretical basis for differential weighting in this exploratory context. The Sustainability Rounded Mean Score for each neighbourhood was calculated as the arithmetic mean of all indicator scores. Following the 5-point Likert scale adopted, the mean scores were categorized into five sustainability levels. Scores of 1.00–1.80 = Non-Sustainable, 1.81–2.60 = Poorly Sustainable, 2.61–3.40 = Fairly Sustainable, 3.41–4.20 = Sustainable, 4.21–5.00 = Highly Sustainable (Boone & Boone, 2012; Sullivan & Artino, 2013).

The findings show that infrastructure provision in the study area is inadequate. The result of the Chi-square test in Table 5 also reveals strong and consistent significant differences in environmental challenges across the various local government areas.

Table 5: Chi-square test of Housing Environment Challenges Across the LGAs

Component	**Pearson χ^2**	**Df**	**Sig. (p-value)**	**Interpretation**
Road Condition	91.565	15	0.000	Significant variation
Storm Water/Flooding	208.719	15	0.000	Very large LGA differences
Waste Disposal	178.144	15	0.000	Varies significantly
Electricity Supply	48.441	10	0.000	Significant differences
Water Supply	163.980	15	0.000	Varies widely
Environmental Pollution	279.333	15	0.000	Very high variation
Security	144.528	15	0.000	Varies significantly
Community Governance	127.409	15	0.000	Significant differences

Source: Authour's Analysis 2025

Integrated Sustainability Assessment

The composite Sustainability Score construction above was used to assess the overall sustainability performance of the study area. The results show that the majority of peri-urban housing environments are in a weak sustainability condition.
The dominance of the "Poorly Sustainable" category (66.5 percent) suggests that most neighbourhoods are characterized by poor infrastructure, weak environmental management and limited regulatory enforcement (Table 6).

Table 6: Frequency Distribution of Sustainability Scores Across Study Area

Sustainability Category	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Non-Sustainable	10	1.5	1.5	1.5
Poorly Sustainable	430	66.5	66.5	68.0
Fairly Sustainable	207	32.0	32.0	100.0
Total	647	100.0	100.0	—

Source: Authour's Analysis 2025

While about 32percent of communities are classified as "Fairly Sustainable," this designation represents only moderate levels of environmental performance, not fully sustainable conditions. Based on cumulative analysis, 68percent of the study area is located in the non-sustainable or poorly sustainable categories, which shows a considerable deficit in sustainability.

Sustainability Performance of Local Government Areas

The average sustainability score of the study area was 2.3045, which means the housing environment is between "Poorly Sustainable" and "Fairly Sustainable". However, there are large spatial differences between local government areas (Table 7).

Table 7: Mean Sustainability Scores by Local Government Area

Local Government Area	Mean Score	N	Std. Deviation
Akinyele	2.1911	293	0.39386
Egbeda	2.5909	66	0.49543
Ido	2.2117	137	0.56139
Lagelu	2.9268	41	0.26365
Oluyole	2.2963	81	0.45947
Ona Ara	2.3793	29	0.49380
Overall Mean	2.3045	647	0.49301

Source: Authour's Analysis 2025

Of these areas, Lagelu Local Government Area had the highest sustainability score (2.93) which denotes relatively better provision of infrastructure and environmental management.
Conversely, Akinyele Local Government Area had the lowest sustainability score, implying poorer infrastructure condition and weak environmental management.

The One-Way ANOVA test results in Table 8 presented Between-group Sum of Squares value of 26.407, Within-group Sum of Squares value of 130.610 with degrees of freedom 5 (for between groups) and 641(for within groups). F-statistic results yielded 25.920 while Significance (p-value) is .000 ($p < .001$).

Table 8: ANOVA Table of Sustainability by Local Government Area

ANOVA Table						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Sustainability RndMean Score * Local Govt. Areas	Between Groups (Combined)	26.407	5	5.281	25.920	.000
	Within Groups	130.610	641	.204		
	Total	157.017	646			

Source: Authour's Analysis 2025

The results indicate that there are substantial variations attributable to group differences, but more variations exist within groups than between them. The ANOVA results indicate a statistically significant difference in mean sustainability scores across the Local Government Areas ($p < .001$). This confirms that sustainability conditions vary meaningfully by location, rather than being uniform across the study area.

The F-Statistics value of 25.920 which is very large, indicate greater separation among group means relative to within-group variability. This shows that group means differ substantially and not merely due to chance.

The findings of this study show that the peri-urban areas of Ibadan are rapidly expanding spatially but without adequate infrastructure and development policy.
The widespread poor sustainability conditions suggest that the existing urban governance frameworks are not adequate to address the development pressures in the peri-urban areas.
These findings affirm earlier research that pointed to infrastructural deficiencies, weak governance capacity and poor environmental management as key barriers to the peri-urban sustainability in Nigerian cities (Adelekan *et al.*,2017; UN-Habitat, 2020).
Moreover, the spatial variations across the six local government areas show that sustainability outcomes are not uniform but rather shaped by local development dynamics.
Without strategic planning interventions, these peri-urban settlements are likely to become poorly serviced urban environments with long-term environmental and socio-economic consequences.

Terrain Characteristics and Sustainability Outcome

Terrain plays an important role in housing environment sustainability. Soyebo, (2026) highlighted how topographic attributes – including slope, elevation, drainage networks and landform configuration – affects housing environment sustainability outcomes.

However, results on terrain analysis using digital elevation models (DEM) or topographic maps, and tests regarding sustainability scores correlation with terrain variables (such as mean slope, elevation range, distance to drainage lines) are not available for this study. This is acknowledged as a limitation, and therefore, recommend future research incorporating GIS-based terrain analysis.

CONCLUSION

The findings of this study highlight the structural challenges affecting on the sustainability of housing environment in the peri-urban Ibadan.

Firstly, peri-urban areas have become important sites for urban expansion and housing development. However, the pace of residential development in these areas has not been matched with adequate provision of infrastructure, or coordinated planning interventions. As a result, many neighbourhoods show signs of environmental stress, lack of infrastructure and declining housing environment quality.

Second, the study provides evidence that sustainability of housing environment is closely related to the socio-economic characteristics of the residents. Income levels, education and occupation, affect households' ability to invest in sustainable housing construction and environmental management practices.

Third, the study finds that though regulatory frameworks exist, monitoring and enforcement are often patchy, leading to the proliferation of informal or poorly planned developments in peri-urban settlements.

Fourth, the findings suggest that sustainability outcomes differ across the six Local Government Areas due to variations in infrastructure provision and local governance effectiveness. The spatial variation indicates that generic policy interventions are not suitable to address peri-urban sustainability challenges and that planning strategies need to be tailored to local contexts.

Finally, the study concludes that the achievement of sustainable housing environments in peri-urban Ibadan needs a departure from reactive development control to proactive, integrated and participatory planning

approaches. For sustainable urban development in the city, strengthening institutional capacity, improving infrastructure investment and promoting active community participation in environmental management will be essential.

RECOMMENDATIONS

The results of the study lead to the following recommendations:

Government and Policy Suggestions

- Peri-Urban Planning Policies: Urban development planning policies should clearly designate peri-urban areas as strategic areas for growth and offer planning frameworks that are attuned to their unique socio-economic and environmental contexts.

- Infrastructure Investment: Boost investment in critical infrastructure, including roads, drainage systems, waste management facilities, water supply, and electricity services in peri-urban communities.

Institutional and Governance Issues

- Inter-agency Collaboration: Effective management of peri-urban development requires better coordination among planning authorities, environmental agencies, housing institutions and local governments.

- Capacity Building: Technical and administrative capacity building programs for planning officers and local government officials should be organized.

- Transparent Governance Systems: Institutionalized transparent procedures for development approvals and infrastructure planning should be institutionalized to improve accountability and public trust.

Community Level

- Public Awareness Programmes: Government agencies and community organizations should promote public awareness campaigns on environmental consciousness, building regulations and sustainable housing environment practices.

- Community Participation: Residents' association should be empowered to participate in activities of environmental management such as drainage maintenance, waste management and neighbourhood monitoring.

- Household Sustainability Practices: Households need to embrace sustainable practices such as proper disposal of waste, environmental maintenance and collective action against environmental degradation.

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