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URBAN ENCROACHMENT ON AGRICULTURAL LAND IN ABEOKUTA NORTH, SOUTHWESTERN NIGERIA: GEOSPATIAL ASSESSMENT AND RESIDENTS' PERCEPTION OF LAND USEN CHANGE

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Abstract https://doi.org/10.65760/sjgs.v4.i1.7

Urban encroachment has become a growing concern in developing regions, particularly in fast-urbanizing areas where agricultural land is being lost to residential and industrial development. This study investigates the extent, patterns, and drivers of urban encroachment on agricultural land in Abeokuta North Local Government Area, Ogun State. The objectives include examining the socio-economic characteristics of residents, analyzing land use and land cover changes between 1994 and 2024, assessing the effects of urban encroachment on agriculture, and identifying the major factors driving land conversion in the area. A descriptive survey design was adopted, and data were collected through structured questionnaires administered to 75 randomly selected residents. Geospatial analysis using Landsat satellite imagery for the years 1994, 2004, 2014, and 2024 was used to assess land cover changes. Descriptive statistics, one-sample ttest, and ANOVA were employed for data analysis using SPSS. Findings reveal that residential land use is dominant (60%), with 72% of respondents noting significant land use change over two decades. Built-up areas increased by 10% between 1994 and 2024, while agricultural land declined to 66% of total area. Urban encroachment was found to significantly reduce agricultural productivity, with 60% confirming reduced farmland and 64% reporting that some farmers had abandoned agriculture. The one-sample t-test ($t = 52.299$, $p < 0.05$) confirmed a significant reduction in agricultural land, while ANOVA ($F = 248.18$, $p = 0.000$) revealed significant variation in land use patterns. Key drivers identified include population growth, poor planning, housing demand, industrialization, and weak policies. The study concluded that urban encroachment poses a significant threat to agricultural sustainability and food security in Abeokuta North. It recommends the enforcement of land use zoning regulations, farmland conservation policies, public awareness campaigns, and promotion of vertical urban development to ensure balanced urban growth.

Keywords: *Urban Encroachment, Agricultural Land, Land Use Change, Abeokuta North, Geospatial Analysis.*

1.0 Introduction

Agricultural land is fundamental to global food production, livelihood sustenance, and economic development, supporting the needs of over 7.8 billion people worldwide (United Nations, 2022). However, rapid urbanization has increasingly intensified the conversion of agricultural land to residential, commercial, and infrastructural uses, thereby threatening food security and rural livelihoods. Globally, agricultural land per capita has declined considerably due to urban expansion and population growth, despite agricultural land accounting for approximately 4.8 billion hectares of the Earth's land area in 2019 (Food &Agriculture Organization (FAO), 2019; FAO, 2021). With the global urban population projected to reach 68% by 2050, demand for land for housing, industries, and

infrastructure is expected to further accelerate farmland conversion, particularly in developing economies where agriculture remains a major economic sector (United Nations, 2018; FAO, 2020). Urban encroachment, defined as the transformation of rural and peri-urban land into urban uses, has become a major driver of agricultural land loss, environmental degradation, and socio-economic challenges across Sub-Saharan Africa, where urbanization rates average about 4% annually (World Bank, 2021). This trend contributes significantly to farmland depletion, rural poverty, and food insecurity in developing countries (Sakketa, 2023). Nigeria exemplifies this challenge, as rapid population growth and urban expansion have reshaped land-use dynamics, with urban population growth rising from 25.7% in 1970 to 52.3% in 2020 and approximately 3.7 million hectares of agricultural land lost within the last two decades (United Nations, 2021; National Population Commission (NPC), 2022; Federal Ministry of Agriculture & Rural Development (FMARD), 2022).

Ogun State, owing to its proximity to Lagos and expanding economic opportunities, has experienced accelerated urban growth, particularly in Abeokuta and adjoining settlements. Abeokuta North Local Government Area has witnessed substantial urban expansion over the past two decades, resulting in the conversion of large areas of farmland to residential and commercial developments. Agricultural land in the state reportedly declined by approximately 25% between 2000 and 2020, with consequences for crop production, farmers' income, and food availability (Emmanuel & Salami, 2024). Similarly, recent studies revealed significant expansion of built-up areas and corresponding decline in vegetation cover in Abeokuta due to increasing urban pressure (Adebayo et al., 2024). Despite the importance of agriculture to food security and rural livelihoods, rapid urban encroachment in Abeokuta North has intensified competition for land, reduced access to arable land, and disrupted farming activities (Olayiwola & Lawal, 2019). Farmers increasingly face displacement, environmental degradation, and declining productivity, which may worsen Nigeria's fragile food security system (Ihemezie & Dallimer, 2021). Additionally, weak land-use planning and poor policy enforcement have encouraged uncoordinated urban expansion, undermining sustainable land management objectives (Coulibaly & Li, 2020; Wu et al., 2024; Enoguanbhor et al., 2021). Although previous studies have examined urban encroachment and agricultural land loss in different parts of Nigeria (Tokula, 2017; Mohamed & Yacout, 2019), limited empirical attention has been given to Abeokuta North. Given the area's unique socio-economic and environmental characteristics, there is a need to assess the spatial extent of urban encroachment, its implications for agricultural land, and residents' perception of land-use change. Therefore, this study employs Geographic Information Systems (GIS) and remote sensing techniques to evaluate urban encroachment on agricultural land in Abeokuta North, Ogun State, while integrating residents' perception to support evidence-based land-use planning and sustainable urban development (Bratley & Ghoneim, 2018).

1.1 Literature Review

Several studies have examined the effects of urban expansion on agricultural land across developed and developing countries. In developed countries, Lawton and Morrison (2022) investigated periurban agricultural land loss in Greater Western Sydney, Australia, highlighting tensions between housing demands and farmland preservation. Their findings revealed that housing priorities and market-driven urbanization continue to accelerate farmland conversion unless urban growth policies are restructured. Similarly, Meyer and Früh-Müller (2020) examined agricultural land-use changes in Southern Germany and reported substantial farmland losses due to settlement expansion and afforestation. The study found that urban growth and population density were major drivers of agricultural land conversion, while existing governance tools were insufficient in balancing agricultural preservation

with urban development. In developing countries, urban encroachment has similarly intensified pressure on agricultural land. Bratley and Ghoneim (2018) assessed urban encroachment in the Eastern Nile Delta using GIS and a Markov Chain Model, revealing a 222.5% increase in urban areas between 1988 and 2017, with over 235 km² of cultivated land converted to urban use. Their projections further indicated continued urban expansion, emphasizing the value of remote sensing and predictive modelling for monitoring land-use change. Likewise, Qiao and Huang (2022) examined land urbanization in China's Yangtze River Delta and found that increasing urban land expansion significantly reduced ecosystem health, underscoring the environmental consequences of unregulated urban growth. In Nigeria, studies have consistently reported the adverse impacts of urbanization on agricultural land. Adebayo et al. (2024) analyzed land use/land cover changes in Abeokuta between 1972 and 2022 using GIS and remote sensing, revealing a significant increase in built-up areas from 0.66% to 10.93% and a decline in vegetation cover from 93.66% to 58.82%. The study attributed these changes to rapid urbanization and emphasized the need for effective urban planning. Similarly, Olayiwola and Lawal (2018) examined urban growth in Abeokuta from 1966 to 2016 and reported substantial farmland loss, particularly in northern and western parts of the city, with implications for food security and agricultural productivity. In a related study, Jimoh et al. (2020) found that urban encroachment on rural agricultural land in Edo State led to farmland displacement, deforestation, and changes in farming practices, driven largely by profit-oriented development and weak land-use planning.

Despite these contributions, existing studies have largely focused on broad urban growth patterns, environmental impacts, and agricultural land loss, with limited attention to Abeokuta North Local Government Area specifically. Furthermore, few studies have integrated geospatial assessment with residents' perception of land-use change. This study therefore fills this gap by assessing urban encroachment on agricultural land in Abeokuta North using GIS and remote sensing techniques while examining residents' perceptions of land-use change and its socio-economic implications.

1.2 Theoretical Review

This study is anchored on three complementary theories that explain the dynamics of urban expansion and agricultural land conversion: Von Thünen's Agricultural Land Use Model, Urban Land Use Theory (Burgess Model), and Land Rent Theory (Alonso Model). These theories collectively provide a framework for understanding the spatial organization of land use, urban growth patterns, and the economic drivers of land conversion. Von Thünen's Agricultural Land Use Model, developed by Johann Heinrich von Thünen (1826), explains how transportation costs and market accessibility influence agricultural land use patterns. The model assumes an isolated state with a single market, homogeneous environmental conditions, and profit-maximizing farmers. Agricultural activities are arranged in concentric rings around a central market, with intensive and high-value farming located closest to urban centers, while extensive agriculture and livestock production occur farther away. Although the model simplifies real-world conditions, it remains relevant in explaining how urban growth disrupts agricultural zones near cities, often resulting in farmland conversion to residential and commercial uses (Sinclair, 1967; Chisholm, 1972; Parr, 2013; Han et al., 2022). The Burgess Model, also known as the Concentric Zone Model, was developed by Burgess (1925) to explain urban spatial structure and city expansion. The model proposes that cities grow outward from a Central Business District (CBD) in concentric zones comprising transition areas, working-class neighborhoods, better residential zones, and commuter suburbs. Land values are highest near the CBD and decline outward, driving urban expansion into peripheral agricultural lands. Despite criticisms regarding its simplified

assumptions and limited applicability to modern cities, the model remains useful for understanding outward urban growth and land-use transformation in rapidly urbanizing areas (Park et al., 1925; Rodrigue, 2020; Chakroborty, 2024). In the context of this study, the Burgess Model explains how Abeokuta North's urban growth increasingly extends into adjoining agricultural zones. The Land Rent Theory (Bid Rent Theory), advanced by Alonso (1964), further explains urban encroachment through economic competition for land. The theory posits that land values are highest near the city center due to accessibility advantages, with businesses, industries, and households competing for strategically located land. As urban land demand rises, agricultural land at the urban fringe becomes increasingly vulnerable to conversion because its economic value for urban uses often exceeds its agricultural value (Brueckner, 1987). This theory is particularly relevant in explaining the economic pressures driving farmland conversion in Abeokuta North, where proximity to urban markets and infrastructure increases demand for residential and commercial development. Together, these theories provide a comprehensive explanation of how proximity to markets, urban growth patterns, and land value competition contribute to urban encroachment on agricultural land, making them suitable for analyzing land-use change and residents' perceptions in Abeokuta North, Ogun State.

2.0 Materials and Methods

2.1 The Study Area

Abeokuta North Local Government Area is located in Ogun State, Southwestern Nigeria. The Local Government Area (LGA) lies approximately between Latitude 7°03'14"N and 7°24'58"N and Longitude 3°00' 04"E and 3°21'49"E (Figure 1). It is bounded by Abeokuta South to the south, Obafemi-Owode to the north, Ewekoro to the east, and Odeda to the west, covering approximately 1,000 km² (Figure 1). The area is characterized by an undulating landscape comprising rolling hills, valleys, and river systems, with generally fertile soils that support extensive agricultural activities. The Ogun River traverses the area, providing water resources for domestic and agricultural use, while Olumo Rock remains a notable physical and cultural landmark within the metropolis. Abeokuta North experiences a tropical climate with distinct wet and dry seasons. The rainy season spans March to October, while the dry season occurs between November and February. The area records an average annual rainfall of about 1,200 mm, with temperatures ranging from 25°C to 32°C. Vegetation consists mainly of tropical rainforest and derived savannah, with farmlands, plantations, and natural vegetation dominating the rural landscape. Common crops cultivated include cassava, maize, yam, and oil palm. Socio-economically, Abeokuta North is dominated by agriculture, trade, and small-scale industrial activities. Farming remains the primary livelihood, while commercial activities are concentrated in markets such as Akomoje and Lafenwa, which facilitate regional trade (Orekan & Bello, 2020). The area also benefits from tourism and strategic transport linkages within Ogun State, contributing to its growing urbanization and economic development. These characteristics make Abeokuta North suitable for examining urban encroachment on agricultural land and residents' perception of land-use change.

2.2 Methods

This study adopted a descriptive and analytical research design, integrating quantitative methods with Geographic Information Systems (GIS) and remote sensing techniques to examine land use/land cover (LULC) changes and the impacts of urban encroachment on agricultural land in Abeokuta North LGA.

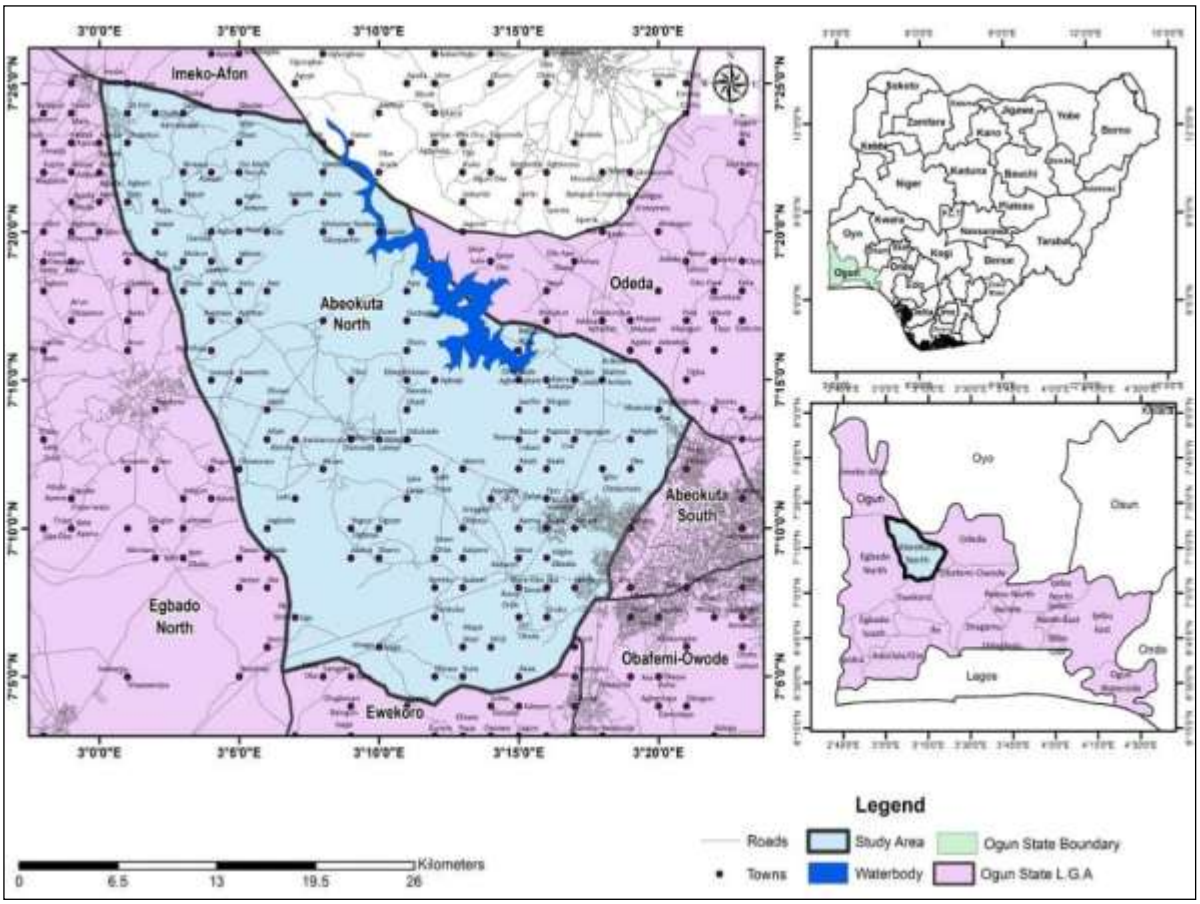

Figure 1: Map of Abeokuta North in the Context of Ogun State and Nigeria

2.3 Method of Data Collection

Both primary and secondary data were utilized. Primary data were collected through a structured questionnaire administered to 75 respondents, comprising farmers, residents, and local government officials selected using stratified random sampling to ensure representation of both urban and rural communities. Secondary data included multi-temporal satellite imagery covering decadal 1994 to 2024.

The questionnaire was divided into sections capturing respondents' socio-economic characteristics, perceptions of land use changes, drivers of urban encroachment, effects on agricultural productivity and food security, and strategies for sustainable land management. Data collection involved selfadministered questionnaires supported by research assistants, while satellite images (Path 191, Row 55) from Landsat 7 and Landsat 8 were processed and classified into land use categories such as built-up areas, vegetation, farmland, and water bodies (Table 1& 2).

2.4 Method of Analysis for the Questionnaire

The method of analysis for the questionnaire involved combining descriptive statistics (frequency, percentages, and charts) and inferential statistics, including Analysis of Variance (ANOVA) to examine the perception of residents on the changes in LULC patterns across study years and Student's t-test to assess the significance of urban encroachment on agricultural land reduction.

2.5 Spatial Analysis

Geospatial analysis involved image preprocessing, supervised classification, and change detection techniques in GIS software to quantify urban expansion and agricultural land loss over the study period.

Table 1: Summary of data sources for GIS Analysis

Satellite	Sensor	Band	Spectral Range	Pixel Resolution	Year	Path and Row
Landsat7	TM Multi-spectral	2,3,4	0.45-2.35 µm	30meters	1994	P191 r55
Landsat7	TM Multi-spectral	2,3,4	0.45-2.35 µm	30 meters	2004	P191 r55
Landsat8	ETM+ Multi-spectral	3,4,5	0.45-2.35 µm	30 meters	2014	P191 r55
Landsat8	ETM+ Multi-spectral	3,4,5	0.45-2.35 µm	30 meters	2024	P191 r55

Source: United State Geological Survey (2025)

Table 2: Image Classification

S/N	Classes	Description
1	Built-up Area	Residential, commercial and services, transportation, communications, utilities, industrial and commercial areas
2	Vegetation	Farmland, plantation, natural vegetation and all other green spaces
3	Water Bodies	Rivers, streams, lakes, and reservoirs
4	Rock outcrop	Exposed bedrock surfaces or large rocky formations with little or no soil or vegetation cover

Source: Adapted from Anderson (1976)

3.0 Results and Discussions

3.1 Land Use/Land Cover Classification and Changes in Abeokuta North (1994-2024)

The analysis of the land use/land cover (LULC) dynamics in Abeokuta North between 1994 and 2024, revealed a significant spatial transformation associated with urban expansion (Table 3 and Figures 2, 3, 4, and 5). Agricultural land remained the dominant land use throughout the study period but declined substantially from 63,014.20 ha (79%) in 1994 to 52,632.60 ha (66%) in 2024, indicating a net loss of 10,381.60 ha over 30 years (Table 3). This reduction suggests progressive conversion of farmland to other competing land uses, particularly built-up areas, due to increasing urbanization

pressures. Built-up areas showed the most remarkable increase, expanding from 3,690.45 ha (5%) in 1994 to 12,105.90 ha (15%) in 2024 (Table 3 and Figures 2, 3, 4, and 5). This tripling of urban land reflects rapid population growth, infrastructural development, housing demand, and the outward expansion of Abeokuta metropolis into peri-urban agricultural zones. Similar patterns have been reported in southwestern Nigeria, where urban growth has accelerated the encroachment of settlements onto agricultural landscapes (Akinyemi et al., 2021; Olajuyigbe et al., 2023). Rock outcrop coverage increased from 13% in 1994 to 19% in 2014 before declining slightly to 16% in 2024 (Table 3 and Figures 2, 3, 4, and 5). This fluctuation may be linked to improved satellite classification accuracy, vegetation clearance exposing rocky surfaces, or changes in land surface conditions. Water bodies remained relatively stable, fluctuating marginally between 3% and 4%, indicating limited hydrological changes within the study area. The findings align with recent studies on urban expansion and agricultural land conversion in Nigeria. For instance, Akinyemi et al. (2021) found that urban growth in southwestern Nigerian cities significantly reduced cultivable land while increasing built-up density. Similarly, Olajuyigbe et al. (2023) reported that peri-urban growth in Ogun State has intensified land competition, threatening food production and environmental sustainability. These results underscore the urgent need for sustainable land use planning, urban growth management, and agricultural land protection policies in Abeokuta North.

The summarizes of the hypothesis testing results on land use/land cover (LULC) changes and the impact of urban encroachment on agricultural land in Abeokuta North LGA are presented in Tables 4, 5, and 6. The Analysis of Variance (ANOVA) result revealed a statistically significant difference in LULC patterns over the study period, with an F-value of 248.18 and a p-value of .000, which is below the 0.05 significance threshold. Consequently, the null hypothesis (H_{01}) was rejected, confirming that substantial changes have occurred in land use and land cover patterns in Abeokuta North between 1994 and 2024 (Table 4). This finding is consistent with the observed increase in built-up areas and the decline in agricultural land across the study years, reflecting rapid urban growth and spatial transformation.

The one-sample t-test result indicated that urban expansion has significantly reduced agricultural land availability in Abeokuta North (Table 5). The analysis produced a t-value of 52.299 with 74 degrees of freedom and a p-value of .000, demonstrating statistical significance at the 5% level. The mean difference of 2.067 and the narrow 95% confidence interval (1.99–2.15) further validate the robustness of the result (Table 5). Therefore, the null hypothesis (H_{02}) was rejected, indicating that urban encroachment has a significant negative effect on agricultural land extent in the study area (Table 5).

These findings align with recent studies highlighting the impacts of urbanization on agricultural land conversion in Nigeria and other developing countries. Akinyemi et al. (2021) reported that urban growth in rapidly expanding African cities has significantly altered land use structures, with agricultural lands increasingly converted into residential and infrastructural uses. Likewise, Olajuyigbe et al. (2023) found that urban sprawl in peri-urban Ogun State has intensified land competition, reduced cultivable land, and threatened food security. The present study therefore reinforces the need for proactive urban planning, agricultural land protection policies, and sustainable growth strategies to manage urban expansion in Abeokuta North.

Table 3: Land Use/Land Cover Classification and Changes in Abeokuta North (1999–2024)

Land Use/Land Cover	1994 Area (ha)	1994 (%)	2004 Area (ha)	2004 (%)	2014 Area (ha)	2014 (%)	2024 Area (ha)	2024 (%)

Water Body	2,343.87	3	2,929.23	4	2,485.35	3	2,397.60	3
Built-up Area	3,690.45	5	6,018.93	8	8,278.83	10	12,105.90	15
Rock Outcrop	10,692.20	13	14,308.50	18	15,470.80	19	12,604.60	16
Agriculture	63,014.20	79	56,484.10	71	53,505.70	67	52,632.60	66
Total	79,740.70	100	79,740.70	100	79,740.70	100	79,740.70	100

Source: Author's Fieldwork (2025)

Table 4: ANOVA Result of variation in Land use/Land cover in Abeokuta North

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	7325855486.05	3	2441951828.68	248.18	0.000
Within Groups	118072607.70	12	9839383.97		
Total	7443928093.75	15			

Source: Author's Fieldwork (2025)

Table 5: One sample test of difference in reduction of agricultural land as a result of Urban Encroachment in Abeokuta North

Statement	**T**	**Df**	**Sig. (2-tailed)**	**Mean Difference**
Urban expansion has significantly reduced the availability of agricultural land in Abeokuta North LGA	52.299	74	0.000	2.067

Source: Author's Fieldwork (2025)

Table 6: Summary of Hypotheses Testing on Land Use/Land Cover Change and Agricultural Land Reduction in Abeokuta North LGA

Hypothesis	**Statistical Test**	**Test Statistics**	**pvalue**	**Decision**	**Interpretation**
H_{o1}: There is no significant change in land use and land cover patterns in Abeokuta North LGA over the study period	ANOVA	F = 248.18	.000	Rejected	Significant variations exist in land use and land cover patterns across the study years
H_{o2}: Urban encroachment does not significantly reduce the extent of agricultural land in Abeokuta North LGA	One-Sample t-test	t = 52.299, df = 74, Mean Difference = 2.067, 95% CI [1.99, 2.15]	.000	Rejected	Urban expansion has significantly reduced agricultural land availability in the study area

Source: Author's Fieldwork (2025)

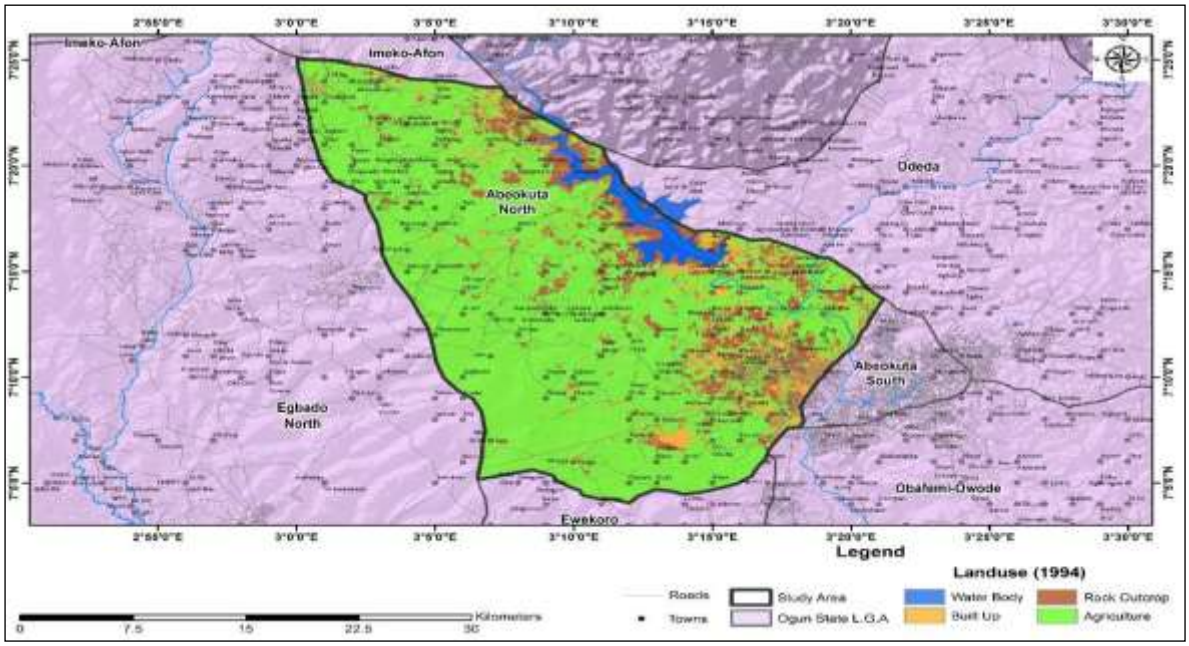

Figure 2: Land Use/Land Cover Classification and Changes in Abeokuta North for Year 1994

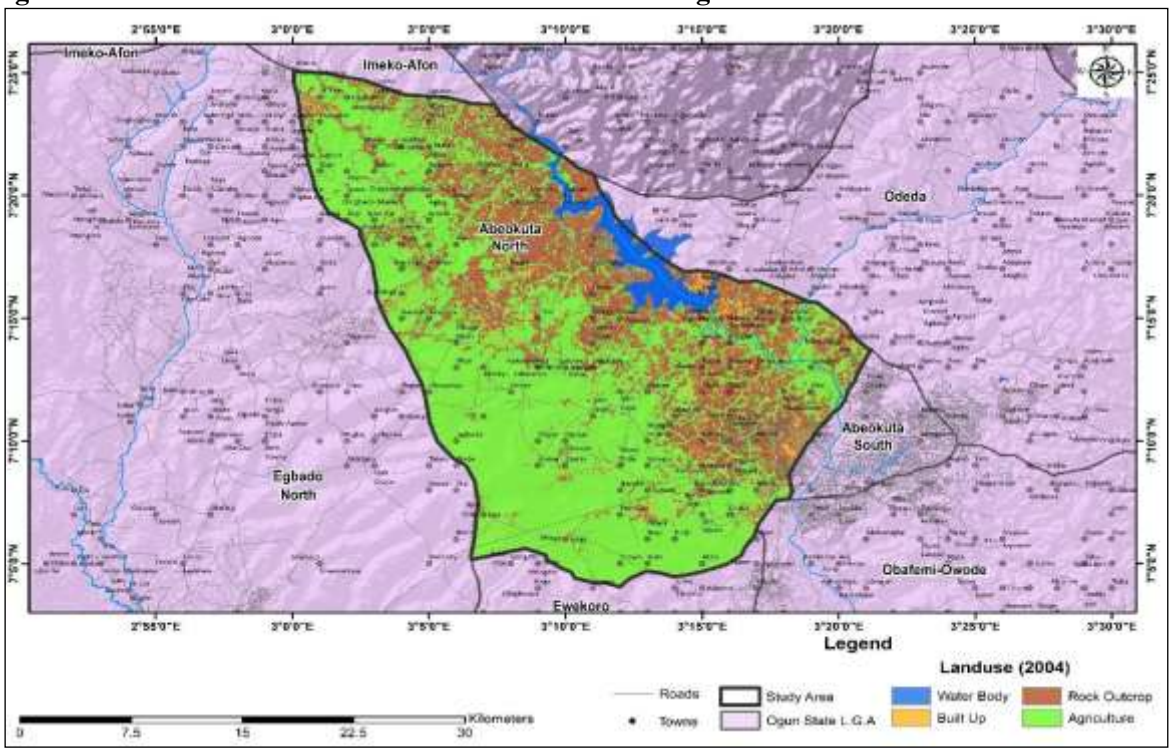

Figure 3: Land Use/Land Cover Classification and Changes in Abeokuta North for Year 2004

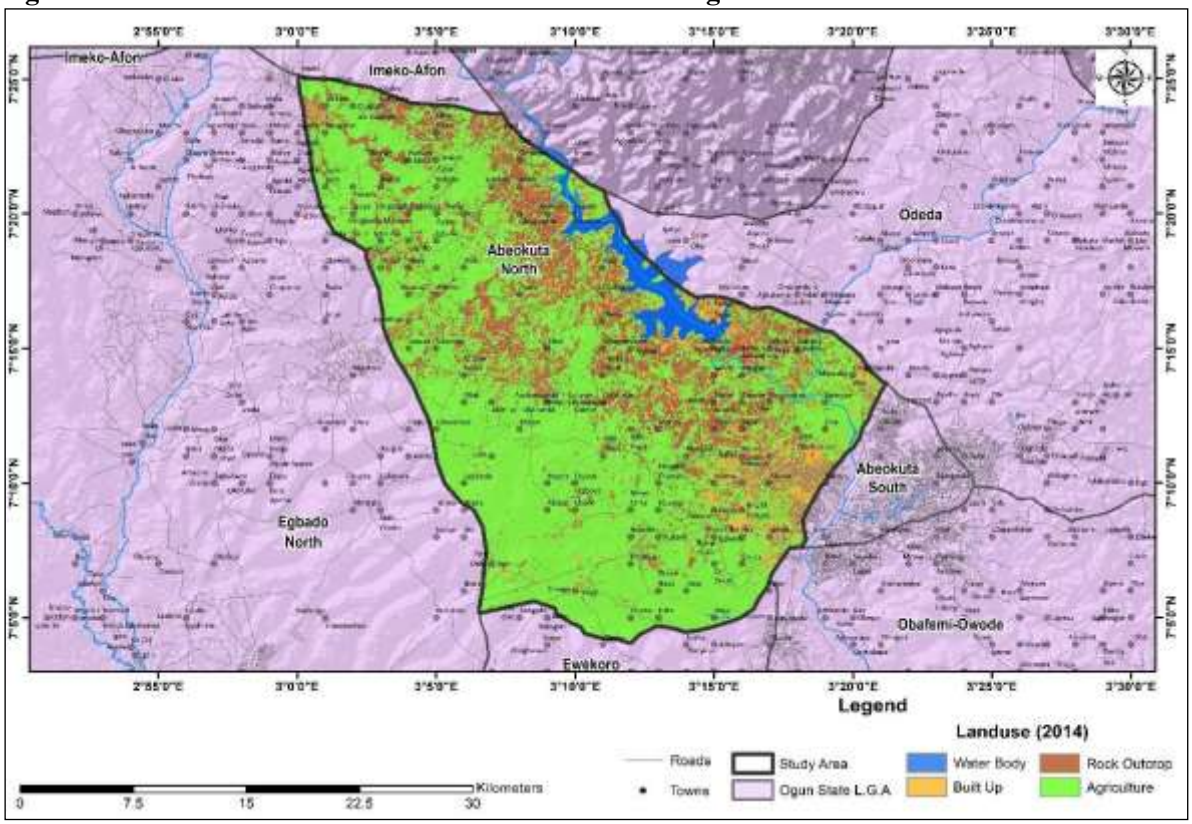

Figure 4: Land Use/Land Cover Classification and Changes in Abeokuta North for Year 2014

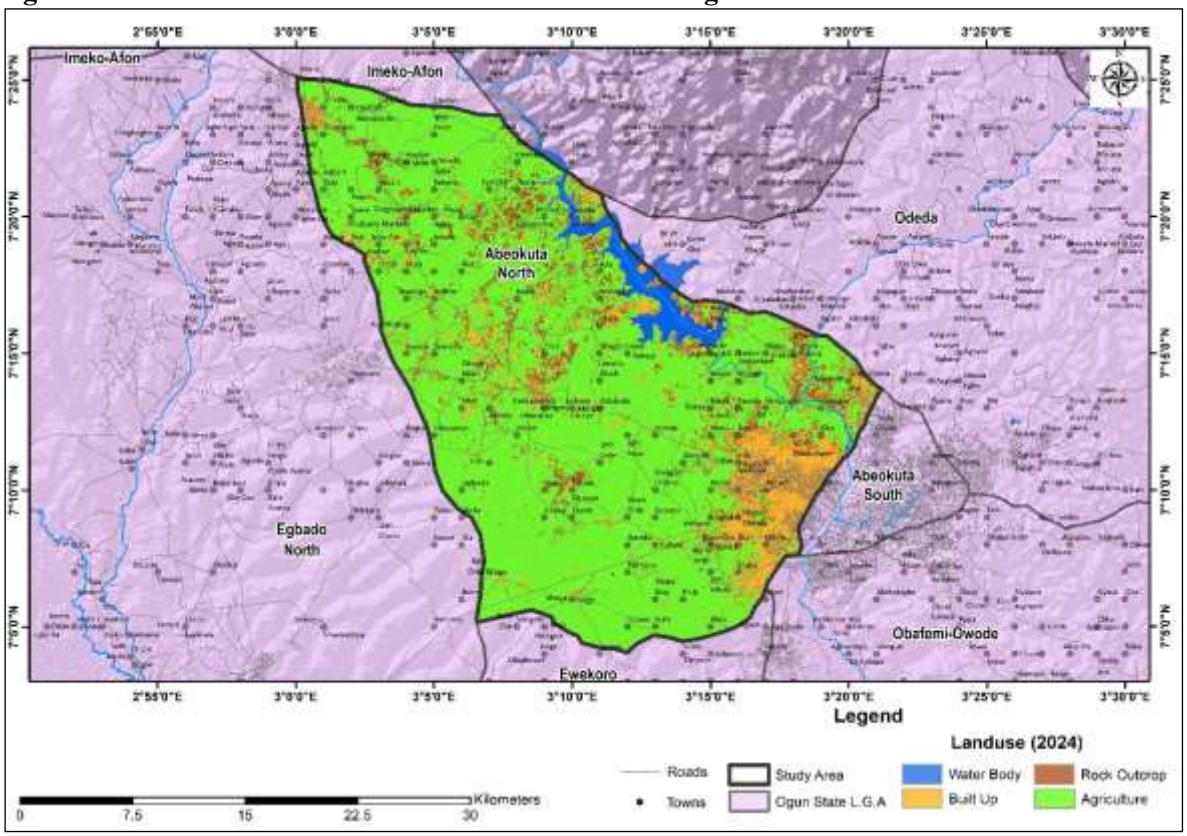

Figure 5: Land Use/Land Cover Classification and Changes for Year 2024

3.1 Socio-Economic Characteristics of Respondents in Abeokuta North

The findings in Table 7 shows that males constituted a slightly higher proportion of the sample (54.7%) than females (45.3%), indicating relatively balanced gender participation. The majority of respondents were married (65.3%), while 29.3% were single, suggesting that most participants were household decision-makers whose views may reflect family-oriented housing and land-use preferences (Table 7). In terms of age distribution, respondents aged 31–40 years accounted for the largest proportion (41.3%), followed by those aged 21–30 years (28.0%), indicating that the study population was dominated by economically active adults likely to be directly affected by urban expansion and housing demand (Table 7). Educational attainment was relatively high, with 73.3% of respondents possessing tertiary education, while only 4.0% had no formal education. This suggests a high level of literacy and awareness regarding urban development issues. Similar findings were reported by Akinyemi and Adelekan (2023), who noted that higher educational levels improve residents' understanding of land-use change and environmental management practices in rapidly urbanizing Nigerian cities. Occupationally, civil servants represented the largest group (33.3%), followed by traders and artisans (24.0% each), reflecting the mixed urban economy of Abeokuta North. Income distribution shows that nearly half of respondents (46.7%) earned between ₦30,000 and ₦60,000 monthly, while only 9.3% earned above ₦100,000, indicating a predominantly low- to middle-income population. This income structure may influence housing affordability and settlement choices (Table 7). Furthermore, most respondents had lived in the area for 6–10 years (50.7%) or 11–20 years (40.0%), implying substantial familiarity with changes in land use and urban growth patterns (Table 7). This aligns with findings by

Oduwaye (2022), who emphasized that long-term residents are better positioned to assess urban sprawl and land transformation processes in Nigerian metropolitan areas.

Table 7: Socio-Economic Characteristics of Respondents in Abeokuta North

Variables	Options	Frequency	Percentage (%)
Gender	Male	41	54.7
	Female	34	45.3
Marital Status	Single	22	29.3
	Married	49	65.3
	Divorced	4	5.3
Age	Under 20	5	6.7
	21–30 years	21	28
	31–40 years	31	41.3
	41–50 years	14	18.7
	Above 50 years	4	5.3
Educational Qualification	No formal education	3	4
	Secondary school	17	22.7
	Tertiary education	55	73.3
Occupation	Farmer	11	14.7
	Trader	18	24
	Civil servant	25	33.3
	Artisan	18	24
	Others	3	4
Monthly Income	Below N30,000	11	14.7
	N30,000–N60,000	35	46.7
	N61,000–N100,000	22	29.3
	Above N100,000	7	9.3
Length of Stay	Less than 5 years	4	5.3
	6–10 years	38	50.7
	11–20 years	30	40
	More than 20 years	3	4
Total		75	100

Source: Author's Fieldwork (2025)

3.2 Residents' Perception on the Patterns of Land Use/Land Cover Changes in Abeokuta North

The findings reveal that residential land use is the predominant land use type in the area, as indicated by 60% of respondents, while agricultural land accounts for 20%, industrial land 13.3%, and

commercial land 6.7% (Table 8). This suggests that the area is increasingly characterized by urban residential expansion, reflecting rapid population growth and urbanization trends commonly observed in many Nigerian cities. Recent studies have similarly reported that urban expansion in peri-urban areas of southwestern Nigeria is largely driven by residential development and increasing housing demand (Akinyemi & Mashapa, 2023; Oduwaye et al., 2022). Table 8 further shows that 72% of respondents noticed significant land use changes within the last 20 years, indicating a high level of public awareness regarding environmental transformation in the study area. Concerning the land use category that increased the most, 41.3% identified residential land use, followed by industrial development (29.3%). This pattern reflects the conversion of natural and agricultural landscapes into built-up environments to accommodate urban growth and economic activities. Similar findings were reported by recent studies on urban growth dynamics in southwestern Nigeria, where residential and industrial expansion were identified as major drivers of land transformation and urban sprawl (Adelodun et al., 2023; Olalekan & Yusuf, 2021). Regarding environmental components that declined most, 38.7% of respondents indicated forest cover, while 26.7% identified open spaces and 21.3% identified agricultural land (Table 8). This implies that urban development has contributed substantially to environmental degradation, vegetation loss, and reduction of ecological spaces in the area. The decline in forest cover and open spaces is consistent with recent geospatial studies that linked rapid urbanization in Nigerian metropolitan regions with deforestation, biodiversity loss, and declining environmental sustainability (Adelekan et al., 2022; Arowolo & Deng, 2024). Overall, the findings demonstrate that urban expansion in Abeokuta North has intensified pressure on natural land resources, resulting in significant alterations in land use patterns and environmental quality.

Table 8: Residents' Perception on the Patterns of Land Use /Land Cover Changes in Abeokuta North

Variable	Options	Frequency	Percent (%)
Predominant Land Use in the Area	Residential	45	60
	Commercial	5	6.7
	Agricultural	15	20
	Industrial	10	13.3
Notice of Land Use Changes in 20 Years	Yes	54	72
	No	21	28
Type of Land Use that Increased the Most	Residential	31	41.3
	Commercial	11	14.7
	Industrial	22	29.3
	Agricultural	11	14.7
Environmental Aspect that Decreased Most	Built-up areas	7	9.3
	Agricultural land	16	21.3
	Forest cover	29	38.7
	Open spaces	20	26.7
	Others	3	4
Total		75	100

Source: Author's Fieldwork (2025)

3.3 Residents' Perception on the Extent of Urban Encroachment on Agricultural Land in Abeokuta North

The findings show that 70.7% of respondents indicated that agricultural lands are located close to urban areas, while 72% observed a reduction in agricultural land as a result of urban development (Table 9). This suggests that rapid urban expansion has increasingly pushed residential, commercial, and infrastructural development into previously agricultural zones. Similar studies in Nigeria and other developing countries have reported that urban growth frequently occurs at the expense of periurban agricultural land due to rising population pressure and increasing land demand (Adelekan et al., 2022; Arowolo & Deng, 2024). Regarding the extent of urban encroachment, the majority of respondents (88%) perceived that urban expansion has moderately reduced the availability of agricultural land, while 9.3% considered the reduction to be high (Table 9). Furthermore, 74.7% of respondents indicated that urban development projects are highly encroaching on prime agricultural land, reflecting increasing pressure on productive farmland (Table 9). The findings also reveal that 65.3% of respondents moderately agreed that the conversion of agricultural land to residential and commercial uses is increasing in the area (Table 9). This pattern aligns with recent studies that identified land conversion from agricultural to built-up uses as a major consequence of urban sprawl in rapidly growing Nigerian cities (Oduwaye et al., 2022; Adelodun et al., 2023). In addition, 92% of respondents moderately agreed that encroachment on agricultural land poses a serious concern for the economic sustainability of the community. This perception reflects growing fears about food insecurity, declining agricultural productivity, and loss of rural livelihoods associated with urban land conversion. Recent literature has similarly emphasized that uncontrolled urban expansion threatens sustainable agriculture and weakens local economic resilience in peri-urban regions (Olalekan & Yusuf, 2021; FAO, 2023).

Table 9: Resident Perception on the Extent of Urban Encroachment on Agricultural Land in Abeokuta North

Variables	Options	Frequency	Percent (%)
Agricultural Lands Close to Urban Areas	Yes	53	70.7
	No	22	29.3
Observed Reduction in Agricultural Land Due to Urban Development	Yes	54	72
	No	21	28
Total		75	100
Extent of urban encroachment on agricultural land	Low	Moderate	High
Urban expansion has significantly reduced the availability of agricultural land in Abeokuta North LGA	2.7	88	9.3
Urban development projects are rapidly encroaching on prime agricultural land in the area.	6.7	18.7	74.7
The conversion of agricultural land to residential or commercial use is increasing in this area	10.7	65.3	24

Encroachment on agricultural land is a major concern for the community's economic sustainability	4	92	4

Source: Author's Fieldwork (2025)

3.4 Residents' Perception of the Drivers of Urban Encroachment on Agricultural Land in Abeokuta North

The results show that 66.7% of respondents agreed that population growth contributes significantly to urban encroachment, highlighting the role of increasing population pressure in stimulating land demand (Table 10). Similarly, 86.7% either agreed or strongly agreed that poor land use planning is a major driver of urban encroachment, indicating weaknesses in urban management and development control (Table 10). This finding supports recent studies that identified ineffective planning regulations and weak enforcement mechanisms as major causes of uncontrolled urban expansion in Nigerian cities (Akinyemi & Mashapa, 2023). Table 10 also indicates that increased housing demand has accelerated urban encroachment on agricultural land, with 60% of respondents agreeing and 21.3% strongly agreeing. This reflects the growing need for residential accommodation resulting from urban population increase. In addition, 69.3% of respondents agreed or strongly agreed that industrialization and commercial activities drive urban expansion, while 73.3% believed that government policies have indirectly encouraged encroachment through inadequate land management practices and infrastructure development policies. These findings are consistent with recent urban development studies which identified housing demand, industrial growth, population increase, and weak policy implementation as major drivers of agricultural land conversion in rapidly urbanizing regions of sub-Saharan Africa (UN-Habitat, 2022; Adelekan et al., 2022). Overall, the findings indicate that urban encroachment in Abeokuta North is driven by multiple socio-economic and institutional factors, with significant implications for agricultural sustainability and urban environmental management.

Table 10: Residents' Perception of the Drivers of Urban Encroachment on Agricultural Land in Abeokuta North

Drivers of Urban Encroachment	SD	D	A	SA
Population growth has contributed to urban encroachment on agricultural land in this community	2.7	30.7	66.7	—
Poor land use planning is a major driver of urban encroachment in my area	1.3	12	46.7	40
Increased demand for housing has led to urban encroachment on agricultural land	—	60	18.7	21.3
Urban expansion is driven by industrialization and commercial activities	2.7	28	52	17.3
Government policies have encouraged urban encroachment in my area	1.3	25.3	45.3	28

Source: Author's Fieldwork (2025)

3.5 Residents' Perception on the Effects of Urban Encroachment on Agricultural Productivity and Food Security

The findings reveal that a majority of respondents (60%) believed that urban encroachment has negatively affected agricultural productivity, while 40% disagreed (Table 11). This indicates that the rapid expansion of urban land uses into agricultural areas is increasingly perceived as a threat to farming activities and rural livelihoods within the study area. This finding aligns with recent studies which reported that urban expansion in Nigerian cities has contributed to the loss of agricultural land, declining productivity, and pressure on peri-urban farming systems (Akinyemi & Omojola, 2022; Adepoju et al., 2023). Regarding the specific ways productivity has been affected, more than half of the respondents (50.7%) identified increased cost of farming as the major effect of urban encroachment, while 36% indicated reduced farmland availability and 13.3% reported decreased crop yields (Table 11). The increase in farming costs may be associated with rising land values, transportation expenses, and the need for farmers to cultivate more distant lands due to urban expansion. Reduced farmland availability further confirms the growing competition between urban development and agricultural land use in Abeokuta North. Similar observations were made by recent studies on peri-urban agriculture in sub-Saharan Africa, which noted that urbanization often reduces access to fertile farmland and increases the economic burden on farmers (Olapade & Agbola, 2021; FAO, 2023). Table 11 further shows that 64% of respondents agreed that some farmers have abandoned agriculture due to urban encroachment, whereas 36% disagreed. This suggests that continued urban pressure may be discouraging farming activities and contributing to occupational shifts among rural residents. Such trends have been documented in rapidly urbanizing regions where farmers sell or lose agricultural land to residential and commercial development, thereby reducing agricultural participation and threatening local food systems (UN-Habitat, 2022).

Concerning food availability in markets, responses were nearly divided, as 49.3% believed urban encroachment has affected food availability, while 50.7% disagreed. Although perceptions varied, the majority of respondents (69.3%) still rated the overall impact of urban encroachment on food security as moderate, while 17.3% considered it severe and 13.3% perceived it as minimal. This implies that urban encroachment is gradually influencing household and community food security through reduced agricultural production and supply instability. Recent studies have similarly emphasized that unchecked urban growth contributes to food insecurity by diminishing local agricultural output and increasing dependence on external food sources (World Bank, 2023; Adeboye et al., 2024). In terms of mitigation measures, respondents suggested public awareness campaigns (33.3%) and farmland conservation policies (32%) as the most effective strategies for reducing the effects of urban encroachment. Other measures included promoting vertical urban expansion (18.7%) and enforcing strict land use zoning regulations (16%). These responses highlight the need for integrated urban planning policies that protect agricultural land while accommodating urban growth. Contemporary urban sustainability studies have similarly advocated farmland preservation policies, effective zoning systems, and public participation as critical approaches for achieving balanced urban and agricultural development (UNEP, 2023; Adebayo & Adebisi, 2024).

Table 11: Residents' Perception on the Effects of Urban Encroachment on Agricultural Productivity and Food Security

Variables	Options	Frequency	Percent (%)
Has urban encroachment affected agricultural productivity?	Yes	45	60

	No	30	40
How has productivity been affected?	Decreased crop yields	10	13.3
	Reduced farmland availability	27	36
	Increased cost of farming	38	50.7
Farmers abandoned agriculture due to encroachment?	Yes	48	64
	No	27	36
Urban encroachment affected food availability in markets?	Yes	37	49.3
	No	38	50.7
Impact of urban encroachment on food security	Minimal	10	13.3
	Moderate	52	69.3
	Severe	13	17.3
Measures to reduce effects of urban encroachment	Strict land use zoning regulations	12	16
	Promote vertical expansion	14	18.7
	Farmland conservation policies	24	32
	Public awareness campaigns	25	33.3
Total		75	100

Source: Author's Fieldwork (2025)

4.0 Conclusion and Recommendations

The study concluded that urban encroachment had a significant impact on land use patterns in Abeokuta North. Residential development dominates land use, owing to population growth, housing demand, industrialization, and inadequate land-use planning. This trend has resulted in a steady reduction in agricultural land, with serious consequences for food production, environmental sustainability, and rural livelihoods. Forests and open spaces are disappearing, while agricultural productivity is declining. These changes have the potential to affect long-term socioeconomic development if they are not addressed through effective policies and sustainable planning strategies. Therefore, the study recommends the following:

1. Government should enforce strict land use zoning regulations to control the conversion of agricultural land into residential or commercial use.
2. Urban planning authorities should promote vertical expansion to reduce horizontal spread and preserve more farmland.

3. Farmland conservation policies should be introduced to protect agricultural areas from further encroachment.
4. Public awareness campaigns should be organized to educate residents on the importance of sustainable land use.
5. Local governments should encourage integrated land use planning to balance development with agricultural needs.

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