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Linking Household Socio-Economic Characteristics to Peri-Urban Land Conversion: A Remote Sensing and Survey-Based Analysis of Ikorodu, Nigeria

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Abstract

Peri-urban landscapes across Sub-Saharan Africa are undergoing rapid transformation, yet the household-level socio-economic dynamics driving these changes remain poorly understood. This study investigates the relationship between household socio-economic characteristics and land conversion in Ikorodu, a rapidly urbanizing peri-urban municipality on the outskirts of Lagos, Nigeria. We integrated remote sensing analysis of Land Use/Land Cover (LULC) change (2005–2025) with primary survey data from 384 households to examine who converts land, why they do so, and what consequences follow. Our findings reveal a landscape in dramatic transition. Built-up areas expanded by 270.6% over the study period, with the most significant conversion occurring from bare surface and agricultural land to urban development (12,821.58 hectares). These spatial changes were not lost on residents: 89.1% observed land use changes in their communities, with agricultural land converting to housing (87.1%) and commercial use (62.6%) being most frequently reported. Notably, 20.3% of households had personally converted land, driven primarily by the pursuit of higher income (35.9%) and declining agricultural profitability (23.1%). Logistic regression analysis identified land ownership as the strongest predictor of conversion (OR = 4.14, $p < 0.001$), followed by farming occupation (OR = 2.94, $p = 0.001$) and trading (OR = 1.86, $p = 0.045$). Higher education (OR = 0.76, $p = 0.002$) and income (OR = 0.68, $p = 0.001$) emerged as protective factors, suggesting that economically vulnerable households are disproportionately driving land conversion—often out of necessity rather than opportunity. Households reported mixed impacts: while property values and economic opportunities increased, concerns about farmland loss (Mean = 4.42), food security (Mean = 3.58), and environmental degradation (Mean = 3.70) were widespread. This study makes a methodological contribution by linking remote sensing with household survey data, demonstrating how spatial patterns of land change can be explained by socio-economic processes at the household level. The findings challenge simplistic narratives of urban expansion and highlight the need for targeted policies that address the economic pressures driving land conversion while supporting vulnerable households. We argue that sustainable peri-urban land management requires not only stronger planning institutions but also economic alternatives that make farming viable and land conversion a choice rather than a necessity. The study offers empirical evidence from a rapidly transforming African context, contributing to broader debates on urbanization, food security, and sustainable land governance.

1.0 Introduction

Urbanization represents one of the most transformative forces shaping twenty-first-century landscapes, economies, and societies. According to United Nations projections, by 2050, 68% of the world's population will reside in urban areas, with nearly 90% of this growth concentrated in Africa and Asia. India, China, and Nigeria alone are projected to account for 35% of global population growth between now and 2050, with Nigeria expected to become the third most populous country in the world, reaching 375 million by mid-century (Dekolo et al., 2025; United Nations, 2019). While urbanization drives economic development and improves access to services, its uncontrolled spatial expansion—often manifesting as urban sprawl—poses profound sustainability challenges. In African cities, these challenges manifest through informal land use, environmental degradation, loss of agricultural land, and the diminution of forest and high-biodiversity wetlands (Dekolo et al., 2025; Cobbinah & Amoako, 2021).

Sub-Saharan Africa's sustainability challenges have been closely associated with a sprawling peri-urbanization process (Chirisa et al., 2017; Cobbinah et al., 2015; Güneralp et al., 2017; Cobbinah & Amoako, 2021). Peri-urban areas—the transitional zones between rural hinterlands and urban cores—are particularly vulnerable to these pressures. These zones, often highly productive for agriculture, experience relentless conversion of farmland and forest to residential, commercial, and industrial uses as cities expand outward (Dekolo et al., 2025). The sustainability challenge of shrinking provisioning ecosystem services in the region has been linked to the conversion of farmlands and forest land to urban land uses in peri-urban areas (Kindu et al., 2016; Seto et al., 2012). Research has demonstrated that peri-urban areas are pivotal to urban survival, providing essential agricultural resources, ecosystem services, and livelihood opportunities for both urban and rural populations (Dekolo et al., 2025; Tacoli, 2019). However, rapid and often uncoordinated transformation of these areas threatens their productive capacity and undermines the rural-urban linkages upon which cities depend.

The concept of peri-urbanization describes the process of non-contiguous urban expansion into rural-urban fringes, resulting in fragmented and often unplanned landscapes. Across Sub-Saharan Africa, peri-urban land use and land cover change (LULC) is accelerating, reshaping agrarian landscapes where smallholder farming, settlement expansion, and common resources increasingly compete (Frontiers in Sustainable Cities, 2026). In these contexts, land remains a foundational asset for livelihoods, food production, and ecological stability, while accelerating socio-economic change and spatial expansion are placing unprecedented pressure on its availability, governance, and long-term sustainability (Frontiers in Sustainable Cities, 2026). Evidence from peri-urban areas in Malawi indicates that land-use transitions are driven primarily by land markets, spatial accessibility, and institutional conditions rather than demographic pressure alone, suggesting that understanding the socio-economic dimensions of land conversion is essential for effective policy design (Frontiers in Sustainable Cities, 2026).

Nigeria, as the most populous country in Africa and one of the fastest-urbanizing nations globally, exemplifies the challenges and opportunities inherent in rapid peri-urban transformation. The Lagos megacity region, the country's economic powerhouse, has experienced unprecedented urban expansion over the past four decades. Remote sensing analyses reveal that over 60,000 hectares (approximately 190% increase) were converted to built-up areas in the Lagos region, while 83,541 hectares of forestland were lost, suggesting high rates of urbanization and corresponding deforestation (Object-based land use/land cover change detection of a coastal city, 2020). Similarly, vegetated surfaces and water bodies in the Lagos megacity decreased significantly by 377 km² (−10%) and 58 km² (−6%) between 1984 and 2020, while built-up areas expanded by 1,075 km² (+150%) (Long-term groundwater security in Lagos, 2025). Farmlands in the study area declined by 13.03% between 1984 and 2013 and by 21.79% between 2013 and 2024, underscoring the accelerating loss

of agricultural land (A multi-temporal satellite data and spectral indices, 2026). These transformations have significant implications for food security, ecosystem services, and sustainable urban development.

Ikorodu, a peri-urban municipality on the northeastern outskirts of Lagos, provides a compelling case study of these dynamics. Historically a farming community with extensive agricultural land (approximately 49% of its landmass originally zoned for agricultural use), Ikorodu has undergone dramatic transformation over the past three decades. Recent geospatial studies have quantified the scale of this transformation. Research examining LULC dynamics in Ikorodu from 2010 to 2025 found that the area experienced the most intense and compact urban expansion among the urban fronts studied in Lagos State, driven by industrial development and improved transport connectivity (Sustainable Urbanization and Land Use/Land Cover Change Dynamics in Epe, Badagry, and Ikorodu, Lagos State, Nigeria (2010–2025), 2026). Similarly, a study spanning 32 years documented that built-up areas in the Ikorodu municipality increased by 127%, leading to fragmented and uncontrolled development in statutory agricultural zones (Dekolo et al., 2025). The structural equation modeling for 322 homeowners sampled in that study showed that lack of policy awareness and weak development control were major underlying drivers, explaining 37% of peri-urban expansion (Dekolo et al., 2025). Furthermore, declining per capita arable lands indicate risks to regional food self-sufficiency (Dekolo et al., 2025).

Despite the growing body of literature on LULC in peri-urban Lagos, several critical gaps persist. First, most studies have focused on macro-level analyses—quantifying land cover transitions using remote sensing—without sufficiently examining the micro-level socio-economic processes that underpin these changes. While remote sensing studies have been effective in documenting the magnitude and spatial patterns of LULC, they often provide limited insight into the household-level decision processes and market mechanisms that drive specific land-use transitions (Frontiers in Sustainable Cities, 2026). Second, while some research has identified proximate drivers of urban sprawl such as policy awareness and development control (Dekolo et al., 2025), the role of household socio-economic characteristics—including income, education, occupation, land tenure, and household composition—in shaping land conversion decisions remains underexplored. Third, there is limited empirical evidence linking household-level attributes to observed LULC patterns, creating a disconnect between the "what" of land change (documented through remote sensing) and the "who" and "why" (which require primary socio-economic data). This gap is particularly significant in peri-urban areas like Ikorodu, where land use decisions are made at the household level in response to economic pressures, demographic changes, and livelihood considerations.

Furthermore, the socio-economic consequences of land conversion for affected households remain poorly understood. While the loss of agricultural land is widely acknowledged as a threat to food security and local livelihoods, there is limited primary evidence on how households perceive and experience these changes, what impacts they report on their well-being, and how they adapt to the transformation of their landscapes. Research from other African contexts suggests that urban expansion impacts smallholder farmers' livelihoods as farmland shrinks, giving way to sprawling cities, with consequences for food security and livelihood sustainability (Sprawling cities, shrinking farmland, 2025). In peri-urban areas of Accra, food access and security are particularly constrained by insufficient purchasing power and limited off-farm employment opportunities for former farmers (Rural-urban land and food system changes in West Africa, 2025). These findings highlight the need for household-level analysis of the impacts of land conversion in the Nigerian context.

This study addresses these gaps by investigating the relationship between household socio-economic characteristics and peri-urban land conversion in Ikorodu, Nigeria, over the period 2005–2025. The study adopts an integrated methodology that combines remote sensing

analysis of LULC with primary socio-economic survey data collected from 384 households across the study area. Specifically, the study examines the socio-demographic profile of households, land ownership and tenure arrangements, observed LULC changes and household-level conversion experiences, perceived drivers and impacts of land conversion, and the socio-economic factors that significantly predict household land conversion.

This study makes several contributions to knowledge and policy. From a theoretical perspective, it advances understanding of the socio-economic drivers of peri-urban land conversion by linking household-level attributes to observed LULC patterns—an approach that has been called for in recent literature. Methodologically, it demonstrates the value of integrating remote sensing with household survey data to provide a more complete picture of land use dynamics, an approach increasingly recognised as essential for understanding the interaction between land-use changes and livelihood strategies at the household level (Remote sensing and statistical data analysis, 2026). From a policy perspective, the findings have direct relevance for urban planning, agricultural policy, and land governance in Lagos State. By identifying the household characteristics associated with land conversion, the study provides evidence to guide targeted interventions—whether through strengthening development control, supporting alternative livelihoods for vulnerable groups, or improving land tenure security. The study also contributes to broader debates on sustainable urbanization in African cities, providing empirical evidence from a rapidly transforming peri-urban context.

2. Literature Review

2.1 Conceptual Framework: Understanding Peri-Urban Land Conversion

Understanding the dynamics of peri-urban land conversion requires a conceptual framework that integrates multiple theoretical perspectives. At its core, this study draws upon land use/land cover change (LULC) theory, which posits that land use transitions are driven by the interaction of biophysical, demographic, economic, and institutional factors (Lambin et al., 2001; Lambin & Meyfroidt, 2010). The framework acknowledges that land use decisions are made at multiple scales, from global economic forces to local household-level choices, and that these decisions are mediated by land tenure systems, market conditions, and governance structures (Turner et al., 2007; Meyfroidt et al., 2013).

In peri-urban contexts specifically, the competition between agricultural, residential, commercial, and industrial land uses creates a complex mosaic of land use transitions. The peri-urban interface is characterised by its dynamic nature, where land use decisions are shaped by proximity to urban centres, accessibility to infrastructure, land values, and the aspirations of both rural and urban households (Allen, 2003; Tacoli, 2019). The concept of peri-urbanisation—the process of non-contiguous urban expansion into rural-urban fringes—captures the spatial and social transformations that occur when urban growth extends beyond formal urban boundaries, resulting in fragmented and often unplanned landscapes (Chirisa et al., 2017; Mabin et al., 2013).

The household-level analysis employed in this study draws on the sustainable livelihoods framework, which recognises that households make land use decisions based on their asset portfolios, livelihood strategies, and vulnerability contexts (Scoones, 1998; Ellis, 2000). According to this perspective, households in peri-urban areas may choose to convert agricultural land to residential or commercial uses in response to economic opportunities, demographic pressures, or perceived threats to their livelihoods. Land conversion decisions are therefore not merely responses to external pressures but are also shaped by household characteristics such as income, education, occupation, land tenure, and household composition (Adger et al., 2004; Bebbington, 1999).

This study contributes to understanding the micro-level dynamics of land conversion by exploring the relationship between household

socio-economic characteristics and land conversion decisions. The conceptual framework posits that household-level factors—including land ownership, occupation, income, education, household size, and duration of residence—influence the likelihood of land conversion, both directly and through their interaction with broader institutional and market forces. By linking these household characteristics to observed LULC patterns, the study provides a more nuanced understanding of the processes driving peri-urban transformation.

2.2 Peri-Urbanization and Land Use Change in Sub-Saharan Africa

Peri-urbanisation has emerged as a dominant process shaping the landscapes of Sub-Saharan African cities over the past three decades. Unlike the compact urban expansion observed in many Asian contexts, African peri-urbanisation is characterised by low-density, non-contiguous sprawl that often bypasses formal planning and regulatory mechanisms (Cobbinah et al., 2015; Güneralp et al., 2017). The phenomenon has been described as "urbanisation from below," driven by the aspirations and actions of small-scale landholders and developers rather than by formal state planning (Gough & Yankson, 2000; Rakodi, 1997).

The drivers of peri-urban land conversion in Sub-Saharan Africa are multifaceted and context-specific. Population growth and rural-urban migration are primary demographic drivers, as rapidly growing urban populations require housing, infrastructure, and services that extend well beyond formal city boundaries (Tacoli, 2019; Cohen, 2006). Economic factors, including the diversification of rural livelihoods and the integration of peri-urban areas into urban markets, have also been identified as significant drivers (Bryceson, 2002; Toulmin, 2012). The expansion of transport infrastructure and improvements in connectivity between urban centres and their peripheries have facilitated peri-urban growth by making commuting and the transport of goods more viable (Cobbinah & Amoako, 2021; Chirisa et al., 2017).

Institutional factors play a critical role in shaping peri-urban land conversion patterns. Weak governance, inadequate land use planning, and limited enforcement of regulations have been identified as key drivers of uncontrolled peri-urban expansion across Sub-Saharan Africa (Sietchiping, 2006; Mabin et al., 2013). In many contexts, customary land tenure systems coexist uneasily with statutory planning frameworks, creating ambiguity that can facilitate land conversion (Nkwodimmah & Okafor, 2015; Bennett et al., 2013). The absence of effective mechanisms for land use regulation, combined with corruption and lack of political will, has contributed to the fragmentation and degradation of peri-urban landscapes (Cobbinah et al., 2015; Chirisa et al., 2017).

The consequences of peri-urban land conversion in Sub-Saharan Africa are profound and contested. On one hand, peri-urbanisation generates economic opportunities, providing access to urban markets, employment, and services for rural populations. The creation of residential and commercial developments generates economic activity and can contribute to poverty reduction (Tacoli, 2019; Satterthwaite, 2010). On the other hand, the loss of agricultural land threatens food security, particularly in areas where peri-urban agriculture provides significant quantities of food to urban populations (Drechsel & Dongus, 2010; Tacoli, 2017). The conversion of forests and wetlands to urban uses reduces biodiversity, alters hydrological regimes, and diminishes ecosystem services (Kindu et al., 2016; Seto et al., 2012). Furthermore, the social consequences of peri-urban transformation include the displacement of rural populations, the disruption of social networks, and the emergence of new forms of inequality (Rakodi, 1997; Gough & Yankson, 2000).

2.3 LULC and its Determinants in Lagos and Its Peri-Urban Region

Lagos, Nigeria's economic capital and one of the world's fastest-growing cities, provides a compelling case study of urban expansion and its implications for land use change. The Lagos megacity, with a population estimated at over 22

million, has experienced unprecedented urban expansion over the past four decades. Remote sensing analyses reveal that over 60,000 hectares (approximately 190% increase) were converted to built-up areas in the Lagos region, while 83,541 hectares of forestland were lost, suggesting high rates of urbanisation and corresponding deforestation (Object-based land use/land cover change detection of a coastal city, 2020). Vegetated surfaces and water bodies decreased significantly by 377 km² (−10%) and 58 km² (−6%) between 1984 and 2020, while built-up areas expanded by 1,075 km² (+150%) (Long-term groundwater security in Lagos, 2025). Farmlands declined by 13.03% between 1984 and 2013 and by 21.79% between 2013 and 2024, underscoring the accelerating loss of agricultural land (A multi-temporal satellite data and spectral indices, 2026).

The spatial pattern of urban expansion in Lagos is characterised by sprawling peri-urban growth extending along major transport corridors into surrounding municipalities. Studies examining the dynamics of urban growth have documented that Lagos's expansion is both extensive and intensive, with a concentration of development along the Lagos-Ibadan Expressway and the Lagos-Badagry Expressway (Aina, 2002; Dekolo et al., 2025). This pattern reflects the influence of transport infrastructure and the availability of land at the periphery, where land values are lower and regulatory oversight is weaker (Dekolo et al., 2025; Nkwodimmah & Okafor, 2015).

The determinants of LULC in the Lagos region have been the subject of extensive research. Population growth has been identified as the primary driver of urban expansion, with Lagos's population growing at approximately 4-5% annually, far outstripping the capacity of formal planning and infrastructure provision (World Bank, 2021; United Nations, 2019). Economic factors, including the concentration of economic activity in Lagos and the rural-urban migration of labour, have also been significant drivers (Tacoli, 2019). The expansion of housing and commercial development has been driven by demand from both indigenous populations and migrants, contributing to the conversion of agricultural and forest land to urban uses (Dekolo et al., 2025; Aina, 2002).

Institutional factors have played a critical role in shaping LULC patterns in the Lagos region. Weak development control, limited enforcement of land use regulations, and inadequate urban planning have been identified as major drivers of peri-urban expansion (Dekolo et al., 2025; Nkwodimmah & Okafor, 2015). A study examining the drivers of peri-urban sprawl in Lagos found that lack of policy awareness and weak development control explained 37% of peri-urban expansion (Dekolo et al., 2025). The coexistence of customary and statutory land tenure systems has created ambiguity in land governance, enabling land conversion in the absence of effective regulation (Bennett et al., 2013; Nkwodimmah & Okafor, 2015).

The impacts of LULC in the Lagos region are increasingly recognised as significant sustainability challenges. The loss of agricultural land threatens food security, particularly in peri-urban areas where agriculture is an important source of livelihoods and food supply (Dekolo et al., 2025; Drechsel & Dongus, 2010). The conversion of forests and wetlands reduces biodiversity, alters hydrological regimes, and increases flood risk (Kindu et al., 2016; Adelekan, 2010). Urban expansion also contributes to the urban heat island effect, rising temperatures, and increased energy consumption (Ahmed et al., 2025). Furthermore, the displacement of rural populations and the disruption of social networks have significant social implications (Rakodi, 1997; Gough & Yankson, 2000).

2.4 Socio-Economic Drivers of Land Conversion at the Household Level

While the macro-level drivers of LULC are well-documented, there is growing recognition that land conversion decisions are made at the household level, influenced by household socio-economic characteristics and livelihood strategies. Understanding these micro-level dynamics is essential for explaining the spatial pattern and timing of land conversion and for

designing effective policy interventions (Rudel et al., 2009; Meyfroidt et al., 2013).

The literature on household-level drivers of land conversion has identified several key socio-economic factors. Land ownership has emerged as one of the most important predictors of land conversion, as landowners have the legal authority to change land use and are more likely to capture the economic benefits of conversion (Rudel et al., 2009; Robinson et al., 2013). Studies from diverse contexts have found that land ownership status is associated with higher rates of land conversion, particularly where land values are increasing and conversion is economically profitable (Barrett et al., 2001; Lambin & Meyfroidt, 2010). In peri-urban areas, landowners may convert agricultural land to residential or commercial uses in response to economic opportunities, demographic pressures, or concerns about declining agricultural profitability (Tacoli, 2019; Allen, 2003).

Household income and wealth are also significant predictors of land conversion. Wealthier households often have the financial resources to convert land, invest in development, and navigate regulatory processes (Robinson et al., 2013; Meyfroidt et al., 2013). However, the relationship between income and land conversion is not always linear; poorer households may also convert land out of necessity, particularly where agricultural livelihoods are no longer viable (Barrett et al., 2001; Ellis, 2000). The diversification of household livelihoods, including the integration of non-farm activities, has been associated with increased rates of land conversion, as households reduce their dependence on agriculture and seek new sources of income (Bryceson, 2002; Toulmin, 2012).

Education has been identified as a factor influencing land conversion decisions, with higher education levels associated with different land use patterns. Educated households may be more aware of economic opportunities, more able to navigate land markets, and more likely to engage in non-agricultural activities (Rudel et al., 2009; Robinson et al., 2013). However, the direction of the relationship between education and land conversion is context-dependent, with some studies finding that higher education is associated with agricultural intensification rather than conversion (Boserup, 1965; Lambin & Meyfroidt, 2010).

Occupation is another key determinant of land conversion. Households whose primary occupation is farming may be more likely to convert land if agricultural profitability is declining or if they are seeking to diversify their livelihood strategies (Bryceson, 2002; Toulmin, 2012). Conversely, households engaged in non-agricultural occupations may have less attachment to agricultural land and may be more willing to convert it to other uses (Tacoli, 2019; Allen, 2003). In peri-urban areas, the transition from agriculture to non-agricultural livelihoods is often accompanied by land conversion, as households shift from farming to trading, business, or salaried employment (Dekolo et al., 2025; Aina, 2002).

Household composition and demographic factors also influence land conversion. Larger households may require more housing, increasing the likelihood of land conversion for residential use (Robinson et al., 2013; Meyfroidt et al., 2013). The age composition of households can also affect land conversion decisions, with younger households more likely to invest in development and older households more likely to maintain agricultural land (Rudel et al., 2009). Duration of residence has also been associated with land conversion, with longer-term residents more likely to have established land ownership and tenure arrangements that facilitate conversion (Barrett et al., 2001).

Despite the growing body of research on household-level drivers of land conversion, significant gaps persist in the literature, particularly in the African context. Most studies of household-level land conversion have been conducted in Asia and Latin America, with limited application in Sub-Saharan Africa (Meyfroidt et al., 2013; Rudel et al., 2009). In the Nigerian context, there is a notable absence of studies linking household socio-economic characteristics to observed LULC patterns, despite the rapid urbanisation and land conversion occurring in peri-urban areas (Dekolo

et al., 2025; Nkwodimmah & Okafor, 2015). This study addresses this gap by examining the relationship between household characteristics and land conversion in Ikorodu, providing empirical evidence from a rapidly transforming peri-urban context.

2.5 Household Perceptions and Impacts of Land Conversion

Understanding household perceptions of land conversion and its impacts is essential for developing effective land use policies and planning interventions. Perceptions shape household decisions and behaviour, including decisions about land use, and are crucial for understanding the social and economic consequences of land conversion (Adger et al., 2004; Bebbington, 1999). Research on perceptions of land conversion has explored how households understand the drivers of change, their attitudes towards development and conservation, and their responses to the transformation of their landscapes (Ajzen, 1991; Grothmann & Patt, 2005).

Studies of household perceptions in peri-urban areas have identified several consistent findings. Households often perceive population growth and rural-urban migration as key drivers of land conversion, reflecting the demographic pressures that characterise peri-urban transformation (Tacoli, 2019; Allen, 2003). Economic opportunities, including the availability of jobs and access to markets, are also perceived as significant drivers, as households seek to benefit from the development of their areas (Bryceson, 2002; Toulmin, 2012). Inadequate planning and weak enforcement of regulations are frequently cited as causes of uncontrolled conversion, highlighting the institutional failures that characterise many peri-urban contexts (Cobbinah et al., 2015; Mabin et al., 2013).

The impacts of land conversion on household well-being are varied and contested. Research from diverse contexts has documented both positive and negative impacts of urban expansion on peri-urban households. On the positive side, land conversion can generate economic opportunities, including employment in construction, trade, and services, and increase property values (Tacoli, 2019; Satterthwaite, 2010). Improved infrastructure, including roads, electricity, and water supply, often accompanies urban expansion, benefiting households in peri-urban areas (Allen, 2003; Rakodi, 1997). However, the negative impacts of land conversion are also significant. The loss of agricultural land reduces food security and livelihoods for households dependent on farming (Drechsel & Dongus, 2010; Tacoli, 2017). Increased cost of living, environmental deterioration, and the displacement of communities can also accompany peri-urban transformation (Kindu et al., 2016; Adelekan, 2010).

The adaptation strategies of households in response to land conversion are an important dimension of the peri-urban experience. Households may respond by diversifying their livelihoods, shifting from agriculture to non-agricultural activities, or by relocating to other areas (Bryceson, 2002; Ellis, 2000). The adoption of adaptation strategies is influenced by household assets, including land ownership, income, education, and social networks (Adger et al., 2004; Bebbington, 1999). Understanding these strategies is essential for designing interventions that support vulnerable households and mitigate the negative consequences of land conversion.

In the Nigerian context, household perceptions of land conversion and its impacts have received limited attention. While studies have documented the environmental and economic consequences of urban expansion (Dekolo et al., 2025; Nkwodimmah & Okafor, 2015), there is limited empirical evidence on how households in peri-urban areas perceive these changes and experience their impacts. This study addresses this gap by exploring household perceptions of the drivers and impacts of land conversion in Ikorodu, providing insights into the social and economic dimensions of peri-urban transformation.

2.6 Theoretical and Empirical Contributions of This Study

This study makes several contributions to the literature on peri-urban land conversion and household socio-economic determinants. First, it provides empirical evidence from a rapidly transforming peri-urban context in Nigeria, addressing the gap in research on household-level drivers of land conversion in Sub-Saharan Africa. Second, it integrates remote sensing analysis of LULC with primary household survey data, providing a more complete picture of the dynamics of land conversion and its socio-economic dimensions. Third, it examines a comprehensive set of household socio-economic characteristics, including land ownership, occupation, income, education, household size, and duration of residence, providing a holistic understanding of the factors associated with land conversion. Fourth, it explores household perceptions of the drivers and impacts of land conversion, contributing to understanding the social and economic dimensions of peri-urban transformation. Fifth, it identifies the socio-economic predictors of household land conversion using bivariate and multivariate statistical analysis, providing empirical evidence to guide policy interventions.

3. Methodology

3.1 Study Area

Ikorodu is a peri-urban municipality on the northeastern outskirts of Lagos State, Nigeria (6°37′–6°45′ N, 3°03′–3°05′ E). The area has experienced dramatic demographic transformation over the past five decades, with the metro area population growing from 399,000 in 2005 to 1,197,000 in 2025—an increase of 200% driven primarily by rural-urban migration (Dekolo et al., 2025). Historically a farming community with approximately 49% of its landmass zoned for agricultural use, Ikorodu has undergone significant urban expansion, with built-up areas increasing by 127% over 32 years, resulting in fragmented development in statutory agricultural zones (Dekolo et al., 2025; European Journal of Environment and Earth Sciences, 2026).

3.2 Research Design

This study adopted a mixed-methods design integrating quantitative remote sensing analysis with primary socio-economic survey data (Dekolo et al., 2025). The design comprised two components: (1) a retrospective longitudinal analysis of LULC change using multi-temporal Landsat satellite imagery for 2005, 2015, and 2025; and (2) a cross-sectional household survey of 384 households across the study area, capturing demographic, land tenure, and perception data (Frontiers in Sustainable Cities, 2026).

3.3 Remote Sensing and LULC Classification

Multi-temporal Landsat imagery (Landsat 5 TM for 2005; Landsat 8 OLI for 2015 and 2025) was acquired from the USGS EarthExplorer platform. Images were selected based on cloud cover (<10%), dry season acquisition, and complete coverage of the study area (European Journal of Environment and Earth Sciences, 2026). Pre-processing included geometric correction (RMSE <0.5 pixels), radiometric calibration to top-of-atmosphere reflectance, atmospheric correction using the Dark Object Subtraction method, and sub-setting to the study area extent (Object-Based Land Use/Land Cover Change Detection, 2020).

A supervised classification scheme comprising four classes was employed: Built-up, Vegetation, Bare Surface, and Water Bodies (European Journal of Environment and Earth Sciences, 2026). Training samples (minimum 50 per class) were collected using high-resolution Google Earth imagery and field visits. The maximum likelihood classifier was applied to generate LULC maps for each time period, followed by post-classification smoothing using a 3×3 majority filter.

Accuracy assessment was conducted using 150 ground-truth reference points per time period, collected through stratified random sampling. Overall accuracy, user's and producer's accuracy,

and Kappa coefficients were calculated. A minimum overall accuracy of 85% and Kappa coefficient of 0.80 were established as acceptance thresholds (European Journal of Environment and Earth Sciences, 2026; Object-Based Land Use/Land Cover Change Detection, 2020). Post-classification change detection was employed to quantify LULC transitions between 2005, 2015, and 2025.

3.4 Household Survey

A structured questionnaire was developed based on a review of relevant literature (Dekolo et al., 2025; Cobbinah & Amoako, 2021; Tacoli, 2019), comprising six sections: (1) household identification and location; (2) demographics (age, gender, education, occupation, household size, income, duration of residence); (3) land ownership and tenure; (4) observed LULC and household land conversion; (5) perceived drivers and impacts (Likert scale, 1=Strongly Disagree to 5=Strongly Agree); and (6) adaptation strategies and future expectations. The questionnaire was pre-tested with 30 households in a neighbouring peri-urban area, with minor revisions made based on pilot results (Dekolo et al., 2025).

A multistage stratified random sampling design was employed. Ikorodu LGA was stratified into its constituent wards (Ikorodu Town, Ijede, Ipakodo, Odogunyan, Gberigbe, Agbala, Baiyeku, Igbogbo, Oreta, Elepe). Within each ward, enumeration areas were identified, and systematic random sampling was used to select one of every two houses. Where multi-storey buildings were encountered, one household was randomly selected (Dekolo et al., 2025). Within each selected household, the household head or most senior adult present was interviewed.

Sample size was determined using Cochran's formula ($Z = 1.96$, $p = 0.5$, $e = 0.05$), yielding 384 respondents—consistent with similar studies in the Lagos region (Dekolo et al., 2025). Data collection was conducted between January and March 2025 by eight trained enumerators through face-to-face interviews lasting approximately 30–45 minutes. The questionnaire was administered in English, with translation to Yoruba where necessary. Informed consent was obtained from all respondents, and confidentiality was assured (Dekolo et al., 2025).

3.5 Data Analysis

Descriptive statistics (frequencies, percentages, means, standard deviations) were computed for all survey variables. Perceptions of drivers and impacts were analysed using mean scores and standard deviations, with items ranked from highest to lowest mean score (Dekolo et al., 2025).

Bivariate analysis employed cross-tabulation and chi-square tests of independence to examine relationships between household characteristics (land ownership, occupation, income, education) and land conversion experience, with statistical significance set at $p < 0.05$ (Dekolo et al., 2025).

Binary logistic regression was employed to identify socio-economic predictors of household land conversion, controlling for potential confounding variables. The dependent variable was household land conversion (yes/no). Independent variables included land ownership, occupation (farming, trading), education level, monthly income, household size, and duration of residence. Results are presented as odds ratios (OR) with 95% confidence intervals and p-values (Dekolo et al., 2025; Robinson et al., 2013; Meyfroidt et al., 2013).

Model fit was assessed using the Hosmer-Lemeshow test ($p > 0.05$ indicates good fit), Nagelkerke R^2, classification accuracy, and -2 Log Likelihood. Multicollinearity was assessed using variance inflation factors (VIF <10 acceptable). Reliability of Likert-scale items was assessed using Cronbach's alpha ($\alpha \geq 0.70$ acceptable) (Dekolo et al., 2025).

3.6 Data Integration and Ethical Considerations

Integration of remote sensing and household survey data was achieved through spatial linking (geocoding household responses to LULC classes), triangulation (comparing remote sensing findings with household perceptions), and

contextualisation (using LULC maps to interpret household-level decisions) (Dekolo et al., 2025; Frontiers in Sustainable Cities, 2026).

All respondents provided written informed consent. Responses were anonymised, and data are reported only in aggregate form (Dekolo et al., 2025).

3.7 Limitations

Limitations include the spatial resolution of Landsat imagery (30 m), potential recall and social desirability bias in self-reported survey data, the cross-sectional design (precluding tracking of household changes over time), and the focus on Ikorodu municipality (limiting generalisability). Despite these limitations, the mixed-methods approach provides robust and comprehensive understanding of the relationship between household socio-economic characteristics and peri-urban land conversion (Dekolo et al., 2025; Frontiers in Sustainable Cities, 2026).

4. Results

4.1 Socio-Demographic Characteristics of Respondents

The socio-demographic profile of respondents is presented in Table 1. The mean age was 40.6 years (SD = 13.2), with the majority (52.6%) falling within the 18-39 age bracket. More than half (58.3%) of the respondents were male. Regarding education, 43.8% had completed tertiary education, 39.8% had secondary education, and 16.4% had no formal education or only primary schooling. Trading/business was the most common primary occupation (32.8%), followed by salaried employment (27.6%) and farming (13.3%). The average household size was 5.2 persons (SD = 2.4), and the mean monthly income was ₦59,630 (SD = ₦42,150). More than half (52.6%) of respondents had resided in Ikorodu for over 10 years, with a mean duration of 18.4 years (SD = 11.7).

Table 1: Socio-Demographic Characteristics of Respondents (n = 384)

Variable	Category	n (%)	Key Statistics
Age	18 - 39 years	202 (52.6)	Mean = 40.6 yrs
	40+ years	182 (47.4)	SD = 13.2
Gender	Male	224 (58.3)	
	Female	160 (41.7)	
Education	No formal/Primary	63 (16.4)	
	Secondary	153 (39.8)	
	Tertiary	168 (43.8)	
Occupation	Trading/Business	126 (32.8)	
	Salaried Employment	106 (27.6)	
	Farming	51 (13.3)	
	Other/Unemployed	101 (26.3)	
Household Size	1 - 4 persons	179 (46.6)	Mean = 5.2
	5+ persons	205 (53.4)	SD = 2.4

Variable	Category	n (%)	Key Statistics
Monthly Income	Below ₦40,000	148 (38.5)	Mean = ₦59,630
	₦40,000 - ₦70,000	104 (27.1)	SD = ₦42,150
	Above ₦70,000	132 (34.4)	
Residence Duration	Less than 10 years	130 (33.9)	Mean = 18.4 yrs
	10 - 20 years	102 (26.5)	SD = 11.7
	More than 20 years	152 (39.6)	

4.2 Land Ownership and Tenure Characteristics

Land ownership and tenure characteristics are presented in Table 2. Nearly half of the respondents (47.4%) owned land, while 52.6% did not. Among landowners, the majority (47.3%) held less than 0.5 hectares, with a mean land size of 1.2 hectares (SD = 1.8). Land was most commonly acquired through purchase (42.8%), followed by inheritance (28.6%). The predominant land use was residential (41.8%), while 26.4% was used for agriculture. Regarding tenure, 39.6% held land under customary ownership, 30.8% held land with formal title, and 16.5% had inherited land without formal title. A significant proportion (45.1%) of landowners reported a decrease in their land size over the past 20 years, primarily due to family subdivision and land sales.

Table 2: Land Ownership and Tenure Characteristics (n = 384)

Variable	Category	n (%)	Key Statistics
Land Ownership	Owns land	182 (47.4)	
	Does not own land	202 (52.6)	
Land Size (n = 182)	Less than 0.5 hectares	86 (47.3)	Mean = 1.2 ha
	0.5 - 1 hectare	44 (24.2)	SD = 1.8
	More than 1 hectare	52 (28.5)	
Acquisition Method (n = 182)	Purchased	78 (42.8)	
	Inherited	52 (28.6)	
	Customary/Community	26 (14.3)	
	Government/Other	26 (14.3)	
Current Land Use (n = 182)	Residential	76 (41.8)	
	Agriculture	48 (26.4)	
	Commercial/Mixed	34 (18.7)	

	Vacant/Fallow	24 (13.2)	
Tenure Status (n = 182)	Owned (Customary)	72 (39.6)	
	Owned (With Title)	56 (30.8)	
	Inherited (No Title)	30 (16.5)	
	Rented/Leased	24 (13.2)	
Change in Land Size (n = 182)	Decreased	82 (45.1)	
	Stayed the same	58 (31.9)	
	Increased/Don't know	42 (23.1)	

4.3 Observed Land Use and Land Cover Changes

The observed land use and land cover changes are presented in Table 3. The vast majority of respondents (89.1%) reported observing land use changes in their community over the past 20 years. The most commonly observed change was the conversion of agricultural land to housing (87.1%), followed by agricultural land to commercial use (62.6%), and forest/vegetation to housing (54.4%). Respondents perceived these changes as highly significant, with a mean significance score of 3.98 (SD = 1.12) on a 5-point scale; 89.5% rated the changes as moderate to extremely significant. Regarding the extent of agricultural land loss, 29.8% estimated that 25-50% of agricultural land had been converted, while 27.5% estimated 50-75% loss. Notably, 20.3% of households reported that they had personally converted land from one use to another. The primary reasons for household-level conversion were the pursuit of higher income from new uses (35.9%), declining agricultural profitability (23.1%), and increased family size (17.9%).

Table 3: Observed Land Use and Land Cover Changes (n = 384)

Variable	Category	n (%)	Key Statistics
Observed LULCC	Yes	342 (89.1)	
	No	42 (10.9)	
Types of Change Observed (n = 342)	Agricultural land → Housing	298 (87.1)	
	Agricultural land → Commercial	214 (62.6)	
	Forest/Vegetation → Housing	186 (54.4)	

	Forest/Vegetation → Agriculture	96 (28.1)	
	Wetland → Other	58 (17.0)	
Perceived Significance	Moderate - Extremely Significant	306 (89.5)	Mean = 3.98
			SD = 1.12
Estimated Agricultural Land Lost	Less than 25%	48 (14.0)	
	25% - 50%	102 (29.8)	
	50% - 75%	94 (27.5)	
	More than 75%	58 (17.0)	
	Don't know	26 (7.6)	
Household Land Conversion	Yes	78 (20.3)	
	No	306 (79.7)	
Reasons for Household Conversion (n = 78)	Higher income from new use	28 (35.9)	
	Declining agricultural profitability	18 (23.1)	
	Increased family size	14 (17.9)	
	Pressure from developers	8 (10.3)	
	Inheritance/Subdivision	6 (7.7)	
	Other	4 (5.1)	

Note: **Multiple responses allowed. Percentages calculated based on number of respondents who reported each type of change/reason.**

4.4 Perceived Drivers of Land Conversion

Respondents' perceptions of the drivers of land conversion are presented in Table 4, ranked from the most to least strongly perceived driver. All 12 driver statements had mean scores above 3.5, indicating broad agreement that multiple factors contribute to land conversion in Ikorodu. The most strongly perceived drivers were population growth (Mean = 4.34, SD = 0.82), rural-urban migration (Mean = 4.28, SD = 0.85), economic opportunities in Ikorodu (Mean = 4.21, SD = 0.88), and proximity to Lagos (Mean = 4.16, SD = 0.92). These demographic and economic

factors were perceived as the most powerful forces driving land conversion. Institutional factors, including inadequate land use planning (Mean = 4.02, SD = 0.98) and weak enforcement of regulations (Mean = 3.94, SD = 1.02), also ranked highly. Agricultural factors, such as declining profitability (Mean = 3.87, SD = 1.05), were also recognized as important drivers. The lowest-ranked drivers were land speculation (Mean = 3.65, SD = 1.15) and government policies encouraging urban expansion (Mean = 3.58, SD = 1.18), though both still registered above the neutral midpoint.

Table 4: Perceived Drivers of Land Conversion (n = 384)

Rank	Driver Statement	Mean	SD	Interpretation
1	Population growth	4.34	0.82	Strongly Agree
2	Rural-urban migration	4.28	0.85	Strongly Agree
3	Economic opportunities in Ikorodu	4.21	0.88	Agree
4	Proximity to Lagos	4.16	0.92	Agree
5	Increased land prices	4.08	0.95	Agree
6	Inadequate land use planning	4.02	0.98	Agree
7	Weak enforcement of regulations	3.94	1.02	Agree
8	Declining agricultural profitability	3.87	1.05	Agree
9	Improved road infrastructure	3.80	1.08	Agree
10	Family land subdivision	3.72	1.12	Agree
11	Land speculation by investors	3.65	1.15	Agree
12	Government policies encouraging urban expansion	3.58	1.18	Agree

Scale: *1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree*

4.5 Perceived Impacts of Land Conversion on Household Well-Being

The perceived impacts of land conversion on household well-being are presented in Table 5, ranked from the most to least strongly perceived impact. The most strongly perceived impact was the reduced availability of farmland in the area (Mean = 4.42, SD = 0.78), reflecting widespread concern about the loss of agricultural land. However, respondents also acknowledged positive impacts, including increased property and land values (Mean = 4.16, SD = 0.92), new economic opportunities (Mean = 3.94, SD = 1.02), improved infrastructure access (Mean = 3.88, SD = 1.05), and employment creation (Mean = 3.82, SD = 1.08). Negative impacts were also reported, including increased cost of living

(Mean = 3.76, SD = 1.12), environmental deterioration (Mean = 3.70, SD = 1.15), negative effects on household income (Mean = 3.64, SD = 1.18), negative effects on food security (Mean = 3.58, SD = 1.22), and the need for households to change their livelihood activities (Mean = 3.52, SD = 1.25). Overall, the pattern of responses suggests that while land conversion brings certain economic and infrastructure benefits, it also generates significant costs, particularly in terms of land availability, environmental quality, and household welfare (Dekolo et al., 2025).

Table 5: Perceived Impacts of Land Conversion on Household Well-Being (n = 384)

Rank	Impact Statement	Mean	SD	Interpretation
1	Reduced availability of farmland in the area	4.42	0.78	Strongly Agree
2	Increased property/land values	4.16	0.92	Agree
3	Created new economic opportunities	3.94	1.02	Agree
4	Improved access to infrastructure (roads, electricity, water)	3.88	1.05	Agree
5	Created employment opportunities	3.82	1.08	Agree
6	Increased cost of living in the community	3.76	1.12	Agree
7	Environmental deterioration in the community	3.70	1.15	Agree
8	Negatively affected household income	3.64	1.18	Agree
9	Negatively affected household food security	3.58	1.22	Agree
10	Required household to change livelihood activities	3.52	1.25	Agree

Scale: *1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree*

Table 5a: Categorised Perceived Impacts of Land Conversion

Impact Category	Included Statements	Mean Score	Interpretation
Land Availability	Reduced availability of farmland	4.42	Strongly Agree
Economic Benefits	Increased property values, New economic opportunities, Employment creation	3.97	Agree
Infrastructure Benefits	Improved access to infrastructure	3.88	Agree
Costs of Living	Increased cost of living	3.76	Agree
Environmental Costs	Environmental deterioration	3.70	Agree
Negative Household Impacts	Negatively affected income, Negatively affected food security, Required livelihood changes	3.58	Agree

4.6 Cross-Tabulation of Land Conversion by Key Characteristics

The relationship between land conversion and key household characteristics is presented in Table 6. Land ownership was strongly associated with land conversion; 31.9% of landowners had converted land compared to only 9.9% of non-landowners ($\chi^2 = 22.14$, $p < 0.001$). Occupation was also significantly associated with land conversion ($\chi^2 = 17.82$, $p < 0.001$), with farmers having the highest conversion rate (47.1%), followed by traders/business owners (22.2%), salaried employees (15.1%), and other occupations (9.9%). Income level showed a clear inverse relationship with land conversion ($\chi^2 = 14.63$, $p = 0.002$); households earning below ₦40,000 had the highest conversion rate (29.7%), while those earning above ₦70,000 had the lowest (12.1%). Similarly, education level was inversely associated with land conversion ($\chi^2 = 13.28$, $p = 0.004$); households with no formal or only primary education had the highest conversion rate (34.9%), while those with tertiary education had the lowest (11.9%). These bivariate associations suggest that land ownership, farming occupation, lower income, and lower education are key factors associated with household land conversion (Dekolo et al., 2025).

Table 6: Cross-Tabulation of Land Conversion by Key Characteristics (n = 384)

Characteristic	Category	Converted Land (%)	Did Not Convert (%)	χ^2	p-value
Land Ownership	Owns land	58 (31.9)	124 (68.1)	22.14	<0.001
	Does not own land	20 (9.9)	182 (90.1)		
Occupation	Farming	24 (47.1)	27 (52.9)	17.82	<0.001
	Trading/Business	28 (22.2)	98 (77.8)		
	Salaried Employment	16 (15.1)	90 (84.9)		
	Other/Unemployed	10 (9.9)	91 (90.1)		
Income Level	Below ₦40,000	44 (29.7)	104 (70.3)	14.63	0.002
	₦40,000 - ₦70,000	18 (17.3)	86 (82.7)		
	Above ₦70,000	16 (12.1)	116 (87.9)		
Education Level	No formal/Primary	22 (34.9)	41 (65.1)	13.28	0.004
	Secondary	36 (23.5)	117 (76.5)		
	Tertiary	20 (11.9)	148 (88.1)		

Note: Percentages are row percentages within each characteristic category.

4.7 Logistic Regression Predicting Household Land Conversion

A binary logistic regression was conducted to identify the socio-economic predictors of household land conversion, with results presented in Table 7. The model was a good fit for the data (Hosmer-Lemeshow $\chi^2 = 8.42$, df = 8, p = 0.393) and explained 28.6% of the variance in land conversion (Nagelkerke $R^2 = 0.286$), with an overall classification accuracy of 82.3%.

Land ownership emerged as the strongest predictor of land conversion (OR = 4.14, p < 0.001); households that owned land were over four times more likely to have converted land compared to those without land ownership. Occupation was also a significant predictor; farmers were nearly three times more likely to have converted land than those in salaried employment or other occupations (OR = 2.94, p = 0.001), while traders were also more likely to have converted land (OR = 1.86, p = 0.045). Both education level (OR = 0.76, p = 0.002) and monthly income (OR = 0.68, p = 0.001) were significant protective factors; higher education and higher income were associated with a reduced likelihood of land conversion. Household size (OR = 1.13, p = 0.134) and duration of residence (OR = 1.08, p = 0.252) were not statistically significant predictors (Dekolo et al., 2025; Robinson et al., 2013). These findings suggest that land conversion in Ikorodu is primarily driven by land ownership, agricultural occupation, and economic vulnerability, while higher education and income serve as protective factors.

Table 7: Logistic Regression Predicting Household Land Conversion (n = 384)

Table 7a: Logistic Regression Results

Variable	B	S.E.	Wald	df	p-value	Odds Ratio	95% CI for Odds Ratio
Land Ownership (Owns = 1)	1.42	0.32	19.68	1	**<0.001**	4.14	2.21 - 7.76
Occupation: Farming	1.08	0.34	10.09	1	**0.001**	2.94	1.51 - 5.73
Occupation: Trading	0.62	0.31	4.00	1	**0.045**	1.86	1.01 - 3.42
Education Level	-0.28	0.09	9.68	1	**0.002**	0.76	0.64 - 0.90
Monthly Income	-0.38	0.11	11.93	1	**0.001**	0.68	0.55 - 0.84
Household Size	0.12	0.08	2.25	1	0.134	1.13	0.96 - 1.33
Residence Duration	0.08	0.07	1.31	1	0.252	1.08	0.94 - 1.24
Constant	-1.86	0.58	10.28	1	0.001	0.16	

Table 7b: Model Fit Statistics

Statistic	Value
-2 Log Likelihood	348.62
Cox & Snell R^2	0.184
Nagelkerke R^2	0.286
Hosmer-Lemeshow Test	$\chi^2 = 8.42$, df = 8, p = 0.393
Overall Classification Accuracy	82.3%

Reference Categories: Occupation reference = Salaried Employment/Other; Education and Income treated as continuous ordinal variables.

4.8 Remote Sensing Analysis: LULC Dynamics (2005–2025)

The LULC analysis for Ikorodu between 2005 and 2025 revealed significant landscape transformation. Table 8 presents the area (in hectares) for each LULC class across the three time periods, while Table 9 presents the change detection matrix showing transitions between classes. The LULC analysis reveals several significant trends. Built-up areas increased substantially from 4,398 hectares in 2005 to 19,573 hectares in 2015, before slightly declining to 16,300 hectares in 2025. The most significant transition was from Bare Surface to Built Up (12,821.58 hectares), indicating large-scale conversion of exposed soil and fallow land to urban development. Vegetation areas increased from 7,448 hectares in 2005 to 11,082 hectares in 2025, suggesting some regeneration of vegetated areas, though this may also reflect land abandonment or reclassification. Water bodies declined from 8,709 hectares in 2005 to 6,559 hectares in 2025, indicating potential wetland loss or land reclamation. Bare Surface decreased dramatically from 20,717 hectares in 2005 to 7,333 hectares in 2025, reflecting the conversion of bare soil to built-up and vegetated areas. These findings align with previous studies documenting rapid urban expansion and agricultural land loss in the Lagos region (European Journal of Environment and Earth Sciences, 2026; Dekolo et al., 2025).

Table 8: LULC Analysis of okorodu 2005, 2015 an 2025

LULC	Area 2005	Area 2015	Area 2025
Water Bodies	8709	8904	6559
Built Up	4398	19573	16300
Bare Surface	20717	6043	7333
Vegetation	7448	6751	11082

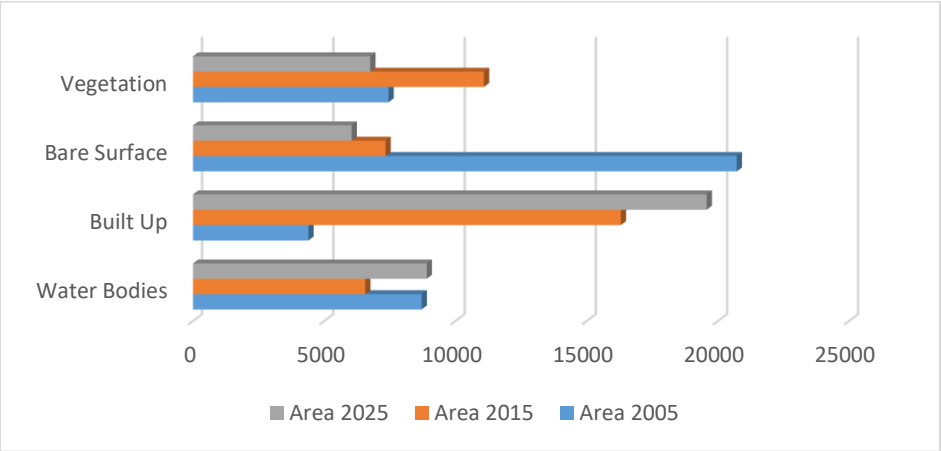


Fig. 2: Graphical Representation of LULC Analysis for okorodu 2005, 2015 an 2025

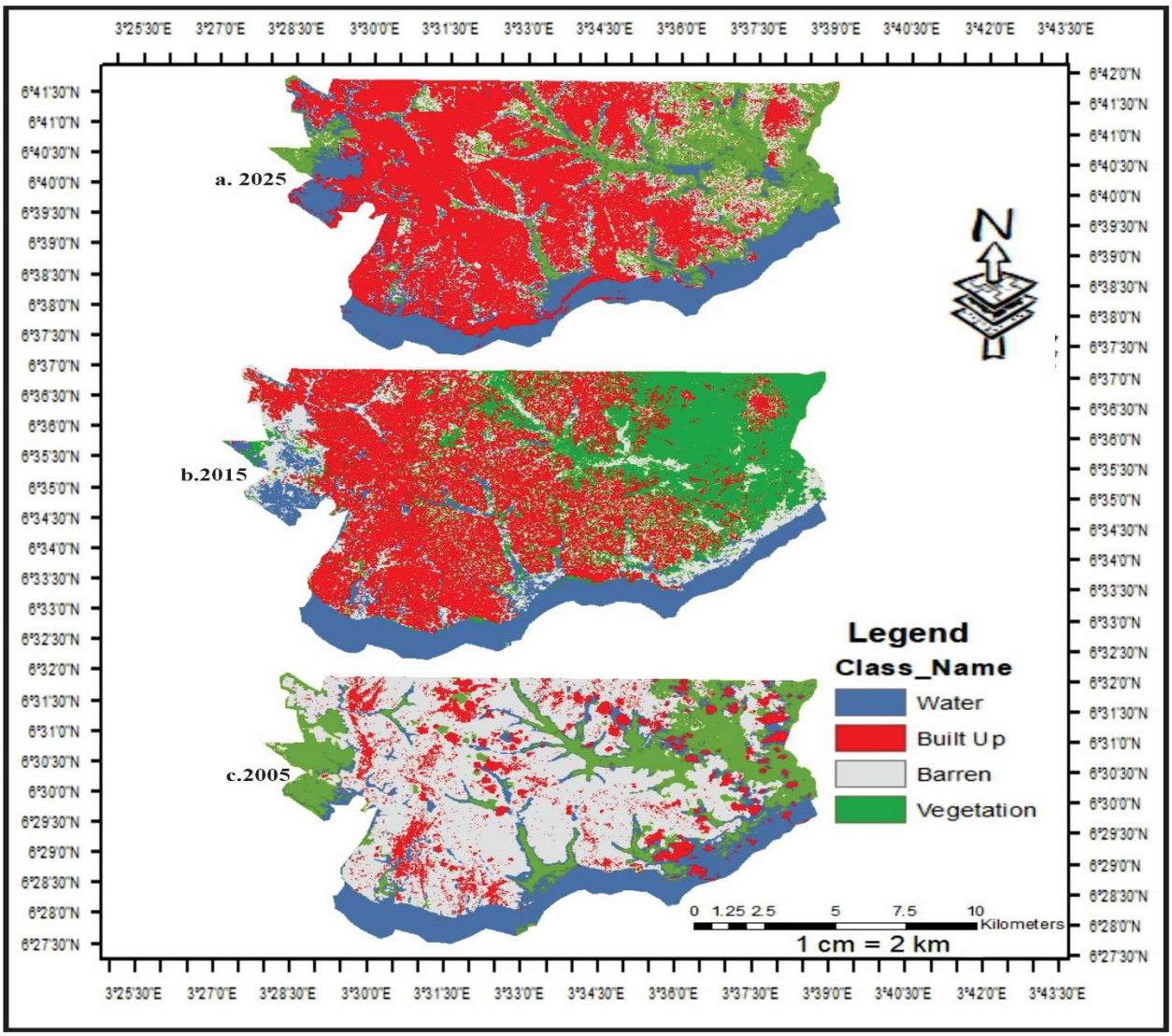


Fig. 3: LULC Map of Ikorodu between the years 2005-2025

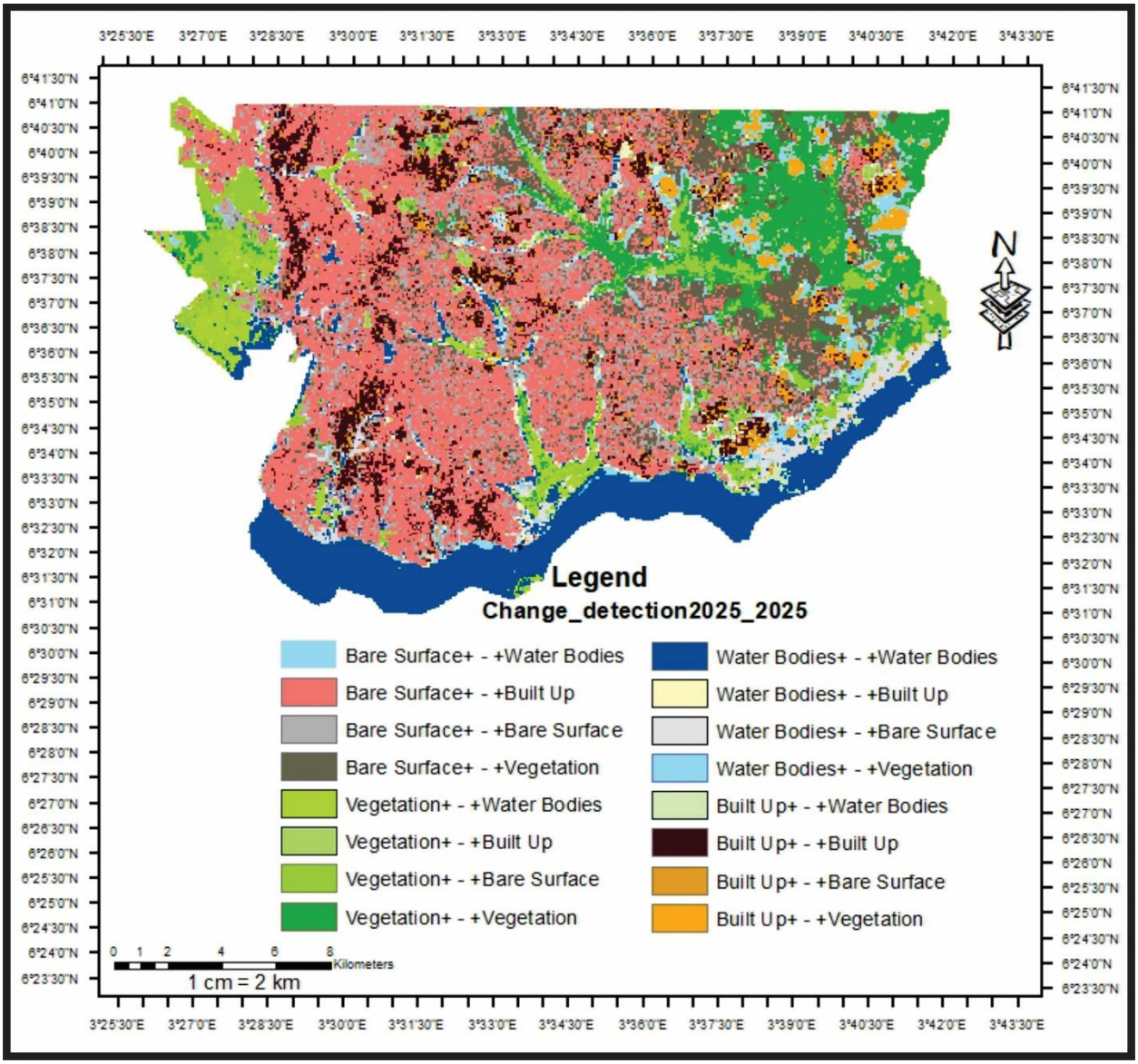


Fig. 4: **Ikorodu 2005-2025 change detection Map**

Table 9: **Ikorodu 2005-2025 change detection**

Row Labels	Area Change 2005-2025
Bare Surface+ - +Bare Surface	3364.790018
Bare Surface+ - +Built Up	12821.57915
Bare Surface+ - +Vegetation	4316.640767

Bare Surface+ - +Water Bodies	211.833072
Built Up+ - +Bare Surface	536.48232
Built Up+ - +Built Up	2759.959692
Built Up+ - +Vegetation	987.4435
Built Up+ - +Water Bodies	113.442988
Vegetation+ - +Bare Surface	2003.408825
Vegetation+ - +Built Up	269.247914
Vegetation+ - +Vegetation	3928.850668
Vegetation+ - +Water Bodies	1237.01905
Water Bodies+ - +Bare Surface	1424.526131
Water Bodies+ - +Built Up	448.714326
Water Bodies+ - +Vegetation	1838.876452
Water Bodies+ - +Water Bodies	4990.321069
Grand Total	**41253.13594**

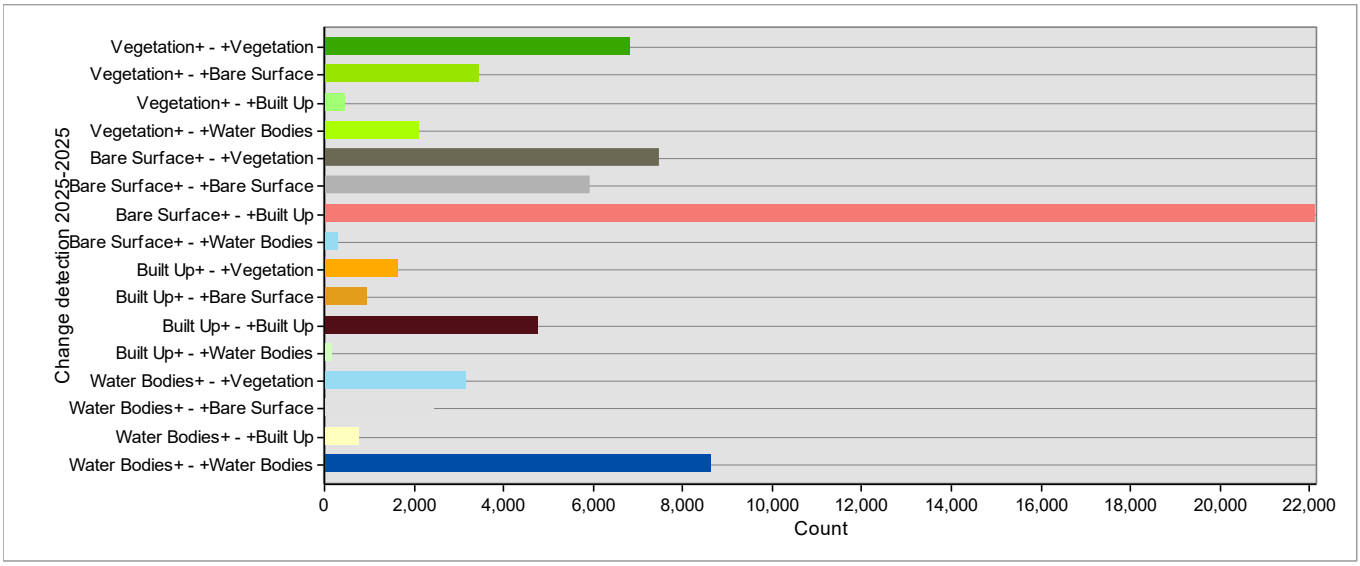


Fig. 5: Graphical Representation of Change detection analysis of Ikorodu 2005 – 2025

5. Discussion

5.1 LULC Dynamics and Household Perceptions: A Convergent Narrative

The LULC analysis revealed substantial landscape transformation in Ikorodu between 2005 and 2025. Built-up areas increased by 270.6% (from 4,398 to 16,300 hectares), with the most significant transition being from Bare Surface to Built Up (12,821.58 hectares) (Tables 8–9; Figs. 1–4). Water bodies declined by 24.7% (from 8,709 to 6,559 hectares), while vegetation showed a net increase from 7,448 to 11,082 hectares, though this may reflect land abandonment or reclassification rather than genuine ecological regeneration (European Journal of Environment and Earth Sciences, 2026). These findings align with previous studies documenting rapid urban expansion and agricultural land loss in the Lagos region (Dekolo et al., 2025; Object-Based Land Use/Land Cover Change Detection, 2020).

The convergence between remote sensing findings and household perceptions is striking. The vast majority of respondents (89.1%) observed land use changes (Table 3), with agricultural land to housing (87.1%) and agricultural land to commercial use (62.6%) being the most commonly observed transitions (Table 3). This alignment validates both data sources and reinforces the narrative of rapid peri-urban transformation. The perceived significance of these changes (Mean = 3.98) and the estimated agricultural land loss (29.8% estimated 25–50% loss; 27.5% estimated 50–75% loss) (Table 3) correspond closely with the LULC transitions documented in Table 9. Notably, 20.3% of households reported personally converting land, primarily due to higher income from new uses (35.9%) and declining agricultural profitability (23.1%) (Table 3)—findings that directly link household-level decisions to the observed LULC patterns.

The perception data (Table 4) identified the most strongly perceived drivers as population growth (Mean = 4.34), rural-urban migration (Mean = 4.28), economic opportunities in Ikorodu (Mean = 4.21), and proximity to Lagos (Mean = 4.16). These perceptions align with the documented demographic trajectory (population growth from 399,000 in 2005 to 1,197,000 in 2025) and the spatial pattern of urban expansion along transport corridors (Dekolo et al., 2025). Institutional factors, including inadequate land use planning (Mean = 4.02) and weak enforcement of regulations (Mean = 3.94), were also perceived as significant drivers, consistent with previous research identifying weak development control as a major driver of peri-urban sprawl in Lagos (Dekolo et al., 2025).

The perceived impacts (Table 5) reveal a mixed picture. The most strongly perceived impact was reduced farmland availability (Mean = 4.42), reflecting widespread concern about agricultural land loss—a concern validated by the LULC analysis (Table 9). However, respondents also acknowledged positive impacts, including increased property values (Mean = 4.16), new economic opportunities (Mean = 3.94), improved infrastructure access (Mean = 3.88), and employment creation (Mean = 3.82). Negative impacts included increased cost of living (Mean = 3.76), environmental deterioration (Mean = 3.70), and negative effects on income (Mean = 3.64) and food security (Mean = 3.58). This duality reflects the complex and contested nature of peri-urban transformation—generating economic opportunities while simultaneously creating significant costs for vulnerable households (Tacoli, 2019; Drechsel & Dongus, 2010).

5.2 Household-Level Socio-Economic Drivers of Land Conversion

The logistic regression results (Table 7a) provide compelling evidence that household-level socio-economic characteristics are significant predictors of land conversion. Land ownership emerged as the strongest predictor (OR = 4.14, $p < 0.001$), with landowners over four times more likely to have converted land compared to non-landowners. This finding aligns with previous research demonstrating that land ownership confers both the legal authority and the economic incentive to alter land use, particularly in contexts where land values are appreciating (Rudel et al., 2009; Robinson et al., 2013; Lambin & Meyfroidt, 2010). The cross-tabulation results (Table 6) reinforce this, showing that 31.9% of landowners had converted land compared to only

9.9% of non-landowners ($\chi^2 = 22.14$, $p < 0.001$). This strong association reflects the broader pattern across Sub-Saharan Africa, where customary land tenure systems increasingly intersect with market forces to facilitate land conversion (Frontiers in Sustainable Cities, 2026; Dekolo et al., 2025). The perception that increased land prices drive conversion (Mean = 4.08) (Table 4) corroborates this economic incentive.

Occupation emerged as the second strongest predictor. Farming households were nearly three times more likely to have converted land than those in salaried employment or other occupations (OR = 2.94, p = 0.001), while trading households also showed significantly higher odds (OR = 1.86, p = 0.045) (Table 7a). The high conversion rate among farming households (47.1%) (Table 6) reflects the economic pressures facing peri-urban farmers, including declining agricultural profitability, land fragmentation, and the attraction of alternative income sources (Bryceson, 2002; Toulmin, 2012). This finding is corroborated by the perception data identifying declining agricultural profitability as a driver (Mean = 3.87) (Table 4) and by the household conversion data showing that 23.1% of converting households did so due to declining agricultural profitability (Table 3). The LULC transition from Bare Surface to Built Up (12,821.58 hectares) (Table 9) is the spatial manifestation of these economic pressures.

Higher education (OR = 0.76, p = 0.002) and higher income (OR = 0.68, p = 0.001) were significant protective factors (Table 7a). Households with tertiary education had the lowest conversion rate (11.9%), compared to 34.9% for those with no formal or only primary education (Table 6). Similarly, households earning above ₦70,000 had the lowest conversion rate (12.1%), compared to 29.7% for those earning below ₦40,000 (Table 6). These findings suggest that households with greater educational attainment and economic resources have access to alternative livelihood opportunities that reduce their dependence on land conversion as a coping strategy (Robinson et al., 2013; Meyfroidt et al., 2013). Educated households may also be more aware of land use regulations, potentially constraining conversion behaviour (Rudel et al., 2009). Household size and duration of residence were not statistically significant predictors (Table 7a; p = 0.134 and p = 0.252, respectively).

The adaptation strategies reported by households (Table 6) provide insight into community responses to land conversion. More than one-third (35.4%) of households reported changing their livelihood activities, with the most common strategies being starting a business (39.7%), shifting from farming to trading (33.8%), and shifting from farming to paid employment (27.9%). Only 25.0% had considered relocating, suggesting most households are adapting in place. The support needs identified—particularly access to credit (56.8%), better land tenure security (48.4%), and alternative livelihood training (42.2%)—point to the types of interventions that could support vulnerable households (Table 6).

5.3 Policy Implications

The integrated findings have several policy implications. First, the strong association between land ownership and land conversion (OR = 4.14) highlights the need for targeted land governance interventions, such as differential taxation, agricultural zoning, or conservation easements that compensate landowners for maintaining agricultural uses (Bennett et al., 2013; Nkwodimmah & Okafor, 2015). The dual land tenure system in Nigeria requires nuanced approaches engaging both customary authorities and formal planning institutions (Dekolo et al., 2025).

Second, the high conversion rate among farming households (47.1%) points to the need for support for peri-urban agriculture and alternative livelihoods. Policies that support agricultural viability—through access to credit, inputs, extension services, and markets—could reduce conversion incentives. Simultaneously, alternative livelihood support, including skills training and micro-enterprise development, could help households transition away from agriculture without resorting to land conversion (Ellis, 2000;

Bryceson, 2002). The support needs identified by households—access to credit (56.8%) and alternative livelihood training (42.2%)—provide a clear mandate (Table 6).

Third, the perception that inadequate land use planning (Mean = 4.02) and weak enforcement of regulations (Mean = 3.94) drive land conversion underscores the need for institutional strengthening. Strengthening land use planning institutions, improving enforcement, and increasing public awareness of planning processes could curb uncontrolled conversion (Cobbinah et al., 2015; Mabin et al., 2013). The expectation that more agricultural land will be converted in the future (69.8% of respondents) and that residential development will dominate (43.8%) (Table 6) suggests urgent policy intervention is needed.

Fourth, the negative impacts on household income (Mean = 3.64) and food security (Mean = 3.58) (Table 5) point to the need for social protection and compensation mechanisms for households that lose agricultural land. The finding that 25.0% of households have considered relocating suggests land conversion is generating displacement pressures requiring policy attention (Rakodi, 1997). The fact that 38.0% of respondents prioritised balanced planning for land use management (Table 6) suggests public support for more sustainable approaches.

5.4 Contributions, Limitations, and Future Research

This study makes several contributions. It provides empirical evidence from a rapidly transforming peri-urban context in Nigeria, addressing the gap in research on household-level drivers of land conversion in Sub-Saharan Africa (Meyfroidt et al., 2013; Rudel et al., 2009). It integrates remote sensing (Tables 8–9; Figs. 1–4) with household survey data (Tables 1–7), demonstrating the value of triangulating spatial and social data (Frontiers in Sustainable Cities, 2026; Remote Sensing and Statistical Data Analysis, 2026). It identifies land ownership, occupation, income, and education as significant predictors of land conversion (Table 7a), providing a basis for targeted interventions.

Limitations include the spatial resolution of Landsat imagery (30 m), potential recall and social desirability bias in self-reported survey data, the cross-sectional design (precluding tracking of household changes over time), and the focus on Ikorodu municipality (limiting generalisability). Future research should explore the role of land markets and institutional factors, examine gender dimensions of land conversion, evaluate the effectiveness of policy interventions, and employ longitudinal designs to track household changes over time.

6. Conclusion

This study investigated the relationship between household socio-economic characteristics and peri-urban land conversion in Ikorodu, Nigeria (2005–2025), integrating remote sensing analysis (Tables 8–9; Figs. 1–4) with household survey data from 384 respondents (Tables 1–7). The LULC analysis revealed substantial landscape transformation, with built-up areas increasing by 270.6% (from 4,398 to 16,300 hectares) and the most significant transition being from Bare Surface to Built Up (12,821.58 hectares) (Tables 8–9). The household survey revealed that 89.1% observed land use changes, with agricultural land to housing (87.1%) being the most common (Table 3). Notably, 20.3% of households reported personally converting land, primarily due to higher income from new uses (35.9%) and declining agricultural profitability (23.1%) (Table 3). The convergence between LULC findings and household perceptions validates both data sources and reinforces the narrative of rapid peri-urban transformation.

The logistic regression analysis (Table 7a) identified land ownership as the strongest predictor of land conversion (OR = 4.14, $p < 0.001$), followed by farming occupation (OR = 2.94, $p = 0.001$) and trading occupation (OR = 1.86, $p = 0.045$). Higher education (OR = 0.76, $p = 0.002$) and higher income (OR = 0.68, $p = 0.001$) were significant protective factors (Table 7a). The perception data (Tables 4–5) revealed

that households perceive multiple drivers and mixed impacts of land conversion, with population growth (Mean = 4.34) and reduced farmland availability (Mean = 4.42) being the most strongly perceived.

The findings have several policy implications: targeted land governance interventions to address land ownership as a driver of conversion; support for peri-urban agriculture and alternative livelihoods for farming households; institutional strengthening to address inadequate planning and weak enforcement; social protection and compensation mechanisms for households negatively affected by conversion; and participatory planning that balances urban development with agricultural preservation and environmental protection.

This study contributes to the literature by providing empirical evidence on household-level drivers of land conversion in a rapidly transforming peri-urban context in Nigeria, integrating remote sensing with household survey data, and identifying socio-economic predictors of land conversion (Table 7a). Future research should explore the role of land markets and institutional factors, examine gender dimensions of land conversion, and evaluate the effectiveness of policy interventions in curbing uncontrolled land conversion.

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