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Peri-urban Ibadan: Land use change and livelihood impact

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ABSTRACT: This study investigates land use changes and their impacts on livelihoods in peri-urban Ibadan, focusing on the areas of Eleyele, Adetokun, Alafara, and Ologuneru. Over the past few decades, rapid urbanisation has transformed the peri-urban landscapes, driven by factors such as population growth, economic expansion, and rural-urban migration. Utilising remote sensing data and geographic information systems (GIS), this research analyses satellite imagery to quantify changes in land use patterns, focusing on agricultural lands, residential areas, and industrial zones. A survey was conducted with a sample size of 346 respondents, of which 325 responses were valid. The research methodology involved structured questionnaires to capture land use patterns and livelihood impacts. Analysis revealed that residential use is overwhelmingly dominant at 95.1%, while commercial, institutional, and recreational uses are minimal at 2.9%, 1.2%, and 0.6%, respectively. The study found that 52.0% of respondents felt only slight or rare effects of land use changes on their livelihoods. Specifically, when examining impacts on agriculture, Eleyele had the highest perception of effect at 55.7%, followed by Adetokun at 45.3%, and Ologuneru at 52.4%. In contrast, Alafara showed a majority (54.6%) who did not perceive any significant impact. The analysis also confirmed a significant difference in perceived impacts of land use change across the sampled communities, indicating varying local experiences and responses. This suggests that while land use changes are primarily residential in nature, their impact on agriculture and livelihood varies by locality, highlighting the need for tailored interventions in different peri-urban areas. This research underscores the need for integrated land-use planning policies that balance urban expansion with the preservation of agricultural lands. The findings contribute to understanding the complexities of peri-urban dynamics and offer recommendations for sustainable development practices that support both urban growth and livelihoods in Ibadan's peri-urban areas.

Keywords: Land use change, livelihood impact, peri-urbanisation, rural transition.

INTRODUCTION

The peri-urban interface, characterised as the transitional zone between urban and rural areas, has become a focal point for research and policy discussions globally (Rajendra *et al.*, 2024). This region typically experiences rapid land use changes due to urbanisation, which profoundly impacts rural livelihoods, social structures, and environmental sustainability (Varkey, 2019). As cities expand outward to accommodate growing populations, peri-urban areas face unique challenges and opportunities that differ from those in core urban or purely rural settings (Mortoja and Yigitcanlar, 2022).

Globally, the peri-urban spectrum is shaped by diverse socio-economic factors. In developing countries, urban centres often outpace infrastructure development, leading to informal settlements and agricultural displacement (Abdulai *et al*., 2020). Countries in Africa and Asia are particularly affected, where burgeoning urban populations create intense competition for land. Agricultural land diminishes as residential and industrial developments encroach, altering traditional livelihoods and threatening food security. For instance, in regions like sub-Saharan Africa, loss of arable land can impact not only local economies but also entire national food systems (Morenikeji, 2023).

Conversely, peri-urban zones can present opportunities for economic diversification. As cities expand, peri-urban

areas often attract investment and new businesses, providing residents with access to diversified employment options (Danielaini *et al*., 2018). However, the transition from agro-centric economies to more industrial or service-oriented economies can instigate socio-economic disparities, as those without the skills to transition may be left behind (Manda, 2021).

The peri-urban zones of Ibadan, Nigeria, represent a critical interface between urban and rural environments, where demographic, economic, and social changes are profoundly reshaping the landscape (Adaku, 2023). Rapid urbanisation has been a hallmark of developing nations, and Ibadan, as one of Nigeria's largest cities, is no exception. The city has experienced significant growth, prompting expansion into surrounding peri-urban areas. This transformation has led to extensive land use changes that impact local livelihoods, agricultural practices, and social dynamics (Alawode and Olayemi, 2020).

Urban expansion in Ibadan has been driven by factors such as rural-urban migration, population growth, and economic development. These forces have resulted in the conversion of agricultural land to residential and commercial uses, leading to a decline in arable land and changes in land ownership patterns (Babalola, 2023). The peri-urban areas are often characterised by a mixed-use landscape where farming coexists with burgeoning residential developments, creating complex land use dynamics (Adedayo *et al*., 2022).

The conversion of land for urban use poses challenges to agricultural production. As farmers face land scarcity, they are compelled to either intensify their farming practices or abandon agriculture altogether. This situation can lead to decreased food security and economic stability for those reliant on agriculture for their livelihoods (UNEP, 2014). The pressure on land is aggravated by informal land tenure systems, which can lead to conflicts over land rights and usage, further complicating the livelihoods of peri-urban residents (Adewoyin *et al*., 2024a).

The impact of land use change on livelihoods in peri-urban Ibadan is multifaceted. Many households rely on a combination of agricultural and non-agricultural income sources, navigating a precarious economic landscape. As agricultural land diminishes, households may resort to informal employment, which often lacks job security and benefits (Fapohunda *et al*., 2023). This shift can lead to increased poverty and vulnerability, particularly among marginalised groups, including women and youth who are often at the forefront of agricultural activities (Adewoyin *et al*., 2024b).

Moreover, the socio-economic implications of land use change extend beyond individual livelihoods to affect community cohesion and social structures. The influx of urban residents can lead to social tensions, as established communities grapple with changing demographics and resource competition (Alao *et al.,* 2020). Such dynamics underscore the need for integrated approaches to urban planning that consider the needs of both urban and peri-urban populations (Ogunba *et al*., 2022).

Addressing the challenges posed by land use change in peri-urban Ibadan requires a comprehensive understanding of local contexts and the development of sustainable urban policies. Participatory planning frameworks that engage local communities in decision-making processes and ensure that their voices and needs are represented have been advocated (Adewoyin *et al*., 2024c). By fostering sustainable land use practices and enhancing access to resources, policymakers can help mitigate the adverse effects of urbanisation on livelihoods.

This study aims to investigate the complexities of land use change in peri-urban Ibadan and its implications for local livelihoods, contributing to a growing body of literature that seeks to inform sustainable urban development strategies in rapidly urbanising contexts. In conclusion, the peri-urban interface serves as a critical site for examining the dynamics of land use change and livelihood impact across diverse global contexts. Understanding these interactions is vital for fostering resilience and sustainability in a rapidly urbanising world, as policymakers and stakeholders strive to navigate the complexities of urban-rural transitions.

LITERATURE REVIEW

The phenomenon of urbanisation is reshaping landscapes worldwide, particularly in developing countries where rapid growth leads to significant land use changes in peri-urban areas. Peri-urban zones are characterised by their transitional nature, where urban and rural elements coexist, influencing local livelihoods, resource management, and socio-economic dynamics (McGregor, 2019). Urbanisation in peri-urban areas typically results in the conversion of agricultural land to residential, commercial, and industrial uses, often driven by population growth and economic opportunities (Alawode and Olayemi, 2020).

Ibadan, with its rapid urban sprawl, exemplifies this trend, as the city's expansion increasingly encroaches on surrounding agricultural lands. The dual pressures of urbanisation and the need for agricultural production, illustrating a common struggle faced by peri-urban communities, must be underscored (Seto, 2012; Manda, 2021). This transformation is evident as traditional agricultural practices are challenged by urban development, leading to a decline in available arable land. The urban sprawl not only reduces land for farming but also disrupts local ecosystems, further impacting agricultural productivity and biodiversity (Ogunba *et al*., 2022).

The livelihoods of residents in peri-urban Ibadan are intricately linked to these land use changes. Many households depend on a mix of agricultural and non-agricultural income sources, adapting to the pressures of urbanization (Adewoyin *et al*., 2024c) However, as agricultural land diminishes, farmers are often forced to abandon traditional practices or seek alternative employment in the

informal sector, which can be unstable and unregulated (Alao *et al.,* 2020).

Additionally, livelihood diversification is a common strategy among peri-urban households facing land loss. It was noted that many families turn to informal activities such as trade or services, which can provide immediate financial relief but may not offer long-term sustainability or security (Fapohunda *et al*., 2023). This situation often leads to increased economic vulnerability, particularly among marginalised groups, including women and youth (UNEP, 2014).

The social implications of land use change in peri-urban areas are significant. Urban expansion often results in social fragmentation, where established communities confront challenges related to resource competition and cultural shifts (Mastrorillo, 2016). In Ibadan, the influx of migrants into peri-urban areas has heightened tensions over land rights and access to resources, complicating community dynamics (Adaku, 2023; Adewoyin *et al*., 2024b).

Moreover, environmental degradation is a critical concern as urbanisation leads to habitat loss, pollution, and increased vulnerability to climate change. The need for sustainable land use practices that integrate ecological considerations into urban planning has been highlighted (Babalola, 2023). The loss of green spaces and agricultural lands not only threatens food security but also diminishes community resilience against environmental shocks.

Addressing the challenges posed by land use change in peri-urban Ibadan necessitates integrated policy approaches that consider both urban and rural needs. Participatory planning frameworks as essential for effective land use management, as emphasised by Nunan (2018). Engaging local communities in decision-making processes can help ensure that policies are responsive to the realities faced by peri-urban residents.

The intersection of land use change and livelihood impacts in peri-urban Ibadan reflects broader global trends observed in rapidly urbanising regions. Understanding these dynamics is critical for developing sustainable urban policies that promote equitable resource access and enhance community resilience. Future research should continue to explore the complexities of peri-urban livelihoods, focusing on innovative solutions to mitigate the adverse effects of urban expansion.

METHODOLOGY

This study employs a mixed-methods approach to comprehensively examine land use change and its impact on livelihoods in peri-urban Ibadan. By integrating both quantitative and qualitative data, the research aims to capture the complexity of land use dynamics and the socio-economic realities faced by local communities.

The research focuses on selected peri-urban communities of Eleyele, Adetokun, Alafara, and Ologuneru in Ibadan, Nigeria. These areas have been significantly influenced by the city's expansion, making them ideal for investigating the interactions between urban growth and rural livelihoods. The selection of study sites was based on criteria such as proximity to the urban centre, levels of agricultural activity, and varying degrees of urban influence, especially growth trends since 2005.

Quantitative data were gathered through a structured household survey administered to a representative sample of residents in these selected peri-urban areas. The survey included questions on demographics, land use patterns, income sources, agricultural practices, and perceptions of land use changes. A stratified random sampling technique was employed to ensure that different socio-economic groups are adequately represented, including farmers, traders, and informal sector workers.

In-depth qualitative interviews were conducted with key informants, including local leaders, agricultural extension officers, and community members. Focus group discussions were also organised to gather diverse perspectives on land use changes and their implications for livelihoods. These discussions facilitate an understanding of local experiences and attitudes towards urban expansion, land rights, and economic opportunities.

To complement the survey and interviews, geospatial analysis was conducted using remote sensing data and Geographic Information Systems (GIS). This analysis identified and visualised land use changes over time, providing a spatial context to the qualitative and quantitative findings. Historical satellite imagery was utilised to assess changes in land cover, particularly the conversion of agricultural land to residential and commercial uses.

Through GIS, the areas are marked from the Google Earth map and further subjected to satellite imagery acquisition of the study area. The total land mass of the study areas stands at 3,600 hectares, while the growth trend for a 20-year period – 2005, 2010, 2015 and 2020 was downloaded as shown in Table 1. The acquired satellite imagery is as contained in Figure 1.

The quantitative data collected from the household surveys were analysed using statistical software. Descriptive statistics were used to summarise demographic and socio-economic characteristics, while inferential statistics were employed to examine relationships between land use changes and livelihood outcomes. The regression analysis technique was employed to identify significant predictors of livelihood changes associated with land use transitions.

The qualitative data from interviews and focus group discussions were analysed using thematic analysis. This approach involved coding the data to identify key themes and patterns related to land use change and its impact on livelihoods.

RESULTS AND DISCUSSION

This research methodology provides a comprehensive framework to explore the intricate dynamics of land use

Table 1. Overview of growth trend over years.

Land use Category	Year (Percentage)			
	2005	2010	2015	2020
Developed Area	32%	57%	63%	71%
Undeveloped Area	68%	43%	37%	29%
Total	**100%**	**100%**	**100%**	**100%**

Source: Adewoyin *et al*., 2024a.

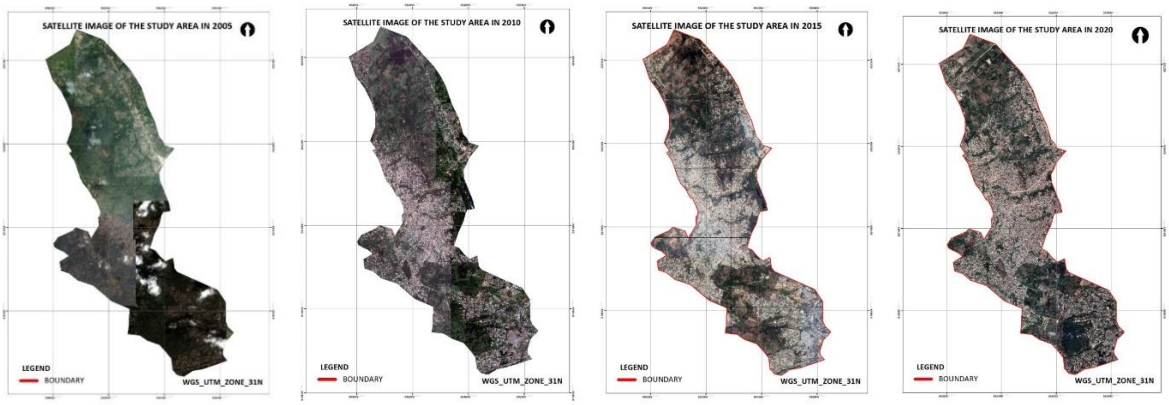

Figure 1. Satellite image of the study area for year 2005, 2010, 2015 & 2020 (Source: Adewoyin *et al.*, 2024a),

change and its impact on livelihoods in peri-urban areas. By leveraging mixed methods, this study aims to contribute valuable insights into the socio-economic implications of urban expansion, informing policymakers and stake-holders in promoting sustainable peri-urban development.

Type of land use

Findings in Table 2 showed the type of land use in the study area. It was established that the dominant land use was residential land use. This accounted for about 97.0% of the respondents' claims. On the other hand, the relatively small proportion of commercial and industrial areas, less than 4%, suggests that economic activities and businesses may not be as prominent in this region.

This imbalance could be due to various factors such as urban planning decisions, demographic characteristics, or economic priorities. For instance, a study on Lagos City, Nigeria, found that rapid urbanisation and population growth have led to significant changes in land use and cover over the past two decades. The study revealed that built-up areas, including residential and commercial spaces, increased by 33.57% between 2000 and 2020 (Gilbert and Shi, 2023).

Prevailing changes in land use

A similar finding was observed in terms of the prevailing land use change in the study. In Table 3, the findings indicate a significant transformation of land use in peri-urban communities - Eleyele, Adetokun, Alafara and Ologuneru, with 95.1% of the existing land use being converted to residential purposes. This trend is consistent with the rapid urbanisation and population growth experienced in many developing countries.

A study by Oyebanjo and Adedeji (2020a) found that peri-urban areas in Nigeria are experiencing rapid land use changes, driven by urbanisation and population growth. The study revealed that residential land use increased by 45.6% between 2000 and 2015, while agricultural land use decreased by 21.1% during the same period. Similar to this, Awotoye *et al.* (2020) examined land use changes in the peri-urban areas of Ibadan, Nigeria. It was found that residential land use increased from 23.4% in 1986 to 63.2% in 2016, while agricultural land use decreased from 54.5% to 21.1% during the same period.

The finding that a minute proportion of respondents indicated land use changes to commercial (2.9%), institutional (1.2%), and recreational use (0.6%) suggests that these land use types are not as prominent in the study area. However, this could also indicate a lack of diversity in land use, which could have implications for the sustainability and livability of the peri-urban communities.

Impact of land use changes on residents' livelihood in the study area

The extent to which residents were aware of land use changes and development in the different neighbourhoods

Table 2. Predominant land use.

Use	Residential communities {(Freq. (%)}				Total Freq. (%)
	Eleyele	Adetokun	Alafara	Ologuneru	
Residential	68 (97.1)	143 (96.6)	83 (96.5)	41 (97.6)	335 (96.8)
Commercial	1 (1.4)	5 (3.4)	1 (1.2)	1 (2.4)	8 (2.3)
Industrial	1 (1.4)	-	2 (2.3)	-	3 (0.9)
Institutional	-	-	-	-	-
Others	-	-	-	-	-
Total	70 (100.0)	148 (100.0)	86 (100.0)	42 (100.0)	346 (100.0)

Source: Fieldwork 2023.

Table 3. Perceived changes in land use

Use	Residential communities Freq. (%)				Total Freq. (%)
	Eleyele	Adetokun	Alafara	Ologuneru	
Residential	68 (97.1)	140 (94.6)	82 (95.3)	39 (92.9)	329 (95.1)
Commercial	1 (1.4)	4 (2.7)	2 (2.3)	3 (7.1)	10 (2.9)
Institutional	-	3 (2.0)	1 (1.2)	-	4 (1.2)
Recreational	-	1 (0.7)	-	-	1 (0.3)
None	1 (1.4)	-	1 (1.2)	-	2 (0.6)
Total	70 (100.0)	148 (100.0)	86 (100.0)	42 (100.0)	346 (100.0)

Source: Fieldwork 2023.

Table 4. Awareness of rapid development and land use changes in the neighbourhood

Use	Residential communities {Freq. (%)}				Total {Freq. (%)}
	Eleyele	Adetokun	Alafara	Ologuneru	
Rarely	8 (11.4)	9 (6.1)	1 (1.2)	2 (4.8)	20 (5.8)
Slightly	37 (52.9)	39 (26.4)	20 (23.3)	5 (11.9)	101 (29.2)
Neutral	2 (2.9)	-	1 (1.2)	-	3 (0.9)
Strongly	17 (24.3)	53 (35.8)	29 (33.7)	12 (28.6)	111 (32.1)
Very strongly	6 (8.6)	47 (31.8)	35 (40.7)	23 (54.8)	111 (32.1)
Total	70 (100.0)	148 (100.0)	86 (100.0)	42 (100.0)	346 (100.0)

Source: Fieldwork 2023.

was examined. The findings (Table 4) indicate that a significant proportion of residents (64.2%) are aware of rapid development and land use changes in their areas. However, there are variations in awareness levels across different locations, with Ologuneru (83.4%) and Alafara (74.4%) showing higher awareness, while Adetokun (67.6%) and Eleyele (35.7%) show lower awareness.

Community awareness and participation are crucial factors in determining the success of land use planning and management initiatives. Communities with high levels of awareness and participation tend to have better outcomes in terms of sustainable land use and development (Ademola *et al*., 2020).

In another study, the impact of rapid urbanisation on land use changes in peri-urban areas of Nigeria was examined. The study found that communities with high levels of awareness and engagement tend to be more resilient to the negative impacts of rapid urbanisation (Oyebanjo and Adedeji, 2020b).

The finding that 64.3% of residents in Eleyele were skeptical of rapid development and land use changes suggests that there may be a lack of trust or confidence in the development process among residents in this area. This could be due to various factors, including a lack of community engagement, inadequate information dissemination, or perceived negative impacts of development.

Perceived land use change and residents' means of livelihood

The level of agreement which land use changes had affected residents' means of livelihood in the study area showed a non-affirmative view among the respondents in

Table 5. Land use changes affecting means of livelihood in the community.

Parameters	Residential communities {Freq. (%)}				Total {Freq. (%)}
	Eleyele	Adetokun	Alafara	Ologuneru	
Rarely	21 (30.0)	42 (28.4)	18 (20.9)	6 (14.3)	87 (25.1)
Slightly	21 (30.0)	29 (19.6)	24 (27.9)	18 (42.9)	92 (26.6)
Neutral	8 (11.4)	24 (16.2)	6 (7.0)	1 (2.4)	39 (11.3)
Strongly	18 (25.7)	40 (27.0)	30 (34.9)	11 (26.2)	99 (28.6)
Very strongly	2 (2.9)	13 (8.8)	8 (9.3)	6 (14.3)	29 (8.4)
Total	70 (100.0)	148 (100.0)	86 (100.0)	42 (100.0)	346 (100.0)

Source: Fieldwork 2023.

Table 6. Perceived effect of land use changes on agricultural activities in the neighbourhoods.

Parameters	Residential communities {Freq. (%)}				Total {Freq. (%)}
	Eleyele	Adetokun	Alafara	Ologuneru	
Rarely	12 (17.1)	28 (18.9)	12 (11.9)	5 (11.9)	57 (16.5)
Slightly	27 (38.6)	39 (26.4)	17 (19.8)	17 (40.5)	100 (28.9)
Neutral	11 (15.7)	24 (16.2)	10 (11.6)	3 (7.1)	48 (13.9)
Strongly	9 (12.9)	38 (25.7)	31 (36.0)	13 (31.0)	91 (26.3)
Very strongly	11 (15.7)	19 (12.8)	16 (18.6)	4 (9.5)	50 (14.5)
Total	**70 (100.0)**	**148 (100.0)**	**86 (100.0)**	**42 (100.0)**	**346 (100.0)**

Source: Fieldwork 2023.

the entire study area. Findings showed that about 52.0% of the respondents in the study rarely or slightly felt the effect of land use changes on their means of livelihood. Furthermore, a closer look at findings in the different sampled communities revealed similar trends. For instance, in the sampled peri-urban communities, it was evident that the proportion of respondents who felt little or no effect of land use changes on means of livelihood was higher compared to respondents who claimed otherwise or were indifferent (Table 5). However, based on a chi-square test conducted, the differences in respondents' perception of the effect of land use change on the means of livelihood were significantly different across the sampled communities at p-value ≤ 0.05 (χ^2= 24.694, p = 0.016). In Alawode and Olayemi (2020), it was revealed that participation in non-farm activities and livestock farming positively impacted livelihood income of peri-urban dwellers in Ibadan.

Effect of land use changes on agricultural activities in the neighbourhood

In regards to residents' perceived effect of land use changes on agricultural activities in the neighbourhood, a large majority of residents in Eleyele (55.7%), Adetokun (45.3%) and Ologuneru (52.4%) communities provided a non-affirmative response to the fact that land use changes had an effect on agricultural activities. However, the majority of the respondents (54.6%) at Alafara community agreed to the fact that land use changes affected agricultural activities in the neighbourhood (Table 6). A Chi-square test further confirmed a significant difference in the perceived responses of the respondents across the sampled communities (χ^2= 21.247, p = 0.047). In a similar study, Bako and Ojolowo (2021) reveals a consistent patterns of agricultural land loss due to urban expansion.

Effect of land use change on residents' means of livelihood

A Spearman correlation test was conducted to determine the relationship between land use change and residents' means of livelihood in the study area. As such, the relationship between the questions: Does change in land use affect your means of livelihood in the community? This was examined with three key questions such as: Does a change in land use affect agricultural activities in the neighbourhood? Is there any noticeable increase/ improvement in socio-economic activities in the neighbourhood as a result of the increase in population? Does upward growth in development in the neighbourhood affect rent and land cost?

Findings from Table 7 revealed a negative and weak relationship between land use changes and socio-economic activities in the study area (r_s = - 0.051, n = 346, p>0.05). However, this relationship was not statistically

Table 7. Relationship between land use change and resident means of livelihood.

Effects	Does change in land use affect your means of livelihood in the community	
	Spearman Correlation	**p-value**
Agricultural activities in the neighbourhood	0.253	0.000**
Socio-economic activities in the neighbourhood	-0.051	0.342
Rent and land cost in the neighbourhood	-0.038	0.486

******Significant @ p-value ≤ 0.05 (**Source:** Fieldwork 2023).

significant at p-value ≤ 0.05. A similar insignificant and weak relationship between land use change and rent/land cost was the study area. (r_s = - 0.038, n = 346, p > 0.05). However, a positive but weak relationship was observed between land use change and agricultural activities in the study area (r_s = 0.253, n = 346, p < 0.05). Based on this finding, it was established that high land use changes result in a higher effect on agricultural activities in the study area. Adewoyin *et al*. (2024b) stated the extent of peri-urbanisation influenced local attitudes towards changing economic conditions, underscoring the need for targeted urban policies to address challenges posed by rapid development.

Conclusion

This study investigated land use change and its impact on livelihoods in peri-urban Ibadan, focusing on Eleyele, Adetokun, Alafara, and Ologuneru in Ibadan North West and Ido Local Government areas. The findings revealed a significant imbalance in land use, with residential areas dominating (97%) and commercial and industrial areas being underrepresented (less than 4%). This imbalance is attributed to urban planning decisions, demographic characteristics, and economic priorities.

The study also found that land use changes have had a considerable impact on residents' livelihoods, with 64.3% of respondents being aware of the changes and their effects on economic growth. However, the relationship between land use changes and socio-economic activities, including rent/land cost, was found to be weak.

As part of recommendations, the government should adopt a more integrated approach to urban planning, considering the needs of all stakeholders, including residents, businesses, and farmers. This will help balance the land use distribution and ensure sustainable development.

Efforts should be made to preserve agricultural land and promote sustainable agriculture practices. This can be achieved through initiatives such as agricultural zoning, subsidies for farmers, and education on sustainable farming methods. Programs aimed at socio-economic empowerment, such as vocational training, entrepreneurship development, and access to credit facilities, should be implemented to support residents' livelihoods.

Public awareness campaigns should be organized to educate residents about the importance of sustainable land use and the impact of land use changes on their livelihoods. Participation of residents in decision-making processes related to land use planning should also be encouraged. Regular monitoring and evaluation of land use changes and their impact on livelihoods should be conducted to inform policy decisions and ensure sustainable development.

By implementing these recommendations, the government and stakeholders can work together to promote sustainable land use, support residents' livelihoods, and ensure the long-term development of peri-urban Ibadan.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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