

LAGOS PERI-URBAN HOUSING DEVELOPMENTS AND MANAGEMENT: CHALLENGES AND PLANNING INTERVENTION

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ABSTRACT

The aim of this study is to assess the existing challenges in the management of Lagos peri-urban and the intervention measures put in place by the regional government. Using case study approach and two-stage sampling techniques, the sample size constitutes heads of 370 housing units selected randomly from clusters of purposively selected 16 settlements in Ibeju-Lekki peri-urban. Purpose sampling was adopted to minimise cost because the settlements were dispersed over a wide geographical area. The Primary sources of data were structured interview and questionnaires administered through field survey to planning personnel and selected household heads respectively. Data analysis was done by using descriptive statistics. Findings show three levels of challenges as environmental, socio-economic and institutional. Notable among the challenges were flooding, industrial pollution, traffic congestion, rising cost of commodities, unaffordable land, lack of social facilities, land regularisation, inadequate land data and land speculation. Measures put in place to counter challenges include zoning, and effective town planning policy and management. It is recommended that the regional government should design a policy that would guide in managing the spatial pattern of growth and infrastructure distribution in Lagos peri-urban settlements. Also, this study should be conducted in other peri-urban settlements in developing countries.

Keywords: *Infrastructure, Institutional policy, Peri-urban, Planning intervention, Urban governance, Urban policy*

INTRODUCTION

The rapidity of development in the metropolitan fringe where local institutions have no authority to deal with contextual changes is the bane of sustainable development in Lagos peri-urban settlements. The complexity of the socio-economic and environmental changes in the peri-urban interface calls for urban planning intervention but the prevailing regulations have brought forth difficulty in managing and dealing with urbanization-related development issues (Cadène, 2005). Local and corporate governance is needed to participate in the process of urbanization through coordination of urban planning activities with relevant stakeholders in the metropolitan periphery (Obeng and Whittal, 2014). The existence of overlapping jurisdictions and poor local management often impact negatively on the provision of essential infrastructural services in the peri-urban settlements. Characteristics of peri-urban interfaces indicate that peri-urban areas are outside formal urban boundaries and urban jurisdictions and the rate of development could not be matched by proper development and planning of the peri-urban zones, thus poor infrastructure development (Lawanson *et al*; 2012).

Challenges to the governance of the peri-urban in developing countries appear in different forms with different stakeholders pursuing contradictory goals. Factional interest and individual objectives often overshadow corporate interest (Leaf, 2002). There is an institutional failure which translates to other challenges in Lagos peri-urban housing developments and ultimately impairs the characteristics of housing in Lagos peri-urban. Contributing also to the chaotic development pattern in metropolitan fringe is the lack of adequate monitoring of the continuous development by the building regulation

authority and lack of proper documentation of the pattern of growth as seen in most peri-urban developments in developing countries (Puttal and Ravadi, 2014). Poor spatial planning in the peri-urban is a contributing factor to hindered infrastructure development in the interface (Adell, 1999). Significant areas of peri-urban settlements are not state-managed hence leading to the emergence of organic and informal settlements. Poor living condition and lack of basic infrastructure facilities and services also abound in peri-urban settlements (Obeng and Whittal, 2014).

There exists a problem of mismatch between the nested jurisdictions of governmental administration in peri-urban areas. Original plans did not capture the speed of growth in peri-urban areas while they were also not backed up with infrastructure investments commensurate to this growth. Also affecting peri-urban-urban governance is deficient financial and human capital, this translates into inconsistencies in implementation and enforcement of planning regulations (DiGaetano and Klemanski, 1999; Firman, 2000). There is evidently no integrated advocacy group for implementation of urban planning in the urban fringe. Thus constituting a great challenge to the governance of peri-urban generally. The role of the local public sector in urban planning and development is also weak in comparison to the private sector (Connell, 1999).

Urban governance in Nigeria cannot be fully understood without reference to the three principal levels of power: the local, the state and the federal government. Each of these levels intervenes more or less directly in urban management (Jiboye, 2011). The lack of autonomy of the local governments, the arm directly responsible for urban governance responsibilities has contributed to the challenges of governing and managing development in the peri-urban of Lagos State. Therefore, this study seeks to examine the multidimensional challenges in the governing of peri-urban housing development in Lagos and the efficiency of existing intervention strategies.

LITERATURE REVIEW

Governance can be defined as the exercise of political, economic and administrative authority in the management of a country's affairs at all levels. It comprises the mechanisms, processes and institutions, through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and meet their differences (United Nations, 2006). Government and public institutions are major actors in the governance of the peri-urban. Government roles come through active participation done through land acquisition at government determined prices (Winarso, 2007). Among many issues hindering efficient governance of peri-urban settlements are duplicated jurisdiction in planning, land tenure, undefined title to land, lack of planning and building and regulations, inadequate infrastructural services and the influx of lower income residents resulting in informality in buildings. General characteristics of peri-urban settlements in developing countries are rapid land use change, land speculation, conflicting land tenure and unbalanced infrastructure provision for the growing population (Allen, 2010).

It is the responsibility of the local government to shape the peri-urban developmental pattern through effective political and economic institutions (Wu *et al*; 2013). This however has been reduced because the local government capacities to focus on strengthening collaborative approaches and interactive governance has been limited due to lack of autonomy (Hudalah *et al*; 2007). Also, city primacy in Nigeria, especially Lagos has resulted in unbalanced distribution of the development process and mostly the neglect of the peri-urban (Towry-Coker, 2002). Local government ability to generate revenue has collapsed, increasing their dependence and reducing their capacities to face the challenges of urban governance. Local governments of the peri-urban areas often have only limited personnel to enforce urban planning rules. This hinders good monitoring of the vast development in the urban periphery.

A host of the peri-urban challenges could be avoided by efficient regional planning practice. Developmental problems can majorly be attributed to the lack of effective urban policy and method (Daramola and Ibem, 2010; Jiboye, 2011). Effective governance is needed to create a balance between the growing population, the environment and infrastructure to improve on peri-urban environmental quality. Investigating the environmental challenges of peri-urban settlements in Lagos mega city,

Lawanson *et al.* (2012), identified security and poor infrastructure problems. The degree of infrastructure development in the peri-urban is a function of whether peri-urban housing is state-led or group-led. That is the influence of the initiative and developers are enormous on housing in the interface (Wu and Zhang, 2012). Land development control is pivotal in driving peri-urban growth (Webster, 2002). Due to the absence of land use development plan enforcement, land speculation thrives greatly in peri-urban settlements (Salem, 2015). Land zoning or land ceiling or price control is a tool that can be used in controlling peri-urban growth by sanctioning specific use in selective zones (Salem, 2015). Peri-urban housing is a product of distorted land market. The customary land tenure is a major hindrance to the development of the interface (Chirisa, 2010). Control of peri-urban growth calls for strict zoning regulation. Advocacy for neo-customary land control may help in contributing to compliance to zoning, supervision of land sales and resolution of land conflicts. In the absence of equitable land allocation, in a market-driven environment, low-income households with limited financial capacities are compelled to solve their shelter and livelihood problems informally thus constituting challenges to governance of the peri-urban (Fangzhu *et al.*; 2013).

CONTEXT OF THE STUDY

The selected case study area is Ibeju-Lekki (Figure 1), a rapidly urbanizing Local Government Area located outside the metropolitan region of Lagos State. Ibeju-Lekki has grown phenomenally in the past ten years in terms of residential development and human population but not without accompanying environmental and socio-economic challenges. It is approximately 75 kilometres long and about 20 kilometres wide and has a land area of about 646 kilometres square, which equals one quarter of the total land mass of Lagos State. It is located at approximately latitude 40 15' north latitude 40 17' north and longitude 13015' east and 13020' east. According to the National Population Commission (2006) Census, Ibeju-Lekki had a population of 117,481 out of Lagos State's total of 9,113,605

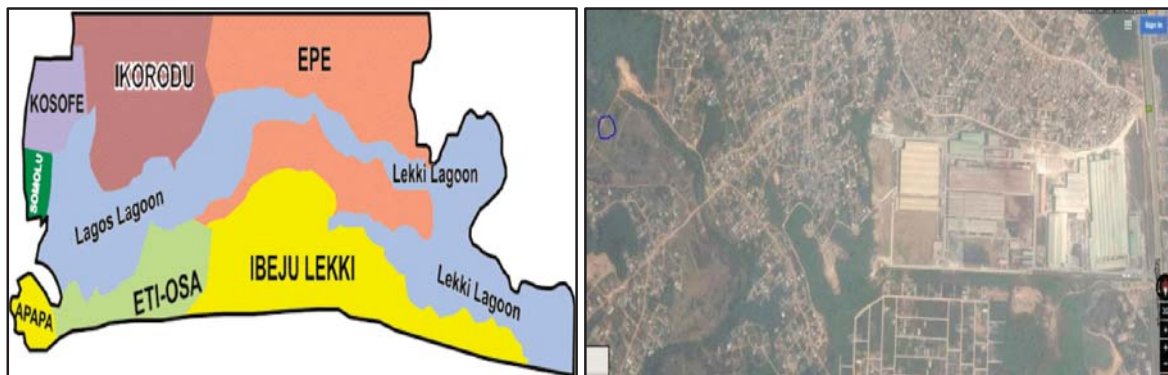


Figure 1: Map of Lagos showing Ibeju-Lekki, major primary and secondary roads

METHODOLOGY

Data for this objective were captured by both qualitative and quantitative method, using a structured interview and a survey questionnaire to capture respondents' perception on socio-economic, institutional and environmental challenges in the study area. Two sets of questionnaires were used to address this objective. The first set addressed issues of the multi-dimensional challenges in the study area. This set was administered to the heads of selected housing units in purposively selected 16 peri-urban settlements in Ibeju-Lekki to extract information on development and planning oriented challenges. The second set, an open ended structured interviews were to address planning issues. The structured interviews were targeted at information from planning officials. Twenty structured questionnaires were administered to personnel of all relevant planning institutions in the Local Government Area. Responses to the structured questions were recorded. Government offices visited were building control agency and the State Physical Planning Permit Authority in Ibeju-Lekki. Data processing and analysis on responses from closed ended questionnaires from housing units' representative was carried out using the Statistical

Package for Social Sciences (SPSS) 22. Descriptive statistics were used to present results in tables, charts and cross tabulation. Findings from the interview were analysed using content analysis.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Analysis of the research questionnaires provided in Table 1 shows 36.6% of the population is involved in informal trading and commercial enterprises making it the predominant occupation in the study area. Aside other unknown occupations, farming is the least engaged among all the occupations considered. Civil service, skilled work and professional practices are well represented having 19.1%, 15.3% and 16.7% respectively. Only 9% of the respondents had primary school education and below thus constituting the illiterates in the study area. The predominant income group in the study area was the high income group earning above N150, 000.00 monthly. This income group constitutes 44.6% of the entire population. This runs contrary to the belief that most peri-urban is mainly dominated by the low income group and the middle income group. The low income group earning N25, 000.00-N50, 000.00 and living mostly in informal buildings and self-built housing is 36.3%. The middle income earning N50, 000.00-N150, 000.00 monthly income constitute 19.1% and the least represented in the study area.

Table 1: Household heads socio-economic profile

		Ibeju-Lekki	
		N=366	%
Occupation of household heads	Civil service	70	19.1
	Informal Trading	134	36.6
	Professional practice	61	16.7
	Skilled work(Artisan)	56	15.3
	Farming	1	0.3
	Others	44	11.9
Literacy level of household heads	Postgraduate	56	15.3
	First degree/Higher diploma	105	28.7
	National diploma	62	16.9
	Secondary	110	30.1
	Primary/Below	33	9.0
Monthly income of household heads	Low income (N25,000-N50,000)	133	36.3
	Middle income (N50,001-N150,000)	70	19.1
	High income (N150,001-Above)	163	44.6

(Source: Field survey, 2017).

Assessment of challenges to management in study area

Challenges to the governance of the study area can be viewed in three dimensions, environmental, socio-economic and institutional. While some challenges are existing challenges, some are potential problems related to the present trend of development and activities in the study area.

Assessment of environmental challenges in study area.

Based on the analysis of field survey presented in Table 2, poor environmental quality constitutes about 48.9% to the developmental challenges in Ibeju-Lekki. The present and potential environmental challenges in the peri-urban includes flooding, poor-quality environment, traffic congestion, industrial pollution and a high level of informal development. The challenges of flooding in the peri-urban is due to the existing flat terrain and inadequate drainage system in the study area. Often when it rains, the flooding issue usually limits pedestrian and vehicular movement thus contributing to traffic congestion. The impact of flooding during raining season in Ibeju is overwhelming. The analysis shows it contributes 41.2% to environmental challenge in the peri-urban. Massive migration to Ibeju-Lekki peri-urban due to housing challenges and the poor state of secondary roads is the major causes of traffic congestion in the peri-urban. This factor impacts negatively on the daily commuting hours in the peri-urban and constitute 2.5% of environmental challenges.

The challenge of industrial pollution is as a result of Ibeju-Lekki being home to some manufacturing and industrial activities thus creating both air pollution and water pollution through discharges into the water bodies. Most sources of water are mostly polluted through arbitrary discharges of effluents into them. Industrial pollution constitutes 3.8% of the challenges. The double standard system of land ownership in Ibeju-lekki is having its manifestation on the developments on lands not under the direct control of government. The cumbersome regularisation system put in place for self-help housing has pushed most household into informal developments in the peri-urban. This variable constitutes 3.6% of environmental challenges in the study area.

Table 2: Environmental challenges in the study area.

Variables	N=366	%
Flooding	151	41.2
Poor environmental quality	179	48.9
Traffic congestion	9	2.5
Industrial pollution	14	3.8
High level of informal development	13	3.6

Source: Field survey (2017).

Assessment of socio-economic challenges in the study area.

There exist some socio-economic challenges in Ibeju-Lekki peri-urban (Table 3, Figure 2), some of which are Lack of infrastructure development, inflation in the cost of commodities, escalation of land price, lack of social, unaffordable land, tenure conflict and cost of land security. The rapid development of Ibeju-Lekki peri-urban settlements outpaces the capacity of the regional government in provision of infrastructural facilities. Having earmarked the peri-urban for non-residential purpose originally coupled with the inefficiency of the planning authority to carry out timely reclassification of the emerging new towns from rural to urban in order to match the pace of growth. Peri-urban settlements suffer from high end neglect from the government. This is major institutional failure in Ibeju-Lekki peri-urban settlements.

Most of the communities lack basic facilities like water supply, electricity, medical facilities and children in school. This challenge constitutes 28.6% in the study area. The creation of rich elite communities in the peri-urban has the driven cost of consumable commodities up arbitrarily. Also the cost of travelling to the city centre for supply is factored into the final consumer prices by the retailer thus increasing the prices of regular commodities. This socio-economic challenge constitutes 33.7% from residents' perception. Escalation in the cost of land and unaffordable land for housing and related development comprise 20.4% and 5.2% respectively to the socio-economic challenges in the study area. This issue particularly is fueled by the activities of land speculators and the creation of high end gated

communities driving the cost land higher. Observation through the field survey shows a disproportionate distribution of social facilities like banking in the development of the peri-urban. Most household still rely heavily on the city centre for use of such facilities. This factors among other factors identified by the respondents and through the observation schedule as challenges to growth and management by 6.3%.

Land tenure conflict constitutes 2.5% to the socio-economic challenges. A fragile relationship exists between the land natives and the regional government because of the continuous forced acquisition of land by the government often leaving the original land owners deprived of their inheritance. Ibeju-Lekki peri-urban settlements suffer greatly from land conflict. As gathered through the interview sessions, the original land owners feel deprived and not well compensated for their rights. Many land conflicts have resulted in loss of lives, both of government officials and among the land owners. Cost of land security constitutes 3.3% in the study area. Land security in an urban system is through regularisation of building documents with the planning arm of the government. The lengthy processing time and the cost attached to assessment often discourage most migrants from attending to proper documentation of their land hence increasing informality. Informality at the end also breeds slum development.

Table 3: Analysis of socio-economic challenges in the study area.

Variables	N=366	%
Lack of infrastructural development	105	28.6
Inflation in cost of commodities	123	33.7
Escalation of land price	75	20.4
Unaffordable land	19	5.2
Lack of education and social facilities	23	6.3
Land tenure conflicts	9	2.5
Cost of land security	12	3.3

Source: Field survey (2017).

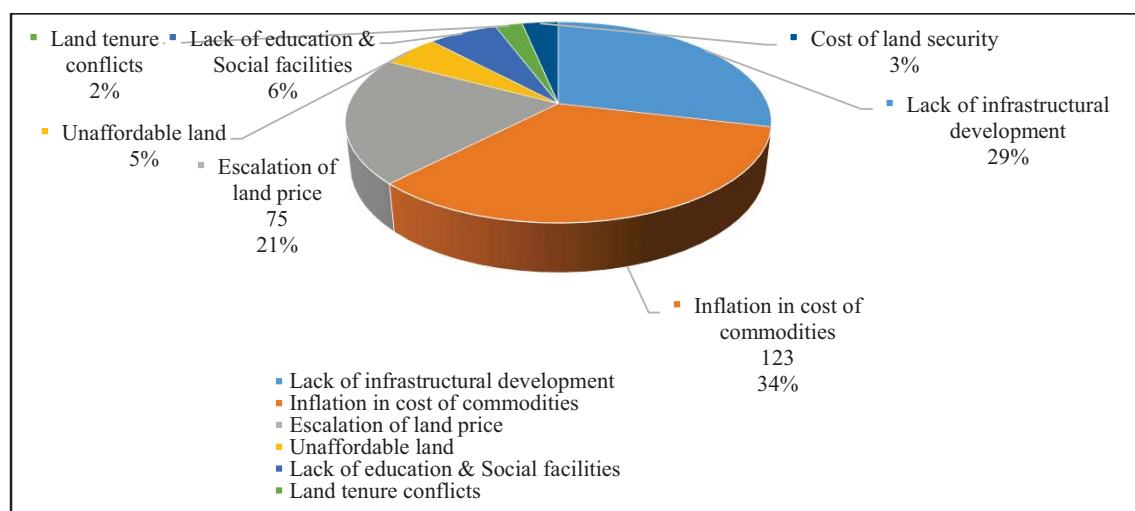


Figure 2: Analysis of socio-economic challenges in Ibeju-Lekki. Source: (Fieldwork, 2017).

Assessment of Institutional Challenges in the Study Area.

Planning in the peri-urban has its challenges both from the residents and the system that created the policies. There are several institutional challenges to planning in Lagos peri-urban but found to be peculiar to Ibeju-lekki through the field survey presented in Table 4 and Figure 3 are landownership problems, huge cost of land regularisation, inadequate land data, and land titling and land speculation.

Land ownership problems constitute 11.7%. Land under excision belonging to the natives lacks detailed data and end up being problematic for those that acquire them for residential purpose. It is common to see different families claiming ownership to same piece of land because of limited land information hence posing to be problematic for the planning officials. The responses of households to regularisation as a result of the high cost attached by the central government also constitute an institutional challenge and ultimately allow informality. This factor contributes 73%. Inadequate land data and land titling problem constitute 6.8% and 6.6% respectively. Land speculation problems constitute 1.9% in the study area.

Table 4: Analysis of Institutional challenges in the study area

Variables	N=366	%
Land ownership problems	43	11.7
Huge cost of land regularisation	267	73
Inadequate land data	25	6.8
Bottleneck in land titling	24	6.6
Land speculation	7	1.9

Source: Field survey (2017).

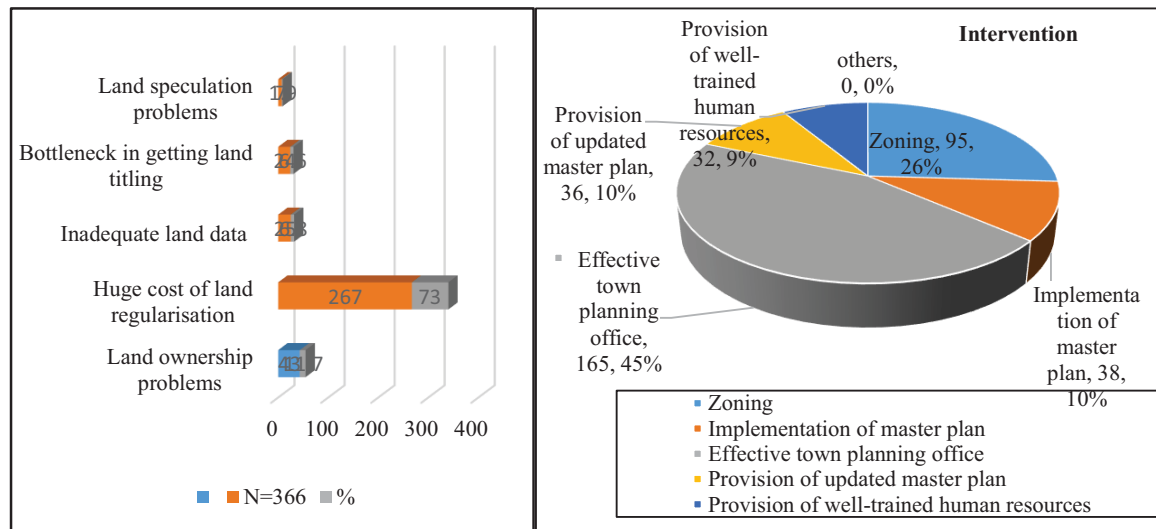


Figure 3: Analysis of institutional challenges

Figure 4: Analysis of intervention strategy

Development in the Study Area

Analysis of the field survey in Table 5, shows that land price dynamics and development tend to increase in the study area. Growth forecast is predicted to appreciate by 98.1% and to depreciate by 1.6% and consistent as indicated by 0.3% of the sampled households.

Table 5: Analysis of development and land price forecast.

Variables	N=366	%
<i>Future growth forecast:</i>		
Appreciate	359	98.1
Depreciate	6	1.6
Consistent trend	1	0.3
Others	0	0
<i>Land price forecast:</i>		
Appreciate	360	98.4
Depreciate	1	0.3
Neutral	5	1.4

Source: Field survey (2017).

Development intervention strategy in the study area

Field work survey using in-depth interviews and questionnaires shows some factors are necessary for an effective development strategy from both residents' perception and governments. Interviewed for this section were government representatives in planning offices, private developers and the community leaders. Analysis of the interview sessions is presented in Table 6 and Figure 4. As shown through the analysis, the strength of zoning as a planning tool is 26%. This implies the strict adherence of spaces in urban development to the earmarked purpose. It was noted through the interview that defaulters to this are both the central government and individuals. It was observed that there was conversion of spaces for purposes contrary to those set out in the master plan. Zoning if well executed is a tool for shaping urban space and for enforcing sustainable cities.

Further shown to be problematic in the planning policies in the study area, is deviation from the master plans. Findings through this field work show that there is no regular update of the master plans in generally at the state level this also translates to regional areas. Lagos. The existing master plan for the Lagos metropolitan region was last updated in the year 2000, showing lapses of sixteen years of uncaptured development in places outside Lagos metropolitan region of which Ibeju-Lekki is one. There is need for a regular update of the master plan to capture the trend and pattern of development. Availability of updated master plan and the implementation according to the analysis of field work response will improve development strategy by 9.8% and 10.4% respectively. Lack of effective town planning office and well trained human resources is also an institutional challenge in the study area. Though Ibeju-Lekki have a make shift mobile planning office, limited services are delivered in such. Analysis of the field survey shows that availability of an effective town planning office and well trained human resources will enhance development strategy by 45.1% and 8.7% respectively.

Table 6: Analysis of intervention tools in the study area.

Variables	N=366	%
Zoning	95	26
Implementation of master plan	38	10.4
Effective town planning office	165	45.1
Updated master plan	36	9.8
Well trained human resources	32	8.7
Others	0	0

Source: Field survey (2017).

CONCLUSION

Urban policy does not come without its own challenges. Three types of challenges exist in the management of the study area namely institutional challenges, environmental challenges and socio-economic challenges. Institutional challenges are created by policy lapses and ineffectiveness and can only be solved by the regional government. Prevailing institutional challenges in the study area are land ownership problems, huge cost of land regularisation, inadequate land data, land titling and land speculation. Environmental challenges are either induced by the natural topography or uncontrolled industrial activities. Noted environmental challenges in the study area are flooding, industrial pollution and traffic congestion. Socio-economic challenges are driven by people and the circumstances surrounding them. Recognised socio-economic challenges are rising cost of commodities as population increase, lack of affordable land and social facilities. It can be deduced that there exists an inter-relationship among the three-tier challenges because most environmental and socio-economic challenges are due to delayed or poor institutional responses to the pattern and pace of development in the study area.

In-depth interview with planning officials and the analysis of the questionnaires show that some measures can be put in place to counter challenges to planning and governance in the study area.

Identified strategic tools for planning are zoning, availability of an updated master plan, and implementation of master plan, effective town planning office and provision of well-trained planning human resources. Findings show that availability of effective town planning offices in the study area is the most considered strategy to an effective management. Informality operates in the absence of effective development control, if planning is to be effective in Lagos peri-urban settlements, there must be a responsive planning and policy framework to the different interest of all actors and stakeholders to control further unsustainable housing development in the study area. With the peripheral areas playing vital role in housing development, it is necessary for regional government to play a strategic role in building a minimally challenged urbanism by developing infrastructure and policy that could guide in managing the spatial growth of the peri-urban settlements in achieving sustainable development.

RECOMMENDATIONS

A policy framework that anticipates the pattern of development to avoid having an unsustainable and environmentally disruptive or impaired development will aid in abating the challenges facing the management of Lagos peri-urban housing development. Planning of housing schemes in the peri-urban should be integrated with other urban land uses for efficient distribution of infrastructural facilities.

REFERENCES

- Adell, G. (1999). *Theories and models of the peri-urban interface: A changing conceptual landscape*. Development planning unit. London: University College London.
- Allen, A. (2003). Environmental planning and management of the peri-urban interface: perspectives on an emerging field. *Journal of Environment & Urbanization*, 15(1), 135-147.
- Allen, A. (2010). Neither Rural nor Urban: Service Delivery Options That Work for the Peri-urban Poor. In *Peri-urban Water and Sanitation Services* (pp. 27-61). Netherlands: Springer Netherlands.
- Allen, A., da Silva, N. L., & Corubolo, E. (1999). Environmental problems and opportunities of the peri-urban interface and their impact upon the poor. *Strategic Environmental Planning and Management for the Peri-urban Interface Project*. London: University College, London.
- Binns, J., Maconachie, R., & Tanko, A. (2003). Water, land and health in urban and peri-urban food production: the case of Kano, Nigeria. *Kano Water LDD Revised*, 14(5), 431-444.
- Cadène, P. (2005). Dynamics of peri-urban areas: from the French case to the developing countries. *Peri-Urban Dynamics: Population, Habitat and Environment on the Peripheries of Large Indian Metropolises. A Review of Concepts and General Issues*, New Delhi.
- Chirisa, I. (2010). Peri-Urban Dynamics and Regional Planning in Africa: Implications for Building Healthy Cities. *Journal of African Studies and Development*, 2(2), 015-026.
- Connell, J. (1999). Environmental change, economic development, and emigration in Tuvalu. *Pacific Studies*, 22(1), 1-20.
- Daramola, A., & Ibem, E. O. (2010). Urban environmental problems in Nigeria: Implications for sustainable development. *Journal of Sustainable Development in Africa*, 12(1), 124-145.
- DiGaetano, A. and Klemanski, J. S. (1999), "Power and city governance. Comparative Perspectives on urban governance", *Urban Studies*, 8(1), 535-560.
- Fangzhu Zhang, F. W., & Webster, C. (2013). Informality and the Development and *Urban Studies*, 50(10), 1919-1934.
- Firman, T. (2000). Rural to urban land conversion in Indonesia during boom and bust periods. *Land Use Policy*, 17(1), 13-20.

- Hudalah, D., & Firman, T. (2012). Beyond Property: Industrial Estates and Post-Suburban Transformation in Jakarta Metropolitan Region. *Cities*, 29(1), 40–48.
- Jiboye, A. D. (2011). Urbanization challenges and housing delivery in Nigeria: The need for an effective Policy framework for Sustainable Development. *International Review of Social Sciences and Humanities*, 2(1), 176-185.
- Lawanson, T., Yadua, O., & Salako, I. (2012). An investigation of rural-urban linkages of the Lagos megacity, Nigeria. *Journal of Construction Project Management and Innovation.*, 2(2), 464-581.
- Leaf, M. (2002). A Tale of Two Villages: Globalization and Peri-Urban Change in China and Vietnam. *Cities*, 19(1), 23-31.
- Obeng, W., & Whittal, J. (2014). Peri- Urban Infrastructure Development through Community Participation: A Case Study of Yasore, Ghana. *Research Gate*, (pp. 1-13).
- Puttal, V., & Ravadi, N. (2014). Role of urban planning as tool to mitigate the environmental repercussions due to peri-urbanisation. *Journal of Civil Engineering and Environmental Technology*, 1(3), 96-102.
- Salem, M. (2015). Peri-urban dynamics and land-use planning for the Greater Cairo Region in Egypt. *Sustainable Development*, 1, 109-119.
- Towry-Coker, L. (2002). Megacities: The Lagos example/Nigeria. *Konrad-Adenauer-Stiftung e. V.*
- United Nations. (2016). *Urbanisation and Housing*. New York: United Nations.
- Webster, D. (2002). *On the Edge: Shaping the Future of Peri-Urban East Asia*. Stanford: Stanford University Press.
- Winarso, H. (2007), *Large scale land development and the peri-urban transformation in Jakarta metropolitan area: the case of Tangerang regency*. In: *Paper delivered to the International Conference on new concepts and approaches for urban and regional policy*, University of Gronigen, Netherland, 2007.
- Wu, F., Zhang, F., & Webster, C. (2013). Informality and the Development and Demolition of Urban Villages in the Chinese Peri-urban Area. *Urban studies*, 50(10), 1919–1934.
- Wu, K. Y., & Zhang, H. (2012). Land use dynamics, built-up land expansion patterns, and driving forces analysis of the fast-growing Hangzhou metropolitan area, eastern China (1978-2008). *Applied geography*, 34(1), 137-145.