



Research Paper

Assessing the Challenges of Parking Systems in Neighbourhoods to Enhance Residents Quality of Life of Port Harcourt Municipality

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Abstract

Parking systems and provision are essential to neighbourhood quality and quality of life (QoL). The study assessed the challenges of parking systems of neighbourhoods to enhance residents' QoL of Port Harcourt Municipality. The objectives are describing the types of parking systems of neighbourhoods, identifying the challenges of parking systems of neighbourhoods and effects on residents QoL, identifying the contributing factors to the challenges of parking systems of neighbourhoods, and identifying sustainable measures to enhance parking and residents QoL. The study adopted a quantitative approach and descriptive research design. The study employed stratified and simple random sampling techniques for data collection. The study stratified the neighbourhoods into 3 strata (high, medium, and low densities). One(1)neighbourhood was selected to represent each stratum namely, PH Township (high density), Orominike – D/Line (medium density) and Orije Layout – Old GRA (low density). A total of 397 respondents were determined and interviewed employing the Taro Yamane formula at a 5% precision level and 366 questionnaires were retrieved and valid for analysis. The study found that the neighbourhoods are characterised by parallel, perpendicular, double and angled echelon parking systems with on-street and off-street parking types, though inadequate for residents. This has caused residents difficulty in parking vehicles, fear of car theft, difficulty in movement by pedestrians and residents, tight streets and neighbourhoods, unattractive neighbourhoods, and residents parking far from their homes, difficulty navigating the streets and clustering. The contributing factors include no clear marking of parking spaces along the streets, motorists not adhering to parking regulations, poor enforcement of parking regulations by the authorities, poor education of parking regulations and street trading and indiscriminate parking by commercial drivers. The study suggested the following recommendations to improve parking systems to enhance residents' QoL by preparing parking plans and regulations to control and manage parking activities in the neighbourhoods based on their specific challenges, identify vacant plots and strategic locations in the neighbourhoods where off-street parking facilities will be provided to accommodate expected parking demands, clearly mark out parking spaces and lots along the streets of the neighbourhoods to separate vehicular paths, parking areas and pedestrian walkways, introduce one-side (parallel) parking along narrow streets and introduce pay-parking system in the neighbourhoods through the provision of off-street parking facilities.

Keywords: Challenges, Parking Systems, Neighbourhoods, Residents Quality of Life

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I. Introduction

In recent times, urban areas have continued to grow in spatial area and population size in developing economies of the global south of Asia and Africa continents which is triggered by rapid migration and natural increase (United Nations, Department of Economic and Social Affairs (UNDESA), 2019; Enger, Smith & Bockarie, 2006). Africa's urban population growth is projected to grow at 3.1% and 2.4%, respectively in the 2030s and 2040s (Kundu, Sharma, Debnath, Chakravorty & Kar (2022). This growth is in urban areas irrespective of its opportunities equally affecting several aspects of urban life negatively in developing economies. Some of the notable aspects of the urban spectrum this growth is affecting include housing, economy, high energy consumption, increase in densification, transportation, poor air and water quality consumption and environmental risks and hazards (National Geographic, 2023). This increase is also occurring

in Nigeria's urban spaces as the population continues to soar higher. One prominent aspect of urban life that the increase in urban growth is affecting is parking adequacy for residents of urban areas.

The issue of provision of parking in Nigeria's urban areas has become a worrisome activity in urban planning and management. The challenges that are hindering the provision of parking spaces in urban areas including Port Harcourt Municipality. Neighbourhoods in the municipality from a planning perspective have not provided the needed parking facilities from lot design, block and neighbourhood level. This is affecting the quality of life and well-being of residents of neighbourhoods in the municipality which is experienced in many urban areas in Nigeria. QoL can be summarised as the summary of both positive and negative conditions of life of individuals showing their satisfaction with society (Eyenghe, 2020; Eyenghe, Brown & Ibisiki, 2022). The correlation between parking and QoL also can provide the basis for assessing the perceived satisfaction of individuals in their neighbourhoods.

Port Harcourt Municipality in Nigeria has planned neighbourhoods that were supposed to better neighbourhood quality that will portray an improved QoL of its residents. Parking provisions and characteristics for residents, businesses and visitors of various planned neighbourhoods have called for concern to governments and researchers, especially the academia. There is a need for investigation to ascertain the challenges that constrain parking systems adequacy in the neighbourhoods of Port Harcourt Municipality that will promote better QoL and the wellbeing of residents and achieve sustainable urban development. The study will explore the challenges of parking systems, their adequacy and improve their conditions in the study area and the general neighbourhood quality.

Problem Statement

Parking provision in any neighbourhood is an essential component and indicator of neighbourhood quality domain of QoL assessment in urban areas. Observations on planned neighbourhoods of Port Harcourt Municipality in recent times, continue to portray inadequacy in meeting users' (residents, businesses, and visitors) demands. This has triggered the need to ascertain the challenges causing the inadequacy of parking systems in the neighbourhoods to enhance the QoL of residents in the municipality. The parking situation may have been caused by poor urban planning and development control, neglect of the parking provision importance by government agencies and developers, and road users not adhering to parking regulations in the municipality. These conditions have resulted in the distortion of street aesthetics, traffic congestion and increasing environmental problems associated with noise and fumes from vehicles. This study seeks to assess the challenges of parking systems of planned neighbourhoods of the municipality to enhance residents' QoL to achieve a sustainable living urban environment.

Aim and Objectives of the Study

The aim is to assess the challenges of parking systems of neighbourhoods to enhance residents' QoL of Port Harcourt Municipality.

The objectives of the study are to:

- i. Describe the types of parking systems of neighbourhoods of the study area.
- ii. Identify the challenges of parking systems of neighbourhoods and effects on residents QoL of the study area.
- iii. Identify the contributing factors to the challenges of parking systems of neighbourhoods of the study area; and
- iv. Identify sustainable measures to enhance parking and residents' QoL in the study area.

Scope of the Study

The study geographically covers the neighbourhoods of Port Harcourt Municipality of Rivers State, Nigeria. The content scope covers describing the types of parking systems of neighbourhoods of the study area; identifying the challenges of parking systems of neighbourhoods and effects on residents QoL of the study area; identifying the contributing factors to the challenges of parking systems of neighbourhoods of the study area; and identify sustainable measures to enhance parking and residents QoL in the study area.

II. Literature Review

Parking and Parking System

Parking is an essential provision and asset in urban residential neighbourhoods. This provision has enhanced the quality of neighbourhoods and the urban environment in terms of liveability and sustainability. So, for this reason, the parking system characterises and becomes eminent as an urban community facility and

service (Al-Tamimi & Asmael, 2020). A parking system is described as the innovation and technique employed to manage parking in an area which helps people to organise the spaces provided for parking (de Buitleir, 2020). Residential neighbourhoods are places where people reside and they attract other people and activities that are non-residents (visitors and commercial) to the streets and neighbourhoods including vehicles (Al-Tamimi & Asmael, 2020). These conditions and activities determine the quantity and number of spaces that will be provided or required for parking the neighbourhoods and equally characterise them.

Two distinct types of parking characteristics are found within residential neighbourhoods of any urban area namely: on-street and off-street parking (Pass Member, 2019). On-street parking as the name implies is a parking system in which vehicles are parked on the street within a neighbourhood (Parking Network, 2021). In this type of parking, vehicles are parked anywhere on or along a street, though there may be restrictions and regulations guiding the parking system depending on the municipal authority and traffic management agency of the city (Parking Network, 2021). The on-street parking system is determined by conditions such as right-of-way, width of carriageway and hierarchy of the road (Zhang, Li, Yuan & Yu, 2013). Also, sometimes a parking permit is needed for a person to park on a particular street (Zhang *et al.*, 2013). Off-street parking requires vehicles off the carriageway of the street in a parking facility such as a garage, parking lot or driveway (Parking Network, 2021). Off-street parking can be indoors or outdoors for parking purposes (Chegg, 2023). The parking facility may be a private lot, a garage or a public parking facility where the parker may pay for the lot where he or she is parking depending on the payment arrangement of the operator (Parking Network, 2021).

Parking in any environmental area is characterised by four basic types of parking namely, perpendicular, parallel, angled echelon, and double parking which describes the parking system of the urban area especially in residential neighbourhoods (Pass Member, 2019). Perpendicular parking is where vehicles are arranged and parked side-to-side perpendicular to aisles, walls and curbs in streets or neighbourhood parking facilities (The Ranty Highwayman, 2020; Alberta, 2023). In this type of parking, vehicles are parked side-by-side perpendicularly and considering the doors during opening without obstruction from other parked vehicles beside it (Alberta, 2023). This type of parking is called bay parking. Parallel parking occurs whenever vehicles are parked in the same line such that the front bumper of a vehicle is facing the back or rear bumper of another vehicle that is adjacent (Smith, 2018; Piao, Zhang, Chang, Li & Liu, 2021). In parallel parking, safety is considered as vehicles are parked to keep a reasonable distance at the front for easy access to the carriageway when leaving the parking lot.

The angled echelon parking arrangement follows the perpendicular parking type with the exception that the vehicles are parked in angular form in the aisle (Pass Member, 2019). This type of parking can be organised or arranged in street sides (on-street parking) and parking facilities in neighbourhoods (off-street parking). This is one of the most common parking arrangements both on the street and in parking facilities within neighbourhoods. This type of parking arrangement in practice accommodates more vehicles than the perpendicular and parallel parking arrangements (Pass Member, 2019). Double parking occurs when a vehicle is parked or is standing on a roadside where another vehicle has parked already at an aisle, curb, or wall (Parkhound, 2020, Estepa, Estepa, Wideberg, Jonasson & Stensson-Trigell, 2017). Generally, double parking is unconventional and unacceptable and not encouraged in any environment as it constitutes challenges in the environment (Estepa *et al.*, 2017). However, perpendicular, parallel, and angled echelon parking types can be applied both in on-street and off-street parking systems depending on the population, available space, and activity type in the environment (Smith, 2018; Pass Member, 2019).

Parking, Neighbourhood Quality and Quality of Life

Parking and its systems complement the liveability and quality of neighbourhoods in any urban environment, especially in large cities and urban areas. This provision equally determines residents, visitors, and other road users' perceptions about their neighbourhoods and QoL. Perception of parking by residents is triggered by neighbourhood planning and management schemes adopted by planning agencies and municipal authorities of the urban area (Yousif, 1999). There are factors influencing parking provision and management in neighbourhoods including available parking facility and type, preferred parking by drivers, presence of vehicles in the parking lots, road hierarchy and width of the carriageway, traffic condition of streets and neighbourhoods and type of land uses and the activities that take place in the neighbourhood (Yousif, 1999).

The physical, social, economic, and environmental concerns of parking contribute to parking adequacy or inadequacy in a neighbourhood and further determine residents' QoL and well-being. Parking systems and conditions further create awareness among residents, traffic management agencies and planning agencies to evaluate parking demands and availability of parking facilities to enhance parking policies and regulations and neighbourhood safety which promote sustainability, liveability, aesthetics, and attractiveness of neighbourhoods

in urban areas (Albalate & Fageda, 2019). Some factors that shape parking characteristics of neighbourhoods include parking space dimension, driveways/drive aisles for off-street parking, parking space delineation and pavement, access, and manoeuvrings within provided parking space, and drainage and landscaping pattern of the streets and neighbourhood (Temecula Municipal Code, 2021). QoL deals with individuals' feelings about their living environment and is determined by the basic neighbourhood provisions of infrastructure, facilities, and services that make them feel satisfied with the living conditions whether these provisions affect their lives positively or negatively (Barcaccia, 2013; Eyenghe, 2020). The availability of basic neighbourhood provisions such as parking facilities or spaces becomes essential and crucial for determining the quality of a neighbourhood and the perception of residents QoL about their living environment. This will further promote sustainability and liveability in all senses of a neighbourhood and QoL in urban areas.

III. Methodology

Sequentially, to obtain information and data to achieve the aim and objectives of the study, the study employed a quantitative approach and descriptive research design to assess the challenges of parking systems of neighbourhoods on QoL of residents in Port Harcourt Municipality, Nigeria. The study employed stratified and simple random sampling techniques for data collection. The neighbourhoods were stratified into three (3) strata (high, medium, and low densities). The Taro Yamane formula at a 5% precision level was employed to determine the size of the study in which three hundred and ninety-seven (397) respondents were determined and interviewed (see Table 1). The three (3) neighbourhoods were selected to represent each stratum namely: PH Township (high density), Orominike – D/Line (medium density) and Orije Layout – Old GRA (low density) for the study. Consequently, to determine the sample size, the population of the neighbourhoods were projected for the study year (2023) using 1991 population census results with a 6.5% growth rate (National Population Commission (NPC), 1991; NPC, 2018). To achieve the sample size, an average of five (5) persons per household was used to determine the number of households in the sampled neighbourhoods (National Bureau of Statistics (NBS), 2016). Thus, the Taro Yamane formula was used to determine the sample size and proportionately distribute the households across the neighbourhoods sampled for the study. A simple random technique was employed to select respondents (household heads) who were interviewed. Also, physical observations and photographs were used to characterise the parking systems of the neighbourhoods and their effects on residents' QoL of the study area. Consequently, for collation and analysis, three hundred and sixty-six (366) questionnaires were retrieved and valid for analysis.

Table 1: Sampling Details for the Study

S/N	Densities and Sampled Neighbourhoods	1991 Population	2023 Population (Projected Using 6.5% Growth Rate)	Number of Households (5 Persons per Household)	Number of Households Sampled
1	High Density PH Township	12,369	92,768	18,554	122
2	Medium Density Orominike (D/Line)	21,377	160,328	32,066	211
3	Low Density Orije Layout (Old GRA)	6,482	48,615	9,723	64
	Total	40,228	301,711	60,343	397

Source: NPC, 1991; NPC, 2018; NBS, 2016; Researchers' Computation, 2023

IV. Results and Discussion

Types of Parking Systems of Neighbourhoods of the Study Area

Figure 1 shows the types of parking systems on the streets of the neighbourhoods in the study. As presented in the chart, there are several parking systems in the study including parallel parking, perpendicular parking, parallel, double parking, and angled echelon parking. The modal parking systems of the study area were parallel and perpendicular parking systems accounted for 41.5% of the responses in the distribution. Double parking and angled echelon parking systems are lower in the responses from residents accounting for 4.9% of the distribution. These parking systems are observed in two (2) common parking types usually found in the neighbourhoods including on-street parking and off-street parking. From the responses of the residents the modal parking type is off-street parking accounted for 42.8% of the responses and on-street parking accounted for 37.5% of the distribution while neighbourhoods with both on-street and off-street parking represented 19.7% (see Figure 2).

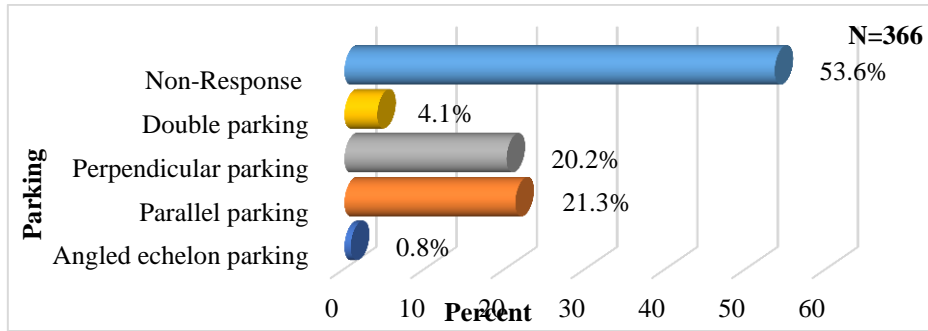


Figure 1: Type of Parking System on the Street of Respondents

Source: Researchers' Survey, 2023

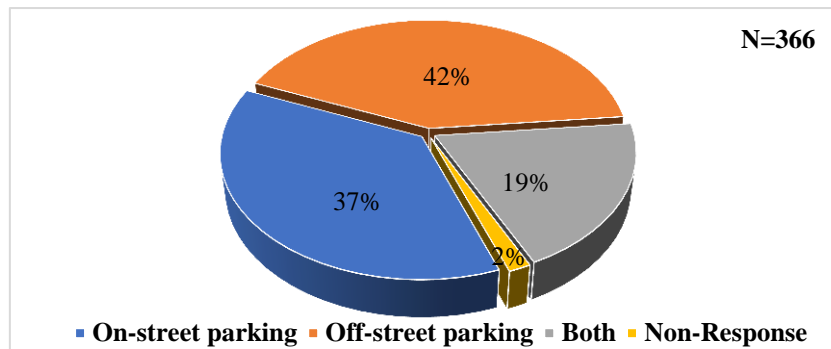


Figure 2: Type of Parking in Neighbourhood

Source: Researchers' Survey, 2023

Off-street parking is mostly found in low-density neighbourhoods studied (Orije Layout - Old GRA) where the plot size is large and can accommodate many vehicles and allowable plot-building coverage is small to planning standards and regulations of the municipality. On-street parking is mostly found in the high-density neighbourhood of Port Harcourt Township where plot-building coverage is high not allowing for off-street parking. This is also observed in some parts of the medium-density neighbourhood of Oromenike (D/Line) where the coverage is the same as that of Port Harcourt Township neighbourhoods. These neighbourhoods do not have parking facilities provided for parking purposes and encourage on-street parking as 47.3% of the residents affirmed that parking facility is not available in their neighbourhoods as indicated in Table 2. The parking systems, types and availability generated the perceptions of parking by the residents in the study neighbourhoods. From Table 3 as presented, the residents rated the adequacy of the parking system, types and availability in the neighbourhoods mostly "inadequate", "very inadequate" and "fair" accounted for 20.8%, 16.4% and 16.1%, respectively from the distribution. The ratings of the parking in the neighbourhoods as indicated to be "adequate" and "very adequate" representing 13.7% and 6.3% of the responses from the residents of low-density and medium-density neighbourhoods in the study area. The condition of parking as narrated by residents requires attention by the government and its planning agencies to improve upon to achieve quality neighbourhood and improve QoL in the urban environment.

Table 2: Availability of Parking Facility in Neighbourhoods

Availability of Parking Facility	N	%
Yes	17	4.6
No	173	47.3
No response	176	48.1
Total	366	100

Source: Researchers' Survey, 2023

Table 3: Rating of Adequacy of Parking System in Neighbourhoods

Rating of Adequacy of Parking System	N	%
Very adequate	23	6.3
Adequate	50	13.7
Fair	59	16.1
Inadequate	76	20.8

Very inadequate	60	16.4
Non-response	98	26.7
Total	366	100

Source: Researchers' Survey, 2023

Challenges of Parking Systems in Neighbourhoods and Effects on Residents QoL

The available parking systems and types have triggered some impacts on the residents, and this has affected the QoL in the neighbourhoods of the study area. Table 4 indicates these impacts caused by the parking systems and types on residents affecting their QoL. From the data, the challenges of the parking systems and types in the neighbourhoods are difficulty parking vehicles, fear of car theft and difficulty moving by pedestrians and residents which are modal impacts as indicated by the residents from their responses accounting for 53.3%, 12.3% and 4.9%, respectively. Other impacts are challenges as indicated by the respondents such as tight streets and neighbourhoods, unattractive neighbourhoods, and residents parking far from their homes accounting for 4.4%, 4.1% and 2.7%, respectively. These impacts equally affect their visitors in different ways including difficulty navigating the streets and clustering (poor aesthetics of street) accounted for 67% and 13%, respectively while the remaining 20% did not respond to the question (see Figure 3). This reflects a major impact on the residents' QoL affects the neighbourhood's environmental quality and defaces the serenity of the cityscape.

Table 4: Impact of Parking System on Residents

Impact of Parking System on Resident	N	%
Difficulty parking vehicles	195	53.3
Fear of car theft	45	12.3
Unattractive neighbourhood	15	4.1
Difficulty moving by pedestrians and residents	18	4.9
Tight street and neighbourhood	16	4.4
Residents Park far from their homes	10	2.7
Non-response	67	18.3
Total	366	100

Source: Researchers' Survey, 2023

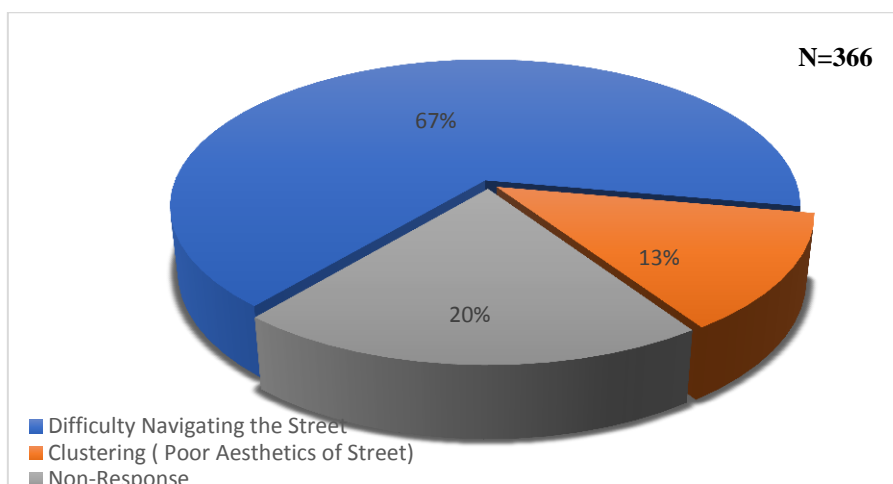


Figure 3: Impact of Parking System on Visitors

Source: Researchers' Survey, 2023

Contributing Factors of Parking Systems Challenges of the Neighbourhoods

From the study findings, several factors have contributed to the parking system challenges in the neighbourhoods of the study area which have parking inadequate for the residents. These challenges have generated negative impacts on the residents as identified in Table 4 and Figure 3. Thus, from Table 5 as indicated by the residents interviewed, the modal contributing factor to parking system challenges is insufficient parking spaces in neighbourhoods accounted for 29% of the responses. Other major contributing factors are no clear marking of parking spaces along the street and motorists not adhering to parking regulations accounting for 25.1% and 19.4%, respectively of residents' responses. The residents also identified issues such as poor enforcement of parking regulations by the authorities, poor education of parking regulations to motorists and

street trading and indiscriminate parking by commercial drivers as other factors that heighten the challenges faced by the available parking systems in the neighbourhoods of the study area (see Figure 4). All identified challenges affect the QoL of residents of the study area and contribute to their perception of the neighbourhoods in terms of liveability and sustainability.

Table 5: Contributing Factors of Parking Systems Challenges in the Neighbourhoods

Contributing Factors of Parking System Challenges	N	%
Motorists not adhering to parking regulations	71	19.4
Insufficient parking spaces in the neighbourhood	106	29
No clear marking of parking spaces along the street	92	25.1
Poor enforcement of parking regulations by the authorities	39	10.7
Poor education about parking regulations to motorists	31	8.4
Street trading and indiscriminate parking	27	7.4
Total	366	100

Source: Researchers' Survey, 2023



Figure 4: Street Trading and Indiscriminate Parking by Commercial Drivers

Source: Researchers' Survey, 2023

V. Conclusion

Parking systems are a major provision and activity in urban planning especially in residential neighbourhoods. The study revealed that there are four conspicuous types of parking systems in the planned neighbourhoods of Port Harcourt Municipality namely, parallel, perpendicular, angled echelon and double parking with on-street and off-street parking but more of the parallel and perpendicular parking. On-street parking is found in high and medium-density neighbourhoods of PH Township and Oromenike (D/Line) while off-street parking is found in low-density neighbourhoods of Orije Layout (Old GRA) because of the larger plot sizes and low plot coverage permissible for development. The study found that the parking spaces are inadequate from the residents' responses affected QoL and neighbourhood and environmental quality. The residents are having trouble parking vehicles such as car theft, difficulty in movement by pedestrians and residents, tight streets and neighbourhoods, unattractive neighbourhoods, and residents parking far from their homes. There is also difficulty navigating the streets and clustering causing poor aesthetics of the street. The study found that the contributing factors to these challenges are no clear marking of parking spaces along the streets, motorists not adhering to parking regulations, poor enforcement of parking regulations by the authorities, poor education of parking regulations to motorists and street trading and indiscriminate parking by commercial drivers. There is a need to improve the inadequacy of parking systems in the neighbourhoods of the municipality. Thus, the study has suggested a sustainable and workable policy framework to improve parking systems to enhance residents' QoL in planned neighbourhoods of the study area.

Recommendations

- i. Rivers State Government its planning agencies and traffic agencies should collaborate by preparing parking plans and regulations to control and manage parking activities in the neighbourhoods based on their specific challenges, through regular parking studies to know the parking demands of the various neighbourhoods.
- ii. There should be a collaboration between the Rivers State Ministries of Physical Planning and Urban Development and Transport to identify vacant plots and strategic locations in the neighbourhoods where off-street parking facilities will be provided to accommodate the expected parking demands of the neighbourhoods.
- iii. The Rivers State Ministries of Transport and Environment should collaborate to mark out parking spaces and lots along the streets of the neighbourhoods to separate vehicular paths, parking areas and pedestrian walkways to enhance the on-street parking system and safety of all road users.
- iv. There should be the collaboration of the Rivers State Ministries of Physical Planning and Urban Development, Transport and Environment to regulate and enforce the elimination of unauthorised street trading and indiscriminate parking by motorists in streets to improve parking inadequacy in the neighbourhoods.
- v. The Government should introduce one-side (parallel) parking along narrow streets to enhance parking and discourage double parking in the neighbourhoods.
- vi. The government agencies and the National Union of Road Transport Workers should collaborate to regulate commercial drivers' activities to stop indiscriminate parking and improve vehicular and pedestrian traffic; and
- vii. The government should introduce the pay-parking system in the neighbourhoods through the provision of off-street parking facilities and in areas where on-street parking spaces can be encouraged that are close to major commercial facilities and office complexes.

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