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Spatial Assessment of Urban Facilities and Services in Port Harcourt Metropolis, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author CHW designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author EW managed the analyses of the study. Author EW managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

The rapid increase in both urban and rural populations in Rivers State has led to the problem of inadequate availability of urban facilities and social services thus giving rise to social disparity and unequal access to these basic facilities and services by people of the same population spectrum. Empirical research has shown that the problems of social disparity (inequality) particularly in urban areas are on the increase and is gaining global and local attention. Despite the efforts of successive governments in the study area to combat this social problem, it is still raising its head in form of unequal access to educational facilities, health care, urban housing, good roads, and emergency services. This study, therefore, spatially assessed urban facilities and services in Port Harcourt metropolis, Nigeria. The mixed research method was adopted. However, the sampling size for the study comprises of 160 users of these urban facilities/services and staff of the facilities who were also interviewed. Data for the study were analyzed using descriptive statistical tools while Chi-square (X2) method of analysis was used to validate the research hypothesis. The result of the study revealed that accessibility to urban facilities and services is contingent on the level of

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income of residents in Port Harcourt Metropolis. The result further showed that the accessibility level to urban facilities and services varies across the sampled urban neighbourhoods. Arising from the above, the researchers recommended the deliberate formulation and implementation of policies targeted at eliminating the increasing inequality in access to urban facilities and services in Port Harcourt metropolis and the urgent need to increase the number of basic socio-economic, health, educational and recreational facilities/services to serve the increasing population in the metropolis.

Keywords: Accessibility; assessment; facilities; geospatial; mapping; services; urban.

1. INTRODUCTION

The continuous increase in both urban and rural population has led to the problem of inadequate facilities and social services thus giving rise to social disparity and unequal access to basic facilities and services in most urban areas. In contemporary times, the problem of social disparity (inequality) is on the increase and is gaining global and local attention. Enyenghe et al. [1] noted that despite the efforts of various governments to combat this social problem, it is still raising its head in the form of unequal access to educational facilities and emergency services. Urban inequalities are as a result of economic, demographic and social stratifications affected by political will, management, distribution of resources and corruption at different levels in society particularly in sub-Sahara Africa. The effect or non-existent service provision, interrupted service or poor facility management of infrastructure and services availability, delivery, maintenance and interlinked aspects of social services and management are burning nexus that need urgent attention and political will. Failure to do so will inevitably lead to deprivation and inequality, a retarded economy and social stigma in urban societies. Besides, spatial and social fragmentations have serious implications for urban growth and competitiveness [2].

Geographical or spatial accessibility refers to physical access a user possesses to a location [3,4]. It captures the connection between the location where the supply is and where the demand is, taking into cognizance existing transportation infrastructure and travel impedance [5]. It captures the connection between the location where the supply is and where the demand is, taking into cognizance existing transportation infrastructure and travel impedance [5,6].

Accessibility is indeed a common term, yet it has no precise definition. It, however, connotes the ease with which one gets at a point or something for the satisfaction of want [7]. Adeyemo [8] defined accessibility in terms of social and physical accessibility. Social accessibility means the ease with which various social groups get access to the social surplus of the bundle of goods without hindrance from colour, race, social status, birth and age. This affects the geographical distribution of power in the environment of planning which is characterized by conflicts resolutions and consequently affects the location of public service provision [9]. On the other hand, physical accessibility refers to the path an individual move from one location to another depending on whether or not his/her ability to pay for the cost of transportation to satisfy his/her need at any supply point within a suitable time and convenience [10].

The utility of physical accessibility is in the area of regional development planning on how to make resources available to using population. The basic propelling motive of economic development is to increase accessibility in all its connotations to resources and power in the distribution of the benefits of development. Thus, in practical terms, having to rationalize the supply of limited services and at the same time maintaining or improving the accessibility of these services to the consumer, leads to a fundamental dilemma [11,12]. The dilemma is predicated on the questions of who gets what? How? and who decides? The answers lie within the realms of distance which constraints physical accessibility and geographical distribution of power which is social accessibility [13]. The distance factor affects accessibility because of distance decay effects. Distance decay or inverse distance law states that information flow or movement between origin and destination pair (all things being equal) is inversely related to a frictional exponent of the distance between the pair [14].

Cities are supposed to serve as a central place whose function is to serve as a mediator of the production and consumption activities of the local

region and the outside world [15]. Apart from the fact that they will enhance the aesthetic and emotional qualities of the cities and areas around it, there are numerous social, political and economic benefits to be derived from the accessibility to urban facilities [16]. The more urbanized a country becomes, the more hunger for urban facilities and services. There is, therefore, the need to know the motivation for people's desire to accessing these facilities and services, demand and ways to respond in future growth regarding urban facilities.

The poor state or rather declining level of easy access to urban facilities and services in most areas of Port Harcourt metropolis has continued to attract the attention of both the government and private sector to palliate the problem. However, it is necessary to provide a detailed catalogue of accessibility to these urban facilities in the city which will now serve as a guide to foreigners and visitors to the city of Port Harcourt on how to access urban services based on what is of priority to them. People have often lamented on the high side of cost on accessing these facilities now and compared to the good old days. Despite the recent increase in urban facilities and consequent inequity in accessing the facilities/services within neighbourhoods in Port Harcourt metropolis, there has been little or no attempt to document, ameliorate or possibly solve the menace even though government and corporate institutions have made efforts in the past.

A critical observation of the Port Harcourt metropolitan city reveals that some part of the city could access certain urban facilities and services while some parts are growing or possibly getting into such status while some parts remain relatively as slum settlements. Accessibility encompasses the availability of opportunities and access to that opportunity. As earlier mentioned, a city becomes functional and economically viable when people can move from one area to the other with ease in search of fairer opportunities of life. However, given the nature of perennial acute service problems in the urban settings of Port Harcourt metropolis particularly as regards the access to facilities and services, this study seeks to investigate the spatial assessment of urban facilities and services in Port Harcourt Metropolis, Nigeria.

2. MATERIALS AND METHODS

The mixed research method was adopted in this study. GPS coordinates of the various urban facilities and satellite imagery were utilized in the mapping of urban facilities and services. The study area was narrowed down into five main zones. These zones were called zones (A)-(E) which comprise of the high-income zone, middle-income zone, low-income zone, sub-urban zone and urban poor zone. However, the sampling size for the study comprises of 160 users of these facilities/services who were randomly selected and staff of the facilities who were also interviewed. Simple random sampling technique was used to ensure that all elements have equal chances of being represented in the target population. Data for the study were analyzed using descriptive statistical tools. One hypothesis was formulated and tested in this study. Chi-square (X^2) method of analysis was used to validate the research hypothesis. The Chi-square (X^2) formula is presented below.

$$X^2 = \sum \frac{O - E^2}{E}$$

Where O = Observed frequency of response
E = Expected frequency of response
Σ = Summation
X^2 = Chi-square

3. STUDY AREA

From a geographical perspective, Port-Harcourt city lies between Latitudes 4º45′ N, and 4º55′ N and Longitudes 6º55′ E and 7º05′ E. Port-Harcourt city is situated at about 25 km from the Atlantic Ocean and it is sited between the Dockyard Creek/Bonny River and the Amadi Creek [17,18]. Port-Harcourt, previously known, as "Igwe-Ocha" was established in 1913 by the British in a region usually settled by the Ikwerres. It was named after Lewis Viscount Harcourt, the then-Secretary of State of Colonies. The key City of Port Harcourt is the Port-Harcourt City Local Government Area. It serves as the administrative Headquarters of Rivers State [19]. At present, Port-Harcourt metropolis is made up of three Local Government Areas (LGAs), namely Port-Harcourt LGA, Obio-Akpor LGA and Eleme LGA. For this study, only Port Harcourt and Obio-Akpor LGAs are examined (Fig. 1).

The surface area of land is low-lying and the rivers are influenced by tidal oscillation. The Port-Harcourt city lies at an average elevation of about 12 m above mean sea level. In expressions of general surface features, the Port-Harcourt city is very unique. The area falls within the coastal belt conquered by Low-Lying

coastal plains which structurally belong to the sedimentary formation of the recent Niger Delta [20]. It contains mainly muddy deposit pushed out of the River Niger into a comparatively tide-less salt sea. The Port-Harcourt city is drained by many rivers such as Ntawogba, New Calabar, Amadi Creek, Dockyard Creek, Dick Fiberesima creek, Isaka River, Mini Apalugo, Elechi creek, Primrose River, Mgbuodohia River, etc,. Izeogu and Aisuebeogun [21] viewed the beach ridge barrier islands as depositional landforms which receive fine coarse-grained sands from the sea with a height of just about 13m above sea level. Chiadikobi [22] in their empirical studies observed that most rivers and creeks in Port Harcourt and its environs shows that the network pattern created does not easily fit the convectional, typical dendritic and trellised pattern of drainage. The entire area is crisscrossed by numerous rivers and creeks which empty into the Atlantic Ocean.

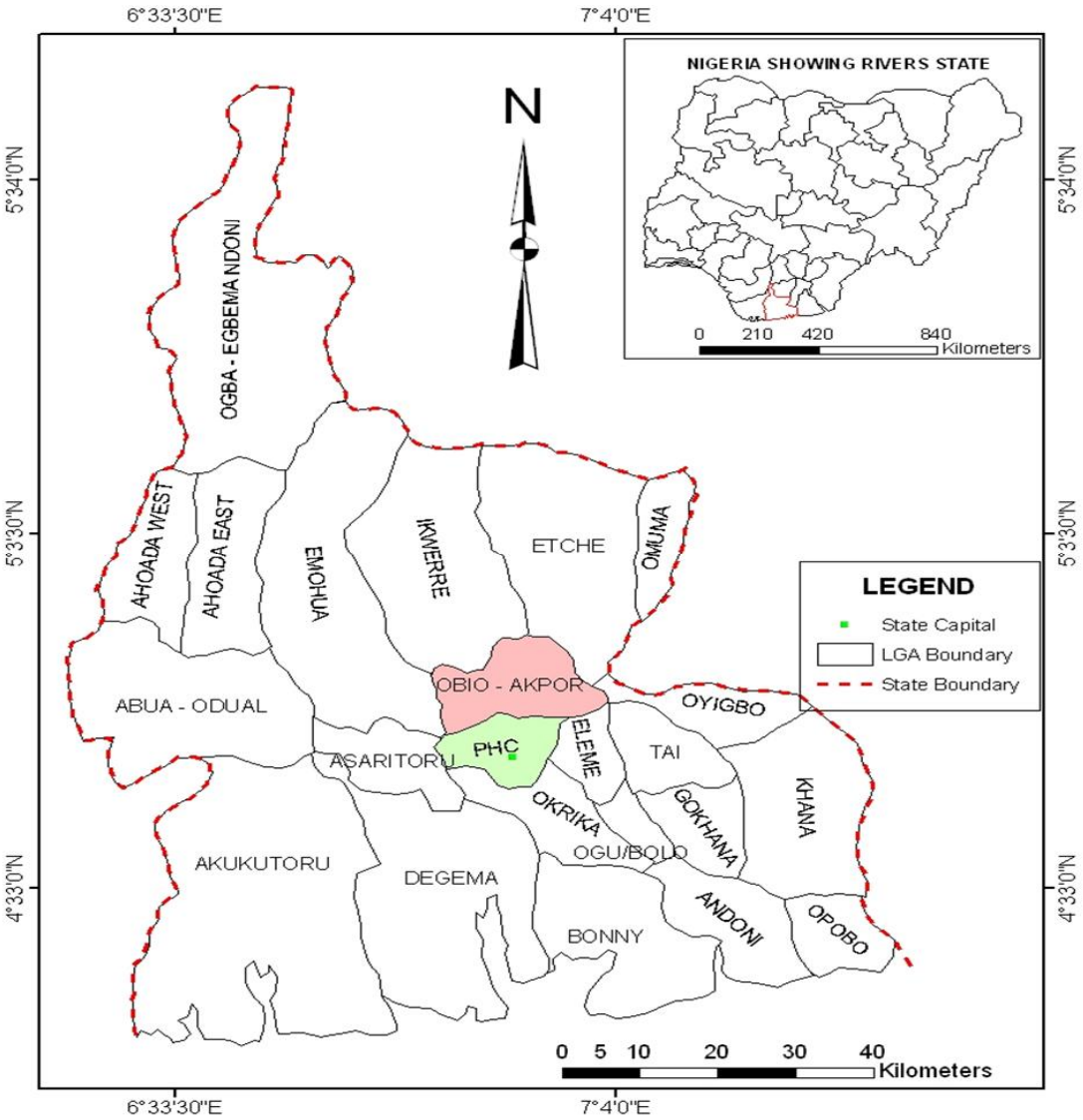

Fig. 1. Rivers State showing Port Harcourt city and Obio/Akpor LGA
Source: GIS Laboratory, Department of Geography and Environmental Management, University of Port Harcourt

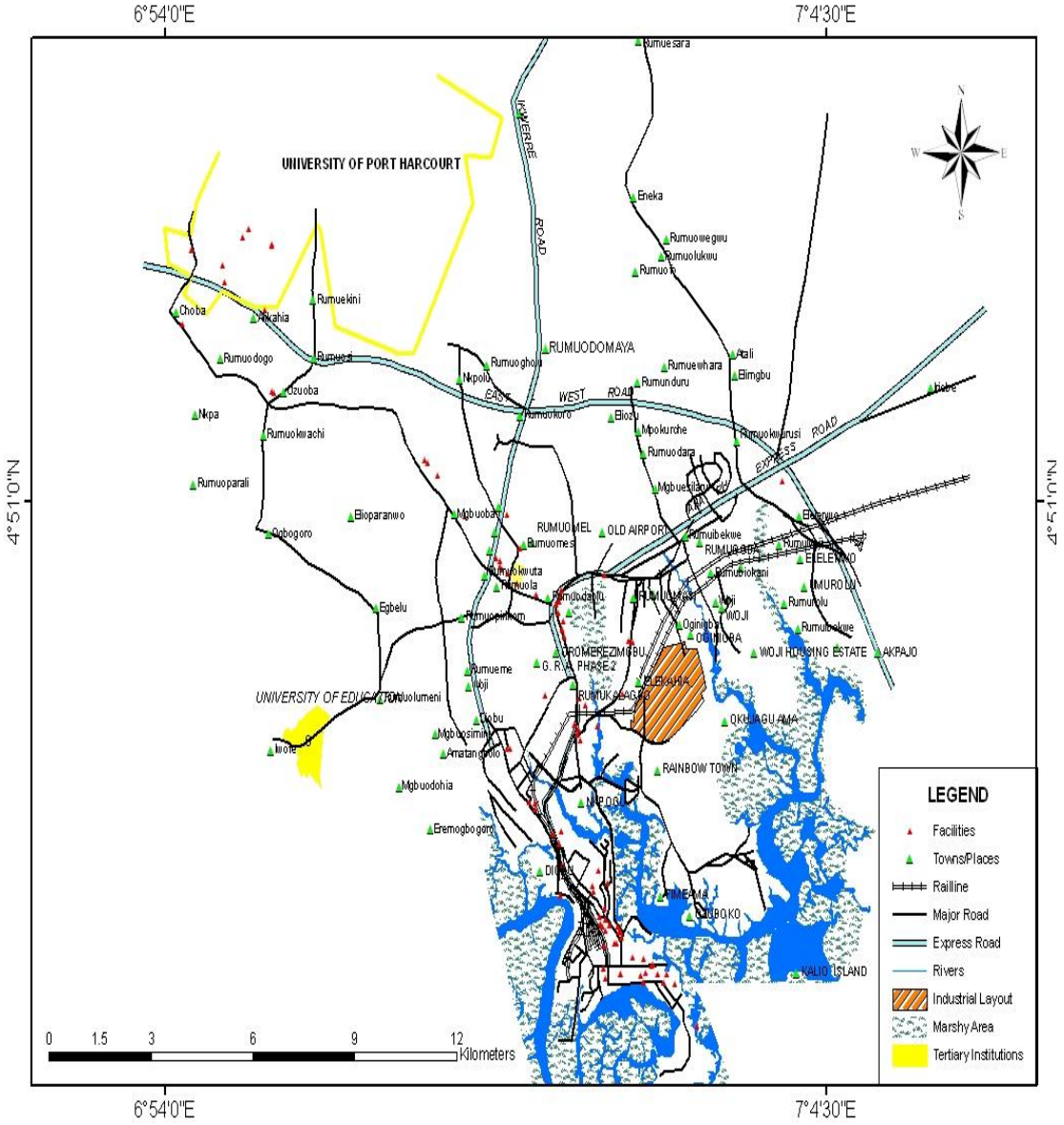

Fig. 2. Urban facilities and services map of Port Harcourt Metropolis
Source: GIS Laboratory, Department of Geography and Environmental Management, University of Port Harcourt

The occupants of Port-Harcourt city (within its municipal boundaries) has grown from 7,000 dwellers in 1921 to more than 538,558 in 2006. According to the 1963 National population poll outcomes, Port-Harcourt had a population of 179,563 persons [23]. With the rise in the number of residents, the 1991 National population poll outcomes showed that Port-Harcourt and Obio-Akpor LGAs had a population of 703,416 persons [24]. Though, in 2006, the population of the Port Harcourt city grew to 1, 000, 908 persons (National population Commission, 2006) with Obio-Akpor LGA having 462,350 persons while Port Harcourt LGA had 538,558 persons [25]. These current statistics of the two Local Government Areas gave the aggregate population density of the study area to be 2695 km^2 [25].

Table 1. Questionnaire administration and retrieval

Sampled neigbhourhoods	Number of questionnaire distributed	Number returned	Number not returned	Returned %	Not returned %
New G.R.A Phase 1,2 & 3	16	16	-	10.0	-
Forces Avenue	16	16	-	10.0	-
D/Line	16	16	-	10.0	-
Main Town	16	14	2	8.75	1.25
Diobu Mile 1,2 & 3	16	13	3	8.125	1.875
Rumuokwuta	16	16	-	10.0	-
Rumuomoi	16	16	-	10.0	-
Marine Base	16	12	4	7.5	2.5
Bundu	16	12	4	7.5	2.5
Iriebe	16	15	1	9.375	0.6
Total	160	146	14	91.25	8.73

Source: Fieldwork, 2019

4. RESULTS AND DISCUSSION

Geospatial mapping of urban facilities and services was done to show the spatial distribution of the locations of these facilities in the study area. The major urban facilities and services considered are tertiary educational institutions, major markets, model secondary schools, courts, airports, police stations, tertiary health institutions, major shopping malls, recreational facilities, LGA headquarters, fire service stations and transportation (Ports and Railways) in Port Harcourt metropolis. The results of the analysis are shown in Fig. 2.

Out of 160 questionnaires that were distributed in the 10 selected urban neighbourhoods, only 146 questionnaires were completed and returned which represent 91.25% while 14 out of the initial 160 questionnaires were not returned which represent 8.73% non-response as seen from the Table 1. This clearly shows that the inhabitants of the sampled neighbourhoods were not careless to academic request since the total of 16 questionnaires each that was administered especially at New G.R.A Phase 1, 2 & 3, Force Avenue, D/Line, Rumuokwuta and Rumuomoi were completed and returned.

Table 2 shows that a higher percentage of respondents has lived in the area for 21 years and above which accounted for 31% of the total respondents. This implies that the respondents have adequate knowledge of the location, condition, accessibility and reliability of the urban facilities and services in the metropolis.

Table 2. Respondents' residency period

Years	Frequency	Percentage (%)	Rank
1 – 5 years	18	12	5
6 – 10 years	31	21	2
11 – 15 years	22	15	4
16 – 20 years	30	21	3
21 years & above	45	31	1
Total	146	100	

Source: Fieldwork, 2019

Table 3. Access to urban facilities and services in the metropolis

Response	Frequency	(%)	Rank
Yes	17	11	4
No	52	36	1
Indifferent	51	35	2
I don't know	26	18	3
Total	146	100	

Source: Fieldwork, 2019

From the Table 3, 17 of the respondents affirmed that residents and visitors have access to urban facilities in the area which represent 11% of the total respondents; while majority of the respondents (36%) were of the view that the residents and visitors have no access to urban facilities and services in the metropolis. On the other hand, 35% of the total population do not know if the people have access or not to urban facilities and services in the metropolis.

Table 4 shows that minority of the respondents (18%) of the sampled population is of a positive opinion (yes) that urban facilities and service are present in the study area. On the other hand, majority of the respondents representing 36% of the sampled population is of a negative view of the presence of urban facilities and services in the study area. 19% of the respondents believe that there used to be urban facilities and services in the past.

The result on Table 5 shows that 28% respondents believe that urban facility and services in the metropolis are reliable while majority of the respondents (32%) think that urban facilities and services in the metropolis are not reliable. However, the lowest no of respondents (15%) believe that the urban facilities and service in the metropolis could be reliable sometimes.

Table 6 clearly shows variations in responses derived from respondents. Majority of the respondents (49%) have a strong conviction that seasons (rainy, dry & harmattan) of the year affect accessibility to urban facilities and services in the metropolis, while 37% of the respondents are of the view that seasons do not affect accessibility to urban facilities and services in the metropolis. Minority of the respondents (6%) doubts any seasonal effect on the accessibility to urban facilities and services while 8% of the respondents are indifferent about the seasonal effect on the accessibility to urban facilities and services in the metropolis.

The differences in responses from the respondents as regards satisfaction with the quality and quantity of urban services rendered are shown in Table 7. The result shows that majority of the respondents (31%) are of the view

Table 4. Presence of urban facilities and services in the metropolis

Response	Frequency	Total (%)	Rank
Yes	26	18	4
No	52	36	1
I doubt	39	27	2
Use to be	29	19	3
Total	146	100	

Source: Fieldwork, 2019

Table 5. Reliability of urban facilities and service in Port Harcourt metropolis

Response	Frequency of occurrence	Percentage of difference (%)
Yes	41	28
No	47	32
I Don't Know	36	25
Some Times	22	15
Total	146	100

Source: Fieldwork, 2019

Table 6. Depicting seasonal effect of access to urban facilities and services

Response	Frequency of occurrence	Percentage of total (%)	Rank
Yes	71	49	1
No	54	37	2
I doubt	9	6	4
Use to be	12	8	3
Total	146	100	

Source: Fieldwork, 2019

Table 7. Satisfaction of quantity and quality of urban services rendered

Response	Frequency of occurrence	Percentage of total (%)	Rank
Yes	37	25	3
No	45	31	1
At times	21	14	4
I think I am	43	30	2
Total	146	100	

Source: Fieldwork, 2019

Table 8. Class of people who have access to urban facilities and service

Level of Income Earners	Frequency of occurrence	Percentage of total (%)	Rank
High Income Earners	72	49	1
Middle Income Earners	29	20	3
Low Income Earners	33	23	2
The Poor	12	8	4
Total	146	100	

Source: Fieldwork, 2019

Table 9. Location of urban facilities and services satisfaction

Variable	Frequency	Total (%)
Very Satisfied	32	22
Satisfied	72	49
Not Satisfied	23	16
Indifferent	19	13
Total	146	100

Source: Fieldwork, 2019

Table 10. Condition of urban facilities and services

Variable	Frequency	Total (%)	Rank
Very Good	28	19	3
Good	47	32	1
Poor	31	21	2
Very Poor	23	16	4
Extremely Poor	17	12	5
Total	146	100	

Source: Fieldwork, 2019

that they are not satisfied with the quantity and quality of urban services in the metropolis and the lowest no of respondents (14%) believe that sometimes they are satisfied, even though not all the time with the quality of and quantity of service rendered. However, 25% of the sampled population are of the view that they are satisfied with the quantity and quality of urban services rendered in Port Harcourt metropolis.

Table 8 shows that greater no of respondents (49%) believe that the high-income earners have easy access to urban facilities and services in the metropolis, while minority of the respondents (8%) are of the view that the poor have little or no access to urban facilities and services in the metropolis.

From Table 9, it is obvious that majority of the respondents representing 49% of the sampled population are satisfied with the location of urban facilities and services in Port Harcourt metropolis while 16% of the respondents were of the view that they are not satisfied with the location of urban facilities and services in the metropolis.

In terms of the conditional status of urban facilities and services, Table 10 shows that majority of the respondents (32%) are of the view that the urban facilities and services in the metropolis are good, 19% of the respondents maintain that the condition of urban facilities and services are very good while the lowest no of respondents (12%) affirms that urban facilities and services in the metropolis are extremely poor.

Table 11. Provision of urban facilities and service

Variables	Frequency of occurrence	Percentage of total (%)	Rank
Government	49	33	2
Private	20	14	4
Both Private & Government	51	35	1
I Don't Know	26	18	3
Total	146	100	

Source: Fieldwork, 2019

Table 12. Effect of the presence of urban facilities and services

Response	Frequency of occurrence	Percentage of total (%)	Rank
Very High	42	29	2
High	18	12	3
Moderate	69	47	1
No Effect	17	12	3
Total	146	100	

Source: Fieldwork, 2019

Table 13. Impact of non-availability of urban facilities and services

Variables	Frequency of occurrence	Percentage of total (%)	Rank
Positive Impact	6	5	2
Negative Impact	47	32	2
Positive + Negative Impact	78	53	1
Indifferent	15	10	3
Total	146	100	

Source: Fieldwork, 2019

Table 14. Level of income per month

Income level in Naira (N)	Frequency	Total (%)
Less than 50,000	53	36
50,000 – 100,000	22	16
101,000 – 200,000	42	29
201,000 and Above	29	19
Total	146	100

Source: Fieldwork, 2019

Table 11 shows that 33% respondents strongly believe that the government is responsible for the provision of urban facilities and service in the metropolitan area while 14% of the sampled respondents think that the private institution can also provide urban facilities and services in the metropolis. Interestingly, majority of the respondents (35%) strongly believe that both the government and private sector can provide urban facilities and services in the study area.

Following the analysis on Table 12, majority of the respondents (47%) are of the view that the presence of urban facilities and services in the metropolis have moderately positive effects on the residents and visitors while 29% of the respondents believe that the presence of urban facilities and services have very high positive effects on the residents and visitors in the metropolis.

From Table 13, minority of the respondents (5%) are of the opinion that the non-availability of urban facilities and services in some parts of the metropolis has positive impacts while 32% of the respondents are of the view that the absence or non-availability of urban facilities and services in some parts of the metropolis has negative impacts.

Level of income per month from respondents in the sampled urban neighbourhoods as shown on Table 14 clearly indicate that majority of the respondents (36%) earn less than 50,000 naira

Table 15. Suggestions to improve the accessibility of urban facilities and service

Suggestions	Frequency	Total %
Government should do more in terms of development of the city	45	31
Some of these facilities should be located in areas that do not have them.	69	47
We should imitate the good old days.	9	6
The government should partner with foreign investors.	23	16
Total	146	100

Source: Fieldwork, 2019

Table 16. Access to urban facilities and services are contingent on income level

Response	Frequency of occurrence	Percentage of total (%)
Yes, it does	56	39
No, it does not	21	14
I don't know	26	17
Indifferent	43	30
Total	146	100

Source: Researcher's Fieldwork, 2019

per month while the lowest number of the respondents (16%) earn between 50,000 to 100,000 naira per month. Interestingly, only 19% of the respondents (19%) are in the category earning from 201,000 naira and above. This further agrees with the authors' research question.

Table 15 shows that greater number of the respondents (47%) suggest that urban facilities and services in the metropolis should be equitably distributed in various urban neighbourhoods to ensure easy access while minority of the respondents (6%) recalls the memory of the good old days when facilities and services in the Port Harcourt city were accessible without stress.

Responses from Table 16 shows that majority of the respondents (39%) believe that accessing urban facilities and services are contingent on income level while the lowest number of respondents (14%) does not agree that having access to urban facilities and services are based on the level of income. 17% of the respondents do not know if accessibility to urban facilities and services are hinged on the level of income.

5. HYPOTHESIS TESTING

H_1: Accessibility to urban facilities and services are contingent on the level of income of residents in Port Harcourt Metropolis.

H_0: Accessibility to urban facilities and services are not contingent on the level of income of residents in Port Harcourt Metropolis.

Table 16 was used to test the formulated hypothesis.

Contingency Table

Observed	56	26	82
Value	21	43	64
Total	**77**	**69**	**146**

→ **Grand Total**

Table 17. Chi-square test calculations

O	E	O – E	$(E - O)^2$	$\sum \frac{O - E^2}{E}$	Calculated value	Degree of freedom	Critical value
56	43.24	12.76	162.8	3.76			
21	33.75	-12.75	162.5	4.81			
26	45.20	-19.2	368.6	8.15			
43	30.24	12.76	162.8	5.38			
146				22.1	22.1	1	3.841

From the Chi-square test analysis on Table 17, the calculated value is 22.1 at 0.05 significant level. Base on the standard decision rule, we reject the stated null hypothesis and accept the alternate hypothesis since the critical value is smaller than the calculated value. Hence the conclusion becomes: Accessibility to urban facilities and services are contingent on the level of income of residents in Port Harcourt metropolis.

6. CONCLUSIONS

The issue of accessibility of urban facilities and services has in the contemporary time taken a central place in the geographical and environmental study of the urban areas, especially for its physical and socio-economic significance. This current study is aimed at providing a suitable framework for understanding accessibility to urban facilities and quality services in Port Harcourt metropolis, Rivers State, Nigeria. Understandably, this aim is borne out of the fact that since the 1980s, all efforts made by various governments to eliminate the spatial differences in access to urban facilities and services within cities, particularly in the global south have been futile. Hence differences continued in the quality of facilities and services as well as inequality in accessibility to these facilities and services within the city. The result of this study is consistent with the work of Wizor [26].

Empirically, the findings of the research revealed that the quality of services and accessibility to urban facilities are contingent on the level of income of residents in Port Harcourt metropolis. The implication, therefore, is that the research had revealed that access to urban facilities and services is a function of income status of residents since those with high income reside in areas where these facilities are located and with good privileges to the facilities; that is, they can afford the cost of accessing such facilities and services. Similarly, the research showed that there is a high relationship between low-income earners in residential areas where access to urban facilities is relatively low with low privileged facilities.

The outcomes of this research corroborate the findings of Oluigbo and Ikenna [27] who reported that the high-income group in Afikpo are favourably disposed to accessing educational, health and recreational facilities in urban areas. Olugbenga [28] on the other hand posited that access to urban facilities is a reflection of the socio-economic characteristics of the people with regards to income, occupation and education since access and services hinges on these characteristics.

Based on the major findings of this study, the following recommendations are made to reduce the concern of differences and inequity in access to urban facilities and services in metropolitan cities.

- The government should formulate policies and implement techniques that will promote accessibility to urban facilities and services in Port Harcourt metropolis.
- There is an urgent need for the government to increase the number of basic socio-economic, educational, health, transportation and recreational facilities in the city to serve the increasing population.
- The government should supplement by constructing more low and medium-cost urban facilities in the city to reduce the burden of inequality and inaccessibility.
- Since the government cannot tackle these problems single-handedly, non-governmental organizations and cooperate bodies should be encouraged to invest in urban facilities and services to enhance easy access and ultimately the livability of the city.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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