Assessment of Urban Infrastructure Quality and User Satisfaction in Low Income Residential Neighbourhoods in Minna, Nigeria

[1]R. A. Ogunbajo, [2]M. O. Bello and [2]M. A. Adebayo,

[1]Department of Estate Management and Valuation,
Federal University of Technology, Minna, Nigeria.

[2]Department of Estate Management,
Federal University of Technology, Akure, Nigeria.

Abstract

This study assessed urban infrastructure quality and the level of user satisfaction with urban infrastructure in low income residential neighbourhoods in Minna, Nigeria. Five (5) neighbourhoods were selected for the study, and a total of 250 housing units were sampled. Questionnaire was administered on households that fell within the sample and used to retrieve relevant data. This was followed with an observatory study of the entire study area. Simple descriptive statistic, frequency distribution, Kruskal wallis (H) test, Pearson's correlation, and Relative satisfaction index (RSI) were used to analyse collected data at different levels in the research. Analyse-it ® v4.5 statistical software for Microsoft excel was used to carry out all statistical analysis. Seven (7) components of urban infrastructure were identified to sustain residential properties in the study area and the varied conditions of each of these infrastructure was presented. The overall quality of urban infrastructure was established based on cumulative weighted scores of respondents rating of urban infrastructure quality in their respective neighbourhoods. Total weighted scores of 600 and below signified a general poor quality of urban infrastructure in the affected areas. A correlation coefficient of 0.853 indicates a strong positive relationship between drainage conditions and the condition of access roads, among others, while low RSI for access roads (1.972), drainage systems (1.456), waste disposal (1.712), security (2.632), water supply (1.372), electricity supply (1.52), and neighbourhood cleanliness (1.688) indicate a very low level of user satisfaction with urban infrastructure in the study area. Over 50% of respondents described the management of urban infrastructure in their neighbourhoods as being poor. The study recommend that efforts by the concerned authorities should be intensified towards the provision and proper management of urban infrastructure in urban areas.

Keywords: Infrastructure quality, residential neighbourhood, urban infrastructure, user satisfaction

Introduction

The provision of basic urban infrastructure is essential in any geographical setting and it is a very significant determinant of the quality of life of urban dwellers. Over the years, it has been known to tremendously serve the inhabitants of urban areas, thus it is often regarded as a prerequisite for the development of any urban economy. The significance of infrastructure in the proper functioning of an urban area cannot be over-emphasised. As observed by Harvey (1994), productive and profitable land uses are usually attracted to areas with adequate and effectively managed infrastructure resulting in increased land and housing values. According to Babarinde (1998), the efficiency of any urban area depends largely on the provision of efficient infrastructure and services. Floyd and Allen (2005) emphasized the importance of infrastructure in the local development process and argued that infrastructure development or the lack of it is often used as a policy tool to encourage or discourage growth. Cao and Zhao (2011) explained that good quality infrastructure have significant influences on the progress of the society as a whole as well as the welfare of the citizens. According to Anofojie, Adeleye and Kadiri (2014), the provision of adequate infrastructure such as good roads, electricity, water, telecommunications, sewage and drainage are basic requirements that determine the socio-economic wellbeing of an area. Good quality and sufficient infrastructure are vital elements of prosperity of any nation; hence, land has little potential for residential and other land uses in the absence of urban infrastructure (Saed, Kamariah, Mohammed, and Johani, 2015). Urban Infrastructure refers to the physical constructs provided by human endeavour which underpin the economic and social life of a community (Convery, 1998). They are also being referred to as interconnect facilities, and include public utilities such as power, piped gas, telecommunications, water supply, sanitation and sewerage, and solid waste management; municipal works such as roads and drainages; and transport sector such as public transit, ports and airports (Saed *et al*, 2015).

With the rapid urbanization of many Nigerian cities and parts of other developing countries, good quality urban infrastructure has become increasingly important. However, one of the persistent problems facing Nigerian cities in the past decades is the inadequacy of urban infrastructure, as well as management of existing ones (Ogu, 2005). Anofojie, *et al* (2014) described the inadequacy or complete absence of amenities in housing estates as a major setback or hindrance to the quality of such estates. It is however pertinent to note that major infrastructure challenges result from increased urban growth and density, as well as the inability to effectively manage existing infrastructure. The ability of infrastructure to accommodate growth depends on the ability of the urban area to maintain and improve the condition of existing infrastructure. While describing the quality and quantity of urban infrastructure in China, Wu (1999), identified low user charges as a major problem in

funding proper urban infrastructure maintenance. As observed by Lin (2001), increasing provincial disparity is also a problem of urban infrastructure provision in China. Cities in the eastern region uniformly enjoy higher levels of services in all sectors, while in inland provinces, public transportation, roads, streets, water supply, and waste treatment are in poor condition (Wu, 2008).

The World Economic Forum (2014) ranked countries around the Globe based on the quality of general infrastructure (i.e Transport, power, telecoms, etc) in these countries. In the assessment, infrastructure were assigned scores from 1 – 7, with 1 signifying extremely underdeveloped, and 7 signifying extensive and efficient- among the best in the world. Nigeria was ranked 125th with a weighted average of 2.7 for road quality, 110th and a weighted average of 3.2 for port infrastructure, 121st with a weighted average of 3.2 for air transport infrastructure, and 141st with a weighted average of 1.6 for quality of electricity supply among others. On the overall condition of infrastructure, Nigeria was ranked 133rd with a weighted average score of 2.7, as against 3.2 in 2012.

The inadequacy and poor management of urban infrastructure in Nigeria are quite obvious in many towns and cities, for instance, a research by Coker, *et al*, (2007) which aimed at evaluating environmental quality in Ibadan divided the city into high, medium and low density zones, and a total of 172 dwellings were surveyed. Penalty scoring was used to assess the conditions of housing and quality of the environment in each zone. Results showed that only one of the low density areas had good neighbourhood environment, while none of the high and medium density areas had good environmental conditions. Ogunleye (2013) examined the physical conditions of low-income settlements in the core areas of Akure. 14 residential neighbourhoods were sampled and findings showed that majority of the housing units lack basic infrastructure and as much as 53.3% of them were described as unsatisfactory by modern standards. A research by Okoye and Onwuka (2014) was motivated by the desire to evaluate the conditions of basic infrastructural facilities in public housing estates in Awka. Among other core objectives, the study assessed the conditions of basic infrastructural facilities in the area by retrieving questionnaire administered on 506 households in five public estates, and also analysing collected data with Pearson's correlation analysis. Findings revealed a generally poor condition of basic infrastructural facilities in the estates. It further revealed a relationship between income status of residents and the condition of some of the identified infrastructure. Owoeye and Ogundiran (2014) assessed the environmental quality of Moniya community in Ibadan. 185 residents were sampled, and findings revealed that Moniya is a typical slum community with inadequate basic services and unhealthy living conditions. Indices used in assessing environmental quality were: sources of water supply, toilet and bathroom facilities, source of electricity, condition of drainages, method of waste disposal, condition of access roads, health and educational facilities. Otegbulu (2014)

however examined the implication of infrastructure condition to urban neighbourhood sustainability and how a demand driven approach can enhance willingness to pay for service improvement. Findings from the study indicated that different areas have preferences for different infrastructure both in specific types and service option, and that demand driven provision will enhance willingness to pay, and also has implication on neighbourhood sustainability.

Traditionally, government (at the state and local levels) had been the major provider of urban infrastructure in Minna, and were known to take responsibility for its management and maintenance over the years. However, with the rapid urbanization and expansion of the area, the infrastructure needs of the growing population are hardly met. Available urban infrastructure in parts of the area is being over-stretched, while some of these infrastructural facilities are completely unavailable in other parts. The population of the area is increasing at an alarming rate without a corresponding growth in urban infrastructure, thus resulting in the dilapidated state of urban infrastructure in the affected areas. While the traditional budgetary allocation for infrastructure development and management is perceived in some quarters to be grossly inadequate in meeting the urban infrastructure needs of the teaming population in the study area, corruption as well as bureaucratic bottlenecks has hindered the effective utilization of available resources. A physical survey of the study area has revealed an uneven spatial distribution of urban infrastructure across neighbourhoods, with an obvious disparity in urban infrastructure (quantitatively and qualitatively) between low density/high and medium income residential areas on one hand, and high density/low income areas on the other hand. Some areas are highly favoured in terms of urban infrastructure provision and management, as opposed to other areas.

The Central Statistics Office (2012), emphasized that measuring infrastructure performance is required for decision making in order to improve the availability and capacity of existing infrastructure. On this basis, it is paramount that the quality of infrastructure in the study area be measured with a view to determine user satisfaction and evaluate the performance of these infrastructure in meeting the needs and expectations of the users. This research therefore theoretically and empirically examined the infrastructural facilities sustaining residential properties in Minna, Nigeria and assessed the conditions of these infrastructure. The overall quality of urban infrastructure in low income residential neighbourhoods was established, and the sampled neighbourhoods were thereafter ranked based on the quality of overall infrastructure. The relationship between all the quality indicators used was also established. The study further assessed the management of the identified infrastructure, and provides an indepth analysis of the level of user satisfaction with these infrastructure. This study recommends appropriate measures to address all observed challenges.

The Study Area

Minna is the capital of Niger state. It lies on latitude 9.61° North and longitude 6.56° East, and occupies an area of about 884 hectares. Spanning from Tudun Fulani in the North West, to Chanchaga in the South, Minna is about 135km away from Abuja the Federal Capital and about 250km to Kaduna city. Over the years, the population of Minna has continued to rise. According to the State Bureau of Statistics – Niger State Planning Commission (2011), the population of Minna was put at 59,989 in 1963, and rose to 76,480 in 1979. The 1991 population census put the population of Minna metropolis at 190,750, which further rose to 201,429 according to the 2006 population census. Before it became the state capital, its indigenous population engaged themselves mainly in farming activities. Today, the significance of Minna has been further enhanced with the movement of the seat of the Federal Government from Lagos to Abuja as it is the closest state capital to the Federal Capital Territory. A large number of residents are employed in federal and state government paralstatals, ministries and agencies spread across the state capital, while others are engaged in agriculture, trading and other crafts. Minna is characterized by fertile soil which can support a large variety of agro allied industries. The town experiences distinct dry and wet seasons with annual rain fall varying from 1,100mm in the northern parts to 1,600mm in the southern parts (State Bureau of Statistics – Niger State Planning Commission, 2011). The people of Minna are predominantly Muslims and Christians with very few traditional religionists and atheists. The major ethnic groups are Nupe, Gwari, and Hausa. There are also numerous settlers from other parts of the country. Government at all levels have over the years made efforts to provide infrastructure such as roads, electricity, water and communication facilities among others to pave way for interested investors.

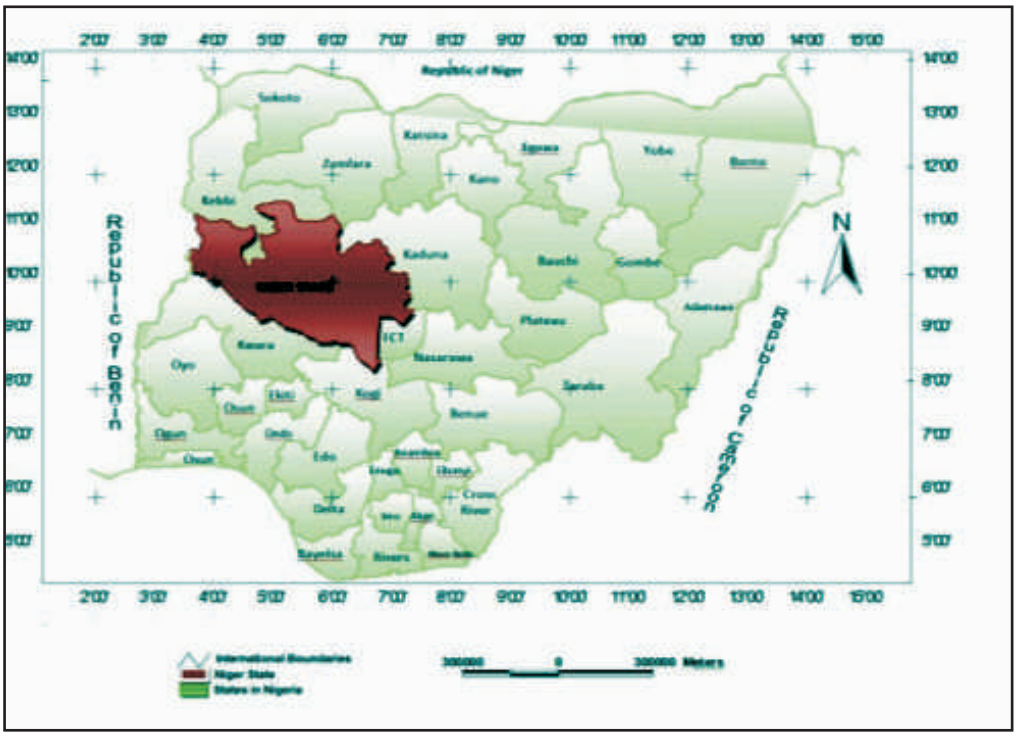

Figure 1: Map of Nigeria showing Niger State. **Source:** Niger state Ministry of Land and Housing (2015)

Methodology

This study sampled Five (5) low income residential neighbourhoods in Minna. The choice of these areas was as a result of the tremendous increase in real estate developments personally observed in the areas in the last decade, as well as the adjoining nature of the areas. The selected areas constitute a cluster of adjoining neighbourhoods, lying along the same axis, having similar neighbourhood characteristics, and all having visible signs of decline in urban infrastructure. These are Fadikpe, Barkin-saleh I, Kpakungu, Gbaganu, and Nyikangbe areas. Equal numbers of housing units were sampled across all the neighbourhoods. This is considered reasonable given the homogenous characteristics of the five (5) neighbourhoods. A total of 250 households were sampled using the stratified random sampling technique. This entailed the division of each neighbourhood into a number of strata and thereafter, housing units were selected from each stratum using the simple random sampling technique. Questionnaire were administered on households that fell within the sample group and used to retrieve data for the study. The use of questionnaire was adopted due to its ease and relevance in gathering information on facts, opinions, and behaviors of the sample group. The use of questionnaire has being employed over the years to generate data for researches of this nature. According to

Radhakrishna (2007), questionnaire is the most widely used data collection instrument in educational and evaluation research. The questions in the questionnaire centered on the types and conditions of urban infrastructure, assessment of the management of these infrastructure, as well as user satisfaction. Inspections were also carried out across the entire study area and observations noted for analysis.

Seven components of urban infrastructure were measured in each area. Six of these components were measured on a three (3) point likert-type scale, while one was measured on a four (4) point scale. Frequency distribution and simple percentages was used to show the varied conditions of these urban infrastructure in each of the sampled areas. In assessing the overall quality of urban infrastructure in each of the areas, the conditions of each infrastructure component were weighted. In other words, scores ranging from 1 – 3 (or 4, as the case may be) were assigned to respondents' rating of the conditions of urban infrastructure within the immediate vicinity of their dwelling units, with 1 representing the worst condition in each case and 3 (and 4, in the case of one of the components) representing the best condition. The overall condition of urban infrastructure in the sampled areas was established by comparing the summation of weighted scores for each area with the derived cut-off marks. In arriving at the cut-off marks, the summation of weighed scores was computed based on the assumption that all respondents in an area rated each infrastructure as being in their best conditions on one hand (ie, 1,100), and in their worst conditions on the other hand (ie, 350). These two values (1,100 and 350) were thereafter divided into three (3) class intervals, and further indexed into three quality grades indicating good quality, fair quality and poor quality respectively (as shown in table 4). This is in line with Allen and Seaman (2007) which affirmed that combining likert scales into indexes adds value and variability to the data.

The Kruskal Wallis (*H*) test was used to test for a significant difference in urban infrastructure quality scores across the sampled neighbourhoods, while Correlation analysis was used to establish the relationships between pairs of the identified urban infrastructure. Relative Satisfaction Index (RSI) was computed and used to determine the level of users' satisfaction with each of the identified urban infrastructure in the study area. It entailed the collation of responses on the level of satisfaction with each infrastructure, rated on a 3-point likert-type scale (i.e. satisfied, indifferent, and not satisfied). The three (3) indices were scored as follows: 3 = Satisfied, 2 = Indifferent, and 1 = not satisfied. Weighted Mean scores were computed therefrom and equals the Relative Satisfaction Index (RSI). The Relative Satisfaction Index (RSI) is given mathematically as:

N

Where n_3 = number of satisfied respondents

n_2 = number of indifferent respondents

n_1 = number of not satisfied respondents, and

N = Total number of responses

The Relative satisfaction index (RSI) was further ranked to show infrastructure that residents were most satisfied with in order of preference. All data analysis was conducted using Analyse-it® v4.5 statistical software for Microsoft Excel.

Findings and Discussion

Findings from the study are presented and discussed as follows:

Condition of Urban Infrastructure components

Seven components of urban infrastructure were identified to sustain residential properties in the study area, and thus, were used to measure urban infrastructure quality. These are access roads, drainages, sewage/waste disposal systems, electricity supply, sources of water supply, security and general sanitary condition/ neighbourhood cleanliness. Respondents' rating of the conditions of urban infrastructure within the immediate vicinity of their housing units is presented in table 1. Frequencies (i.e, number of occurrence of a certain condition) in each neighbourhood were collated and percentages computed therefrom.

Table 1: Condition of varied components of urban infrastructure in the sampled neighbourhoods.

Infrastructure condition	Neighbourhood				
	Barkin saleh (1)	Fadikpe	Kpakungu	Gbaganu	Nyikangbe
Access road					
Tarred	0%	4%	0%	0%	0%
Untarred / motorable	40%	64%	52%	70%	70%
Untarred / Not motorable	60%	32%	48%	30%	30%
Drainage					
Good	12%	26%	14%	26%	18%
Blocked	30%	32%	30%	26%	28%
Not available	58%	42%	56%	48%	54%
Sewage disposal					
Dustbins (cleared by waste management authorities)	16%	4%	0%	0%	0%
Dump sites	22%	38%	34%	42%	42%
Unkepth open space	62%	58%	66%	58%	58%
Electricity supply from the mains					
More than 12 hours per day	0%	12%	0%	0%	0%
6 - 11 hours per day	24%	32%	16%	0%	28%
less than 6 hours per day	76%	56%	84%	100%	72%
Sources of water supply					
From the mains	10%	6%	0%	0%	0%
Borehole	8%	12%	6%	14%	24%
Hand dug wells	74%	64%	60%	48%	44%
Water vendors	8%	18%	34%	38%	32%
Level of Security					
Very secured	34%	22%	16%	30%	38%
Fairly secured	56%	64%	50%	64%	46%
Not secured	10%	14%	34%	6%	16%
General sanitary condition / Neighbourhood cleanliness					
Clean	20%	14%	4%	16%	28%
Fair	38%	34%	10%	38%	18%
Dirty	42%	52%	86%	46%	54%

A cursory look at table 1 shows that a significant percentage of access roads to residential dwellings in the study area are untarred. However, while some of these untarred access roads are motorable, quite a number of them are not motorable. Precisely, none of the dwelling units in Barkin saleh I, Kpakungu, Gbaganu and Nyikangbe areas have tarred access roads, while only 4% of dwelling units in Fadikpe have tarred access roads. Over 50% of access roads in all the sampled areas are untarred/motorable, while 42%, 32%, and 48% of access roads in Barkin-saleh (1), fadikpe, and Kpakungu respectively are untarred and not motorable. 30% of access roads in Gbaganu and Nyikangbe are also untarred and not motorable. Findings in table 1 also shows that quite a number of dwelling units in the sampled areas lack functional drainage systems to convey waste water and runoff. As much as 58%, 42%, 56%, 48% and 54% in Barkin saleh I, Fadikpe, Kpakungu, Gbaganu and Nyikangbe areas respectively lack functional drainage systems. For dwelling units with drainage systems, a considerable number of them are blocked. While only 12%, 14% and 18% of the drainages in Barkin saleh (1), Kpakungu, and Nyikangbe respectively are good, 30%, 30%, and 28% of drainages in these areas respectively are blocked. Observations made during physical survey of the neighbourhoods revealed that all drainages in the sampled areas are open, these drainages are not cleared and littered with refuse.

Some residents dispose refuse in designated refuse dump sites, while only 16% and 4% of residents in Barkin saleh and Kpakungu areas dispose their refuse in dustbins which are further cleared by waste disposal authorities at intervals. Over 50% of residents in the sampled areas dispose refuse in available open spaces which were observed to be unkepth and dirty. However, in some cases, wastes disposed in open spaces are burnt by residents. A considerable number of houses in the study area are assumed to be connected to the national grid, thus, electricity supply to the neighbourhoods is mainly from the mains. Responses from respondents shows that 72%, 76% and 84% of residents in Nyikangbe, Barkin saleh (1) and Kpakungu respectively do not have regular supply of electricitry. For these residents, electricity is supplied for less than 6 hours a day. All residents of Gbaganu also experience irregular electricity supply from the mains. Only 16%, 24% and 28% of residents in Kpakungu, Barkin saleh (1), and Nyikangbe respectively receive electricity supply to their housing units for between 6 – 11 hours a day.

Water, in the study area is commonly sourced from four (4) sources, viz: from the mains, boreholes, hand dug wells, and from water vendors. It is evident from findings shown in table 1 that a higher proportion of residents in the study area source water from hand dug wells. 74%, 64%, and 60% of residents in Barkin saleh (1), Fadikpe, and Kpakungu respectively affirmed sourcing water from hand dug wells provided by individuals in the neighbourhood. 8%, 18%, and 20% of residents in these areas purchase water from water vendors on a regular basis, while water supply from the public mains is only available to 10% of residents in Barkin

saleh, and 14% of residents in Kpakungu. In terms of security, majority of the residents affirmed that their neighbourhoods are secured. Only 6%, 10%, 14%, and 16% of residents in Gbaganu, Barkin saleh (1), Fadikpe, and Nyikangbe respectively described their neighbourhoods as insecure, while 34% of Kpakungu residents described their neighbourhoods as insecure. Over 50% of residents in four out of the five areas sampled described their neighbourhoods as being fairly secured. The general sanitary condition of the study area was rated as clean, fair, and dirty (as the case may be) as at the time of this study. As shown in the last row of Table 1, findings revealed that the vicinity of 86%, 46%, and 54% of housing units in Kpakungu, Gbaganu, and Nyikangbe respectively are dirty, while 42% and 50% of housing units in Barkin saleh I, and Fadikpe respectively have dirty surroundings. The vicinity of only 20%, 16%, and 28% of housing units in Barkin saleh (1), Gbaganu, and Nyikangbe respectively were observed to be clean.

Overall Urban Infrastructure Quality

Weighted scores for each of the identified infrastructure in the sampled neighbourhoods are presented in table 2. The total weighted scores shown in the last row of the table indicate overall infrastructure quality scores in the sampled neighbourhoods. Fadikpe had the highest total weighted score of 619. Nyikangbe presented a total weighted score of 606, and was followed closely by Barkin saleh with a total score of 600. Kpakungu and Gbaganu areas had lower total scores of 539, and 580 respectively. These total weighted scores were compared with cut-off marks in table 3, and the overall urban infrastructure quality for the study area determined.

Table 2: Weighed scores of urban infrastructure in the sampled neighbourhoods

S/n	Urban Infrastructure	Neighbourhood				
		Barkin saleh (1)	Fadikpe	Kpakungu	Gbaganu	Nyikangbe
1	Access roads	79	88	76	85	85
2	Drainages	77	92	79	89	82
3	Sewage/Waste Disposal	75	73	67	71	79
4	Security of the Area	112	104	91	112	111
5	Sources of Water supply	106	103	107	88	96
6	Regularity of Electricity supply	62	78	58	50	64
7	General sanitary condition/ Neighbourhood Cleanliness	89	81	61	85	89
	Total weighted score	600	619	539	580	606

Table 3: Cut-off marks to establish the overall quality of urban infrastructure

Total Weighted score	Quality grade
350 – 600	Poor quality
601 – 850	Fair quality
851 – 1100	Good quality

Cut-off marks in table 3 were used to establish the overall quality of urban infrastructure in the study area. A total weighted score of 350 – 600 signified poor urban infrastructure quality in the neighbourhood, while total weighted scores of 601 – 850 indicated fair quality of urban infrastructure. A total score of 851 – 1100 implied that the area have good quality urban infrastructure.

Table 4: Overall urban infrastructure quality in the sampled areas

Neighbourhood	Total weighed score	Overall Urban Infrastructure Quality	Rank
Fadikpe	619	Fair quality	1st
Nyikangbe	606	Fair quality	2nd
Barkin saleh (1)	600	Poor quality	3rd
Gbaganu	580	Poor quality	4th
Kpakungu	539	Poor quality	5th

Data analysis shows that none of the sampled areas have good quality urban infrastructure. As shown in table 4, urban infrastructure in Fadikpe is of fair quality. It ranked 1st with a total weighed score of 619 which indicates that overall infrastructure quality in Fadikpe is slightly better than other neighbourhoods sampled. Nyikangbe also have fair urban infrastructure quality, and ranked 2nd with a total weighted score of 606. Urban infrastructure in Barkin saleh, Gbaganu and Kpakungu are of poor quality. A total weighed score of 539 shows that urban infrastructure quality in Kpakungu is the worst compared to other neighbourhoods. This is followed closely by Gbaganu which ranked 4th with a total weighted score of 580, and Barkin saleh which ranked 3rd with a total weighted score of 600.

Since the sampled areas are low income areas with similar neighbourhood characteristics, the Kruskal wallis (*H*) test is used to test the null hypothesis that there is no significant difference in urban infrastructure quality scores across the sampled neighbourhoods, and if any observed difference was due to chance or sampling errors.

Table 5: Kruskal wallis (*H*) test for a significant difference in urban infrastructure quality scores across the sampled neighbourhoods

	Urban Infrastructure quality score
Chi-Square	22.307
df	4
Asymp. Sig.	.000

Based on the Kruskall wallis (*H*) test shown in table 5, with a 95% confidence level, the Kruskal wallis chi square = 22.307, df = 4, and p-value = 0.000. Thus, at a 0.05 significance level, we conclude that there is a significant difference in urban infrastructure quality scores across in the sampled neighbourhoods, and that the differences are not due to chance or sampling errors.

The Relationship between Urban Infrastructure Components

This research also sought to establish the relationships between all components of urban infrastructure measured, as well as the strength of the relationships between each pair of variables. This was determined by computing the linear product-moment correlation coefficients. Results of these are presented in table 6.

Table 6: Pearson's correlation coefficients for Urban Infrastructure

	Condition of access road	Drainage Condition	Sewage/Waste Disposal	Security of the Area	Sources of Water supply	Regularity of Electricity supply	Neighbourhood Cleanliness
Condition of access road	-	0.853	0.476	0.522	-0.573	0.440	0.574
Drainage Condition	0.853	-	-0.052	0.159	-0.510	0.319	0.159
Sewage/Waste Disposal	0.476	-0.052	-	0.743	-0.210	0.328	0.844
Security of the Area	0.522	0.159	0.743	-	-0.580	-0.092	0.978
Sources of Water supply	-0.573	-0.510	-0.210	-0.580	-	0.478	-0.463
Regularity of Electricity supply	0.440	0.319	0.328	-0.092	0.478	-	0.101
Neighbourhood Cleanliness	0.574	0.159	0.844	0.978	-0.463	0.101	-

Analysis in table 6 shows that quite a number of relationships exists between the various components of urban infrastructure in the study area. The strength of the relationships however varies across pairs. A correlation coefficient of 0.853 signifies a strong positive relationship between drainage conditions and condition of access roads. This implies that the condition of access roads improves with an improvement in drainage conditions, and vice versa. A correlation coefficient of 0.844 also signifies a strong positive correlation between neighbourhood cleanliness and systems of sewage/waste disposal. It implies that the general sanitary condition of neighbourhoods improves with adequate and appropriate waste disposal systems, i.e., neighbourhoods where residents dispose refuse properly are cleaner than neighbourhoods where refuse/sewage are poorly disposed. In the same vein, a correlation coefficient of 0.978 signifies a strong positive correlation between security and neighbourhood cleanliness which

implies that the level of security improves with better sanitary conditions. There is also a positive correlation between security of neighbourhoods and systems of sewage/waste disposal (r = 0.743).

Results in table 6 further shows a weak, positive relationship between neighbourhood cleanliness and drainage condition (r = 0.159), between drainage condition and neighbourhood security (r = 0.159); and between neighbourhood cleanliness and regularity of electricity supply (r = 0.101). A correlation coefficient of -0.092 signifies a weak, negative correlation between regularity of electricity supply and security of the area, while a correlation coefficient of -0.463 implies a negative relationship between sources of water supply and sanitary condition of the area /neighbourhood cleanliness.

Level of User satisfaction with Urban Infrastructure

Relative Satisfaction Index (RSI) was computed and used to determine the level of users' satisfaction with each of the identified urban infrastructure in the study area. Based on computed scores, urban infrastructure is ranked in table 7 to indicate infrastructure that residents were most satisfied with.

Table 7: Relative Satisfaction Index (RSI) for urban infrastructure

Infrastructure	RSI	Rank
Condition of access road	1.972	2nd
Drainage Condition	1.456	6th
Sewage/Waste Disposal	1.712	3rd
Security of the Area	2.632	1st
Sources of Water supply	1.372	7th
Regularity of Electricity supply	1.52	5th
Neighbourhood Cleanliness	1.688	4th

Table 7 shows the relative satisfaction index in the study area. The RSI for each of the urban infrastructure measured are quite low, thus signifies a very low level of satisfaction. A relative satisfaction index of 2.632 in table 7 implies that residents' level of satisfaction with the security of their neighbourhoods exceeds their level of satisfaction for other infrastructure. Next on the hierarchy is the condition of access roads with a relative satisfaction index of 1.972, Sewage/waste disposal (1.712), Neighbourhood cleanliness (1.688), Regularity of electricity supply (1.52), Drainage condition (1.456), and Sources of water supply (1,372).

Respondents further rated the level of user satisfaction with overall urban infrastructure on a three (3) point likert-type scale. Response frequencies were collated and converted into simple percentages as shown in figure II.

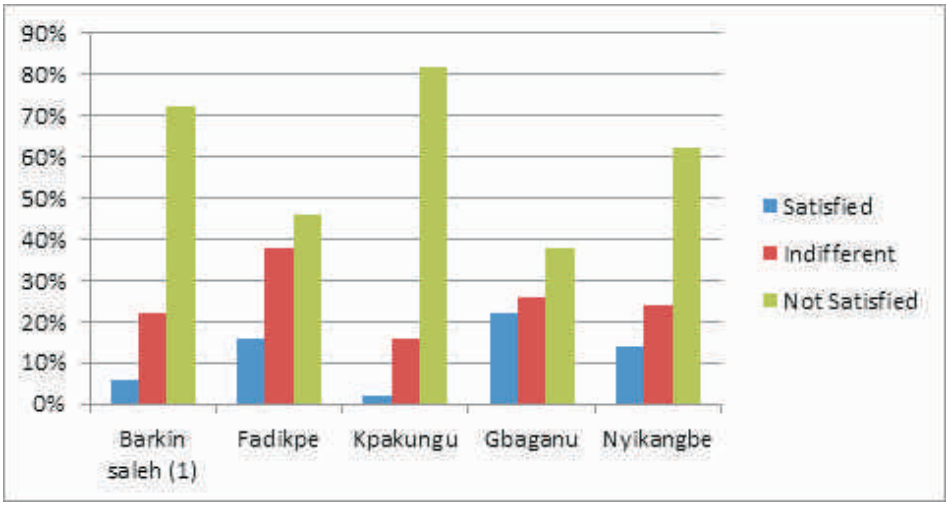

Figure II: Level of user satisfaction with urban infrastructure

Figure II shows respondents' level of satisfaction with urban infrastructure in the study area. It shows that only 2%, 6% and 14% of respondents in Kpakungu, Barkin saleh (1), and Nyikangbe respectively are satisfied with the overall urban infrastructure condition in their neighbourhoods. Quite a number of respondents were indifferent, while 82%, 72%, and 62% of respondents in Kpakungu, Barkin saleh (1) and Nyikangbe were not satisfied with the overall condition of urban infrastructure in their respective neighbourhoods.

Management of Urban Infrastructure

The management of urban infrastructure is perceived by many urban dwellers to be the sole responsibility of the government, thus residents only pay attention to the management and maintenance of their dwelling units, while urban infrastructure are often left unattended to. Respondents assessed the management of urban infrastructure in their various neighbourhoods on 5 point scale. Frequencies of were collated and percentages computed therefrom.

Table 8: Assessment of the management of urban infrastructure

Neighbourhood	Very good	Good	Fair	Poor	Very poor	Total
Barkin saleh (1)	0%	0%	32%	30%	38%	100%
Fadikpe	0%	0%	18%	56%	26%	100%
Kpakungu	0%	0%	14%	42%	44%	100%
Gbaganu	0%	18%	22%	42%	18%	100%
Nyikangbe	0%	14%	26%	46%	14%	100%

Table 8 shows residents' assessment of the management of urban infrastructure in their various neighbourhoods. None of the respondents rated the management of urban infrastructure as very good, while only 18% and 14% of respondents in Gbaganu and Nyikangbe described the management of urban infrastructure within the immediate vicinity of their housing units as good. 18%, 14% and 22% of respondents in Fadikpe, Kpakungu and Gbaganu respectively described it as fair, while 56%, 42% and 46% of respondents in Fadikpe, Kpakungu and Nyikangbe respectively described it as poor. 44%, 38% and 26% 0f respondents in Kpakungu, Barkin saleh (1) and Fadikpe respectively described the management of urban infrastructure in their respective neighbourhoods as very poor.

Conclusion

Findings from this study have provided further evidence on the deplorable conditions of urban infrastructure in parts of Nigeria. The quality of basic infrastructure that has direct impacts on residential buildings was established using weighted scores. Analysis revealed a generally poor state of urban infrastructure in the sampled areas, and low relative satisfaction indexes showed a very low level of user satisfaction with available urban infrastructure. There is also a general poor attitude to the management and maintenance of infrastructure in low income residential areas. Furthermore, quite a number of relationships were found to exist between components of urban infrastructure, for instance, the general sanitary condition of neighbourhoods improves with adequate and appropriate waste disposal systems. A strong positive relationship also exists between drainage conditions and condition of access roads, which implies that the condition of access roads improves with an improvement in drainage conditions, and vice versa.

It is widely accepted that basic urban infrastructure enhances the liveability and comfort of urban dwellers in residential areas. Basic urban infrastructure is essential to achieve the development targets of any urban area, thus the provision and proper management of urban infrastructure are absolutely necessary in any urban area if rapid economic growth is to be achieved and sustained. The 1999 constitution of the federal republic of Nigeria recognises urban infrastructure as a social responsibility of the government, thus the three (3) tiers of government have crucial roles to play in the development and management of urban infrastructure. Inadequate and poorly managed urban infrastructure is a common sight in towns and cities in developing countries, and is particularly noticeable in low income and high density residential neighbourhoods. It is therefore recommended that the concerned authorities should intensify efforts aimed at providing basic urban infrastructure for urban dwellers. Existing infrastructure should be properly managed and maintained, while residents should be sensitized on the need to imbibe good maintenance culture.

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