Infrastructure Delivery in Public Housing Estates of Lagos, Nigeria

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Abstrak: Banyak bukti menunjukkan bahwa penyediaan infrastruktur yang efisien dan efektif dapat meningkatkan kualitas hidup. Di banyak kota di negara berkembang, terdapat kondisi yang kurang menyenangkan akibat ketidakberhasilan dalam penyediaan infrastruktur, khususnya di kawasan perumahan umum, dan Lagos tidak terkecuali. Studi ini berfokus pada penilaian penyediaan infrastruktur di perumahan umum berbiaya rendah di Lagos, Nigeria. Terdapat masing-masing 456 dan 660 blok di kawasan perumahan federal dan negara bagian yang dipilih, dan sampel penelitian ini diambil menggunakan teknik sampling bertahap (multi-stage sampling). Melalui prosedur ini, sebanyak 224 kepala keluarga terpilih untuk mengisi kuesioner. Data yang dikumpulkan dianalisis menggunakan statistik deskriptif dan inferensial. Hasil penelitian menunjukkan bahwa ketersediaan infrastruktur tergolong rendah, dan lebih parah di kawasan perumahan negara bagian. Secara umum, penyediaan infrastruktur di kedua kawasan perumahan tersebut tidak efektif, dan tingkat kepuasan penghuni pun rendah. Untuk meningkatkan penyediaan infrastruktur, studi ini merekomendasikan perlunya kerangka kerja yang solid dari pemerintah untuk penyediaan dan pemeliharaan infrastruktur dasar yang memadai di kedua kawasan perumahan tersebut. Selain itu, pemerintah federal dan pemerintah Negara Bagian Lagos disarankan untuk menjalin kemitraan publik-swasta guna mendorong penyediaan infrastruktur yang berkelanjutan di perumahan umum berbiaya rendah. Dengan langkah-langkah yang tepat, penyediaan infrastruktur oleh pemerintah di kawasan perumahan di Nigeria dapat ditingkatkan. Manfaatnya juga akan dirasakan di berbagai kawasan perumahan lain di seluruh negeri.

Kata kunci: Infrastruktur, Perumahan Umum, Lagos, Persepsi, Pelayanan

Abstract: A large body of evidence suggests that efficient and effective delivery of infrastructure enhances quality of life. In many cities of developing countries, there is an unpalatable situation of ineffective delivery of infrastructure especially in public housing estates and Lagos is not left out. This study focuses on assessment of infrastructure delivery in public low-cost housing estates in Lagos, Nigeria. There are 456 and 660 blocks in the selected federal and state housing estates respectively and the sample for the study was selected using multi-stage sampling technique. Through the sampling procedure, a total of 224 household heads were selected on which questionnaires were administered. Data collected were analyzed using descriptive and inferential statistics. Findings reveal that availability of infrastructure was low and even more pronounced in state estate. Generally, infrastructure delivery was not effective in the two housing estates and residents were less satisfied with them. For effective infrastructure delivery, the study recommends a need for viable framework by government for adequate provision and maintenance of basic infrastructure in the two housing estates. Likewise, the owners (Federal and Lagos State Governments) should engage in public-private partnership to enhance sustainable infrastructure delivery in public-low-cost housing estates. With the right steps firmly taken, infrastructure delivery in housing estates by governments in Nigeria can be improved. The benefits will also cut across housing estates in the country.

Keywords: Infrastructure, Public Housing, Lagos, Perception, Delivery

INTRODUCTION

The high rate of urbanization is a global phenomenon especially in developing countries of the world. The global demographic flux is attributable to rapidly growing population and migration from rural to urban areas (Ellen & Kellogg, 2005; World Bank, 2010; Mobolaji, 2023). This is because urban areas attract people as they offer hope of better future. Unfortunately, the ever-increasing urban population has made existing housing stock in urban areas unable to cope with the housing need of the people and has also led to overstretching of infrastructure in the housing environment. Except immediate actions are taken, meeting sustainable development goal of decent accommodation for all in urban areas of developing countries will be impossible.

Housing is the process of providing a large number of residential buildings on a permanent basis with adequate infrastructure to meet the basic and special needs of the people (World Bank, 2010). Apart from comforts and conveniences, housing plays vital role in improving health and well-being of residents. It transcends the mere provision of shelter but play significant roles in providing a wide range of benefits such as safety, security and serenity. Environment without quantitative and qualitative housing and infrastructure reflects poor living of residents (Mobolaji, 2023).

Customarily, provision of housing is one of the responsibilities of every level [Federal, State and Local] of governments to its citizens (UN-Habitat, 2010; World Bank; 2010). Particularly in Nigeria, prior to the period when the country got independence in 1960, there was a dare need for the provision of affordable housing with basic infrastructure. Government at the federal level installed certain drivers and initiatives with the aim of providing quality housing for every citizen such as housing programs and reforms as contained in the (1991, 2002, 2006 and 2012) National Housing Policies (Adejumo, 2008). One of these programs aside housing provision and urban redevelopment is the provision of public low-cost housing estates (Amao, 2013). Public low-cost housing estates are those housing provided, owned or managed autonomously by government or in partnership with private sector for the purpose of providing bulk housing for citizens based on rental or owner-occupied tenure system (Ibem, 2009).

Public low-cost housing estate is a well-planned environment with houses (building) and basic infrastructure (water supply, sanitation, waste collection, drainage, electricity and road) that supports residents' living and working (Hu & Morton, 2011; Morakinyo et al., 2014). Government provides public low-cost housing estates for citizen who are incapable of gaining access to decent housing at market prices. Regrettably, in Nigeria, residents in many public low-cost housing estates in comparison to inhabitants of privately controlled housing estates live in poorly maintained houses that lack adequate basic infrastructure (Amao & Ilesanmi, 2022; Adewole et al., 2023).

Infrastructure connotes the basic systems of facilities, services and utilities that are necessary for effective and efficient functioning of a home or community (Akintola, 2011; Olatunji et al., 2022). At the public low-cost housing estate, infrastructure comprises the physical components of interrelated systems providing services that are essential to enable, sustain and enhance the living condition of residents. These include road, water supply and sanitation, electricity, drainage and waste collection. Availability and accessibility to basic infrastructure in public housing estate enhances residents' standard of living. Efficient and effective infrastructure in housing estate promote economic growth, poverty reduction and environmental sustainability. But this is only the case when provision of infrastructure is effectively delivered.

Infrastructure delivery involve meeting the infrastructure demand of residents in housing environment and sustainability of such infrastructure in order to continually fulfil the purpose for which they are provided. A large body of evidence suggests that efficient and effective delivery of infrastructure enhances quality of life and promote sustainable development (Morakinyo et al., 2014; Olatunji et al., 2021; Amao & Ilesanmi, 2022; Adewole

et al., 2023). However, in many cities of developing countries, there is unpalatable records of ineffective delivery of basic infrastructure in housing estates and Lagos is not left out (World Bank, 2022). Besides, studies on infrastructure delivery, particularly in federal and state public low-cost estates in Lagos are patchy and characterized by incomplete information. Thus, empirical method of study is therefore needed to understand the perception of residents in relation to infrastructure delivery.

It is against this background that this study assesses infrastructure delivery in Federal and Jakande low-cost housing estates of Lagos, Nigeria. The choice of the housing estates is premised on the fact that they are both public low-cost estates owned by different tiers of government. This allowed reasonable comparison based on infrastructure delivery in the housing estates. This study therefore examined infrastructure delivery in public low-cost estates of Lagos, Nigeria.

Study Area
Lagos is situated between Longitudes 20º42′ E and 40º42′ E and Latitudes 60º23′ N and 60º41′ N in Nigeria. Lagos has over 20million inhabitant with majority of the residents lived in the Metropolis. In the city, there exist 20 local government areas with 16 in the metropolis. Also, Lagos Metropolis being among the largest metropolitan areas in Nigeria has density of over 20,000 persons per square km (Ojewale, 2014; Mobolaji et al., 2022). This alarming population is not without housing deficit.

With the population surge in Lagos and the need for housing provision for low-income earners, government at Federal and State levels provided low-cost housing estates. Amongst the public low-cost estates, federal low-cost housing estate and jakande low-cost housing estate were purposely selected for this study. This is premised on the basis that both public low-cost estates have the same land area size and were provided by different tiers of government. Federal low-cost housing estate established by federal government were situated along Ipaja road with an area of approximately $0.6km^2$ while jakande housing estate established by state government were situated in Ilasan, Lekki with an area of approximately $0.6km^2$. The two public low-cost housing estates were provided in order to reduce housing deficit in Lagos, Nigeria.

The federal low-cost housing estate was completed and allocated to the residents in 1989. With 456 residential blocks, federal low-cost housing estate was designed for low-income earners with availability of bungalows and storey-buildings. Housing units in federal low-cost housing estate meant for low-income earners were later sold to interested citizens of Lagos State. Deplorably, in the recent time, change in ownership coupled with over population in federal low-cost estate has resulted into structural alteration of buildings and infrastructural decay. In the same vein, the 660 residential blocks (bungalows and storey buildings) in jakande estate were also designed and constructed by Lagos State government in 1983. However, cursory glance to the two estates revealed evidence of infrastructure decay. As a result, empirical study on infrastructure delivery is a recipe for sustainable infrastructure planning in both federal and state estates.

METHODS

Multistage sampling technique was adopted for this study. The 1116 residential blocks which comprises of 456 in federal and 660 in state low-cost estates respectively were purposively identified. Using systematic sampling technique, every 5th blocks of the estates were sampled. Thus, 20% of the residential blocks were sampled and also considered sufficient based on previous similar work (Asa et al., 2018; Salisu et al., 2019). In federal estate, 92 residential blocks were sampled while in state estate, 132 residential blocks were sampled making a total of 224 residential blocks. Households' heads were therefore targeted for questionnaire administration in each of the selected block.

Data collected were on the respondents' socioeconomic characteristics, condition of the available infrastructure and respondents' level of satisfaction derived from infrastructure in the study area. The RCI [residents' condition index] and RSI [residents' satisfaction index] was used to rank respondents' level of condition and satisfaction to available infrastructure in the two low-cost estates. The higher the RCI of any infrastructure above the mean, the condition is good whereas the lower the RCI of any infrastructure the condition is bad. Furthermore, the higher the RSI of any infrastructure above the mean derived, the more the level of satisfaction derived by respondents to

such infrastructure. Likewise, the lower the RSI of any infrastructure below the mean derived, there is low level of satisfaction derived by respondents to such infrastructure.

In addition, data collected were analyzed using descriptive and inferential statistical methods. Except otherwise stated, data collected and analyzed were based on author's field survey in 2024.

RESULT AND DISCUSSIONS

Presented in this section are findings and discussion on the socioeconomic characteristics of respondents, availability and condition of infrastructure. Also, findings were made on the respondents' level of satisfaction derived from available infrastructure in both federal and state low-cost housing estates.

Socioeconomic characteristics of respondents

Socioeconomic characteristics in this study were the respondents' gender, age, educational level, income and marital status. According to Olowoporoku et al. (2019), Olatunji & Yoade (2021), Daramola et al. (2022) socioeconomic characteristics are important elements in evaluating respondents' opinion on infrastructure provision and distribution. Particularly, the work of Amao & Ilesanmi (2022) indicated that residents' socioeconomic characteristics in housing estate provides basis for effective and efficient infrastructure delivery. Therefore, as presented in Table 1, findings revealed socioeconomic characteristics of respondents in the federal and state low-cost housing estates.

Based on the results in the study area, findings revealed that 66.9% of the respondents were male while 33.1% were female. The results are similar as majority 64.1% and 68.9% of the respondents in federal and state estates respectively were male. In addition, fewer 35.9% and 31.1% in federal and state estates respectively were also female. This is an indication that two third of the respondents were male whereas one third were just female. As a result, male respondents were more than their female counterpart. Besides, differences in gender of the respondents in the study area were statistically insignificant in the two estates based on the Chi – square test result ($x^2 = 0.631$; $p = 0.760$). Thus, the findings reflect the study of Mobolaji (2023) that male gender was more concerned about infrastructure provision in their homes.

Age is an important variable in examine infrastructure delivery in housing estate. This is because age has been found to be positively correlated with the level of perception of residents to infrastructure provision in cities of the world (Dabiri, 2019; Kasali, 2020). Therefore, age of respondents was grouped into young adults (18 – 39 years), adult (40 – 59 years) and elderly (above 60 years). Findings indicated that adult (39.1%) and elderly (50.1%) were predominant age of respondents in federal estate unlike in state estate where majority (60.6%) were adult. Also, young adult constituted 10.8% and 12.2% in federal and state estates respectively. In all, majority (51.7%) were adult and they understand the need for adequate provision and delivery of infrastructure in housing estate. Additionally, analysis of variance [ANOVA] result (F=4.481 and p=0.410) revealed variation in the age of respondents across the two estates.

Education was categorized into primary, secondary and tertiary in order to ascertain the literacy level of respondents. Findings revealed that most of the residents (52.2%) had tertiary education in federal estate. This included respondents with secondary education that constituted 39.1% and respondents with primary education that constituted 8.7%. In the state estate, respondents with tertiary education were the highest proportion (54.5%), followed by secondary education (36.4%) while the least educational level (9.1%) were respondents with primary education. Summarily, the proportion of respondents with tertiary education was 53.6% which constituted the majority in the study area. Impliedly, tertiary education being the highest level of education in the study area depicts a well-informed and environmentally concerned community. As opined by Theodori and Luloff (2002) learned persons are more concerned about their environment and place more prominence on preserving the environment.

Income was considered relevant to this study as it has been established by Afon (2007) as an attribute that shape people's behaviour and their perception on specific environmental attributes. Respondents' income was classified into low (below N30,000); medium (N31,000 - N60,000) and high (N61,000 and above) levels. Majority of the residents in the federal and state estates were in the high level with proportion of 52.1% and 51.5% respectively.

The next predominant level of respondents' income was medium which constituted 34.7% in federal estate and 33.3% in state estate respectively. Similarly, in federal and state estates, 13.2% and 15.2% were in low-income levels respectively. Consequently, the predominant income level of respondents was high (51.7%). As a result, respondents were capable of maintaining infrastructure in the study area. Furthermore, ANOVA test [F (119, 2) = 3.331, p = 0.004 < 0.05)] revealed similarity in the respondent's income level in the two estates.

On the marital status, the proportion of married respondents (94.5%) was more than that of single respondents (2.3%) in the federal estate. This was similar to the case in state estate where married respondents comprised 92.4% of the respondents while single respondents constituted 4.5%. Also, respondents that are widowed constituted 3.2% and 3.1% in federal and state estates respectively. In the two estates, the proportion of married respondents (93.3%) was higher than that of the single respondents (3.5%). The findings further indicated that large proportion 93.3% of the respondents were married and also considered to be matured especially on the provision of infrastructure in the two estates.

Based on the above findings, it was considered that variation exist on the socioeconomic characteristics of the respondents in the two estates.

Table 1: Socioeconomic attributes of the respondents

Attributes	Federal	State	Total
	Frequency (%)	Frequency (%)	Frequency (%)
Gender			
Male	59 (64.1)	91 (68.9)	150 (66.9)
Female	33 (35.9)	41 (31.1)	74 (33.1)
Total	**92 (100)**	**132 (100)**	**224 (100)**
Age (years)			
18 – 39	10 (10.8)	16 (12.2)	26 (11.5)
40 – 59	36 (39.1)	80 (60.6)	116 (51.7)
≥ 60	46 (50.1)	36 (27.2)	82 (36.8)
Total	**92 (100)**	**132 (100)**	**224 (100)**
Educational Level			
Primary	8 (8.7)	12 (9.1)	20 (8.9)
Secondary	36 (39.1)	48 (36.4)	84 (37.5)
Tertiary	48 (52.2)	72 (54.5)	120 (53.6)
Total	**92 (100)**	**132 (100)**	**224 (100)**
Income (₦)			
Less than 30,000	12 (13.2)	20 (15.2)	32 (14.4)
30,000 - 60,000	32 (34.7)	44 (33.3)	76 (33.9)
≥ 61,000	48 (52.1)	68 (51.5)	116 (51.7)
Total	**92 (100)**	**132 (100)**	**224 (100)**
Marital Status			
Single	2 (2.3)	6 (4.5)	8 (3.5)
Married	87 (94.5)	122 (92.4)	209 (93.3)
Widowed	3 (3.2)	4 (3.1)	7 (3.2)
Total	**92 (100)**	**132 (100)**	**224 (100)**

Availability of Infrastructure
Infrastructure is a prerequisite for sustainable living in urban areas of developing countries (Daramola et al., 2023). Studies have demonstrated evidences that availability of adequate infrastructure make an environment effective, efficient, functional and supportive for good health and well-being of residents (Kasali, 2020; Amao & Ilesanmi, 2022). Infrastructure that support housing environment ranges from pipe borne water supply, drainage, road,

electricity, traffic calming systems, solid waste collection, sanitation and parking lot. Thus, presented in Table 2 is the findings on the availability of infrastructure in the federal and state estates of Lagos, Nigeria.

Water supply is important and its availability is essential for good living. Findings indicated that fewer 37.0% in federal estate had water supply through public tap whereas majority 56.1% of respondents in state estate declared not availability of water supply through public tap. Impliedly, variation exist in the availability of water supply from the federal to state estates. This was confirmed to be significant through Chi – square test result (x^2 =1.213; p = 0.402). Additionally, most (54.3%) had water supply through borehole in federal estate despite the fact that 53.0% declared not availability of borehole in the state estate. Still, majority 54.3% and 54.5% in federal and state estates respectively declared not availability of water supply through well. Summarily, water supply through public tap and borehole is quantitatively low and even more pronounced in the state estate. The findings do not conform with the agreement with WHO (2003), WHO (2015) that water supply should be from a pipe borne water system, a public standpipe or borehole and must be available in every urban and rural areas.

Findings were made on the solid waste collection in the study area. In federal estate, majority (58.7%) of the respondents declared availability of solid waste collection and findings are similar in the state estate where 62.1% had solid waste collection. Although, 41.3% and 37.9% in the federal and state estates respectively declared not availability of solid waste collection. Whereas, similarity exists in the availability of solid waste collection across the two estates. In addition, most 59.7% and 65.9% of the respondents revealed availability of solid waste collection in the federal and state estates respectively. Based on the findings, there is availability of solid waste collection in spite of similarity in the two estates. Results of Chi – square test ($x^2 = 1.340$; p = 0.300) also revealed significant similarity in solid waste collection and housing estates.

Except fewer 39.1% of respondents in federal estate that declared availability of road, most respondents 63.6% in state estate declared not availability of road. In fact, road is quantitatively low and it is similar in the two estates. Nevertheless, 63.0% and 56.1% of the respondents in the federal and state estates declared availability of parking lot respectively. While, one third 37.0% and 43.9% declared not availability of road in the federal and state estates respectively. As a result, findings indicated availability of road in the two estates. Also, majority 63.0% and 56.1% of the respondents in federal and state estates had parking lot. Across the two states, similarity exist in the opinion of respondents on parking lot. This is confirmed by the result of Chi – square test ($x^2 = 1.339$; p = 0.381) that similarity exist in the availability of parking lot in the study area.

Findings revealed similarity in the two estates as majority 67.4% and 71.2% of the respondents declared not availability to pedestrian crossing. In the same vein, just one third 32.6% and 28.8% had pedestrian crossing in federal and state estate respectively. As a result, pedestrian crossing is at the low ebb in the two estates. Further findings indicated that 52.2% of the respondents in the federal estate declared not availability to bus stop even though one third 47.0% had bus stop in state estate. Similarly, majority 60.9% and 63.6% of the respondents declare availability of traffic calming element systems in the federal and state estates respectively. As a result, similarity exist in the availability of traffic calming element systems in the study area. This is confirmed by Chi – square test results (x^2 =1.291; p = 0.309) that similarity exist in the availability of traffic calming element systems in the study area.

Based on the findings, it was revealed that most 60.9% and 62.1% of the respondents also declared not availability of traffic control lights in the federal and state estates respectively. Besides, just 39.1% and 37.9% had traffic control lights in the federal and state estates respectively. Summarily, findings revealed evidence of low traffic control lights across the two estates. In addition, majority 54.3% and 54.3% of the respondents in the federal and states estate declared not availability to electricity. The results are in consonance with the studies of Ogunniyi et al. (2012), Mobolaji (2023) that electricity is low in most urban centres of developing countries owing to inadequate provision from government.

Table 2: Availability of Infrastructure of the respondents

Infrastructure	Federal Estate			State Estate		
	Available	Not Available	Total	Available	Not Available	Total

Water supply through public tap	34(37.0)	58(63.0)	92(100)	58(43.9)	74(56.1)	132(100)
Water supply through borehole	50(54.3)	42(45.7)	92(100)	62(47.0)	70(53.0)	132(100)
Water supply through well	42(45.7)	50(54.3)	92(100)	60(45.5)	72(54.5)	132(100)
Solid waste collection	54(58.7)	38(41.3)	92(100)	82(62.1)	50(37.9)	132(100)
Drainage system	55(59.7)	37(40.3)	92(100)	87(65.9)	45(34.1)	132(100)
Paved Road	36(39.1)	56(60.9)	92(100)	48(36.4)	84(63.6)	132(100)
Parking lot	58(63.0)	34(37.0)	92(100)	74(56.1)	58(43.9)	132(100)
Pedestrian crossing	30(32.6)	62(67.4)	92(100)	38(28.8)	94(71.2)	132(100)
Bus stop	44(47.8)	48(52.2)	92(100)	62(47.0)	70(53.0)	132(100)
Traffic calming elements(bumps)	56(60.9)	36(39.1)	92(100)	84(63.6)	48(36.4)	132(100)
Traffic control lights	56(60.9)	36(39.1)	92(100)	82(62.1)	50(37.9)	132(100)
Electricity	42(45.7)	50(54.3)	92(100)	60(45.5)	72(54.5)	132(100)

Condition of Available Infrastructure

The quality of infrastructure in urban housing estate is a panacea for sustainable development. Studies have discussed urban housing conditions in cities of the world (Oladapo, 2006; Towry-Coker, 2009). Particularly, Jiboye (2009), Daramola et al. (2023) revealed that the condition of infrastructure in housing environment provides basis for physical, social and economic development of residents. In the light of this, as presented in Table 3, findings were made on the condition of available infrastructure in the study area.

On the mean computation, the average mean index was 2.68 in federal estate. This showed that on the average, respondents expressed that the condition of infrastructure was fair. Whereas, in the state estate, average mean index was 2.58 with an indication that respondents perceived the condition of infrastructure to be fair. Based on the findings, road (DM = 1.19) was ranked first and in good condition in federal estate unlike in the state estate where traffic calming elements (DM = 0.37) were the most ranked infrastructure. Traffic calming elements (DM= 0.47) were ranked second in federal estate whereas electricity (DM = 0.10) ranked second infrastructure with good condition in state estate. In addition, bus stop (DM = -0.03) ranked fourth in federal estate while water supply through borehole (DM = -0.02) ranked fourth in state estate. Similarity exists as parking lot ranked fifth with DM (-0.09) and DM (-0.03) in the federal and state estates respectively.

Findings were also made on the infrastructure with negative deviations that respondents perceived their condition to be very bad. Findings revealed that similarity exist as respondents ranked traffic control lights seventh (DM = -0.14 and DM = -0.05) in the federal and state estates respectively. In addition, respondents perceived the condition of pedestrian crossing (DM = -0.15) ranked eight, water supply through well (DM = -0.19) ranked nineth and drainage system (DM = -0.18) ranked tenth to be bad in federal estate. In the state estate, infrastructure with negative deviations that respondents perceived their condition to be bad were traffic control lights (DM = -0.05) ranked seventh, solid waste collection (DM= -0.06) ranked eight, water supply through tap (DM = -0.08) ranked nineth and bus stop (DM = -0.10) ranked tenth. Summarily, findings revealed variation in the condition of available infrastructure in the two estates.

Table 3: Condition of Available Infrastructure

Variable	Federal Estate			State Estate		
	Mean	DM	Rank	Mean	DM	Rank
Water supply through tap	2.33	-0.35	12	2.50	-0.08	9
Water supply through borehole	2.67	-0.01	3	2.56	-0.02	4
Water supply through well	2.50	-0.19	9	2.40	-0.13	12
Solid waste collection	2.41	-0.27	11	2.52	-0.06	8
Drainage system	2.50	-0.18	10	2.53	-0.04	6
Paved Road	3.87	1.19	1	2.64	0.06	3
Parking lot	2.59	-0.09	5	2.55	-0.03	5
Pedestrian crossing	2.54	-0.15	8	2.47	-0.11	11
Bus stop	2.65	-0.03	4	2.48	-0.10	10

Infrastructure						
Traffic calming elements	3.15	0.47	2	2.95	0.37	1
Electricity	2.57	-0.11	6	2.68	0.10	2
Traffic control lights	2.54	-0.14	7	2.55	-0.05	7
Average Mean		**2.68**			**2.58**	

Keys:

N	–	Number of respondents
DM	–	Deviation about the Mean
SD	–	Standard Deviation
CV	–	Coefficient of Variation
SWV	–	Sum of Weighted Value

Level of satisfaction that residents derive from the available infrastructure

The satisfaction of people to infrastructure in their environment plays a critical role in infrastructure delivery (Daniel, 2013; Ofili, 2014; Jayaramu et al., 2014; Uka, 2014; Hamzah et al., 2015). Particularly, satisfaction of residents with infrastructure delivery in public housing estates provides basis for sustainable infrastructure planning. Therefore, residents' satisfaction has been applied to infrastructure which are considered as products in the infrastructure delivery process. In the light of this, as presented in Table 4, findings were made on the satisfaction of availability of infrastructure in the study area.

On the mean computation, the average mean index was 2.46 in the federal estate. This showed that on the average, respondents were just satisfied with the condition of available infrastructure. Meanwhile, the infrastructure with the high level of satisfaction was those with indices above 2.46 and had positive deviations about the mean (DMs). In the federal estate, of the five infrastructure, residents' satisfaction with the availability and condition of water supply from borehole and traffic calming elements with DMs of 0.47 ranked first, road (DM = 0.34) ranked third while solid waste collection (DM = 0.08) ranked fourth and electricity supply ranked fifth with (DM =0.04). Of the other five infrastructures with negative deviations, residents were least satisfied with the availability and condition of drainage (DM = -0.66) which was with the twelfth rank. Others on this list include bus stop and traffic control lights, both ranking tenth with (DMs = -0.16), water supply through public tap ranked ninth with (DM = -0.12) while pedestrian crossing and water supply through well with (DM = -0.12) was ranked seventh simultaneously.

For the state estate, the average mean residents' satisfaction with infrastructure index was 2.41. An average respondent was therefore viewed to also be just satisfied with the availability of infrastructure in state estate. Similarly, five facilities were with indices above 2.41 with positive deviations about the mean (DMs), thus indicating that residents had high satisfaction with their availability and condition. The first five of the facilities are road (DM = 0.60, Rank = 1st), traffic calming elements (DM = 0.43, Rank = 2nd), water supply through borehole (DM = 0.39, Rank = 3rd), electricity (DM = 0.11, Rank = 4th) and water supply through public tap (DM = 0.07, Rank = 5th). The other five infrastructures were however with negative deviations. Five from the least ranked of them were drainage (DM = -0.61, Rank = 12th), traffic control lights (DM = -0.29, Rank = 11th), parking lot (DM = -0.13, Rank = 10th), pedestrian crossing (DM = -0.08, Rank = 9th) and bus stop (DM = -0.05, Rank = 8th).

On comparing the results from the two estates, it was found that residents in the estates were satisfied with availability and condition of infrastructure such as to water supply from borehole, pedestrian crossing and paved road. They were however not satisfied with the availability and condition of infrastructure such as water from public tap, drainage and bus stops. The CV of the datasets for both estates indicated high reliability in responses of surveyed residents. However, that of federal estate (CV = 11.74) showed more reliability compared with that of state estate (CV = 13.05).

Table 4: Level of satisfaction derived from available infrastructure

Infrastructure	Federal			State		
	Mean	**DM**	**Rank**	**Mean**	**DM**	**Rank**
Water supply through public tap	2.30	-0.12	9	2.41	0.07	5
Water supply through borehole	2.89	0.47	1	2.73	0.39	3
Water supply through well	2.33	-0.09	7	2.30	-0.04	6

Electricity supply	2.46	0.04	5	2.45	0.11	4
Solid waste collection	2.50	0.08	4	2.30	-0.04	6
Drainage system	1.76	-0.66	12	1.73	-0.61	12
Road	2.76	0.34	3	2.94	0.60	1
Parking lot	2.26	-0.16	10	2.21	-0.13	10
Pedestrian crossing	2.33	-0.09	7	2.26	-0.08	9
Bus stop	2.37	-0.05	6	2.29	-0.05	8
Traffic calming	2.89	0.47	1	2.77	0.43	2
Traffic control	2.26	-0.16	10	2.05	-0.29	11
RSI	**2.46**			**2.41**		

CONCLUSION AND RECOMMENDATIONS

The study assessed infrastructure delivery in public low-cost housing estates of Lagos, Nigeria. It was found that, differences exist in respondents' socioeconomic characteristics from the federal to state estates. It was also found that availability of infrastructure was low and even more pronounced in state unlike federal estates. Moreover, road and traffic calming elements were the most infrastructure with an acceptable condition in the two estates; the condition of all the other infrastructure in housing estates which was the responsibility of government was just adjudged to be fair by the respondents. This could be due to poor quantitative and qualitative condition of available infrastructure in the estates.

The findings of this study have several policy implications for both the study area and the generality of housing estates in Nigeria. No public low-cost housing estate can function maximally without a well-planned environment (building and basic infrastructure) that are largely lacking in many low-cost housing estates. Nevertheless, infrastructure delivery was not effective in the housing estates and respondents were less satisfied with them. Meanwhile, without provision of housing and basic infrastructure, meeting sustainable development goal of decent accommodation in the country is impossible. Thus, concerted and conscientious efforts should be made to provide adequate infrastructure for the purpose of achieving aesthetic, safe, functional and healthy environment for conducive living in low-cost housing estates.

For effective infrastructure delivery in housing estates, by governments in Nigeria, the following policy recommendations are proffered with respect to the provision and utilization of infrastructure in the study area. First, in order to correct the poor state of the infrastructure in the estates, there is need for a viable framework for adequate provision and maintenance of infrastructure in the estates in order to ensure liveable environment in the housing estates. This could be through effective management of the estates and making every household or house owners in the estate responsible for the provision of adequate infrastructure at the household level and also by ensuring community involvement that will make provision for adequate infrastructure delivery at the neighbourhood level. Also, the owners of the housing estates (Federal Government and Lagos State Government) should engage in public-private partnership to enhance infrastructure delivery in the housing estates. This is necessary as experience in Nigeria revealed that private involvement and regulation from public sector enhances infrastructure delivery. With the right steps firmly taken, infrastructure delivery in housing estates by government in Nigeria can be improved. The benefits will also cut across housing estates in the country.

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