IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 15, Issue 5 Ver. II (Sep. - Oct. 2018), PP 12-22
www.iosrjournals.org

Effects of the Quality of Facilities on Residential Building and Environmental Sustainability in the LSDPC Low-Cost Housing EstateIba, Lagos State.

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Abstract: *The impact of good quality facilities in sustainable housing development cannot be overemphasised. Hence, there is need for proper provision and effective maintenance by qualified professionals. The main purpose of this research is to assess the effects of the quality of the supporting facilities (households' water connection and liquid waste disposal) on the residential buildings of the study area. The study was conducted using the existing literature and empirical survey. The study area comprised 199 twin-blocks, each contained 12 flats. These accounted for 2,388 apartments of 3-bed room type. Systematic random sampling was used to select 101 from the total number of the available blocks, on which inspection and questionnaire surveys were conducted. In each of the sampled blocks, an adult household member was sampled using convenience sampling method for questionnaire survey. Hence, 101 blocks were successfully inspected to assess the quality effect of facilities on the buildings and the residents, while, 101 questionnaires were successfully administered on the sampled respondents to solicit for their perception on the subject under investigation. The study found that the quality of the study facilities have effects on the residential buildings and their environment. There was a significant association between residents' level of satisfaction and quality of liquid wastewater pipe installation. Hence, unethical adjustments into buildings made the two facilities under investigation to have high negative effect on the buildings. Also, there is statistical significant relationship between the high level of the need for building renovation, and the use of unqualified personnel. Conclusively, households' water connection and wastewater facilities of the sampled buildings were in a deplorable condition posing a great danger on the residents. Thus, there was dare need for comprehensive renovation, which should be handled by a qualified personnel, under a well-established building maintenance department.*

Keywords*: facilities, housing, low-income, residential building, sustainability, quality.*

Date of Submission: 10-09-2018 Date of acceptance: 25-09-2018

I. Introduction

The roles of basic utilities and facilities, such as electricity, water, and waste disposal system cannot be overemphasised in providing comfort for the households. Hence, there need to pay adequate attention into their provision. The reason is not farfetched, because proper installation of these facilities plays a significant role in prolonging the lifespan of buildings, at the same time enhance sustainable residential building environment.

The installation of facilities within a building starts from materials selection. The reason is that it is one of the contributing factors to building failure. As noted by [1], building failure and deficiency can be caused by design, construction, materials used, the quality of personnel, soil condition and earth movement. This implies that if good quality materials were used to provide basic facilities into buildings, and were well handled by qualified personnel, these facilities will serve the purpose they meant and prolong the lifespan of the affected building. Poor quality of materials, such as pipe for the supply of water into the building and disposal of wastewater and sewage leads to leakages, which can have significant effect on the building and environmental sustainability. Similarly, poor quality materials add to building maintenance cost and the rate, in which the maintenance is carried out. Frequent replacement of basic facilities within a building has been attributed to poor quality of materials and poor installation, due to involvement of unqualified personnel.

There has been tremendous increase in the housing provision in Lagos State, through its agency, Lagos State Property Development Corporation (LSDPC), majority of these housing units, particularly those built between 1980s and 1990s were in dilapidated condition and poor state of despairs. This has significantly affected the condition of these buildings and the general housing area. Hence, residential satisfaction has been grossly compromised.

Iba housing estate is one of the low income residential housing built in the 1980s by the LSDPC. The estate, just like any others, built around the same period, such as Ipaja and Ojokoro has been facing the challenge of poor condition, not because of how they were constructed alone, but because of poor condition of the facilities and utilities.

However, the aim of this research is to assess the condition of households' water and liquid wastewater disposal facilities, and measure the impacts on the buildings conditions and the residential area functional efficiency. In doing this, the study assessed the facilities provision quality, and the qualification of the personnel used in providing the facilities. Others include the condition of the facilities and effects on the buildings. The study identified whether these facilities were provided during building construction stage, or after the occupants have occupied the buildings. Residents' satisfaction on the environmental quality due the functional level of the study facilities was also determined. Similarly, factors contributing to functional challenges of the facilities on the study area were identified.

II. Literature Review

Residential area is the major component of human settlement. It is an area that comprises different residential buildings. It is a housing area needed for human healthy habitation. However, housing has been described as the provision of any physical structures usually used for shelter, and includes all facilities, equipment, services and devices needed for healthy living. It is also a shelter, which to a reasonable degree maintains, protects, and supports human health, in safe and sanitary conditions and an atmosphere of reasonable dignity [2], [3].

A housing or residential area may be publicly or privately own. According to [3], public housing is a form of government-provided housing at low rent; managed by the government and at a relatively low rent as a form of public assistance. It is a form of housing tenure in which the property is owned by a government authority consisting houses or apartments [4]. Hence, it is a social housing, a rental housing owned and directly or indirectly managed by the government.

However, buildings within a residential area, according to [5] are generally required to provide safe and conducive environment for the performance of various human activities. [6] stated that the ability of a building to provide the required environment for a particular activity is a measure of its functionality. A functional housing environment must be of a good quality. However, a good quality housing environment means more than a roof over one's head but also includes adequate privacy; adequate space, accessibility; adequate security, structural stability and durability; adequate lighting, heating and ventilation; adequate basic infrastructure such as water supply, sanitation and waste-management facilities; suitable environmental quality and health related factors; and adequate and accessible location with regard to work. Hence, housing habitability signifies the physical condition of dwellings (structurally, internally and externally); the existence of basic household facilities (such as cooking, washing and heating facilities); and the condition of the surrounding environment [7].

In order to make a residential building perform its function adequately, and to confirm with the expected quality, there is need to provide some basic facilities and utilities. Succinctly put, to achieve a good living condition, better domestic economic growth rate, priority has to be given to the provision of basic facilities and utilities, such as water, electricity, wastewater and sewage disposal system [8]. Efficient distribution of utilities has significant effect on the level of accessibility and reduces vulnerability level [9]. Basic facilities are those provisions central to the supply of basic goods and services, in term of close accessibility, adequate quantity, good quality, and affordability. Basic goods within and outside buildings, which their examples include clean air, potable water, public safety, and security system and alarm are invaluable to human life [10], [11]. Others include gas supply, air conditioning and heating, radio, telephone and television signalling systems, emergency exist, lift and escalator, fire system, and drainage system.

However, adequate attention must be paid to quality, in order to ensure that facilities within a building serve the purpose of which they were provided, and help in sustaining environmental quality and protect the building lifespan. The quality of a facility is determined by design, the materials used for provision, and the personnel involved [1]. Poor quality of facilities installed within a house has a significant impact on the building lifespan and housing environmental sustainability [12]. This is because; they are part of building materials and components. It was on this note [1] identified causes of building failure to include design, construction, material, personnel and soil condition. Similarly, building maintenance problems can be attributed to problems originating from construction process, starting from design, materials and the personnel used [13]. However, building maintenance is very important for the sustainability of infrastructural development. Quoting from [[14], maintenance, as noted by [5] is the combination of all technical and associated actions intended to retain an item or restore it to a state in which it can perform its required function. Whether it is for preventive or corrective measure, for maintenance to be minimum and effective, the quality of materials, construction method and the personnel involved cannot be overemphasized [15]. When all this is achieved there can be a good quality housing area.

A good housing quality provides basic requirement to guarantee stable communities as well as social inclusion [16]. Although, housing quality is subjective, it results from the overall perception of residents [3]. When a housing area is of good quality, it will be sustainable and efficient. However, sustainable housing development is a development that meets the housing needs of the present without compromising the ability of the future generations to meet their own housing needs [17], [18].

The Study Area

Lagos State is located in the south-western Nigeria, along the West Coast of Africa and situated within latitudes 6° and 7° north of the equator, and longitude 2° and 5° east of the Greenwich Meridian [3]. The state is bounded in the north and east by Ogun State, in the west by the Republic of Benin and the south by the Atlantic Ocean [9]. It is located at 800km southwest of Abuja, the Nigeria's capital [19].

Geographically, the state is the smallest among the 36 states of the Federal Republic of Nigeria. Lagos State occupies an area of 3,577km^2 with approximately 22% or about787km^2 of its area consisting of lagoons and creeks water [3]. It was the first Federal Capital of Nigeria until 1991, when the capital was moved to Abuja. The state with a population size of 9,013,534 is the second largest, after Kano State [20]; [21]. Because of its size, it is the most population concentrated in the country, with a population density of 7,938 persons per Km^2 [9].

Due to its position as the former capital of the country, and the economic nerve, as well as its influence on the African economy, Lagos State has been facing the challenge of housing shortage, as far back as 1920s, during the colonial era [22]. The first attempt was when the Lagos Executive Development Board (LEDB) was established as a measure to clear the swampy area and provide housing facilities, as a result of bubonic plaque outbreak between 1924 and 1930. The board was expected to provide better sanitary condition for the colonial officials. It was during this period Lagos central slums clearance was carried out, specifically in 1951. Housing estates were built in such places like Yaba, Surulere, Apapa and Ikoyi. Similarly, sites and services housing programs were executed. It was discovered that as at 1955, the board had been able to build 4,500 housing units.

When the LEDB was operating as the Federal Government agency, the old Western Region established Ikeja and Epe Planning Authorities to perform similar functions. In 1972, after the old western region has been subdivided, from

where Lagos State emerged, LEDB, Ikeja and Epe planning authorities were merged and became Lagos State Development Property Corporation (LSDPC). Planning and development control functions were moved to the ministry created for such a purpose, while the LSDPC was saddled with the responsibility of housing provision.

An appreciable number of housing units have been built across the state. Between 1972 and 1975, Surulere and Ogba housing estates were completed. During the second republic, there was more attention on low-income housing provision, in such places like Amuwo-Odofin, Ipaja. To be specific, during the inception of the second republic in 1979, LSDPC was able to build more than 10,000 housing units for the low-income group across Lagos State. The effort of the LSDPC continued to be more significant during the military era. By the 1992, about 17,000 units were built in several locations which include Abesan (4,272 units), Amuwo Odofin (2,068), Iba (1,560), Ijaye (812), Isolo (3,632), Ojokoro (534) [23]; [22]; [3]. However, 17,000 housing units were also built at different location in the state. During the 1999 democratic dispensation, new approach was taken with the development of housing, tagged Millennium Housing Scheme.

Iba Low- Income Housing Estate, Iba in Ojo Local Government Area, which was among the housing estates completed in 1992 is a housing scheme developed for low-income earners. According to [3], its early development commenced between 1981 and 1989, under the LSDPC. That is the estate is over 30 years old. Fig 1 is a land use plan of the estate.

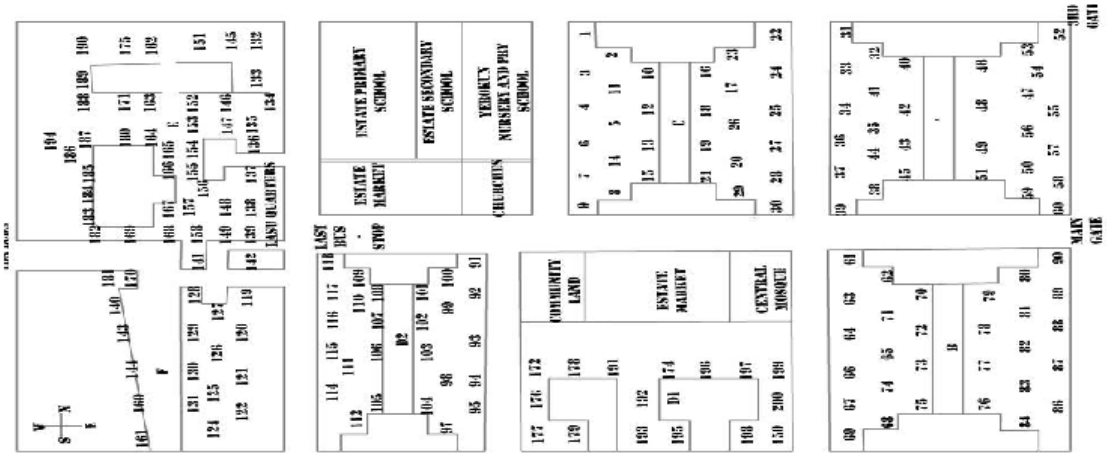

Figure 1: Land Use Plan of Iba Low-Income LSDPC Housing Estate

Source: Babalola (2016), Field Survey (2018)

The initial development consisted about 1,500 dwelling units. These have been expanded through the construction of 888 more housing units to make the estate accommodate 2,388 households [19]. Plates 1 and 3 show the old and new blocks of flats respectively. The estate comprised 199 twin-blocks, each contained 12 flats of 3-bedroom type. Fig 2 is a floor plan of the building block. For security reason, the estate has a wall fence, with 3 entrances as shown by Fig 1, but it was only one at the centre that was kept open for vehicular movement. Although, these 3 entrance roads were tarred to the midpoint, but they were in deplorable condition.

However, the study area was accessible through LASU-Idimu Road, via Lagos-Badagry Expressway to the south of the state linking Abeokuta-Lagos expressway at Iyana Ipaja. See the study area location plan, as shown by Fig 1. Iba Housing Estate shared boundary with Iba community in the north and west, while in the south and east, it shared boundary with Igbo Elerin and LASU-Idimu/Iyana-Ipaja Road.

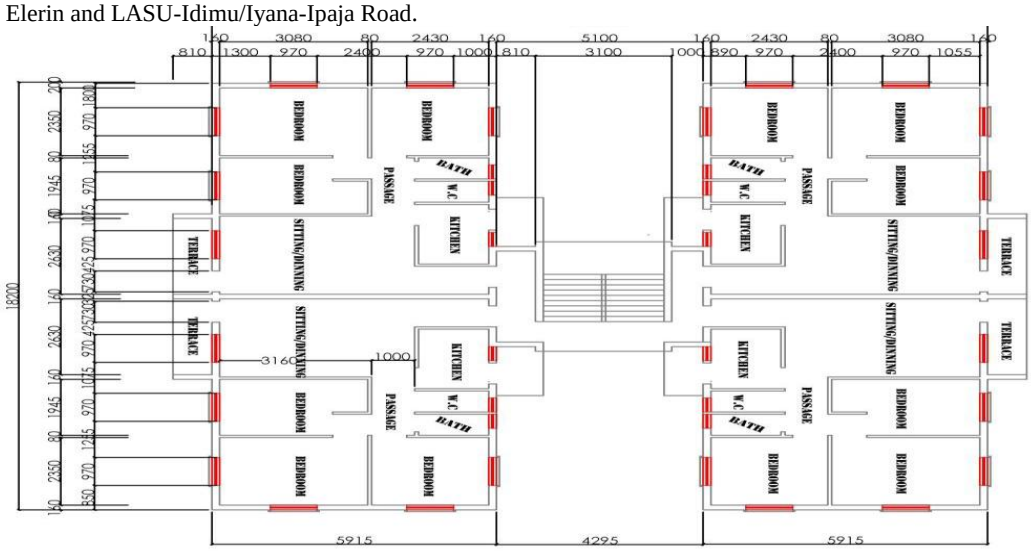

Figure 2: Floor Plan of Residential Building in Iba Low-Income LSDPC Housing Estate

Source: Babalola (2016), Field Survey (2018)

Apart from the road at the centre of the estate that passed through the primary school and the other community facilities in the north to the southern part, other internal roads were not tarred. Hence, they were in bad condition. The estate was provided with such public facilities and services as clinic, primary and secondary schools, recreation/event center, playgrounds, offices, churches, mosque, auto-mechanical and related workshops. Others included mini-markets, retails shops and corner shops. See fig 1. It was observed that major portion of land for parking, recreation and sporting activities have been converted to other land use activities, such as corner shops, mechanics workshops, place of worship, and private schools. See Plates 2 and 3.

III. Research Methodology

Since the focus of this study were residential buildings in the LSDPC low-income estates, efforts were made to identify those estates in this category. These were identified to include Abesan, Amuwo-Odofin, Ijaiye, Ojokoro, Iponri, Isolo, Ipaja and Iba. These housing estates were similar in characteristics, in term of period of construction (1980s-1990s), design type and the occupants. Hence, Iba Housing estate, which was the second largest, after Abesan was sampled for this study. It comprised 2, 388 housing units of 3–bedroom type [24] and [19]. These housing units were built in 199 twin-blocks, each contained 12 flats. From these number of twin-blocks, 101 were sampled using systematic random sampling, which accounted for 50.8% of the total number of building blocks. Hence, questionnaire and inspection surveys were conducted. From each of these sampled building blocks, a housing unit was selected through convenience sampling method for questionnaire survey. Similarly, convenience sampling method was used to sample an adult household member from each flat for questionnaire survey, while physical survey of the facilities and effect was conducted on the 101 sampled blocks of flats. Both inspection and questionnaire surveys were conducted simultaneously on the selected buildings. The essence of the questionnaire was to solicit for residents' perception on the condition of the facilities and their effects on the building condition, while inspection survey was for the researcher to take note of the effects. However, standard deviation and chi-square were employed for the statistical analysis.

IV. Data Analysis And Discussion

Age of Respondents

As shown in Table 1, 11.52% of the respondents for this study were in the age bracket 20-24, 13.86% and 12.67% were in the age bracket 25-29 and 30-34 respectively, 11.88% were in the age group 35-39. Those who were in age groups 40-44 and 45-49 were 12.87% and 9.9% respectively, 10.99% were in each of age groups 50-54 and 55-59, while it was only 3.60% that were in age group 60-64. This age structures may not represent age distribution of the residents of the study area, since all the residents were not at home during the study.

Table 1: Age of Respondents

Age Group	Frequency	Percentage
20-24	12	11.52
25-29	14	13.86
30-34	13	12.87
35-39	12	11.88
40-44	13	12. 87
45-49	10	9.9
50-54	11	10.89
55-59	11	10 .89
60-64	4	3.60
Total	101	100.00

Source: Field Survey (2018)

Housing Ownership

The study discovered 4 categories of property ownership, which include ownership by direct purchase from the government, and second hand purchase, i.e. those who purchased their own apartment from the original owner. Others include ownership by inheritance and by renting. However, some of the respondents were family members of these 4 categories. The study found that 35.64% (36) of the respondents bought the housing unit they occupied directly from the government, while 12.87% (13) bought their own apartment from the original owners, as second hand property owners. However, 24.75% (25) rented their own apartment from the owner, while 26.73% (27) inherited their own apartment from their parents, who either bought it directly or indirectly from the government.

Length of Staying in the Apartment

As shown in Table 2, the study found that 0.99% of the respondents during the data collection for this study have spent more (1-5) years in the study area, 2.97% have spent (6-10) years, while 13.86% have spent (11-15) years. It was discovered further that those who have spent (16-20) and (21-25) years were 25.74% and 30.69% respectively. However, 21.78% and 9.90% of the respondents have spent (26-30) and (31-35) years respectively. It was only 1.98% that have spent 36 years and above in the study area.

Table 2: Length of Staying in the Apartment

Length in Year	Frequency	Percentage
1-5	1	0.99
6-10	3	2.97
11-15	14	13.86
16-20	21	25.74
21-25	28	30.69
26-30	22	21.78
31-35	10	9.90
36 and above	2	1.98
Total	101	100.00

Source: Field Work (2018)

Occupancy Size per Housing Unit

The study found, as shown in Table 3 that 47.52% of the respondents have the occupancy size of (3-5) household's members, 40.59% have (6-8), while 10.89% have a household's size of (9-11). It was only 0.99% that has a household's size of 11 members and above.

Table 3: Occupancy Size per Housing Unit

Occupancy Size	Frequency	Percentage
3-5	48	47.52
6-8	41	40.59
9-11	11	10.89
Above 11	1	0.99
Total	101	100.00

Source: Field Survey (2018)

Facilities and Utilities Constructed with Buildings

Apart from water and wastewater, there were other 8 facilities, as identified in literature that were assessed to determine whether they were constructed with the sampled buildings. As in Table 4, all the sampled buildings constructed with the following facilities during the construction stage, which include electricity, wastewater pipes and external drainage pipes. However, 7.92% were provided with exist or emergency staircase, and 45.55% with emergency door during the construction stage. Those who have exist staircase were those apartments in the new buildings, while those with emergency door in the old building blocks could only be found on the ground floor. This implies that the old residential buildings were built with only one staircase, as shown in Fig 2. Other facilities that were needed to provide services, such as water pipe, overhead tank, air-conditioner, and television signal were not part of building construction. Individual occupants provided them thereafter. Hence, there was variation in the location, the construction method and the materials used to provide these facilities.

The reason why the case of households' water facilities was like that is because there was no public water, particularly, pipe born water. The only public water, a borehole provided by the Federal Government, under the Ogun-Osun River Basin water scheme was not functioning. Hence, 63.37% (64) of the sampled buildings have access to borehole, while 36.63% (37) have access to well. It was observed that each apartment has their different water facilities, provided by individual households. This made the provision of these facilities uncoordinated, and was not constructed in accordance with the building plan, as shown by the picture in Plate 1. However, Plate 2 shows illegal installation of such facilities as air conditioners, television decoder signaling system, and other illegal developments.

Table 4: Facilities and Utilities Constructed with Buildings

Facilities	Frequency	Percentage
Water Pipe	0	0.0
Overhand water tank	0	0.0
Electricity	101	100.0
Wastewater Pipe	101	100.0
Overhead water tank	0	0.0
Air conditioner	0	0.0
Television Signaling System	0	0.0
Exist Staircase	8	7.92
Emergency Door	46	45.55
External Drainage Facility	101	100.0

Source: Field Survey (2018)

Plate 1: A Typical Building Provided with Water Facilities Using Different Methods
Source: Field Work (2018)

Condition of Household Water and Liquid Waste/Sewage Disposal Facilities

The study discovered that 42.57% of the buildings inspected have their pipes for liquid waste disposal in good condition, while 57.43% have their own broken and in bad condition. In case of households' water, 37.62% of the sampled buildings have their water pipes in working and in good condition, while 62.38% have their own broken and in bad condition. Because of this situation, 62.38% of the sampled buildings have their structures, including foundations under threat, due water and wastewater leakages, overflowing on the sampled building walls. This has resulted in weakening of building walls and foundation.

Plate 2: Illegal Installation of Air Conditioners, Television Decoder Signaling System, Water Tank
Source: Field Work (2018)

Condition of Buildings and the Surroundings

Table 5 shows that higher proportion, 48.52% of the sampled buildings have their roof in bad condition, 51.49 and 57.43% have their wall and paints in bad condition respectively, while 57.43% and 66.34% have their drainage and open space in bad condition respectively. It was only 40.59% and 10.89% that have their roof in fair and good condition respectively, while 38.61% and 9.9% have their wall in fair and good condition respectively.

Table 5: Condition of Buildings' Components and the Surroundings

	Roof		Wall		Painting		Drainage		Open Space	
Condition	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Good	11	10.89	10	9.90	12	11.88	8	7.92	5	4.95
Fair	41	40.59	39	38.61	31	30.69	34	33.66	29	28.71
Bad	49	48.52	52	51.49	58	57.43	59	58.42	67	66.34
Total	**101**	**100**	**101**	**100**	**101**	**100**	**101**	**100**	**101**	**100**

Source: Field Survey (2018)

However, 30.69% have their paints in fair condition, while 11.88% have it in good condition. The condition was assessed, based on the physical outlook and professional judgment. When these were analysed using statistical tool, as shown in Table 6, the overall assessment shows that the condition of the roof, wall, painting and drainage of the sampled buildings were in fair condition, while the condition of open space was bad.

Table 6: Mean Response Rating on the Condition of the Building Components

N = 101	Frequency of Occurrence		
Condition of the following components of the residential buildings and the environment	Mean Response Rating		
	Mean	SD	Category
Roof	1.64	.672	2
Wall	1.69	.644	2
Painting	1.64	.672	2

Drainage	1.54	.641	2
Open Space	1.41	.586	1

Source: Field Survey 2017. Scale Category: Bad = 1, Fair = 2, Good = 3.

The reason for the present condition of these facilities was because of the quality of installation. As shown in Table 7, it was only .32.67% of the sampled buildings that have their water connection pipes properly installed, while 67.33% were not properly installed. In the case of liquid waste or sewage pipes, 45.55% were properly installed, while 54.46% were not properly installed. Majority of buildings that have these 2 facilities under investigation properly installed could be found in the new buildings, as shown by Plate 3.

Table 7: Quality of Installation of the Investigated Facilities

	Properly Installed		Not Properly Installed		Total	
Type of Facility	Freq.	%	Freq.	%	Freq.	%
Water Connection Pipe	33	32.67	68	67.33	101	100.00
Liquid Waste Water Pipe	46	45.55	55	54.46	101	100.00

Source: Field Work (2018)

The high number of cases of poor installation could be attributed to the type of personnel involved. As shown in Table 8, the study found that it was only 10.89% of the sampled households that contacted professionally certified personnel, when there was need to install or repair their building facilities and services; 17.82% hired technically certified or technologist, while 71.29% hired the service of unqualified or noncertified personnel.

Plate 3: New Blocks of Flats in Iba Housing Estate

Source: Field Work (2018)

Table 8: Qualification of Personnel Involved in Installation and Maintenance of Facility

Qualifications	Frequency	%
Professional	11	10.89
Technician/Technologist	18	17.82
Noncertified Personnel	72	71.29
Total	101	100.00

Source: Field Survey (2018)

Effects of the Condition of Facilities on the Building Blocks and Residential Environment

The study identified 10 main effects of the condition of the households' water and wastewater disposal facilities on the residential buildings and the residents. These are as shown in Table 9, which include weakening the building structure, and the building foundation, causing crack of walls, and high cost of building maintenance among others. However, 77.23% and 64.36 of the sampled residents believed that the condition of the study facilities weakened the building structure and building foundation respectively, 62.38% believed that the condition of the study facilities caused cracking of wall, while 71.29% affirmed that the condition could lead to high cost of building maintenance. On the other hand, 76.24% of the sampled residents believed that the condition of the facilities can shorten the lifespan of the residential buildings, while 81.19% observed that the value of building aesthetic can be lowered due to poor condition of liquid waste discharge and households' water connection facilities. The table further shows that 57.43% and 68.32% of the sampled residents observed that the condition of the facilities can cause damage to floor tiles and the drainage system respectively. However, 53.47% and 91.09% believed that the condition of the study facilities can destroy the estate landscape and cause pollution and health hazard respectively.

Table 9: Efects of the Condition of Facilities on the Buildings and Residential Environment

Effects	Frequency	Percentage
Weakening the Building Structure	78	77.23
Weakening the Building Foundation	65	64.36
Causing Crack of Walls	63	62.38
Leading to High Cost of Building Maintenance	72	71.29
Shortening the Lifespan of Building	77	76.24
Lowering the Building aesthetical Value	82	81.19
Damaging Tiles and Floors of Building	58	57.43
Damaging Drainage System	69	68.32
Destruction of the Estate Landscape	54	53.47
Causing Pollution and Health Hazard	92	91.09

Source: Field Survey (2018)

The Level of the Need for Building Renovation

The study found that there was high level of the need for housing renovation in the study area, towards restoring habitable living area. As shown in Table 10, it was only 2.97% of the sampled buildings that were not in need renovation at all. These samples were only in the newly built area, while 17.82% required partial renovation. A very large proportion of 79.21% of the sampled buildings required complete renovation to restore them into a habitable condition.

Table 10: The Level of the Need for Building Renovation

Type of Renovation Required	Frequency	Percentage
No Renovation	3	2.97
Partial Renovation	18	17.82
Complete Renovation	80	79.21
Total	101	100.00

Source: Field Survey (2018)

Residents' Satisfaction on the Environmental Quality due the Functional Level of Facilities

Investigation was carried out to determine the residents' satisfaction on the environmental quality, due to the existing condition of the two facilities investigated. In overall, 9.9% of the sampled residents were very satisfied with the quality of the environment they lived, due to the existing condition of their household's water and wastewater facilities, 14.85% were satisfied, 30.69% were fairly satisfied, while 44.56% were not satisfied at all. See Table 11.

Table 11: Residents' Satisfaction on the Environmental Quality and Functionality of Facilities

Level of Satisfaction	Frequency	Percentage
Very satisfied	10	9.90
Satisfied	15	14.85
Fairly satisfied	31	30.69
Not satisfied	45	44.56
Total	101	100.00

Source: Field Survey (2018)

A chi-square (χ^2) analysis was carried out, as shown in Table 12 to examine the association between residents' level of satisfaction and factors such as quality of pipe water installation, quality of wastewater/sewage pipe installation, qualification of personnel, condition of pipe water and condition of wastewater/sewage pipe connected with the house The result of the chi-square analysis showed that, among all these factors, there was significant association between residents' level of satisfaction and quality of wastewater/sewage pipe installation; $\chi^2(3, N = 101) = 12.474)$, $p < 0.05$. In other words, the level of satisfaction of the residents was only influenced by the quality of wastewater/sewage pipe installation in the buildings. However, this does not mean that other factors did not have any effect at all on the level of residents' satisfaction.

Table 12: Chi-square Analysis on Residents' Satisfaction on the Environment Quality

Factors	Categories	**RESIDENTS' SATISFACTION LEVEL ON BUILDING**				Overall	p-value
		N.S	**F.S**	**S**	**V.S**		
Quality of Pipe water installation	Properly Installed Not Properly Installed	39.4% (13) 47.1% (27)	42.4%(14) 25%(17)	12.1%(4.0) 17.6%(12)	6.1%(2.0) 10.3% (7)	100%(33) 100%(68)	0.339
	Overall	44.6% (45)	30.7%(31)	15.8%(16)	8.9%(9)	100%(101)	
Quality of waste water/sewage	Properly Installed Not Properly Installed	48.2%(27) 40%(18)	19.6%(11) 44.4%(20)	25%(14) 4.4.%(2.0)	7.1%(4.0) 11.1%(5)	100%(56) 100%(45)	0.006

pipe Installation	Overall	44.6% (45)	30.7%(31)	15.8%(16)	8.9%(9)	100%(101)	
Quality of Personnel	Professional Technician/Technologist Noncertified Personnel	50%(6.0) 52.9%(9.0) 41.7%(30)	16.7%(2.0) 35.3%(6.0) 31.9%(23)	25%(3.0) 11.8%(2.0) 15.3%(11)	8.3%(1) 0.0%(0) 11.1%(8)	100%(12) 100%(17) 100%(72)	0.657
	Overall	44.6% (45)	30.7%(31)	15.8%(16)	8.9%(9)	100%(101)	
Condition of Pipe Water connected with the House	Good Broken/Leaking Not working	47.2 (17) 42.1(24) 50(4.0)	33.3%(12) 29.8%(17) 25%(2.0)	5.6(2.0) 22.8%(13) 12.5%(1.0	13.9%(5) 5.3%(3.0) 12.5%(1.0)	100%(36) 100%(57) 100%(8)	0.365
	Overall	44.6% (45)	30.7%(31)	15.8%(16)	8.9%(9)	100%(101)	

Note: N.S=Not Satisfied, F.S=Fairly Satisfied, S=Satisfied, V.S=Very Satisfied
Source: Field Survey (2018)

Contributing Factors to the Challenge Posed by the Study Facilities

The study identified 8 factors contributing to the challenge posed by the study facilities on the residential buildings and the surrounding area. These are as identified in Table 13. The factors identified include unethical adjustment into buildings, poor construction, and low quality of materials. Others include poor maintenance, the use of unqualified personnel, and inadequate use of water, overutilization of facilities, and age of buildings. When these factors were rated as shown in Table 13, based on the households' perceptions, the factors that were ranked to have had high effect on the buildings and the housing environment, include factors with serial number 1, 2, 3,4, and 5, while factors with serial number 6 and 8 were ranked to have had medium effect. It was only factor with serial number 7 that was rated with low effect (37.62%).

Table 13: Factors Contributing to Functional Challenges of Facilities in the Buildings

		Rating					
		1		2		3	
S/N	Factors	No.	%	No.	%	No.	%
1	Unethical adjustment into buildings	58	57.43	34	33.66	9	8.91
2	Poor Construction	54	53.47	36	35.64	11	10.89
3	Low Quality of Materials	42	41.58	33	32.67	26	25.74
4	Poor Maintenance	56	55.45	35	34.65	10	9.90
5	The Use of Unqualified Personnel	45	44.56	33	32.67	23	22.77
6	Inadequate Use of Water	38	47.62	49	48.52	14	13.86
7	Overutilization of facilities	29	28.71	34	33.66	38	37.62
8	Age of Buildings	42	41.58	49	48.52	10	9.90

1= High effect, 2= Medium effect, 3=Low effect
Source: Field Survey (2018)

In overall, when the standard deviation (SD) was calculated, the study shows that all of the contributing factors to the challenges posed by the water pipe, overhead tank stand and waste water/sewage pipe on the buildings, as in Table 14 have medium effect on the sampled buildings, except for unethical adjustments into the buildings which have high effect. Specifically, those contributing factors that have medium effect were poor construction of buildings, low quality of materials used for the provision of the facilities, poor maintenance, and the use of unqualified personnel, inadequate of water for flushing of pipe, overutilization of facilities and age of buildings.

Table 14: SD of the Contributing Factors to the Challenges Posed By the Water Pipe, Overhead Tank Stand, and Waste Water/Sewage Pipe on the Buildings

N = 101	Frequency of Occurrence		
Contributing factors to the challenges posed by the water pipe, overhead tank stand, & waste water/sewage pipe on the buildings	Mean Response Rating		
	Mean	SD	Category
Unethical adjustment into the building	2.50	.658	3
Poor construction of the building	2.46	.671	2
Low quality of materials used for the provision of the facilities	2.17	.801	2
Poor maintenance	2.46	.671	2
The use of unqualified personnel	2.22	.795	2

Inadequate use of water for flushing of pipe	2.24	.680	2
Over-utilization of facilities	1.87	.821	2
Age of buildings	2.33	.634	2

Scale Category: Low effect = 1, Medium effect = 2, High Effect = 3.
Source: Field Survey 2017.

When the effect of these 8 factors, as in Table 13 were statistically analysed using chi-square, the, result shows that there is relationship between the high level of the need for renovation, as in Table 10 and the use of unqualified personnel in the study area. Hence, there is statistical significant relationship between the high level of the need for renovation, and the use of unqualified personnel in the study area; $\chi^2(4, N = 101) = 12.044)$, $p < 0.05$. In other words, the level of the need for renovation of the residential buildings in the study area was significantly influenced by the use of unqualified personnel for construction, installation and repair of households' water connection and wastewater or sewage disposal facilities. However, the use of unqualified personnel could be identified as the route of such factors, as unethical adjustment into the building, poor construction of the building, low quality of materials used for the provision of the facilities, and poor maintenance. The consequence is high level of buildings' dilapidation, which will make buildings to require urgent renovation, as in the case of the study area.

Table 15: Chi-Square Tests On the Use of Unqualified Personnel and High Level of the Need for Renovation

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.044[a]	4	.017
Likelihood Ratio	14.720	4	.005
Linear-by-Linear Association	2.739	1	.098
N of Valid Cases	101		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .68.
Source: Field Survey (2018)

V. Summary of Findings, Conclusion and Recommendation

The study found that some basic facilities and services were not provided during the construction of the sampled buildings. Households' water facilities, such as water pipe connection, water tank stands were provided and connected after the residents of the study area have occupied the buildings. Hence, the provision were handled by personnel of different background, while majority of them were not qualified. The liquid waste disposal facilities, such as wastewater pipe, and sewage disposal facilities were provided and connected with the residential buildings during the construction stage. Due to the poor condition of these two facilities, the buildings in the study area have be facing a number of challenges, such as weakening of the building structure and foundation, high cost of building maintenance, reduction in building lifespan, and damaging of drainage, among others. These have lowered the residential satisfaction on the quality of the residential building ant their environment. Hence, there was a significant association between residents' level of satisfaction and quality of wastewater/sewage pipe installation; $\chi^2(3, N = 101) = 12.474)$, $p < 0.05$.

Significantly, eight contributing factors were identified causing bad condition of the study facilities, which include unethical adjustment into buildings, poor construction, low quality of materials, and poor maintenance. Others include the use of unqualified personnel, inadequate, use of water, overutilization of facilities, and age of buildings. When the level of their contribution were rated using standard deviation, the overall effect of these factors was medium. Unethical adjustments into the buildings made the two facilities (households' water and liquid waste) to have high negative effect on the buildings. The test conducted shows that there is statistical significant relationship between the high level of the need for building renovation, and the use of unqualified personnel [$\chi^2(4, N = 101) = 12.044)$, $p < 0.05$] in the study area.

It can be concluded that households' water and wastewater facilities provided in the buildings of the study were in a deplorable condition. This have posed a great danger on the buildings and the residents. Hence, there is a high level of the need to renovate the residential buildings of the study area. Therefore, the study recommends urgent step to carry out a comprehensive renovation of these buildings and their surroundings. These should be handled by a qualified personnel. Good and standard building materials should be used. After the renovation has been carried out, a building maintenance department should be set up to oversee the overall maintenance of all buildings, at expense of the occupants. However, the use of the department must be strictly enforced to prevent the use of unqualified workers.

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