INFRASTRUCTURAL AVAILABILITY AND CONDITIONS WITHIN RESIDENTIAL AREAS IN INTERNATIONAL BORDER TOWNS IN OGUN STATE, NIGERIA

Ojo, Oladimeji Olusola, Morakinyo, Kolawole O (PhD)
Urban and Regional Planning Department, Federal Polytechnic Ilaro, Ogun State, Nigeria
oladimeji.ojo@federalpolyilaro.edu.ng +2348063409884
Department of Architectural Technology, Federal Polytechnic Ede Osun State, Nigeria
+2348068053283

Abstract
Infrastructure has played an important role in development of both physical and socioeconomic activities in residential areas. The aim of the study is to assess the infrastructural availability and conditions in residential areas of international towns in Ogun State. The major objectives were to assess the physical conditions, challenges and providers of the infrastructure. Structured questionnaire was used to draw information from 361 respondents. Settlements with high population and close to border line in each local government were considered. Descriptive and inferential methods of data analysis was employed for the analysis. The descriptive part consists of frequency and percentage while the inferential part consists of Completely Randomized Design (CRD) and Pearson movement correlation coefficient. Findings show that there exists a statistically significant difference at the $p < .05$ level in overall residential areas and neighbourhood facilities for the three selected towns: $F (2, 246) = 1.477$, $p = .021$. Post-hoc comparisons using the Tukey HSD test the mean score for Idi-iroko ($M = 2.733$, $SD = 1.13$) was significantly different from Ohunbe ($M = 2.875$, $SD = 1.07$). Ilara town ($M = 2.616$, $SD = 1.19$) did not differ significantly from either Idi-Iroko or Ohunbe towns in terms of overall residential formation and neighbourhood facilities respectively. In conclusion, the peculiarity of the areas as border town towns and image of the country as entry point needs urgent attention in providing adequate facilities. Therefore, there should be presence of governance of local, state or federal government to improve the wellbeing of the inhabitants.

Keywords*: Availability, Condition, Infrastructure, International Border, Residential Areas*

Introduction

African border settlements are characterised by different patterns, peripheral sprawl, economies dominated by informal activities and widespread informal settlements with limited infrastructure (UN Habitat, 2009). Goswami (2014) pointed out that lack of infrastructure in slum areas contributed to the environmental and social condition of individual residents in such areas. Lack of infrastructure created inefficiencies in areas of economic growth and on land value at the suburbs (IHC, 2009 and Gukurume, 2012). Enhancement of efficiency at border towns needs adequate services for competitiveness (Kudo, 2009). Sufficient services can be enhanced by financial supportability and developmental attitude of the government (UN-Habitat, 2012). In Nigeria as in other Africa countries, advantages of sustainable infrastructure are not only to increase socioeconomic growth, but also need to strengthen inhabitant's empowerment and aids poverty reduction to elevate standard of living (Purokayo and Soon, 2014).

Development of border communities with infrastructural facilities is a major step towards stemming the tides in smuggling contraband goods and the long-term effect will be effective management of subsequent crisis in the border areas (Aluko, 2012). Eilenberg and Wadley (2009) examined the borderland livelihood strategies in West Kalimantan, Indonesia. It was discovered that underdevelopment of border towns caused by poor infrastructure and illegal activities poses a national threat. Ricci (2011) studied sub-Saharan African cities functionality and infrastructure provision. The study advocated for practical answers for enhancing impromptu and underserviced settlements. Kudo (2009) found that infrastructure development like roads, electricity, and water provisions, reduces the services and hygiene within the territory if they are inadequate, or absent in the areas. Development takes place in line with industrialization, population increase, and changing settlement patterns, therefore, governments need to provide basic infrastructure for the new change (Kimba, 2012). It was observed that in Africa, Asia, and Latin America, over 600 million people reside in housing with inadequate facilities which prone to health risk (UN-Habitat, 1996).

International border towns have been an area that suffer infrastructure deficit over the years, it may be as a result of location and hostility of the territory. This paper investigated availability and quality conditions of existing infrastructure in the major border towns in Nigeria that share boundary with Benin Republic. The following

objectives were adopted to address the problem: assess the physical conditions, challenges and identification of providers of existing infrastructure in the study areas with a view to improving the environmental condition of the area and wellbeing of the inhabitants.

Study areas

Geographically, the research covered selected border towns in Ogun State, Nigeria. The towns are Idiroko, Ohunbe and Ilara. Idiroko town is located within Ipokia LGA within 6032'00"N2^{0}51"00"E, Ohunbe is situated within 7^{o}14'00"N 3^0 02'00"E in the North East of Yewa North LGA of Ogun State., while Ilara, falls within the jurisdiction of Imeko Afon LGA within 7^{0}29'00" N2^{0}53'00" E. These three LGAs in Ogun State share borderlines with the Benin Republic. An adequate study of these three border towns was considered as part of the research in order to draw conclusions on variables relevant to the study. Figure 1.1 shows map of Nigeria, Ogun State, the three LGAs that share boundary with Benin Republic and study areas.

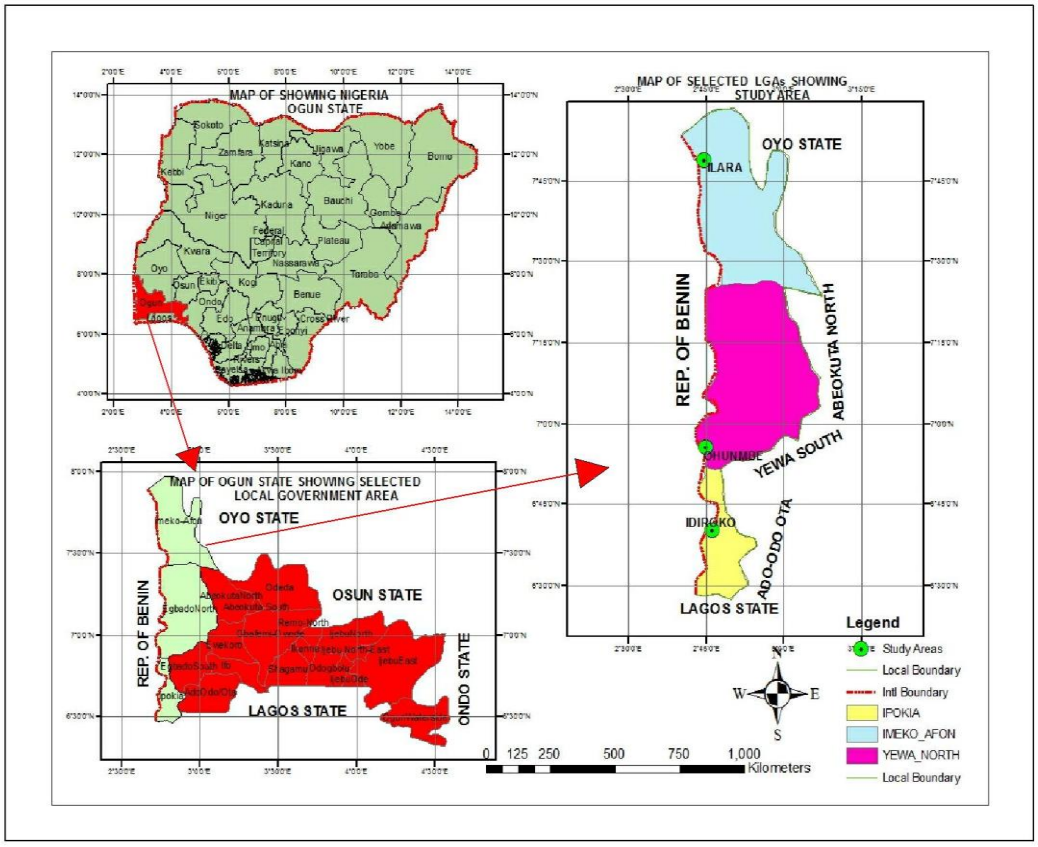

Figure 1.1: Map of Nigeria and Ogun State showing 20 Local Government Areas and the Study Areas

Source: Survey and Geo-informatics Department, Federal Polytechnic, Ilaro. Ogun State, (2017).

Materials and methods

This study adopts quantitative research design to fine-tune the motivation of the study. This research design approach was adopted due to complexity of the degree of residential formation within the international border towns which cannot be addressed from unique perspective of a qualitative study.

The study population consists of twelve (12) international border towns in Ogun State, Nigeria. These border towns consist of Idiroko, Agosasa, Ibatefin, and Ilashe situated in Ipokia local Government area of the State; Ohunbe,

Tobolo, Ibayun and Igbkoto situated in Yewa North Local Government, while Ilara, Iwoye, Idofa and Oke Agbede of Imeko Afon L.G area. Out of the listed towns, one (1) town per identified local government area were conveniently selected namely Idi iroku, Ohunbe and Ilara. These three towns were selected due to their peculiarities based on the highest population in each local government and their high proximity to the border line. The three settlements were considered. The buildings were generated using Goole Earth with on-field pilot survey which indicated that Idi Iroko has 4111 buildings with Ilara and Ohunbe having 1,905 and 1,331 buildings respectively. Out of these buildings, about 3802, 1480 and 821 were found to be habitable in Idiroko, Ilara and Ohunbe respectively. However, these habitable buildings formed the basis of our population from which the sample size was drawn.

The Cochram (1977) sample size calculator was adopted to randomly select 361 habitable buildings for inclusion across the three conveniently selected towns, Therefore, Idiiroko 224 with 62.05 %, Ilara 87 with 24.10% and Ohunbe 50 with 13.85 % respectively. Structure questionnaire was used. Household heads of each randomly selected buildings served as the respondents. The questionnaire was sectioned into two. The first section dwelt on the infrastructural availability while the second section were based on condition of neighbourhood facilities. Descriptive and inferential methods of data analysis was employed to analyses the properly filled and returned research instrument. The descriptive part consists of frequency and percentage while the inferential part consists of completely randomized (CRD) and Pearson movement correlation coefficient. CRD was used to compare location and neighborhood facilities of residents across the towns while Pearson moment correction coefficient was used to depict the relationship existing between dwelling type and overall housing and neighborhood facilities.

Interpretation of findings

The study investigated infrastructural facilities in the study area. The focus was to examine the extent of availability of these facilities in the international border towns in study areas. Infrastructural facilities variables investigated in this section are contained in "A" Section B of the structured questionnaire. These facilities include water supply, electricity supply and type of toilets, drainage level, types of roads, types of health care, health challenge, infrastructural provision level and provider of infrastructural facilities.

Table 1: Sources of Water Supply

	ILARA		IDIROKO		OHUNBE		TOTAL	
Source of water	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Public well	12	20.34	35	23.83	4	16.67	51	20.32
Hand pump	9	15.25	21	12.50	4	16.67	34	13.55
River/lake	1	1.69	2	1.19	0	0.00	3	1.20
Borehole	35	59.32	108	64.29	16	66.67	159	63.35
Public water source	2	3.39	2	1.19	0	0.00	4	1.59
Total	**59**	**100**	**168**	**100**	**24**	**100**	**251**	**100**

The sources of water supply available in the study area were examined by the current research. Table 1 shows that 63.35% of the research population got water supply through borehole. A typical borehole in the area is shown in Plates 1 – 3. This is followed by 20.32% who obtained water through public well. Those residents that source for water through hand pump or deep well constituted 13.55%. Also, 1.59% of the study population sourced water through public water while the remaining 1.20% sourced for water from river or lake. This result indicates that majority of the residents in the study area sourced for water by borehole. In addition, the finding indicates that residents are lacking good pipe-borne water supply in the study area.

Plate 1: Source of water in Idi-iroko

Plate 2: Source of water in Ilara

Plate 3: Source of water in Ohunbe

Table 2: Sources of Power Supply

	ILARA		IDIROKO		OHUNBE		TOTAL	
Source of electricity supply	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
IBEDC	44	70.97	138	79.31	22	91.67	204	78.76
Self-generating plant	18	29.03	34	19.54	2	8.33	54	20.77
Why not solar before others? Others	0	0.00	2	1.15	0	0.00	2	0.77
Total	**62**	**100**	**174**	**100**	**24**	**100**	**260**	**100**

The supply of electricity in the study area was also investigated. The information in Table 2 reveals that 78.46% of the research population used energy supply from Ibadan Electricity Distribution Company (IBEDC), the main electricity distributor in Ogun State. Moreover, 20.77% of the sampled respondents sourced energy through self-generating plant while the remaining 0.77% of the total residents used power from other sources. The pictorial information in Plate 4 further reveals the two main sources of power supply used by the residents in the three towns. This result indicates that majority of the residents in the study area relied heavily on power supply from IBEDC.

Table 3: Regularity of Electricity Supply

	ILARA		IDIROKO		OHUNBE		TOTAL	
Mode of electricity supply	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Regular	4	6.45	6	3.45	0	0.00	10	3.85
Not regular	48	77.42	141	81.03	21	87.50	210	80.77
Not available	10	16.13	27	15.25	3	12.50	40	15.38
Total	**62**	**100**	**174**	**100**	**24**	**100**	**260**	**100**

The study considered it important to investigate the regularity of power supply by IBEDC as the main source of electricity in the study area. The data in Table 3 shows that 80.77% of the research population stated that electricity supply in the study area was not regular. In fact, 15.38% of the sampled population opined that electricity was not available. The remaining 3.85% indicated that electricity was regular in the study area. The result indicates majority of the residents in the study area do not regularly enjoy electricity supply mostly by IBEDC.

Table 4: Type of Toilet in Use in the study towns

	ILARA		IDIROKO		OHUNBE		TOTAL	
Type of toilet available	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Pit latrine	26	42.62	82	48.24	10	41.67	118	46.27
Water closet	29	47.54	65	38.24	10	41.67	104	40.78
Open defecation	1	1.64	2	1.18	0	0.00	3	1.18
Bucket system	2	3.28	6	3.53	1	4.17	9	3.53
VIP Toilet	3	4.92	15	8.82	3	12.50	21	8.24
Total	**61**	**100**	**170**	**100**	**24**	**100**	**255**	**100**

The types of toilet facilities in the various dwelling units in the towns were examined. Table 4 provides the result on this. From this result, houses with exclusively pit latrine closet constituted around 46.27% of the research population; followed by those with water closet/squat, constituting 40.78%; followed by those whose toilet type is Ventilated improved pit toilet, constituting 8.24%. Next were houses with bucket/pail type of toilet (3.53%) and 1.18% of dwelling units without toilet facilities (open defecation). This result indicates that over 46% of the houses used pit latrine toilet facilities, though, there still exists a strange occurrence in the standard of sanitation in the towns of the study area with regards to the use of bucket/pail type of toilet and (almost 4%) and houses without toilet at all (being more than 1%), which had long been outlawed in the State.

Table 5: Drainage System

	ILARA		IDIROKO		OHUNBE		TOTAL	
Level of drainage available	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Adequate	0	0.00	6	3.49	1	4.17	7	2.72
Not adequate	27	44.26	68	39.53	10	41.67	105	40.86
Not available	34	55.74	96	55.81	12	50.00	142	55.25
Existing but blocked	0	0.00	2	1.16	1	4.17	3	1.17
Total	**61**	**100**	**172**	**100**	**24**	**100**	**257**	**100**

The study investigated the condition of drainage system in the study area. Drainage system can have influence on the pattern of housing development; however, this can be much evaluated via inferential statistics. The result in Table 5 reveals that almost 55.25% of the research population argued that drainage system was not provided in the three towns.. This finding was further reinforced by pictorial information in Plate 5 & Plate 6. The next is followed by 40.86% who argued that drainage system was available but not adequate. The next who contended that drainage system was available constituted 2.72% while 1.17% argued that the existing drainage system was blocked. The result indicates that over 95% of the research population found drainage system was either unavailable or inadequate. Thus, this has implications on circulation within neighborhood and also affects efficient housing development control.

Plate 4: Road without drainage in Ilara

Plate 5: Road without drainage in drainage Idi-iroko

Plate 6: Road without in Ohunbe

Table 6: Type of Road

	ILARA		IDIROKO		OHUNBE		TOTAL	
Type of road	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Tarred road	6	9.68	29	16.67	4	16.67	39	15.00
Untarred road	52	83.87	128	73.56	19	79.17	199	76.54
Footpath	4	6.45	17	9.77	1	4.17	22	8.46
Total	**62**	**100**	**174**	**100**	**24**	**100**	**260**	**100**

The study investigated type of road available in the study towns near Nigeria-Benin Republic international border. This factor can also influence housing development patterns just like above factor, drainage system. The result in Table 6 indicates that only 15% of the respondents confirmed that the roads in the study areas were tarred, 76.54% of them agreed that the roads were untarred while 8.46% respondents said that there were just footpaths. The pictorial information in Plate 4 - Plate 6 reinforces this finding. This result indicates that majority of the roads in Nigerian international border towns between Nigeria Benin-Republic were untarred, thus, poorly designed for vehicular movement.

Plate 7: Neighbourhood Accessibility in Ilara

Plate 8: Neighbourhood Accessibility in Idi-iroko

Plate 9: Road view in Ohunbe

Plate 10: Road view in Idi-iroko towards Benin Republic

Table 7: Type of Health Care Facility

	ILARA		IDIROKO		OHUNBE		TOTAL	
Type of health care facilities	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Dispensary	15	24.59	41	23.84	3	12.50	59	22.96
Maternity	28	45.90	61	35.47	7	29.17	96	37.35
State hospital	4	6.56	18	10.47	2	8.33	24	9.34
Federal medical centre	4	6.56	8	4.65	0	0.00	12	4.67
Trado-medical homes	4	6.56	19	11.05	4	16.67	27	10.51
Community health centre	6	9.84	25	14.53	8	33.33	39	15.18
Total	**61**	**100**	**172**	**100**	**24**	**100**	**257**	**100**

One of the important wellbeing indicators of households and neighborhoods is access to health care facility **(**Travers and Richardson, 1997). For this reason, the study investigated type of health care facility to better understand neighborhoods characteristics in the study area. The information in Table 7 conveys that maternity is the most common health care facility in the study area constituting 37.35%; followed by dispensary constituting 22.96%; the next is Community Health Centre which constituted 15.18%. Residents made use of Trado-medical homes which constituted 10.18% while state hospital constitutes 9.34% and federal medical centres constituted 4.67% of the respondents. The implication of this finding is that residents in Nigeria international border towns near Nigeria and Benin Republic boundary need more accessibility to health services from government of State and Federal levels.

Table 8: Level of Infrastructural Facilities

	ILARA		IDIROKO		OHUNBE		TOTAL	
Level of infrastructural provision	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Very inadequate	5	8.20	13	7.51	1	4.17	19	7.36
Inadequate	52	85.25	144	83.24	22	91.67	218	84.50
Not sure	2	3.28	6	3.47	1	4.17	9	3.49
Adequate	2	3.28	10	5.78	0	0.00	12	4.65
Total	**61**	**100**	**173**	**100**	**24**	**100**	**258**	**100**

The study examined the level of infrastructural provision in the study area having investigated means of water supply and electricity, drainage system, type of road networks, and health care facilities. The focus is to determine overall availability of infrastructural facilities in the study area. The result in Table 8 indicates that 84.50% of the research population is of the opinion that there is inadequate provision of infrastructural facilities in the study area. In fact, a sizeable 7.36% further argued that these facilities were very inadequate. 4.65% of the sampled respondent argued otherwise that there was adequate provision of infrastructural facilities while 3.49% were not sure about the level of infrastructural facilities provision in the study area. This result indicates that infrastructural facilities were highly inadequate in the study area.

Table 10: Provider of Infrastructural Facilities

	ILARA		IDIROKO		OHUNBE		TOTAL	
Provider of Infrastructural facilities	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**	**Freq.**	**(%)**
Government	44	74.58	126	75.00	16	66.67	186	74.10
NGOs	0	0.00	2	1.19	1	4.17	3	1.20
CDAs	13	22.03	30	17.86	5	20.83	48	19.12
Individual	2	3.39	10	5.95	2	8.33	14	5.58
Total	**59**	**100**	**168**	**100**	**24**	**100**	**251**	**100**

Lastly, the study investigated who provides infrastructural facilities given the fact that infrastructural facilities are poorly available in the area and where available they are inadequate. Previous findings in this research buttress this argument. The information revealed in Table 10 illustrates that almost 74.10% of infrastructural facilities in the study area were provided by the government followed by those provided by Community Development Associations (CDAs) which constituted 19.12%. The result also reveals that individuals contributed in providing infrastructural facilities and this constituted 5.58%. The remaining 1.20% of the facilities was provided by Non-Governmental Organisations (NGOs). The result indicates that majority of the infrastructural facilities were provided by the government but inadequate in relation with existing population and economic activities in border towns

Test of Relationship between Overall residential formation and Neighbourhood facilities

In this section, the study aimed at examining the relationship between type of dwelling building units, overall **residential formation** and neighbourhood facilities across three selected towns. The variable on overall **residential formation** and neighbourhood features was obtained through composite score on all buildings and neighbourhood features. This is done to obtain more triangulation of research findings about housing and neighbourhood facilities in the study area. The researcher employed polyserial correlation to assess this relationship. Polyserial correlation is a special case of Pearson's Product-Moment Correlation just like point-biserial correlation (Cox, 1974; Tate, 1955;

Pearson, 1909). The use of this technique informed by the ability of data on overall housing and neighbourhood features not to violate assumptions of normal distribution and equality of variance. The result is presented in Table 11.

Table 11: Correlation between Overall Housing and Neighbourhood facilities

			Dwelling Type	Overall Housing and Neighbourhood facilities
Polyserial rho	Dwelling Type	Correlation Coefficient	1.000	.015
		Sig. (2-tailed)	.	.017
		N	254	243
	Overall Housing and Neighbourhood facilities	Correlation Coefficient	.015	1.000
		Sig. (2-tailed)	.017	.
		N	243	249

****. Correlation is significant at the 0.05 level (2-tailed).**

The result presented in Table 11 indicates that the relationship between the dwelling building unit type and overall housing and neighborhood facilities was significant at 5% level of significance (p = 0.017) with correlation coefficient (r) of .015. This result suggests a weak but positive relationship between these two variables. From this finding, it can be inferred that an improved position of socioeconomic and cultural characteristics of residents have relationship with a little better choice of housing type in the Study Area.

Table 12: Overall Housing and Neighbourhood facilities (ANOVA)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.246	2	.623	1.477	.021
Within Groups	321.075	246	1.305		
Total	322.321	248			

Table 13: Multiple Comparisons
Dependent Variable: Overall Housing and Neighbourhood facilities
Tukey HSD

(I) Location Town	(J) Location Town	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Idiroko	Ilara	.11667	.17223	.777	-0.2895	.5228
	Ohunbe	**.14167****	.24959	**.037**	-0.7302	.4469
Ilara	Idiroko	-0.1167	.17223	.777	-0.5228	.2895
	Ohunbe	-0.2583	.27593	.618	-0.909	.3923
Ohunbe	Idiroko	**.14167****	.24959	**.037**	-0.4469	.7302
	Ilara	.25833	.27593	.618	-0.3923	0.909

** The mean difference is significant at the .05 level.

Comparison of Housing and Neighbourhood facilities of Residents across the Towns

The overall housing and neighbourhood facilities of the three selected towns investigated are reported in this section. The comparison was made possible with the use of One-way analysis of variance (ANOVA) having had the data satisfied normal distribution and equality of assumptions. The result in Table 11 indicates a one-way between-groups analysis of variance to explore the difference in overall housing and neighbourhood facilities among the three selected towns of the study. This multivariate analysis was conducted to investigate whether there is a significant difference in housing and neighbourhood facilities among the study area units. In addition, Table11 reveals where the difference emanated if actually present.

From table 12, it was discovered that there exists a statistically significant difference at the $p < .05$ level in overall housing and neighbourhood facilities for the three selected towns: $F (2, 246) = 1.477$, $p = .021$. Post-hoc comparisons using the Tukey HSD test in Table 13 shows that the mean score for Idi-Iroko ($M = 2.733$, $SD = 1.13$) was significantly different from Ohunbe ($M = 2.875$, $SD = 1.07$). Ilara town ($M = 2.616$, $SD = 1.19$) did not differ significantly from either Idi-Iroko or Ohunbe towns in terms of overall housing and neighbourhood facilities respectively. The implication of this finding is that both Idi-Iroko town and Ohunbe town differ significantly in terms of housing and neighbourhood facilities conditions. However, Ilara town is indifferent to either of the two towns in this aspect.

Conclusion and recommendations

The study access infrastructure availability and condition in three major towns located along Nigeria/ Benin republic. It was discovered that from the study 63.3% get water from borehole, 78.46% source power from IBEDC 20% from generator while the three towns under study Idiroko, Ilara and Ohunbe attest to it that there was irregular power supply with 77.42%, 81.03% and 87. 50% respectively. The most type toilet used in the study area is pit with 46.25% of the respondents while 55.25% indicate non availability of drainage from three towns. Plate 4-9 support the evidence of non-availability of drainage system while untarred roads have major percentage with 76.5% and government provided the available facilities with 74.10% of total respondents.

These are indications that the study areas lack behind in infrastructure provision and even the available ones were not well-maintained. Due to the peculiarity of the areas as border towns and entry points to the country, they present first impression of the image of the country to immigrants and tourists, hence, there should be presence of governance of local, state and federal governments by providing adequate and sufficient infrastructure in all the three towns and their environs in order to improve socioeconomic activities of the residents, and their wellbeing an act that would then shore up the image of the country and enable it to live up to its cherished name – giant of Africa. Also, there should be monitoring and maintenance of both existing and new provisions to increase their durability.

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