OSUN GEOGRAPHICAL REVIEW
Published by the Department of Geography, Osun State University, State of Osun, Nigeria
ISSN: 2695 - 1959 Volume 2, 2019; 52 – 63

QUALITY OF URBAN OPEN SPACES IN A SOUTHWESTERN NIGERIAN CITY

[1*]A. Ajayi and [2]D. Amole

[1] Department of Urban and Regional Planning Osun State University, Osogbo
[2]Department of Architecture Obafemi Awolowo University, Ile-Ife
Corresponding author's e-mail: ayodeji.ajayi@ uniosun.edu.ng

Abstract

Open spaces are multi-functional and beneficial in diverse ways to both residents and the general environment. However, most attention has been on formal open spaces, other typologies are commonly ignored especially in developing countries where different types of informal open spaces exist. This study examined the quality of open spaces in Osogbo, Osun State, Nigeria. Primary data were obtained through a multi-stage sampling technique. Three neighborhoods each were purposively selected from the high, medium and low-density areas. Typologies of open spaces were identified through direct observation. Geographic information systems were used to obtain information about features and quality of open spaces. Descriptive and inferential were used to analyse the data. The results showed that school playgrounds were the most common (63.6%); open spaces in the high-density areas had the best quality and overall, the neighbourhood park had the best quality. The results of chi-square analysis show differences in open space typologies within the residential densities were statistically significant (χ^2 = 244.832, df = 6, p<0 .001). Findings show that quality of open spaces differ by residential densities. The study recommends design interventions that consider the potentials of informal open spaces to improve the quality of urban residential neighborhoods.

Keywords: Built environment, Geographic Information Systems, Open space quality typologies, Urban neighborhoods.

Introduction

Open spaces are very important in the design and planning of residential environments. Open spaces play prominent roles in defining physical and environmental characters of residential neighbourhoods. Open spaces are generally considered as avenues through which people are able to interact with nature, recreate and socialise (Omoleke, 2012). Findings from literature review revealed that open space is inter-disciplinary in nature. An overview of these studies suggest that scholars have studied open spaces from physical sciences, managerial, economic, policy, health, socio-ecological and environmental-psychology perspectives (Cafuta, 2015; Wang, 2015; Vaughan et al., 2013; Elizalde, 2013; Bununu, 2012; Sutton, 2008).

This suggests that a universal meaning for this subject may be challenging. However, terminologies such as urban green spaces, green infrastructure, public open spaces, urban recreational spaces, green space network, neighbourhood open space and urban greening are used interchangeably in literature as urban open space.

The most commonly used term is open space. Kellett and Rofe (2009) defined open space as space within the urban environment which is readily available to the community regardless of its size, design or physical features and which is intended for, primarily, amenity or physical recreation, whether active or passive. This definition implies that urban or public open spaces can be put to different types of uses by residents at various planning scales. At the individual plots in residential areas, open spaces exit as

driveways, parking spaces, interior courtyards, household gardens, kitchen gardens and play spaces. Similarly, at the neighbourhood level open spaces exist as playgrounds, sport facilities, parks, incidental space, streetscape, communal spaces, driveways, courtyards, small private and public gardens. Open spaces at national scales can exit as national parks, stadia, game reserves and agriculture fields.

Stanley *et al.* (2012) posits that open spaces are not limited to residential areas alone but can also be found in other land uses in the urban fabric. Stanley et al., (2012) defined open space as any urban ground space, regardless of public accessibility, that is open or covered by an architectural structure. The urban environment can be broadly categorised into green and grey (non-green) space. Non-green open spaces are the paved surfaces of playgrounds, sport facilities, walkways, cycling routes, yards and hard-surfaced squares (Jurkovič, 2014; Thawaba, 2014).

Another term which sometimes refers to the open space but which emphasizes more on the green content is green space. Terms such as public green space, urban green space and green space network are used interchangeably in this context. It can also differ in ownership (public or private) size, accessibility (open to general public or restricted to certain categories) of users. Green space typically includes parks, both designed for formal and informal physical activities, playgrounds and nature reserves (Regional Public Health, 2010; Brodhead, 2009). According to the Greenspace Scotland (2008), green space refers to any vegetated land or water within or adjoining an urban area and includes natural green space, green corridors and amenity grassland, parks and gardens. It also includes outdoor sports facilities, playing fields, cemeteries and allotments and derelict, vacant and contaminated land.

While research on open spaces is growing, almost all existing studies are domiciled in developed cities of western countries. In view of the clear cultural and socio-economic differences, it is not certain if the findings of these studies are generalizable to other countries, especially developing countries (Chen et al., 2016; Green Health, 2014; Omoleke, 2012). This is especially necessary in low income countries like Nigeria, because the literature on open spaces is few and studies on open spaces in urban environments were defined and conceptualised in very limited ways (Sati et al., 2016; Simon, 2016; Sati et al., 2014). For example, these studies have limited their focus on parks, usually excluding other types of open spaces such as school playgrounds, gardens and incidental open spaces. Hence studies are needed to capture a variety of open spaces. Therefore, this research aims to provide contextual information on the types and attributes of neighbourhood open spaces in Osogbo in order to inform researchers, policy makers and built environment professionals.

Literature review

Typologies of Open Spaces

Findings from studies show that open spaces have been categorised as food production areas, parks, gardens, amenity space, incidental space, recreational space, plazas and streets (Stanley et al.,2012; Aziz, 2012; Schipperijn, 2010; Mell, 2010).

The external environment is made up of two main entities, green space and grey space. The green space may either be linear (occurred along transport routes such as roads, railways), semi-natural (wetlands, woodland), functional (allotments, churchyards, school grounds) or amenity (parks and gardens) (Adjei Mensah, 2014; Dunnett et al., 2002). The second component of the external environment, which is grey space covers land that to a greater extent is sealed, impermeable and has hard surfaces such as concrete, paving or tarmac. The grey space is of two types, functional grey space which provides a specific purpose such as roads, pavements, car parks and other hard surfaced areas related to different types of built development and civic grey space publicly accessible areas planned basically for public enjoyment such as town squares, plazas and esplanades (Urban Development Vienna, 2015; Adjei Mensah, 2014).

Parks and gardens are very common type of open spaces used in studies. Typically, classification schemas of parks are based upon the size, function, geographic location, target population and the types of facilities present and sometimes the degree of naturalness of the open space (Stanley et al., 2012; Byrne and Sipe, 2010; Coorey, 2007). Findings from studies show that open spaces are categorised as urban parks, nature parks, pocket parks, district parks, community parks and neighbourhood parks. For instance, pocket parks, also known as mini-park or vest-pocket parks, are urban open space at the very small scale usually no more than one-quarter of an acre. Functions can include small event space, play areas for children, spaces for relaxing or meeting friends, taking lunch breaks (Byrne and Sipe 2010). Amenity open space is another common typology. Spaces such as informal recreation spaces, children's

play areas, playing fields, communal green spaces within housing areas, domestic gardens, village greens, urban commons, other incidental space and green roofs are in this category (Shi, 2013; Elizalde, 2013). Because of the diverse and multifaceted nature of urban open space in literature, open space is defined in this study as all amenity or incidental space, playgrounds and parks at neighbourhood and residential scale regardless of its size, design or physical features and use.

Open Spaces Attributes

Broadly speaking, open spaces have physical and social attributes. Personal safety from fear of crime and anti-social behaviour concerns are examples of social issues relating to open spaces while conditions, facilities, amenities, size, accessibility and aesthetics of open spaces are examples of physical attributes that have been extensively studied (Chen et al., 2016; Vaughan et al., 2013; Brunnet et al., 2012). Preferences, attitudes, meanings and value of open space were examined either qualitatively or quantitatively. In some studies, respondents were asked for their level of agreement with attitudinal statements using quantitative methods while meaning and values of open spaces were explored via qualitative means (Jorgensen and Gobster, 2010).

McCormack et al. (2010) examined the characteristics of parks associated with park use. Results showed that attributes such as personal safety, aesthetics, amenities, maintenance and proximity are important for encouraging open space use. It also reported that perceptions of the social environment entwine inextricably with perceptions of the physical environment. Similarly, in a study carried out by Coorey (2007), social qualities such as interaction, privacy, safety and crowding were reported to be significant in a study of open spaces in high density zones of public housing estates in Hong Kong.

Other physical factors such as aesthetic preferences and visual perception of open spaces have been studied by scholars. The category of aesthetics incorporates the perceived attractiveness and appeal of the various design elements of an open space. A study shows that having something beautiful or interesting to look at while exercising or visiting an open space can be a powerful motivator for physical activity (Bedimo-Rung et al., 2005). Some other studies have suggested aesthetics of open space as the most important attribute that influence use. For instance, Sugiyama et al. (2010) posits that attractiveness of open space may be more important for physical activity than is size or number of open spaces alone. Thus, simply increasing the numbers of open spaces in neighbourhoods may not be effective in promoting residents' use, unless it has features that make them attractive.

Hidalgo et al., (2006) deconstructed aesthetics of open spaces into variables for in depth examination in two European cities. Vegetation, visual diversity, congruence, openness, luminosity, historical place, cleanliness, maintenance, place for leisure activities, meeting place, and novel place were used in two different cites of Malaga (Spain) and Padova (Italy) to examine aesthetics attributes of open spaces. In a qualitative review of the characteristics of open space associated with use and physical activity, presence of tress and hedges, flowers, grass, flowers, natural settings, water features, presence of distinctive smell in open spaces were attributed as aesthetic qualities (McCormack et al.,2010).

Features of open spaces can positively or negatively affect use. Features as conceptualised in most studies are made up of facilities and amenities. Facilities of an open space can be used for active and passive activities while amenities are the elements that support activities (Vaughan et al., 2013; McCormack et al., 2010; Bedimo-Rung et al., 2005). For example, Vaughan et al. (2013) explored the distribution of park availability, features, and quality across Kansas City, Missouri. Results showed that low-income neighbourhoods contained significantly more parks, but also had fewer parks with playgrounds and more quality concerns per park. It was also reported that high minority neighbourhoods had more parks with basketball courts, but fewer parks with trails, while medium-income neighbourhoods contained more aesthetic features per park (Vaughan et al.,2013).

Physical conditions and availability of facilities in open spaces are important issues that have been examined in literature. Findings from McCormack et al. (2010) submitted that poor conditions of features such as uneven playing surfaces, courts with cracks and poor quality footpaths might deter park use. While poor maintenance and condition in themselves can discourage park use, poor maintenance negatively affects aesthetics, perceptions of safety, functionality, and the overall perception of park quality as well. Unsafe or poorly maintained parks may discourage use even when they are located within easy walking distance of home.

Studies like Fermino et al. (2013), conducted in Curitiba, Brazil also reported that attributes such as presence of attractions, low traffic, trees and the neighbourhood environment were all associated with increased open spaces use. It stated further that aesthetics, traffic and crime safety attributes of neighbourhood open space encouraged use rather than any feature alone. Dunnett et al. (2002), asserts that the provision of dog litter bins, seating, litter bins, information centre/boards, children's play area, sports areas, provision of a café and toilets would particularly encourage infrequent users to use urban green spaces. Use of open spaces is not dependent on features alone but also the condition of the features. Users are more likely to use open space where features are maintained on regular basis and shun those places that are in disrepair (McCormack et al., 2010).

Methodology

Primary data were obtained through a multistage sampling technique. Preliminary investigation via Satellite Imagery from Google Earth (acquired in 2017) and reconnaissance survey revealed the major neighbourhoods in Osogbo. Examples are shown in Figure 1-3. The study of the physical attributes and imageries showed the existence of low, medium and high residential densities in the study area. The investigation from reconnaissance survey also revealed availability of open spaces such as incidental space, playgrounds as well as parks in the study area.

The sample frame comprises all residential zones identified from the preliminary survey of the study area. The first stage of sampling stratified the study area into high density/low quality residential area, medium density/ medium quality residential areas and low density/ high quality residential area was done based on dominant observed characteristics and updates on Adedotun (2016). This stratification was based on previous studies which asserted that open space attributes are better carried out on the basis of residential densities (Rollings et al. ,2015; Vaughan et al., 2013; Astell-Burt et al., 2013; Crawford et al., 2008; Croucher, 2007).

The second stage was the purposive selection of the density areas due the varieties of open spaces in existence these locations. From the high residential density area, Alekuwodo, Owoope/Sabo, and Ogooluwa neighbourhoods were purposively selected. In similar manner, Powerline, Oke-Onitea, and Igbonna were selected from medium density area and G.R.A., Oroki Estate and Oke-Ayepe were selected from the low density area respectively Direct observation schedule was used to examine physical attributes of only publicly accessible open spaces in the selected neighborhoods. information such as the specific locations, sizes of open spaces, types of open spaces, features, conditions, aesthetics elements and amenities were obtained. Frequency tables, cross tabulation, and analysis of variance were used to analyse the data.

Findings and discussion

Types of Open Spaces

Results from direct observation revealed 33 open spaces in the selected neighbourhoods. The open spaces were categorised into four major typologies as identified in literature (Shi, 2013; Elizalde, 2013; Stanley et al., 2012; Byrne and Sipe 2010; Obateru, 2009). The classification categories were school playgrounds, neighbourhood park, incidental open space and pocket parks (Figure 4).

School playgrounds were the most common open space typology observed in the city (63.6%), 27.3% of the open spaces were incidental in nature, while 3.0% was neighbourhood park while 6.1% were pocket parks. In the low-density area, 83% of open spaces were playgrounds of secondary and primary schools, while pocket parks accounted for 6.3%. The medium density area had equal numbers of playgrounds and incidental spaces, 50% for each type. Furthermore, 66.7%, 6.7%, 20% and 6.7% of open spaces in the high-density area were school playgrounds, neighbourhood park, incidental open space and pocket parks respectively. Further analysis reveal that incidental open spaces were only observed in high and medium density areas. Half of the entire proportion (50%) of open spaces in medium density were incidental, whereas incidental open space accounted for 20% of open spaces in high density neighbourhoods. In addition, neighbourhood and pocket parks were observed only in high and low densities. However, only the high-density area had all open space typologies.

The highest proportions of open spaces in high density area in this study substantiate earlier studies (Vaughan et al.2013; Lee et al, 2007). The results of chi-square analysis show differences in open space typologies within the residential densities were statistically significant ($\chi^2 = 244.832$, df = 6, $p<0.001$).

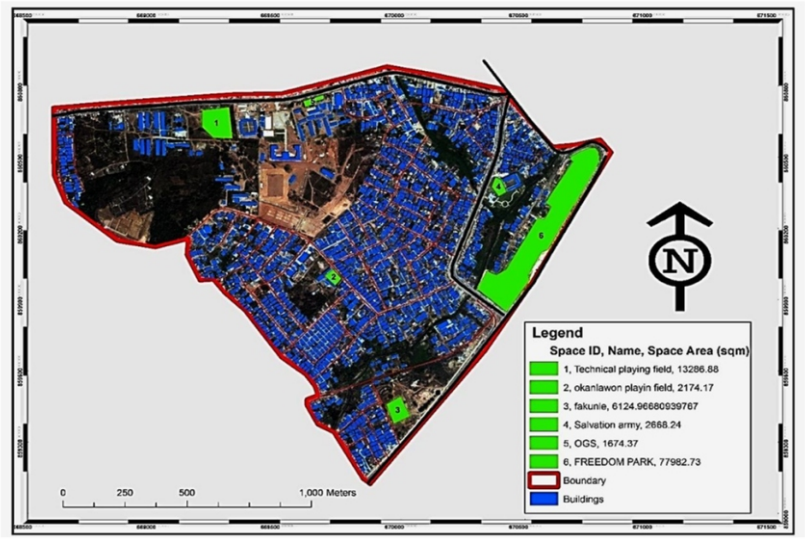

Figure 1: Names and sizes of open spaces in Alekuwodo (high density area)

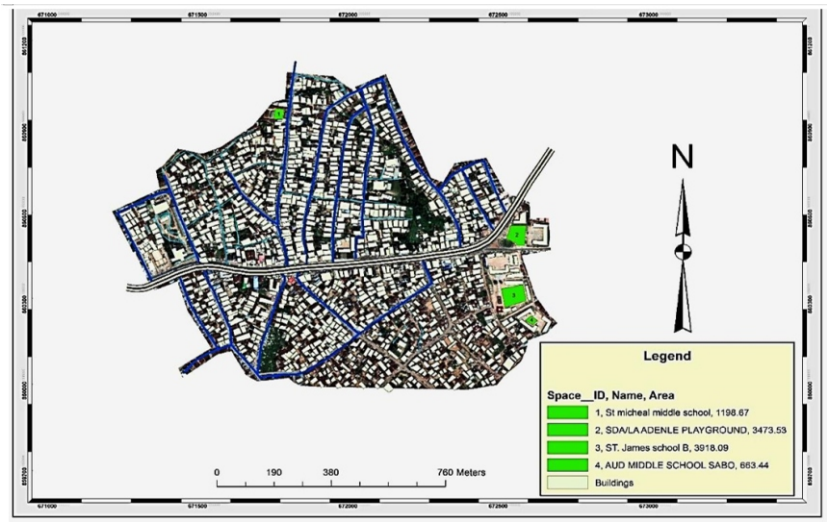

Figure 2: Names and sizes of open spaces in Ayetoro/Igbona (Medium density area)

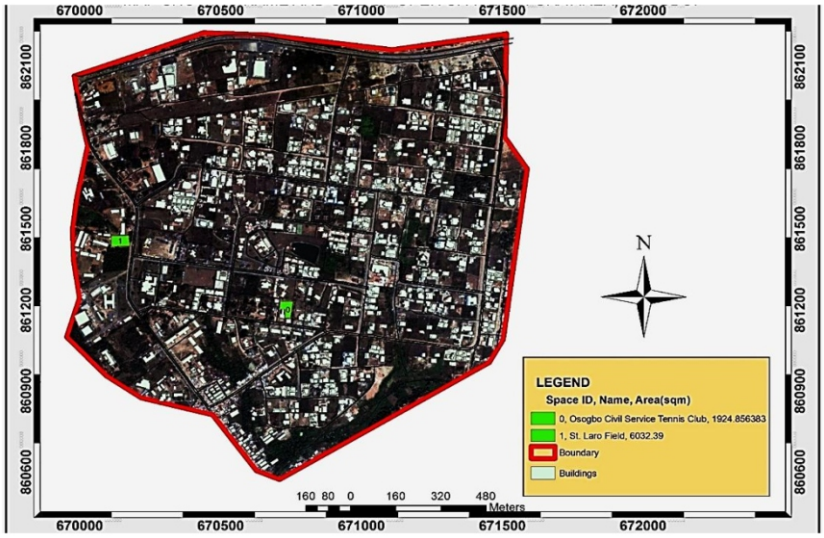

Figure 3: Names and size of open spaces in G.R.A. (Low density area)

The observed typologies of open spaces are indicative of major kinds of open spaces available in the city. For instance, playgrounds of secondary and primary schools are spatially distributed in varying dimensions across the residential densities in the city, this makes this type of open space readily available and most common in the study area. In terms of prevalence, ranking next to playgrounds were incidental open spaces, pocket and neighbourhood parks in that order. Table1 shows the distribution of open spaces in existence across the residential neighbourhoods in the study area.

Features of neighbourhood open spaces

Features as conceptualised in this study are facilities and amenities in neighbourhood open spaces. Facilities of an open space can be used for active and passive activities while amenities are the elements that support activities. Amenities are car parks, toilets, benches, picnic table, shaded places for sitting, things to play or relax with, rain and sun-shading cover, auxiliary seats such as flower bed edges, stone pillars, and sculptures, snack bar and trash can. Direct observations were used to evaluate the attributes of neighbourhood open spaces.

Sizes and locations of neighbourhood open spaces

With the aid of ArcGIS, sizes of the identified open spaces were measured. From the results presented in Table 2 it was revealed that the smallest, largest and mean sizes (m^2) of open spaces in the city were 79 m^2, 77,982 m^2 and 7,253 m^2 respectively.

In the high-density area, sizes of open spaces ranged from the smallest (79m^2) to the largest (77,982m^2) while the mean was 8,212.15m^2. The range in the sizes of open spaces in the medium density areas were 425 m^2 (smallest), 21,253 m^2 (largest) and 6,336.26 m^2 (mean). Similarly, 545 m^2, 21,247 m^2 and 66, 88.87 m^2 were the respective smallest, largest and mean sizes of open spaces in the low density area. This result suggests that the mean size of open spaces in high density area is largest, this may be influenced by the presence of neighbourhood park which is the largest in the city. Further analysis of open spaces typologies sizes by residential densities are presented in Table 3.

Results show that only one neighbourhood park (77,982m^2) exits. This was followed by playgrounds (7,395.70 m^2), pocket parks (2,296.55 m^2) and incidental spaces (2,144 $m^{2)}$ in terms of their respective mean sizes. School playgrounds were the most common type of open spaces in the city. Findings show that the respective mean sizes of school playgrounds in the high, medium and low density areas were 3,459.82 m^2, 11,088.8 m^2 and 7,638.47 m^2 respectively.

Figure 4: Types of open spaces in the selected neighbourhoods

Table 1: Typologies of open spaces identified in Osogbo.

Open Space Typology	Residential Density			
	High	Medium	Low	Total
School Playgrounds	10(66.7%)	6(50.0%)	5(83.3%)	21(63.6%)
Neighbourhood Park	1(6.7%)	0(0.0%)	0(0.0%)	1(3.0%)
Incidental Open Spaces	3(20.0%)	6(50.0%)	0(0.0%)	9(27.3%)
Pocket Parks	1(6.7%)	0(0.0%)	1(16.7%)	2(6.1%)
Total	15(100.0%)	12(100.0%)	6(100.0%)	33(100.0%)

Table 2: Sizes of open spaces

Features	Residential Density			
	High	Medium	Low	Total
Number of Open Space	15	12	6	33
Area of smallest open space (Square Meters)	79	424	545	79
Area of largest open space (Square Meters)	77,982	21,253	21,247	77,982
Mean Area (Square Meters)	8,212.15	6,336.26	6,688.87	7,253.05
Standard Deviation (Square Meters)	19,576.331	7,151.580	7,953.793	13,997.726

Table 3: Types and Sizes of open spaces across residential densities

Residential Density	Type of Open Space							
	School Playground		Neighbourhood Park		Incidental		Pocket Park	
	No of Open Space	Mean Size	Number	Mean Size	Number	Mean Size	Number	Mean Size
High	10	3,459.82	1	77,982.73	3	3,003	1	2,668.24
Medium	6	11,088.8	0	0	6	1,284.2	0	0
Low	5	7,638.47	0	0	0	0	1	1,924.86
Total	21	7,395.70	**1**	77,982.73	9	2,144	2	2,296.55

Amenities in neighbourhood open spaces

The results of direct observation of open space features were categorised into two and they are presented in Tables 4 and 5. The first are features that could be counted and the second category measured the presence or absence of open space features. Presented in Table 4, is the summary of the quantities of regular seats, such as seats and benches, improvised seats that could be sat on, such as flower bed, dustbins and trash cans, and all kinds of sculptures used for decoration found in the open spaces.

It was revealed that 13(39.4%) out of the 33 open spaces in the city had regular seats. Only 38.1% of school playgrounds, 22.2% of incidental spaces had regular seats whereas, all the pocket parks and the neighbourhood park had regular seats. Furthermore, the highest number of regular seats was observed in school playgrounds (350) while incidental spaces had the least (5). The high number of regular seats observed in school playgrounds may be connected to the fact that some school playgrounds, had permanent seating areas. The ANOVA results of the numbers of regular seats in open spaces show a non-statistically significant variation in the distribution across the typologies (F= .254, p=.857). This also confirms that most open spaces did not have seats and the number of seats were significantly higher in school playgrounds. On the other hand, overall

results show that improvised or temporary seats were common in most of the open spaces. Results similarly show that 93.9% open spaces had temporary seats while only 6.1% open spaces in the city did not have, this suggests that residents improvised on the inadequate provision of seats in most of the open spaces.

In addition, it was observed that most of the open spaces (57.6%) in the city had dustbins or trash cans, with the highest number recorded in the neighbourhood park. Findings also reveal that most of the school playgrounds (71.4%) had trash cans while only 11.1% of incidental spaces had trash cans. In terms of decoration, 24.2% of the observed open spaces in the city were decorated with sculptures. The results of the Analysis of Variance show a non-statistically significant variation in the distribution of sculptures across the typologies (F=. 5.524, p=.066).

Table 4: Quantities of neighbourhood open spaces attributes

Open Space features	Count	Typology				
		School Playgrounds	Neighbourhood Park	Incidental Spaces	Pocket Parks	Total
Seats and benches	Number of **open spaces**	**8(38.1%)**	**1(100%)**	**2(22.2%)**	**2(100%)**	**13(39.4%)***
	Average no of seats	75.5	100	3.5	49.5	62.3
	Std. Deviation	129.6	-	2.121	36.0	103.6
	Minimum number of seats	1	100	2	24	1
	Maximum number of seats	350	100	5	75	350
Improvised seats	Number of open spaces	20(95.2%)	**1(**100.0%)	8(88.9%)	2(100.0%)	31(93.9%)*
	Average no of seats	13.3	50	9.1	12.5	13.3
	Std. Deviation	7.7	-	4.2	10.6	9.7
	Minimum number of seats	5	50	3	5	3
	Maximum number of seats	35	50	14	20	50
Dustbins and trash cans	Number of open spaces	15(71.4%)	1(100.0%)	1(11.1%)	2(100.0%)	19(57.6%)*
	Average no of trash cans	3.7	10	2	6	4.21
	Std. Deviation	1.4	-	-	1.4	2.1
	Minimum number of features	2	10	5	2	2
	Maximum number of features	7	10	2	7	10
All kinds of sculptures used for decoration	Number of open spaces	4(19.0%)	1(100.0%)	2(22.2%)	1(50.0%)	8(24.2%)*
	Average no of **sculptures**	3.6	8.	2	2	3.0
	Std. Deviation	1.2	-	1.4		2.2
	Minimum number of sculptures	1	8	2	1	1
	Maximum number of sculptures	4	8	3	2	8

Note: * Number of open spaces where attributes were found.

The patterns of distribution also reflected the concentration of decorations in the neighbourhood park. This was followed by pockets parks (50%), incidental spaces (22.2%) and school playgrounds (19%).

The presence of outdoor lights, parking spaces (formal and informal), public toilet, snack bars, water bodies, trees and flowers were observed and the results are shown in Table 5.

The overall results show that most of the open spaces (69.7%) did not have outdoor lights while only 30.3% of open spaces had outdoor lights. It was further revealed that outdoor lights were present in the neighbourhood park and 50% of pocket parks. None of the incidental open spaces had outdoor light whereas it was observed in 38.1% of the school playgrounds. This result may affect the time spent in utilisation of open spaces owing to safety and security concerns at night. Residents are likely to avoid the open spaces as the sun sets when natural lighting recedes.

Findings show that 84.8% of the open spaces had one form of parking spaces (both formal and informal) while 15.2% of the observed open spaces had no parking facility. This indicates that most of the open spaces have motorised access, which may influence the utilisation of the spaces by users across the socio-economic groups. In addition, most of the spaces (63.6%) had public toilets, although majority were not in good and hygienic conditions. The distribution of open space without toilets in the study area revealed that 23.8% and 77.8% of the school

Table 5.: Presence of neighbourhood open space attributes

Open Space attributes	open space	Typology				Total
		School Playgrounds	Neighborhood Park	Incidental Open Spaces	Pocket Parks	
Outdoor lights	Yes	8(38.1%)	1(100.0%)	0(0.0%)	1(50.0%)	10(30.3%)
	No	13(61.9%)	0(0.0%)	9(100.0%)	1(50.0%)	23(69.7%)
	Total	21(100.0%)	1(100.0%)	9(100.0%)	2(100.0%)	33(100.0%)
Parking spaces (formal and informal)	Yes	18(85.7%)	1(100.0%)	7(77.8%)	2(100.0%)	28(84.8%)
	No	3(14.3%)	0(0.0%)	2(22.2%)	0(0.0%)	5(15.2%)
	Total	21(100.0%)	1(100.0%)	9(100.0%)	2(100.0%)	33(100.0%)
Public toilet	Yes	16(76.2%)	1(100.0%)	2(22.2%)	2(100.0%)	21(63.6%)
	No	5(23.8%)	0(0.0%)	7(77.8%)	0(0.0%)	12(36.4%)
	Total	21(100.0%)	1(100.0%)	9(100.0%)	2(100.0%)	33(100.0%)
Snack bars	Yes	3(14.3%)	1(100.0%)	1(11.1%)	1(50.0%)	6(18.2%)
	No	18(85.7%)	0(0.0%)	8(88.9%)	1(50.0%)	27(81.8%)
	Total	21(100.0%)	1(100.0%)	9(100.0%)	2(100.0%)	33(100.0%)
Fountains,	Yes	0(0.0%)	1(100.0%)	0(0.0%)	0(0.0%)	1(3.0%)
	No	21(100.0%)	0(0.0%)	9(100.0%)	2(100.0%)	32(97.0%)
	Total	21(100.0%)	1(100.0%)	9(100.0%)	2(100.0%)	33(100.0%)
Lakes and streams	Yes	1(4.8%)	1(100.0%)	0(0.0%)	1(50.0%)	3(9.1%)
	No	20(95.2%)	0(0.0%)	9(100.0%)	1(50.0%)	30(90.9%)
	Total	21(100.0%)	1(100.0%)	9(100.0%)	2(100.0%)	33(100.0%)
Trees and flowers	Yes	12(57.1%)	1(100.0%)	3(33.3%)	2(100.0%)	18(54.5%
	No	9(42.9%)	0(0.0%)	6(66.7%)	0(0.0%)	15(45.5%)
	Total	21(100.0%)	1(100.0%)	9(100.0%)	2(100.0%)	33(100.0%)

playgrounds and incidental spaces had no toilets. Results also show that 54.5% of open spaces had some amount of greenery (trees and flowers) while 45.5% do not. It was further observed that 42.9% and 66.7% of school playgrounds and incidental spaces did not have greenery.

Conclusion and recommendations

The results show that neighbourhood open spaces in high density had the best amenities and facilities. This observed high quality of open space attributes in high density area is at variance with Vaughan et al. (2013), which submits that high density neighbourhoods had the least quality open spaces. These findings might be explained by the scale of urban renewal projects of the Osun State Government. The high-density area of the city benefitted immensely from the programmes with the creation of Nelson Mandela Freedom Park (Neighbourhood Park), Salvation Army Park (pocket park) and the renovations of schools and their playgrounds.

These interventions have changed the physical configurations and outlooks of high-density neighbourhoods from the hitherto blighted scenarios usually attributable to high density. Meanwhile most open spaces in the medium and low-density areas are playgrounds of privately-owned schools and incidental spaces. Similarly, the neighbourhood park had the best attributes. This was followed by pocket parks, school playgrounds and incidental open spaces. The results show that school playgrounds were the most common neighbourhood open space. Therefore, the potentials of playgrounds should be fully maximized by architects. Conscious design programmes that will transform playgrounds facilities to an aesthetically appealing multi-use spaces which could attract all categories of residents in the neighbourhood should be made. Facilities and amenities that will attract and encourage all user groups should be provided in open spaces. In addition, the untapped natural sites such as derelict quarried land, steep slopes, rock outcrops, flood plains and wetlands in the city can be conserved and developed by private and government agencies to standard parks and playgrounds. Furthermore, surface water bodies and water fronts are prominent features in the study area. They have the potentials of attracting residents of different ages and social classes if they are developed into linear parks along the water bodies.

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APPENDIX

Sizes of different types of open spaces across residential densities

	Name of Open Space	Size(M^2)	Typology	Density
1.	Okanlawon Playing Field, Alekuwodo Area	2,174.17	School Playground	High
2.	Fakunle Playing Field, Alekuwodo Area	6,124.97	School Playground	High
3.	Salvation Army	2,668.24	Pocket Park	High
4.	Technical Playing Field, Alekuwodo Area	13,286.88	School Playground	High
5.	Osogbo Grammar School,	1,674.37	School Playground	High
6.	Freedom Park, Alekuwodo Area	77,982.73	Neighbourhood Park	High
7.	Open Field besides L.A Adenle,Igbonna	2,314.76	Incidental	High
8.	Saint James High School, Owoope	3,918.09	School Playground	High
9.	Playing Field beside Celestial church, Owoope	4,382	Incidental	High
10.	AUD Playing Field,Owoope	4,728.25	School Playground	High
11.	Idowu Estate Field, Ogooluwa Area	2,312	Incidental	High
12.	ADEKID Playing Field, Ogooluwa Area	78.5	Playground	High
13.	Adedayo Kareem Playing Field, Ogooluwa Area	1632	School Playground	High
14.	FOMWAN Playing Field, Ogooluwa Area	632	School Playground	High
15.	GOF Playing Field, Ogooluwa Area	349	School Playground	High
16.	St Marks Ayetoro	18,867.89	School Playground	Medium
17.	St Michael Middle School,Ayetoro	1,198.67	School Playground	Medium
18.	Unity High School, Power line area	21,253.88	School Playground	Medium
19.	Mobinu Football Pitch, Power line area	424.51	Incidental	Medium
20.	Steel Rolling Football Pitch, Power line area	9,705.91	School Playground	Medium
21.	Nomadic School Football Pitch, Power line area	8,568.88	School Playground	Medium
22.	Open Space Beside Aroma of God, Oke-Onitea Area	2,894.13	Incidental	Medium
23.	El-Shaddai Playing Field, Oke-Onitea Area	1,837.92	Incidental	Medium
24.	Open Space Beside Grace Bible Mission Field, Oke-Onitea Area	1,298.44	Incidental	Medium
25.	Iya Elewa Playing Ground, Oke-Onitea Area	736.4	Incidental	Medium
26.	St. Leo Playing Field, Oke-Onitea Area	6,938.02	Playground	Medium
27.	Open Space Beside Excellent Group of School, Oke-Onitea Area	514	Incidental	Medium
28.	St. Charles Playing Field, Oke-Ayepe Area	21,247.24	School Playground	Low
29.	Ifeoluwa Playing Field, Oke-Ayepe Area	9,609.71	School Playground	Low
30.	Osogbo Civil Service Tennis Club, G.R.A Area	1,924.86	Pocket Park	Low
31.	Laro Middle High School, G.R.A Area	6,032.39	Playground	Low
32.	First Foundation Field, Oroki Estate	545	School Playground	Low
33.	St Andrews Field, Oroki Estate	758	School Playground	Low