

Original Research Paper

Assessment of Parks Distribution and Accessibility in Ibadan Metropolitan City

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This work examines equitable distribution and residents' accessibility to urban parks in Ibadan metropolis. The study is situated in the growing field of urban green equity drawing on the theories of environmental justice which posit that environmental facilities are not equally distributed and accessible. The primary data used was obtained through multistage sampling techniques. From eleven Local Government areas of the city, five core local governments were zoned into West, North and East. Google Earth was then used to systematically select park locations across the LGAs; and (231) copies of questionnaire were administered on the 10th house-head which is (10%) of the total number of households in selected streets. Both physical and non-physical factors were examined by multiple linear regressions. The work reveals inadequate, uneven distribution and poor access to parks in Ibadan city, classified the factors affecting parks accessibility as spatial and personal-social that includes but not limited to socio-economic, city's land use, neighbourhood spatial configuration. Provision of adequate and equitable distribution of parks, sustainable enforcement of eco-friendly master plans and building designs, improved master plans compliance as well as environmental education were recommended. The work will be of immense to urban designers/planners, researchers, and general public.

Keywords: Adequacy, Accessibility, Parks, Ibadan, regression and GPS

INTRODUCTION

Inequitable or denied access of urban residents to parks portends untoward on their health status as well as social interactions and lives. These urban green resources are needed in cities (Layton & Latham, 2022); and are of diverse benefits to humanity and environment (Liu *et al.*, 2022; Xiao, Wang & Fang, 2019). Consequently, studies have recorded the role of parks in supporting healthy living, enhance city aesthetic values, performs ecological roles, provide space for social interactions (Du, He, Liu & Xing, 2022; Xie, An, Zheng, & Li, 2018; Velzen & Helbich, 2023). Thus, there is need for city planners to provide sufficient and equitable parks in urban places. However, despite these mounting benefits, park sites are not evenly accessible and appropriately distributed across the strata of urban communities resulting in environmental injustice for park users.

Interestingly, the field of urban planning is saturated with scholarly deliberations on the importance of green infrastructure within environmental or green justice studies more so in the context of urban green equity. Environmental justice scholars have since recognized that the supplies of social amenities are not equitably distributed in urban places (Jennings, Johnson-

Gaither, & Gragg, 2012; Shao, Liu, & Tian, 2021). Environmental justice therefore means equal access to urban park spaces for all (Xiao, *et al.*, 2019). Thus, it provides ideal social services for everyone irrespective of socio-status inclinations of race, income, education, and economic status of dwelling locations.

Several studies on environmental justice had been carried out in different countries of the world with the findings almost similar in those places: for example, in China (Liu, *et al.*, 2022; Zhang & Zhou 2018; Xie, An, Zheng, & Li, 2018), in the USA (Xiao, Lee & Larson, 2021), also in Australia (Wang, Brown, & Liu, 2015). Specifically, Shen, Sun, and Che (2017) examined the influence of green spaces on users' well-being; the result informed the existence of spatial differences when accessing recreational park spaces in Shanghai China.

Despite the global recognition of the theme, there appears to be scarce literature or little research on the study of environmental justice and equity in the Africa context, especially in Nigeria. Although few local studies existed on the parks and gardens in Ibadan but they either concentrated on a particular park or garden and the five local government areas that forms

the core metropolis of Ibadan or a local government/location. For example, Agodi park and garden was studied by a number of researchers (see Arowosafe & Ajayi, 2018; Ugege & Ajewole, 2019; Operinde & Emma-Egoro, 2020); further, researchers likewise focused on University of Ibadan (UI) zoo and gardens (Agbaogun & Saka, 2021; Adefalu, Aderinoye-Abdulwahab, Olabanji, & Tijani, 2014).

Besides, past researches have so much concentrated on influencing variables like demographic information (e.g. age, gender, ethnicity, race, annual income) and community socioeconomic status (SES), park distance, quality, travel time, gate fee (Gobster, 2002; Weber & Sultana, 2013; Xiao, Manning, et al., 2018), which are still relevant to this research. Nevertheless, this study additionally looks into other seemingly unexplored factors like city landuse/allocation, neighbourhood spatial configuration and residents' park-use awareness. Thus the focus of this empirical study is to investigate the unequal distribution of parks green spaces (PGS) in Ibadan metropolis; and the specific study objectives are: 1) to chart out the current location of parks and gardens in the study area, 2) to identify and examine the factors that are responsible for inadequate provision of park sites in the study area 3) and to propose the way forward on the balance distribution of the urban parks and gardens.

LITERATURE REVIEW

The Concept of Environmental (Green) Justice

Du et al., (2022) noted that the goal of environmental justice is "equity and justice in park usage and distribution". This theory is about efficient, elegant and equitable service delivery in urban settings (Wang et al. 2015) to support the increasing recreation and therapeutic demands of urban dwellers. At the centre of the supply block are the park green spaces (PGSs) serving various benefits (Brown, Schebella, & Weber, 2014). The addition of parks therefore not only interjects seeming tendencies of overcrowding cities with physical development but also creates both fauna and flora-induced scenic beauty; this interjection actually prevents crowdedness from high housing density per given area.

Every egalitarian society is expected to give everyone adequate and equal rights to urban social services (Sen, 2011). Urban infrastructure such as green spaces should be available for recreation without discrimination. As nice as this assertion sounds it is not always so in reality; the obvious certainty is that human settlements are not evenly provided with park services accessibility. Hughey et al. (2016) study revealed that the spatial provision of public parks occurs mainly in minority neighborhoods; the parks investigated are equally found to be of poor quality. Likewise, Xiao, et al. (2019) noted in their work impossibilities of uniformly spreading green space within the city. Further, Gobster (2002) compared travel distances covered by white and ethnic minority park users and found that the former had easier access than the latter who travelled far distances to access parks.

Investigating urban green justice is usually carried out at equality levels of social and spatial equities (Du, et al., 2022), and also at local, district, and regional scale dimensions that are measured using accessibility index and/or supply-demand ratio of per capita green space (Liu, et al., 2022). Whereas the spatial equity level deals with land resource allocations and utilizations, the social equity therefore focuses on the supply of green services among diverse social groups (Dai, 2011; Wolch, Byrne

& Newell 2014). This study combines both strategies - spatial and social equities – to understand the disparities involved in the demand and supply of urban green park sites and will be carried out at neighbourhood scale dimension. According to Liu et al. (2022) this is a multi-dimensional approach technique.

Accessibility and Other Factors Influencing Urban Green Injustice and Inequity

Extant studies have shown the close affinity between the concepts of environmental justice and accessibility (e.g. Hughey et al., 2016; Lucas, van Wee, & Maat, 2016; Wang et al., 2015). Park accessibility has been reported as having a significant influence on park use (Wang et al., 2015). Accessibility is seen as a multidimensional construct conveying different meanings in different situations of application and use; and not just in terms of transport to parks (Xiao, Manning, et al., 2018) but as in equal availability of green spaces for use in the city (Liu et al., 2022). Consequently, accessibility according to Wang, et al. (2015) means how convenient a park site may be reached and same time aids the preference for the use of nearby parks and gardens. Further, Du, et al., (2022) referred to accessibility as the spatial dissimilarities in the provision of urban green spaces.

There are empirical evidences from various researches on the objective or perceived spatial access to parks for communities with different socio-economic statuses (SES) (Zhang et al., 2021; Wang et al., 2015; Zhang & Zhou, 2018). For example, in Brisbane, Australia Wang et al. (2015) examined two neighbourhoods of varied Social-Economic Status (SES) – higher and lower SES. The result shows low park accessibility in neighbourhood with lower SES.

Additionally, built environment factors are as well been found to influence park accessibility and provisional equity. Such factors have been described in literature including community size, distance of urban parks or proximity to parks, the percentage of tree coverage, road network density, road intersections, are examined and presented by scholars (Ayala-Azcarraga, Diaz & Zambrano, 2019; Zhang et al., 2020).

Besides neighbourhood SES and built environment variables, few other physical factors have been found to affect people's park access and by extension park use. Among these parameters are walking experiences, acreage and number of parks, park quality, individual/family socio-economic status and demographic characteristics, ethnicity or racial compositions (Du, et al., 2022; Wang et al. 2015; Xiao, et al., 2021). Xiao, et al. (2021) argued that visitors to U.S. national parks are mainly whites; meanwhile, low-income groups avoid the national recreation facilities. Likewise, Liu et al., (2022) observed social class discrimination in park access reporting that aged individuals and low-income earners are disadvantaged by an inadequate supply of park sites. All these indicators are diversely involved in environmental justice studies in urban centers of different countries (Rigolon, 2017).

Another contributing factor to urban environmental infrastructural injustice is the nonconsideration of parks as a priority in city planning. Indeed, Liu et al., (2022) claimed that strict planning rules and high priority are given to park creations in China. However, in Nigeria and some other African locations priority is mainly given to physical structures and building developments. Although distortions of urban master plans do regularly occur where spaces allocated for greenery are misappropriated for other purposes.

With the unstable national economy, uninterested political will-power to create social infrastructure, and the complete lack of citizens education on the need for and use of recreational amenities, the problem of the unequal distribution of public social assets is common (Xiao, et al., 2021). For the case in point, unequal distribution of parks and other green infrastructure is evident in some parts of the Western world too (Du, et al., 2021 Liu et al., 2022; Zhang, et al., 2021). The African continent is not exempted from this social menace resulting in mental health problems and social fragmentation.

STUDY AREA

The study was executed at Ibadan city; as a state capital in South-West Nigeria. Ibadan is a typical mega city and the most populated city in Oyo state. Its boundaries lie within latitude 7° 2' N - 7° 44' N and longitudes 3° 30' E - 4° 9' E with 11 local government areas (LGAs) out of which 5 LGAs are core urban

centre and the remaining 6 LGAs form semi-urban areas (Olokeogun, Oladoye, & Aderounmu, 2020).

The core urban areas are more densely developed with buildings and structures; and thus with fewer parks and gardens in comparison with semi-urban areas. Figure 1 shows a map of the study area: Ibadan urban core comprising the 5 LGAs of Ibadan North, Ibadan North-West, Ibadan South-West, Ibadan Central and Ibadan South-East; and also Akinyele, Egbeda, Ido, Lagelu, Ona Ara, and Oluyole that form the other 6 semi-urban LGAs (Ugege & Ajewole 2019). The parks and gardens which are the objects of this study are located in the LGAs (figure 2). The population of Ibadan today as projected from the 2006 census is 4,004000 with a built-up area of 400km². Such population, the city to full of busy, stressful, hustle and bustle nature of urban centres, there is therefore need for places of relaxation, for rejuvenation and wellness which urban parks and gardens provide. For this study, we selected therefore parks and gardens in the 11 local government areas of the city.

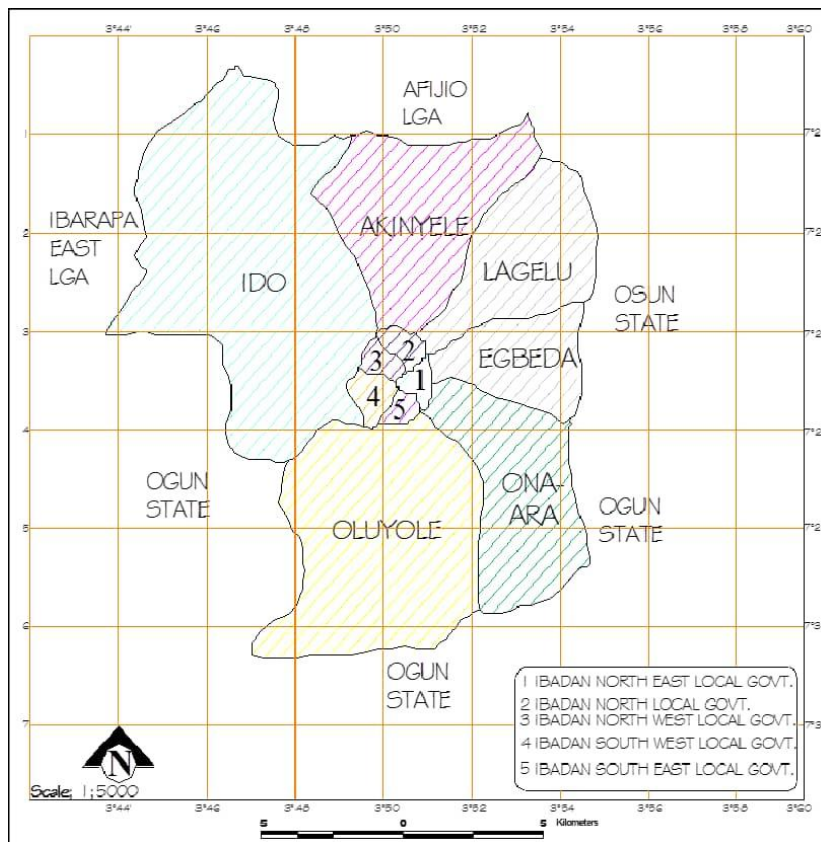


Figure 1: Map of the 11 LGAs of Ibadan.
Source: Authors' fieldwork (2023)

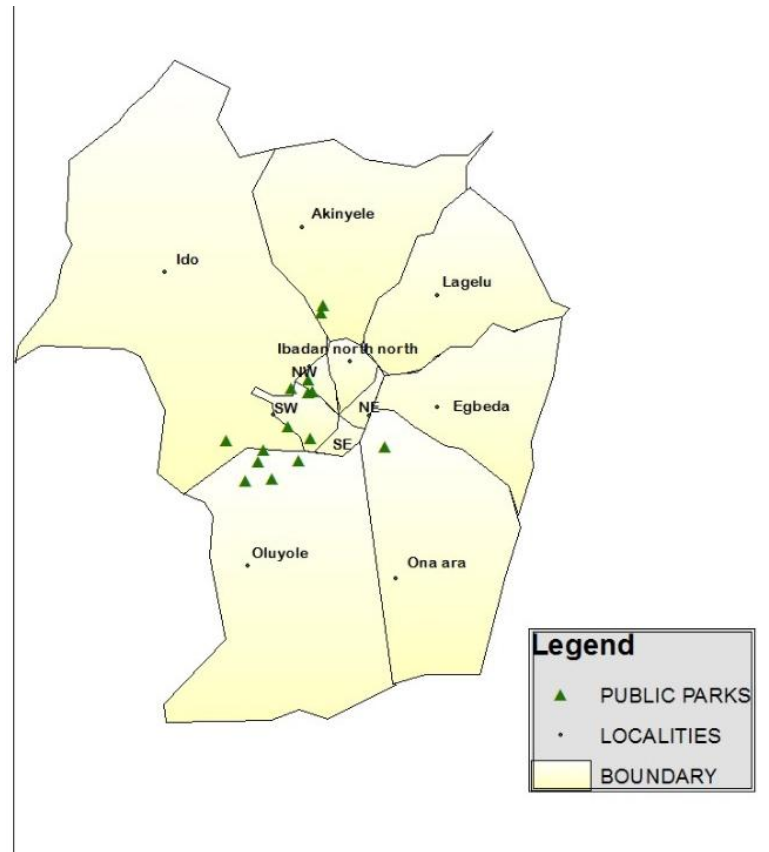


Figure 2: Sum parks and distribution across the 11 LGAs in Ibadan city.
Source: Authors' fieldwork (2024)

METHOD AND MATERIALS

Primary and secondary data obtained were analyzed using frequency and percentage distributions. Multistage sampling technique was employed: stratification of the residential area into three zones; (the West, East and North), systematic selection of six political wards, streets and houses for administration of copies of structured questionnaire across the stratified residential zones in the city.

The primary data was collected with the use of Google Earth's satellite image (for park location chatting). 231 copies of questionnaires were administered to the 10th household which represents 10% of households in the selected streets. The copies of the structured questionnaire were divided into two sections; first section captured the socio-demographic information of the respondents, and the second section dealt with the questions on the likely factors that may account for the uneven distribution of urban parks of green recreation places in Ibadan city. Questionnaire survey data collected for the study were analyzed using Descriptive statistics like frequency distribution to examine the respondents' demographic characteristics. Likert scale was used to examine respondent

perception on the factors that influenced park distribution and access. Journals, periodicals and conference materials were the sources of the secondary data used in this study. Ibadan city was chosen for this study purposefully because of its size, population density, commercial and administrative relevance.

RESULTS AND DISCUSSIONS

Spatial distribution of parks and gardens.

Geospatial analysis of the Google Earth map of the study area was considered to extract information on the available distributions and accessibility of parks in the 11 Local government areas of the city; with accessibilities rated as 'Good, Weak, Poor, or Nil' and distributions rated as 'Even, Uneven or Nil' (refer to Table 2).

In line with objective one of this research work the geospatial analysis of the Google Earth map was carried out. Based on Figure 2, it was observed that the current access to the parks and gardens are shared among Ibadan South-West, Ibadan North-West, Oluyole, Ido, Akinyele and Ona-Ara LGAs. Other LGAs (Ibadan North, Ibadan South-East, Ibadan North-East, Lagelu, and Egbeda) are deprived of access to the green public

relaxation spaces necessary for improved health and well-being. However, observation revealed that accesses to green spaces in the 6 LGAs are not evenly distributed. This finding agrees with the study by Popoola, et al., (2016) which concluded that two out of five core local government areas of Ibadan possess planned and organized public parks and gardens. However, outside the core area, Oluyole LGA has a fair number of parks located within its boundaries. With this result, it shows that of all the 11 LGAs, two have fair; next four have weak access and the remaining five have no access to green spaces. In addition, it was observed that there is an uneven distribution of access in all the 6 LGAs with green spaces (see Fig. 2 and Table 1)

Table 2 indicates that Government Agencies are the major providers of parks as 57.6% of the total responses followed by Communities with 13.8%, Private Bodies 15.7% and Individuals/Groups 12.9

Factors responsible for perceived uneven access to parks and gardens.

The respondents rated accessibility to parks on a 5-point Likert scale {(1) = not adequate at all, (2) = not adequate, (3) = neutral, (4) = adequate and (5) = very adequate}.

The average means were computed to determine the relative effectiveness of indexes. Standard Deviations (SD) for each of the mean, relative adequacy indexes as well as the overall standard deviation for each of the zones and the Coefficient of Variations (CVs) were computed. Variables with the real value of the mean Relative Adequacy Index (RAI) indicated moderate accessibility; those with high standard deviations had high accessibility while those with low standard deviations indicated low accessibility.

Table 1: Sample and Sampling Techniques

Residential zone	Local Government Areas	Selected Wards	Selected Streets	Quest. Dist	Quest. Retrieved.
Ibadan West	Oluyole, Ibadan S/West, Ido	09	12	76	65
Ibadan East	Ona-Ara, Egbeda, Ibadan N/E & Ibadan S/E	12	16	87	81
Ibadan North	Akinyele, Ibadan N/N and Lagelu	09	12	68	66
Total 3	11	30	40	231	212

Source: Authors' Fieldwork (2024)

Table 2: Table of parks and gardens accessibility and distributions in 11 LGAs of Ibadan

S/n	Local Govt. Areas	Accessibility	Distribution
1	Ibadan North	Nil	Nil
2	Ibadan South-West	Weak	Uneven
3	Ibadan South-East	Nil	Nil
4	Ibadan North-West	Poor	Uneven
5	Ibadan North-East	Nil	Nil
6	Egbeda	Nil	Nil
7	Oluyole	Weak	Uneven
8	Ona-Ara	Poor	Uneven
9	Ido	Poor	Uneven
10	Akinyele	Poor	Uneven
11	Lagelu	Nil	Nil

Source: Authors' Field work (2024)

Table 3: Parks provision in the study area

Providers	East		North		West		Total	
	Freq.	%	Freq	%	Freq	%	Freq	%
Government Agencies	45	54.2	35	48.6	41	74.5	121	57.6
Communities	13	15.7	10	13.9	6	10.9	29	13.8
Private Bodies	12	14.5	16	22.2	5	9.1	33	15.7
Individuals /Groups	13	15.7	11	15.3	3	5.5	27	12.9
Total	83	100	72	100	55	100	212	100

Source: Author's Field Survey (2024)

Table 4: Parks Availability in the Study Area

Facility	Iba.East.			Iba. North			Iba/West			Study Total	Area %
	%	Rank		%	Rank		%	Rank			
Metropolitan Park	58	18.4	1	53	18.66	1	40	20.73	1	151	19.06
Open landscape	45	14.3	2	32		3	30	15.54	2		
					11.27					107	13.51
Green ways	18	5.71	8	15	5.28	9	6	3.10	8	39	4.92
Green ways	24	7.62	4	18	6.39	6	10	5.18	6	52	6.56
Botanical garden	23	7.30	5	24	8.45	4	12	6.21	5	59	7.45
Zoological garden	16	5.08	9	13	4.58	10	13	6.74	4	42	5.30
Vacant lots	7	2.22	11	9	3.17	12	6	3.12	8	22	2.78
Urban forest area	4	1.27	12	9	3.17	12	6	3.12	8	19	2.39
Private gardens	7	2.22	11	11	3.87	11	6	3.12	8	24	3.03
Cemetery	12	3.81	10	13	4.58	10	8	4.15	7	33	4.17
Wild life corridor	29	9.21	3	33	11.62	2	19	9.84	3	81	1.02
Religion Yards	22	6.98	6	17	5.99	7	12	6.22	5	51	6.43
Drinking Spot/park	29	9.21	3	21	7.39	5	12	6.22	5	62	7.82
Outdoor sport fields	21	6.67	7	16	5.63	8	13	6.74	4	50	6.31

* Some figures exceeded the total questionnaire retrieved as a result of multiple responses that is permitted
 Source: Computer Printout (2024)

Table 5: Illustration of the findings.

Facility	East		North		West		Study Area Tot	
	PAI	MD	PAI	MD	PAI	MD	PIA	MD
Metropolitan Park	1.77	0.57	1.82	0.51	1.87	0.64	1.82	0.54
Open landscape	1.77	0.57	1.94	0.61	1.47	0.24	1.80	0.52
Stadium/Play field	1.20	0.00	1.39	0.06	1.00	-0.23	1.20	-0.08
Natural reserved	1.18	-0.08	1.01	-0.32	1.11	-0.12	1.10	-0.18
Greenways	1.16	-0.04	1.38	0.05	1.39	0.16	1.30	0.02
Botanical garden	1.10	-0.10	1.26	-0.07	1.43	0.20	1.25	-0.03
Zoological garden	1.03	-0.17	1.39	0.06	1.47	0.24	1.28	0.00
Amusement parks	1.03	-0.17	1.04	-0.29	1.03	-0.20	1.03	-0.25
Vacant lots	1.01	-0.19	1.01	-0.32	1.00	-0.23	1.00	-0.28
Urban forest area	1.00	-0.20	1.40	0.07	1.38	0.15	1.25	-0.03
Private gardens	1.18	-0.08	1.36	0.04	1.03	-0.20	1.08	-0.20
Wild life corridor	1.19	-0.09	1.01	-0.32	1.02	-0.21	1.17	-0.11
Cemetery	1.02	-0.18	1.02	-0.32	1.00	-0.23	1.00	-0.28
	PAI_E = 1.19		PAI_N = 1.29		PAI_S = 1.23		PAI_S = 1.28	

Source: Computer Printout (2024)

PAI= Park Accessibility Index, DM - Deviation from the Mean (of East, North, and West), PAI_E = Accessibility Index East, PAI_S = Park Accessibility Index, PAI_N = Accessibility Index North

Equitable Distribution of Parks in the Study Area

It is not just the availability of parks that enhances the quality of life but how accessible the parks are to the residents. In order to determine the level of equitable distribution of parks in the study area, respondents were asked to rate each of the identified types of parks in the questionnaire using one of the 5 Likert Scales of 'Very Accessible (VA), 'Accessible' (A), 'Just Accessible' (JA), 'Not Accessible' (NA), 'Not Accessible at all' (NAA). Parks

Accessibility Index (PAI) was arrived at. If the parks are rated above or the same as mean value, this depicts that the parks are accessible while lower than mean value rate indicates no accessibility as a result of lopsided or uneven distribution.

From Table 5, the parks with PAI mean for the study area (PAI =2.81) included parks, Metropolitan Park, Open landscapes, Greenways, Botanical garden Private gardens. On the other hand, parks with lower PAI lower than the mean for the study area were; Natural reserves, Urban forests, Private gardens,

Vacant plots, Zoological garden Amusement parks Cemetery and Wildlife corridors.

As shown in Table 3, most accessible parks in the study area have a PAI of 1.82 which is higher than the PAI, which is 1.28. In the East, it was the most adequate green infrastructure and also ranked first in availability too. The situation was the same in the west, while in the north, the parks ranked second as the most adequate with PAI 1.82, higher than the PAI and its availability is also high.

Green ways were the next most adequate park in the study area. Its PAI was 1.80, which was higher than the average PAI for the study area. The adequacy of public green space was ranked as first most adequate by respondents in the north; it had 1.94 as its PAI which is higher than the average PAI of 1.29 for the north. It was ranked as the first most adequate infrastructure in the East as well; it had PAI of 1.77, which is higher than the average PAI for the East which is 1.19. In the west, it ranked the second most accessible park with PAI of 1.47, also higher than the average PAI for the west which is 1.23.

The third most accessible park in the study area was an urban forest. The PAI for urban forest was 1.30. In the west, it had PAI of 1.39; it ranked fifth most adequate park and also ranked fifth in its availability and by implication accessibility. In the north, it had PAI of 1.38, it ranked sixth most accessible park. While in the east, the PAI for urban forest /street trees was 1.16, it ranked the seventh most accessibility and respondents ranked its availability as the seventh most available infrastructure.

Botanical garden was the fourth most adequate park in the study area. It was ranked by respondents as the fifth most assessable in the study area; it had a PAI of 1.28. In the east, the PAI for the park was 1.03, it ranked ninth most accessible park while it was ranked fifth most available access by respondents. In the north, it was ranked fourth most adequate parks with PAI of 1.39; it ranked fourth most available and accessible park. In the west, this park ranked second most available with PAI of 1.47, and it also ranked fourth most available infrastructure by its respondents.

The least adequately distributed parks in the study area are green corridors, allotments, urban forests, vertical greening, city squares and plazas. All these had negative deviations about the mean. Their PAI in the study were 1.10, 1.20, 1.25, 1.03, 1.00, 1.00, 1.08, 1.00 and 1.00 respectively, their values were lower than the average PAI of the study area of mean 1.28. As shown in Table 6, this entire park had a negative deviation from the mean in the three residential zones.

In summary, the result of the One Way Analysis of Variance suggested that this variation was not statistically significant ($F=0.777$ and $p=0.466$).

SUMMARY, CONCLUSION AND RECOMMENDATION

Access to the parks is shared among Ibadan South-West, Ibadan North-West and (Oluyole, Ido, Akinyele and Ona-Ara LGAs. Other LGAs (Ibadan North, Ibadan South-East, Ibadan North-East, Lagelu, and Egbeda) lack adequate access. However, observation revealed that accesses to green spaces in the LGAs and across the city is poor Popoola, et al., (2016). However, outside the core area, Oluyole LGA has a fair number of parks located within its boundaries. Government is the principal provider of the available few packs in the study area. Metropolitan Park, Open landscape, Greenways, Botanical and Private Gardens are considered adequate Street trees, green corridors, allotments, urban forests, vertical greening, city

squares and plazas least adequate and accessible. It's evident that the existing packs in the metropolitan city of Ibadan are insufficient in number, poorly distributed, and are mostly inaccessible.

This study recommends the provision of additional and well-distributed packs, and adequate maintenance and protection of the existing ones in the study area. Enforcement of eco-friendly master plans that provide parks, gardens, and other green infrastructure in all our cities has become very necessary. Both public and private should collaborate to ensure development plans have parks and green spaces in their designs which must be religiously adhered to.

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