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Socio-Demographic Predictors of Residents' Attitudes Towards the Use of Green Infrastructure in Lagos Metropolis, Nigeria

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ABSTRACT: To harness the multifunctional capacity of Green Infrastructure (G.I.) in enhancing environmental quality and sustainability, it is pertinent to uncover the socio-demographic characteristics that motivate residents to use G.I. in their neighborhoods. This study assesses the socio-demographic predictors of residents' attitudes towards using G.I. in Lagos Metropolis, Nigeria. Data was gathered using the multi-stage sampling technique through questionnaire administration in four Local Government Areas (total n=1560). Results from descriptive and multinomial regression analyses reveal that age, educational level, rank in occupation, and type of housing, among others, emerged as predictors of residents' attitudes toward using G.I. in the study area. In the adjusted multinomial regression analysis, only the residents' occupation rank is significantly associated with the attitude of users of the G.I. facilities. In particular, compared with the management staff/business owners, those in the senior staff cadre are approximately twice (1.837) more likely to have an averagely good attitude toward using G.I. in Lagos Metropolis. This study demonstrates the importance of availability and publicly accessible G.I. facilities for different occupational ranks/levels of residents in a crowded city. The results can help to plan better and design G.I. facilities, responding to the needs and distribution for usage across different strata of society among the urban population in developing nations.

Keywords: *Ecology, Green infrastructure, Lagos Metropolis, Occupational rank, Predictors*

INTRODUCTION

Going by the alarming rate of green space depletion and the rampant reduction in human-nature connection, urgent actions are required toward efforts that can promote improved ecosystems and provide opportunities for constant human reconnection to nature, especially through effective use and activities around green spaces. Studies on G.I. have become one of the major efforts by researchers in promoting the restoration of depleted green spaces in the built environment. Many studies on ecology often use the concepts' green space' and 'green infrastructure' interchangeably. However, green space is just an aspect of the concept of green infrastructure (G.I.), which generally refers to a network of multifunctional green spaces such as parks, gardens, playing fields, grasses, woodlands, street trees, horticulture, allotments, water bodies, community forests, green walls, green roofs, and other open spaces. These open spaces are interconnected to deliver various quality and environmental benefits in rural and urban settings (Wolch et al., 2014; Kumar et al., 2019; Dipeolu et al., 2021). Approaches through G.I. have also assisted in creating and maintaining balanced ecosystem services for human well-being. However, technological advancements, industrial revolutions, and rapid increase in population over the past decades have made human activities negatively impact ecosystem services and reduce biodiversity functions (Dipeolu et al., 2020a; Narh et al., 2020). As the large-scale depletion of these natural resources continues, it becomes imperative to develop better strategies to mitigate, restore, and protect further degradation. Such strategies and approaches will help enhance ecosystem services' continuous functions and reduce exposure to risks emanating from dysfunctional environmental services among urban populations

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(Woldegerima et al., 2016; Kozamernik et al., 2020).

Lagos State (in Southwest Nigeria) recently embarked on massive environmental greening through the Lagos State Parks and Gardens Agency (LASPARK) under the Ministry of Environment. LASPARK had been saddled with various responsibilities, among others, to maintain and manage all created parks/recreational spaces in Lagos state, promote afforestation with relevant tree species in various neighborhoods, take proper records of all trees and green spaces within the State (Dipeolu, 2017; LASPARK, 2019). This enumeration will allow close monitoring of shortfalls in the number of G.I.s in the State and consequently create an opportunity to replace such facilities within the state. This current initiative of the Lagos state government to increase environmental greening and ensure a sustainable environment in the state has continued to attract both encomiums and criticisms. Issues being raised are those related to the selective distribution of the parks and gardens within the state, neglect of stewardship for G.I. facilities by residents, lack of correct usage of the facilities by residents, and residents' perception of inadequate technical facilities to implement this laudable project by the government (Oluwafeyikemi & Julie, 2015; Babalola & Akinsanola, 2016). This research seeks to assess the socio-demographic predictors of residents' attitudes toward using G.I. in Lagos Metropolis to ascertain the needed corrective measures. The specific objectives are to examine residents' attitudes toward the use of G.I. in the study area, investigate the extent of the influence of residents' socio-demographic characteristics in having good attitudes toward G.I. in the study area, and determine the socio-demographic factors that mostly predict residents' attitude toward the use of G.I. in the study area. Mainly, this study contributes to knowledge on sustainable urban design practices and management of urban open spaces by clarifying the major factors of residents' characteristics that mostly enhance adequate usage of G.I. facilities in densely populated and developing cities. Apart from adding to the growing literature on this subject, this study also identifies ways to improve the hierarchical arrangement of G.I. provisions and management. This is with a view that various residents will use the facilities and strengthen the human nature connection while attempting to create a liveable and sustainable city in Lagos and other states with similar settings.

Review of related literature

Urbanisation and Resultant Decline in Green Spaces

The United Nations (2014) projects an increase in the proportion of city residents from 54 percent to 66 percent by 2050. Reasons adduced to favor this increase include the need to secure more profitable jobs, the need to access social amenities, and the need to have access to and improve quality of life (Naab et al., 2013). As a result of urban development, substantial changes in the initial forest cover on the earth's surface have occurred, increasing built-up areas and impervious surfaces (Naab et al., 2013; Alexander et al., 2019). Further, the need to cater to the increasing population's livability has altered land uses into residential, commercial, and industrial use (Dipeolu & Ibem, 2022; Narh et al., 2020). Grey surfaces have taken over green spaces that act as a sponge to mitigate flood occurrence (Amoateng et al., 2018), undermining the role green spaces play in flood management, carbon sequestration, and ecosystem maintenance.

In many African countries, habitats are becoming increasingly fragmented, degraded, and depleted. Many hectares of agricultural land are lost daily to urbanization and industrial activities (Mensah, 2014; Amoako & Adom-Asamoah, 2019). It is alarming to note that Nigeria has lost around 47.5% (8,193,000 hectares) of its green areas between 1990 and 2010 (Ojekunle, 2014; Dipeolu, 2017). In Kumasi, Narh et al. (2020) also reported an alarming decline in green spaces from 0.25 acres in 2000 to 0.04 in 2019. Studies, such as Abebe and Megento (2016), Woldegerima et al. (2016), Dipeolu and Ibem (2020), further reporting on the geometric depletion of green spaces, concluded that poor perception and attitude of the public towards G.I., poor maintenance, inadequate stewardship and paucity of funds commitment by authorities are primarily the cause of this depletion. Although experts have constantly canvassed for improved strategies (Bowler et al., 2010; Abebe and Megento, 2016; Girma et al., 2019), rapid loss of green spaces with attendant environmental challenges remains a recurrent experience in most of these cities (Girma et al., 2019; Dipeolu et al., 2021; Amaglo et al., 2022). Therefore, the need to look for systems or processes that can reinvent the loss of green spaces in existing urban centers to achieve sustainable and liveable cities appears inevitable.

Urban green infrastructure, associated benefits, and peoples' attitude

Research has shown that G.I. produces multiple ecosystem services and positively impacts human well-being (Alaimo et al., 2016; Dipeolu et al., 2020b). Moreover, communities with well-maintained G.I. facilities in relatively good proportion have reported enjoying increased property values, a reduction in crime rate, friendliness, and good sense of community (Shackleton et al., 2014; Cooper et al., 2014; Francis et al., 2012). Dipeolu and Ibem (2022) reported that access to quality and well-maintained natural environment promotes quality connectedness with nature, enhancing recreation and community in most neighborhoods. G.I. also encourages sports activities and the general well-being of urban residents. Streets trees, for example, have been reported to encourage pedestrian walkability, and the visual presence of greeneries is perceived to reduce tensions and anxieties (Kim et al., 2013; Lu et al., 2018). Similarly, several studies on human health and well-being (van den Berg et al., 2015; Levi, 2017; Kumar et al., 2019) have observed a positive relationship between G.I. and human health. Most of these studies concluded that the availability of G.I., quality, and quantity, living closer to, visiting, and recreating within G.I. sites have produced some health benefits to people. Other benefits of G.I. in urban centers include air filtration, which helps to reduce pollutants from the atmosphere (Adegun et al., 2021), regulates perceived environmental noise (Van Renterghem, 2019), regulates microclimate by providing shade and cooling an area, thus, help in reducing urban heat island effect (Bowler et al., 2010). Moreover, some G.I. facilities such as trees, horticulture, domestic gardens, and community forests can provide food for people (Barau et al., 2020), while G.I. like green covers, grasses, and urban forests help to regulate stormwater (Armson et al., 2013).

However, despite the benefits of G.I. in the human environment, studies (Okunlola et al., 2016; Arabomen et al., 2019) have reported various types of people's attitudes towards G.I. facilities and factors that influence such attitudes. These studies mainly reported variations in human attitudes around green spaces and noted that individuals show different attitudes based on the differences in their socio-demographic profiles, belief systems, and values that individuals attach to environmental issues. Okunlola et al. (2016) reported in a study in Akure, Nigeria, that while some urban residents were willing to pay to access benefits from street trees and community forests, others declined this attitude. Some of the factors that influence the willingness and the amount to pay, according to the study, are residents' employment status, age, income and education obtained, years spent in the neighborhood, and proximity to the urban forest. In a similar study by Arabomen et al. (2019), female household heads yielded more to paying than males, while older residents are more resistant to paying for the maintenance of trees and community forests, unlike younger adults. A study in New York by Barnhill and Smardon (2012) reported that stakeholders' attitudes towards G.I. were influenced by their awareness of G.I. and its associated benefits. A study in China by Zhang et al. (2013) posited that residents' socio-demographic factors (income, gender, and dwelling location) are the key determinants of their attitude toward urban G.I. Also, an initial study in Lagos Metropolis by Dipeolu et al. (2020) reported that many residents visit G.I. facilities for either spiritual exercises or due to joblessness rather than for recreation/relaxation activities. In all of these studies, the socio-demographic factor(s) that mostly predicted the attitude of users towards G.I. facilities, especially in Lagos State, Nigeria, is unclear.

Study Area

This study is domiciled in Lagos State, Nigeria. The state is located on longitude 20 421E and 30 421E and latitude 60 221N and 60 521 with an estimated population of over 15 million people and about 70% of the land area covered with cities. As depicted in Figure 1, administratively, 20 Local Government Areas (LGAs) are present in the state, with 16 of these LGAs located in the metropolis, while the remaining 4 LGAs are located on the outskirts of the metropolis. The metropolis consists of about 18,000 hectares of the total built-up area of Lagos State, an average population density of approximately 20,000 persons per km2, and a land mass of 1,171.28 km2 (BudgIT, 2018).

The constant influx of people to Lagos State has given the state a rapid population growth rate estimated to be over 2.8% annually. The rapid development has brought about consequential changes in the land-use pattern, the disappearance of virgin forests, and the conversion of natural land into concrete surfaces.

To arrest further depletion of Lagos state vegetation, the Lagos State government has initiated steps to increase environmental greening in the state. A study by Dipeolu (2017) noted the establishment of the Lagos State Parks and Gardens Agency (LASPARK) in 2011. The agency is charged with the responsibility of reinventing the lost vegetation of Lagos State by planting trees, creating green gardens, maintaining forest areas, and beautifying open spaces in the state. Available statistics revealed that the agency has maintained over 400 parks and gardens around the state, planted over 6,203,553 trees, and pruned over 50,000 trees, while 288,681 persons in all have visited the park between 2015 and 2021 (Adesina & Uduma-Olugu, 2023). However, the extent to which this agency has been able to achieve the set goals of the state is part of what drew the attention of the present study.

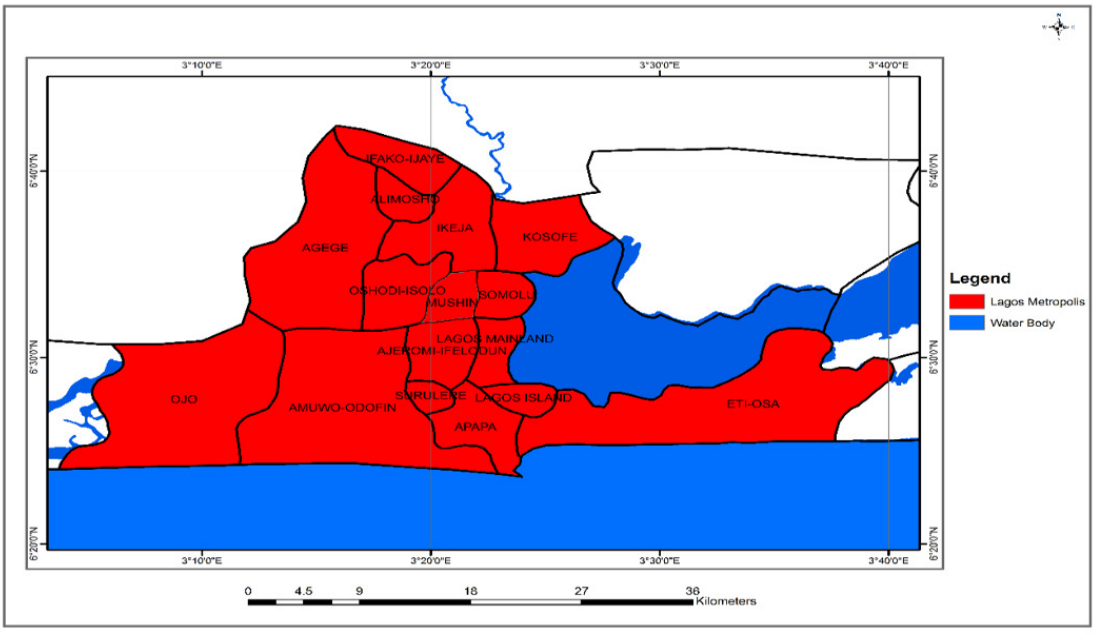

Fig 1: Map of Lagos metropolis showing the study area

MATERIALS AND METHODS

Based on the outlined objectives and related literature, this study adopted a cross-sectional survey (Francis et al., 2012; Yapici et al., 2017). For a reasonable sample size, 25 percent or one-quarter of the 16 LGAs in the Lagos Metropolis was adopted for the survey. Specifically, the sample size was drawn randomly from Surulere, Kosofe, Lagos Island, and Ikeja LGA residents. A multi-stage sampling technique was adopted to manage the sample size effectively. This involved the selection of existing Enumeration Areas (E.A.) in each of the selected four LGAs. Information from the National Population Commission Lagos office revealed that 17 Enumeration Areas (E.A.s) and 6283 households existed across the four selected randomly LGAs. The distribution of the identified E.A.s and the households is such that Surulere =5 E.A.s with 1438 households, Kosofe = 5 E.A.s with 1852 households, Lagos Island = 4 E.A.s with 1402 households, and Ikeja = 3 E.A.s with 1591 households. To determine the minimum sample size to represent the general population, Turner's (2003) formula was considered relevant, as given in Equation 1. This formula considers household size in a developing country like Nigeria.

$$n = \frac{(Z_\alpha)^2 r(1-r) fk}{phe^2} \quad \text{(Equation 1)}$$

Where n is the minimum sample size for the survey, Z_α = 1.96 is the critical value of the normal distribution obtained in the Table of Standard Normal Distribution at a 95% confidence level, r =50% is the estimate of the proportion of individuals assumed to have different attitudes towards urban green infrastructure in the neighborhoods. At the same time, f= 4 is the design effect. k=20% represents the non-response rate, p= 0.03x18 = 0.54 is the proportion of the total population accounted for by the target population and upon which the parameter, while r, is based. As a rule of thumb, Tuner (2003) suggested the adoption of 0.03 for each year of age that the target population represents and h=6 as the average number of persons per household, which is often considered to be about six persons in most developing countries; e =0.05 is the margin of error or level of precision set at 5% of r. Equation 2 shows how the minimum sample size was estimated using Turner's (2003) formula

$$n = \frac{(1.96^2 \times 0.5 \times 0.5 \times 4 \times 0.2)}{[0.54 \times 6 \times (0.05 \times 0.5)^2]} = 379.4 \approx 380$$

(Equation 2)

Three hundred eighty participants in each of the four LGAs will give a total of 1520 participants for the survey.

The main data collection instrument used was a semi-structured questionnaire. The questions were derived from a critical review of the literature. The first section of the questionnaire was used to collect data on the participants' socio-economic and demographic characteristics. The second section had questions that extracted data on the residents' attitudes toward the identified G.I. within their neighborhoods. For this, the participants completed a 10-item attitude toward green infrastructure (ATGI) scale developed by Carrus et al. (2004). Each participant was asked to indicate the extent to which they agreed or disagreed with some selected statements using a 5-point Likert-type scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. However, in interpreting the results of the residents' attitudes toward G.I., the framework used by Akpa and Bamgboye (2015) was adopted. The mean score (M.S.) less than 3.0 (i.e., M < 3.0) was interpreted as a poor attitude, and the mean score (M.S.) equal to 3.0 (i.e., MS= 3.0) was an averagely good attitude, while the mean score (M.S.) more than 3.0 (MS >3.0) was described as a good attitude. The reliability of the questionnaire instrument in measuring Attitude towards G.I. was assessed using Cronbach's Alpha coefficient test, with the result being 0.79 for the ten items investigated. This is more than the 0.7 recommended by Pallant (2011), suggesting that the scale of measurement used in the survey to assess attitude toward G.I. is reliable.

The survey started with a pilot study conducted to pre-test the questionnaire in an unselected Local Government Area in the Lagos Metropolis, and the feedback was used to fine-tune the final version of the questionnaire. Households were systematically selected from the list of numbered houses in each E.A. until the required number for each E.A. was achieved. Meanwhile, 20 questionnaires were added to the calculated minimum (380) sample size to address non-response. Thus bringing the sample size for each LGA to 400 participants. In selecting the houses where participants were recruited, the first (1st) house at the nodal point within each E.A. was chosen, while subsequent houses were systematically selected using a predetermined sampling interval (v) for each of the four LGAs sampled. One copy of the questionnaire was handed to a randomly selected household head or an adult representative in each house visited during the survey. In all, 1600 copies of the questionnaire were administered to the residents by the researchers, but 1560 copies were retrieved and found to have been correctly filled out by the participants in the survey. This represents around a 97.5% response rate.

The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) software package Version 20. Three types of analyses were conducted. The first was descriptive statistics, to compute the frequencies and percentages of the variables used in describing the socio-demographic characteristics of the respondents, the mean attitude score for each item (MASI) for the ten variables used to measure Attitude toward G.I. (ATGI). These analyses were used to address research objective one, and the results are presented in Tables (1 & 2). This was followed by the Chi-square analysis used to analyze objective two, investigating the extent of the influence of residents' socio-demographic characteristics in having good attitudes toward G.I. in the study area (see results in Table 3). The last analysis was the multinomial regression analysis, used to determine the socio-demographic factors that mostly predict residents' attitudes toward using G.I. in the survey. It was used to resolve objective three, and the results are presented in Table 4.

RESULTS AND DISCUSSIONS

Participants' Social Demographic Characteristics

From Table 1, the majority (58.6%) of residents participating in this study are men. Their age distribution is between 30 and 49 years (or 48.2%), with a family size of two - four persons (or 46.9 %). Concerning their marital status, 57.4% of the residents are already married, while 37.9% are not. A proportion of 4.0% is observed to

be previously married, currently separated, or divorced. The results further show that around 87.4% of the respondents have post-primary education, and approximately 73.2% are in one form of employment or the other.

Table 1: Socio-demographics characteristics of the participants

Variables	Frequency n=1560	Percentage (%)
Gender		
Female	646	41.4
Male	914	58.6
Age Groupings in years		
Less than 30 years	587	37.6
Between 30 years and 49 years	752	48.2
50 years and above	189	12.1
No Response	32	2.1
Marital Status		
Not yet married	592	37.9
Already married	896	57.4
No longer married	62	4.0
No Response	10	0.6
Persons per household		
1	166	10.6
2-4	731	46.9
4 +	654	41.9
No Response	9	0.6
Ethnic origin		
Yoruba	1102	70.6
Others	457	29.3
No Response	1	0.1
Highest Education Obtained		
No formal education	89	5.7
Primary education	108	6.9
Post-primary education	395	25.3
Post-secondary education	968	62.1
Employment status		
Not employed	417	26.7
Self-employed	704	45.1
Private/public sector employee	439	28.1

Residents' Attitude towards the use of urban green infrastructure

According to Table 2, participants in the study asserted that G.I. provides various services and benefits in the human environment, such as enhancing social relationships, easing tension in human beings, restoring nature, making people feel lively and less stressed, preventing direct Ultraviolet (U.V.) radiation on buildings and that trees do not obstruct scenery in the city. However, they feel that providing adequate stewardship for G.I. in the city is very expensive for the citizens. These results suggest that while most of the study's participants have good attitudes toward the use of G.I. within their neighborhoods, some residents still have poor attitudes toward the use of G.I. in their neighborhoods.

To group (poor, averagely good, and good) the participants based on their attitudes toward the use of G.I., the survey data were further analyzed using the chi-square test for independence to understand the influence of residents' socio-demographic characteristics on their attitudes toward the use of G.I. (Table 3).

Table 2: Descriptive statistics of residents' attitudes toward the use of GI

ATGI variables	N	Mean Score	Std. Deviation
People need nature for restoration in the city	1560	4.05	0.96
The presence of green in the city makes us feel more alive	1560	3.97	1.02
Scene of green areas in the city can ease tensions	1560	3.95	1.06
The presence of green areas in the city helps improve social interactions	1560	3.86	1.1
Having contact with nature makes people feel less stress	1560	3.84	1.19
The development of urban green areas is too expensive for citizens	1560	3.27	1.08
Stewardship for urban green areas is too costly for citizens	1559	3.06	1.2
Trees in the city often prevent too much ultraviolet radiation on buildings	1560	2.49	1.29
Trees in the city often create more problems than advantages	1560	2.16	1.29
Clear views from the windows are often difficult due to the trees in the streets	1560	2.15	1.19

Association between residents' identified factors and attitude toward the use of green infrastructure facilities

As shown in Table 3, the residents' socio-demographic characteristics are disaggregated by their attitudes toward using G.I. — poor, averagely good, and good. A chi-square analysis is conducted to understand the influence of these socio-demographic characteristics on the residents' attitudes toward using G.I.

From the result, the proportion of residents with bad attitudes is significantly higher (49.1%) among younger participants (those less than 30 years of age) compared to any other age group. In comparison, the proportion with average attitudes towards the use of G.I. (51.7%) is significantly higher among the middle-aged (30-49 years) participants ($p<0.000$). Similarly, the proportion of participants with poor attitudes is significantly higher in households with two to four persons (51.2%; $p=0.000$), while the proportion with good attitudes is significantly higher in residences of more than four persons' households (45.2%; $p=0.000$). However, the proportion with poor attitudes is significantly higher among participants who are junior staff (46.9%; $p=0.027$) in their organizations, while the proportion with good attitudes towards the use of G.I. is significantly higher among participants who are management staff/business owners (42.9%; $p=0.027$).

In addition, the proportion of participants with bad attitudes towards the use of G.I. is significantly higher among residents in private residential estates (24.9%; $p=0.012$), while the proportion with a good attitude towards the use of G.I. is significantly higher among residents of government residential estate (21.9%; $p=0.027$) in the study area.

Table 3: Residents' identified factors and attitudes towards the use of green infrastructure facilities

Attitude of Respondents						
Variables	**Poor Attitude**	**Averagely good attitude**	**Good Attitude**	**Total**	**Chi-square**	**P-value**
Sex of Respondent						
Male	152(61.3)	726(58.5)	46(5.0)	924(58.8)	1.232	0.54
Female	96(38.7)	514(41.5)	38(5.9)	648(41.2)		
Total	248(100.0)	1240(100.0)	84(5.3)	1572(100.0)		
Age						
Less than 30 years	120(49.1)	431(35.5)	38(46.3)	589(38.2)	21.021	0.000*
30-49 years	102(41.8)	628(51.7)	31(37.8)	761(49.4)		
Greater than 50 years	22(9.1)	155(12.8)	13(15.9)	190(12.4)		
Total	244(100.0)	1214(100.0)	82(100.0)	1540(100.0)		
Marital Status						
Never Married	105(42.5)	450(36.6)	38(45.2)	593(38.0)	10.71	0.030*
Married	133(53.8)	735(59.7)	39(46.5)	907(58.0)		
Previously Married	9(3.7)	46(3.7)	7(8.3)	62(4.0)		
Total	247(100.0)	1231(100.0)	84(100.0)	1562(100.0)		
Persons Per Household						
1	39(15.9)	113(9.2)	14(16.7)	166(10.6)	20.124	0.000*
2-4	126(51.2)	578(46.9)	32(38.1)	736(47.0)		
4+	81(32.9)	542(43.9)	38(45.2)	661(42.3)		
Total	246(100.0)	1233(100.0)	84(100.0)	1563(100.0)		
Religious Affiliation						
Christianity	163(16.2)	793(78.7)	52(5.2)	1008(100.0)	0.701	0.951
Islam	71(14.8)	381(79.5)	27(5.6)	479(100.0)		
Others	13(16.3)	62(77.5)	5(6.3)	80(100.0)		
Total	247(15.8)	1236(78.9)	84(5.4)	1567(100.0)		
Ethnic Group						
Yoruba	172(15.5)	885(79.5)	56(5.0)	1113(100.0)	0.89	0.641
Others	76(16.6)	355(77.5)	27(5.9)	458(100.0)		
Total	248(15.8)	1240(78.9)	83(5.3)	1571(100.0)		
Highest Education Obtained						
No Formal Education	14(5.6)	65(5.3)	5(6.0)	84(5.4)	13.393	0.037*
Primary Education	16(6.5)	89(7.2)	3(3.5)	108(6.9)		
Sec/Tech. Education	49(19.8)	333(27.0)	13(15.5)	395(25.2)		
Tertiary Education	169(68.1)	748(60.5)	63(75.0)	980(62.5)		
Total	248(100.0)	1235(100.0)	84(100.0)	1567(100.0)		
Profession						
Unemployed	27(15.6)	137(79.2)	9(5.2)	173(100.0)	2.039	0.916
Self Employed	106(15.1)	564(80.1)	34(4.8)	704(100.0)		
Private/Pub. Employee	73(16.2)	353(78.3)	25(5.5)	451(100.0)		
Students and Others	42(17.2)	186(76.2)	16(6.6)	244(100.0)		
Total	248(15.8)	1240(78.9)	84(5.3)	1567(100.0)		

Continiue of Table 3: Residents' identified factors and attitudes towards the use of green infrastructure facilities

Attitude of Respondents						
Variables	**Poor Attitude**	**Averagely good attitude**	**Good Attitude**	**Total**	**Chi-square**	**P-value**
Rank in Occupation						
Junior Staff	82(46.9)	307(34.6)	26(41.3)	415(36.9)	10.94	0.027*
Senior Staff	34(19.4)	183(20.6)	11(17.5)	228(20.2)		
Management Staff/ Business Owners	59(33.7)	398(44.8)	26(41.3)	483(42.9)		
Total	175(100.0)	888(100.0)	63(100.0)	1126(100.0)		
Type of G.I resident visited.						
Green features	119(18.0)	507(76.6)	36(5.4)	662(100.0)	5.596	0.47
Tree features	31(19.4)	122(76.3)	7(4.4)	160(100.0)		
Water features	14(13.2)	85(80.2)	7(6.6)	106(100.0)		
Others	53(14.4)	299(81.5)	15(4.1)	367(100.0)		
Total	217(168)	1013(78.2)	65(5.0)	1295(100.0)		
Distance of G.I to Participant						
Less than 100m	33(20.9)	117(74.1)	8(5.1)	158(100.0)	10.836	0.211
100-200m	53(16.8)	244(77.2)	19(6.0)	316(100.0)		
300-400m	47(17.1)	213(77.5)	15(5.5)	275(100.0)		
500-1000m	45(17.8)	194(76.7)	14(5.5)	253(100.0)		
Above 1000m	37(12.3)	255(84.7)	9(3.0)	301(100.0)		
Total	215(16.5)	1023(78.5)	65(5.0)	1303(100.0)		
Reasons for visiting G.I sites						
Relaxation/Recreation	52(21.0)	307(24.8)	17(4.5)	376(24.0)	13.732	0.033*
Joblessness	137(55.2)	612(49.5)	40(5.1)	789(50.3)		
Spiritual exercises	55(22.2)	315(25.5)	26(6.6)	396(25.2)		
Others	4(1.6)	3(0.2)	1(12.5)	8(0..5)		
Total	248(100.0)	1237(100.0)	84(5.4)	1569(100.0)		
Respondents Type of Housing						
Govt. Residential Estate	51(20.6)	271(21.9)	24(28.6)	346(22.0)	22.623	0.012*
Private Residential Estate	61(24.9)	246(19.8)	16(19.0)	323(20.5)		
Private Company Residential Estate	24(9.9)	106(8.5)	11(13.0)	141(9.0)		
Private/Individual ResidentialDevpt. Area	72(28.9)	475(38.3)	20(23.8)	567(45.1)		
Industrial/Commercial Area	24(9.9)	89(7.2)	11(13.0)	124(7.9)		
Others	16(100.0)	53(4.3)	2(2.4)	71(4.5)		
Total	248(100.0)	1240(100.0)	84(100.0)	1572(100.0)		

Regression analysis of factors associated with residents' attitudes toward using G.I.

Table 4 shows the multinomial regression analysis of the seven factors influencing residents' attitudes toward using G.I. in the Lagos metropolis. In this adjusted multinomial regression analysis, only the rank in occupation of the residents has a significant association with the attitude of users of the G.I. facilities. In particular, compared with the management staff/business owners, those in the senior staff cadre are approximately twice (1.837) more likely to have an average good attitude toward using G.I. in the study area (Table 4).

Table 4: Multinomial regression analysis of factors associated with residents' attitudes towards using G.I.

Categories of Attitude	Variables	p-value	OR (-)
Averagely good attitude	**Age**		
	Less than 30 years	0.656	0.871(0.473-1.603)
	30-49 years	0.62	0.866(0.492-1.527)
	Greater than 50 years	0	
	Marital Status		
	Never Married	0.227	0.540(0.199-1.467)
	Married	0.349	0.634(0.245-1.643)
	Previously Married	0	
	Persons Per Household		
	1	0.993	0.997(0.500-1.986)
	2-4	0.089	0.726(0.502-1.050)
	4+	0	
	Highest Education Obtained		
	No formal Education	0.187	0.612(0.295-1.269)
	Primary Education	0.724	1.124(0.589-2.145)
	Sec/Tech. Education	0.058	1.527(0.985-2.366)
	Tertiary Education	0	
	Rank in Occupation		
	Junior Staff	0.132	1.351(0.913-1.999)
	Senior Staff	0.020*	1.837(1.103-3.060)
	Management Staff/Business Owners	0	
	Reasons for visiting G.I sites		
	Relaxation/Recreation	0.915	1.132(0.117-10.956)
	Joblessness	0.894	1.165(0.123-11.068)
	Spiritual exercises	0.745	1.457(0.151-14.009)
	Others	0	
	Respondents Type of Housing		
	Govt. Residential Estate	0.51	1.354(0.550-3.331)
	Private Residential Estate	0.12	2.070(0.827-5.184)
	Private Company Residential Estate	0.316	1.689(0.606-4.706)
	Private/Individual Residential Devpt. Area	0.608	1.252(0.531-2.954)
	Industrial/Commercial Area	0.706	1.214(0.444-3.322)
	Others	0	

Continiue of Table 4: Multinomial regression analysis of factors associated with residents' attitudes towards using G.I.

Categories of Attitude	Variables	p-value	OR (-)
Good attitude	**Age**		
	Less than 30 years	0.278	0.659(0.310-1.400)
	30-49 years	0.186	0.625(0.311-1.254)
	Greater than 50 years	0	
	Marital Status		
	Never Married	0.688	0.776(0.226-2.668)
	Married	0.499	0.665(0.204-2.170)
	Previously Married	0	
	Persons Per Household		
	1	0.585	1.263(0.546-2.921)
	2-4	0.175	0.715(0.440-1.161)
	4+	0	
	Highest Education Obtained		
	No formal Education	0.335	0.603(0.215-1.686)
	Primary Education	0.765	1.136(0.492-2.623)
	Sec/Tech. Education	0.432	1.257(0.711-2.223)
	Tertiary Education	0	
	Rank in Occupation		
	Junior Staff	0.834	0.947(0.299-3.231)
	Senior Staff	0.738	1.122(0.572-2.201)
	Management Staff/Business Owners	0	
	Reasons for visiting G.I sites		
	Relaxation/Recreation	0.698	0.565(0.032-10.089)
	Joblessness	0.905	0.840(0.049-14.497)
	Spiritual exercises	0.773	1.521(0.088-26.398)
	Others	0	
	Respondents Type of Housing		
	Govt. Residential Estate	0.978	0.983(0.299-3.231)
	Private Residential Estate	0.744	1.225(0.362-4.148)
	Private Company Residential Estate	0.802	1.188(0.309-4.567)
	Private/Individual Residential Devpt. Area	0.962	0.973(0.308-3.067)
	Industrial/Commercial Area	0.659	1.342(0.364-4.949)
	Others	0	

Discussion

This study assesses the socio-demographic predictors of residents' attitudes towards using G.I. in Lagos Metropolis. From the analyses of the study objectives, three major findings attract further discussion. First, there is a general good attitude towards G.I. observed among residents involved in the survey; this finding supports some previous studies (Woldegerima et al., 2016; Yapici et al., 2017) that have focussed on understanding the activities of humans around green spaces. Judging from the results presented in Table 2, the respondents are very conversant with the diverse benefits that G.I. provides for urban residents, such as enhancing social relationships, creating a lively environment, restoring the beauty of nature, and preventing direct ultraviolet radiation on buildings, among other roles. This result may have come from the effect of the availability of G.I. in the neighborhoods under consideration. Previous studies (Lu et al., 2018; Kim et al., 2013) have noted that communities with well-maintained G.I. facilities in relatively good proportion have reported enjoying various benefits of G.I. Moreover, it is also possible that the majority of the study's participants show a good attitude towards the use of G.I. because of their awareness of effective ecosystem services in the city in regulating the microclimate by providing shades and coolness and, thus, reducing urban heat island effects for city dwellers (Bowler et al., 2010; Kozamernik et al., 2020).

Furthermore, the results that show poor attitudes by some residents and their belief that providing stewardship for G.I. in the city is very expensive for the citizens corroborates previous findings that people tend to show varying attitudes towards the environment based on differences in their socio-demographic profiles, belief system and values attached to environmental issues (Arabomen et al., 2019; Steg & Vlek, 2009). Largely, these percentages with poor attitudes may be residents unwilling to pay to access benefits from trees and community forests, as reported by a previous study (Okunlola et al., 2016). As evidenced in the literature, some of the factors that influence willingness and the amount to pay are residents' employment status, age, income and education obtained, years spent in the neighborhood, awareness of ecosystem services, and proximity to the urban forest (Arabomen et al., 2019; Zhang et al., 2013; Barnhill & Smardon, 2012).

The results from the second research objective that investigates the extent of the influence of residents' socio-demographic characteristics in having good attitudes towards using G.I. in the study area also reveal interesting findings. First, the proportion of residents with bad attitudes is significantly higher among younger participants than any other age group in the study. According to previous studies (Gray & Manning, 2014; Agosto & Abbas, 2013; Pickering et al., 2012), younger adults prefer digital connectivity and virtual experiences. They are, thus, likely to prefer virtual engagement with nature (e.g., social media, virtual reality). This virtual experience of the younger ones and addiction to social media may be responsible for their poor attitude towards using G.I. in the neighborhoods since social media may keep them engaged for many hours with little attention to connectivity with nature. This is unlike the older generation, who are most likely to be nostalgic towards memories of green spaces in the past, thereby seeking green spaces for recreation, relaxation, a sense of community, and a post-retirement lifestyle (see Ali et al., 2017; Wen, Albert & Haaren, 2018; Cummins, 2011).

Moreover, the result, which shows that the proportion with bad attitudes towards the use of G.I. is significantly higher among junior staff compared with the good attitude towards the use of G.I. by participants who are management staff/business owners, does not come by surprise. As earlier explained, the younger generation's attitude towards activities around G.I. is limited by their growing attraction and attention to virtual environments and connectivity rather than activities around green spaces. The study observes that a good proportion of the junior staff in the survey are, on average, aged 18-30 years. This age cohort represents the younger adults in the survey, who are not likely to show a good attitude toward using G.I. (Mitchel & Popham, 2007; Wen et al., 2018).

The study also observes that the proportion of residents with poor attitudes is more common among private residential estates than residents with good attitudes in government estates. This result may be due to some level of law enforcement typical among government-regulated facilities compared with private facilities often laden with non/partial law enforcement (Certoma, 2015; Finlay-King et al., 2017; Dickinson et al., 2019).

From the third objective on the socio-demographic factors that mostly predict residents' attitudes towards the use of G.I. in the study area, the result of the multinomial regression analysis on the seven factors identified to influence attitudes of residents towards the use of G.I. shows that only rank in occupation of the residents has a significant association with the attitude of residents towards the use of G.I. In particular, compared with the management staff/business owners, those in the senior staff cadre are approximately twice (1.837) more likely to have an averagely good attitude towards the use of G.I. The respondents feel that even though all the seven socio-demographic factors are relevant to their use of G.I., they are more attracted to G.I. centers when they know that the facilities are designed and segregated into ranks/strata. This may be further explained by the nature of Lagos Metropolis and its environs, where people from all works of life reside. The elite, for example, may not be easily disposed to sharing facilities with an uneducated or less educated set of people due to the fear of harassment or molestation that is rampantly reported in Lagos and other locations with similar environments (Certoma, 2015; Dipeolu, 2017). This suggests that quality attention is required to put facilities on G.I. sites into proper strata or ranking, especially according to the user's income/occupational level in society. This result aligns with the studies of Rivera et al. (2022) that suggest segregation of recreational facilities for various income levels and age groups so that all participants will be able to afford the facilities provided in the centers and also relate freely with other people of their rank without fear of molestation.

CONCLUSION

This study has investigated the socio-demographic predictors of residents' attitudes towards using G.I. among residents in selected Lagos metropolis, Nigeria neighborhoods. Discoveries from this study can be summarised as follows. First, it has been observed that the respondents in the survey generally show a good attitude towards the use of G.I. This implies that the residents have a very high tendency to show a more positive attitude, especially toward taking care of G.I.

in their neighborhoods. This attitude will greatly influence them to be willing to conserve green spaces in their neighborhoods and pay for G.I. services, support government policies or programs on environmental greening of their neighborhoods, and provide necessary stewardship for the G.I. facilities as may be demanded from them. Given this, it is suggested that policymakers and other relevant stakeholders ride on these findings to establish policies and developmental programs to get residents actively involved in tree planting and other G.I. installation programs in the Lagos metropolis. This can be achieved through increased environmental education through public awareness campaigns via mass and social media, religious organizations, and Community Development Organisations (CDAs). This effort will have positive effects and gradually reduce the proportion of residents in the state with bad attitudes toward G.I.

Second, it can also be concluded that despite the general good attitude of the participants towards the use of G.I. in this study, some proportion of the participants still exhibit some degree of poor attitude towards the use of G.I. These include the younger participants in the study compared to the older participants, the junior staff more than the management staff cadre, and residents in the private residential areas more than those in the government residential areas. The implication is that more effort is still needed in the green spaces' design and implementation programs of LASPARK for this category of users. To achieve this, government agencies and private sectors should be involved in the creation of more well-equipped G.I. facilities with spaces where the younger generation can have adequate access to internet connectivity and services and other games that naturally attract the affinity of the youths, such as snooker, chess game, and various computer games. In the case of the junior staff cadre and their poor attitude towards the use of G.I., it is recommended that the government should subsidize the access fees to G.I. sites to reasonable and affordable prices for all categories of income groups in society.

To further ensure a more positive attitude towards using G.I. among residents in Lagos Metropolis, the state government should put more effort into implementing its housing policies. Government housing estates can be made available for residents since they seem to show a better attitude in government residential areas than in private ones. However, for residents who prefer private residential development to government housing estates, private building development in the state should be guided by legislative actions that will make it compulsory for a certain percentage of land use in future residential and public building developments to be earmarked for the provision of G.I. These, among other benefits, will help to greatly boost the environmental greening of residential neighborhoods and public spaces in Lagos.

Third, the respondents' occupation rank is the key socio-demographic factor that mostly predicts residents' attitudes towards using G.I. in the study area. This means that the variable is the most specific aspect of the socio-demographic characteristic of respondents that motivates residents in the study area to have a good attitude towards the use of G.I. This finding calls for more attention to be given to the issue of rank in the occupation of residents in the provision of G.I. in Lagos State by LASPARK and other relevant agencies. In addition, to ensure that most of the urban population accesses the various benefits of G.I., city managers, and designers need to be more creative in developing G.I. sites that can be all-inclusive for different categories/cadres of users. Such design can also be put into various segments and facilities that will permit people of similar age, grades, social status, cadre, and occupational rank to meet and relate with each other better in the neighborhood.

Lastly, the limitations of this research are those related to the limited geographic coverage of the few LGAs sampled in Lagos Metropolis. This makes the findings non-generalizable beyond its coverage. For future studies, the survey can include more neighborhoods and other LGAs in the state to generate more robust data and findings. Such future studies might consider adopting a longitudinal survey that will extend beyond the boundaries of the current research. Such study design may also be experimental instead of the present questionnaire approach, which is limited to the biases of the participants.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest concerning this article's research, authorship, and publication.

REFERENCES

Abebe, M. & Megento, T. L. (2016). The city of Addis Ababa from 'Forest City' to 'Urban Heat Island' assessment of urban green space dynamics. *J. Urban Environ. Eng.* 10(2), 254–262.

Adegun, O. B., Ikudayisi, A. E. Morakinyo, T. E. & Olusoga, O. O. (2021). Urban green infrastructure in Nigeria: A review. *Scientific African,* 14 e01044.

Adesina, A. J. & Uduma-Olugu, N. (2023). Assessment of Government Policies for Sustainable Open Space Planning in Lagos Metropolis-A study of LASPARK and Ikeja Government Reserved Area. In: Adedeji, Dipeolu and Jegede (Eds). *A Festschrift for Joseph Akinlabi Fadamiro*. (pp. 56-74). Obafemi Awolowo University Press, Ile-Ife, Nigeria. ISBN: 978-978-136-110-4.

Agosto, D. E. & Abbas, J. (2013). *Youth and online social networking.* In J. Beheshti & A. Large (Eds.), The information behaviour of a new generation (pp. 117–141). Plymouth: Scarecrow Press.

Akpa, O. M. & Bamgboye, E. A. (2015). Correlates of the Quality of Life of Adolescents in families affected by HIV/AIDS in Benue State, Nigeria. *Vulnerable Child Youth Studies,* 10(3), 225–242.

Ali, O., Di Nardo, F, Harrison, A. & Verma, A. (2017). The link between perceived characteristics of neighbourhood green spaces and adults' physical activity in U.K. cities: analysis of the EURO-URHIS 2 Study. *The European Journal of Public Health,* 27(4), 761–765.

Alexander, K., Hettiarachchi, S., Ou, Y. & Sharma, A. (2019). Can integrated green spaces and storage facilities absorb the increased risk of flooding due to climate change in developed urban environments? Journal of Hydrology, 579 (October), 124201.

Alaimo, K., Crawford, C. & Snyder, E. H. (2016). *Harvesting health in the garden. In*

Sowing Seeds in the City, 65-75. Springer Netherlands.

Amaglo, J. N., Takyi, S. A., Asibey, M. O., Amponsah, O. & Mensah, H. (2022). The dilemma of food occurrence in Accra: climate change or poor land use planning and practices? *S.N. Social Sciences,* 2, 121.

https://doi.org/10.1007/s43545-022-00438-0

Amoako, C. & Adom-Asamoah, G. (2019). From the seat of a traditional Kingdom to a Garden City: the socio-spatial politics of managing green areas in Kumasi, Ghana. *African Geographical Review,* 38 (4), 310–325.

Amoateng, P., Finlayson, C.M., Howard, J. & Wilson, B. (2018). Risk Reduction: A multi-faceted analysis of annual flood incidences in Kumasi, Ghana. *International Journal of Disaster Risk Reduction*, 27, 105–117.

Arabomen, O. J., Chirwa, P. & Babalola, F. (2019). Willingness-to-pay for environmental services provided by trees in core and Fringe Areas of Benin City, Nigeria, *Int. For. Rev*. 21(1) (23–36.

Armson, D., Stringer, P. & Ennos, A.R. (2013). The effect of street trees and amenity grass on urban surface water runoff in Manchester, U.K. *Urban Forestry and Urban Greening,* 12(3), 282–286

Babalola, O. S. & Akinsanola, A. A. (2016). Change detection in land surface temperature and land use land cover over Lagos Metropolis, Nigeria. *J. Remote Sens. GIS* 5(2), 171–178.

Barnhill, K. & Smardon, R. (2012). Gaining Ground: Green Infrastructure Attitudes and Perceptions from Stakeholders in Syracuse, New York. *Environmental Practice,* 14(1), 6-16. doi:10.10170S1466046611000470.

Barau, A. S., Kafi, K. M., Sodangi, A.B. & Usman, S.G. (2020). Recreating African biophilic urbanism: the roles of millennials, native trees, and innovation labs in Nigeria. *Cities Health,* (2020), 1–11

Bowler, D. E., Buyung-Ali, L., Knight, T. M. & Pullin, A. S. (2010). Urban greening to cool towns and cities: A systematic review of the empirical evidence. *Journal of Landscape and Urban Planning, 97*, 147-155.http://dx.doi.org/10.1016/j.landurbplan.2010.05.006.

Breed, C. A., Du Plessis, T., Engemann, K., Pauleit, S. & Pasgaard, M. (2023). Moving green infrastructure planning from theory to practice in sub-Saharan African cities requires collaborative operationalization. *Urban Forestry & Urban Greening,* 89 (2023), 128085 https://doi.org/10.1016/j.ufug.2023.128085.

BudgIT, 2018. 'What we Know About Lagos State Finances'. Retrieved on 15 January 2021 from https://yourbudgit.com/wp-content/uploads/2018/05/LAGOS-STATE-DATA-BOOK.pdf.

Carrus, G., Passafaro, P. & Bonnes, M. (2004). Environmentalism, ethnocentrism, and authoritarianism: an attitude towards urban green scale. *Bollettino di Psicologia Applicata*, 242*,* 3-12.

Certoma, C. (2015). "Expanding the 'dark side of planning': Governmentality and biopolitics in urban garden planning". 14(1), 23–43.

Cooper, C. H. V., Fone, D. L. & Chiaradia *Planning Theory,* A. J. F. (2014). Measuring the impact of spatial network layout on community social cohesion: A cross-sectional study. *International Journal of Health Geographics,* 13(11), 1–14. https://doi.org/10.1186/1476-072X-13-11.

Cummins, S.F.J. (2011). Does greener mean thinner? Associations between neighbourhood greenspace and weight status among adults in England. Int. J. Obesity, 36, 1108–1113.

Dickinson, J., Bennett, E. & Marson, J. (2019). Challenges facing green space: is statute the answer? *Journal of place management and development,* 12(1), 121-138.

Dipeolu, A. A. (2017). *Impact of Green Infrastructure on Environmental Sustainability in Selected Neighbourhoods of Lagos Metropolis, Nigeria.* An unpublished PhD Thesis in the Department of Architecture, Federal University of Technology, Akure, Nigeria.

Dipeolu, A. A. & Ibem, E. O. (2020). Green Infrastructure Quality and Environmental Sustainability in Residential Neighbourhoods in Lagos, Nigeria. *International Journal of Urban Sustainable Development,* 12(3), DOI: 10.1080/19463138.2020.1719500.

Dipeolu, A. A., Ibem, E. O., Fadamiro, J. A. & Fadairo. G. (2020a). Factors influencing residents' attitude towards urban green infrastructure in Lagos Metropolis, Nigeria. *Environment, Development and Sustainability,* 23(1) 6192-6214. https://doi.org/10.1007/s10668-020-00868-x

Dipeolu, A. A., Ibem, E. O. & Fadamiro, J. A. (2020a). Influence of Green Infrastructure on Sense of Community in Residents of Lagos Metropolis, Nigeria. *Journal of Human Behaviour in the Social Environment,* 30(6), 743-759 https://doi.org/10.1080/10911359.2020.1740853

Dipeolu, A. A., Aluko, O. R., Omoniyi, S. S. & Oyinloye, M. A. (2020c). Assessment of Residents' Socio-demographic Factors Associated with Visit to Green Infrastructure Facilities in Lagos Metropolis, Nigeria. *International Journal of Built Environment and Sustainability,* 7 2), 45-55. DOI: 10.11113/ ijbes.v7.n2.489.

Dipeolu, A. A., Ibem, E. O. & Fadamiro, J. A. (2021). Determinants of residents' preferences for Urban Green infrastructure in Nigeria: Evidence from Lagos Metropolis. *Urban Forestry & Urban Greening,* 57(2021), 126931. https://doi.org/10.1016/j.ufug.2020.126931.

Dipeolu, A. A. & Ibem, E. O. (2022). Influence of green infrastructure on residents' connectedness with nature in Lagos metropolis, Nigeria. *Urbani Izziv,* 82-92. DOI: DOI: 10.5379/urbani-izziv-en-2022-33-01-03.

Finlay-King, L., Nichols, G., Forbes, D. & Macfadyen, G. (2017). "Localism and the Big Society: the asset transfer of leisure centres and libraries - fighting closures or empowering communities?", *Leisure Studies,* 37(2), 158-170.

Francis, J., Giles-Corti, B., Wood, L. & Knuiman, M. (2012). Creating sense of community: The role of public space. *Journal of Environmental Psychology,* 32, 401-409.

Girma, Y., Terefea, H., Pauleit, S. & Kindu, M. (2019). Urban green spaces supply in rapidly urbanizing countries: The case of Sebeta Town, Ethiopia. Remote Sensing Applications: *Society and Environment* 13, 138–149.

Gray, D. & Manning, R. (2014). 'Oh my god, we're not doing nothing': Young people's experiences of spatial regulation. *British Journal of Social Psychology,* 53(4), 640–655.

Kim, E. S., Park, N., & Peterson, C. (2013). Perceived neighbourhood social cohesion and stroke. *Social Science Medicine,* 97, 49–55. https://doi.org/10.1016/j.socscimed.2013.08.001

Kozamernik, J., Rakuša, M. & Nikšič, M. (2020). How green facades affect the perception of urban ambiences: Comparing Slovenia and the Netherlands. *Urbani Izziv,* 88-110 DOI: 10.5379/urbani-izziv-en-2020-31-02-003.

Kumar, P., Druckman, A., Gallagher, J., Gatersleben, B., Allisone, S., Eisenman, T.S, … Morawskam. L. (2019). The Nexus Between Air Pollution, Green Infrastructure and Human Health. *Environment International,* 133, 1-14.

LASPARK (2019). Laspark Urges Residents to Visit Parks for Recreation. *Says Parks Improve Value of Social Life*

Levi, B. (2017). Perceived health status in a comparative perspective: Methodological

Limitations and Policy Implications for Israel. *Israel Journal of Health Policy Research,* 6(2), 1-11.

Lu, Y., Sarkar, C., & Xiao, Y. (2018). The effect of street-level greenery on walking behaviour: Evidence from Hong Kong. *Social Science and Medicine,* 208(2), 41–49. DOI: 10.1016/j.socscimed.2018.05.022

Mensah, C. A. (2014). Urban Green Spaces in Africa: Nature and challenges. *International*

Journal of Ecosystem, 4(1), 1–11. doi: 10.5923/j.ije.20140401.01.

Mitchell, R. & Popham, F. (2007). Greenspace, urbanity, and health: relationships in England. *J. Epidemiol Community Health,* 61, 681–683.

Naab, F. Z., Dinye, R. D. & Kasanga, R. K. (2013). Urbanization and its impact on agricultural lands in growing cities in developing countries: a case study of Tamale in Ghana. Mod. *Social. Sci. J.*, 2, 256–287.

Narh, S. N., Takyi, S. A., Asibey, M. O., Amponsah, O. & Park, U. (2020). Urban Forestry and Urban Greening Garden city without parks: an assessment of the availability and conditions of parks in Kumasi. *Urban Forestry and Urban Greening,* 55(2020), 126819.https://doi.org/10.1016/j.ufug.2020.126819.

Ojekunle, O. Z. (2014). The effects and link ages of deforestation and temperature on climate change in Nigeria, *Global Journal of Science Frontier Research: (H) Environment and Earth Science, USA,* 1(6), 1-18.

Oluwafeyikemi, A. & Julie, G. (2015). Evaluating the impact of vertical greening systems on thermal comfort in low-income residences in Lagos, Nigeria. *Procedia Engineering,* 118, 420-433.

Okunlola, A. I., Adepoju, A. O. & Agele, S. O. (2016). Air Pollution Tolerance Index (APTI) and carbon sequestration of selected trees and shrubs for urban development in Akure Ondo State, Southwest Nigeria. *Braz. J. Biol. Sci.,* 3(6), 395–405.

Pallant, J. 2011. *SPSS Survival Manual-A Step by Step Guide to Data Analysis Using SPSS, 4th edn.* Australia: Allen and Unwin.

Pickering, J., Kintrea, K. & Bannister, J. (2012). Invisible walls and visible youth: Territoriality among young people in British cities. *Urban Studies,* 49(5), 945–960.

Rivera, E., Veitch, J., Loh, V. H. Y., Salmon, J., Cerin, E., Mavoa, S., Karen Villanueva, K. & Timperio, A. (2022). Outdoor public recreation spaces and social connectedness among adolescents. *BMC Public Health,* 22, 165-175. https://doi.org/10.1186/s12889-022-12558-6.

Shackleton, C., P. Hebinck, H. Kaoma, M. Chishaleshale, A. Chinyimba, S. Shackleton, J. Gambiza, V. & Gumbo, D. (2014). Low-Cost Housing Developments in South Africa Miss the Opportunities for Household Level Urban Greening. *Land Use Policy,* 36, 500–509.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative

review and research agenda. *Journal of Environmental Psychology,* 29(3), 309-317. doi:10.1016/j.jenvp.2008.10.004.

Turner, A. G. (2003). *Sampling strategies*- Expert Group Meeting to review the draft handbook on designing of household sample surveys. Secretariat, Statistics Division. ESA/STAT/AC.93/2. Retrieved on January 22 2020 from https://unstats.un.org/unsd/demographic/meetings/egm/sampling_1203/docs/no_3.pdf.

United Nations, 2014. *World Urbanization Prospects:* The 2014 Revision, Highlights (ST/ESA/SER. A/352). New York.

van den Berg, M. Wendel-Vos, W. van Poppel, M. Kemper, H. van Mechelen, W. & Maas, J. (2015). Health benefits of green spaces in the living environment: A systematic review of epidemiological studies. *Urban Forestry and Urban Greening,* 14, 806-816.

van Renterghem, T. (*2019) Towards explaining the positive effect of vegetation on the perception of environmental noise. *Urban Forestry & Urban Greening,* 40, 133–144. DOI: 10.1016/j.ufug.2018.03.007.

Wen, C., Albert, C. & Haaren, C. V. (2018). The Elderly in Green Spaces: Exploring requirements and preferences concerning nature-based recreation. *Sustainable Cities and Society,* 3(7)11-18. DOI: 10.1016/j.scs.2018.01.023.

Wolch, J. R., Byrne, J. & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities' just green enough.' *Journal Landscape and Urban Planning*, 125, 234-244. https://doi.org/10.1016/j.landurbplan.2014.01.017.

Woldegerima, T., Yeshitela, K. & Lindley, S. (2016). Characterizing the urban environment through urban morphology types (UMTs) mapping and land surface cover analysis: the case of Addis Ababa, Ethiopia. *Urban Eco Syst.,* 20, 245–263.

Yapici, G., Ögenler, O., Kurt, O. A., Koças, F. & Sasmaz, T. (2017). Assessment of Environmental Attitudes and Risk Perceptions among University Students in Mersin, Turkey. *Environmental and Public Health,* 5(12), 21-32. https://doi.org/10.1155/2017/5650926.

Zhang, H., Chen, B., Sun, Z. & Bao, Z. (2013). Landscape perception and recreation needs in urban green space in Fuyang, Hangzhou, China. *Urban Forestry and Urban Greening*, 12, 44-52.