



Original scientific paper

Influence of Green Infrastructure on Residents' Endorsement of the New Ecological Paradigm in Lagos, Nigeria

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ARTICLE INFO:

Article History:

Received: 24 February 2022

Revised: 15 June 2022

Accepted: 29 June 2022

Available online: 6 August 2022

Keywords:

Environmental attitudes;
Green infrastructure;
Residents' endorsement
New ecological paradigm;
Lagos metropolis;
Pro-environmental behaviour.

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Journal of Contemporary Urban Affairs stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

ABSTRACT



Given the significance of green infrastructure in enhancing social, economic and ecological sustainability of the built environment, it is important to unearth how green infrastructure can influence pro-environmental behaviours among the urban population. This research assessed the influence of green infrastructure on residents' endorsement of the New Ecological Paradigm (NEP) in Lagos Metropolis, Nigeria. A total of 1560 residents recruited through the multi-stage sampling technique participated in the survey, and the data gathered were subjected to descriptive and regression analyses. The participants generally felt that the available green infrastructure in their neighbourhoods was of low quality and rapidly disappearing, but it positively influenced all the key variables of the NEP and its endorsement. The size of neighbourhood green spaces, availability of green spaces for relaxation and its proximity to the people were found to be the three attributes of green infrastructure with the most noticeable influence on residents' endorsement of NEP. This study implies that the availability and accessibility of a reasonable quantity of green areas within urban neighbourhoods can enhance a better understanding of the role of green infrastructure and promote favourable environmental behaviours among the urban population within and outside Nigeria.

JOURNAL OF CONTEMPORARY URBAN AFFAIRS (2022), 6(2), 159-173.

<https://doi.org/10.25034/ijcua.2022.v6n2-4>

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1. Introduction

With the alarming rate of environmental challenges, it is important to intensify efforts that can promote a better understanding of the environment and engender positive ecological behaviours among the urban population across

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How to cite this article:

Dipeolu, A. A., Ibem, E. O., & Oriola, O. A. (2022). Influence of Green Infrastructure on Residents' Endorsement of the New Ecological Paradigm in Lagos, Nigeria. *Journal of Contemporary Urban Affairs*, 6(2), 159-173. <https://doi.org/10.25034/ijcua.2022.v6n2-4>



the globe. One major area of research in the built environment that can promote local and global ecological sustainability is the exploration of different strategies for deepening understanding of the environment as the basis for human existence. Researchers generally agree that such strategies must be geared towards an understanding of people's feelings and attitudes toward environmental issues (Kovács et al., 2014; Steg et al., 2014). Empirical studies have confirmed a strong relationship between attitudes and ecological behaviours as evidenced in the various environmental attitudes (EA) scales developed over the years. Moreover, research on the environment is gaining momentum, especially arising from the need to develop strategies to mitigate human-induced environmental problems. Several studies have argued that many of these problems are products of human behavioural tendencies (Giusti & Samuelsson, 2020; Ogunbode, 2013; Santiago et al., 2015; Steg & Vlek, 2009; Zuniga-Teran et al., 2019). Thus, studies that help to improve understanding of people's way of life, organization and their use and disposition toward their environment are necessary for identifying strategies for encouraging environmental attitudes that can promote a quality and sustainable environment in the population (Erdogan, 2009; Steg et al., 2014; Vlek & Steg, 2007).

However, in the quest to develop a positive attitude among urban dwellers it is also imperative to explore the influence of green infrastructure in residential neighbourhoods, which is the simplest form of nature, on residents' understanding of several concepts used in the assessment of how humans relate with the natural ecological system. The green infrastructure consists of natural and semi-natural spaces like parks, gardens, green roofs, sports fields, streams, fountains, river banks, horticulture, community gardens, street trees, school yards and others (Dipeolu & Ibem, 2020; Jiang et al., 2018; Yu et al., 2019; Zijlema et al., 2020). The potential benefits of green infrastructure range from improving individuals' health and well-being (Maes et al., 2015), strengthening social cohesion within the community (Kim et al., 2013), and providing environmental services like reducing urban heat islands, carbon sequestration, flood control, create a micro-climate and reconnecting fragmented natural

environment (Ignatieva et al., 2010; Naumann et al., 2011; Venter et al., 2020).

In suggesting solutions to environmental challenges, different assessment parameters, scales and paradigms for assessing peoples' concern and care for the environment have been put forward and empirically tested in different studies. Some of these include but not limited to a- the Maloney-Ward ecology inventory scale that measures knowledge, emotion and verbal and/or practical commitment; b-new environmental paradigm (NEP) scale that measures the extent to which people endorse the then-emerging worldview; (Dunlap & Van Liere, 1978) c- the ecological and human-centred scales for assessing the motivations of individuals to protect the natural environment because of its intrinsic values (Thompson et al., 1994); Thompson and Barton (1994); d- motivation toward the environment scale for measuring individuals rationale for engaging in environmentally-friendly behaviours (Pelletier et al., 1998); e- the scale that measures the level of connectedness and emotional feeling attached to natural environment (Mayer & Frantz, 2004) the integration-opposition scale used to measure the appreciation of human-nature interactions (Carrus et al., 2004) and f: the human-centred scales designed by Thompson et al. (1994) to assess individual value of nature-based on the materials or physical benefits it offers to man. Of specific interest to this study is environmental attitude measurement derived from the revised new ecological paradigm (NEP) scale by Dunlap et al. (2000), which among other things measures the magnitude of the approval human beings give to the ability of man to effectively manage the environment, the extent of industrial development within the environment's carrying capacity, and the need to preserve and care for the environment. Although this scale has been used globally to assess environmental attitude in the literature as noted by previous authors (Dunlap, 2010; Hawcroft & Milfont, 2010), the extent to which the availability of green infrastructure in residential neighbourhoods could affect residents' endorsement of the NEP scale is still grossly under-researched, especially in neighbourhoods in most Africa nations. This is probably because the existing literature seems to concentrate more on discovering the psychometric properties of the scale of measurement of the NEP without assessing its



relationship with green infrastructure, especially in emphasising the variables common to developing nations.

Given this, it has become imperative for urban planners and managers to widen their search for specific strategies that can promote positive environmental attitudes by taking advantage of the green infrastructure facilities within the built environment. Thus, the need for this research in selected residential neighbourhoods in the Lagos metropolitan area of southwest Nigeria. This study specifically attempted to provide answers to three key research questions:

- i. What are the perceptions of residents on the general characteristics of green infrastructure in Lagos Metropolis?
- ii. To what extent has the availability of green infrastructure influenced the endorsement of the revised NEP scale by dwellers in Lagos Metropolis?
- iii. Which characteristics of green infrastructure mostly influence the endorsement of the NEP by residents in the Lagos metropolitan area, Nigeria?

The research created a novelty in its potential to deepen our understanding of the capacity of green infrastructure in shaping the environmental attitude of the public in the area of study. In addition, by revealing the attributes of green infrastructure which mostly influence the endorsement of the NEP scale among the urban population in Lagos, the study findings are expected to inform urban planners and policymakers on the characteristics of green infrastructure that should be given priority attention in aiding urban residents to imbibe pro-environmental behaviours, which are vital in achieving sustainable urban environments in Nigeria and beyond.

2. Review of related literature

2.1 Urban Green Infrastructure

Several definitions and conceptions of green infrastructure are available in both research and policy literature. Many of these definitions and conceptions are based on professional and disciplinary perspectives. For example, whereas some authors viewed grasses, flowers and trees in the cities as green infrastructure because of their visual green components, others have referred to green infrastructure as specially designed structures such as water treatment facilities or allocated recreational spaces or buildings that are designed to be

environmentally friendly. It has also been observed that people sometimes confuse the term "infrastructure," and think of it as grey infrastructures like road kerbs and signposts, or infrastructural facilities like health centres, shopping malls, train stations or hotels (Bao, 2010). Facilities in this category are called built infrastructure and are distinct from green infrastructure (Beauchamp & Adamowski, 2013). Further, Mell (2010) observed that the definitions of green infrastructure adopted by authors reflect their area of interest in green infrastructure research. For instance, recreational and landscape specialists usually focus on the benefits derived from contact with nature (Dipeolu et al., 2021; Frumkin et al., 2017; Jiang et al., 2018), and urban planners and managers are mostly attracted to the policy implementation aspect (Alaimo et al., 2016; Austin, 2014), while conservationists and ecological specialists tend to articulate the ecological and biodiversity components of green infrastructure (Benedict et al., 2012; Naumann et al., 2011). Although the definitions and components of urban green infrastructure may vary, green infrastructure is described as natural or semi-natural urban environments having a reasonable quantity of green spaces (Dipeolu et al., 2021; Wolch et al., 2014; Zhang et al., 2017).

Green infrastructure provides vital ecological services to the built environment, enhancing the functionality of the micro-climates and strengthening the quality of life of urban residents. Urban green infrastructure provides facilities and spaces for relaxation, socialisation and emotional connectivity to nature for individuals and families. Previous studies have argued that the most significant contribution of green infrastructure is the psychological well-being of individuals (Maes et al., 2015; Venter et al., 2020; Zhang et al., 2017). Other benefits associated with urban it includes an increase in worker productivity, reduction of stress and increase in motivation to undertake new challenges (Kim & Song, 2019; Zuniga-Teran et al., 2019). Additionally, green spaces have been linked to fostering social interactions, reducing the crime rate, and enhancing the social cohesion within the community (Arnberger & Eder, 2012; Cooper et al., 2014; Dipeolu et al., 2021; Santiago et al., 2015), reducing energy costs (Gómez-Muñoz et al., 2010), regulating ambient air temperatures, providing the



opportunity for carbon sequestration and improving water and air quality (Barthel et al., 2013; Brantley et al., 2014). These benefits might help to explain why the importance of green infrastructure in the contemporary urban development and sustainability discourse cannot be over-emphasized.

2.2 The New Ecological Paradigm (NEP)

The idea of a new ecological paradigm (NEP) scale, originally known and described as the "new environmental paradigm," was initially conceived by Dunlap and Van Liere in 1978 to evaluate the relationship between humans and nature, specifically on the belief that activities in the modern world were altering the ecological balance, the existing growth limit, and intensifying the human-centred attitude toward nature (Chaves, 2012; Dunlap, 2010). In general, NEP is hinged on the understanding that human relationships with nature should be handled with more care now than ever before. Therefore, individuals adapting the NEP philosophy see grave danger in the present condition of the earth; and thus, canvass the need to rethink how humans relate to the natural environment and curtail human activities within the carrying capacity of the ecological environment (Amburgey & Thoman, 2011). Approving these basic tenets of the NEP by an individual is a measure of the extent of concern about the environment in such an individual (Chaves, 2012; Erdogan, 2009). Therefore, the NEP scale has been seen as the most widely used among other several measures of environmental attitude among the public (Schultz et al., 2004).

The scale derived from the revised NEP has been adopted by different authors and researchers from various cultural backgrounds (Lee & Paik, 2011; Milfont & Duckitt, 2010). For example, in a study to measure environmental attitude among middle-income household heads in Cebu city of Philippines, it was discovered that respondents agreed that there were dangerous outcomes from the severe abuses the environment was being subjected to, and their NEP ratings indicated poor concern for the environment (Chaves, 2012). In another study in Arad, Romania, and Faro in Portugal, that sought to uncover the level of approval of the NEP by the residents using their demographic characteristics and the NEP scale, it was reported that people partially endorsed the NEP and that this was influenced by opportunities

technology offers and the belief in the existence of unlimited resources. Also, in a related study to explore the degree to which 1295 undergraduates in four universities in Turkey were endorsing the NEP, Erdogan (2009) reported that about 56% of the respondents held pro-NEP views, while around 24.9% embraced the dominant social paradigm (DSP) views and 19.1% indicated ambivalent views. In a like manner, previous studies targeted at interest groups such as environmental organisations and other pro-environmental groups consistently found that environmentalists and other pro-environmental groups obtained better scores on the NEP compared to the laymen or the non-environmentalists (Dipeolu, 2017; Wiidegren, 1998)

Although, Dunlap et al. (2000) argued that some items in the NEP scale are an obsolete set of beliefs that indicate human perceptions of nature and the environment, several authors (Amburgey & Thoman, 2011; Hawcroft & Milfont, 2010; Kovács et al., 2014) also believe that the NEP consists a logical pattern of beliefs toward the environment and represents a criterion that predicts human behaviours. Howbeit Dunlap and Van Liere (1978) have noted that the NEP scale has established research validity among different groups, Thompson et al. (1994) insist that the findings of studies relating to perceptions of the NEP scale were the outcome of individual experiences, especially in natural environments. Nonetheless, despite the challenges of determining the behaviours and attitudes of humans as it relates to the natural environment, research has shown a strong link between the items in the NEP and some aspects of human behaviours, including self-reported and observed behaviours (Kovács et al., 2014; Milfont & Duckitt, 2010). Despite these, it is still not clear how these behaviours relate to the existence of green spaces in the built environment and how the quantity and quality of green infrastructure around residential environments can influence residents' endorsement of the environmental attitude measurement under the NEP scale. These are the key issues the current study sought to address using survey data derived from residents of the rapidly growing city of Lagos, southwest Nigeria.

3. Research methods

3.1 Data and Sample

The study area for this research was four randomly sampled Local Government Areas (LGAs) in Lagos metropolitan area, namely;

Surulere, Lagos Island, Kosofe and Ikeja, all of which make up one-quarter of the sixteen administration areas in the Lagos metropolitan area of the Lagos State southwest Nigeria (see Figure 1).

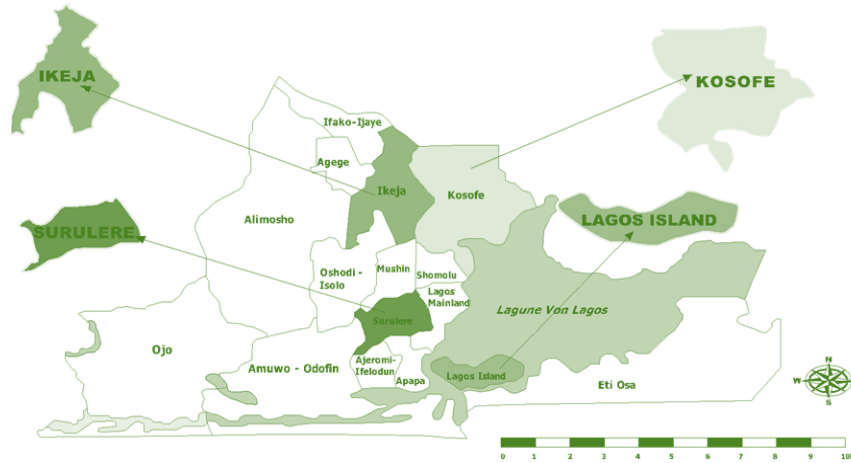


Figure 1. Map of Lagos Metropolis indicating selected Local Government Areas
Source: Lagos State Secretariat, Ikeja Lagos.

Although the research population comprised all residents in the earmarked communities, the high rate of population growth made it difficult to rely on the last population census figure of 2006 for an accurate determination of the population of residents in the Lagos metropolitan area. Consequent to this, the sample size (n) for this study was derived from the formula put forward by Turner (2003) and represented in the following equation.

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

Where *n* represent the expected number of participants, *p* is part of the overall population representing the target population to factor parameter, *r*, and calculated as 0.03x18 =0.54. As explained by Turner (2003), 0.03 was recommended for each year of age included in the expected population and *h*= household size, which is 6 persons in developing nations) and *e* =0.05 for the allowed error margin set at 5% of *r*. In addition, $Z_{\alpha}=1.96$, which stands for the critical value of normal distribution provided in the Standard Normal Distribution Table at a confidence level of 95%, *f* =4 is the design effect, *r* = 50%, which is an estimate of part of the number of the expected respondents in the research and *k*=20% and represents the margin added to the sample size to take care of non-response rate. Using equation 1, the sample size

was calculated by substituting the foregoing values and these parameters as shown in equation 2

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

-----Equation 2

The result obtained was 380 participants as the smallest number of informants to be selected from each of the four LGAs. This gives 1,520 overall minimum participants.

3.2 Measures

A semi-structured questionnaire specifically developed for this study with contents from existing literature was used to generate the required data. Contents of the questionnaire were arranged in three different sections: Sections I, II and III. Section I had questions on the socio-demographic profile of the survey participants, Section II contained information on the participants' understanding or interpretation of the quantity and quality of green infrastructure in their neighbourhoods, while Section III contained 15 items of the NEP scale. In collecting data in section II, the residential quality indicators as perceived by the residents (PRQI) scale previously invented by Bonaiuto et al. (2006) was adopted. Each participant in the survey is required to show the level of agreement or disagreement with



carefully structured statements on green infrastructure quality within a 5-point Likert type scale that ranges from '1' (Strongly Disagree) to '5' (Strongly Agree). The mean score for each statement was interpreted based on the framework previously proposed in the work of Akpa and Bamgboye (2015), which recommended that a mean score < 3.0 should be described as poor quality, mean score = 3.0 for average quality and mean score >3.0 for good quality was adopted.

Similarly, section III of the questionnaire was used to generate information on the respondent's perception of how the quality of green infrastructure in their neighbourhoods had influenced their endorsement of the NEP scale. The revised NEP scale investigated has 15 items, and these items are related to the notion that "humans have the right to modify the natural environment to suit their needs" or "the balance of nature is very delicate and easily upset". Participants were also expected to indicate the extent to which they agree or disagree with the selected statements on a 7-point Likert type scale ranging from '1' (Strongly Disagree) to '7' (Strongly Agree). However, this rating was done bearing in mind the key advantages of urban green infrastructure in shaping the man-nature interaction; thus, helping the respondents to indicate the extent to which the availability of urban green infrastructure can contribute to the environment and also determine if these were strong enough to elicit strong or weak endorsement of the statements. Notably, seven of the 15 NEP statements, including 6th, 7th, 8th, 11th, 13th - 15th stated in negative form (disagreement), and thus scored in reverse order. The remaining eight NEP statements: 1st - 5th, 9th, 10th, and 12th items were stated in positive form (agreement). Notably, both the disagreement and agreement statements help to assess the respondents' concern for the ecological environment as previous authors had indicated (Dunlap, 2010; Kovács et al., 2014).

To enhance the validity of the study findings, the initial questionnaire was moderated by experienced researchers and pre-tested in Ojo Local Government Area in Lagos metropolitan area. Results from the pre-test assisted in adjusting the questionnaire for the main survey. Furthermore, the Cronbach's Alpha reliability

test was conducted on the data to understand the reliability of the scale of measurement for the present study. The results yielded a value of 0.79 and 0.71 for the 15 and 10 items of NEP and the PQGI scale, respectively. These results are more than the 0.6 acceptance level Pallant (2020) and thus, the instruments were considered reliable in measuring the PQGI and endorsement of the NEP scale in this survey.

3.3 Data collection and analysis

As part of the initial preparation for the survey, the archive of the National Population Commission (NPC) office in Lagos State was visited to secure data on Enumeration Areas from where seventeen Enumeration Areas were identified in the selected four LGAs involved in this study. To select participants for the study, sampling intervals (n) were calculated for each EA by dividing the total of dwelling units by the estimated sample size proportionately allocated to each of the enumeration areas. Consequently, households were selected systematically using a list of numbered houses in the neighbourhoods. The first participants were randomly sampled in each EA, while the rest were selected in the order established by the sampling interval (n). Each household head or their representative was requested to complete a questionnaire in every dwelling unit selected. The fieldwork was carried out between April and May 2019 by the authors and trained field workers using 1600 copies of the questionnaire. At the end of the survey, 1560 (97.5%) copies were correctly filled and returned by the respondents

In line with the research questions stated in the introductory section of this paper, the data generated from the fieldwork were analysed using two main types of statistical tools. The first was descriptive analysis involving the use of descriptive statistics such as frequency and percentage distributions to describe the socio-demographics of the participants in the survey. The measure of central tendency (mean) and variation (standard deviation) were specifically employed in the analysis to see how participants perceived the green infrastructure quality (PGIQ) using the ten quality indicators and the overall rating of the green infrastructure quality collectively provided by all the 1560 participants in the survey. The second was the variant of multiple regression analysis is known as



Categorical Regression (CATREG) analysis, which meant to explore how the perceived quality of green infrastructure in the residential neighbourhoods influenced the participants' endorsement of the NEP. In the regression analysis, the NEP mean value serves as the dependent variable, while the mean values for each of the ten statements describing green infrastructure quality as perceived by the respondents were the independent variables. This specific analysis helped in the identification of the variance R2 accounted for, uncovering and comparing the contributions of the various green infrastructure characteristics in explaining the participants' endorsement of NEP in this research. The CATREG analysis was adopted in this research because the dataset is mainly ordinal as Shrestha (2009) had suggested that this variant of multiple regression was most suited for an ordinal dataset.

4. Results

4.1 Participants' description of attributes of green infrastructure

Results of the socio-demographics of those residents that took part in the survey reveal that a majority (58.6%) of them are married male household heads of over 29 years having a household size of between 2 persons and 4 persons (Table 1). The results also show that around 70.6 per cent and 87.4 per cent of the respondents are of Yoruba ethnic origin and attained at least a post-primary education and that about 73.2 per cent of them were employed (Table 1). These results generally show that the respondents are indeed literate, which is typical of the Lagos urban population; and thus, they are considered qualified to provide valid responses to the questions on the questionnaire.

Table 1. Demographics of the participants.

Variables	Frequency	Percentage (%)
Sex		
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		
Never been marriage relationship	592	37.9
Currently in a marriage relationship	896	57.4
No longer married	62	4.0
No Response	10	0.6
Number of persons in the 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 level of educational attainment		
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

The results (from Table 2) of the participants' understanding and interpretation of the features of green infrastructure in the Lagos

metropolis reveal the range for the mean scores to be 2.05±1.11 to 3.57±1.26. The respondents further asserted that there is a minimum of one



garden or park for residents' inter-personal relationships and that green areas were comparatively small in quantity and not enough and were fast disappearing in their neighbourhoods. In addition, the residents strongly disagreed with the following a) there was a dearth of parks where young people can freely play; b) the majority of green spaces in their estates are in proximity to the people; c)

the green areas within their neighbourhoods have adequate equipment; d) residents in this neighbourhood usually visit more parks located outside the neighbourhoods in the city, and e) that their neighbourhoods have green areas that are in good condition. Their levels of agreement/disagreement are reflected in the mean score for each of the 10 items as presented in Table 2.

Table 2. Residents' rating of the features of Green Infrastructure.

Specific Features	Mean	S.D
Green areas are in small quantity in our neighbourhood	3.57	1.26
We are confronted with the fast depletion of green spaces in this neighbourhood	3.47	1.28
We have in this neighbourhood minimum of one garden or park for residents' interaction	3.28	1.27
We do not lack green areas for recreational activities in our neighbourhood	3.10	1.33
There are no parks in our neighbourhood where young people freely can play	2.82	1.40
People stay close to a majority of green areas in this neighbourhood	2.68	1.26
Green spaces in our neighbourhood are adequately equipped	2.54	1.27
Residents in this neighbourhood usually visit more parks located outside the neighbourhoods in the city	2.53	1.29
Green spaces in this neighbourhood are in good condition	2.46	1.24
The green spaces in this neighbourhood are adequate	2.05	1.11

4.2 Endorsement of the NEP by residents in the survey

NEP scale in the study area, the mean scores for the influence of GI quality on their endorsement of the NEP ranged from 4.12±1.93 to 5.62±1.45 (Table 3). A cursory look at the result reveals that the participants felt that green infrastructure

had a positive influence on their endorsement of the 15 aspects of the NEP statements investigated in this study. This was informed by the mean score above 3.5 for each of the 15 variables related to NEP statements investigated (see Table 3).

Table 3. Respondents' rating of influence of green infrastructure in endorsement of the NEP.

Green Infrastructure versus New Ecological Paradigm	Mean Score	S.D
Helps to sustain and develop the earth 's natural resources	5.62	1.45
Ensures that human beings are not seriously abusing the environment	5.47	2.35
The availability of green infrastructure can help to avert ecological catastrophe	5.44	1.50
Assists people understand activities of nature and putting such activities under control	5.42	1.46
People can take advantage of green infrastructure to subdue nature	5.37	1.55
Helps to create habitats for plants and animals	5.35	1.51
Helps to balance the delicate nature of the earth	5.28	1.57
Enhances human special abilities to cope well with the laws of nature	5.25	1.56
Helps to modify the natural environment to meet human demands	5.16	1.69
Helps to balance nature and the impacts of modern industries.	5.13	1.51
Human destruction of green infrastructure often led to disastrous consequences	5.11	1.72
Human ingenuity without green infrastructure will make the earth unliveable	5.09	2.02
Green infrastructure helps to maintain the earth with its limited spaces	4.84	1.84
Enhances expansion of the earth's human carrying capacity	4.71	1.88
Helps to resolve the ecological crisis facing humankind	4.12	1.93

4.3 Influence of Green Infrastructure on the Participants' endorsement of the NEP

The descriptive analysis revealed that of the 15 items used to investigate the participants' endorsement of The regression model of the influence of green infrastructure on the endorsement of the NEP scale produced F

(385.077, 1174.923) =12.135, p<0.000 and R2=0.247, suggesting 25% of the variance in the influence of the features of green infrastructure on the participants' endorsement of the NEP was accounted for in the regression model used in the study. The regression coefficients also show that based on the p-values, only one out



of the 10 characteristics investigated in this research, that is the condition of green spaces/areas in the neighbourhoods ($p=0.161$) did not come up as a significant predictor of the participants' endorsement of the NEP (Table 4).

This means that nine features of green infrastructure significantly influenced participants' endorsement of the NEP in the study area.

Table 4. Regression analysis of Green Infrastructure features on the endorsement of the NEP.

Features of Green Infrastructure	Standardized		df	f	p
	Coefficients				
	Beta	Estimate of Standard Error			
Green areas are small in quantity in this neighbourhood	0.065	0.039	4	2.791	0.025*
In this neighbourhood, there are green areas for relaxation	0.223	0.052	4	18.533	0.000*
We have a minimum of one garden or park in our neighbourhood where people can interact	0.074	0.040	4	3.381	0.009*
Green spaces in this neighbourhood are in good condition	0.058	0.045	4	1.644	0.161
There are no parks in this neighbourhood where children can freely play	0.126	0.046	5	7.448	0.000*
Residents in this neighbourhood usually enjoy the services of parks located in other neighbourhoods in this city	0.062	0.037	4	2.769	0.026*
The green areas in our neighbourhood are small	0.254	0.056	4	20.641	0.000*
Many green areas in our neighbourhood are rapidly been depleted	-0.133	0.045	4	8.569	0.000*
Green spaces in this neighbourhood are adequately equipped	0.132	0.044	4	9.003	0.000*
People stay close to a majority of green areas in our neighbourhood	0.200	0.045	4	20.013	0.000*

Dependent Variable: Mean Score of New Ecological Paradigm
*significant predictors

Considering the Beta (β) coefficients as presented in Table 4 in the ascending order of value, the small number of green areas in this neighbourhood having a beta coefficient of 0.254 is the most noticeable feature of green infrastructure that influenced residents' endorsement of the NEP. This indicates that the size of available green spaces contributed most to explaining residents' endorsement of the NEP scale in the study area. Closely follow is the existence of green areas for relaxation ($\beta = 0.223$), the closeness of a majority of the green areas to the people ($\beta= 0.200$), fast depletion of the green areas ($\beta = 0.133$), level of equipment of the green areas in the neighbourhoods ($\beta =0.132$), availability of parks in the neighbourhoods where children can freely play ($\beta= 0.126$) and others. These results mean that residents' endorsement of the NEP scale will change by 0.254, 0.223, 0.200, 0.133, 0.132 and 0.126 times for 1 unit addition in standard deviation in the number of green areas, the existence of green areas for relaxation, people stay close to a majority of green areas in the neighbourhood, reduction in the rate depletion of the green areas, level of equipment of the green areas and availability of parks in the neighbourhoods where children can freely play neighbourhoods, respectively.

5. Discussion of Findings

In this research, the influence of green infrastructure on residents' endorsement of the new ecological paradigm was investigated. Overall, there are some key issues which have emerged that require further discussion. First, is the finding of how the residents felt about the general attributes/characteristics of green infrastructure in neighbourhoods sampled. Generally, the participants felt that the available green areas were relatively too small, being depleted at a very fast rate, not adequately equipped and thus were considered not to be in good condition. This shows that the residents felt that the green spaces in the residential neighbourhoods sampled were not enough both in quantity and quality. This implies that the current efforts by the Lagos State Parks and Gardens agency in upgrading the green areas in Lagos metropolitan area are yet to produce the desired results as expected by the people. Considering the evidence in the literature on the role of green areas in enhancing ecological balance (Kim et al., 2013; Zhang et al., 2017), promoting environmental sustainability (Dipeolu & Ibem, 2020), community attachment and social cohesion (Dipeolu et al., 2020), the perceived inadequacies of green spaces in the neighbourhoods can contribute to inhibiting the rate at which the residents can imbibe environmentally-friendly behaviours and



denying the city of the several ecological benefits associated with green infrastructure, especially in the area of enhancing its capacity to cope with the challenges associated with climate change.

Secondly, regarding the extent to which the existence of green infrastructure has influenced the respondents' endorsement of the NEP in the neighbourhoods sampled, the survey data also show that the participants believe that the quality of existing green infrastructure was generally poor, but the fact that it was available had a positive influence on their endorsement of the 15 different aspects of the NEP investigated. With each of the 15 items used to investigate endorsement of the NEP having a mean score above 4.01 (Table 3), it is obvious that the residents were certain that the existence of green infrastructure in the neighbourhoods contributed positively to their endorsement of the NEP. In support of previous studies (Liu et al., 2015; Wolch et al., 2014), the respondents generally agreed that green infrastructure can help to sustain and develop the earth's natural resources, create habitats for plants and animals and balance the delicate nature of the earth. In addition, the results further revealed that the participants felt that the presence of green infrastructure in their surroundings contributed to enhancing the capacity of the natural environment to meet human needs; balance nature and the impacts of modern industries and also assist in resolving ecological crisis confronting humankind, especially, in town and cities. These are no doubt basic ecological benefits of green infrastructure that previous authors (Lee & Maheswaran, 2011; Ogunbode, 2013) had a link to the new ecological paradigm.

Lastly, this study also identified nine features of green infrastructure that influenced the participants' endorsement of the NEP. Notably, the size of green spaces, the existence of green spaces for relaxation and the closeness of the green spaces to the residents, respectively, had the greatest positive influence, while the availability of green areas for relaxation in the neighbourhoods had the least influence on the endorsement of NEP. These results seem to provide support to the existing studies (Austin, 2014; Barthel et al., 2013; Benedict et al., 2012) linking green infrastructure and ecological benefits in urban neighbourhoods. Further, the

discovery of the size of green spaces in the neighbourhoods as one of the leading factors influencing the participants' endorsement of the NEP in this research is well-rooted in previous literature. In fact, according to Ignatieva et al. (2011), large green spaces promote biodiversity by providing habitat for plants and animals in the terrestrial and aquatic environment, especially in a place like Lagos State, Nigeria, which has a massive aquatic environment. In addition, several authors (Naumann et al., 2011) have also reported that the availability of green spaces helps residents to have a wider perspective of the functions of nature, including conservation, and social and environmental regeneration, especially in large cities like Lagos.

Similarly, the identification of the existence of green areas for relaxation as the next in the order of influence of green infrastructure characteristics on the residents' endorsement of the NEP is also incongruent with the findings of previous studies (Dipeolu et al., 2021; Kim & Song, 2019; Mansor et al., 2012), indicating that green gardens in urban centres are made up of diverse components of green infrastructure, including street trees, fountains, open spaces, horticulture, urban forests, streams and other water bodies capable of providing the urban population with the opportunities to engage in social interactions and recreational activities in the natural environment. (Mansor et al., 2012) in particular observed that these categories of green infrastructure encourage city residents to engage in various activities such as relaxation, walking and other forms of mental and physical activities that promote mental and physical health and well-being. They are also known to provide the opportunity for people to gain access to nature, unlike the situation where green areas have been completely depleted and replaced with grey infrastructure and there is little or no access to elements of nature for recreation and leisure in towns and cities.

The result shows that the closeness of the green areas to the residents as the next green infrastructure feature with a high influence on residents' endorsement of NEP was also expected. This is because the presence of green infrastructure in urban neighbourhoods has been linked with a positive influence on social interactions by previous studies (Dipeolu et al., 2021; Zhang et al., 2017). The existing studies have also confirmed that having access to



green infrastructure, which is a function of the location of such elements of nature to close to the people can also engender regular contact with nature (Mansor et al., 2012) and that natural environments, such as gardens, parks, community forests, river views, fountains and open spaces have been reported to contribute greatly to improved health (Zijlema et al., 2020). Indeed, natural environments, have empirically been identified as avenues for promoting physical interactions, mental restoration and stress reduction (Markevych et al., 2017; Zhang et al., 2017). It was on this premise that Polat and Akay (2015) noted that the search for comfort in outdoor environments, in particular, was increasingly turning towards having contact with natural environments that green spaces offer to urban dwellers. For the residents of Lagos metropolis, Nigeria, having access to and living close to green infrastructure might mean that they do not need to go in search of green infrastructure and enjoy the benefits associated with adequate contact with nature and its restorative functions.

7. Conclusions and Recommendations

The findings of this study, which explored the influence of green infrastructure on the endorsement of the new ecological paradigm by residents of neighbourhood environments of Lagos metropolis in southwest Nigeria, have produced three major conclusions. The first conclusion is that the respondents in the study rated the quality of the green infrastructure in the studied neighbourhoods low. The second is that notwithstanding the perceived low quality of green infrastructure, the participants felt that the presence of this vital component of the built environment in their neighbourhoods had positively influenced their endorsement of the NEP. The last but not the least conclusion is that the three most important features of green infrastructure that significantly influenced the residents' endorsement of the NEP are the size and existence of green areas for relaxation and the closeness of the green areas to the residents in the neighbourhoods.

There are notable implications from the findings of this study. First, the study implies that residents in Lagos metropolis are confronted with challenges relating to poor quality of green infrastructure; suggesting that they are yet to enjoy the full benefits associated with green

infrastructure, which could have contributed to their level of manifestation of pro-environmental behaviours. To address this situation, the LASPARK, other public institutions and non-state actors responsible for urban development and management need to scale up their activities and programmes to ensure that more green infrastructure, including green spaces, gardens, recreational parks, sports fields and street trees among others are adequately provided and properly maintained in the residential neighbourhoods, towns and cities within and outside Nigeria. Among other benefits, this will help improve the quality and quantity of green infrastructure and reverse the growing trend in the depletion of this vital component of the ecosystem in urban areas. In addition, it is also suggested that when planning and developing public resources such as green infrastructure, the opinions and views of the residents regarding such facilities should be sought and incorporated into the process. Notably, this will help to minimize any form of inconsistency between the need and expectations of users and what urban managers are providing.

Second, the research approach employed suggests that this research has some limitations. For example, the data used were gathered basically through questionnaire administration, and this makes the results to be limited to the participants' biases and moods, which are outside the control of the researchers. In addition, in terms of geographic scope, the survey was restricted to some selected neighbourhoods in the four Local Government Areas of Lagos metropolitan area; and as such the findings cannot be generalised to other residential neighbourhoods and LGAs in Lagos State, southwest Nigeria. To this end, future studies are required in other neighbourhoods and LGAs in this State and beyond. Finally, the regression analysis used in this research accounted for approximately 25% of the influence of green infrastructure on the endorsement of NEP. This implied that about 75% of the factors are not explained in this study. Therefore, other studies are recommended and such studies should include more variables to identify the remaining 75% of the predictors of urban population endorsement of the NEP.



Acknowledgements

The authors specially acknowledged the contributions of the Lagos State Government in approving this study (MOE/OES/7250/52) and also the residents of the study area for their voluntary participation.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest

The Author(s) declare(s) that there is no conflict of interest.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

Ethics statements

Studies involving animal subjects: *No animal studies are presented in this manuscript.*

Studies involving human subjects: *No human studies are presented in this manuscript.*

Inclusion of identifiable human data: *No potentially identifiable human images or data is presented in this study.*

CRedit author statement

Conceptualization: A.A, E.O. **Data curation:** A. A., O. A. **Formal analysis:** E.O., A.A. **Investigation:** O. A., A. A., E. O. **Methodology:** A.A., E.O., O.A. **Project administration:** O.A., A.A. **Writing—original draft:** E.O., A.A. **Writing—review and editing:** A.A., E.O., O.A. All authors have read and agreed to the published version of the manuscript.

References

- 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 Children and Youth Studies, 10*(3), 225-242. <https://doi.org/10.1080/17450128.2015.1066914>
- Alaimo, K., Crawford, C., & Snyder, E. H. (2016). Harvesting Health in the Garden. In E. Hodges Snyder, K. McIvor, & S. Brown (Eds.), *Sowing Seeds in the City: Human Dimensions* (pp. 65-75). Springer Netherlands. https://doi.org/10.1007/978-94-017-7456-7_5

- Amburgey, J. W., & Thoman, D. B. (2011). Dimensionality of the New Ecological Paradigm: Issues of Factor Structure and Measurement. *Environment and Behavior, 44*(2), 235-256. <https://doi.org/10.1177/0013916511402064>
- Arnberger, A., & Eder, R. (2012). The influence of green space on community attachment of urban and suburban residents. *Urban Forestry & Urban Greening, 11*(1), 41-49. <https://doi.org/10.1016/j.ufug.2011.11.003>
- Austin, G. (2014). *Green Infrastructure for Landscape Planning: Integrating Human and Natural Systems*. Routledge. <https://doi.org/10.4324/9781315856780>
- Bao, L. (2010). *Green infrastructure application in the Chelsea River Subwatershed 4*. Amherst: University of Massachusetts]. https://scholarworks.umass.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1003&context=larp_ms_projects
- Barthel, S., Parker, J., & Ernstson, H. (2013). Food and Green Space in Cities: A Resilience Lens on Gardens and Urban Environmental Movements. *Urban Studies, 52*(7), 1321-1338. <https://doi.org/10.1177/0042098012472744>
- Beauchamp, P., & Adamowski, J. (2013). An Integrated Framework for the Development of Green Infrastructure: A Literature Review. *European Journal of Sustainable Development, 2*(3), 1-24. <https://doi.org/10.14207/EJSD.2013.V2N3P1>
- Benedict, M. A., McMahon, E. T., Fund, M. A. T. C., & Bergen, L. (2012). *Green Infrastructure: Linking Landscapes and Communities*. Island Press.
- Brantley, H. L., Hagler, G. S. W., J. Deshmukh, P., & Baldauf, R. W. (2014). Field assessment of the effects of roadside vegetation on near-road black carbon and particulate matter. *Science of The Total Environment, 468-469*, 120-129. <https://doi.org/10.1016/j.scitotenv.2013.08.001>
- Carrus, G., Passafaro, P., & Bonnes, M. (2004). *Ambientalismo, autoritarismo ed etnocentrismo: Una scala di atteggiamento verso il verde urbano*. APA PsycNET. <https://psycnet.apa.org/record/2004-18336-001>
- Chaves, M. G. F. (2012). New Ecological Paradigm: Testing the Environmental Concern Among Urban Middle Income Cebu City Household Heads. *JPAIR Multidisciplinary Research Journal, 8*(1), 38-57. <https://doi.org/10.7719/jpair.v8i1.169>



- Cooper, C. H. V., Fone, D. L., & Chiaradia, 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(1), 1–14. <https://doi.org/10.1186/1476-072X-13-11>
- 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 Tech., 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), 267-282. <https://doi.org/10.1080/19463138.2020.1719500>
- Dipeolu, A. A., Ibem, E. O., & Fadamiro, J. A. (2020). Influence of green infrastructure on sense of community in residents of Lagos Metropolis, Nigeria. *Journal of Human Behavior in the Social Environment*, 30(6), 743-759. <https://doi.org/10.1080/10911359.2020.1740853>
- Dipeolu, A. A., Ibem, E. O., Fadamiro, J. A., & Fadairo, G. (2021). Factors influencing residents' attitude towards urban green infrastructure in Lagos Metropolis, Nigeria. *Environment, Development and Sustainability*, 23(4), 6192-6214. <https://doi.org/10.1007/s10668-020-00868-x>
- Dunlap, R. E. (2010). The New Environmental Paradigm Scale: From Marginality to Worldwide Use. *The Journal of Environmental Education*, 40(1), 3-18. <https://doi.org/10.3200/JOEE.40.1.3-18>
- Dunlap, R. E., & Van Liere, K. D. (1978). The “new environmental paradigm.” *Journal of Environmental Education*, 9(4), 10–19. <https://doi.org/10.1080/00958964.1978.10801875>
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues*, 56(3), 425–442. <https://doi.org/10.1111/0022-4537.00176>
- Erdogan, N. (2009). Testing the new ecological paradigm scale: Turkish case. *African Journal of Agricultural Research*, 4(10), 1023-1031. <https://academicjournals.org/journal/AJAR/article-full-text-pdf/40CFE5F35449>
- Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn Jr, P. H., Lawler, J. J., Levin, P. S., Tandon, P. S., Varanasi, U., & Wolf, K. L. (2017). Nature contact and human health: A research agenda. *Environmental health perspectives*, 125(7), 075001. <https://doi.org/10.1289/EHP1663>
- Giusti, M., & Samuelsson, K. (2020). The regenerative compatibility: A synergy between healthy ecosystems, environmental attitudes, and restorative experiences. *PloS one*, 15(1), e0227311. <https://doi.org/10.1371/journal.pone.0227311>
- Gómez-Muñoz, V. M., Porta-Gándara, M. A., & Fernández, J. L. (2010). Effect of tree shades in urban planning in hot-arid climatic regions. *Landscape and Urban Planning*, 94(3), 149-157. <https://doi.org/10.1016/j.landurbplan.2009.09.002>
- Hawcroft, L. J., & Milfont, T. L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology*, 30(2), 143-158. <https://doi.org/10.1016/j.jenvp.2009.10.003>
- Ignatieva, M., Stewart, G. H., & Meurk, C. (2011). Planning and design of ecological networks in urban areas. *Landscape and Ecological Engineering*, 7(1), 17-25. <https://doi.org/10.1007/s11355-010-0143-y>
- Jiang, Y., Zevenbergen, C., & Ma, Y. (2018). Urban pluvial flooding and stormwater management: A contemporary review of China's challenges and “sponge cities” strategy. *Environmental Science & Policy*, 80, 132-143. <https://doi.org/10.1016/j.envsci.2017.11.016>
- Kim, D., & Song, S.-K. (2019). The Multifunctional Benefits of Green Infrastructure in Community Development: An Analytical Review Based on 447 Cases. *Sustainability*, 11(14), 3917. <https://doi.org/10.3390/su11143917>
- Kim, E. S., Park, N., & Peterson, C. (2013). Perceived neighborhood social cohesion and stroke. *Social Science & Medicine*, 97, 49-55. <https://doi.org/10.1016/j.socscimed.2013.08.001>
- Kovács, J., Pántya, J., Medvés, D., Hidegkuti, I., Heim, O., & Bursavich, J. B. (2014). Justifying environmentally significant behavior choices: An American-Hungarian cross-cultural comparison. *Journal of Environmental Psychology*, 37, 31-39. <https://doi.org/10.1016/j.jenvp.2013.11.001>
- Lee, A. C. K., & Maheswaran, R. (2011). The health benefits of urban green spaces: a review of the



- evidence. *Journal of Public Health*, 33(2), 212-222. <https://doi.org/10.1093/pubmed/fdq068>
- Lee, S., & Paik, H. S. (2011). Korean household waste management and recycling behavior. *Building and Environment*, 46(5), 1159-1166. <https://doi.org/10.1016/j.buildenv.2010.12.005>
- Liu, W., Chen, W., & Peng, C. (2015). Influences of setting sizes and combination of green infrastructures on community's stormwater runoff reduction. *Ecological Modelling*, 318, 236-244. <https://doi.org/10.1016/j.ecolmodel.2014.11.007>
- Maes, J., Barbosa, A., Baranzelli, C., Zulian, G., Batista e Silva, F., Vandecasteele, I., Hiederer, R., Liqueste, C., Paracchini, M. L., Mubareka, S., Jacobs-Crisioni, C., Castillo, C. P., & Lavalle, C. (2015). More green infrastructure is required to maintain ecosystem services under current trends in land-use change in Europe. *Landscape Ecology*, 30(3), 517-534. <https://doi.org/10.1007/s10980-014-0083-2>
- Mansor, M., Said, I., & Mohamad, I. (2012). Experiential Contacts with Green Infrastructure's Diversity and Well-being of Urban Community. *Procedia - Social and Behavioral Sciences*, 49, 257-267. <https://doi.org/10.1016/j.sbspro.2012.07.024>
- Markevych, I., Schoierer, J., Hartig, T., Chudnovsky, A., Hystad, P., Dzhambov, A. M., de Vries, S., Triguero-Mas, M., Brauer, M., Nieuwenhuijsen, M. J., Lupp, G., Richardson, E. A., Astell-Burt, T., Dimitrova, D., Feng, X., Sadeh, M., Standl, M., Heinrich, J., & Fuertes, E. (2017). Exploring pathways linking greenspace to health: Theoretical and methodological guidance. *Environmental Research*, 158, 301-317. <https://doi.org/10.1016/j.envres.2017.06.028>
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503-515. <https://doi.org/10.1016/j.jenvp.2004.10.001>
- Mell, I. C. (2010). Newcastle University eTheses: Green infrastructure :concepts, perceptions and its use in spatial planning. Retrieved July 1, 2022, from <https://theses.ncl.ac.uk/jspui/handle/10443/914>
- Milfont, T. L., & Duckitt, J. (2010). The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes. *Journal of Environmental Psychology*, 30(1), 80-94. <https://doi.org/10.1016/j.jenvp.2009.09.001>
- Naumann, S., Davis, M., Kaphengst, T., Pieterse, M., & Rayment, M. (2011). Design, implementation and cost elements of Green Infrastructure projects. *Final report, European Commission, Brussels*, 138.
- Ogunbode, C. A. (2013). The NEP scale: measuring ecological attitudes/worldviews in an African context. *Environment, Development and Sustainability*, 15(6), 1477-1494. <https://doi.org/10.1007/s10668-013-9446-0>
- Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. Routledge. <https://doi.org/10.4324/9781003117452>
- Pelletier, L. G., Tuson, K. M., Green-Demers, I., Noels, K., & Beaton, A. M. (1998). Why are you doing things for the environment? The motivation toward the environment scale (mtes) 1. *Journal of applied social psychology*, 28(5), 437-468. <https://doi.org/10.1111/j.1559-1816.1998.tb01714.x>
- Polat, A. T., & Akay, A. (2015). Relationships between the visual preferences of urban recreation area users and various landscape design elements. *Urban Forestry & Urban Greening*, 14(3), 573-582. <https://doi.org/10.1016/j.ufug.2015.05.009>
- Santiago, L., Gladkikh, T., Betancourt, L., & Vargas, Y. (2015). Green versus gray: attitudes toward vegetation in a tropical metropolitan square. *Environment and Natural Resources Research*, 5(2), 109-120. <https://doi.org/10.5539/enrr.v5n2p109>
- Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology*, 24(1), 31-42. [https://doi.org/10.1016/S0272-4944\(03\)00022-7](https://doi.org/10.1016/S0272-4944(03)00022-7)
- Shrestha, S. L. (2009). Categorical regression models with optimal scaling for predicting indoor air pollution concentrations inside kitchens in Nepalese households. *Nepal Journal of Science and Technology*, 10, 205-211. <https://doi.org/10.3126/NJST.V10I0.2962>
- Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014). An Integrated Framework for Encouraging Pro-environmental Behaviour: The role of values, situational factors and goals. *Journal of Environmental Psychology*, 38, 104-115. <https://doi.org/10.1016/j.jenvp.2014.01.002>
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309-317. <https://doi.org/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
- Thompson, G., C., S., & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, 14(2), 149-157. [https://doi.org/10.1016/S0272-4944\(05\)80168-9](https://doi.org/10.1016/S0272-4944(05)80168-9)
- Venter, Z. S., Krog, N. H., & Barton, D. N. (2020). Linking green infrastructure to urban heat and human health risk mitigation in Oslo, Norway. *Science of The Total Environment*, 709, 136193. <https://doi.org/10.1016/j.scitotenv.2019.136193>
- Vlek, C., & Steg, L. (2007). Human Behavior and Environmental Sustainability: Problems, Driving Forces, and Research Topics. *Journal of Social Issues*, 63(1), 1-19. <https://doi.org/10.1111/j.1540-4560.2007.00493.x>
- Wiidegren, Ö. (1998). The New Environmental Paradigm and Personal Norms. *Environment and Behavior*, 30(1), 75-100. <https://doi.org/10.1177/0013916598301004>
- 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'. *Landscape and Urban Planning*, 125, 234-244. <https://doi.org/10.1016/j.landurbplan.2014.01.017>
- Yu, Y., Xu, H., Wang, X., Wen, J., Du, S., Zhang, M., & Ke, Q. (2019). Residents' Willingness to Participate in Green Infrastructure: Spatial Differences and Influence Factors in Shanghai, China. *Sustainability*, 11(19), 5396. <https://doi.org/10.3390/su11195396>
- Zhang, Y., Van den Berg, A. E., Van Dijk, T., & Weitkamp, G. (2017). Quality over Quantity: Contribution of Urban Green Space to Neighborhood Satisfaction. *International Journal of Environmental Research and Public Health*, 14(5), 535. <https://doi.org/10.3390/ijerph14050535>
- Zijlema, W. L., Triguero-Mas, M., Cirach, M., Gidlow, C., Kruize, H., Grazuleviciene, R., Nieuwenhuijsen, M. J., & Litt, J. S. (2020). Understanding correlates of neighborhood aesthetic ratings: A European-based Four City comparison. *Urban Forestry & Urban Greening*, 47, 126523. <https://doi.org/10.1016/j.ufug.2019.126523>
- Zuniga-Teran, A. A., Staddon, C., de Vito, L., Gerlak, A. K., Ward, S., Schoeman, Y., Hart, A., & Booth, G. (2019). Challenges of mainstreaming green infrastructure in built environment professions. *Journal of Environmental Planning and Management*, 63(4), 710-732. <https://doi.org/10.1080/09640568.2019.1605890>

**How to cite this article:**

Dipeolu, A. A., Ibem, E. O., & Oriola, O. A. (2022). Influence of Green Infrastructure on Residents' Endorsement of the New Ecological Paradigm in Lagos, Nigeria. *Journal of Contemporary Urban Affairs*, 6(2), 159-173. <https://doi.org/10.25034/ijcua.2022.v6n2-4>