NIU Journal of Social Sciences Copyright©2023
Nexus International University ISSN: *3007-1682*; 9(3): 147–157

Seasonal Cycles in Environmental Quality of Peri-Urban Areas and their Variability in Nigeria: Some Preliminary Findings

OLANREWAJU TIMOTHY DADA, SAMUEL OSAYAMEN TONGO,
FETSUS OSARUMWENSE UZZI
Olabisi Onabanjo University, Ago-Iwoye, Nigeria

GBEMIGA BOLADE FANIRAN, ABEL OMONIYI AFON
Obafemi Awolowo University, Ile-Ife, Nigeria

Abstract. This paper aims to use residents' perceptual data to investigate the seasonality of environmental quality in three peri-urban settlements of Lagos state, Nigeria. This is expected to assist policymakers in how environmental education will focus on similar climatic attributes. The data collection for the study was through personal observation and questionnaire administration. The authors visited the different settlements in the four identified seasons to observe. Using a systematic sampling technique, a questionnaire was administered to respondents drawn from one of every twenty (5 percent) buildings in the peri-urban settlements. A respondent (preferably a household head) was surveyed from a floor of a selected residential building. Three hundred ninety-seven copies of the questionnaire were completed and returned for analysis. Information provided by the respondents was analysed using both descriptive and inferential statistics. The findings revealed significant differences in residents' perception of air quality, street quality, electrical supply, water supply, waste collection, health services, and drainage systems in peri-urban settlements. The results showed that environmental quality in the dry seasons differs considerably from the quality identified in the rainy seasons in Ibafo and Mowe, while it was the same during the rainy and dry seasons in Isheri. It was established that residents derived little or no satisfaction from EQI, which they consider indispensable during the identified seasons. This study would reveal to policymakers the direction of policy initiatives on environmental education. It would also assist in planning the monthly environmental sanitation exercise in the different seasons of the year. The study's findings could guide the improvement of the ecological quality of peri-urban settlements of developing countries with similar socio-economic and climatic attributes.

Keywords: Environmental Quality, Environmental Quality Indicators, Seasonal Cycles, Peri-urban settlements

1. Introduction and Context

There is growing consensus that climate change effects have varying degrees of impact globally but adversely affect people living in developing countries the most because the majority depends directly on the environment for their livelihoods (Hillie and Hlophe, 2007; Mertz *et al*., 2009). In other words, there is a causal association between human activities or sources of livelihood and climate change (Houghton *et al*. 2001). Nevertheless, climate change remains a complex and uncertain phenomenon, making it difficult for people to relate to their daily activities. This implies that it is salient, in perceived or experienced terms, for a smaller proportion of people. By implication, a lack of awareness of the effects of climate change might create a false impression that human activities destroying the quality of our environment are safe. Thus, people are uncertain about the links between escalating ecological disasters and climate change. As a result, it could be anticipated that changes in the climate of a place can precipitate negative or positive environmental quality (EQ).

In the opinion of Rapoport (1997), EQ, by definition, has two significant meanings. The first deals with the physical environment, while the second deals with the perceived environment. The immediate meaning of EQ is the material aspects of the physical environment, like air and water pollution, depletion of resources, domestic and industrial pollution, consequences of overpopulation, and noise, among others, which have specific effects on people (Rapoport, 1990). In contrast, the second and more sophisticated meaning is the qualities, material and immaterial,

of the natural and man-made built environment, which support the social and cultural structures and institutions of a specific group of people and, hence, give them satisfaction or dissatisfaction, with the physical settings provided (Khattab, 1993). In other words, it is an indicator used to measure the degree to which the environment is appropriate for humans to make a living (Kaili, 2003).

EQ can be assessed at objective and subjective levels (Gifford, 2002). The objective involves physical hard measures (through technological instruments, objectively quantifiable indicators, or evaluations based on a specific professional background). In contrast, the subjective relies on individual perspectives or perceptions. Of particular concern to this study is the subjective approach to measuring EQ. People's perceptions are central to their beliefs and values (Tsiagbey, Danso, and Bradford, 2006). In other words, the people's support, views, and involvement are essential in measuring EQ because better information on how people perceive and react to climate change may lead to more enlightened decisions and public uproar, leading to public unrest. Tradition is a prominent factor influencing perception in sub-Saharan Africa (Ranger, 1993). This is because tradition is the local norm, practiced from time immemorial and passed across generations to direct people's way of life. This varies across cities and influences many aspects of their lifestyle, which also influences perceptions of climate change (Fabiyi, 2013; Afon *et al*., 2016) and produces various opinions on the quality of the environment. In addition, Gooch (1996) suggests that information may influence perceptions, yet personal experience modifies such perceptions. Similarly, an individual's socio-economic attributes and familiarity with the environment affect environmental quality perception over time.

Studies have shown that a series of instruments have been developed to measure indicators of environmental quality. These include Perceived Environmental Quality Indicators (PEQI) by (Craik and Zube, 1976; Carp and Carp, 1982), Perceived Residential Quality Indicators (PRQIs) by (Amerigo and Aragones, 1997), Perceived Residential Environment Quality Indicators (PREQIs) by (Bonaiuto, Aiello, Perugini, Bonnes, and Ercolani, 1999) and Environmental Quality Indicators (EQI) by (Afon 1998, 2006). Although these studies have enhanced our understanding of EQ worldwide, many more unanswered questions remain regarding the recent changes in global climate. In other words, very little is known about seasonal variations of EQ. Since seasonal variation in EQ is less prominent in the literature, it would benefit this study to investigate. Besides, Nigeria's location in the tropical zone means that the seasonal patterns are significantly different from those of other continents, with the coldest days falling in July and August and the warmest occurring in December and January. With the attendant population spill-over from cities in Nigeria, one is left to hypothesize that seasonal variations are bound to happen in the environmental quality of the interface between the urban and rural areas.

Therefore, this study is set to investigate if there are seasonal fluctuations in the environmental quality of peri-urban areas in Nigeria, with the examples of three settlements (Isheri, Ibafo, and Mowe) situated in the corridor of the largest metropolitan city (Lagos) in Sub-Saharan Africa. From discussions and debates on peri-urban, it is evident that the concept has many shades. In the traditional sense, the peri-urban area is neither urban nor purely rural (OECD, 1979); it is a diverse area under the urban influence but with a rural morphology (Caruso *et al*., 2001). Similarly, the parameters for describing the peri-urban areas fall into different categories. It is possible to distinguish physical, social, and economic aspects of variables characterizing peri-urban areas (Budiyantini & Pratiwi, 2016). Irrespective of the shades or descriptions adopted in explaining the peri-urban, one particular and obvious issue is that it is fast housing teaming households' population.

Development within the outskirts of cities is fast, making debates around the concept of peri-urban more endearing to diverse scholars locally and globally. The study area is fast becoming home to many households in the city, and it is incumbent upon policymakers and professionals in the built environment to pay significant attention to the structure of peri-urban area growth and development before it becomes more hydra-headed. This study answers the following questions: What are the environmental indicators used by residents in determining the quality of their environment? What is the relative level of importance attached and the satisfaction derived from the environmental quality indicators? Are there any possible inter-city variations in the seasonality of environmental quality? Based on these research questions, this study contributes to the existing body of knowledge by providing empirical facts to correlate weather conditions and environmental quality from Nigeria's perspective. This study also contributes to the literature by comparing environmental quality with weather conditions. This study's uniqueness is in using residents' perceptual data to investigate the seasonality of environmental quality.

Furthermore, a prior investigation into environmental quality has assumed homogeneity of

seasonality across a city. Thus, to our knowledge, we are unaware of any research examining the intercity variation of the seasonality of environmental quality in Nigeria and similar climatic belts. This is, perhaps, the first study in this regard. We believe a better understanding of how environmental quality varies with the season can lead to more efficient policy implementations and how such policies affect residents' happiness.

2. Meterials and Methods

2.1 The Study Area

The study focuses on three peri-urban settlements (Isheri, Ibafo, and Mowe) along the Lagos-Ibadan Expressway in Ogun State, Nigeria. Nigeria is in the tropical zone and enjoys a genuinely tropical humid climate, which is seasonally damp and very humid. The West African monsoon system dominates it and has only two seasons: wet and dry. The wet season starts from April through October, and the dry season from November through March. The wet season is heavily influenced by an Airmass (Tropical Maritime (MT) Airmass) originating from the Atlantic Ocean.

In contrast, the dry season is usually accompanied by a (harmattan) dust-laden airmass (Tropical Continental (CT) Airmass) from the Sahara Desert. The prevalence of these alternating winds over the country is linked to the Inter-Tropical Convergence Zone (ITCZ) north and south of the equator. The point at which these two airmass meet is termed Inter-tropical Discontinuity (ITD). However, there are wide variations in the climate in the country because of the presence of significant contrasts in topography and the existence of water bodies. Generally, ambient temperatures are lower in the wet season than in the dry season and vary from coast to inland areas. The wettest month in Nigeria is June in the southern, and the most saturated area is the east coast, parts of which receive over 4000 mm rainfall annually. Regions along the coast in Southern Nigeria receive about 1800 mm of precipitation annually, which decreases to about 500 to 1000 mm in Northern Nigeria (Nigerian Meteorological Agency, 2016).
Isheri, Ibafo, and Mowe are slightly situated in the tropical swamp forest of fresh water and mangrove swamp forests. The double rainfall pattern influences these two sub-vegetation types. The annual rainfall generally ranges between 1400 mm and 1800mm, with a short break in August (NIMET, nd). On average, the hottest month is March, with a mean temperature of 29°C (84°F), while July is the coldest month. These peri-urban settlements evolved due to the high rate of urbanisation of the parent city - Lagos Megacity (Lawanson *et al.*, 2012). Isheri is in the Ifo Local Government Area (LGA) of Ogun State, while Ibafo and Mowe are in Obafemi Owode LGAs. Isheri is situated on Latitude 6^0 33' North and Longitude 8^0 58' East and is estimated to cover an area of 27.93 sq/km (Lawanson *et al*., 2012). Accordingly, as Ibafo is located on Latitude 6^0 75' North and Longitude 3^0 37' East and has a built-up area of 15.75sq/km, Mowe lies on Latitude 6^0 44' North and Longitude 3^0 25' East and is estimated to cover 22.61 square kilometres. A recent update of land use and land cover change reveals that Isheri, Ibafo, and Mowe cover sq/km ().
Regarding physical development, Isheri is predominantly residential, with newly constructed buildings, tarred roads, and adequate water and electricity supply. Although, there are few areas with residential buildings characterised by leaky roofs and poor ventilation. Like in other peri-urban settlements in Nigeria, there is an epileptic electricity supply and inadequate potable water provision in Ibafo and Mowe. In some places, there are no drains; in some, the gutters provided are filled with waste (solid and water). Available open spaces in Ibafo and Mowe have been turned into the recipient of human faeces products; environmental conditions in many areas were stench as wastewater pit is a luxury. The roads are not tarred, and the residents dump refuse in the open spaces around their houses. Most residents in Ibafo and Mowe commute daily to Lagos, while others engage in primary and traditional occupations such as farming and petty trading.

2.2 Research method

Isheri, Ibafo, and Mowe were purposively selected for this study from other settlements in the peri-urban area along the Lagos-Ibadan Expressway. Data for this study were obtained through questionnaire during different seasons of the year, namely, the long rainy season (beginning of the rainy season and rain maximum), the short dry season (break: a short period of ceasing in the rain), the short rainy season (ending of the raining season), and the long dry season (*see the section on climate condition of the study area*). The multistage sampling technique was used for selecting the respondents. Information from Google Earth Image (2015) estimated 2140, 2347, and 3453 buildings in Isheri, Ibafo, and Mowe, respectively. One resident in every twenty (5%) building was surveyed using a systematic sampling technique. 173, 117, and 107 buildings were selected in Isheri, Ibafo and Mowe. Information obtained included residents' socio-economic characteristics, importance, and the satisfaction derived from environmental quality indicators (EQIs) in different seasons. Respondents were asked to score on a Likert scale of 1 to 5 the level of importance attached and the satisfaction derived from each identified EQI variable, using 1-

unimportance/dissatisfied, 2-very unimportance/dissatisfied, 3-neutral, 4-importance/satisfied and 5-very importance/satisfied. The analyses of the ratings indicated by the residents from the Likert's scales adopted evolved into an index called "the Mean" (M).

To arrive at the mean, the following steps were followed:

A 5, 4, 3, 2, and 1 weight value was attached to each rating.

Summation of weight value (SWV) adds the product of the importance attached to a rating and the respective number of respondents to the rating.

dividing the SWV by the number of respondents that rated indicators

This SWV is expressed mathematically as

$$SWV = \sum_{I=1}^{5} X_i Y_i$$

……..

(1)

Where:

SWV = summation of weight value,

X_i = number of respondents to rating i;

Y_i = the weight assigned a value (i = 1, 2, 3, 4, 5).

SWV was then divided by the number of respondents to arrive at each EQI. The index for each identified EQI thus takes a value of between 5 and 1. The nearer the value to 5, the higher the importance and satisfaction derived from such EQI under consideration.

$$M = \frac{SWV}{\sum_{i=1}^{5} i = X_i}$$

……(2)

After each respondent expressed the level of their perception about the environmental quality and climate change, the researchers, through interpreters that had a good understanding of both the English Language and the local dialect spoken by the resident, made efforts to explain what environmental quality and seasonal variation meant to every respondent in the appropriate mother's tongue. This assisted the people to respond appropriately to questions in each of the selected peri-urban settlements. Information elicited was first entered into a coding spreadsheet on SPSS 21 software, then analysed using descriptive and inferential statistics such as percentage, mean scores, chi-square, and analysis of variance. Elicited data were also subjected to Cronbach's alpha reliability - to test for the accuracy and precision of measurement procedure and to see how well the variable items are positively correlated. The results were greater than 0.70 of the Sekaran (2003) recommended guideline, which suggested a measure of reliability of 0.70 or higher in the early stage of the research predictor test. The internal consistency reliability coefficients employed for the study are 0.78 and 0.81 for the importance attached to and the satisfaction derived in Isheri, 0.84 and 0.73 for Ibafo, and 0.80 and 0.71 for Mowe. These were above the established 0.7 level, which is acceptable for analysis. It is pertinent to state that data used in this paper were collected as part of a larger study to measure residents' perception of environmental quality in peri-urban settlements of Lagos State in Ogun State, Nigeria.

3. Results and discussion

3.1 Socio-economic characteristics of respondents

Four important socio-economic attributes: age, income, level of education, and length of residing in the peri-urban settlements, were considered. These attributes were deemed necessary because Sampei and Aoyagi-Usui (2009) and Fabiyi (2013) posited that response to environmental issues could be best explained based on the socio-economic attributes of the study population. The ages of respondents were categorised into three groups as presented in Table I: the youth (19-30 years), the young adult (31-55 years), and the adults (above 56 years). These followed the classification of Faniran et al. (2017). The minimum age of respondents in the peri-urban settlements was 20 years, while the maximum was 78 years. The mean age of residents showed that the mean age was reducing as the distance increased from Lagos to Ibadan. The mean age was 42, 38, and 36 years in Isheri, Ibafo, and Mowe, respectively, with standard deviations of 9.10, 10.67 and 12.05. Differences in the age of respondents across the peri-urban settlements were statistically significant at a 95 percent (0.05) confidence level. The result of ANOVA (F=7.946 and p=0.000) confirmed this. This finding suggests that there is the possibility that residents' perceptions of environmental quality will vary in the peri-urban settlements.

Table I. Respondents' Socio-Economic Characteristics by Location

Residents' characteristics	Isheri (%)	Ibafo (%)	Mowe (%)	Peri-Urban (%)
Age (years)				

19-30 (Youth)	57 (32.9)	45 (38.5)	15 (14.0)	117 (29.5)
31-55 (young adult)	111 (64.2)	62 (53.0)	83 (77.6)	256 (64.5)
56-65 (adults	5 (2.9)	10 (8.6)	9 (8.4)	24 (6.0)
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)
Income (₦000.00)				
below ₦18000 (poverty Line)	23 (13.3)	26 (22.2)	15 (14.0)	64 (16.2)
₦18000-₦60000 (Low earners)	60 (34.7)	45 (38.5)	21 (19.6)	126 (31.7)
₦61000-₦150000 (Middle earners)	64 (37.0)	28 (23.9)	34 (31.8)	126 (31.7)
above ₦150000 (High earners)	26 (15.0)	18 (15.4)	37 (34.6)	81 (20.4)
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)
Education Qualification				
Primary	4 (2.3)	-	2 (1.7)	6 (1.5)
Secondary	43 (24.9)	36 (33.6)	35 (29.9)	114 (28.7)
Tertiary	121 (69.9)	67 (62.6)	79 (67.5)	267 (67.3)
No Formal	5 (2.9)	4 (3.7)	1 (0.9)	10 (2.5)
Total	173 (100.0)	107 (100.0)	117 (100.0)	397 (100.0)
Length of Residence (years)				
less than 10 (short)	17 (9.8)	14 (12.0)	15 (14.0)	46 (11.6)
10-30 (average)	130 (75.2)	89 (76.0)	72 (67.3)	291 (73.3)
above 30(long)	26 (15.0)	14 (12.0)	20 (18.7)	60 (15.1)
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)

Note: ₦ represents Naira (Nigeria currency)

Four income groups using the Lagos State Civil Service income grade level were identified for easy analysis. The first group comprised residents earning below the national minimum wage (₦18, 000). The low-income groups were residents in the income group of grade levels 01 to 06. The middle-income earners were those in grades 07 to 12, while the high-income earners were residents in the income group of 13 to 17. The numerical monthly income of the groups was below ₦18000, ₦18000-₦60000, ₦61000-₦150000, and above ₦150000, respectively. Similar classifications were employed by Dada (2018). The study confirmed that while high-income earners were predominant in Isheri, Ibafo, and Mowe were dominated by middle and low-income earners. It was also evident that the proportions of residents below the poverty line were predominant in Mowe. Table I shows that the mean monthly income decreased as distance increased from Lagos to Ibadan. The mean income for Isheri, Ibafo, and Mowe was ₦94, 374.00, ₦82, 582.00, and ₦68, 355.00. The result of one-way ANOVA computed ($F=1.450$; $p>0.05$) at a 0.05 confidence level showed no significant difference in the respondents' incomes across the peri-urban settlements. By inference, residents of Isheri are more likely to be willing to support programs that enhance the quality of their environment and the tendency to have better environmental practices.

In the same vein, the residents' level of education showed that the proportion of respondents without formal education qualifications in the peri-urban settlements decreased as distance increased from Lagos to Ibadan. However, residents with tertiary educational qualifications dominated the peri-urban settlements, with 69.9 percent of respondents in Isheri and 62.6 and 67.5 percent, respectively, in Ibafo and Mowe. Information on residents' literacy level in the peri-urban settlements agreed with the views of Weaver (2002) that individuals with high educational status are more likely than individuals with low levels of education to be sympathetic to environmental problems. Information obtained on respondents' length of residence in the peri-urban settlements is presented in Table I. For ease of analysis, residents were grouped into three: short (less than 10 years), average (10-30 years), and long (above 30 years) stay. The results showed that the proportion of respondents who resided in the peri-urban settlements for 10-30 years (average) was dominant, with 75.1 percent in Isheri, 76.1 percent in Ibafo, and 67.3 percent in Mowe. There is no doubt that the respondents can provide accurate information on how changes in seasons have affected the quality of their environment. More so, Raudsepp (2001) and Shen and Saijo (2008) pointed out that residents' experience of an environment is a function of their length of residence.

3.2 Residents' Perception of Environmental Quality

The findings revealed significant differences in residents' perceptions of air quality and street quality in the peri-urban settlements. The percentage of residents who noticed the bad air quality was more significant within Ibafo and Mowe. In contrast, the quality of the streets was significantly perceived as bad in the three settlements. According to Table II, there was no significant difference between the settlements because they all perceived the quality of the recreational areas as bad, totaling 74.8%. Concerning the quality perception of public services evaluated, there was a significant difference in the residents' perception of the peri-urban settlements: electrical supply, water supply, waste collection, health services, and drainage system. Furthermore, more residents reported terrible electrical supply, water, waste collection,

drainage systems, and health services. According to Table II, safety service was perceived as having a fair quality by most of the residents of the peri-urban settlements.

Residents' perceptions vary based on their daily life experiences, often disassociated from their values. For instance, the results presented in Table II concerning air quality showed it varied in the peri-urban settlements. Ibafo and Mowe reported an air quality worse than that of Isheri. This may be based on their observations and knowledge about potential pollution sources such as industry chimneys or famous cattle markets and abattoirs, unpaved streets, and great vehicle flow. In these scenarios, the air quality is most likely affected, in part, by the road quality because an excellent dispersion of particulate material occurs in unpaved roads.

Similarly, a much more significant proportion of the streets within Ibafo and Mowe are unpaved. In addition to the daily coexistence with nature, another possible determinant for this perception is due to the observation of direct discarding of wastes and household trash in the rivers, supporting the perception about the importance of good quality and balance of ecological resources indispensable to their survival, to well-being and human health. The residents perceived the quality of waste collection services and drainage systems as bad. This was because vehicles hired to collect waste were usually open, and the contents were not regularly covered. Thus, waste materials dropped along the road and drainage system. Similarly, rubbish is generally dumped into drainage whenever it rains.

Table II. Perception of the Quality of Environmental Indicators by Location

Location/Environmental Indicators	Isheri N (%)	Ibafo N (%)	Mowe N (%)	Peri-Urban N (%)	p-value
Air Quality					
Good	36 (20.8)	30 (25.6)	23 (21.5)	89 (21.5)	
Fair	69 (39.9)	34 (29.1)	34 (31.8)	156 (31.8)	$p < 0.05$
Bad	68 (39.3)	53 (45.3)	50 (46.7)	152 (46.7)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Streets quality					
Good	5 (2.9)	11 (9.4)	23 (21.5)	39 (9.8)	
Fair	80 (46.2)	42 (35.9)	20 (18.7)	142 (35.8)	$p < 0.05$
Bad	88 (50.9)	64 (54.7)	64 (59.8)	216 (54.4)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Recreational areas quality					
Good	0 (0.0)	7 (6.0)	5 (4.7)	12 (3.0)	
Fair	60 (34.7)	10 (8.6)	18 (16.8)	88 (22.2)	$p = 0.47$
Bad	113 (65.3)	100 (85.4)	84 (78.5)	297 (74.8)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Electrical supply service quality					
Good	13 (7.5)	27 (23.1)	4 (3.7)	44 (11.1)	
Fair	70 (40.5)	28 (23.9)	51 (47.7)	149 (37.5)	$p < 0.05$
Bad	90 (52.0)	62 (53.0)	52 (48.6)	204 (51.4)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Water supply service quality					
Good	23 (13.3)	11 (9.4)	30 (28.1)	64 (16.1)	
Regular	63 (36.4)	35 (29.9)	44 (41.1)	142 (35.8)	$p < 0.05$
Bad	87 (50.3)	71 (60.7)	33 (30.8)	191 (48.1)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Waste collection service quality					
Good	10 (5.8)	14 (11.9)	3 (2.8)	27 (6.8)	
Fair	46 (26.6)	32 (27.4)	44 (41.1)	122 (30.7)	$p < 0.05$
Bad	117 (67.6)	71 (60.7)	60 (56.1)	248 (62.5)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Drainage system quality					
Good	93 (53.8)	4 (3.4)	23 (21.5)	120 (30.3)	
Fair	13 (7.5)	61 (52.1)	23 (21.5)	97 (24.4)	$p < 0.05$
Bad	67 (38.7)	52 (44.4)	61 (57.0)	180 (45.3)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Health services quality					
Good	10 (5.8)	3 (2.6)	31 (29.0)	44 (11.1)	
Fair	77 (44.5)	41 (35.0)	50 (46.7)	168 (42.3)	$p < 0.05$
Bad	86 (49.7)	73 (62.4)	26 (24.3)	185 (46.6)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	
Safety service quality					
Good	2 (1.2)	1 (0.8)	1 (0.9)	4 (1.0)	
Fair	145 (83.8)	45 (38.5)	51 (47.7)	241 (60.7)	$p = 0.30$
Bad	26 (15.0)	71 (60.7)	55 (51.4)	152 (38.3)	
Total	173 (100.0)	117 (100.0)	107 (100.0)	397 (100.0)	

The perception that the recreational areas have bad quality suggests that the absence of sports space and physical activities can contribute to residents' physical and psychological well-being and peri-urban entertainment and learning spaces. Concerning the water supply service quality, it can

be inferred that the factors that influenced a better perception of the lousy service quality relate to the importance attached and the satisfaction derived from the water supplied and the interruption of the supply system. Similarly, half of the residents evaluated the electrical supply service as inadequate. Concerning the quality of health services, a significantly more significant percentage assessed the quality as bad. It implies that the negative healthcare service perception may interfere with the general perception of the environmental quality in peri-urban settlements irrespective of the year's season. The safety services assessment also indicates residents' concern about violence questions, burglary, car theft, and traffic accidents. This concern about the fair quality of safety service is probably more populated by religious organisations that attract worshipers worldwide. The presence of police units and traffic wardens is way less than what is required to maintain safety.

In literature, indicators exist to measure the quality of the environment. Two issues are involved: the level of importance attached to these indicators and the level of satisfaction derived from the indicators. Afon's (2006) Actual Aspiration and Residents' Satisfaction would be employed to ascertain the importance and pleasure derived from the identified thirty-six indicators. The EQI was measured through a personally devised index termed Facility Importance Index (FII) and Residents Satisfaction Index (RSI) for ease of analysis. As shown in Table III, the aggregated levels of importance attached to EQI decreased as we moved further away from the parent city, Lagos. Table II shows Isheri, Ibafo, and Mowe's mean index was 4.57, 4.45, and 4.20, respectively.

Similarly, the mean index for satisfaction derived from the EQI in Isheri, Ibafo, and Mowe were 3.42, 2.99, and 3.07, respectively. To appreciate the importance of the degree of satisfaction expressed by residents. The 36 variables were classified into four main groups using multi-criteria analysis. This was adopted from Afon (2006). The four main groups, as presented in Table IV were (a) indicators with positive deviation about the mean of FII but with negative deviation about the mean of RSI (b) indicators with negative deviation about the mean of FII but with positive deviation about the mean of RSI (c) indicators with positive deviation about the mean of FII and RSI; and (d) indicators with negative deviation about the mean of FII and RSI.

Group A: These were indicators considered to be very basic to human existence; they were of high importance to residents, but the satisfaction derived from them was very low. These variables were electricity, security, available road network, good road conditions, and traffic density. Others include the cost of living, availability of drainage, cost of food and rent, environmental sanitation, aesthetics, and public water supply. It can be deduced that residents' low satisfaction level with very important facilities would strongly influence their perception of the peri-urban environment.

Group B: The second group of indicators was those not considered to be of high priority in meeting the needs of residents, but respondents derived a very high level of satisfaction with them. The indicators in this category were privacy in-home, absence of air pollution, economic opportunity, well water supply, availability of shops, privacy in the neighbourhood, and lack of noise pollution. Others were friendly people, social interaction among neighbours, road safety, and availability of open space. This implies that these indicators would strongly influence respondents' perception of the environment despite not being a priority.

Group C comprises indicators that respondents consider important in satisfying their needs. These indicators were distance to work, the amount paid for waste disposal, housing condition, availability of boreholes, transport network, and nearness to primary school. Other indicators were the cost of going to and fro work, building density, proximity to the health centre, market availability, and nearness to secondary school. These are highly prioritized facilities and significantly influence the environment's perception. The absence of these facilities can force the respondent to employ self-help.

Group D: Respondents attached little or no importance to indicators in this group, and their satisfaction was also low. This was so as respondents improvised substitutes for themselves. Among the indicators were waste disposals. The residents dump indiscriminately on open spaces and drainages. At the same time, the residents utilise available open space instead of recreational space whenever there is a need for relaxation.

Table III: Importance Attached and Satisfaction Derived from Environmental Quality Indicators

	Isheri		Ibafo		Mowe		Peri-urban	
Facility	FII	RSI	FII	RSI	FII	RSI	FII	RSI

Accessibility to economic opportunities	4.65	3.77	4.09	4.07	4.30	3.31	4.30	3.69
Accessibility to recreational space	3.81	3.28	3.93	3.15	3.89	2.39	3.89	2.72
Accessibility to the transport network	4.68	3.74	4.92	3.75	4.35	3.70	4.69	3.69
Aesthetic quality of the environment	4.76	3.41	4.60	2.54	4.26	2.63	4.51	2.64
Amount paid for waste disposal	4.61	3.39	4.12	3.39	4.03	2.31	4.10	3.05
Availability of market	4.74	4.02	3.96	4.00	4.46	3.69	4.43	3.82
Availability of open space/Green area	3.65	3.64	3.57	3.43	3.72	2.54	3.66	3.07
Availability of shops	4.75	4.00	3.92	3.93	4.27	3.97	4.25	3.89
Available Drainage	4.75	2.62	4.65	1.84	4.54	2.09	4.64	2.22
Available road network	4.75	3.03	4.92	2.86	4.55	3.37	4.76	2.76
Borehole	4.85	3.41	4.82	2.90	4.44	3.89	4.71	3.32
Building density	4.62	3.75	4.43	2.73	4.49	3.75	4.46	3.31
Cost of food	4.46	3.28	4.86	2.29	4.38	3.10	4.61	2.63
Cost of going to and fro work	4.60	4.50	4.71	4.05	4.07	3.82	4.49	3.90
Cost of living	4.71	3.18	4.70	1.91	4.34	2.86	4.69	2.54
Cost of Rent	4.72	2.67	4.83	1.69	3.97	2.81	4.54	2.23
Crime rate (security)	4.79	3.67	4.77	3.08	4.79	2.62	4.81	2.81
Degree of air pollution	4.67	4.44	4.34	4.00	4.03	3.07	4.34	3.70
Degree of noise pollution	4.61	4.36	4.21	3.18	3.83	3.22	4.18	3.65
Distance to work	4.82	4.77	4.90	4.00	4.70	3.90	4.77	3.97
Electricity supply	4.84	4.41	4.95	1.42	4.75	2.06	4.86	2.39
Environmental Sanitation	4.65	2.80	4.60	2.04	4.32	2.22	4.53	2.31
Housing condition	4.77	3.74	4.72	2.92	2.14	3.65	4.73	3.62
Living among friendly people	4.47	4.38	4.20	4.00	3.56	3.32	4.08	3.75
Nearness to health facilities	4.74	2.77	4.51	3.23	4.15	3.66	4.46	3.10
Nearness to primary school	4.71	2.48	4.35	3.56	4.31	3.65	4.53	3.22
Nearness to secondary school	4.78	2.69	4.31	3.19	4.30	3.62	4.43	2.86
Neighbourhood social interaction	4.30	3.79	4.32	3.48	3.30	3.65	4.02	3.65
Privacy in your home	4.59	3.87	4.23	3.43	4.34	3.68	4.34	3.66
Privacy in your neighbourhood	4.47	3.47	3.98	3.69	4.44	3.69	4.24	3.68
Public tap water supply	4.36	1.22	4.96	1.09	4.27	1.35	4.50	1.35
Road condition	4.77	1.82	4.87	1.74	4.52	2.64	4.74	2.09
Road safety/pedestrian safety	4.00	4.17	4.86	3.28	4.60	3.05	3.76	3.65
Traffic density	4.88	1.78	4.82	1.80	4.42	2.23	4.72	2.06
Waste disposal facility	4.61	3.50	4.36	2.21	4.28	2.31	4.40	2.62
Well water	4.08	3.16	3.62	3.90	4.18	2.72	4.24	3.37
Mean Aggregate	4.57	3.42	4.45	2.99	4.20	3.07	4.42	3.08

Table IV: Deviation of the means of FII and RSI in the Peri-urban Settlements

Group	Environmental attributes	Deviation about FII	Deviation about RSI
A	Electricity	0.44	-0.71
	Security	0.39	-0.03
	Available road network	0.34	-0.07
	Road condition	0.32	-1.10
	Traffic density	0.30	-1.21
	Cost of living	0.27	-0.60
	Drainage	0.22	-1.00
	Cost of food	0.19	-0.38
	Cost of rent	0.12	-0.85
	Environmental sanitation	0.11	-0.83
	Aesthetics	0.09	-0.33
	Public water supply	0.08	-1.93
B	Privacy in home	-0.08	0.49
	Air pollution	-0.08	0.71
	Economic opportunity	-0.12	0.63
	Well water supply	-0.16	0.22
	Availability of Shops	-0.17	0.83
	Privacy in neighbourhood	-0.18	0.50
	Noise pollution	-0.24	0.38
	Living among friendly people	-0.34	0.77
	Social interaction among Neighbours	-0.40	0.48
	Road safety	-0.66	0.32
	Open space	-0.76	0.09
C	Distance to work	0.35	1.05
	Amount paid for waste disposal	0.32	0.07
	House condition	0.31	0.25
	Borehole	0.29	0.20
	Transport network	0.27	0.61
	Nearness to primary school	0.11	0.16
	Cost of going to and fro work	0.07	0.97
	Building density	0.04	0.17
	Nearness to health	0.04	0.12
	Available market	0.01	0.78
	Nearness to secondary school	0.01	0.05

D	Availability of waste disposal	-0.02	-0.54
	Availability of recreational space	-0.53	-0.17

3.3 Seasonal Cycles in Environmental Quality and their Variability

Across the peri-urban settlements, most (78.2%) residents were highly concerned changes in weather elements would negatively affect the quality of their environment, even though several did not believe (43.6%). In comparison, some felt (29.7%) and smaller percent were uncertain (4.9%) of climate variability. Besides, 16.9% were concerned about the impact of climate variability on the environment, composed of those who believed (8.7%), those who did not think (6.3%), and indifferent (1.9%). Very few (2.2%) had average and low concerns, respectively. In addition, 44.6% of them claimed weather variability was responsible for destroying buildings and roads via irrepressible flooding and wind storms. Considering that water is a public good and an inalienable human right, the findings established that 31.4% of the residents had been experiencing a scarcity of potable water. After all, wells were drying because the amount of precipitation was declining. This is expected to cause uneasiness among residents who claimed not to believe in it or were not sure of changes in weather elements. In other words, environmental education may well boost awareness of climate change since residents' observations of the visible effects are already causing discomfort to both believers and non-believers of its reality.

Table V: Seasonality of Environmental Quality

	Isheri		Ibafo		Mowe		Peri-Urban	
Location/Seasonality	FII	RSI	FII	RSI	FII	RSI	FII	RSI
Long Rainy Season	4.77	2.80	4.74	3.25	4.38	3.22	4.45	3.66
Short Rainy Season	4.35	3.74	4.31	2.93	3.84	3.90	4.35	3.68
Short Dry Season	4.43	4.38	3.97	2.69	4.20	2.22	4.20	2.35
Long Dry Season	4.71	2.77	4.77	3.08	4.36	2.94	4.48	2.61
Seasonal Variation Statistics	F = 1.02; p=.23		F = 16.02; p=.00		F = 11.01; p=.00		F = 5.05; p=.11	

Concerning whether climate variability influences residents' perception of the quality of their environment as presented in Table V. Finding showed that the importance attached to EQI had their highest indices during the prolonged rain and dry season, respectively. For instance, it was 4.77 and 4.71 in Isheri, Ibafo recorded 4.74 and 4.77, and Mowe had 4.38 and 3.36 in the respective prolonged rain and dry seasons. Yet, the satisfaction derived during this season of the year was relatively lower than their importance. In these scenarios, the EQI is considered indispensable during these seasons of the year, but residents' derived little satisfaction would strongly influence their perception of the peri-urban environment during the seasons of the year. However, the dissatisfaction recorded may not be directly linked to climate variability by the residents.

Furthermore, the results showed significant differences in the perceived environmental quality in Ibafo ($F = 16.02$; $p=.00$) and Mowe ($F = 11.01$; $p=.00$) were also statistically significant during the different seasons of the year. This indicates that environmental quality in the dry seasons differs considerably from the environmental quality identified in the rainy seasons in the year. However, residents of Isheri believed that the environmental quality perceived during the rainy seasons is the same as that of the dry seasons ($F = 3.02$; $p=.23$). Many factors may account for this observed trend. The most obvious is that Isheri enjoys a spill-over effect of the quality of services and facilities available in the parent city than Ibafo and Mowe combined.

4. Conclusions

In this study, we have presented the findings of an investigation on whether climate variability influences residents' perception of the quality of their environment. The study established that despite the variation that existed in residents' age, income, education status, and length of residence in the peri-urban area, the perception of residents in Isheri, Ibafo, and Mowe was influenced more by their daily life experiences or interaction with their immediate environment regardless of the season of the year. Similarly, it was established that EQI varies from one settlement to another and was inadequate to meet the needs of the residents in the different seasons of the year. The variance in quality had nothing to do with changes in socio-economic attributes or seasonality. The study also showed that the EQI to meet what people regarded as necessary was not available to a reasonable level of residents' satisfaction, irrespective of the year's season. However, this study did not account for other factors (such as socio-economic drivers, climate change adaptations, government policies, etc.) that may influence residents' perception of the quality of their environment. Hence, further study may be required.

It is imperative to institute environmental education to improve the environmental quality of peri-urban settlements of developing countries with similar socio-economic and climatic attributes. Residents must be taught different environmental practices to achieve an aesthetically pleasing environment

irrespective of the year's season. They must be taught not to vandalize and maintain environmental facilities and the need to pay electric and water bills. This education must be brought to the grassroots level, understanding the variation in age, education status, and residents' income. More importantly, it is a paradigm shift from top-down to bottom-up approaches. A bottom-up approach is such that when planning or the provision of facilities occurs, planning will be done with and for the people so that all residents are carried along. An advantage is that it gives a sense of fulfillment/achievement when residents know they were part of a process that brought solutions to the communities. The government must see the peri-urban area as a solution to new city planning rather than a problem for urban areas. If these recommendations are adopted, it is hoped that the findings will be sufficient to provide a temporal background for future environmental quality research in Nigeria and nations in the same climatic belt.

References

Afon, AO (2006). *Solid Waste Management in Selected Cities of Oyo State, Nigeria*. A PhD. Thesis submitted to the Department of Urban and Regional Planning, Obafemi Awolowo University Ile-Ife.

Afon, AO (1998). *Perception of Environmental Quality of the core of Ogbomoso in Oyo State*. M.Sc. Thesis. Submitted to the Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria.

Afon, A.O., Dada, O.T. and Faniran, G.B. (2016). Socio-Economic Attributes of Residents as Drivers of Adaptation to Climate Change Effects in a Nigerian Traditional Urban Center. *Archives of Current Research International*, 3(3): 1-15

Amerigo, M., and Aragones, J. M. (1997). A Theoretical Approach to the Study of Residential Satisfaction. *Journal of Environmental Psychology, 17*, 47-57.

Bonaiuto, M., Aiellol, A., Perugini, M., Bonnes, M. And Ercolani, A.P. (1999). Multidimensional Perception of Residential Environment Quality and Neighbourhood Attachment in the Urban Environment. *Journal of Environmental Psychology*. 19, pp 331-352.

Carp, F. M., and Carp, A. (1976). Perceived environmental quality of neighborhoods: Development of assessment scales and their relation to age and gender. *Journal of Environmental Psychology, 2*, 245-312.

Craik, K. H., and Zube, F. (Eds.) (1976). Perceiving Environmental Quality*: Research and application*. New York: Plenum Press

Fabiyi, O.O. (2013). Indigenous Knowledge System and Local Adaptation Strategies to Flooding in Coastal Rural Communities of Nigeria. *Journal of Indigenous Social Development Volume 2, Issue 1*.

Faniran G. B., Afon A. O., Dada O. T. (2017). Solid waste management during monthly environmental sanitation exercise in Ibadan municipality Nigeria, *Management of Environmental Quality*, 28(6): 868-878.

Gifford R. (2002). *Environmental Psychology: Principles and Practice*. Boston: Allyn and Bacon.

Gough, J. (2000). *Perception of Risk from Natural Hazards in the Remote New Zealand Communities.* Massey University, New Zealand.

Hillie, T. and Hlophe, M. (2007). 'Nanotechnology and the challenge of clean water', *Nature Nanotechnology*, 2(11): 663–664.

Houghton, J. T., Ding, Y., Griggs, D. J., Noguer, M., van der Linden, P. J., Dai, X., Maskell, K. and Johnson, C. A. (eds.): (2001). *Climate Change: The Scientific Basis. Contribution of Working Group 1 to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK, and NY, USA.

Kadiri, W and Oyalowo, B. (2010). Sustainable Development in The Peri-Urban Interface Of South-Western Nigerian Cities: Challenges, Opportunities And Strategies. Planning Africa Conference of the South African Planning Institute. International Convention Center, Durban, Kwa-Zulu Natal, South Africa. 67-79.

Kaili, D, (2003). Fuzzy evaluation of Urban Environmental Quality: Case study Wuchang Wuhan, University Thesis, International Institute for Geoinformation and Earth Observation.

Khattab, O. (1993). Environmental Quality Assessment: An attempt to Evaluate Government Housing Projects", *Open House International* 18 (4): 41– 47.

Lawanson, T; Salako, I; Yadua, O (2012). Environmental Challenges of Peri-Urban Settlements in the Lagos Megacity. In M. Schrenk, V. V. Popovich, P. Zeile, and P. Elisei (eds.), *17th International Conference on Urban Planning, Regional Development and Information Society* (pp. 275-285). Schwechat: CORP Association.

Mertz, O., Halsnæs, K., Olesen, J.E. and Rasmussen, K. (2009). 'Adaptation to climate change in developing countries,

Environmental Management, 43(5): 743–752.

Nigerian Meteorological Agency (2016). Metrological Bulletin, October, NiMet Press, Abuja, Nigeria.

Ranger, T. (1993). The Invention of Tradition Revisited: The Case of Colonial Africa. In T. R. Vaughan, *Legitimacy and the State in Twentieth-Century Africa* (pp. 62-111). London: Macmillan.

Rapoport, A. (1990). Environmental Quality and Environmental Quality Profiles, in Wikinson, *N.Ced Quality in the Built Environment, conference Proceedings, July 1989.* Newcastle upon Tyne. Open House International Association.

Rapoport, A. (1997). Theory in environment-behaviour studies: Transcending times, settings and groups, Wapner, S. et al. (eds), Handbook of Japan-US Environment Behavior Research (Toward a Transactional Approach). New York: Plenum. United Nations Habitat: State of African Cities.Nairobi, UN-Habitat, 2014. pp.399– 421.

Raudsepp, M (2001). 'Some socio-demographic and socio-psychological predictors of environmentalism,' TRAMES: *A Journal of the Humanities and Social Sciences*, 5(4): 355-67

Sampei, Y. and Aoyagi-Usui, M. (2009). Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Global Environmental Change*, 19: 203-212.

Sekaran U. (2003). *Research Method for Business*: a skill-building approach, 4th edition, John and Wiley and Sons.

Shen, J and Saijo, T (2008). 'Reexamining the relations between socio-demographic characteristics and individual environmental concern: Evident from Shanghai data,' *Journal of Environmental P*sychology, 28(1): 42-50.

Tsiagbey, M.; Danso, G. and Bradford, A. (2006). Perceptions and Acceptability of Urine Diverting Toilets in Low Income Urban Community in Ghana. *Third International Conference on Ecological Sanitation.*