



Environmental Orientation and Tree-Planting Behaviour among a Cohort of Urban Workers in Ibadan, Nigeria

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ABSTRACT

Urban forests are typically bastardized with increasing urbanization. Yet, urban trees are germane to accomplishing the vision of environmental sustainability because environmental sustainability is about bequeathing natural capital (such as trees) to future generations. Moreover, there is a society-wide obligation to nurture and contribute to this capital accumulation. The question of how well people recognize the importance of environmental challenges of our time, and the role of this recognition in people's active involvement in greening the environment (such as engaging in tree-planting) is therefore important. Hence, this study was designed to examine the association between environmental orientation and tree-planting behaviour among Federal civil servants at the Federal secretariat, Ikolaba, Ibadan Nigeria. Primary data collection featured the random selection of 400 respondents and the self-administration of a structured questionnaire among the same. Simple percentile analysis was used to assess the distributions of data. Chi-square was used to test the significance of associations between socio-demographic variables, levels environmental orientation and tree-planting. Craver's V was used to examine the extent of significant associations. Findings indicate that 69% of respondents maintain high pro-environmental orientation while 13.0% of them planted a tree in the last five years before the survey. Gender and age were significantly associated with tree-planting ($p < 0.05$) but religion was not ($p > 0.05$). Environmental orientation is significantly associated with tree-planting ($p < 0.05$). Younger men are significantly more predisposed to engaging in tree-planting irrespective of their religion. People's orientation towards the environment is significantly germane in their tree-planting endeavour. Forestry interventions should focus on boosting people's pro-environmental orientation.

Keywords: Environmental orientation, tree-planting behaviour, urban forestry, sustainability,

Introduction

Urban trees and forests are now typically conceptualized as green infrastructure (Kirkpatrick *et al.*, 2013; Perrotti and Stremke, 2020). The theme of the 2018 International Day of Forests was captioned

Forests and Sustainable Cities. This indicates the importance of trees for the sustainable growth of cities around the world (Endreny, 2018). With increasing urbanization and its attendant growth of human population cum built land area, urban



trees get depleted. However, the recognition of the huge significance of green infrastructure has led to a boom in urban greening activities in cities across the globe. These green-infrastructure-installing activities include the planting of trees, the establishment of parks, the creation of horticultural landscapes, the planting of plants on rooftops and so on. (Kondo *et al.*, 2015; McPherson, 2014). In recent times, Italy and China have added to the samples of green infrastructure by launching forested skyscrapers (Zhang, 2017).

Green infrastructure including urban trees can relieve the ills of poverty and sickness which are characteristic of concentrated urban population in developing countries, through the rendering of vital ecosystem services (Endreny, 2018). The planting of trees affords sustainability-enhancing vegetated landscape. The dimensions of landscape is at the heart of sustainability science—a science that is concerned with complex interactions between the environment and human beings (Wu, 2013). Forest-vegetated landscape supports and enhances human well-being (Jackson *et al.*, 2013; Hartig *et al.* 2014; Kuo, 2015; Wolf and Robbins, 2015).

Among the tangible ecosystem services provided by urban forests include the provision of services, such as food and fuel-wood production. Regulatory services such as air pollution reduction and storm-water management; cultural services such as beautification, recreation, social cohesion (trees serve as venues of social gathering), are among several intangible services provided by trees (Morgenroth *et al.*, 2016). Other intangible benefits of having trees in human-social spaces include the reduction of air temperature (Bowler *et al.*, 2010), carbon sequestration and therefore, air quality

improvement (Grote *et al.*, 2016; Samson *et al.*, 2017); the lessening of ultraviolet radiation (Agbelade *et al.*, 2016). Nevertheless, there are ecological disservices that trees offer: their roots may impair and even damage urban infrastructure; trees predispose to wildfire, and trees may provide habitats to criminal elements thereby enabling crimes to be committed (Moffat, 2016). Despite these, the ecological services provided by trees cannot be overemphasized because they are germane to achieving environmental sustainability.

Concern over environmental sustainability is a prime factor common to challenges confronting nations globally. Jansson *et al.* (2017) asserted that ecosystem degradation has grown to become a major topic among several actors in society. The ethical responsibility that behoves individuals to fulfil for the sake of safeguarding the welfare of current and future generations are often articulated in multiple circles. For instance, Ives *et al.* (2018) noted that humanity's reconnection to nature has been clamoured tremendously by scholars and civil society. With the increasing identification of the environmental crises of our time, society's disconnection from nature has been singled out as the root cause of unsustainability (Ives *et al.*, 2018).

Environmental sustainability has a lot to share with urban forestry. The significance of urban forest maintenance and expansion is even beyond ecological or human benefits to be derived. Urban forestry or urban tree planting is germane to accomplishing the vision of environmental sustainability (Greene *et al.*, 2018). Sustainability is about acquiring natural capital assets. Achieving sustainability is about bequeathing natural capital to future generations (Costanza and Daly, 1992;



Goodland, 1995). The acknowledgement of urban trees as a natural capital resource comes along with the collective obligation to nurture and contribute to capital accumulation. Tree maintenance and planting in especially urban areas are not a prerogative of any class, income group, gender, etc. This argument bears the question of how sustainable-environmental orientation affects people's readiness to take the responsibility for natural capital accumulation. A narrowed question ensuing from this argument is, for instance, how environmental orientation affects people's tree-planting behaviour. Environmental orientation centres on how people recognize the importance of environmental problems. The relevance of environmental orientation and its role in engendering samples of pro-environmental behaviour has been acknowledged (Fenget *et al.*, 2018). However, its role in people's active involvement in greening the environment, such as engaging in tree-planting is still obscured.

Urban forestry is multi-disciplinary and involves the entire community (Endreny, 2018). Public engagement in environmental restoration is important for success in the long run (Sorensen *et al.*, 2018). Urban forestry delves into citizen science, and "empowers citizens to speak on behalf of their trees" (Sorensen *et al.*, 2018). Public participation is germane, considering that the problems of urbanization that created the dire need for urban forestry are still widespread. Recent data shows for instance that though Africa has the lowest rating of urbanization because only 43% of its population lives in urban centres (United Nations, 2018), 90% of global growth in urbanization will be in Asia and Africa by 2050 (United Nations, 2018). Meanwhile, Africa's urban growth will

feature Nigeria prominently. This is because of Nigeria's current population and its huge potential for an increased population. Nigeria is one of the three nations that will produce 35% of the world population by 2050 (United Nations, 2017). Hence, Nigeria has been described as Africa's urban giant (Foxet *al.*, 2017). These showcase the special relevance of urban greening for Africans, especially Nigerians. Hence, this study was designed to examine the association between environmental orientation and tree-planting behaviour among a community of urban workers in Ibadan, Nigeria.

Methodology

The study area

The area of the study is Ibadan, Oyo State of Nigeria. Ibadan is the third-largest city in Nigeria, occupying a land area of about 3,123.30 km². Its coordinates are 7.3775°N, 3.9470°E. The study design is a federal civil-service based cross-sectional survey. The federal civil servants working at the federal secretariat, Ikolaba, Ibadan were the target population. The secretariat is a constellation of offices belonging to federal ministries and agencies whose command centres are located in the capital city, Abuja. The civil service is a microcosm of the larger society; hence the civil servants were targeted because of their representativeness.

Sampling procedure

According to the ministry of information at the secretariat, the total population of civil servants at the secretariat was 1103. At a 95% confidence level and a confidence interval of 4.0, the requisite sample size was calculated using the sample size calculator (<https://www.surveysystem.com/sscalc.htm>). The sample size was 389 and was rounded up



to 400. To sample prospective respondents, 19 units (ministries, agencies and commissions) of the secretariat were identified. Of these, 10 were randomly selected and designated as sampling units. The proportional representation principle influenced the process of drawing respondents from the target population, by applying the formula below:

$$P_r = \frac{P_u \times R_s}{P_t} \dots 1$$

Where P_r is the proportional representation of a unit, P_u is the population of each sampled unit, R_s is required sample size (400) and P_t is the total population of the units sampled (522).

The number of respondents sampled from each sampling unit is presented in table 1 below:

Table 1: Sampling units and number of sampled respondents

Sampling unit	Number of sampled respondents	Sampling unit	Number of sampled respondents
National Agency for Food and Drug Administration and Control	14	Federal Ministry of Works	139
National Bureau of Statistics	8	Federal Ministry of Environment	37
Ministry of Industry	33	Federal Ministry of Mines/Steel Development	31
Ministry of Labour/Productivity	29	Federal Ministry of Education	41
Federal Ministry of Information and Culture	40	National Population Commission	28

Data collection and analysis

A structured, self-administered questionnaire was the instrument of data collection. The questionnaire contained a standard rating scale and a two-item index of tree-planting behaviour. *Environmental orientation* was defined as respondents' ecological worldview in terms of how pro-environmental it is or otherwise. It was assessed using the eight-item new environmental paradigm (Dunlap *et al.*, 2000). These items are presented in figure 1. The Cronbach's alpha of the scale was 0.846. Responses included strongly agree, agree, disagree and strongly disagree and were scored 4 to 1. Therefore, the possible total score could range from 8 to 32. Respondents were categorized as being poorly, averagely and highly pro-environmentally oriented depending on their score. *Tree-planting*

behaviour was defined as respondents' history of tree-planting. It was primarily assessed by probing respondents' tree-planting in the last five years. On a second note, respondents' ever attempt at tree-planting was also assessed. Respondents were simply required to be affirmative or otherwise. Socio-demographic data including gender, age and religion were assessed nominally.

Percentile analysis was used to assess distributions of socio-demographic data. Items analyses of the scale of environmental orientation and the index of tree-planting behaviour were done and visualized using a stacked/simple bar chart. Respondents were classified into three based on the strength of their score on the scale of environmental orientation. The cross-distributions of variables were examined



using cross-tabulations and chi-square was used to test the significance of associations between the levels of these variables. The chi-square formula is:

$$\chi^2 = \sum (O_i - E_i)^2 / E_i \dots \quad 2$$

where O_i = observed value (actual value), E_i = expected value. Craver's V was used to examine the extent of significant associations. Statistical Package for Social Sciences (version 24) was used for data analyses.

Results and Discussion

Socio-demographic characteristics of the respondents

Table 2: Distribution of socio-demographic characteristics of respondents (N = 400)

Socio-demographic characteristic	Sub-groups	Frequency	Percentage
Gender	Male	270	67.5
	Female	130	32.5
Age*	16-25	25	6.3
	26-35	47	11.8
	36-45	147	36.8
	46-55	117	29.3
	56-65	64	16.0
Religion	Islam	134	33.5
	Christianity	265	66.3
	No response	1	0.3

*The mean \pm SD of age was 44.91 \pm 9.63, minimum= 20, maximum= 65.

Environmental orientation among respondents

The item analyses represented in figure 1 shows that there is a high level of agreement with the items that make up the new environmental paradigm scale. In other words, the world view of respondents is largely pro-environmentalism: 54.5% and 36.8% of respondents strongly agreed and agreed that humans are seriously abusing the environment, 29.8% and 51.5% of

The distribution of socio-demographic characteristics of respondents in Table 2 show that up to 7 of 10 (67.5%) respondents were males while about 3 of 10 (32.5%) were females. There appear to be more men than women in the targeted workforce. The mean \pm SD age of respondents was 44.91 \pm 9.63 (minimum= 20, maximum= 65). Categorical data shows that the age of respondents reflected an inverted U distribution that reached a peak at the 36-45 age sub-group. Two-thirds of respondents (66.3%) were Christian while Muslims constituted 33.5%.

respondents strongly agreed and agreed that we are approaching the limit of the number of people the earth can support, respectively. In another instance, 49.3% strongly agreed and 47.3% agreed that despite our special abilities, humans are still subject to the laws of nature. The proportion of respondents who disagreed with the items was generally low and ranged from 2.0% to 14.5%. The range of the proportion of respondents who strongly disagreed with the items was 0.5% and



3.3%.The range of the proportion of those who had no response to offer the items was 1.0% to 1.8%.Further analyses presented in figure 2 shows that 2%, 29% and 69% of respondents were poorly, averagely and highly pro-environmentally oriented respectively. These are indications of a high level of pro-environmental orientation among respondents, and indeed, in the general population of Ibadan. These findings suggest that people of African social context are not left out in the globally increasing consciousness about the environmental challenges confronting man today.The analysis of secondary data of 24 countries by Adeola (1998)shows that contrary to popular stereotypes, people of the developing world were much concerned about environmental issues, much aware of environmental problems, and veryactive in pro-environmental activities. Dunlap and York

(2008) also analyzed secondary data of the World Values Survey and reported that there is a heavier environmental concern among people of poorer countries.Ogunbode and Arnold(2012) also reported a high level of environmental awareness and concern in their study among the people of Ibadan, Nigeria. They found that respondents were able to identify 60%of 15 environmental issues that were presented to them. In their study among farmers of the Ido Local Government Area, Ibadan, Ibrahimet al., (2020) similarly reported that 48.8%, 45% and 6.2% of their respondents exhibited high, moderate and mild extent of perceived severity of environmental hazards, respectively. Current findings pervade the notion that environmental orientation is largely pro-environmentalism in multiple contexts including in developing countries.

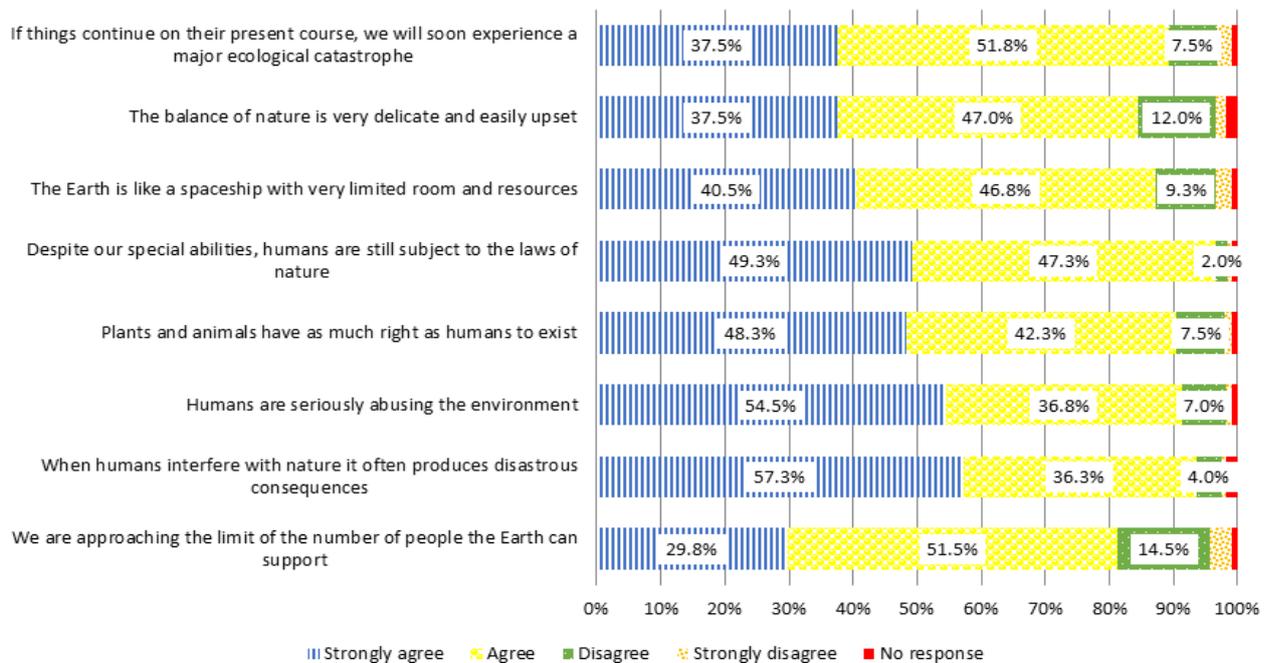


Figure 1: Item analysis of the scale of environmental orientation



Source: Computed from survey data, 2020.

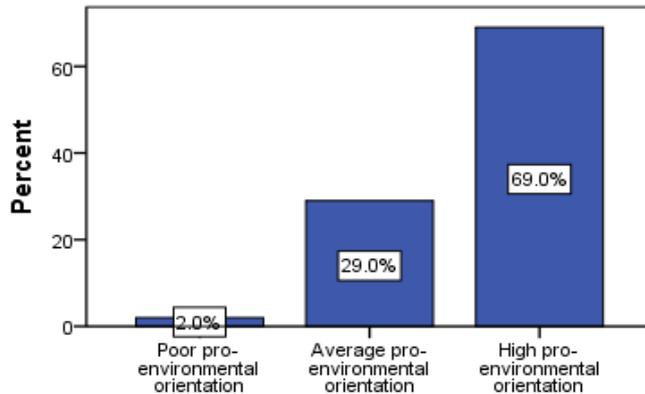


Figure 2: Dimensions of environmental orientation among respondents*

Source: Computed from survey data, 2020.

*Preliminary data analyses show that the mean total score was 26.62 ± 3.91 (minimum = 9, maximum = 32). Respondents who scored 9-16, 17 to 24 and 25-32 were 8, 116 and 276 and were regarded as being poorly, averagely and highly pro-environmentally oriented respectively.

Tree-planting behaviour among respondents

There was a bipolar distribution of respondents when they were confronted with the question of their attempt to plant tree ever: an equal number of respondents (198, 49.5%) were affirmative and otherwise. Four respondents (1%) did not respond to the question. In the last five years before the survey, however, only 52 (13.0%) respondents planted trees, 344 respondents (86.0%) did not while four respondents (1%) did not respond to this question. The literature is very deficient concerning the extent of tree-planting by individuals in urban contexts. Most of the information available is related to agroforestry by rural farmers. The

available information has generally indicated a better extent of tree-planting when compared with current findings: 86% planted trees among farmers in south-eastern Australia (Cary and Wilkinson, 1997); 79% and 75% planted trees and intended to plant trees in rural communities of Leyte Province, the Philippines (Emtage and Suh, 2004); 93.5% planted *Prunus africana* trees in the northwest region of Cameroun (Gyauet *et al.*, 2012); 76% planted trees in rural Malawi (Meijer *et al.*, 2016). Current findings indicate that tree-planting in the last five years is low and limiting to the sustainable ecology of Ibadan city. Meanwhile, respondents' ever attempt to plant tree is fair. The distribution of tree-planting behaviour is presented in figure 3.

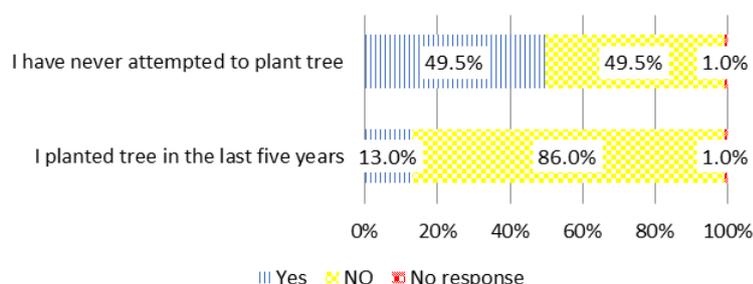


Figure 3: Tree-planting behaviour among respondents

Source: Computed from survey data, 2020.

Association between gender, age, religion and tree-planting behaviour

The cross analyses of gender and tree-planting shows that 16.7% of males and 5.5% of females planted tree in the last five years. More females (94.5%) than males (83.3%) did not also plant tree within the same period. The chi-square of this analysis is 9.515 ($p < 0.05$). Hence, gender is associated with tree-planting in the last five years. More men are significantly predisposed to tree-planting when compared with women. This vindicates the dominant position in the literature asserting the meagre input of women in the forestry and natural resource sector generally (Elias *et al.*, 2017; Kristjanson, 2020). This trend is often attributed to limited land tenure rights among women when compared with men (Adesina *et al.*, 2000; Gyauet *et al.*, 2012). The findings of Gyauet *et al.* (2012) shows that more men planted *Prunusafricana* trees in the northwest region of Cameroun but gender was not a significant determinant of tree-planting ($p > 0.05$). Current findings show that the extent of the significant association between gender and tree-planting is 15.5% (Cramer's $V = 0.155, p < 0.05$).

The proportion of respondents who planted tree in the last five years reduced as categorical age increased: 56.0% among those

aged 16-25 years, 29.8% among those aged 26-35 years, 10.2% among those aged 36-45 years, 5.3% among those aged 46-55 years and 4.8% among those aged 56-65 years. These are strong indications that belonging to younger age category predispose one to increased tree-planting. The chi-square of this analysis is 62.867 ($p < 0.001$). Therefore, age is significantly associated with tree-planting. Lin *et al.* (2012) also found that age significantly influences the intention to engage in afforestation in Taiwan. Gyauet *et al.* (2012) similarly found that age was a significant and inverse determinant of planting *Prunusafricana* trees in Cameroun ($\beta = -0.034, p = 0.025$). The extent of the significant association between age and tree-planting is 39.8% (Cramer's $V = 0.398, p < 0.001$). This is an indication that the younger generation is acting better than the older in the interest of environmental protection, suggesting an optimistic future of environmental dynamics in the study area.

More Muslims (17.2%) planted tree in the last five years when compared with Christians (11.1%). More Christians (88.9%) did not also plant tree in this period when compared with Muslims (82.8%). The chi-square was 2.838 ($p > 0.05$). Hence, religion is not significantly associated with tree-planting. Being Muslim or Christian is not significantly



predisposing to tree-planting. This buttresses the irrelevance of people’s religious affiliation in matters of ecosystem afforestation in the

study area. The summary of results obtained in the cross analyses of gender, age, religion and tree-planting are in table 3.

Table 3: Cross-tabulation of gender, age, religion and tree-planting history

Socio-demographic characteristics	Sub-groups	Tree-planting history (the planting of tree in the last five years)		
		Yes Frequency (%)	No Frequency (%)	Total Frequency (%)
Gender*	Male (%)	45 (16.7)	224 (83.3)	269 (100)
	Female (%)	7 (5.5)	120 (94.5)	127 (100)
	Total	52 (13.1)	344 (86.9)	396 (100)
Age**	16-25	14 (56.0)	11 (44.0)	25 (100)
	26-35	14 (29.8)	33 (70.2)	47 (100)
	36-45	15 (10.2)	132 (89.8)	147 (100)
	46-55	6 (5.3)	108 (94.7)	114 (100)
	56-65	3 (4.8)	60 (95.2)	63 (100)
	Total	52 (13.1)	344 (86.9)	396 (100)
Religion***	Islam (%)	23 (17.2)	111 (82.8)	134 (100)
	Christianity (%)	29 (11.1)	232 (88.9)	261 (100)
	Total	52 (13.2)	343 (86.8)	395 (100)

*Gender: Chi-square = 9.515, $p = 0.002$; Cramer’s V = 0.155, ($p = 0.002$)

**Age: Chi-square = 62.867, $p = 0.000$; Cramer’s V = 0.398, ($p = 0.000$)

***Religion: Chi-square = 2.838, $p = 0.092$.

Association between environmental orientation and tree-planting behaviour

The cross-analyses of the dimensions of environmental orientation and tree-planting behaviour in table 4 shows that among the respondents who planted tree in the last five years, 51.9%, 44.2% and 2.0% were highly, averagely and poorly pro-environmentally oriented. More than 5 of 10, more than 4 of 10 and less than 1 in 20 persons who planted tree in the last five years held high, average and poor pro-environmental orientation. The chi-square = 9.068 ($p < 0.05$). Hence, environmental orientation is significantly associated with tree-planting. The extent of this significance is 15.1% (Cramer’s V = 0.151, $p < 0.05$).

Further analyses show that 66.7%, 33.3% and 0.0% of respondents who had ever planted a

tree maintain high, average and poor pro-environmental orientation respectively. Invariably, up to 7 of 10, more than 3 of 10 and less than 1 in 20 persons who had ever planted tree maintain high, average and poor pro-environmental orientation. The chi-square of this analysis is 10.282 ($p < 0.05$). Therefore, environmental orientation is significantly associated with people’s attempt to plant tree ever. Cramer’s V = 0.161 ($p < 0.05$), so the degree of this significant association is 16.1%. Sorensen *et al.* (2018) similarly reported that being knowledgeable about environmental issues significantly influenced respondent’s willingness to engage in environmental restoration in their study among residents of selected neighbourhoods of New York, the US. However, Cary and Wilkinson (1997) reported that environmental orientation was not a significant determinant



of the decision to plant trees in their study among farmers in south-eastern Australia. Current findings support the position that environmental orientation is an asset to engaging in pro-environmental behaviour such as tree-planting.

Table 4: Levels of environmental orientation and tree-planting behaviour

Environmental orientation	Tree-planting behaviour (the planting of tree in the last five years*)		
	Yes Frequency (%)	No Frequency (%)	Total Frequency (%)
Poor pro-environmental orientation	2(3.8)	5 (1.5)	7 (1.8)
Average pro-environmental orientation	23 (44.2)	91 (26.5)	114 (28.8)
High pro-environmental orientation	27 (51.9)	248 (72.1)	275 (69.4)
Total	52 (100)	344 (100)	396 (100)

Environmental orientation	Tree-planting behaviour (respondent's ever attempt to plant tree**)		
	Yes Frequency (%)	No Frequency (%)	Total Frequency (%)
Poor pro-environmental orientation	0 (0.0)	7 (3.5)	7 (100)
Average pro-environmental orientation	66 (33.3)	48 (24.2)	114 (100)
High pro-environmental orientation	132 (66.7)	143 (72.2)	275 (100)
Total	198 (100.0)	198 (100.0)	396 (100)

*Chi-square = 9.068, $p = 0.011$; Cramer's V = 0.151, ($p = 0.011$)

** Chi-square = 10.282, $p = 0.006$; Cramer's V = 0.161, ($p = 0.006$)

Conclusions

There is a high level of pro-environmental orientation in the study area. This supports the notion that environmental orientation is largely pro-environmentalism in multiple contexts including in developing countries. Tree-planting is low and represents a limitation to the sustainable ecology of Ibadan city. More men are significantly predisposed to tree-planting when compared with women, supporting the dominant position in the literature which affirms the marginal contribution of women in the forestry and natural resource sector.

Belonging to the younger age category predisposes one to increased tree-planting, signifying an optimistic future of environmental dynamics in the study area. People's religious affiliation is not significantly essential for their tendency to

engage in tree-planting. Environmental orientation is significantly associated with people's attempt to plant tree. This makes environmental orientation a pertinent element of tree-planting and ecosystem amelioration/restoration. It is therefore incumbent on stakeholders in the environment sector to focus on maintaining and even improving peoples' environmental orientation through increased pro-environmental interventions.

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