

Socio-Economic Determinants of Willingness to Pay Tree Tax in Selected Suburbs of the Federal Capital Territory, Abuja, Nigeria

Isah Yau and Muhammed Rabiu

Department of Geography, Faculty of Geography and Atmospheric Science,
University of Abuja

Correspondence email: rabi.muhammed@uniabuja.edu.ng

Abstract

The Federal Capital territory, Abuja, Nigeria is witnessing rapid population growth with its attendant consequences on construction especially infrastructural development. Consequently, the natural ecosystem, especially trees are exposed to rapid degradation and depletion. Since the new subsidy regime in Nigeria and the FCT in particular the cost of living is quite high and this has forced many inhabitants of the community especially those living outskirts to rely primarily on fuelwood, charcoal and expansion of agricultural activities which has a direct impact on the availability of trees in the study area. Therefore, in order to reverse the trend of the rapid depletion of trees, the need for tree tax becomes a viable option. The study utilises both the primary and secondary sources of data, data types included: respondents' awareness of tree tax, payment of tree tax and socio-economic characteristics respondents. The sample frame of this work constitutes the six area councils in the FCT. A multi-stage sampling procedure was used to select respondents from Gwagwalada, Kuje and Bwari area councils, leading to 100 suitable responses analysed through cross-tabulation and Chi-Square tests as well as stepwise regression model. The analysis revealed a statistically significant association between willingness to pay the tree tax and gender ($\chi^2 = 9.368$, $p = 0.009$), with females showing higher uncertainty compared to males. Family size also had a significant effect ($\chi^2 = 9.985$, $p = 0.041$), as responses varied based on the number of children. The strongest association was with income level ($\chi^2 = 43.868$, $p < 0.001$), where higher earners (₦60,000–₦80,000) were more willing to pay, while lower-income groups (₦8,000–₦15,000) were entirely unwilling. However, no significant associations were found between willingness to pay and marital status ($p > 0.05$), age ($p = 0.127$), occupation ($p > 0.05$), or education level ($p = 0.101$). These results suggest that gender, family size and income are key factors influencing willingness to pay the tree tax, while other demographic variables do not show a significant relationship. Stepwise regression analysis further confirmed that income alone accounted for 6% of the variation in willingness to pay tree tax, while combining income with age explained 52.8% of the variation, highlighting these as primary predictors. These findings have significant implications for environmental taxation policies and socio-economic engagement strategies.

Keyword: Degradation, Depletion, Ecosystem, Socio-economic, Suburb, Tree Tax and Willingness

Introduction

Trees serve as vital green infrastructure, playing a crucial role in climate adaptation and urban sustainability. Recent studies highlight their multifaceted benefits, including urban heat island mitigation, carbon sequestration and stormwater management (Endreny et al., 2020). Beyond environmental functions, trees enhance public health by reducing air pollution (Shanahan et al., 2022) and improving mental well-being through biophilic interactions (Wolf et al., 2021). Economically, urban trees contribute to energy savings via shading and windbreak effects, while also boosting property values and neighbourhood desirability (Salbitano et al., 2020). Furthermore, they support biodiversity by providing habitats for urban wildlife (Aronson et al., 2021), reinforcing their necessity in resilient city planning.

Urban green spaces, especially those with trees, are essential because they provide key ecosystem services, improve environmental quality, enhance quality of life and support human health, all of which contribute to sustainable cities. Sustainable development has been widely recognized at global and national levels as the best way to guide urban growth now and in the future (Newman & Jennings, 2008).

Urban trees play a pivotal role in enabling cities and nations to achieve 15 of the 17 United Nations Sustainable Development Goals (SDGs), particularly those related to climate action, health and well-being and sustainable cities (Endreny, 2017; Salbitano et al., 2020). The integration of trees into urban systems is not merely an aesthetic consideration but a fundamental component of sustainable urban planning, critical for fostering economic resilience, ecological stability and social welfare (Elmqvist et al., 2019). As Rees (2012) argues, truly sustainable cities must be designed to minimise environmental degradation, reduce energy consumption and mitigate air and water pollution, objectives that are significantly advanced through strategic urban afforestation (Sassen, 2009).

However, despite their myriad benefits, urban trees also present certain disservices that can impede their broader societal acceptance (Lyytimäki, 2014). These disservices, ranging from allergenic pollen emissions and obstructed solar access to infrastructural damage and perceived safety hazards, can diminish public appreciation of urban greenery (Vierikko et al., 2020). The dichotomy

between ecosystem services and disservices is inherently complex, as the perception of these trade-offs is often context-dependent and influenced by socio-cultural factors (Dobbs et al., 2019).

Beyond their ecological and utilitarian functions, trees hold profound spiritual and cultural significance across diverse societies (Chen & Nakama, 2010). In Christian theology, for instance, the Tree of Life and the Tree of Knowledge symbolise divine wisdom and human fallibility, illustrating the deep-rooted intersection of arboreal symbolism and religious thought (Gobster et al., 2022). Similarly, within Hinduism, the *Ashvattha* (sacred fig) tree embodies cosmic consciousness, while in Buddhism, the Bodhi tree represents enlightenment, a motif central to the tradition's spiritual narrative (Haberman, 2022). These cultural dimensions highlight the multifaceted value of trees, extending beyond material benefits to encompass metaphysical and existential meaning. Abuja which is the capital of Nigeria has been witnessing burgeoning population growth with its attendance on ecosystem deterioration especially the degradation of trees arising from developmental activities. If this trend is not reversed, the Federal Capital Territory will likely experience sahelisation. Consequently, there are ongoing conversations among policy makers and academics on the need to reverse the trend through the polluter pay principle which essentially considers the developers and the residents to pay for the tree removal in the cause of their economic as well as developmental activities.

Studies on the willingness of people to pay tree tax is limited and few in the scientific journal especially in the study area. However, Alfredo et al. (2000) investigated the residents' willingness to pay to preserve the community urban forest of a small city of Mandeville, a suburb of New Orleans, Louisiana, United States. The results show that people with higher incomes are more willing to pay over \$12 for tree preservation. More women than men are willing to pay between \$6 and \$12 per year. However, more men than women are willing to pay more than \$12 per year. Age, education level and home ownership do not significantly affect willingness to pay.

The subsidy regime in Nigeria has come with a lot of challenges which is manifested in the socio-economic development of the people. In the present study area, fuel wood consumption and farming activities had intensified as a result of the removal of the fuel subsidy because most of the people could not cope with the rising cost of living. Therefore, majority rely primarily on cutting

down trees for domestic energy and expansion of farming activities. It is on this note that this study was conducted to determine the willingness of the people to pay for tree tax or otherwise.

Study Area

The study will be carried out in Abuja Municipal, Bwari, Gwagwalada, Kuje, Kwali and Abaji Area Councils in the Federal Capital Territory (FCT), Abuja Nigeria. The FCT is located in the North of the confluence of Niger and Benue River. It is bordered by states of Niger to the west and North, Kaduna to the North East, Nasarawa to the East and South and Kogi to the South west. It lies between latitude $8^{\circ}25^0$ and $9^{\circ}20^0$ North of the equator and longitude $6^{\circ}45^0$ and $7^{\circ}39^0$ East of the green-which meridian. It has a land mass of approximately $7,31\text{Km}^2$ Balogun (2001).

The two main types of rocks underlying the area are essentially the sedimentary rocks found in the southern and southwestern extremities of the territory and the basement complex rock. The former covers a total land area of 48%, while the latter covers 52% (Chup, 2004). The area is portrayed by a hilly and dissected landscape (Balogun, 2001) with rocks consisting mainly of schists, gneiss and old granites (Chup, 2004). The geology of the area is underlain by basement complex rocks (Ujoh, Kwabe & Ifatimehin, 2010).

The relief of the study area is characterised by rolling hills, isolated highlands and gaps with low dissected plains. The south west area has the lowest elevation where the flood plain of Gurara River is at an elevation of about 70m above sea level (Olajuyigbe, Ogan, Adegboyega et al., 2014). The land rises irregularly from there; eastward we have Bwari, Aso range in the north east and the Idonkasa range in the North West of Gwagwalada. There are other isolated inselbergs dotting many parts of the area and Federal Capital Territory (Olajuyigbe et al., 2014). The area is generally characterised of undulating plains with scattered rock outcrops and hills (Akpata, Okezie & Okeke, 2017).

Abuja has two distinct seasons, namely the rainy season that begins around March and runs through October and the dry season which begins from October and ends in March. There is extreme concentration of rainfall in the three months of July, August and September when more than 60% of the rainfall is received (Chup, 2004).

The soil of the study area is basically luvisols which are fertile support the growth of tree species and food crops (Ujoh, Kwabe and Ifatimehin, 2010; Agbelade, Onyekwelu and Oyun, 2017). The

characteristics of soils of the area according to Akpata et al. (2017) are deep to very deep and very shallow to moderately deep well drained soils; sand and loamy sand to sandy loam surfaces over sandy loam to sandy clay loam and sometimes gravelly subsoils. The soils of the area are basically from two sources: the crystalline rocks of the basement complex rocks which cover the northern two-thirds of the territory and the Nupe sandstones which cover the southern one-third of the territory. According to Chup (2004), the major soil types in Abuja include the gleysols, fluvisols, luvisols, combisols, regosols and lithosols. The alluvial complexes generally contain gleysols and fluvisols with the exception of the alluvial pediment complex of the Zuba hills, which contain combisols and regosols. The interfluves are dominated by luvisols and combisols. The summit and upper slopes of the most interfluves are dominated by combisols and lithosols, while the wooded hills of plains (specifically Gwagwa, Iku and Kau) are dominated by the regosols (Chup, 2004). The 2006 population census showed that the population of AMAC was 776, 298 (NPC, 2006). This population figure has massively increased as a result of the day-by-day influx of people into the area. This is evidently shown in Table 2.3, where the population figure in 2008 two years after the population census increased to 934,991 persons. This figure thereafter increased to 1,026,116 and 1,126,123 persons in 2009 and 2010 respectively, while in 2011, it increased by 9.7% to 1,235,877 persons. From 2006 to 2011, the population of AMAC steadily increased by 59.2%. The 2016 projected population figure of AMAC with 3.0% growth rate is 1, 432, 720 persons. A similar trend is noticeable in the population of the FCT which was 1,406,239 persons in 2006, but increased to 2,238,751 persons in 2011 (NBS, 2012). The reasons for the large-scale migration of people into the FCT are political, economic to social (Mundi, 2000 cited in Chup, 2004). The projected population as depicted in Table 2.3 showed that in 2008, the total population of Abuja (FCT) was 1,693,707 persons, this figure increased to 1,858,775 persons in 2009 and in 2011, the figure increased to 2,238,751 persons which is an indication of 32.2% increase in human population in 4yrs (2008 to 2011).

The search for jobs and other necessities have resulted in the high rate of urbanisation or urban population growth over time. The continuous increase in population has inherent implications on food and housing demands among others. The increasing demand for food to meet the increasing population results in forest loss in the area council and in areas where farming is predominantly practiced, the loss of vegetation is high and the stands of isolated trees of different species become

evident as seen in farmlands. Abuja Municipal Area Council has the following ethnic groups: Gbagyi settlements in AMAC include the following: Karu, Nyanya, Durumi, Garki, Ketti Kabusa, Mabushi, Jabi, Lugbe, Idu, Toge, Hulumi, Pyakasa, Jikwoyi Kurudu, Orozo, Maitama and Asokoro Areas. The Gwagwalada people can be found in places such as Karshi, Jiwa, Gwagwa, Karmo and Idu. The Area Council besides the city caters for the needs of over 49 communities each presided over by village heads.

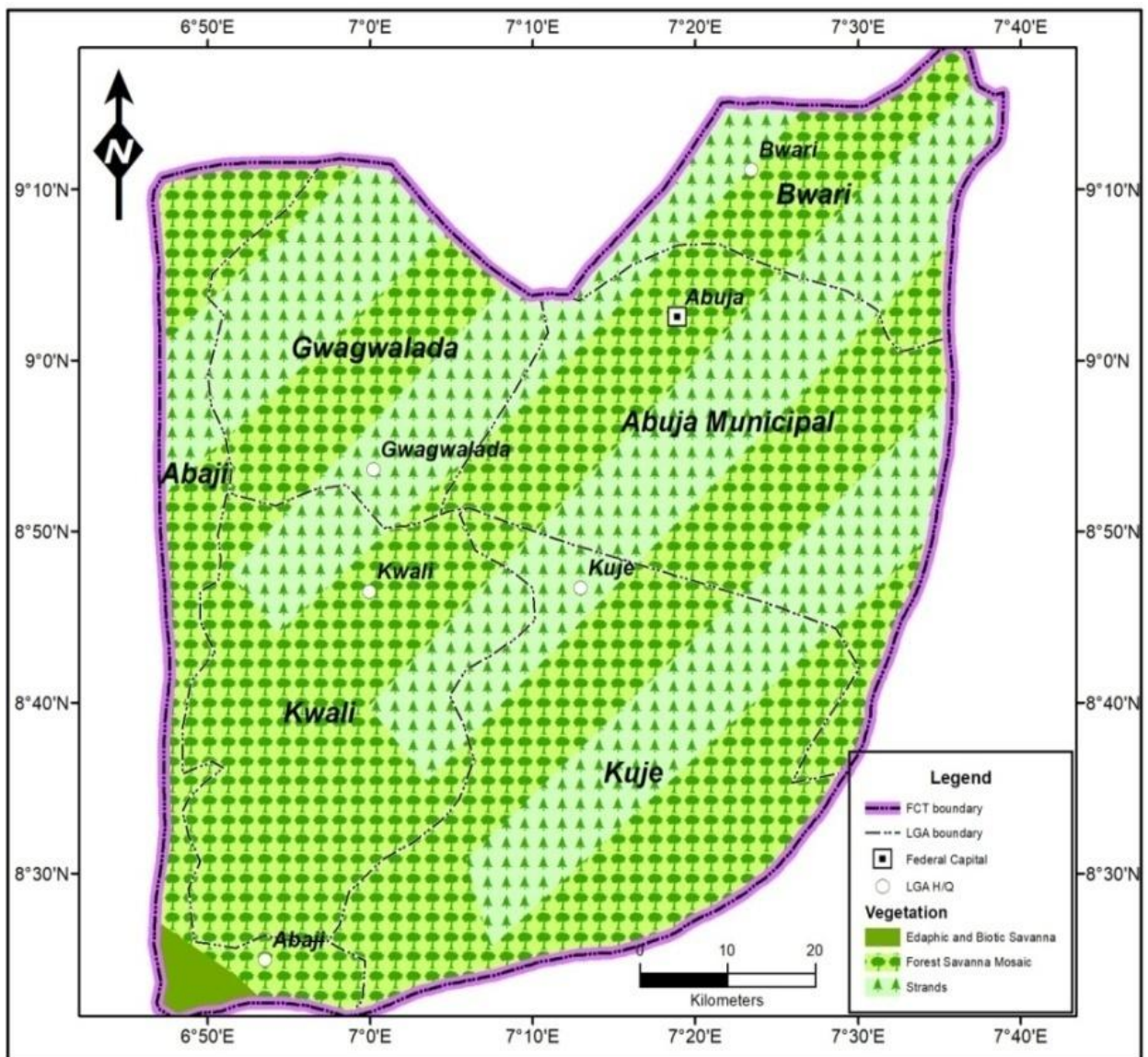


Figure 1.1: Map of Study Area

Research Methods

The study area comprised, Kuje, Gwagwalada, Abaji and Bwari Area Councils. Two settlements each from the three-area council were randomly selected using a table of random number for the study. The settlements are Dobi and Paiko for Gwagwalada Area Council, Kwaku and Gudun Karya for Kuje Area Council, while Kuduru and Igu for Bwari Area Council.

Sample Size and Sampling Technique

Using Krejcie and Morgan $n = \frac{x^2NP(1-P)}{e^2(N-1)+x^2P(1-P)}$

$X^2 =$ table value at degree of freedom at 95% confidence level =4.35

$e =$ margin of error= 0.05

$P =$ population proportion= 0.5

$N =$ population size 6

Substituting the parameter to the equation above,

$$n = \frac{3.841 \times 6 \times 0.5(1-0.5)}{0.05^2(6-1) + 3.841(1-0.5)}$$

$$n = \frac{11.523(1-0.5)}{0.0025(5) + 3.841(0.5)}$$

$$n = \frac{11.523(0.5)}{0.00125 + 1.9205}$$

$$n = \frac{5.7615}{1.933}$$

$$n = 2.9803$$

$n = 3$ approximately. This means three (3) clusters.

Therefore, the three (3) area councils were selected from the six (6) area councils in the study area. A two digits table of random number was used to select the desire sample size from the six area councils as follow:

(01) Abaji, (02) Gwagwalada, (03) AMAC, (04) Kuje, (05) Bwari (06) Kwali. Going by the column of the table of random number, following cluster were selected: (02) Gwagwalada, (04) Kuje and (05) Bwari.

The desire number settlement was obtained using Krejcie and Morgan

X^2 = table value at degree of freedom at 95% confidence level = 2.37

e = margin of error = 0.05

P = population proportion = 0.5

N = population size 3

Substituting the parameter to the equation above,

$$n = \frac{2.37 \times 3 \times 0.5(1-0.5)}{0.05^2(3-1) + 2.37(1-0.5)}$$

$$n = \frac{3.56(0.5)}{0.0025(2) + 2.37(0.5)}$$

$$n = \frac{3.56(0.5)}{2.375(0.5)}$$

$$n = \frac{1.78}{1.19}$$

$$n = 1.4958$$

$$n = 2$$

A total of 135 houses were identified along the twelve footpaths. Using the table of random number for finite population, a total of one hundred (100) houses were selected out of 135 houses. The federal capital territory was clustered into six that is, based on Area Councils as follows: Abaji, Kwali, Gwagwalada, AMAC, Kuje and Bwari. The clusters were selected randomly using the table of random number to a desire clusters size.

The selected clusters (Area Councils) were cluster into settlements and selected to a desire samples size using the table of random number.

The selected clusters (settlements) were cluster into streets and selected to a desire samples size using the table of random number.

The selected clusters (streets) were clustered into houses and selected to a desired samples size using the table of random number.

The three (3) clustered (Area Councils) was cluster into six (6) meaning two (2) clusters (settlements) from each of the three (3) selected clusters (Area Councils). The settlements within the two (2) clusters were numbered to enable the use of table of random number to select the appropriate settlements for the study as follows:

Gwagwalada

01) Gwagwalada centre (02) Kutunku (03) Staff quarters (04) Ibwa (05) Dobi (06) Paiko (07) Tungan Maje (08) Zuba (09) Ikwa (10) Gwako.

Kuje

01) Kuje (02) Chibiri (03) Kwaku (04) Gaube(05) kabi (06) Rubochi (07) Gwargwada (08) Gudun karya (09) Kujekwa (10) Yenché.

Bwari.

(01) Bwari central (02) byazhin (03) Kuduru (04) shere (05) Kawu (06) Ushafa (07) Dutse alhaji (08) Igu (09) Kubwa (10) Usuma

Using four (4) digit table of random number the following clustered (settlements) were selected. GWAGWALADA Area Council: (03) Staff Quarters, (05) Dobi. KUJE Area Council (03) Kwaku and (08) Gudun Karya. BWARI Area Council: (03) Kuduru and (08) Igu.

The six (6) clusters (Settlements) were clustered into twelve (12) streets / footpath. Numbers were assigned to the identified houses on the footpath to enable the use systematic sampling for the administration of the question in each footpath. Every 3rd house was considered for the administration of questionnaires. The footpath was used because of the settlement lacks streets name and houses number.

The data was analysed using the Chi-Square test of association and a stepwise regression model which is a method of building a regression model by automatically adding or removing predictor variables based on their statistical significance in explaining the response variable. This model can be used to test the relationship between a dichotomous dependent' variable (in the case, the

willingness to pay for tree tax) and one or more independent variables (in this content, socio-economic variables).

Results and Discussion

The analysis shows that among the 57 males surveyed: 26 are willing to pay the tree tax, 27 are unwilling to pay, 4 are uncertain. In the same vein, among the 43 females surveyed: 15 are willing to pay, 15 are unwilling and 13 are uncertain.

Also, the Pearson Chi-Square test with a value of 9.368 and $p\text{-value}=0.009$ indicates a statistically significant association between gender and willingness to pay the tree tax at 0.05. Similarly, the significant p -values in both the Likelihood Ratio and Linear-by-Linear Association tests reinforce the main Chi-square result, indicating: There is a significant association between gender and willingness to pay the tree tax and There is potentially a linear trend, suggesting that gender may affect responses in a somewhat predictable, ordered manner rather than randomly.

The analysis also shows that among the 43 married respondents: 18 are willing to pay the tree tax, 21 are unwilling to pay and 4 are uncertain. Also, among the 57 single respondents: 23 are willing to pay, 21 are unwilling and 13 are uncertain. The willingness to pay tree tax does not depend on the marital status. This finding is obtained using the cross tabulation between marital status and willingness to pay tree tax in the study area. The result is not statistically significant at 0.05 level.

Further analysis reveals the breakdown of responses across four age groups, ages 18-25 comprises of 16 respondents of which 3 are willing to pay, 11 are unwilling and 2 are uncertain. Similarly, Ages 34-41 (29 respondents), 12 are willing to pay, 11 are unwilling and 6 are uncertain. Also, Ages 42 and Above (33 respondents), 15 are willing to pay, 10 are unwilling and 8 are uncertain. Also, the values of the Pearson chi-square, Likelihood Ratio and Linear-by-Linear Association include: 9.954, 10.806 and 0.000 with a p -value of 0.127, 0.095 and 0.996 indicates that none of the Chi-square test results are statistically significant (all p -values are above 0.05); therefore, there is no significant association between Age and willingness to pay the tree tax.

The findings also show that among 28 respondents with household size of two: 14 are willing to pay, 12 are unwilling to pay and 2 are uncertain. In the same vein, among 29 respondents with household size of 3-4; 12 are willing to pay, 15 are unwilling to pay and 2 are uncertain. Similarly, among 43 respondents with household size of >5; 15 are willing to pay, 15 are unwilling to pay and 13 are uncertain. All three tests; Pearson Chi-square, Likelihood Ratio and Linear-by-Linear Association indicate a statistically significant association between family size and willingness to pay the tree tax (all p-values are below 0.05).

In addition, results indicate that among 19 respondents who are civil servants, 6 are willing to pay, 11 are unwilling to pay and 2 are uncertain. Also, among 29 respondents that accounted for other occupation types, 17 are willing to pay, 10 are unwilling to pay and 2 are uncertain. In the same vein, among 27 respondents who are into business, 11 are willing to pay, 11 are unwilling to pay and 5 are uncertain. Similarly, among 25 respondents who are farmers, 7 are willing to pay, 10 are unwilling to pay and 8 are uncertain. The statistical analysis shows that there is no significant association between the occupation characteristics of the respondents and willingness to pay tree tax in the study area.

The analysis further reveals that among 27 respondents with primary education, 14 are willing to pay, 11 are unwilling to pay and 2 are uncertain. In the same vein, among 39 respondents with secondary education, 12 are willing to pay, 21 are unwilling to pay and 6 are uncertain. Similarly, among 34 respondents with tertiary education, 15 are willing to pay, 10 are unwilling to pay and 9 are uncertain. The Pearson Chi-Square value of 7.763 with a p-value of 0.101 indicates that there is no statistically significant association between education level and willingness to pay the tree tax at 0.05 level.

The findings also show that among the 4 respondents that earns ₦8000; 3 are willing to pay and 1 is unwilling. In the same vein, among the 9 respondents that earns ₦8,000 - ₦15,000; all 9 are unwilling to pay. Similarly, among 15 respondents that earns between ₦15,000 - ₦23,000; 11 are willing to pay, 2 are unwilling and 2 are uncertain. Also, among the 19 respondents that earns between ₦23,000 - ₦40,000, 8 are willing to pay, 9 are unwilling and 2 are uncertain. The table further shows that, among 13 respondents that earns between ₦40,000 - ₦60,000, 4 are willing to pay and 9 are unwilling. Also, among 19 respondents that earns between ₦60,000 - ₦80,000, 12

are willing to pay, 2 are unwilling and 5 are uncertain. While, among 21 respondents that earn ₦80,000 and above, only 3 are willing to pay, 10 are unwilling and 8 are uncertain. The Pearson Chi-Square value of 43.868 with a p-value of 0.000 indicates that there is a statistically significant association between income level and willingness to pay. All tests: Pearson Chi-square, Likelihood Ratio and Linear-by-Linear Association are statistically significant (all p-values below 0.05). This indicates a strong association between income level and willingness to pay the tree tax, with a possible linear trend.

Finally, in view of the pattern or trend of this association obtained from the cross-tabulation, a stepwise regression is further performed on the variables and the result is further presented in Table 2.

Table 1: Respondents' willingness to Pay for Tree Tax in the Study Area

Category	Response	Willing to Pay	Unwilling to Pay	Don't Know	Total	Pearson Chi-Square	Likelihood Ratio	Linear-by-Linear Association
Sex	Male	26	27	4	57	Value: 9.368, p=0.009	Value: 9.515, p=0.009	Value: 5.352, p=.021
	Female	15	15	13	43			
	Total	41	42	17	100			
Marital	Married	18	21	4	43	Value: 3.483, p=0.175	Value: 3.662, p=0.160	Value: 1.047, p=0.306
	Single	23	21	13	57			
	Total	41	42	17	100			
Age	18-25	3	11	2	16	Value: 9.954, p=0.127	Value: 10.806, p=0.095	Value: 0.000, p=0.996
	26-33	11	10	1	22			
	34-41	12	11	6	29			
	42 Above	15	10	8	33			
	Total	41	42	17	100			
Household Size	Two	14	12	2	28	Value: 9.894, p=0.042	Value: 9.985, p=0.041	Value: 5.098, p=0.024
	Three-Four	12	15	2	29			
	>Five	15	15	13	43			

	Total	41	42	17	100			
Occupation	Civil Servant	6	11	2	19	Value: 10.761, p=0.096	Value: 10.465, p=0.106	Value: 3.268, p=0.071
	Business	11	11	5	27			
	Farmer	7	10	8	25			
	Others	17	10	2	29			
	Total	41	42	17	100			
Education	Primary	14	11	2	27	Value: 7.763, p=0.101	Value: 7.974, p=0.093	Value: 1.847, p=0.174
	Secondary	12	21	6	39			
	Tertiary	15	10	9	34			
	Total	41	42	17	100			
Income	8000	3	1	0	4	Value: 43.868, p=0.000	Value: 51.104, p=0.000	Value: 5.947, p=0.015
	8000-15000	0	9	0	9			
	15000-23000	11	2	2	15			
	23000-40000	8	9	2	19			
	40000-60000	4	9	0	13			
	60000-80000	12	2	5	19			
	80000 And above	3	10	8	21			
	Total	41	42	17	100			

Furtherance to this study, a step wise regression model was also used to determine the relationship between the socio-economic variables and willingness to pay tree tax in the study area. The results reveal that when income alone was used as a predictor it accounted for 6% of the variation of willingness to pay tree tax, but when age was added, the variance of explanation increased to 52.8%. Therefore, income level and age are the most explained predictor in the variation of willingness to pay tree tax in the study area, the result is statistically significant at 0.05 level. However, the other predictors such as gender, marital status, family size, occupation and education were excluded from the model as there were not significant in the explanation of the variation of willingness to pay tree tax.

The analysis reveals that socio-economic characteristics have varying levels of influence on willingness to pay for the proposed tree tax. Sex exhibits a statistically significant association,

suggesting potential differences in environmental valuation and tax responsiveness. Income level shows a particularly strong association with willingness to pay, with higher-income earners displaying greater willingness. This finding is consistent with broader research indicating a positive relationship between income and environmental expenditure. Age, as a predictor when combined with income, explains a substantial portion of the variation in willingness to pay, indicating its importance in shaping environmental perspectives. However, education, marital status and occupation did not demonstrate significant associations, suggesting that knowledge and familial responsibilities may not heavily influence respondents' valuation of environmental services in the study area.

The findings in this study support Alfredo et al. (2000) who assessed residents' willingness to pay to preserve the community urban forest of a small city of Mandeville, a suburb of New Orleans, Louisiana, United States. The results display the willingness to pay a higher premium (>\$12) for tree preservation and protection is directly related to income levels; more female than male respondents are willing to pay \$6 to \$12 per year for tree preservation but more male than female respondents are willing to pay more than \$12 per year for tree preservation; age, level of education and type of residential ownership are not significantly associated with willingness to pay for tree preservation and protection.

This study's findings align with Marek's (2014) research on tree valuation and governance in Lodz, Poland. Using choice experiments to assess street tree values, Marek found that 351 surveyed residents were most willing to pay for greening streets with few or no trees, confirming public support for tree planting initiatives. While our study examines tree taxation rather than valuation, both works demonstrate the importance communities place on urban greening.

Table 2: Regression Analysis of Willingness to Pay Tree Tax

Predictor Variables	Unstandardized B	Standardized Beta	t-value	p-value	Partial Corr.	Tolerance
Model 1						
Constant	1.294	-	6.490	.000	-	-
INCOME	0.099	0.245	2.503	.014	-	-
Excluded Variables						
Gender	-	0.090	0.491	.625	0.050	0.290

Marital Status	-	-0.369	-2.040	.044	-0.203	0.283
Age	-	-2.025	-9.810	.000	-0.706	0.114
Family Size	-	-0.026	-0.092	.927	-0.009	0.119
Occupation	-	-0.566	-1.769	.080	-0.177	0.092
Education	-	-0.623	-2.481	.015	-0.244	0.145
Model 2						
Constant	1.482	-	10.345	.000	-	-
INCOME	0.873	2.151	10.420	.000	-	-
Age	-1.367	-2.025	-9.810	.000	-	-
Excluded Variables						
Gender	-	0.089	0.684	.495	0.070	0.290
Marital Status	-	0.000	0.004	.997	0.000	0.260
Family Size	-	0.316	1.554	.123	0.157	0.116
Occupation	-	0.104	0.430	.668	0.044	0.084
Education	-	0.275	1.334	.185	0.135	0.113

Table 3: Model Fit Statistics

Model	R	R ²	Adjusted R ²	Std. Error
1	0.245	0.060	0.050	0.70784
2	0.727	0.528	0.518	0.50409

Conclusion and Recommendations

The findings from this study highlight several critical policy implications for implementing a tree tax in the study area. Given the significant association between income level and willingness to pay, policymakers should consider implementing a progressive tax structure where higher-income individuals contribute proportionally more, while offering exemptions or reduced rates for low-income earners to ensure affordability and equity. The gender differences in willingness to pay suggest that awareness campaigns and engagement strategies should be tailored to address the specific concerns and motivations of both men and women, potentially through targeted community outreach programmes.

Since age emerged as a key predictor when combined with income, educational initiatives on the benefits of urban trees could be directed toward younger demographics to foster long-term environmental stewardship. The lack of significant association with marital status, occupation and education implies that these factors should not be primary considerations in policy design, though further qualitative research may help explain these trends.

For effective implementation, the government could introduce pilot programmes in neighbourhoods with higher-income residents and strong support for tree conservation, using these as models for broader rollout. Additionally, transparent communication about how the tax revenue will be used for urban greening projects could enhance public trust and willingness to participate. Given the influence of family size on willingness to pay, policies could also incorporate household-based incentives, such as tax rebates for families that participate in tree-planting initiatives.

The willingness to pay for a tree tax among residents of the study area is primarily driven by income and age. These factors significantly shape public response to environmental taxation, while gender exerts a secondary influence. Conversely, marital status, occupation and education appear to have negligible effects. Policies aimed at environmental sustainability through taxation should therefore consider targeting socio-economic brackets and using income as a basis for engagement, ensuring affordability and perceived value.

REFERENCES

- Agbelade, A. D., Onyekwelu, J. C., & Oyun, M. B. (2017): Tree Species Richness, Diversity and Vegetation Index for Federal Capital Territory, Abuja, Nigeria. *International Journal of Forestry Research*, 1-12. <https://doi.org/10.1155/2017/4549756>.
- Akpata Sylvester B. M, Okezie Ifeanyi W. N. Okeke Francis I., (2017): GIS_ Based Digital Soil Map of Abuja; *Journal of Scientific and Engineering Research*, 4(5):65-74.
- Alfredo B. Lorenzo, Catalino A. Blanche, Yadong Qi and malcolm m. guidry, (2000); Assessing residents' willingness to pay to preserve the community urban forest: a small-city case study; *Journal of Arboriculture* 26(6)
- Aronson, M.F. Lepczyk, C.A. K.L. Evans, M.A. Goddard, S.B. Lerman, J.S. MacIvor, C.H. Nilon, T. (2021) Vargo Biodiversity in the city: key challenges for urban green space management *Front. Ecol. Environ.*, 15, pp. 189-196, 10.1002/fee.1480
- Balogun, O. (2001). *The Federal Capital Territory of Nigeria: Geography of its Development*. University of Ibadan; Ibadan University Press.
- Chen, B. and Y. Nakama. 2010. A study of the Village Forest Landscape in Small Island Topography in Okinawa, Japan. *Urban Forestry & Urban Greening*, Issue 2 Volume 9. (Online article in press) (PDF) *On the Establishment of Feng Shui Villages from the Perspective of Old Fukugi Trees in Okinawa, Japan*. Available from: https://www.researchgate.net/publication/286910612_On_the_Establishment_of_Feng_S_hui_Villages_from_the_Perspective_of_Old_Fukugi_Trees_in_Okinawa_Japan
- Chup, C.D. (2004): Analysis of agroforestry practices in the guinea savannah ecological zone: Federal capital territory of Nigeria.
- Dobbs, C., Escobedo, F.J., Clerici, N., de la Barrera, A.A. Eleuterio, I. MacGregor-Fors, F., Reyes-Paecke, S., Vásquez, A., Zea Camaño, J.D., Hernández, H.J. (2019) Urban ecosystem Services in Latin America: mismatch between global concepts and regional realities? *Urban Ecosyst.*, 22 (1) (2019), pp. 173-187, 10.1007/s11252-018-0805-3
- Elmqvist, T. andersson, E., Frantzeskaki, N. (2019) Sustainability and resilience for transformation in the urban century. *Nat Sustain* 2, 267–273 (2019). <https://doi.org/10.1038/s41893-019-0250-1>

- Endreny, T. A. (2020). *Strategically growing the urban forest will improve our world*. Nature Communications.
- Gobster, P.H.; Weber, E.; Floress, K.M.; Schneider, I.E.; Haines, A.L.; Arnberger, A. (2022) Place, loss and landowner response to the restoration of a rapidly changing forest landscape. *Landsc. Urban Plan.* **2022**, 222, 104382. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Haberman, D.L. (2022). People Trees: Worship of Trees in Northern India. 117. 10.1111/aman.12205.
- Jessica B. Turner-Skoff, Nicole Cavender, (2019): The benefits of trees for livable and sustainable communities; *Plants people's planet*, 1, 323-335.
- Lyytimäki, J. (2014). Ecosystem disservices: Embrace the catchword. *Ecosystem Services*. 12. 10.1016/j.ecoser.2014.11.008.
- Marek Giergiczny, Jakub Kronenberg,(2014):From Valuation to Governance: Using Choice Experiment to Value Street Trees; *AMBIO A Journal of the Human Environment*, DOI 10.1007/s13280-014- 0516-9.
- National Population Commission (NPC) (2006) Nigeria National Census: Population Distribution by Sex, State, LGAs and Senatorial District: 2006 Census Priority Tables (Vol. 3). <http://www.population.gov.ng/index.php/publication/140-popn-distri-by-sex-state-jgas-and-senatorial-distr-2006>
- Newman, P. and Jennings, I. (2008), *Cities as Sustainable Ecosystems: Principles and Practices*, Washington, DC: Island Press.
- Nowak, D. J. and Dwyer, J. F. (2007): Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J., ed. *Urban and community forestry in the Northeast*. New York: Springer: 25-46.
- Nowak, D. J. and Dwyer, J.F. (2000): Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J. (Ed.), *Handbook of Urban and Community Forestry in the Northeast*. Plenum Publishers, New York, pp. 11e25.
- Nowak, D.J., et al., (2010): *Sustaining America's Urban Trees and Forests*, USDA Forest Service; General Technical Report.
- Olajuyigba, A.E., Ogan, V., Adegboyega, S.A., Fabiyi O., (2014): Spatio-temporal analysis of road accidents in Abuja, FCT, Nigeria using GIS techniques *journal of scientific research and reports* 3 (12).
- Rees W. E. (2012) 'The ecological crisis and self-delusion: implications for the building sector', *Building Research and Information*, 37/3: 300 – 11.
- Salbitano, F., et al. (2020). *The economic value of urban forests*. *Urban Forestry & Urban Greening*.

- Sassen, S. (2009): Bridging the ecologies of cities and of nature. In: The International Forum on Urbanism, 4th International Conference: The New Urban Question, urbanism beyond Neo liberalism. Amsterdam/Delft, The Netherlands.
- Shanahan, D. F., et al. (2022). *Health benefits of urban trees: A critical review*. The Lancet Planetary Health.
- Sofia Olivero-Lora I, Elvia Meléndez-Ackerman, Luis Santiago, Raúl Santiago-Bartolomei and Diana García-Montiel (2019): Attitudes toward Residential Trees and Awareness of Tree Services and Disservices in a Tropical City. *Sustainability*, 12, 117; doi:10.3390/su12010117 www.mdpi.com/journal/sustainability.
- Sofia Olivero-Lora, Elvia Meléndez-Ackerman, Luis Santiago, Raúl Santiago-Bartolomei, Diana García-Montiel, (2019): Attitudes toward Residential Trees and Awareness of Tree Services and Disservices in a Tropical City; *Sustainability* 2020, 12(1), 117; <https://doi.org/10.3390/su12010117>
- Ujoh, F. Kwabe, I. Ifatimehin, O. (2010): Understanding urban sprawl capital city, Abuja: Tward sustain able urbanisation in Nigeria.
- Vierikko, K., Paula Gonçalves, Dagmar Haase, Birgit Elands, Cristian Ioja, Mia Jaatsi, Mari Pieniniemi, Jasmina Lindgren, Filipa Grilo, Margarida Santos-Reis, Jari Niemelä, Vesa Yli-Pelkonen, (2020) Biocultural diversity (BCD) in European cities – Interactions between motivations, experiences and environment in public parks, *Urban Forestry & Urban Greening*, Volume 48, 2020, 126501, ISSN 1618-8667, <https://doi.org/10.1016/j.ufug.2019.126501>.
- Wolf, K. L., et al. (2021). *Urban trees and human health: A scoping review*. *International Journal of Environmental Research and Public Health*.
- Zhang, W., Ricketts, T. H., Kremen, C., Carney, K. and Swinton, S. M. (2007): Ecosystem services and disservices to agriculture. *Ecol Econ*. 64:253–260.