

An impressionistic painting of a forest path. The scene is dominated by a large, dark tree trunk on the left side. The path leads from the bottom center towards the background, flanked by dense foliage. The colors are rich and varied, including greens, yellows, browns, and greys, with visible brushstrokes throughout. The overall mood is serene and natural.

Knox County's Landscape

A University of Tennessee
Questionnaire



**Understanding Public Opinion and Support
for the Maintenance and Protection of Trees
in Knox County, Tennessee:
A Mail Survey of Area Homeowners**

Conducted by

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August 2006

Funding for this study was provided by:

USDA Forest Service
Tennessee Department of Agriculture, Forestry Division
University of Tennessee Waste Management Research and Education Institute



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EXECUTIVE SUMMARY

Lead Agency	University of Tennessee (UT) Institute for a Secure and Sustainable Environment (ISSE), formerly the UT Energy, Environment and Resources Center Kim Davis (kdavis17@utk.edu or 865-974-1847)
Project Participants	University of Tennessee, Knoxville; ISSE, Kim Davis; UT Department of Sociology, Dr. Robert E. Jones; and UT Department of Forestry, Wildlife, and Fisheries, Human Dimensions Research Laboratory, Dr. J. Mark Fly
Sponsors	United States Department of Agriculture Forest Service; Tennessee Department of Agriculture, Division of Forestry; and ISSE (formerly the UT Waste Management Research and Education Institute)
Survey Objectives	<ol style="list-style-type: none">1. To identify public attitudes toward local tree-related issues2. To gauge public support/opposition for local tree policies3. To determine the level of awareness of local tree-related issues4. To determine the level of public awareness and knowledge about trees in general5. To construct a demographic profile of the average resident responding to the survey6. To determine how sociodemographic characteristics among homeowners influence public opinion and support for the maintenance and protection of trees
Population	Individuals 18 or older living in single family owned households in Knox County, Tennessee
Samples	Random sample of 2,400 Knox County single family dwelling households
Techniques	Multiple-wave (4) mail survey based on Dr. Don Dillman's <i>Tailored Design Method</i> (1999)
Pretest	Evaluation of draft mail survey by key stakeholders in July 2005
Mailing	Human Dimensions Research Laboratory, UT October 14 – November 14, 2005
Response Rate	42% with an estimated margin of error of +/- 3.2%

Who responded to the survey?

All of the eligible survey respondents (N=938) are residents of Knox County. A majority (63%) live outside the city limits. The average survey respondent is white, 53 years of age, has attended college, and lives in a household in which the total annual income is between \$25,000 and \$75,000. The average respondent has lived at his or her current resident residence for about 15 years and is more likely to be a Republican than either a Democrat or Independent. Only 11 percent of respondents are members of an environmental advocacy organization.

What do Knox County homeowners know about trees?

Although a majority of Knox County homeowners (N= 800) who responded to the survey had significant exposure to tree care and other landscaping activities, they still feel uncertain about their ability to identify a native tree or diseased tree, and are unsure about how to protect a tree from pests. They regularly seek out information about landscaping activities by talking with others or by watching television programs, but they are less inclined to attend workshops or consult with public officials about tree care. They are fairly knowledgeable about the extent of the existing urban forest cover in Knox County and Tennessee as a whole, and value trees' contribution to shade, air quality, wildlife habitat, and privacy.

What do Knox County homeowners know about local tree issues?

An overwhelming majority of Knox County homeowners know little or nothing about the Knoxville Tree Board's work on enhancing programs to plant trees or developing plans to expand the local government's oversight on planting and protecting trees. Few are even aware of the City's work, starting in the 1990s, to plant thousands of street trees.

What are the attitudes toward local tree-related issues among homeowners?

Overall, it appears that Knox County homeowners have a positive attitude toward protecting and planting trees, and appreciate the natural environment's contribution to the quality of their lives. There is a high level of appreciation for trees in urban environments and business districts. Most of them have sought out houses that have mature trees because trees have a personal meaning to them and/or they understand that trees will enhance their property values. Most homeowners value the ability to modify their environment to suit their needs and have removed trees from their property recently, mostly because the trees were dead or diseased. Also, a large number of them feel that the local utility company should do a better job trimming trees near power lines.

How strong is support/opposition for local tree policies among homeowners?

Although Knox County homeowners are extremely concerned about the protection of trees during utility line clearance and construction of subdivisions and commercial developments, they are less supportive (or unsure) of providing more public funding to plant trees in public areas. They are also less supportive of having laws that may restrict their own ability to manage their private landscapes.

How do sociodemographic characteristics influence public opinion and support for the maintenance and protection of trees among homeowners?

Homeowners with higher incomes and more education have more experience with tree care. Levels of experience also proved to be slightly different for females vs. males and city residents vs. non-city residents, with the latter of each pair having more. Older homeowners have slightly more knowledge about trees than younger homeowners. Females support policies for tree care and management more than males, and they have more positive attitudes toward trees. Moving up the income scale, the gap between females and males with regard to their attitudes about the value of trees grows significantly larger. Also, homeowners who have resided at the same address for less than ten years have a more positive attitude about trees than those who have lived in the same place for more than ten years. Unsurprisingly, those who belong to environmental organizations or donate resources to tree-planting organizations support tree policies much more than those who do not.

Public Policy Recommendations

1. Plans for a county-wide tree management and protection strategy should continue to harness the interest of the public in this issue.
2. The work of the Knoxville Tree Board and others involved in the promotion of and education about local sustainable development should be better publicized in coordination with public outreach through the school system and community programs.
3. Recognize the value residents place on trees and the natural environment of Knox County.
4. The local utility companies may need to demonstrate greater public sensitivity in their tree-trimming practices.
5. Weigh the environmental and social tradeoffs of urban tree canopy protection.

I. INTRODUCTION

This research report is based on an in-depth public opinion study of 976 adult residents of Knox County, Tennessee. The primary purpose of this research was to determine public knowledge, beliefs, attitudes, and support for the maintenance and protection of trees in Knox County. In addition it was designed to better understand public opinion and support among homeowners and other subgroups of the adult population living within Knox County. A mail survey was implemented to gather this information during the Fall of 2005 by the Waste Management Research and Education Institute (WMREI), in affiliation with the Department of Sociology and the Human Dimensions Research Laboratory, all located at the University of Tennessee, Knoxville (UT).

The report is organized into six sections. Section I gives an overview of the report, while Section II provides background information on Knox County and its urban forest. Section III describes the methods used to survey and assess public opinion obtained from a random sample of county residents. Section IV presents the overall findings from the mail survey and Section V provides a summary of major findings and several policy recommendations. The report concludes with Section VI, followed by references in Section VII and appendices in Section VIII.

II. BACKGROUND

Study Area

Knox County (County) was established on June 11, 1792, and was named after George Washington's Secretary of War, Henry Knox. Knoxville (City), the county seat, initially served as the capital of state of Tennessee following its formation in 1796. The City was incorporated in 1815. The County has a total area of 526 square miles and a population of 382,032, and the City covers 98.1 square miles with a population of 173,890. The town of Farragut is also located within Knox County and has a total area of 16.2 square miles and a population of 17,720 (Wikipedia | Knox County, Tennessee; Knoxville Tennessee; and Farragut, Tennessee, 2006).

Water makes up 17 square miles of the County, or 3.3 percent of the total surface area (Wikipedia | Knox County, Tennessee, 2006). In the southeast part of the City, the French Broad

River (flowing from Asheville, North Carolina) joins the Holston River (flowing from Kingsport) to form the headwaters of the Tennessee River (Wikipedia | Knoxville, Tennessee, 2006). Knox County is comprised of 174,327 acres of tree canopy (52%), 91,380 acres of open space (27%), 44,019 acres of impervious surfaces (13%), and 15,847 acres of bare ground (5%). The dominant land cover in the City is trees, covering 25,151 acres (40%). Impervious urban surfaces comprise 16,981 acres (27%). Open space accounts for 21 percent of the City (13,105 acres) and bare land accounts for 4,276 acres (7%) (American Forests, 2002).

Knox County has been experiencing loss of tree canopy, as indicated by an analysis conducted for 28 communities by American Forests. This study, called the Urban Ecosystem Analysis, indicated a decline in tree canopy throughout the county from 1989 to 1999 (American Forests, 2002). The recognition of this problem in Knoxville and other areas of the U.S. resulted in a proliferation of local tree ordinances in the 1980s. A tree ordinance empowers planning officials and urban forestry personnel to inspect and regulate the maintenance, planting and necessary destruction of city trees (Metropolitan Planning Commission of Knoxville-Knox County, 2005).

Knoxville developed a tree ordinance in 1992, which established a City Tree Board and a municipal arborist to protect trees, but the Knoxville Tree Board has very little power to provide oversight of development plans involving tree removal or replacement. Knoxville employs a municipal arborist and a city horticulturist. Knoxville's ordinance requires eight trees per acre and prohibits cutting more than a quarter of the trees on an undeveloped lot within a five-year span. Cutting a large tree near a building built before 1860 is also prohibited. The city arborist can exempt properties from these rules, but exemptions are rare and fines (\$50 per incident) almost non-existent because requirements are easily met.

The zoning ordinance for Knox County calls for the planting of certain numbers of trees around commercial telecommunications facilities (i.e., cell phone towers), parking lots, front setback areas, rear yards, and side yards of commercial and mixed-use developments, but no provisions are made for the size of the plantings or types of trees other than "native shade trees," "ornamental trees," or "evergreen trees" (Metropolitan Planning Commission of Knoxville-Knox County, 2006). There are no regulations for protecting existing trees except a broad statement to

preserve trees “in the design of the subdivision, wherever possible” (Metropolitan Planning Commission of Knoxville-Knox County, 2006).

The town of Farragut, located inside Knox County, enforces the protection of the urban tree canopy to a greater degree than the City of Knoxville or Knox County. Title 14, Chapter One of the Farragut Municipal Code specifies a Tree Protection Ordinance (Municipal Technical Advisory Service, 1998). All of the following types of trees are protected: any hardwood tree that has a diameter at breast height (DBH) of 10 inches or greater, any evergreen tree that has a DBH of 15 inches or greater, and/or any Dogwood (*Cornus Florida*) or Redbud (*Cercis Canadensis*) that has a caliper of more than 4 inches, any specimen tree, any Dogwood or Redbud tree that has a caliper of more than 4 inches, any public tree, significant groupings of trees, and trees in “environmentally sensitive” areas. Applications may be submitted to the Farragut Municipal Planning Commission for removal of these types of trees, if provisions are made to replace them; new trees planted must equal the caliper inches of the trees they are replacing.

Knox County is not unique in its lack of attention to legislation for urban tree management and protection. Many other rapidly growing urbanized areas in the United States face similar local reluctance to enact regulations that place realistic controls on the removal of trees and encourage the planting of new trees. This has led to a wide range of regulations at the local level throughout the fifty states, as local governments negotiate a constantly evolving judicial framework for tree ordinance development and enforcement. A lack of understanding about sound urban forest management practices among municipal authorities, inadequate budgets for implementation of systematic urban tree management, and political favors for influential developers also contribute to inadequate oversight of local tree ordinances. Therefore, public opinion, trained and motivated natural resource planners, and administrative commitment continue to be the biggest drivers in effective legislation to protect tree canopy in U.S. cities (Profous and Loeb, 1990).

Prior Research

Although there is a large body of research that examines public concern for the environment in general, and on more specific issues related to deforestation, there are few studies that deal

directly with public opinion on the maintenance and protection of city trees, particularly in Knox County. A survey study conducted by Jack Nasar (1997) asked 160 residents of Knoxville and 120 visitors to identify areas of the town they liked and disliked visually, and to give reasons for their preferences. Nasar then developed a list of factors that influence what Knoxvillians like in a city scene. One of the major factors that made Knoxville appealing was its naturalness: homeowners liked areas with a lot of trees and views of rivers and mountains.

The Knoxville/Knox County Metropolitan Planning Commission (MPC) conducted polls of County residents through public workshops and an online survey. In May and June of 2002, MPC held public workshops as part of the public input process for the development of a five-year tree planting and improvement program for the City of Knoxville. The purpose of this plan was to improve and refine the city policies currently in place for planting trees, using standard urban forestry guiding principles along with advice of city engineers and landscape architects. Approximately 100 people participated in the workshops and the subsequent “visual preference survey on the web. Suggestions were given on areas where trees should be conserved, site-specific species that should be planted, species that should be avoided, and road corridors and neighborhoods where trees are needed most (Metropolitan Planning Commission of Knoxville-Knox County, 2002). Another web-based survey was conducted by MPC in the Fall of 2004, which obtained over 400 responses. The results showed that 90 percent of County residents were in favor of protecting mature trees during the creation of new residential subdivisions; using existing or newly planted trees for buffers between different land uses; protecting and planting trees during the development of commercial, office and multifamily projects; and creating a City-County Tree Board to advise the City and County Mayors, County Commission, and City Council on tree conservation and planting (Metropolitan Planning Commission of Knoxville-Knox County, 2005).

Social science research has emphasized the role of environmental concern in public attitudes and behavior towards nature, and the willingness to support environmental legislation such as community tree ordinances. This work recognizes the roles public awareness, local values, and beliefs play in the influence of public support for a tree preservation policy or ordinance, and environmental policies in general (Stern, 2000; Dunlap and Jones, 2000; Routhe and Jones,

2005). This work also suggests that the crafting of such an ordinance should be carried out through the networking of social scientists, natural scientists, planners and the local population. The task of achieving full agreement among the decision-makers and the residents of a particular community such as Knox County is a complicated undertaking due to the many facets and degrees of environmental concern among different segments of society. For example, although residents may say they oppose or support more regulations for the protection and planting of trees, this opinion may be influenced by different levels of awareness and knowledge of tree issues in the County. The goal of the current study is to determine the relationships of Knox County homeowners and other subgroups of the adult population (as defined by selected sociodemographic characteristics) with (1) support for local governmental intervention to protect and manage trees, (2) attitude focused on tree protection, (3) beliefs and opinions about trees, (4) knowledge about trees, and (5) experience with tree care.

III. METHODOLOGY

This section details the methods and procedures used to survey and assess public opinion on tree protection and management in Knox County. The primary objectives of the mail survey were to: (1) identify public attitudes toward local tree-related issues, (2) gauge public support/opposition for local tree policies, (3) determine the level of awareness of local tree-related issues, (4) determine the level of public awareness and knowledge about trees in general, (5) construct a demographic profile of the average resident responding to the survey, and (6) determine how sociodemographic characteristics influence public opinion and support for the maintenance and protection of trees among homeowners. The questionnaire was mailed to adult (18 years or older) residents who are also single-family homeowners in Knox County, Tennessee. The Human Dimensions Research Laboratory implemented the mail survey between October 24 and December 20, 2005 at the University of Tennessee – Knoxville.

Population and Sample

It is estimated that there are 86,386 single-family households in Knox County, Tennessee (Survey Sampling International, 2005). To achieve a 95 percent confidence interval and a sampling error of plus or minus five percentage points for this population, it was necessary to

obtain 382 completed surveys from this population (Salant and Dillman, 1994). However, if we wish to compare residents living in households in the City limits with residents living in households outside the City limits, the number of returned and completed questionnaires necessary for this same confidence level and precision would need to be doubled, to 764. Based on these estimates and upon conservative assumptions about the percentage of eligible respondents in the sample, likely response rates for the mailing, and number of usable questionnaires returned, a random sample of 2,400 households located in Knox County was obtained from Survey Sample International of Fairfield, Connecticut (SSI). The names and addresses of the head of these households were included in this sample and were subsequently mailed a questionnaire.

The initial sample size of 2,400 potential respondents was then reduced by 57 to 2,343 after the mailing was completed (see Table 1). These 57 subjects were not eligible to represent the target population either because they were deceased, they were no longer living in Knox County, they had refused the survey due to age or illness, or the survey was sent to an undeliverable address. Of the remaining 2,343 questionnaires sent to eligible respondents, 1,301 were not returned and 67 were returned blank. The 976 returned and completed questionnaires from eligible respondents represent a 42 percent response rate. The final sample size thus had an estimated sampling error or plus or minus 3.2 percentage points at the 95 percent level of confidence.

The extent to which a randomly selected sample of respondents represents the target population mostly depends upon the number of completed questionnaires returned by eligible respondents. A randomly selected sample of 976 eligible respondents provides an accuracy level of +/- 3.2 percentage points (i.e., the confidence interval). Overall, this means that 95 out of a 100 times (i.e., at a confidence level of 95 percent) a random sample of this size ($N = 976$) is drawn, the sample results should be within plus or minus 3.2 percentage points from the true value of the targeted population. Sampling error is the basis upon which tests of statistical significance can then be calculated from sample results.

Table 1: Breakdown of the Mailing

Category	Number	Percent
Questionnaires Mailed	2,400	100.0
Deceased	4	<1.0
Non-deliverable	47	2.0
Refused due to age or illness	5	<1.0
Eligible Respondents	2,344	
Questionnaires received by Eligible Respondents	2,344	100.0
Unreturned questionnaires	1,301	55.5
Questionnaires returned blank	67	2.9
Completed questionnaires	976	41.6

We also assessed the representativeness of the sample and the accuracy of our results by comparing the characteristics of the *final sample* with those of the targeted population. This procedure helps identify any significant differences that might impact the survey findings. Based on the U.S. Census Bureau estimates of the county population, it was expected that the final sample would be over represented by males and residents who were older, more educated, and more affluent than non-respondents. These expectations were confirmed by our analysis (U.S. Bureau of the Census, 2006; Survey Sampling International, 2005).¹ Our overall assessment of the sample and knowledge of the general literature suggest that the survey results should provide a reasonable depiction of the general views of county residents on tree management issues. Still, interpretations of these results should be considered with respect to measurement error, to coverage error, and to other potentially significant differences in the views of non-respondents.

Additionally, we assessed completeness of the survey responses by determining which respondents did not complete enough of the survey to provide meaningful results. If the respondent did not answer 20 or more questions out of the 90 questions, we discarded that case. There are 38 surveys that were discarded because of incompleteness, bringing the total number of respondents in our data set to 938. The 938 cases were examined to remove respondents who

¹ According to 2004 U.S. Census data, females represent 51.7% of Knox County, and in our sample, females represent 47.2%. According to SSI's projection of 2000 U.S. Census data to July 2004, residents age 55 or older represent 23.4% of Knox County, and in our sample it is 27.4%. SSI also estimates that incomes above \$100,000 represent 12.6% of County households, and in our sample it is 19.7%. According to 2004 U.S. Census data, the proportion of County residents living inside City limits is 46%, while 37% of our sample were from City households.

were not single-family homeowners. Although the sample provided by SSI for the analysis targeted “single family dwelling households,” responses to Q29 (see Appendix A) indicated that some dwellings other than single family houses (e.g., multi-family, condominium, or apartments) were included. These cases, along with renters (as indicated by responses to Q28 in Appendix A) were subtracted from the initial data set. After these deletions were made, the final dataset contained 800 cases representing the responses of **homeowners** living in Knox County.

Questionnaire and Mail Survey Design

Kimberly Davis, P.E. (UT WMREI) and Dr. Robert Emmet Jones (UT Department of Sociology) began designing the mail survey and drafting questions in the Spring of 2004. Graduate students in Dr. Jones’ Advanced Survey Design and Analysis class (Sociology 633) reviewed preliminary drafts of the questionnaire. During modification of this questionnaire during 2004, Ms. Davis met with the citizen-based Knoxville Tree Board and members of the Knoxville Tree Board’s Planning/Tree Ordinance Committee, led by Mr. Mike Carberry (Comprehensive Planning Manager, Knoxville/Knox County Metropolitan Planning Commission). During 2004, Mr. Carberry and the committee developed *The Knox County Tree Conservation & Planting Plan (Plan)*, which addressed conservation and planting issues in Knox County (Metropolitan Planning Commission of Knoxville-Knox County, 2005). The *Plan* also discussed the potential of expanding the Knoxville Tree Board to a county-wide Tree Board. Mr. Carberry also conducted focus group meetings and implemented a pilot web-based survey in October and November of 2005, and these results were used to gather ideas for further refining this mail survey. The draft mail survey was finalized to incorporate concepts discussed at these meetings and highlighted in the draft *Plan*. In July 2005, the draft survey was then put on a website (http://geomicro.utk.edu/tree_survey/), and Mr. Carberry and Ms. Davis identified 20 stakeholders from the Knox County region to review this online draft and give Ms. Davis their comments and suggestions for improving the survey. Thirteen of these stakeholders (Table 2) provided comments. Also during July 2005, UT’s Office of Compliance and Contracts-Institutional Review Board (IRB) conducted a “human subjects” review of (1) the research proposal to conduct the study and (2) a draft version of the questionnaire. The study and its questionnaire were subsequently approved by the IRB on July 18, 2005.

Table 2 Key Survey Informants and Affiliation

Scott Boles, P.E.	Civil Engineer II, City of Knoxville Engineering Department
Mike Carberry	Comprehensive Planning Manager, Knoxville/Knox County Metropolitan Planning Commission
David Harrell, P.E.	Chief Civil Engineer, City of Knoxville Engineering Department
Indya Kincannon	Knox County 2nd District School Board Representative
Leo LaCamera	Engineer, Knox County Engineering and Public Works
Judy Loest	Local writer and tree advocate (Knoxville)
Dr. William Lyons	Senior Director of Policy Development, City of Knoxville
David McGinley P.E.	Stormwater Engineer II, City of Knoxville Engineering Department
Garry Menendez	Associate Professor, UT Dept. of Plant Sciences, Registered Landscape Architect, and Knoxville Tree Board member
Steve Noe	Manager of Overhead Construction for the Knoxville Utilities Board and Knoxville Tree Board member
Jeff Pfeifer, ASLA	Landscape Architect, Barge Waggoner Sumner & Cannon Engineers, Architects, Planners, Landscape Architects and Chairman of the Knoxville Tree Board
Frank Rothermel	President, Denark-Smith, Inc. and member of the Knoxville Tree Board
Bob Whetsel	Director of Public Service, City of Knoxville

Mail Survey

The final version of the questionnaire used in the study contains 90 questions. There are 15 sociodemographic questions (e.g., age, gender, income, length of residency, etc.), 34 questions to determine the level of public awareness and knowledge about trees in general, 7 questions to determine the level of public awareness on local tree-related issues, 20 questions to identify public attitudes toward tree-related issues, and 14 questions to gauge public support/opposition for local tree and other environmental policies. Respondents were given an opportunity to provide open-ended comments on the back of the survey booklet. A space was provided for the

respondent to provide a mailing address if he or she wished to receive a summary of the survey results.

Mailing Procedures

The UT Human Dimensions Laboratory administered the mail survey in consultation with project investigators. It employed a four-wave mailing approach designed to improve mail survey rates (Salant and Dillman, 1994). The first wave included an introductory letter personally hand-addressed to potential respondents explaining how they were selected and the purpose of the survey. A second hand-addressed envelope containing a letter, questionnaire, and a stamped business-reply envelope followed. The third mailing was a postcard reminder thanking respondents who had already returned questionnaires and encouraging those who had not yet returned them to do so as soon as possible. Finally, a fourth mailing was a hand-addressed letter sent to every potential respondent who had not yet returned a blank or completed questionnaire. The mailing cycle began on October 24 and ended on November 14, 2005. Surveys were returned between November 9, 2005 and February 2, 2006.

Data Collection and Analysis

All returned survey materials were received at the UT Energy, Environment and Resources Center (EERC) where Ms. Davis has her office. Surveys returned each day were marked with their arrival date and then delivered by Ms. Davis to the Human Dimensions Laboratory. Lab supervisors tracked response rates using Microsoft Excel (Excel) and entered survey responses into a digital data file using Statistical Package for the Social Sciences, version 13.0 (SPSS). All open-ended responses were entered into a Microsoft Word (Word) file and sorted according to survey identification number. All project materials (e.g., complete and incomplete questionnaires, Excel and SPSS digital data files) were delivered to project investigators December 20, 2005. The original data file was examined and reorganized by Ms. Davis, and EERC staff entered responses from 22 more questionnaires that arrived between December 20, 2005 and February 2, 2005. No information that could be used to identify a respondent was included in the data.

Closed-ended survey responses were analyzed by computer. The overall results presented in this report are based only on the analysis of this dataset. Frequencies, means, and standard deviation statistics were used to identify trends in the data and are included in Appendix B.

Operationalizing Variables

Sociological theory has linked intentions to perform a behavior (i.e. willingness to a *support* local tree ordinance) with *attitudes* towards the behavior, *beliefs*, *life experience*, and *knowledge*. Attitudes, or perspectives toward trees that correlate with how one values trees, have been shown to be influenced by the socioeconomic makeup of a particular geographic region. Likewise, environmental beliefs may be shaped by cultural constructs that include exposure to traditions (life experience) and knowledge of gardening, urban planning, and landscape preferences (Jones et al., 2003; Jones and Dunlap, 1992; Stern et al., 1995; Kaltenborn and Bjerke, 2002; Cottrell, 2003; Carman, 1998; and Klineberg, 1998). These specific beliefs about the value of trees and beliefs about other concepts of environmentalism are influenced by institutional constraints (e.g., position in social structure) that filter the amount of information available to shape an individual's view of the world (Stern et al. 1995). In this way, *sociodemographic* variables indirectly influence environmental behavior, as mediated by environmental belief and knowledge. The following sections describe how each component of these social-psychological dimensions is operationalized in the survey instrument.

Support—Intention (hereinafter “support”) was measured with a six-item index (see Appendix A: Questions Q18a-Q18f) to allow respondents to express their support or opposition to different levels of governmental intervention in protecting and managing trees (e.g., legislation to: plant more public trees, require developers to protect and/or plant trees, and control private citizens' management of trees around their homes). Each question employed a Likert response scale with anchors of “agree” and “disagree”, and adverb modifiers of strongly and mildly. Four questions (Q18a, Q18b, Q18d, and Q18f) asked subjects to estimate their level of agreement with statements that were supportive of: governmental intervention in the planting of public trees, protection of street trees, curtailment of deforestation by residential developers, and placing more protective measures on mature trees located on private residential property. Two questions (Q18c and Q18e) asked subjects to estimate their opposition to governmental spending on protecting

and planting trees and requiring commercial developers to protect and plant trees. The first four questions referred to above were then reversed coded so that support for local tree protection and management policies could be measured among all six questions on a scale of 1 – 5. The six measures were then summed to form a general measure of respondent support. The alpha reliability test for the index yielded a satisfactory alpha score of 0.73. Higher values on the *Support Index* indicate more support for governmental intervention in the protection and management of urban trees. Survey responses on this index range from 6 to 30 with a mean of 23.0 and a standard deviation of 4.2.

Attitude—Attitudes are assumed by theory to be one of the predictors of support, and was measured with a fourteen-item index (see Appendix A: Questions Q12a-Q12o with the exception of Q12j) to measure attitudes about urban trees. Each question employed a Likert response scale with anchors of “agree” and “disagree”, and adverb modifiers of strongly and mildly. Eight questions (Q12a, Q12b, Q12c, Q12i, Q12k, Q12l, Q12m, and Q12n) asked subjects to estimate their level of agreement with statements that were supportive of the presence, protection, and planting of urban trees, and six questions (Q12d, Q12e, Q12f, Q12g, Q12h, and Q12o) asked subjects to estimate their level of agreement with statements that were in opposition to the presence, protection, and planting of urban trees. The first eight questions referred to above were then reversed coded so that pro-tree attitudes could be measured among all fourteen questions on a scale of 1 – 5. The fourteen measures were then summed for a general measure of respondent *attitudes* (Ajzen and Fishbein, 1980). The alpha reliability test for the index yielded a high alpha score of 0.86. Higher values indicate stronger pro-tree attitudes. Survey responses on this *Attitude Index* range from 14 to 70 with a mean of 57.8 and a standard deviation of 8.1.

Beliefs/Opinions—A nine-item index was used to measure beliefs and opinions about trees, as defined by the respondent’s preferences about tree characteristics and functions (see Appendix A: Questions Q8a – Q8i). Each question employed a Likert response scale with the responses “very important,” “somewhat important,” and “not important.” The questions were reverse-coded so that importance could be measured on a scale of 1 – 3. The nine measures were then summed for a general measure of importance of tree characteristics. The alpha reliability test for the index yielded a very high alpha of score 0.84. Higher values indicate increasing levels of

importance of trees to the respondent. Survey responses on the *Belief Index* range from 9 to 27 with a mean of 23.2 and a standard deviation of 3.4.

Experience—Life experience is assumed by theory to be one of the predictors of beliefs and attitudes, and was measured with a twelve-item index (see Appendix A: Questions Q3a-Q3l) to measure *past* behavior and actions pertaining to urban trees. Each item stated a particular activity about gardening and/or tree care, a method of pursuing knowledge about gardening or tree care, or donation of resources to an organization that focuses on gardening or tree care. The respondent was asked to place a check next to the each item if he/she or a member of his/her household had engaged in the behavior stated in each item. One point was recorded if the item was checked, and no points were recorded if the item was not checked, for a scale of 0 – 1. The twelve measures were then summed for a general measure of respondent experience. The alpha reliability test for the index yielded a satisfactory alpha of 0.72. Higher values indicate more experience with gardening or tree care. Survey responses on the *Experience Index* range from 0 to 11 with a mean of 5.9 and a standard deviation of 2.2.

Knowledge—Knowledge is assumed by theory to be one of the predictors of beliefs and attitudes, and was measured with a nine-item index (see Appendix A: Questions Q6a-Q6i) to measure the level of knowledge of planting, caring for, managing, and identifying urban trees. Each question employed a Likert response scale with the responses “very knowledgeable,” “somewhat knowledgeable,” and “know little or nothing.” The questions were reverse-coded so that knowledge could be measured on a scale of 1 – 3. The twelve measures were then summed for a general measure of respondent knowledge. The alpha reliability test for the index yielded a very high alpha score of 0.90. Higher values indicate more knowledge about urban trees. Survey responses on the *Knowledge Index* range from 9 to 27 with a mean of 16.4 and a standard deviation of 4.2.

Sociodemographic variables—Selected subgroups of the Knox County homeowner population were defined by sociodemographic characteristics. The sizes of these subgroups in the study sample were compared to U.S. Census data for the targeted population to assess representativeness of our sample. Also, the mean responses for each of the operationalizing variable indices discussed above were compared among these subgroups to determine if there

were significant differences. Sociodemographic characteristics were measured by 15 questions: Q22 – Q35 and Q17 (see Appendix A). These questions asked the survey respondent to report their age, gender, ethnic orientation, political affiliation, household income, geographic location, and education level, among other identifying characteristics.

IV. FINDINGS

The findings are organized by objectives that were developed through suggestions by Knox County stakeholders. A summary of the most important findings and the characteristics or responses of the *average* respondent precedes a list of more detailed results for each question in the survey. Selected findings are presented using figures. Unless specifically noted, the findings represent the individual responses to single questions from the survey. The exact wording for each question is presented in Appendix A and the distribution of responses to each question is in Appendix B.

The findings are organized according to the following questions:

1. Who responded to the survey?
 2. What do Knox County homeowners know about trees?
 3. What do Knox County homeowners know about local tree issues?
 4. What are the attitudes toward local tree-related issues among homeowners?
 5. How strong is support/opposition for local tree policies among homeowners?
 6. How do sociodemographic characteristics influence public opinion and support for the maintenance and protection of trees among homeowners?
-

Who Responded to the Survey?

Summary *All of the eligible survey respondents (N=938) are residents of Knox County. A majority (63%) live outside the city limits. The average survey respondent is white, 53 years of age, has attended college, and lives in a household in which the total annual income is between \$25,000 and \$75,000. The average respondent has lived at his or her current resident residence for about 15 years and is more likely to be a Republican than either a Democrat or Independent. Only 11 percent of respondents are members of an environmental advocacy organization.*

Additional Findings

- Ages ranged from 20 to 91 years, with half of the respondents being 53 years or older. The average age of the respondents is also 53 years (Question 22).
- Fifty-four percent (54%) are male, 46% are female (Question 23).
- Respondents are overwhelmingly Caucasian (94%), with a limited number of African-Americans (4%) and Asian or Pacific Islander (1%). Hispanic and American Indian represented less than 1 percent each of the respondents (Question 24).
- Thirty percent of respondents (30%) have some college or technical school experience and 32 percent obtained a college undergraduate degree. Twenty-one percent (21%) had attended graduate school. Fourteen percent (14%) obtained at least a high school diploma or GED. Few residents (5%) have less than a high school diploma or GED (Question 27, Figure 1).
- More respondents are conservative Republicans (27%) than moderate Republicans (26%), Independents (20%), or moderate Democrats (19%). Few residents identify themselves as being a liberal Democrat (8%) (Question 25, Figure 2).
- The typical total annual household income of respondents is between \$25,000 and \$50,000 (27%). A quarter of the respondents (25%) reported household incomes between \$50,000 and \$75,000. The next highest percentage of respondents has an annual income over \$100,000 (20%). Fewer numbers of respondents have incomes between \$75,000 and \$100,000 (16%) and under \$25,000 (12%) ([Question 26, Figure 3).
- Sixty-three percent (63%) live outside Knoxville City limits; 37 percent live inside the City of Knoxville (Question 32).
- A little over a quarter of the respondents (26%) have lived at their current residence from 1 to 5 years. The average length of time is 15.4 years, and the median is 10 years at the same address. The next highest percentage of respondents have lived in the same place for more than 25 years (23%), followed closely by those that have lived in the same house for 5-10 years (19%). The next likely lengths of time residing at the same residence are 10 to 15 years (14%), 15 to 20 years (8%), 1 year or less (6%), and 20 to 25 years (5%) (Question 31, Figure 4).

- Eleven percent (11%) of respondents are members of an environmental advocacy organization; 89 percent are not (Question 34).
- Forty-one percent (41%) indicated that they would like to see a summary of this study's results.

What do Knox County Homeowners Know about Trees?

Summary *Although a majority of Knox County homeowners (N= 800) who responded to the survey had significant exposure to tree care and other landscaping activities, they still feel uncertain about their ability to identify a native tree or diseased tree, and are unsure about how to protect a tree from pests. They regularly seek out information about landscaping activities by talking with others or by watching television programs, but they are less inclined to attend workshops or consult with public officials about tree care. They are fairly knowledgeable about the extent of the existing urban forest cover in Knox County and Tennessee as a whole, and value trees' contribution to shade, air quality, wildlife habitat, and privacy.*

Additional Findings

- A majority of the homeowners (56%) engaged in gardening, caring for trees, or lawn landscaping activities as a youth. More than a quarter of them (28%) reported doing these activities occasionally and 16 percent had little or no exposure to these activities while growing up (Question 1).
- Sixty-seven percent (67%) of the homeowners planted a tree in the past five years, and those who live outside the city are more likely to have done this than city dwellers (Question 2).
- Most homeowners (91%) had planted or maintained a home garden during the past year. Eighty percent (83%) have talked to others about gardening, tree care, or landscaping and 77 percent have read articles or watched programs about gardening, tree care, or landscaping. At least half of the respondents have worked on trees, mulched around trees, visited an arboretum or nursery, and cut down a tree in the past year (76%, 71%, 55%, and 55%, respectively). More than one-third of the homeowners (38%) have hired others to maintain their home's landscape. Few had consulted with a public agency about landscaping, donated time or money to a landscaping group, or attended classes or workshops about landscaping in the past year (12%, 8%, and 6%, respectively) (Question 3, Figure 5).
- More than one-third of the homeowners (36%) correctly answered Question 4 which asked the respondents to estimate the percentage of Knox County's landscape covered by trees (the answer is 50 percent).

- One-quarter of the homeowners (26%) correctly estimated the relative amount of urban forest that Tennessee has in comparison with other southeastern states (the answer to Question 5 is “more urban forest than most other southeastern states”).
- Over half of the homeowners are at least somewhat knowledgeable about planting, caring for, trimming, and cutting down trees; protecting trees from pests; identifying native trees; identifying healthy trees; and selecting suitable trees for a particular landscape. Homeowners know the most about planting, caring for, and trimming trees (85%, 82%, and 77% respectively); and know the least about identifying a diseased tree, protecting a tree from pests, and identifying native trees (49%, 52%, and 61% respectively) (Question 6, Figure 6).
- Homeowners identify air quality, wildlife habitat, and increased privacy as the most important contributions of trees (99%, 98%, 96%, and 95% respectively). The least important characteristics of trees for area homeowners are their potential to slow wind, production of attractive blooms, and reduction of street noise (87%, 92%, and 93% respectively) (Question 8).

What do Knox County Homeowners Know about Local Tree Issues?

Summary *An overwhelming majority of Knox County homeowners know little or nothing about the Knoxville Tree Board’s work on enhancing programs to plant trees or developing plans to expand the local government’s oversight on planting and protecting trees. Few are even aware of the City’s work, starting in the 1990s, to plant thousands of street trees.*

Additional Findings

- Almost all (93%) of the homeowners know little or nothing about *any* of these items: the Knoxville Tree Board, the City of Knoxville’s Master Street Tree Plan, the proposal to create a Knoxville-Knox County Tree Board, and the proposal for a Knoxville-Knox County Tree Conservation and Planting Plan (Questions Q7a-Q7d).
- Few (13%) of the homeowners know that the City of Knoxville had a program beginning in the 1990s to plant 1,000 trees per year along city streets. Of the people who know about this program, they most frequently became aware of it by observing the new street trees that had been planted (56%). The next two most common ways of learning more about the program were by reading the Knoxville News-Sentinel (49%) and by watching television (35%) (Questions Q13 and Q14).
- A majority (54%) of the homeowners are knowledgeable or somewhat knowledgeable about the National Arbor Day Foundation (Question Q7e).

What are the Attitudes toward Local Tree-Related Issues among Homeowners?

Summary Overall, it appears that Knox County homeowners have a positive attitude toward protecting and planting trees, and appreciate the natural environment's contribution to the quality of their lives. There is a high level of appreciation for trees in urban environments and business districts. Most of them have sought out houses that have mature trees because trees have a personal meaning to them and/or they understand that trees will enhance their property values. Most homeowners value the ability to modify their environment to suit their needs and have removed trees from their property recently, mostly because the trees were dead or diseased. Also, a large number of them feel that the local utility company should do a better job trimming trees near power lines.

Additional Findings

- More than half (60%) of the homeowners indicated that they removed an older tree from their property in the past five years. Of those that had removed a tree, the two most common reasons indicated for doing so were: the tree was dead or almost dead (71%) and fear that the tree would fall on the respondent's house (51%). Unattractiveness of the tree (15%) and fear of the tree roots damaging the respondent's house foundation (13%) were the next two most frequently indicated reasons (Questions Q9 and Q10).
- Most homeowners agree that trees enhance property values (94%), with those living outside of the city valuing trees for this reason more often than city dwellers. This level of agreement is followed closely by agreement that: (1) humans have a responsibility to protect trees and (2) trees are worth protecting if they have historical value (both 91%). A significant proportion of homeowners do not believe that utility companies are doing a good job clearing branches around overhead wires (39%). Forty-five percent (45%) are satisfied with the way trees are trimmed around power lines. There is a high level of *disagreement* with the statements (1) "trees should not be planted in cities because their roots crack the sidewalks" and (2) "trees should not be planted in business districts because they block store signs" (80% for both). Over one-quarter are unsure whether trees can be protected in a cost-effective manner on construction sites (27%), but 57% agree that trees can be protected on these sites (Question 12, Figure 7).
- Trees have personal, symbolic, or spiritual meaning to 59 percent of the homeowners (Question 15).
- Sixty percent (61%) of the homeowners feel it is *very* important to live in on property with trees; 32 percent think that having trees is somewhat important. Few homeowners (7%) think that it is unimportant to have trees around their houses (Question 16).
- Eighty-eight percent (88%) of the homeowners live on property that have one or more mature trees that are taller than their residence; 12 percent do not. City dwellers are slightly more likely to have mature trees in their yards than those living outside the city (Question 17).

- Few homeowners (18%) reported that they are *not* concerned with environmental issues (Question Q21c).
- A solid majority (93%) state that getting out into nature is a stress reducer for them (Question Q21d).
- Just over half (52%) think that people have the right to modify the natural environment to suit their needs (Question Q21e).

How Strong is Support/Opposition for Local Tree Policies among Homeowners?

Summary *Although Knox County homeowners are extremely concerned about the protection of trees during utility line clearance and construction of subdivisions and commercial developments, they are less supportive (or unsure) of providing more public funding to improve tree management in these instances. On the other hand, few residents think that environmental laws hurt the economy. They are also less supportive of having laws that may restrict their own ability to manage their private landscapes.*

Additional Findings

- Ninety percent (90%) support having utility districts enforce proper trimming of street trees and protection of tree roots. A majority of homeowners also feel that residential developers should cut down fewer trees when building subdivisions in Knox County (87%) and that developers of commercial property in Knox County should be required to protect old trees or plant new trees (81%). Fewer homeowners support having stronger rules about protecting large old trees on private residential property (53%) (Questions 18a, 18b, 18d, 18e, and 18f; Figure 8).
- Few homeowners (20%) support devoting more public funding to saving and planting trees in Knox County; however, a significant number (63%) are undecided or unsure about this issue (Question 18c).
- Just over half of the homeowners (53%) would likely donate time or money to plant trees in Knox County, with city dwellers showing more of a tendency than non-city dwellers (Question 19).
- Regarding other environmental issues, few homeowners (18%) think that environmental laws hurt the economy and a majority (60%) would support vehicle emissions testing for Knox County. City dwellers support vehicle emissions testing slightly more than those living outside the city (Questions 21b and 21a, respectively).

How do Sociodemographic Characteristics Influence Public Opinion and Support for the Maintenance and Protection of Trees among Homeowners?

Summary Homeowners with higher incomes and more education have more experience with tree care. Levels of experience also proved to be slightly different for females vs. males and city residents vs. non-city residents, with the latter of each pair having more. Older homeowners have slightly more knowledge about trees than younger homeowners. Females support policies for tree care and management more than males, and they have more positive attitudes toward trees. Moving up the income scale, the gap between females and males with regard to their attitudes about the value of trees grows significantly larger. Also, homeowners who have resided at the same address for less than ten years have a more positive attitude about trees than those who have lived in the same place for more than ten years. Unsurprisingly, those who belong to environmental organizations or donate resources to tree-planting organizations support tree policies much more than those who do not.

Additional Findings

- Higher levels of education are significantly ($p < 0.01$) and moderately associated ($r = 0.20$) with more experience with tree care.
- Higher levels of income are significantly ($p < 0.01$) and moderately associated ($r = 0.28$) with more experience with tree care.
- Homeowners living outside of the city limits report a statistically higher level of experience with and knowledge about trees than homeowners living inside the city (6.0 vs. 5.6 out of 12 and 16.8 vs. 15.6 out of 27, respectively). However, there are few if any real substantive differences between these two groups in both areas.
- Although older homeowners (i.e., greater than the median age of 53) have more knowledge about trees and their care than homeowners less than 53 years old, there is little or no practical difference in knowledge between the groups (means of 16.8 and 15.9, respectively, out of 27).
- Males reported slightly more knowledge about trees and their care than females (16.9 vs. 15.7 out of 27). However, females scored significantly higher on their pro-tree attitude than males (59.6 vs. 56.2 out of 70). Females also support policies to protect and manage trees more than males (24.2 vs. 22.7 out of 30).
- The effect of gender on pro-tree attitudes changes at different income levels. For example, females with incomes greater than \$50,000 have a significantly higher pro-tree attitude than males with incomes greater than \$50,000 (60.7 vs. 56.3, out of 70). However, there is no significant difference in attitudes of males and females earning less than \$50,000 (58.1 vs. 56.7, respectively). The most dramatic difference in the Attitude Index is at incomes above \$100,000, where females score 63.3 out of 70 and males score 56.2 out of 70

- Knowledge about tree care between city and non-city dwellers depends on political affiliation, to some degree. Democrats living outside city limits know significantly more than Democrats living within city limits (18.0 vs. 15.6, respectively, out of 27), whereas there is no significant difference between Republicans living outside and inside the city (16.5 vs. 15.7).
- Homeowners living at their current residence for less than ten years (i.e., the median number of years for current residence) show a slightly higher pro-tree attitude than homeowners who have resided at the same place for more than ten years (58.4 vs. 57.1 out of 70). Although statistically significant, this finding reflects little or no substantive difference between these two groups of homeowners.
- Members of environmental organizations and those who indicated that they would donate time or money to support planting trees scored significantly higher on all facets of public opinion that were examined (i.e., knowledge, experience, belief, attitude, and support).
- The *Belief Index* was not significantly related to any of the sociodemographic variables that were examined.

Figure 1: Education Level of Survey Respondents

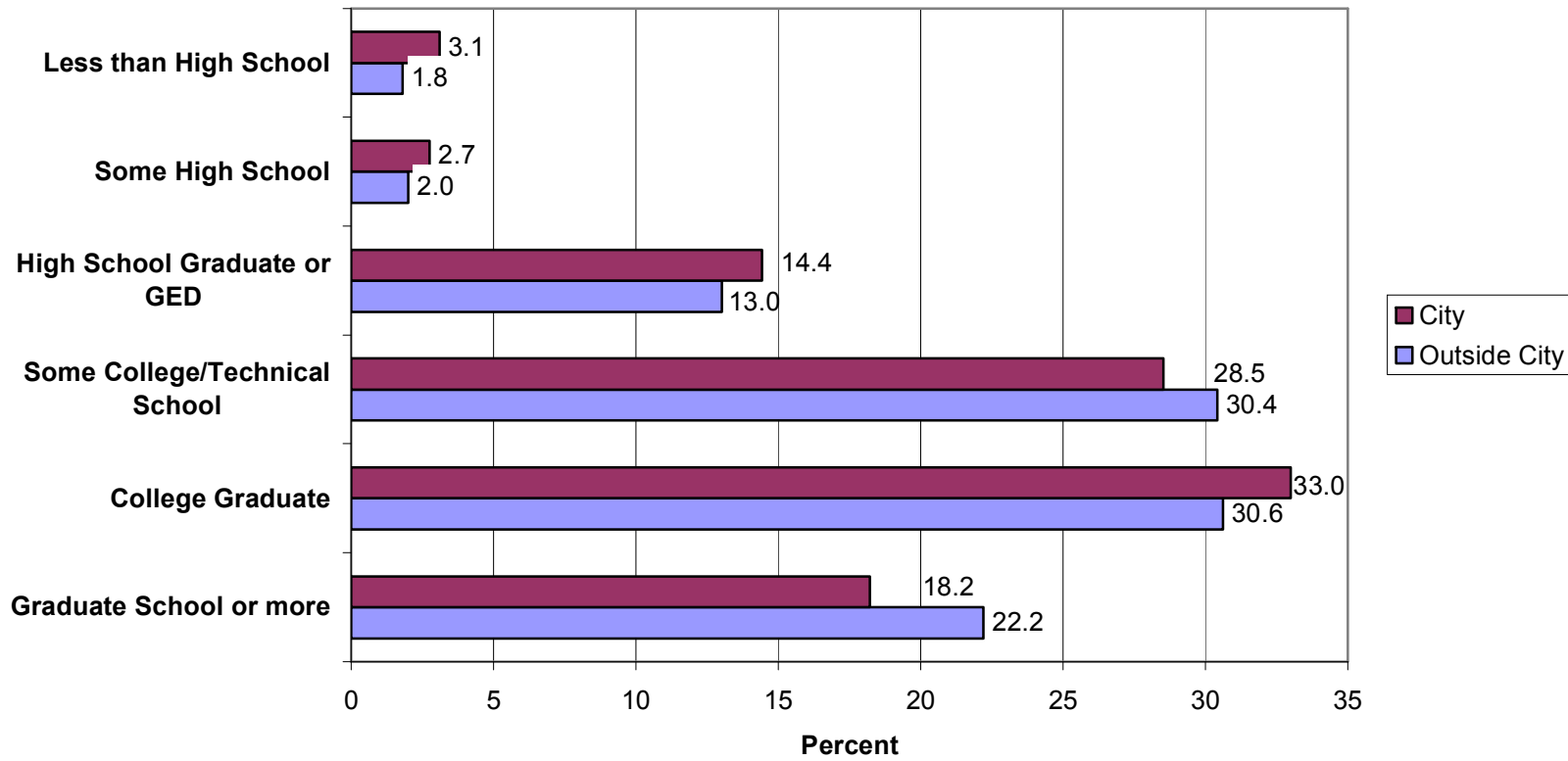


Figure 2: Political Affiliation of Survey Respondents

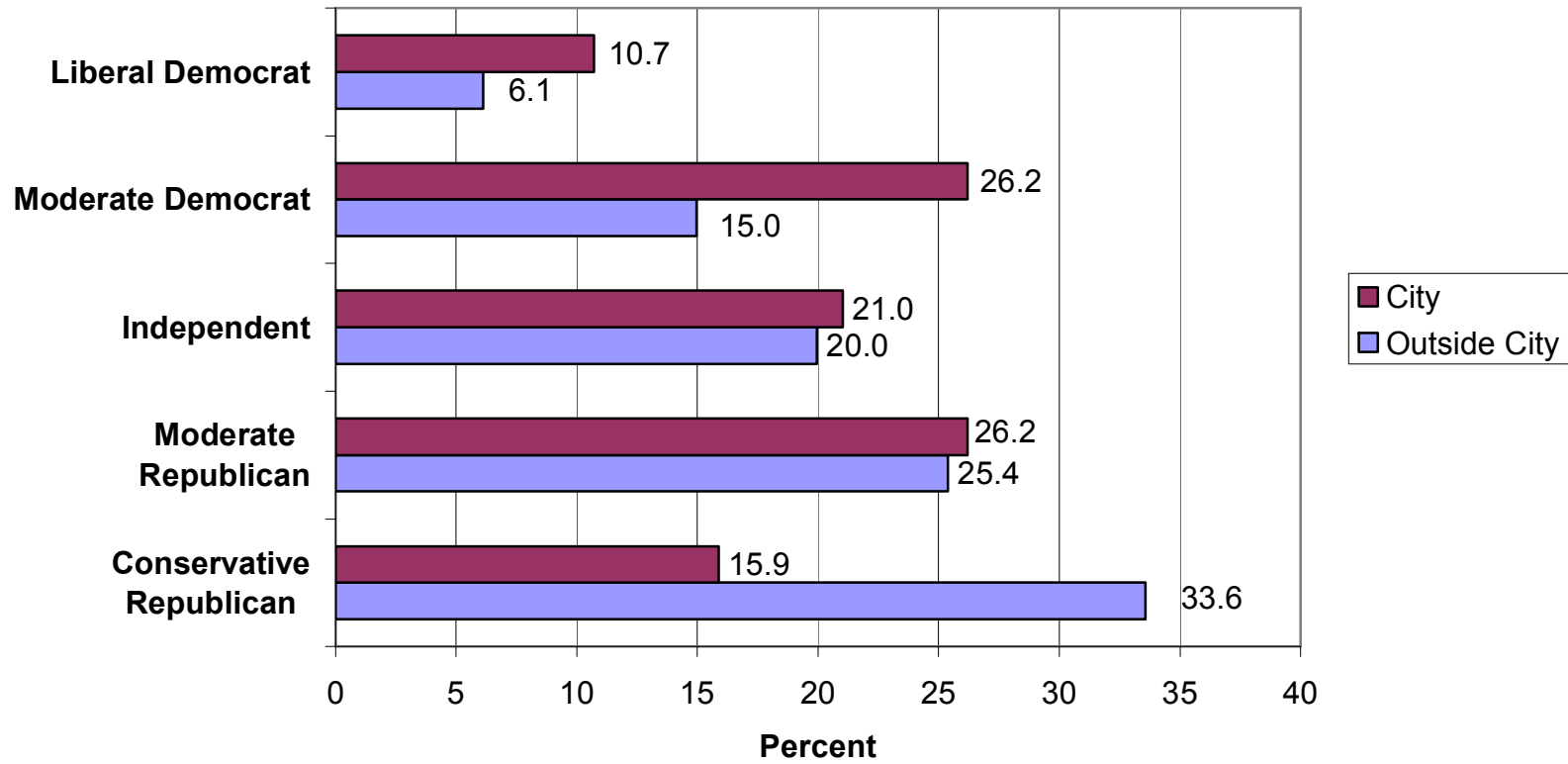


Figure 3: Household Income of Survey Respondents

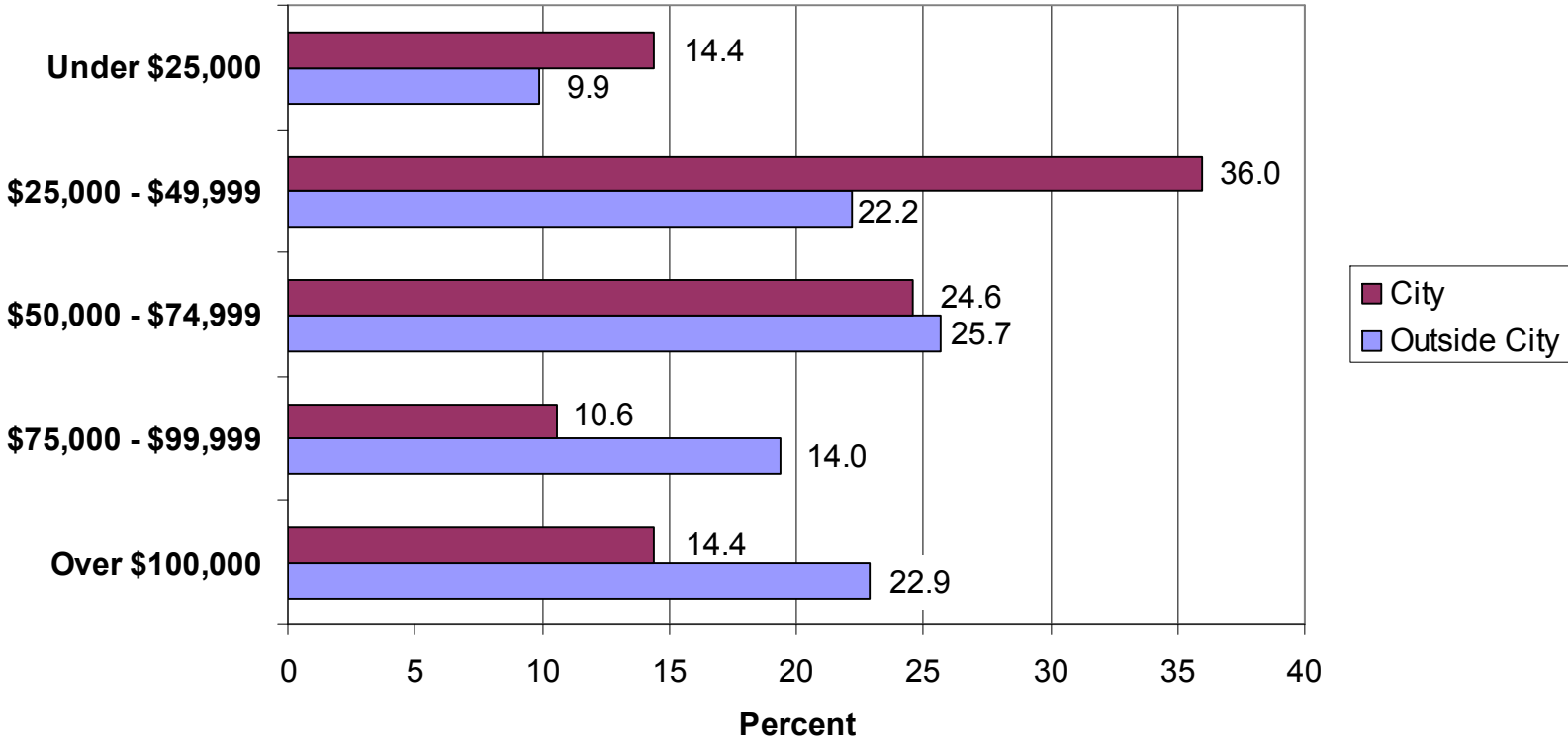


Figure 4: Number of Years at Current Address

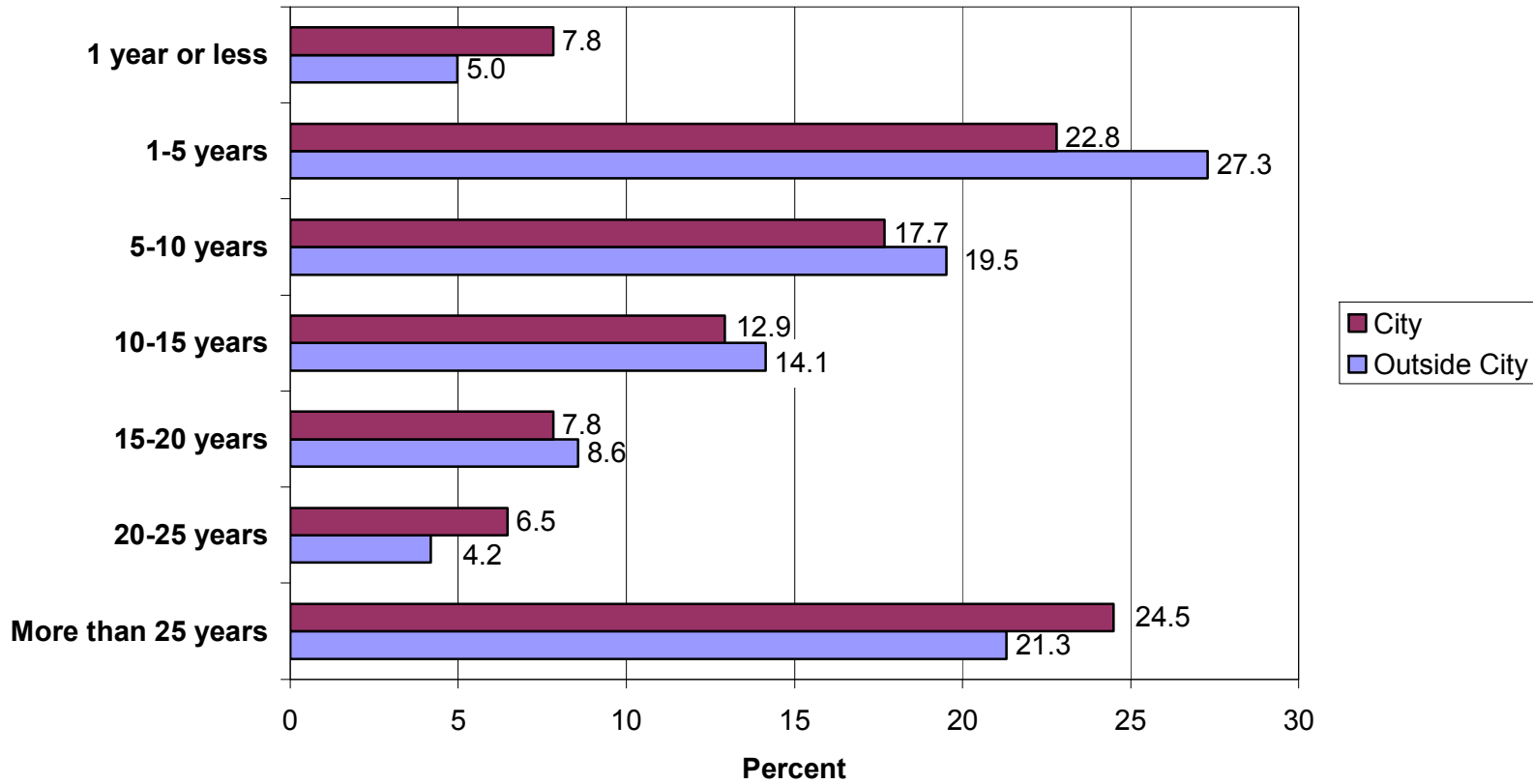


Figure 5: Experience of Homeowners With Landscaping Activities

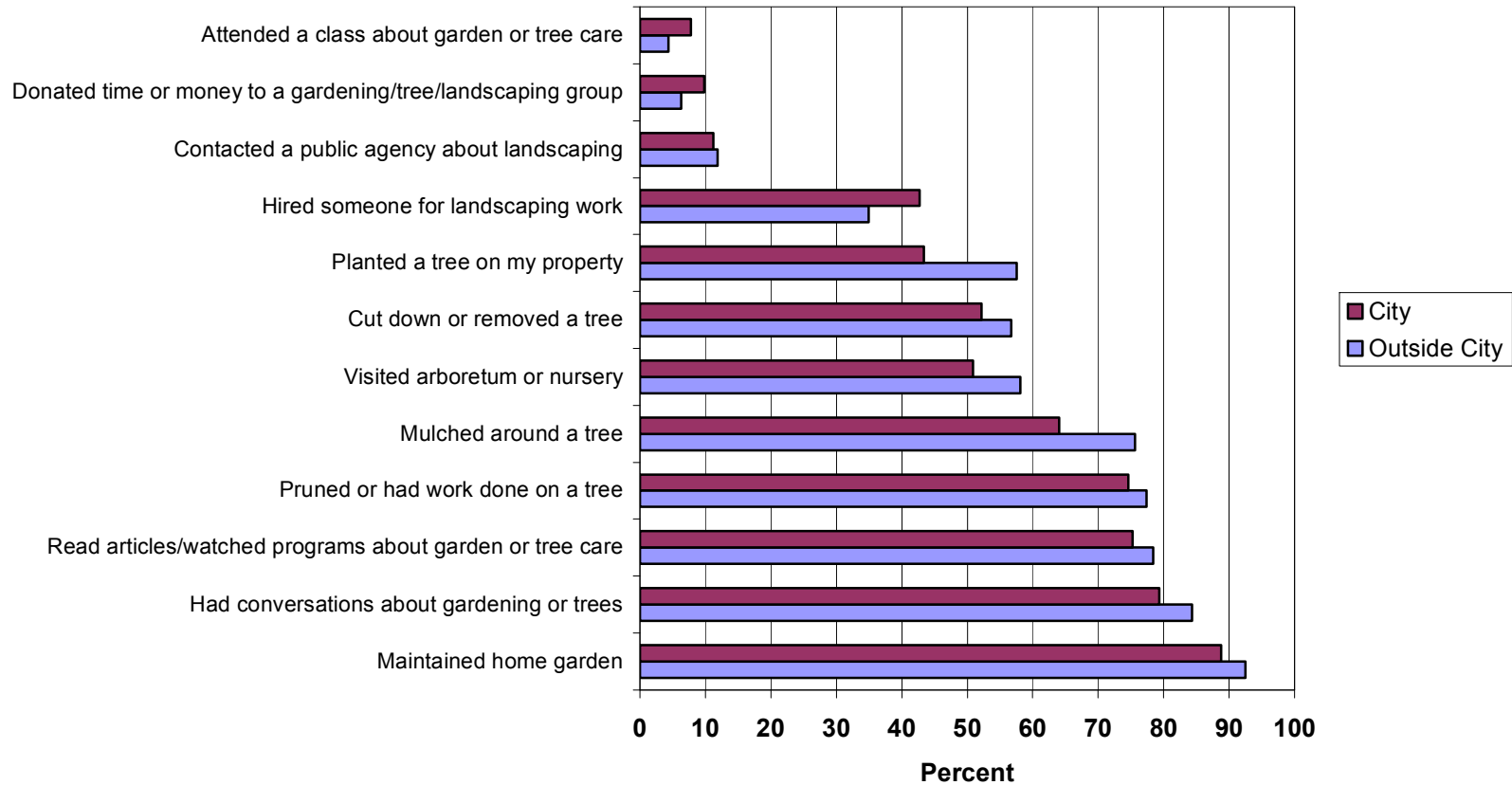


Figure 6: Homeowners' Knowledge About Tree Care

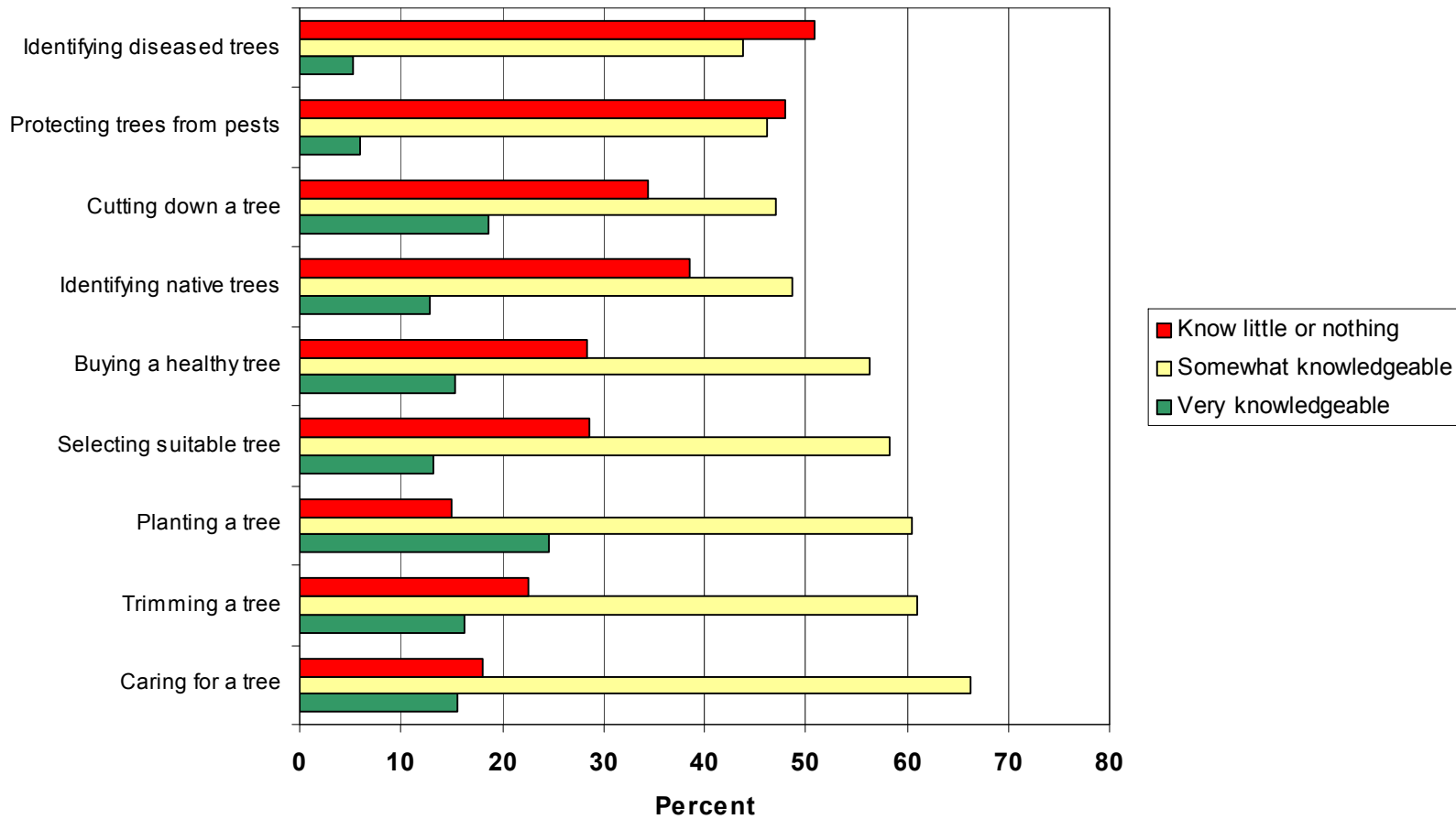


Figure 7: Homeowners' Attitudes About the Value of Trees*

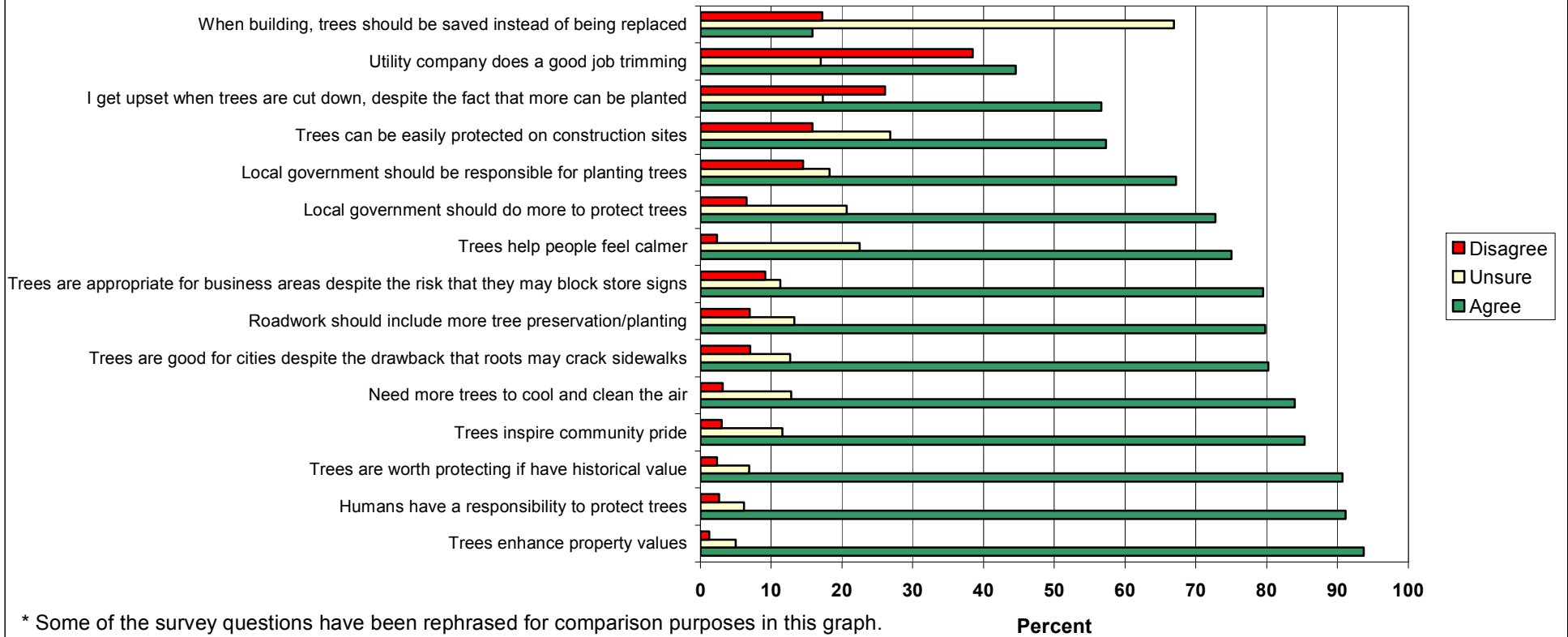
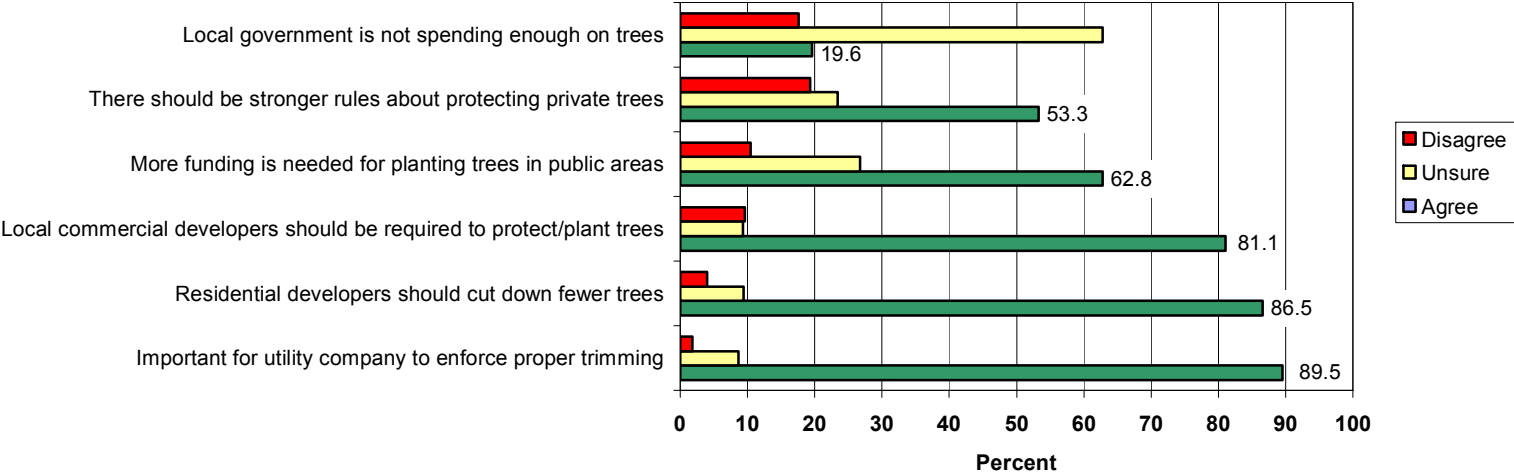


Figure 8: Homeowners' Level of Support for Tree Protection and Management Policies*



* Some of the survey questions have been rephrased for comparison purposes in this graph.

V. SUMMARY OF MAJOR FINDINGS AND POLICY RECOMMENDATIONS

This section offers policy recommendations about tree maintenance and protection strategies for Knox County. These conclusions are based on the views of 800 Knox County residents and on 173 written comments provided by a mail survey conducted in late 2005.

1. Plans for a county-wide tree management and protection strategy should continue to harness the interest of the public in this issue.

The survey results show remarkable interest in the range of topics touched on in this questionnaire, as evidenced by the 41 percent of the residents who indicated that they would like to read about the results of this survey and the 42 percent response rate for this survey. Based on the comments of 173 homeowners who provided open-ended comments, the protection of the local urban forest is a salient issue. Thirteen percent (13%) thanked the sponsors for conducting the survey or offered suggestions on how the survey could have been better and 10 percent suggested ways that the local government could improve policy for tree protection and maintenance.

2. The work of the Knoxville Tree Board and others involved in the promotion of and education about local sustainable development should be better publicized in coordination with public outreach through the school system and community programs.

An overwhelming number of homeowners are not familiar with the Knoxville Tree Board (96%), the City of Knoxville's Master Street Plan (97%), the proposal to create a Knoxville-Knox County Tree Board (98%), or the proposal for a *Knoxville-Knox County Tree Conservation & Planting Plan* (96%). Ninety-three percent (93%) of the homeowners know little or nothing about *any* of the items above. Residents addressed the lack of outreach on tree-related issues; 7 percent of the open-ended comments suggest that more outreach is needed on tree-related issues and another 3 percent of the comments asked a specific question regarding a tree problem. As one respondent pointed out:

"I think more should be done on both a local and state level to encourage both new planting and conservation of existing trees. Public outreach and education are important in helping people to understand the value of trees, especially in the area of air quality, a particular concern here in Knox County."

Of the 13 percent of the homeowners that knew about Knoxville's street-tree planting program, nearly half (49%) learned about it through reading the *Knoxville News-Sentinel* and another 35 percent learned about this program by television. These two media outlets would provide the biggest exposure for future publicity regarding potential policies being considered for local management and protection of Knox County's trees.

3. Recognize the value residents place on trees and the natural environment of Knox County.

Ninety percent (90%) of the homeowners said that it is very important that the property around their homes have trees, and 59 percent (59%) said that trees have a particular personal, symbolic, or spiritual meaning for them. Seventeen percent (17%) of the open-ended comments stated

concern for the state of the environment with regard to trees, extolled the value of Knoxville's greenway system, talked about their attraction to the East Tennessee or Knox County region because of the natural areas, or made general statements about their attraction to trees. One respondent observed:

"I've never been a tree-hugging hippie, so to speak, but I believe trees are a sign of life and health and provide great beauty and comfort. East Tennessee has the privilege of four distinct seasons and trees are a huge part of helping us celebrate each turn of the year. Having trees in the yard has been a significant factor in the decision to buy each home I've owned."

Often, those who expressed concern for the environment were personally involved in some aspect of environmental protection as a volunteer, as typified by this response:

"I do underwater cleanup two to three times per year. The people I work with in this effort are dedicated to surface and underwater environmental cleanup. I only wish everyone could see [what] we boat and swim in. They would indeed be shocked. There is no way all that trash can be picked up by divers. This does have a very direct affect on our trees, clean environment, and animals."

Finally, many of the comments suggested ways to enhance the local urban tree canopy, as shown in the comments below:

"We need more native trees planted."

"More landscaping trees, particularly dogwoods, should be planted along roadways. Fewer large trees should be cut down. We should attempt to copy Charlotte, North Carolina's tree policies."

"In many localities developers who cut down trees are required to replace it with a similar type of tree somewhere on the property. I think that would be a good policy for Knox County to adopt."

4. The local utility companies may need to demonstrate greater public sensitivity in their tree-trimming practices.

Forty five percent (45%) of the survey homeowners agree with Q12i (see Appendix A) which states:

"The utility company does a good job trimming tree branches to clear a zone for overhead wires."

However, thirty-nine percent (39%) of the survey homeowners disagree with this statement. This percentage was virtually the same regardless of whether the respondent is served by Knoxville Utilities Board (76% of the homeowners) or Lenoir City Utilities Board (24% of the homeowners).

Nine percent (9%) of the open-ended comments addressed the way that the local utility maintains clearance around power lines. According to one respondent, who touches on many of the concerns addressed in most of these comments:

"I am very unsatisfied with tree trimming practices of KUB. There seems to be no real accountability of private contractors doing the trimming. In my locale [it is] not a local company which has [the] contract. At the least KUB needs an employee easily contacted by citizens with concerns."

These results and comments demonstrate that Knox County homeowners have a high level of concern about the tree-trimming and removal practices carried out by the two local utility companies. The survey responses suggest that: (1) more public outreach may be needed regarding the necessity of the tree-trimming program and types of trimming practices needed to gain proper power line clearance, and (2) utility companies' relationship with the public may benefit from acknowledging input from customers about improving this program.

5. Weigh the environmental and social tradeoffs of urban tree canopy protection.

Nearly one-third (32 percent) of homeowners responding to the survey have lived at their current address for fewer than five years. On the other end of the spectrum, 28 percent of the homeowners are long-time residents, having lived in the same place for over 20 years. As the demographic characteristics of Knox County homeowners change due to this influx of newcomers, the overall public value given to different social and environmental benefits of urban tree protection may change. Previous research has shown that newcomers who migrate to relatively rural areas characterized by high environmental quality (such as East Tennessee) often seek to preserve the amenities that drew them to the area. On the other hand, longtime residents have been shown to be bigger supporters of growth and development (Clendenning et al., 2005). As newer residents displace longtime residents, public support may increase for sustainable development of new residential housing, convenient shopping, and other infrastructure associated with population growth.

The results of this study show that Knox County homeowners value the local natural environment (summarized in #3 above). In addition, nine percent (9%) of all the open-ended comments address the respondents' concern with the loss of natural areas in Knox County due to unsustainable residential and commercial development. The following two comments are characteristic of this sentiment:

“New subdivisions are going in around our area and developers are removing every single tree, bush, and plant completely before they put in the roads and utilities. They have removed many trees that were over 100 years old, [and] removed the only buckeye and chinquapin that were still in our area. The wild turkeys have left.”

“I would like to see less commercial building in the city. We're fast becoming a city of pavement and concrete. Let's keep K-town a nice little southern city, not like Atlanta. Let's don't forget our southern heritage, a nice town at the foothills of the mountains.”

However, these statements are balanced by another 8 percent of the open-ended comments that express an interest in curtailing the level of governmental intrusion into private individuals' lives:

“I believe that the government needs to be less involved in the private lives of its citizens. I also believe that the MPC and zoning departments are being irresponsible in their duties. They are inconsistent in their rulings and planning decisions. It appears that developers receive 'carte blanche' if they have enough money and influence.”

“While I do not think the government has a right to force rules on people who own property that infringes on their rights as a property owner, I do have some concerns about the taking down of whole ridges for more development.”

“I am undecided on many of the issues touched upon because they’re so complex. For example, it might pay to provide incentives for developers or homeowners to preserve trees, but I don’t know that property owners should be forbidden to remove trees. I can’t come down firmly on either side of the issue.”

The value that Knox County homeowners give to area trees is clearly reflected in the level of agreement with the Q18 series of statements that makes up the *Support Index* (Appendix A). For example, 87 percent of homeowners agree with Q18d: “Residential developers should cut down fewer trees when building new subdivisions in Knox County.”

Yet a cautious attitude toward legislation of tree protection in homeowners’ own yards is demonstrated, as well. The survey responses to Q18f—“There should be stronger rules about protecting large old trees on private residential property”—show a lower level of agreement of 53 percent.

VI. CONCLUSION

It was the goal of this study to provide decision-makers a better understanding of the social factors that may influence public support for modifying tree protection and management policy. The results show that Knox County homeowners' *knowledge* about and *experience* with tree care enable an openness to outreach on these policy issues, but that the complex relationships of these indices with *attitudes* and willingness to *support* environmental protection proposals are also valid for understanding why residents may oppose an option. Gender, age, and prior involvement with pro-environmental organizations and activities showed the strongest correlation with support for more governmental intervention in the protection, planting, and management of trees. Income only made a difference if associated with gender; statistically, women score higher on the *attitude* scale than men at higher income levels, while there is no significant difference between men and women at lower income levels. Finally, there was no difference between city vs. non-city dwellers either in attitudes about trees nor levels of support for legislation to protect the local urban tree canopy.

In areas undergoing rapid population growth such as Knox County, the protection of the urban tree canopy for social and environmental benefits necessitates tradeoffs. Implementing a management strategy is further complicated when views in a community vary about the appropriate level of legislation for meeting environmental standards as opposed to social and economic expectations. Ultimately, however, citizens and decision-makers alike in a democratic society must decide what social, economic, and environmental amenities are the most important when crafting a policy to protect and maintain the urban tree canopy in Knox County.

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VIII. APPENDIX A—Survey Questionnaire

IX. APPENDIX B—Survey Results: Frequencies and Descriptive Statistic