Who is tending their garden? Participation in home-based edible gardening

Tenley M. Conway[a] and Kyle Brannen[b]
Department of Geography
University of Toronto- Mississauga
3359 Mississauga Rd N.
Mississauga, ON L5L 1C6
Canada
a. 1-416-767-8753, tenley.conway@utoronto.ca
b. kyle.brannen@utoronto.ca

Introduction

Worldwide, over 600 million urban residents engage in household agriculture on allotment gardens, vacant lots, private gardens, rooftops and balconies (Petts, 2005), and many cities in the Global South now produce over 20% of their food within their urban boundaries (MacRae et al., 2010). In the US and Canada, popular media and activists have drawn attention to the development of small-scale urban agriculture as a way of overcoming the shortfalls of our current food system, while expansion of urban food production has also been proposed as a planning solution in a handful of cities that are experiencing significant population decline (Colassanti et al., 2012). While urban agriculture endeavors can include large-scale and/or commercial ventures, most urban agriculture occurring in North America today is conducted by individuals and households for personal consumption. In response to the growing interest at the household-level, municipalities and NGOs across North America are increasingly adopting enabling regulations and providing support to urban residents interested in growing their own food at their home (Goldestein et al., 2011).

While use of community gardens to grow food for individual consumption has received significant consideration within the academic literature (Armstrong, 2000), food grown in private residential yards, hereafter referred to as home-based edible gardening, has received less attention. Undertaking an edible gardening project at one's home is often difficult to start and maintain, especially without prior experience (Newman, 2008). Yet, Kortright and Wakefield (2011) found that 54% of residents in two Toronto neighborhoods were growing food at home, while a 2002 survey found that over 40% of residents in the Toronto and Vancouver metropolitan areas grew at least some of their own food either at home or in community gardens (City Farmer, 2002).

A household's investment in landscaping activities and allocation of yard space to various features, including growing fruits and vegetables, is thought to be influenced by a variety of factors such as cultural and neighborhood norms, environmental attitudes, and basic household demographics (Larson et al., 2010; Zagorski et al., 2004). However, there has been an absence of research examining why some North American households engage in home-based edible gardening and others do not. This chapter begins to address this question, by identifying characteristics of households who participate in home-based edible gardening. Our study area is four neighborhoods within the urban municipality of Mississauga (Ontario, Canada). The key questions examined are: (1) what are the basic characteristics of home-based edible gardens in the study area? and (2) what household-level factors are associated with residents engaged in edible gardening? These questions are considered from the perspective of edible gardening representing one option within a household's yard use and landscaping choices.

Urban Edible Gardening

As North American cities expanded over the last century much of the land previously used for agriculture was transformed into urban spaces. With the loss of peri-urban farmland and increasing globalization of the broader food system, recent attention has been given to reconnecting city dwellers with their food supply, including growing at least part of one's own food (Corrigan, 2011; Muhlke, 2010). Of course, there are a number of challenges facing residents engaging in urban agriculture including issues of land tenure, start-up costs, acquisition of knowledge and skills, and time (Brown and Carter, 2003; Kortright and Wakefield, 2011; Newman, 2008). Garden plots often take a few seasons of work before the soil is productive enough to yield a substantial amount of food, with the typical household garden plot consuming

large amounts of economic and non-renewable resources while producing relatively small yields in the first few years (Beck and Quigley, 2001).

However, if one can overcome the barriers, the possible benefits of edible gardening include increased fruit and vegetable consumption, land stewardship, educational opportunities, community building, increased property values, and potential jobs (McClintock and Cooper, 2009). Blake and Cloutier-Fisher (2009) found that individuals who grew edible plants benefited from the physical activity, and had increased psychological well-being and social connectedness.

Much of the literature that exists on US or Canadian urban agriculture focuses on community gardens. Community gardens typically consist of small plots in public spaces that are tended by individuals (Patel, 1991). There are approximately 18,000 community gardens in the US and Canada (Kortright and Wakefiled, 2011). Although there is a long history of community gardening in North America (Moore, 2006), the recent phase started during the 1960s and 70s in response to urban decline, by providing a way of using and greening vacant lots (Saldovar-Tanaka and Krasny, 2004). Research has suggested that participation in community gardens can improve individual's' diet, as well as foster social networks, reduce crime rates, and provide exercise (see Armstrong, 2000 for comprehensive review). Community gardens are disproportionately located in low income neighborhoods, with men and seniors most likely to participate (Armstrong, 2000, Saldovar-Tanaka and Krasny, 2004).

Home-based edible gardens can also provide fruits and vegetables for consumption, while helping to maintain cultural identities and provide a venue for self-expression (see Kortright and Wakefield, 2011 for full discussion). When an elderly homeowner with gardening experience was paired with a young partner to assist with tasks, the seniors say they valued the positive personal and spiritual benefits of participating and felt an enhanced confidence and independence

(Blake and Cloutier-Fisher, 2009). Kortright and Wakefield's (2011) study of two neighborhood in Toronto found the primary purpose of home-based edible gardens varied, with growing fresh produce and creating teaching opportunities (for children in the household) common goals. Newman (2008) documented the experience of two companies that facilitate urban agriculture on residential yards, by providing skilled urban farmers who construct and help start up individual garden plots for clients.

It remains unclear, however, why one household might engaged in home-based edible gardening while another does not, and if there are specific characteristics associated with households who do grow fruits and vegetables. An understanding of who engages in home-based edible gardening will illuminate the types of households willing and able to make the investment and highlight groups who may face barriers to participation. Additionally, it can help situation the decision to have an edible garden into broader yard use and landscaping decision-making frameworks.

While research has not explored who participates in home-based edible gardening, various factors have been shown to influence participation and investment by residents in ornamental gardening and other landscaping activities. In general, the style of residential yards is often influenced by neighborhood norms and social pressure to have a property that looks well-cared for (Kirkpatrick et al., 2009; Nassauer et al., 2009), and differences in preferred land cover on residential yards often exist between cultural groups (Fraser and Kenney, 2000) and by 'lifestyle group' (Grove et al., 2006). While pressure to conform particularly influences front yard conditions, which are often designed as a showcase of ones values and wealth, fruit and vegetable gardening typically occurs in the backyard, where more utilitarian activities are allocated (Seddon, 1997). Thus, edible gardens may not be influenced by social pressure to the

same extent that front yard features are, and characteristics at the household-level may prove to be stronger in determining edible garden presence than other landscaping decisions.

The household characteristics typically related to landscaping and ornamental gardening decisions include gender and age of residents, cultural background, level of gardening experience and socioeconomic status (Kendal et. Al, 2010, Yakibu et. Al, 2008). Bhatti (2006) found that gardening participation peaks between 45 and 69, and the US National Gardening Association determined that 68% of food gardeners were 45 years of age or older (Butterfield, 2009). Gardening is often seen as a site of resistance to aging as gardeners seek to maintain physical activeness through gardening activities (Bhatti, 2006, Wakefield et al., 2007). Additionally, women are generally more likely to participate in ornamental flower gardening at home (Bhatti and Church, 2000), which differs from the typical edible gardener in community gardens. Loram et al. (2011) found the length of residency in one's house also influences the extent of landscaping activity residents engage in, with activity-levels peaking in mid-length residencies (15 to 20 years) in the UK.

Broader measures of urban vegetation abundance at the neighborhood-level tend to be related to average level of education (Heynen and Lindsay, 2003; Landry and Chakraborty, 2009; Talarchek, 1990), percent of owner-occupied dwellings (Heynen et al., 2006), and ethnic and racial composition (Heynen et al., 2006; Landry and Chakraborty, 2009; Troy et al., 2007). Areas with larger properties tend to have a higher number of land covers (i.e. ornamental gardens, edible gardens, lawn, shrubs, etc; Loram et al., 2011), not surprising given that there is likely more available planting space.

Across North America, household income and other measures of neighborhood wealth are also consistently shown to be positively related to the extent of urban neighborhoods' vegetation

cover (Emmanuel, 1997; Heynen and Lindsay, 2003; Iverson and Cook, 2000; Landry and Charkraborty, 2009; Martin et al., 2004; Morales et al., 1976; Pedlowski et al., 2002; Talarchek, 1990). Engaging in any type of landscaping requires a certain level of economic input, potentially including costs to construct garden beds, increased water use, seeds and plant material, soil and tools (Beck and Quigley, 2001). Not surprisingly, residents with higher income levels are more likely to make larger lawn care expenditures (Zhou et al., 2009), with wealth and education-level being the best predictors of water and chemical inputs in residential yards (Larson et al., 2011; Robbins et al., 2001; Zhou et al., 2008; Zhou et al., 2009).

Successful edible-gardening also necessitates an individual to be educated in this field. Educating oneself or hiring someone to teach the skill requires both time and money (Newman, 2008), which may not be available. The rest of this chapter identifies characteristics of home-based edible gardens, explores household-level differences between those with and without home-based edible gardens, and considers how significant household characteristics vary from those correlated with other types of landscaping and yard use decisions.

Methods

Study area

The study area is comprised of four neighborhoods in the City of Mississauga (Figure 1). Mississauga is located just to the west of Toronto, Canada's largest city, while Lake Ontario forms the southern border. The city experienced rapid growth over the last 40 years, and now has a population of 713,443 (Statistics Canada, 2011). Mississauga contains a mix of residential neighborhoods (ranging from large apartment towers to fully detached homes), shopping complexes, employment centers, industrial areas, and historic town centers.

Each of the four neighborhoods is defined by two contiguous Statistics Canada census dissemination areas, representing between 200 and 500 households each (Table 1). The neighborhoods were selected for having at least 80% of households living in on-the-ground homes (i.e. detached, semi-detached and/or town-homes) ensuring that most households have access to a yard. The neighborhoods were also selected to represent a range of incomes (either the 20^{th} or 80^{th} percentile of dissemination areas' average household income) and construction ages (at least 80% of houses built either before or after 1970), as we believed these variable likely impact activities and neighborhood norms related to landscaping decisions, including planting edible gardens.

The first older construction neighborhood, Mineola, has a high average household income (approximately the 80^{th} percentile), with the average property size double the area of properties in the other three neighborhoods. Lakeview is the second older neighborhood, but is occupied by households whose average income is in the region's 20^{th} percentile. Not surprisingly, both neighborhoods with older construction also have older residents than the two new construction neighborhoods included in the study. The first newer development neighborhood, Meadowvale, has an average household income greater than Mineola, but is comprised of younger families. Just over half of the dwellings are semi-detached houses, with most structures built in the 1990s and 2000s. The other newer neighborhood, Rathwood, has a mix of housing types that are occupied by relatively low income households. This neighborhood differs from the other three neighborhoods as more than 50% of households are renters, and 60% of residents are immigrants to Canada.

Survey Collection

Information about home-based edible gardening and household characteristics were collected through a mail-based survey sent to 1,399 households during the summer of 2011. An up-to-date address list was acquired for the four study neighborhoods, with all apartments excluded from the survey. A multiple contact approach was used to increase the response rate (Dillman, 2007). Before the survey was mailed out, a recruitment letter was sent to all households informing them of the coming survey and providing residents with the option to complete the survey online. Shortly after, the complete survey package was sent. For those who did not return the first survey, a reminder letter and, if needed, a final mailing with a second copy of the survey was sent. Each survey had a code to keep track of the respondents, which also allowed us to link survey responses with specific property-level characteristics.

The survey asked residents a range of questions about home-based edible gardening, neighborhood and property-level trees, and some basic demographic information. Specifically, respondents were asked to identify if they grew fruits and vegetables. If they answered yes, they were then asked questions about where they grew edible plants, how long they had been growing, what they were growing, and how their edible garden had changed over time. The demographic information collected includes respondent's age, gender and education-level, as well as the number, age and ethnic origins of all household residents. Questions also inquired about the length of time lived in the house, the type of house (i.e. detached, semi), ownership of the house, and household income.

Analysis

Initially, simple summaries of survey responses were completed and the survey demographic data was compared to the 2006 census data to determine how representative the survey sample is. As series of cross-tabulation tables were then created to identify if any of the categorical household variables (i.e. presence of children) significantly differ between households with and without edible gardens. We used Cramer's V as the test statistic because several of the categorical variables had more than two possible values. For continuous household variables (i.e. planting area), ANOVAs were conducted, using the Kolmogorov-Smirnov test statistic to account for differences in either median value or range. Both cross-tabulations and ANOVAs were performed for all neighborhoods together and separately. We examined all neighborhoods together to see if there were differences between the neighborhoods. This also allowed us to explore the effects of a broader range of values than found within the more homogenous neighborhoods. We looked at the neighborhoods individually to see if household characteristics play a role when factors like neighborhood norms and income are more constant.

The variables included in the statistical analyses are given in Table 2. We examined the amount of available planting space, defined as the area of the property minus the building footprint of the house, garage and/or other structures present. Housing type was included based on the assumption that it would influence the location of yard space. Percent of property under tree canopy cover was examined as it that could further limit available planting space as a result of shading, while percent of property covered with lawn grass was considered as it represents the dominant landscape style in the region.

We also examined the effect of residents' owning or renting their houses, because past research has suggested that resident-owners are more likely to invest in landscaping activities

and/or renters often do not have permission to alter their yards' land cover, including planting fruits and vegetables. Income, education, length of residency in their house, and age of household members were also included in the analysis as involvement in ornamental gardening and overall vegetation abundance are clearly correlated with these factors. Income was included in two ways: (1) as a seven category variable, based on how the data was originally collected, and (2) as a binary variable. The binary variable's categories differed by neighborhood, based on the observed conditions in each neighborhood (i.e. where a breakpoint existed; Table 3). Finally, several binary variables representing the different ethnocultural origins of residents were included to determine if presence of edible gardens may reflect cultural norms.

Results

The total number of completed surveys was 586, achieving a response rate just over 42%. The demographics of the survey respondents were generally in line with the broader neighborhood demographics identified from the census data (Table 4), suggesting that the survey respondents are representative of the neighborhood as a whole.

Fifty-three percent of survey respondents indicated that they had home-based edible gardens in 2011, although the older neighborhoods had relatively higher rates of participation (Table 5). In addition, Mineola and Lakeview were the two neighborhoods with the highest average number of years that residents had been growing. But even in the newer neighborhoods, the survey responses do not indicate any recent increase in edible gardening activity; there were not a high number of respondents who had started edible gardens in the last few years. The primary location used by edible gardeners in all neighborhoods is growing their plants directly in the ground, which is not surprising given that all survey participants have access to a yard.

Rathwood, where we might expect high container use due to high rental rates, had only an average number of household using pots and other containers to grow edible gardens (Table 5).

When asked to identify the fruits and vegetables grown, tomatoes were the most popular plant but many other vegetables such as cucumbers, peppers, zucchini, and lettuces were common responses. Most of the fruits mentioned by growers were berries, while tree-grown fruit such as plums, peaches and different types of apples are also present. While we specifically asked about fruits and vegetables, many identified herbs and some households only grew herbs, which we considered sufficient to count as an edible garden for this study.

The responses for the older and newer neighborhoods differed when asked if their edible-garden area had increased or decreased over time (Table 6): in the older neighborhoods of Lakeview and Mineola a higher percentage of respondents said their edible garden had decreased in size, while in the newer neighborhoods of Meadowvale and Rathwood more household had recently increased the growing area. The newer neighborhoods also had a higher percent who wanted to increase the area dedicated to edible plants in the near future (Table 7).

When all the neighborhoods were grouped together, the analysis yielded six categorical variables significantly associated with the presence of home-based edible gardens (Table 8). Specifically, households in the older neighborhoods, living in detached homes, who own their own home, have lived there 15 or more years, and are of European or South Asian ethnicity are more likely to engaged in home-based edible gardening. In Mineola, only length of residence is significant, while completion of university was associated with higher levels of growing in Lakeview (Table 9). In the newer, high income neighborhood of Meadowvale, households with children under 18, South Asian ethnic origins, and a higher household income (60,000 CAD and over, using binary variable) were associated with higher rates of edible gardening. Alternatively,

in low income Rathwood lower income levels (119,000 CAD and under, using binary variable) indicated a stronger likelihood of having a home-based edible garden. As well, living in a detached home was also significantly related to higher rates of edible gardening.

For the continuous variables, when all neighborhoods were combined and in Rathwood, available planting space was significantly correlated with edible gardens, with larger planting areas associated with a higher likelihood of having an edible garden (Table 10). More specifically, residents with very small available planting space had very low rates of growing. Tree canopy and lawn grass was not significantly related to edible garden presence in any neighborhood.

Discussion

Our study of urban neighborhoods in Mississauga (Ontario, Canada) found that over half of households are growing edible plants in their own yards, and that this is occurring at significantly higher rates in the older neighborhoods. We believe there are two likely explanations for why home-based edible gardening rates are higher in areas with older development. First, planting an edible garden may not be a landscaping priority when people move to a new home, but rather a secondary investment that occurs after several years of residence. This is probably a result of multiple factors, potentially including (1) the time and money required to have an edible garden, which may be scarce early on, especially for first time home buyers, and (2) an initial focus on visible and/or aesthetic parts of the yard over utilitarian uses. Residents in our older construction neighborhoods had lived in their houses longer on average than in our newer neighborhoods –in Lakeview and Mineola 57% of respondents had lived in their household 15 years or more, while only 15% had in Meadowvale and Rathwood –

thus older neighborhood residents are more likely to have had the time to meet all of their yard use/landscaping goals. Over time, more residents in the newer neighborhoods may start, and then expand, edible gardens. This is supported by the findings that twice as many residents with edible gardens in the newer neighborhoods, as compared to the older neighborhoods, said the size of their garden had expanded in the last five years and higher numbers also wanted to further expand their edible garden in the future. The ornamental gardening literature has also shown a positive relationship between length of residency, size of garden, and overall level of yard management (Loram et al., 2011).

A second possible explanation is that the older neighborhoods, on average, have older residents. Previous studies have suggested that gardening activity, broadly defined, peaks between 45 and 74 years olds (Bhatti 2006). While we considered the effects of children and seniors on presence of edible gardens, it may be that our age-classes did not capture the increase in edible gardening by older working-age residents (i.e. 45 to 65), who are more common in the older construction neighborhoods of Mineola and Lakeview.

The cross tabulation results found that the only age variable to be significantly related to edible gardening was households with children under the age of 18 in Meadowvale. This neighborhoods has the largest percent of homes with school-aged children– Rathwood has the highest percentage of children under six. It may be that families with school-aged children are most interested in creating edible gardens for their educational potential, which is why the child variable is only significant in Meadowvale.

In terms of income-effects, moderate to high income households in the high income neighborhood of Meadowvale and low to moderate income households in the lower income neighborhood of Rathwood were both significantly more likely to have edible gardens. In other

words, the opposite ends of the income spectrum were most likely to be involved in edible gardening, although in both neighborhoods, households with incomes of 60,000 to 119,000 CAD were relatively more likely to have edible gardens. While the broader residential landscaping literature indicates that higher incomes are associated with higher activity rates, it may be that edible gardening differs from ornamental gardening and other types of landscaping in that there is a tangible benefit to growing fruits and vegetables. Thus, lower income households may be willing to invest the time and money required to have a garden given the expected pay-off.

A caveat to our income findings is that even the low income neighborhoods still have relatively high average household income, when compared to all of Canada. This reflects the relative wealth of the Greater Toronto Area, and that the lowest income families tend to live in apartments, not on-the-ground houses, so were excluded from this survey. As a result, our findings may not be applicable for very low income households who live in on-the-ground houses elsewhere.

The significant income relationship in the newer neighborhoods could mean that wealthy residents have the resources to do multiple landscaping activities at once, while lower income households may prioritize utilitarian activities. In the older neighborhoods, the income effects may be even less important because there has been longer residency, on average, so more time for initial and subsequent landscaping objectives to be met.

Not surprisingly, households with more available planting space, detached housing styles, and resident-owners are more likely to have edible gardens. The first two variables may again indicate that edible gardens are a secondary use/activity, to have when space is available, but that other yard uses and/or land covers are prioritized in small yards. With regard to ownership status, edible gardens are an investment in resources than cannot be transferred to the next house

when you move. Renters are also often restricted in their ability to alter landscaping, and may see themselves as more temporary so are less likely to invest in an edible garden even when they have permission. In Rathwood, with the highest number of renters, there is not a higher level of container gardening, which one might expect in situations where the household wants to have an edible garden but does not have permission to establish an in-the-ground plot. The reasons for this remain unclear.

We anticipated a negative relationship between tree canopy and edible garden presence, because shade producing trees and sun loving fruits and vegetables cannot easily flourish right next to each other. However, this relationship was not present in any of the neighborhoods. This may be because tree canopy was generally low enough to allow sufficient space in the yard to have full sun. Nor does there appear to be a clear trade-off between percent of property covered by lawn grass and edible garden presence. It may also be that the typical location of these land covers is different enough– with trees in the front yard and along the property boundaries, lawn grass dominating the front yard and center of the back yard, and edible gardens found primarily in the back yard– that they did not come into conflict. These findings are interesting in light of urban forestry and urban agricultural organizations increasingly joining forces to advocate for green city initiatives (i.e. Green Infrastructure Ontario Coalition and Ecojustice, nd); our results suggest that a conflict does not exist between the goals of urban forestry and urban agricultural, at least in residential yards over a certain size, and joining forces main strengthen both efforts.

Finally, we did see significant correlations for residents who identified as having European and/or South Asian ancestry. These findings support the thesis that different cultures have varying traditions with home-based edible gardening, and that growing some of your own fruits and vegetables may be a way for households to access culturally important foods that are not

readily available in their area. Interestingly, we did not see high rates of edible gardening generally in Rathwood, which has a high immigrant population. This may be reflecting specific cultural norms and/or barriers to participation associated with residents in this area.

While over half of the households in the study currently have a home-based edible garden, the research also showed most of the gardeners are relatively seasoned, even in the newer neighborhoods; the recent increase in attention given to urban agriculture by popular media and other entities does not seem to have translated into an increase in home-based edible gardens, at least within our study area. While the results suggest that household income is not necessarily a barrier to participate, it may be that residents are still lacking the knowledge, time or interest to participate. Additional research should focus on determining if households lack edible gardens as a result of yard space, landscaping resources allocation decisions, or other factors that may include lack of interest.

A limitation of the current research is that we looked at each household factor independently, and did not consider the relationship between the factors. Specifically, how household characteristics may interact to make a household more likely to engage or create greater barriers to participation. We also did not ask why households had edible gardens. As Kortright and Wakefield (2011) found, there are likely a variety of reason that may or may not be tied to household characteristics. A better understanding of the reasons why people want to grow fruits and vegetables and trade-offs they consider when deciding to invest in an edible garden would help organizations interested in supporting urban agriculture, by providing a framework to encourage different types of growers and target support to overcome real and perceived barriers.

Urban agriculture can provide a valuable opportunity for increasing healthy diets and communities. In North American most edible gardening is conducted informally, by individuals

in community gardens or within their own yard. The aim of this research was to determine the basic characteristics of home-based edible gardens, as well as explore the characteristics associated with residents who engaged in home-based edible gardening. There are a number of household characteristics that are significantly related to edible gardening, although income does not appear to have the same relationship with edible gardens as it does for other types of gardening activity. Building on this basic understanding of who is participating in edible gardening, future research should focus on understanding why households do or do not participate in home-based edible gardening.

References

Armstrong , D. (2000), 'A survey of community gardens in upstate New York: implications for health promotion and development', *Health and Place*, 6: 319-327.

Beck, T.B., and Quigley, M.F. (2001), 'Emergy evaluation of food production in urban residential landscapes', *Urban Ecosystems*, 5: 187-207.

Bhatti, M. (2006), '"When I'm in the garden I can create my own paradise": homes and gardens in later life', *The Sociology Review*, 54(2): 318-341.

Bhatti, M. and Church, A. (2000), '"I never promised you a rose garden": gender, leisure and home-making', *Leisure Studies*, 19: 183-197.

Blake, A. and Cloutier-Fisher, D. (2009), 'Backyard bounty: exploring the benefits and challenges of backyard garden sharing projects', *Local Environment*, 14(9): 797-807.

Brown, K.H. and Carter, A. (2003), *Urban Agriculture and Community Food Security in the United States: Farming from the City Center to the Urban Fringe*. Venice, CA: Community Food Security Coalition.

Butterfield, B. (2009), *The Impact of Home and Community Gardening in America*. Burlington, VT: National Gardening Association.

City Farmer (2002), *City dwellers are growing food in surprising numbers!* http://www.cityfarmer.org/40percent.html.

Colassanti, K.J.A. Hamm M.H. and Litjens C.M. (2012), 'The city as an "agricultural powerhouse"? Perspectives on expanding urban agriculture from Detroit, Michigan', *Urban Geography*, 33(3): 348-369.

Corrigan, M.P. (2011), 'Growing what you eat: developing community gardens in Baltimore, Maryland', *Applied Geography*, 31: 1232-1241.

Dillman, D.A. (2007), *Mail and Internet Surveys: the Tailored Design Method, 2nd ed*. Hoboken, NJ: John Wiley & Sons.

Emmanuel, R. (1997), 'Urban vegetation change as an indicator of demographic trends in cities: the case of Detroit', *Environment and Planning B*, 42: 415-426.

Fraser, E.D.G. and Kenney W.A. (2000), 'Cultural background and landscape history as factors affecting perceptions of the urban forest', *Journal of Arboriculture*, 26(2): 106-113.

Goldestein, M. Bellis J. Morse S. Myers A. and Ura E. (2011), *Urban Agriculture: A sixteen city survey of urban agriculture practices across the country*. Atlanta: Turner Environmental Law Clinic, Emery Law.

Green Infrastructure Ontario Coalition and Ecojustice (n.d.), *Health, Prosperity and Sustainability: The Case for Green Infrastructure in Ontario*. Toronto: Green Infrastructure Ontario Coalition.

Grove, J.M. Cadenasso M.L. Burch W.R. Pickett S.T.A. Schwarz K. O'Neil-Dunne J. Wilson M. Troy A. and Boone C. (2006), 'Data and methods comparing social structure and vegetation structure of urban neighborhoods in Baltimore, Maryland', *Society and Natural Resources*, 19(2): 117-136.

Heynen, N. Perkins, H.A. Roy, P. (2006), 'The political ecology of uneven urban green space: the impact of political economy on race and ethnicity in producing environmental inequality in Milwaukee', *Urban Affairs Review*, 42(1): 3-25.

Heynen, N.C. and Lindsay, G. (2003), 'Correlates of urban forest canopy cover: implications for local public works', *Public Works, Management and Policy*, 8(1): 33-47.

Iverson, L.R. and Cook E.A. (2000), 'Urban forest cover of the Chicago region and its relation to household density and income' *Urban Ecosystems*, 4: 105-124.

Kendal, D. Williams N.S.G. and Williams K.J.H. (2010), 'Harnessing diversity in gardens through individual decision makers', *Trends in Ecology and Evolution*, 25(4): 201-202.

Kirkpatrick, J. Daniels G. and Davison A. (2009), 'An antipodean test of spatial contagion in front garden character', *Landscape and Urban Planning*, 93: 103-110.

Kortright, R., Wakefield, S. (2011), 'Edible backyards: A qualitative study of household food growing and its contributions to food security', *Agriculture and Human Values*, 28(1): 39-53.

Landry, S.M., Charkraborty, J., (2009), 'Street trees and equity: evaluating the spatial distribution of an urban amenity', *Environment and Planning, A*, 41: 2651-2670.

Larson, K.L. Cook E. Strawhacker C. and Hall S.J. (2010), 'The influence of diverse values, ecological structure, and geographic context on residents' multifaceted landscaping decisions', *Human Ecology*, 38(6): 747-761.

Lorman, A., Warren P. Thompson K. and Gaston K. (2011), 'Urban domestic gardens: the effects of human interventions on garden composition', *Environmental Management*, 48: 808-824.

MacRae, R. Gallant, E. Patel, S. Michalak, M. Bunch, M. and Schaffner, S. (2010), 'Could Toronto provide 10% of its fresh vegetable requirements from within its own boundaries? Matching consumption requirements with growing spaces', *Journal of Agriculture, Food Systems, and Community Development*, art 5.

Martin, C.A. Warren P.S. and Kinzig A. (2004), 'Neighborhood socioeconomic status is a useful predictor of perennial landscape vegetation in small parks surrounding residential neighborhoods in Phoenix, Arizona', *Landscape and Urban Planning*, 69: 355-368.

McClintock, N. and Cooper, J. (2009), *Cultivating the Commons: An Assessment of the Potential for Urban Agriculture on Oakland's Public Land*, Berkeley: Department of Geography, University of California, Berkeley.

Moore, S. (2006), 'Forgotten roots of the green city: subsistence gardening in Columbus, Ohio, 1900- 1940', *Urban Geography*, 27(2): 174-192.

Morales, D. Boyce B.N. and Favretti R.J. (1976), 'The contribution of trees to residential property values: Manchester, Connecticut', *Valuation*, 23(2): 26-43.

Muhlke, C. (2010), 'Growing together', *New York Times Magazine*. Retrieved from. http://www.nytimes.com/2010/10/10/magazine/10FOB-WWLN-t.html%3Fref¼magazineon.

Nassauer, J.I. Wang Z. and Dayrell E. (2009), 'What will the neighbors think? Cultural norms and ecological design', *Landscape and Urban Planning*, 92: 282-292.

Newman, L. (2008), 'Extreme local food: two case studies in assisted urban small plot intensive agriculture', *Environments*, 36(1): 33-43.

Patel, I.C. (1991), 'Gardening's socioeconomic impacts', *Journal of Extension*, 29:4.

Pedlowski, M.A. Adell J.J.C. and Heynen N.C. (2002), 'Urban forest and environmental inequality in Campos dos Goytacazes, Rio de Janeiro, Brazil', *Urban Ecosystems*, 6: 9-20.

Petts, J. (2005), 'The economics of urban and peri-urban agriculture'. In *Continuous Productive Urban Landscapes: Designing Urban Agriculture for Sustainable Cities*, ed. Viljoen A. Bohn K. and Howe J. 65–77. Oxford: Architectural Press.

Robbins, P. Polderman A. and Birkenholtz T. (2001), 'Lawns and toxins: an ecology of the city', *Cities*, 18(6): 369-380.

Saldovar-Tanaka, L. and Krasny, M.E. (2004), 'Culturing community development, neighborhood open space, and civic agriculture: the case of Latino community gardens in New York City', *Agriculture and Human Values*, 21: 399-412.

Seddon, G. (1997), *Landprints—Reflections on Place and Landscape*, Cambridge: Cambridge University Press.

Statistics Canada, (2011), *Canadian Census 2006*, http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/index-eng.cfm

Talarchek, G.M. (1990), 'The urban forest of New Orleans- an exploratory analysis of relationships', *Urban Geography*, 11: 65-86.

Troy, A.R Grove J.M. O'Neil-Dunne J.P.M. Pickett S.T.A. and Cadenasso M.L. (2007), 'Predicting opportunities for greening and patterns of vegetation on private urban lands', *Environmental Management*, 40: 394-412.

Wakefield, S. Yeudall, F. Carolin, T. Reynolds, J. and Skinner, A. (2007), 'Growing urban health: community gardening in South-East Toronto', *Health Promotion International*, 22(2): 92-101.

Yabiku, S.T. Casagrande D.G. and Farley- Metzger, E. (2008), 'Preferences for landscape choice in a southwestern desert city', *Environment and Behavior*, 40(3): 382-400.

Zagorski, T. Kirkpatrick J.B. and Stratford E. (2004), 'Gardens and the bush: gardeners' attitudes, garden types and invasive', *Australian Geographical Studies*, 42(2): 207-220.

Zhou, W. Troy A. and Grove J.M. (2008), 'Modeling residential lawn fertilization practices: integrating high resolution remote sensing with socioeconomic data', *Environmental Management*, 41(5): 742-752.

Zhou, W. Troy A. Grove J.M. and Jenkins J. (2009), 'Can money buy green? Demographic and socioeconomic predictors of lawncare expenditure and lawn greenness in urban residential areas', *Society and Natural Resources*, 22(8): 744-760.

Table 1. Characteristics of the Four Study Area Neighborhoods

Neighborhood	Number of Households Surveyed (response rate)	Average Household Income (CAD)	Owned (%)	Household Value (CAD)	Houses Built pre – 1970 (%)	University Degree (%)
Mineola	252 (50%)	138,103	92	581,419	80	29
Lakeview	255 (50%)	66,447	95	350,366	87	14
Meadowvale	582 (37%)	152,765	90	433,798	5	38
Rathwood	305 (38%)	63,520	44	303,707	11	14

Table 2. Household Variables Included in Analysis

Variable	Description
Neighborhood	Categorical: Mineloa, Lakeview, Meadowvale, Rathwood
Available planting space	Continuous: property size minus building footprints (m^2)
House type	Categorical: fully detached, semi-detached, townhouse
Tree canopy	Continuous: percent of property under tree canopy
Lawn grass	Continuous: percent of property covered by lawn grass
Owner-occupied	Categorical: yes/no
Income (7 categories), in 1,000s of CAD	Categorical: 0-29, 30-59, 60-89, 90-119, 120-149, 150-178, 180 and over
Income (binary)	Categorical: see Table 3
Education	Categorical: no university degree, completed at least university
Years in house	Categorical: 1 year or less, 2 to 5 yrs, 6 to 10 yrs, 11 to 15 yrs, 16 to 20 yrs, more than 20 years
Under 18 present	Categorical: yes/no
Over 65 present	Categorical: yes/no
British	Categorical: yes/no
European	Categorical: yes/no
South Asian	Categorical: yes/no
East and Southeast Asian	Categorical: yes/no

Table 3. Categories for Binary Income Variables

Neighborhood	Low Income Category	High Income Category
All Neighborhoods	≤ 89,000 CAD	≥ 90,000 CAD
Mineola	≤ 89,000 CAD	≥ 90,000 CAD
Lakeview	≤ 89,000 CAD	≥ 90,000 CAD
Meadowvale	≤ 59,000 CAD	≥ 60,000 CAD
Rathwood	≤ 119,000 CAD	≥ 120,000 CAD

Table 4. Neighborhood Census and Survey Data Comparison

Neighborhood	Census Data (2006)				Survey Sample Data (2012)			
	Household Income (CAD)	University Degree (%)	Top 3 Ethnicities	Home Ownership (%)	Household Income (CAD)	University Degree (%)	Top 3 Ethnicities	Home Ownership (%)
Mineola	138,103	28	British, European, Other	92	90,000-119,000	30	European, British, E. and S.E. Asian	92
Lakeview	66,447	13	European, British, Other	95	60,000-89,000	14	European, British, Canadian	95
Meadowvale	152,765	40	European, E. and S.E. Asian, British	90	90,000-119,000	40	European, E. and S.E. Asian, S. Asian	94
Rathwood	63,520	16	European, British, Other	44	30,000-59,000	16	European, British, E. and S.E. Asian	59

Table 5. Percent of Respondents with Home-based Edible Gardens and Location of Plants

Neighborhood	Edible Plants		Location of Edible Plants		
	Growing	Average Years	Containers	In Ground	Community Garden
Mineola	57%	20	39%	82%	0%
Lakeview	61%	22	19%	95%	1%
Meadowvale	48%	8	35%	86%	0%
Rathwood	44%	12	33%	84%	0%

Table 6. Percent of Respondents whose Edible Garden has Changed in Size Over the Last Five Years

Neighborhood	Increased	Decreased
Mineola	11	24
Lakeview	17	18
Meadowvale	36	5
Rathwood	27	13

Table 7: Percent of Respondents Who Would Like to Increase the Size of their Edible Garden in the Near Future

Neighborhood	Yes	No	Do not Know
Mineola	53	41	6
Lakeview	42	51	11
Meadowvale	72	15	12
Rathwood	65	27	7

Table 8. Cross-Tabulation Results for Home-Based Gardening and Categorical Household Variables for All Neighborhoods Combined[a]

Variable	Cramer V	More likely to grow
Neighbourhood	0.128	Mineola, Lakeview
House type	**0.154**	Detached
Owner-occupied	**0.129**	Yes
Years in house	0.146	16-20, 20+ yrs
European	0.087	Yes
South Asian	**0.106**	Yes

a. Variables included in the table have p-values less than 0.05. Bolded numbers indicate p-value > 0.01.

Table 9. Cross-Tabulation Results for Home-Based Edible Gardens and Categorical Household Variables[a]

Variable	Mineola		Lakeview		Meadowvale		Rathwood	
	Cramer V	More likely to grow	Cramer V	More likely to grow	Cramer V	More likely to grow	Cramer V	More likely to grow
House type							**0.388**	Detached
Income (binary)					-0.151	Higher	0.191	Lower
Education			0.17	University degree				
Years in house	0.333	2-5, 6-10, 16-20, and 20+ yrs						
Under 18 present					0.146	Yes		
South Asian					0.149	Yes		

a. Statistical results given only when the p-value is less than 0.05. Bolded numbers indicate p > 0.01.

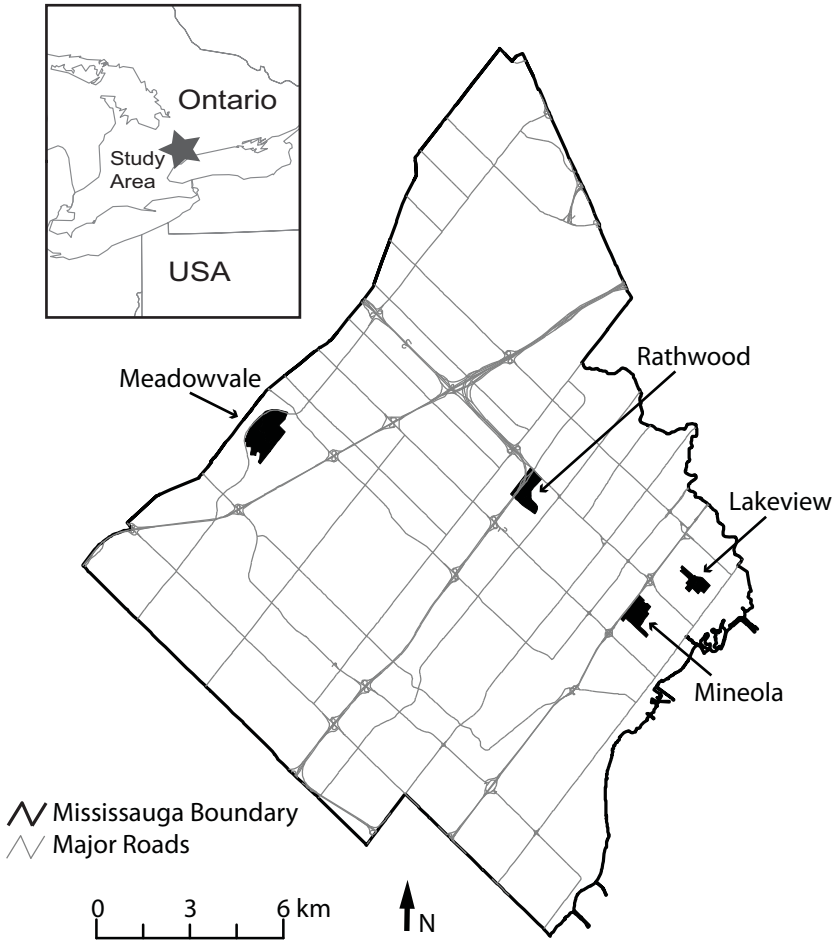
Table 10. ANOVA Results for Home-Based Edible Gardens and Available Planting Space[a]

	Kolmogorov-Smirnov	Grower's Average (m)	Non-grower's Average (m)
All Neighborhoods	(0.04)	500	464
Mineola			
Lakeview			
Meadowvale			
Rathwood	(0.045)	171	99

a. Results given only when the p-value is less than 0.05.

Figure Captions

Figure 1. The four neighborhoods included in the study.


Ontario
Study Area
USA
Meadowvale
Rathwood
Lakeview
Mineola
Mississauga Boundary
Major Roads
0
3
6 km
N