

Greater Lansing Food Bank (GLFB) Garden Project

Impact Analysis



Source: Greater Lansing Food Bank

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Greater Lansing Food Bank Community Garden Impact Analysis

A report

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GREATER LANSING

foodbank

GARDEN PROJECT

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Executive Summary

The following document was created as the capstone for the Bachelor's and Master's in Urban and Regional Planning at Michigan State University. The students were assigned to develop a tool for the Greater Lansing Food Bank (GLFB) to use in order to conduct an impact study of their community garden program. Specifically, health impacts, social impacts, and economic impacts were analyzed.

In order to create a proper tool, the students put together a socioeconomic profile of the community gardeners compared to the population of the City of Lansing. The data used for the community gardeners was collected by the Greater Lansing Food Bank. Members of the GLFB's community garden program were generally of lower income than the Lansing average, and were more ethnically and racially diverse.

Upon profiling the gardeners in relation to the population of Lansing, a literature review was conducted. Here, existing literature on the social, economic and health impacts of urban and community gardening was assessed and summarized in order to isolate key variables that would ultimately be used to develop the assessment tool for the GLFB. The pertinence of each variable was explained.

Since community gardening has already been extensively researched in other cities, a set of relevant case studies was presented, outlining the research methods used and the studies' results. These were further incorporated into the development of the final tool that the GLFB can use for the assessment they will conduct. Cities selected were Flint, MI, Denver, CO, New York, NY, Philadelphia, PA, Bloomington, IN and Chicago, IL.

The recommendations are a combination of two things. The tool created is a list of possible survey questions, which the GLFB distribute among their community garden membership. It also suggests other sources, like City departments, which may have data that is relevant for the impact study that the GLFB is looking to conduct. The survey was developed using fairly standardized questions that have already been used in surveys of the Lansing area, with modifications to make them relevant for community gardens. The recommendations are broken down into three categories, which address the social, health and economic impacts of urban gardening.

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Introduction

About Practicum

Practicum is a capstone course taught by the Michigan State University Urban and Regional Planning Program. Through this course undergraduate and graduate students gain practical planning experience by collaborating with community partners that require planning assistance. It is the responsibility of the student team and client to define a scope of work for the project that meets the client's needs.

Throughout the course, the student's work is guided by Dr. Zenia Kotval and Dr. Rex LaMore as well as the client.

About the Client

The Greater Lansing Food Bank (GLFB) is a non-profit organization that provides emergency food to individuals and families in need in Ingham, Eaton, Clinton, Shiawassee, Clare, Isabella and Gratiot counties. Food is distributed through an extensive network of food pantries and community kitchens located throughout the region. Part of the GLFB's mission is to help those in need reach a greater level of self-sufficiency. In pursuit of that goal, this program provides access to land, how-to education, free seeds and plants, tool lending, a networking hub and more. The program seeks to ensure that everyone in the community can have access to fresh, healthy food.

One of the primary goals of the Greater Lansing Food Bank is to help break the cycle of poverty. By overseeing community gardens, the Garden Project provides the opportunity for Lansing area residents to do just that in a hands-on manner. A garden is self-help. As of January 2014, there are 100 community gardens in the system, with approximately two-thirds of those residing in the Lansing area. Estimates range from 5,000 to 7,000 individuals using the gardens each year, but these estimates are limited by the fact that only one-fifth of the gardens in the system register users. User registration includes collecting demographic data on users as well as assigning a designated location within the community garden plot that belongs to each user for the given growing season. This registration process is often carried out by garden leaders who in turn report to the central staff of the Garden Project. An estimated 80% of families utilizing the community gardens qualify as low income, as defined by the U.S. Department of Housing and Urban Development.

Community gardens are located on land owned by a variety of organizations including churches, schools, hospitals, and Lansing Parks and Recreation. On Lansing's East Side, The Garden Project operates a resource center at the corner of Foster and Marcus, one block south of Kalamazoo. This center provides registered gardeners with tools, seeds, plants, and educational resources for the users of the community gardens. While this resource center serves as the hub of the Garden Project, it merely serves as one cog in a vast system of community gardens in Lansing, Michigan and the surrounding region. In addition to managing the plots of land at the garden sites, the Garden Projects seeks to foster leadership engagement through its Garden Leaders Training program.

Each community garden has a coordinator who is responsible for a number of garden duties throughout the season. These responsibilities can include keeping in touch with gardeners about weed management, plot maintenance and attending coordinator meetings to check in with the Garden Project staff. The community gardens vary greatly in size, diversity, neighborhood

characteristics, and water access.

Alex Bryan serves as the manager of the GLFB Garden Project, and he commissioned the practicum team to conduct this study, which will serve as a valuable asset for the Garden Project for a number of reasons:

- The economic impact of community gardening has been explored both in the abstract and in multiple specific locales across the nation. The Garden Project of the Greater Lansing Food Bank would greatly benefit from collecting and understanding this existing knowledge and work and then applying it to Lansing.
- The Garden Project remains in need of additional sources of financial support. Exploring the individual and communal health benefits of community gardening could increase opportunity to apply for health-related funding, thus further helping the community served by the Garden Project.
- By building upon the Garden Project's existing database, information, and internal surveys, this study could greatly increase program efficiency by assisting the Garden Project model in being more data-driven in its efforts.

About the Study Area

Lansing serves as the capital city of the State of Michigan. In 1835 Michigan was admitted to the Union, and the Constitution of 1837 made Detroit the first capital of the new state. Then in 1847, after months of debate in the legislature, the governor signed into law a bill naming Lansing Township in Ingham County as the new state capital. Despite being the capital of Michigan since 1837, Lansing did not become an incorporated city until 1859 (Egger 30).

Lansing boasts a rich economic history that is built on both its role as a political hub and its deep roots in the automobile history. Ransom Eli Olds founded the car company bearing his name in this city in which he was born, and it eventually became a part of General Motors, whose manufacturing presence in the city remains an integral part of the mid-Michigan economy. Just a few miles east of Lansing sits Michigan State University, one of the nation's preeminent agricultural and research institutions. With an enrollment of nearly 50,000 students, MSU continues to build on its rich foundation as the pioneer land grant college, creating a model for numerous universities across the United States.

Purpose of the Project

This project's purpose is to create a tool through which the impact of the Greater Lansing Food Bank's Garden Project can be measured.

The GLFB Garden Project has commissioned this study for the purpose of creating a greater understanding of the impact that this community garden system has on the Lansing region. Determining impact requires thorough research, as impact can be defined in a variety of ways. For the purposes of this paper, the impact of the Garden Project can be divided into three broad categories: economic, social, and health. While these three categories occasionally overlap, they provide an excellent framework from which the administrators, users, and supporters of the Garden Project can glean the tangible impacts of the community system. In addition, while the Greater Lansing Food Bank operates in seven counties throughout the Mid-Michigan area, limitations on available data and comparable case studies make an impact study on the entire region not immediately feasible. The GLFB Garden Project operates gardens outside of Lansing, but the vast majority of its impact is seen in and around Lansing. The scope of our research and report will be reflective of those conditions.

It is important to note that for the purposes of this study, the focus of research shall remain on the approximately 100 community gardens that are operated by the Garden Project, and that the approximately 450 home gardens that also exist within the system, while an important asset for the project, are not all within the focus of this research. The Garden Project offers home garden assistance to households who qualify based on income. Anyone that is considered low-income based on guidelines set forth by the U.S. Department of Housing and Urban Development can sign up for at-home assistance. This entails getting seeds, plant starts, tool library access, canning supplies, books, and more.

Because the home gardens contain no aspect of communal use and are primarily located on private land, they remain outside the scope of this impact study. Throughout this report, the term “garden” in relation to the Garden Project shall refer only to community gardens, unless otherwise noted. Of those 100 community gardens, the 20 that currently utilize user registration will serve as the model and research template for forming recommendations on how the Garden Project could measure and improve its impact.

There exists a great deal of literature and research on community gardening in the United States and its implications for localities and regions. However, much of this literature focuses on urban and metropolitan areas with a significantly greater population than Lansing and the Mid-Michigan Tri-County area. As a consequence, this paper builds on existing case studies, allowing the research team to then contextualize and regionalize that information for the Lansing region. It should also be noted that the vast majority of this literature was published in support of such agricultural endeavors, so any attempts to use this literature as the baseline of understanding must resist the inclination to portray the economic impact of community gardening as an unquestionably positive development. The practicum team seeks to maintain a more professional approach to the analysis and look for those examples that appear to provide an empirical basis for our findings and recommendations.

Examination Case Studies of Other Community Gardens

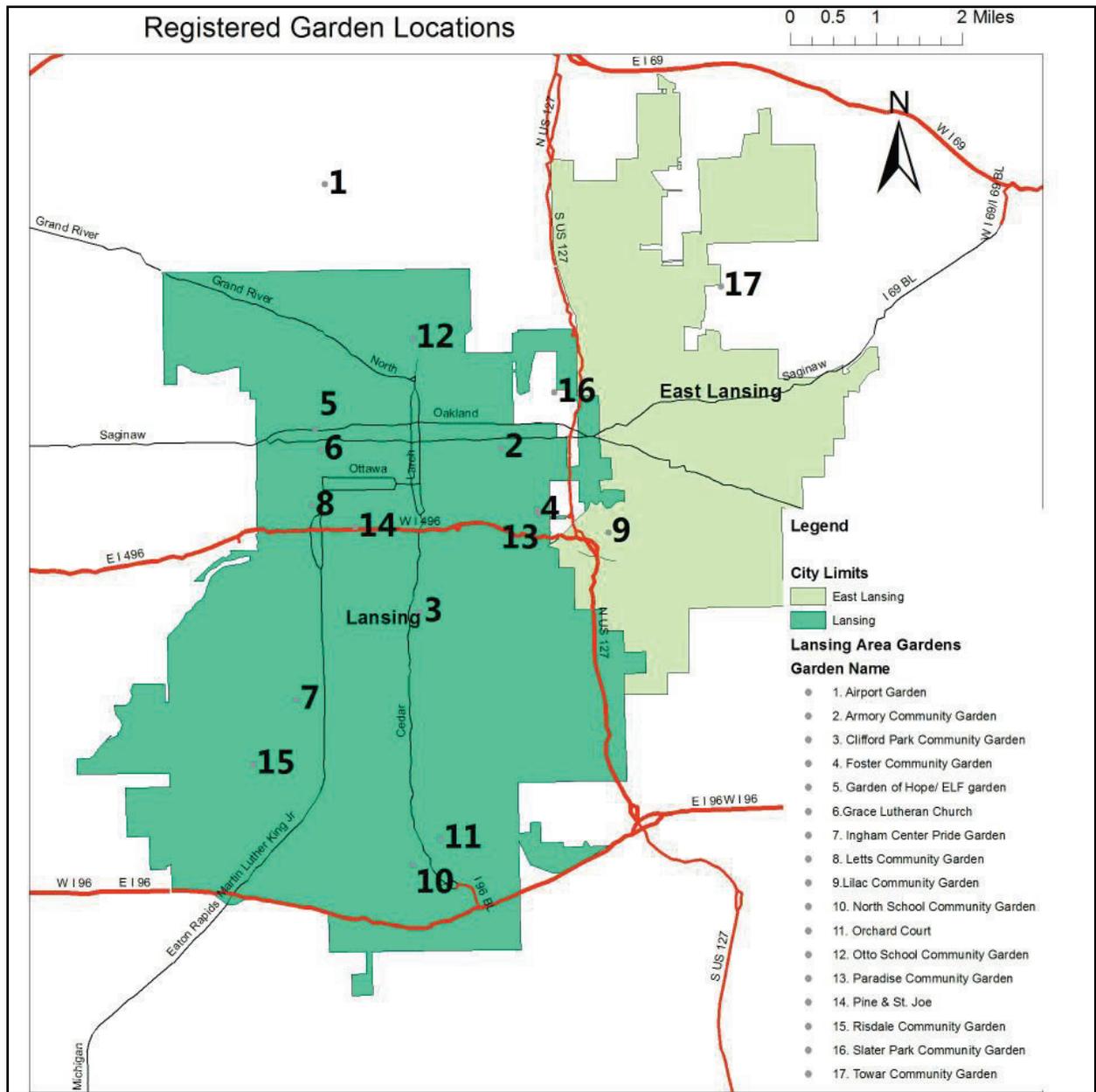
The Practicum team identified and researched multiple community garden projects across North America to determine the nature and extent of which an impact analysis can be used correctly. This work provided the team with an understanding of what other, if any, work is happening that is similar to the team’s efforts. Moving on from the literature review the Practicum team conducted six case studies of similar sized cities that are engaged in community gardening programs. These case studies provided the team with insight to the ways in which gardens have impacted other communities. Special attention was paid to the ways that these gardens have affected the social, health and economic realms.

Based on this research the team will recommend an assessment tool and method for the Greater Lansing Food Bank (GLFB).

Deliverables

The project deliverables include the following:

- An assessment tool with recommended methodology for implementation.
- A comprehensive report detailing the existing conditions of the Garden Project's Impact Analysis Capabilities.
- An exploration of the existing literature on community gardening as an instigator of change at both the individual and community level.
- A comparison of relevant case studies.
- A socio-economic profile comparing the Garden Project clientele to Lansing population.
- A poster displaying findings and recommendations.



Map 1: Garden Locations in Lansing
 Source: Greater Lansing Food Bank

Map 1 shows the geographic boundaries of Lansing and East Lansing and the locations of Garden Project community garden within the region. The dots represent the exact locations of the community gardens and the corresponding numbers allow you to identify the gardens names which are provided in the key.

About the Greater Lansing Food Bank Garden Project

The focus of this practicum report is a community garden program in the greater Lansing area called, “The Garden Project”, a program of the Greater Lansing Food Bank. During the recession of 1981, layoffs left many families in the greater Lansing, Michigan area without resources. Some faced tough choices: whether to pay for housing, medicine, utilities, or food. To help ensure that no one in the community had to go hungry, community leaders David

Hollister, Camille Abood Patrick, Babcock, and William Long founded the Greater Lansing Food Alliance – now known as the Greater Lansing Food Bank (GLFB). In the early days of the alliance, local organizations and businesses held monthly food drives to stock local food pantries. Collected food was stored in an unused Lansing Schools building, sorted by volunteers, and distributed by Ingham County through an informal network of eight area churches, who in turn distributed food to members of the community in need.

By 1982, the GLFB leadership determined that the pantry system alone could not meet the community's food needs, and launched The Garden Project. In 1983, the Self-Help program of the Greater Lansing Food Alliance began to coordinate a network of around nine garden projects. This program provides garden plots, seeds, tools and gardening knowledge to people in underserved areas so they can grow, harvest, prepare, and preserve their own vegetables and increase the local supply of fresh, nutritious food.

The Garden Project that began in 1983 has helped establish and supports more than 100 community gardens and assists low-income residents with their backyard gardens. The GLFB also manages a gleaning program, which rescues edible produce from Michigan State University and area farms to distribute through their network of agencies.

The program also forged alliances with other local groups such as after school programs and neighborhood block coordinators. One such partnership was made with a Hmong refugee nutrition project, and this led to a long-term relationship between the Garden Project and the Hmong community in Lansing (Egger 33). Today, the GLFB Garden Project system continues to serve as a connector for many refugee groups in addition to members of the Hmong community, including Bhutanese, Burmese, Somali, Ethiopian, Meskhetian Turks, and others.

Map 1 shows the location of the 17 gardens, in Lansing, that the Practicum Research Team focused on for this study.

Profile of Garden Project Data in the Context of the Lansing Region

Out of the approximately 100 gardens in the Garden Project, users are registered at about twenty of the sites. Where registration is utilized and enforced, the Greater Lansing Food Bank maintains an information database on some of the community gardens in its system and the users of those gardens. Those twenty garden plots, the majority of which are located in Lansing, can be seen in Table 1. While the entire database managed by the Garden Project encompasses all 100 community garden sites, this chart serves as a sample portion of the database. It corresponds only to the community gardens at which user registration information is collected.

On the individual gardener level, the data includes mailing addresses, which garden site each gardener uses, as well as household type, size, and income. This data was collected by the Garden Project staff as part of its garden registration process. Gardeners were asked to submit their information on a form that was mailed on paper, sent via e-mail, placed on the GLFB website, or completed in person at the Resource Center. The respondent data is incomplete in some parts, but there are over 950 entries in the database.

At the conclusion of the 2013 growing season, the central staff and volunteers of the Garden Project conducted an exit survey with the users of the community gardens. Registered gardeners were asked how using the gardens affected their lives. The end of year survey was done using Survey Monkey, a free online survey service. In addition, the survey was e-mailed to the gardener network via a link in the Garden Project's weekly e-newsletter. It was also available as a paper copy out through the quarterly print newsletter. Each of the three response methods were utilized by gardeners.

The survey contained the following six questions:

1. Did you save money by gardening this year? Yes or No
2. Did your diet improve because of your garden this year? Yes or No
3. In what ways do you think your life is different because of your garden?
4. What Garden Project services did you use in 2013?
5. What suggestions do you have for us that will help us improve our program or services?
6. Do you have resources/talents/skills to offer our greater Garden Project community?

Out of 105 respondents, 82 answered yes to question 1, and 78 answered yes to question 2. Besides those two quantitative questions, the survey also asked users to explain how their life is different because of garden usage, which resources and services provided by the Garden Project they used, what suggestions they had for improvements to the program. Responses to how the Garden Project impacted their lives were overwhelmingly positive and touched on topics such as healthy eating, weight loss, increased youth understanding of agricultural processes, increased exposure to sun and fresh air, family bonding, neighborhood engagement, and a reduction in food bills. The remaining three questions focus more so on improving the Garden Project as opposed to how the gardens helped the users. They yielded wide-ranging answers and obviously provide necessary feedback for the Garden Project central staff, but they are less relevant for our focus on impact made.

This table shows a total of 272,700 square feet of garden space spanning fifteen Lansing community gardens, as well as the number of registered users at each site. The chart also includes the number of households registered to the garden. Combining this information household size data collected within registration, the Garden Project assigned a value of "individuals involved" to each of the garden sites.

Name of Garden	Year Founded	Landowner	Zip Code	Address	Area (sq. ft.)	Number of Plots Available	Average Plot Size (sq. ft.)	Households / Plotholders Involved	Individuals Involved
Airport Garden	1993	Capital Area Airport Authority	48906	2027 W. State Road	80,000	128	625	52	195
Armory Community Garden	2005	Lansing School District	48912	626 Marshall St.	20,000	45	444	48	150
Clifford Park Community Garden	2002	Lansing Parks and Recreation	48910	550 E. Mt. Hope Rd.	4,500	22	205	13	23
Foster Community Garden	~1990	Lansing Parks and Recreation	48912	2325 Marcus Street	12,500	20	625	27	88
Garden of Hope / ELF Garden	2002	Advent House	48915	804 Clyde	4,000	10	400	5	8
Grace Lutheran Church	2009	City of Lansing	48915	528 N. MLK Blvd.	1,200	0		23	87
Ingham County Family Center Pride Garden	2009	City of Lansing	48910	1601 W. Holmes Rd.	18,000	0			60
Letts Community Garden	2006	Lansing Parks and Recreation	48915	1220 W. Kalamazoo	3,500	12	292	15	43
North School Community Garden	1987	Lansing School District	48911	333 E. Miller Road	30,000	49	612	59	233
Orchard Court	2011	Ingham County Land Bank	48911	5745 Orchard Court	30,000	65	462	52	210
Otto School Community Garden	~1985	Lansing School District	48906	500 E. Thomas	6,250	10	625	5	20
Paradise Community Garden	1996	Paradise Missionary Baptist Church	48912	550 S. Foster	13,750	22	625	21	54
Pine & St. Joe	2011	Jim Perkins	48933	522 W. St. Joseph	4,000	10	400	9	20
Risdale Community Garden	1995	Lansing Parks and Recreation	48911	2400 Reo Road	25,000	40	625	31	158
Slater Park Community Garden	2009	City of Lansing	48912	2701 Hopkins Ave.	20,000	25	800	28	62

Table 1: GLFB Community Gardens that offer user registration
Source: Greater Lansing Food Bank

Socioeconomic Profile of GLFB Gardeners and City of Lansing

Population

The following analysis focuses on the demographic data of Greater Lansing Food Bank gardeners solely within the boundaries of Lansing. Establishing a thorough understanding of the basic demographic trends of gardeners will be instrumental in developing an impact analysis model for the GLFB. Population, racial distribution, age distribution and household information were evaluated to capture a socio-economic profile for gardeners that are served by GLFB Gardens. This analysis will assist the practicum team to identify recommendations appropriate in the context in which the GLFB operates. In understanding the population that utilizes the community gardens in the City of Lansing, the Greater Lansing Food Bank can determine the garden's impact and identify possible underserved populations that the GLFB would like to reach. There are a total of 665 registered gardeners utilizing the community gardens in Lansing that responded to the GLFB survey in 2013. The following data set represents community gardeners as well as home gardeners in the City of Lansing because they are also serviced by the Greater Lansing Food Bank.

Age and Gender Distribution

In order to evaluate the impact of community gardens in the Lansing region, it is important to understand who the gardens are serving. A person's age structure can play a critical role in shaping community life, the availability of resources, and the opportunities for social engagement—all factors that can have an effect on the success of community gardens in a city. Table 2 shows the age and distribution of Lansing residents. A large majority of the city's population is near 43 years of age. Older populations may be drawn to the lower level of intensity associated with gardening and may utilize the gardens more. Age and gender have important effects on community health and may have important effects on the social processes that shape health. Consequently, age may be critical to characterizing neighborhood context and the economic opportunities that come from community gardens. **There is currently no data on age or gender distribution for the Greater Lansing Food Bank gardener population.** Image 1 represents the gender distribution of the Lansing population.

Age Distribution of Lansing Residents	
Under 18	13.9%
18 & over	43.8%
20 – 24	5.5%
25 – 34	10.2%
35 – 49	10.8%
50 – 64	10.1%
65 & over	5.7%
Total Population	114,297

Table 2: Age Distribution of Lansing Residents
Source: US Census, 2012

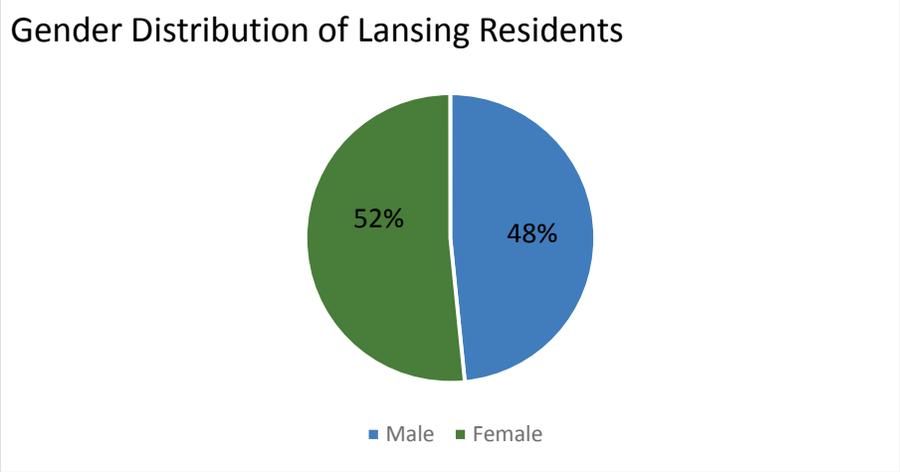


Figure 1: Gender Distribution of Lansing Residents
 Source: US Census, 2012

Racial Distribution

In understanding the composition of race among the gardener population, the GLFB can better evaluate whether or not this is a significant variable in measuring the impact of community gardens. Figure 3 represents the racial distribution for Lansing residents as whole. Figure 4 shows the racial distribution of gardeners in the City of Lansing. An example of one obvious difference when comparing these two datasets is that the population of the city of Lansing is approximately 21% non-white, while the Garden Project user population is approximately 62% non-white. This difference clearly reflects the Greater Lansing Food Bank’s mission of minority outreach and benefitting citizens of diverse backgrounds.

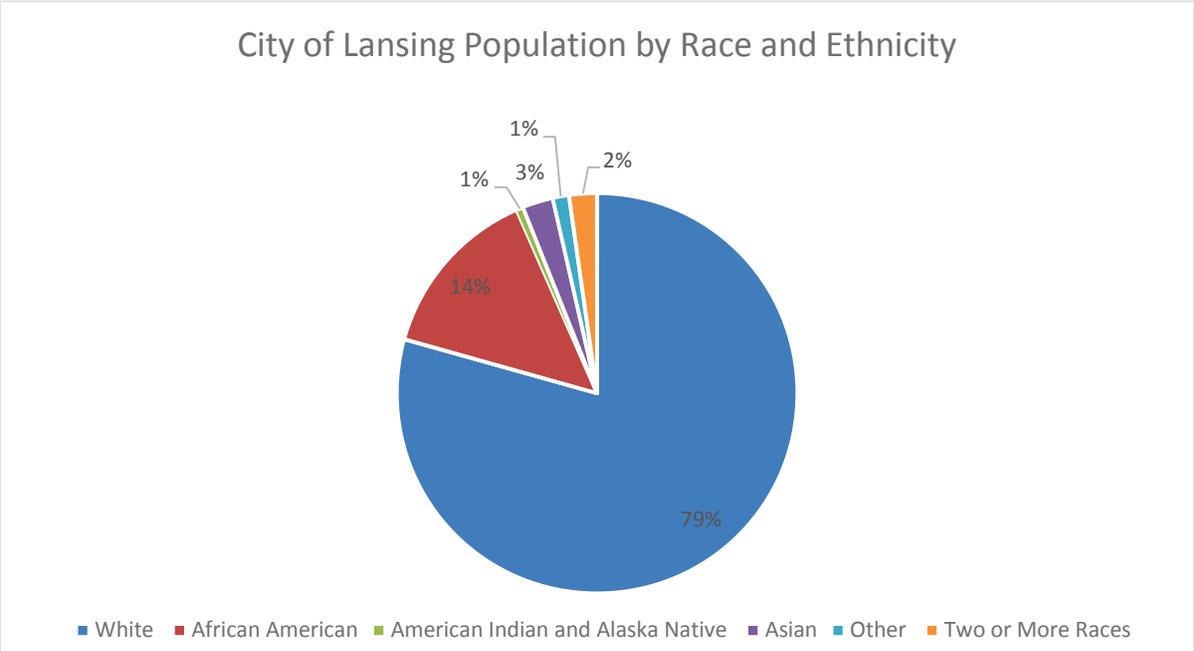


Figure 2: City of Lansing Population by Race and Ethnicity
 Source: US Census Bureau, 2012

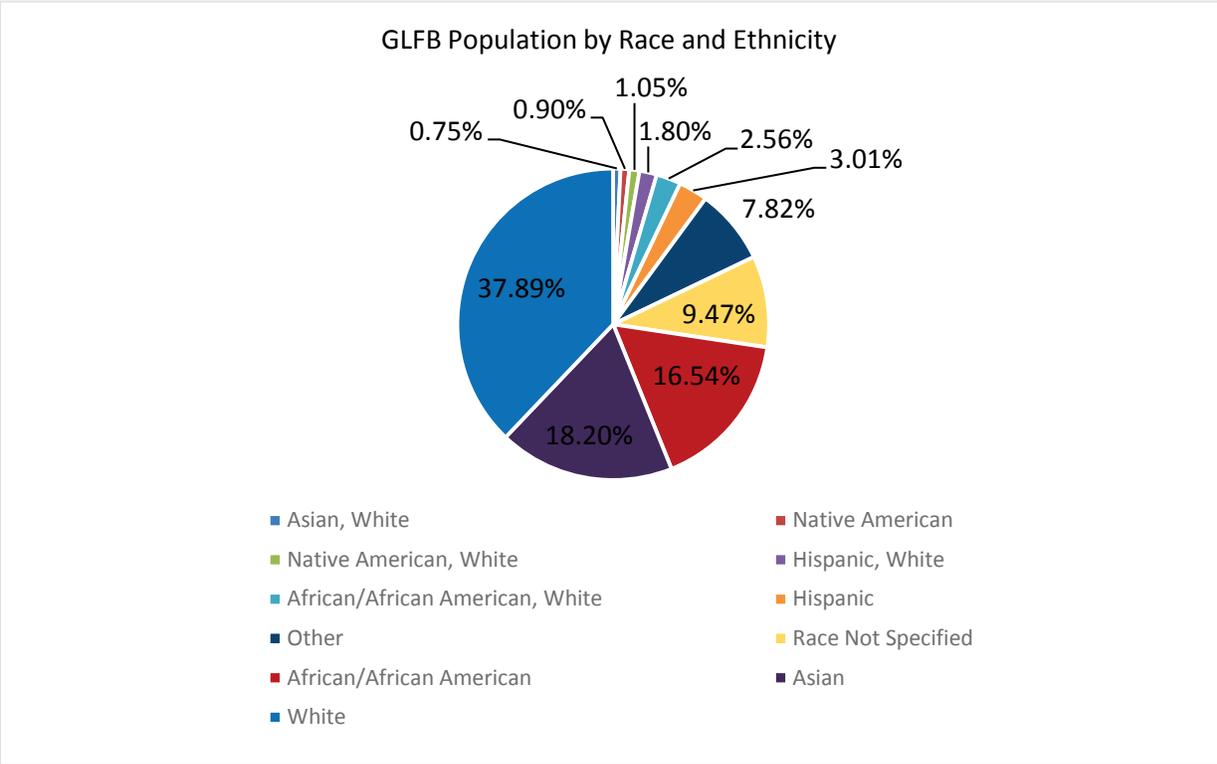
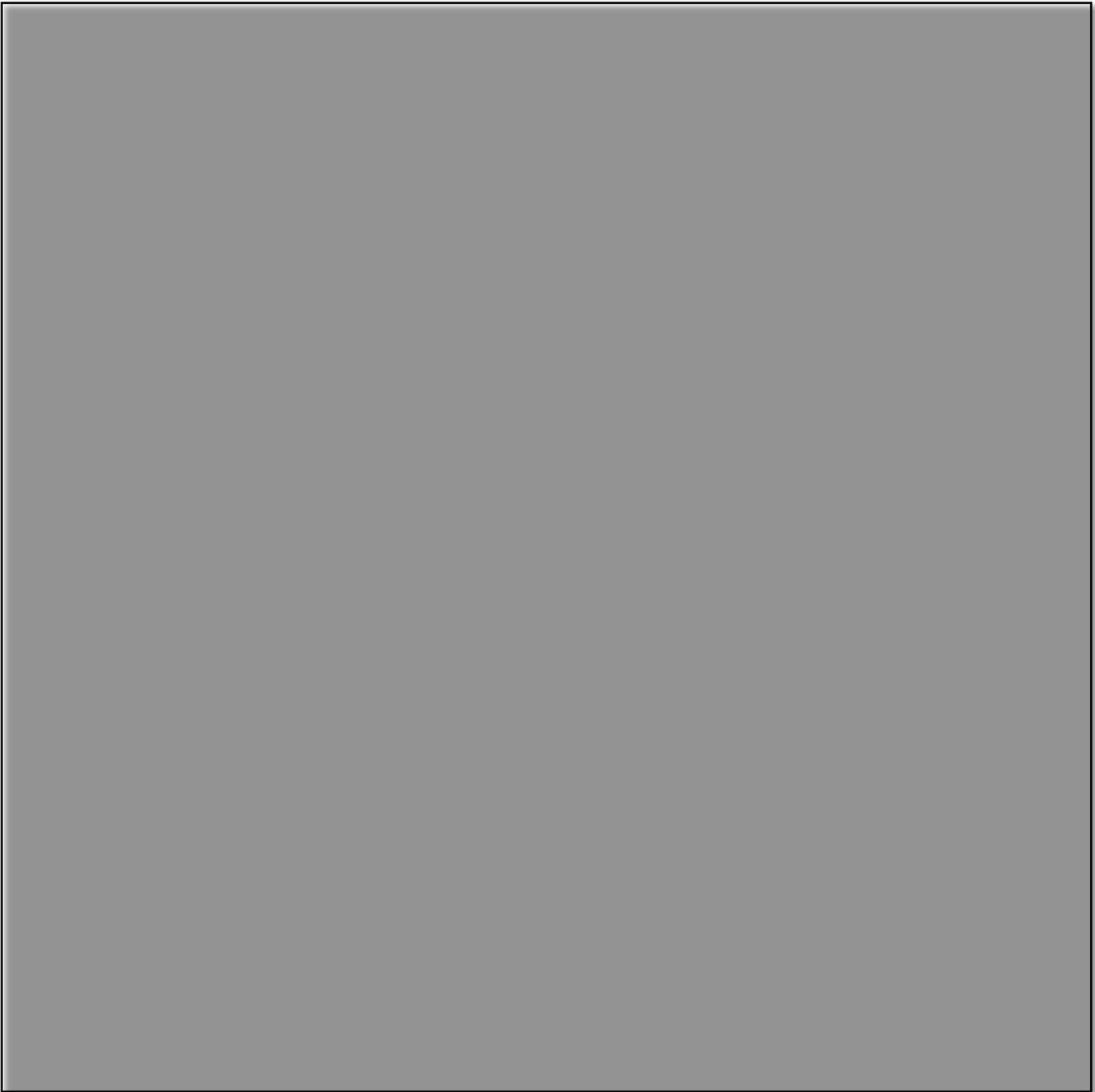


Figure 3: GLFB Population by Race and Ethnicity
 Source: Greater Lansing Food Bank

Household Information

Collecting household data of GLFB gardens can be useful to understand who the garden attracts, how to market the community gardens, and how to better communicate with gardeners. This data is showing the population that the GLFB is currently serving as well as the populations their gardens can better serve. This data could also show where there are potential areas of opportunity for growth in the GLFB garden project. Because this is only a snapshot of data, the GLFB must collect household information over an extended period of time to analyze the demographic trends. Figure 5 shows the household types of gardeners in the City of Lansing. Figure 6 shows household types for the GLFB. As seen in the tables, a little of half of each population is family household. The remaining forty percent exist as a single-family home (either male or female as head of the household). This indicates that the gardens should provide opportunities for both family, and non-family involvement. The GLFB might also analyze the extent to which they are targeting families through marketing and outreach efforts. Map 1 shows the distribution of gardener household types within the Lansing area.



Map 2: Garden Users by Household Type
Source: Greater Lansing Food Bank

Map 2 shows the location of registered gardener residences in the Lansing area. The points on the map are shaded to represent the household types. Dark green represents male head of

households with or without children. Purple represents couples with or without children. Blue represents female head of households with or without children.

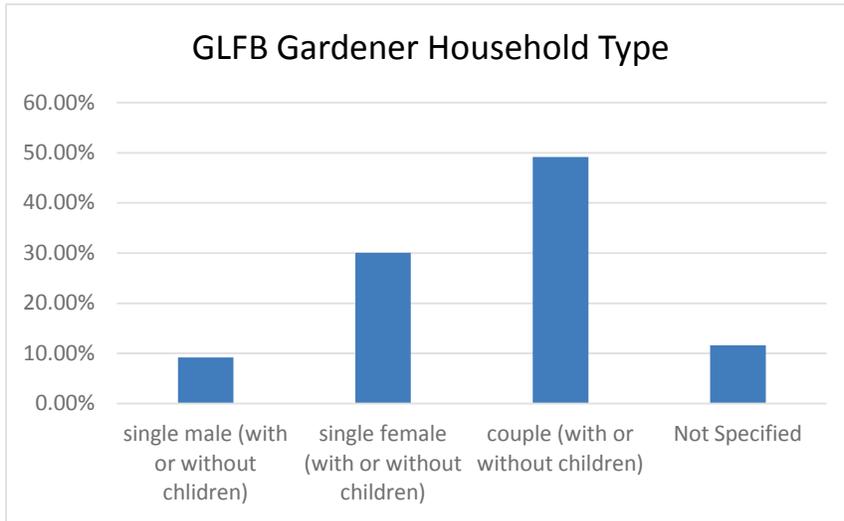


Figure 4: GLFB Gardener Household Type
 Source: Greater Lansing Food Bank

City of Lansing Household Type		
Average Household Size	Average Family Size	Total Households
2.36	3.09	48, 207

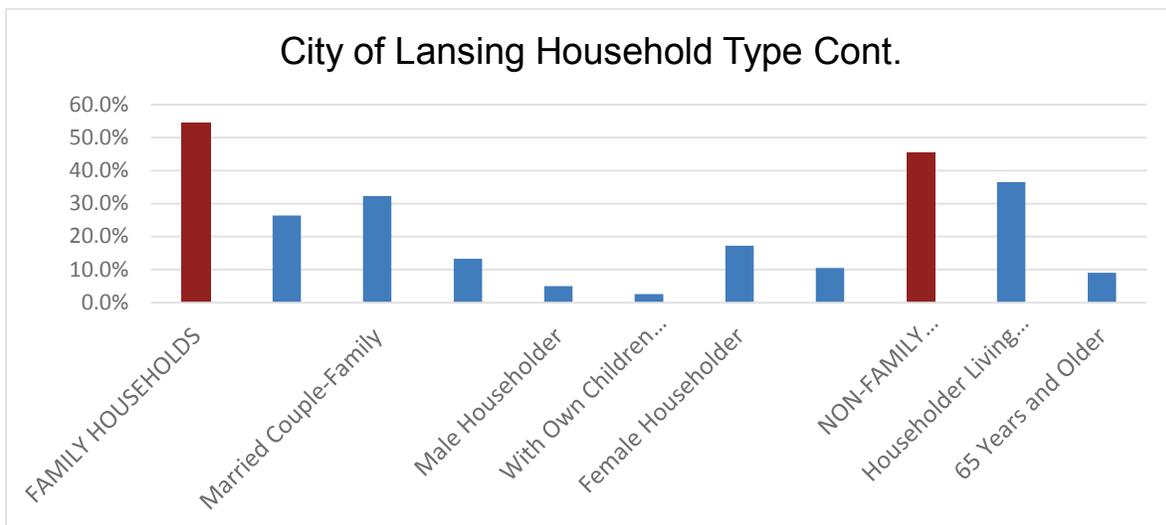


Figure 5: City of Lansing Household Type
 Source: US Census, 2012.

Income

Figure 7 shows the income levels of GLFB Gardeners in 2013. Collecting information on income levels is also helpful in identifying the population that is utilizing the gardens in Lansing. As seen

by the data collected by the GLFB in 2013, 51% of the population using the community gardeners are earning between 0-\$23,100 annually. Map 2 below displays the geographic distribution of median household income based on census tracts of the greater Lansing Area. When comparing the income distribution of the GLFB gardeners (Figure 7) to that of Lansing as a whole (Figure 8), one can clearly see the results of the Garden Project's efforts to target lower income people when planning and managing the gardens. While 35.7% of the city as a whole has an income of \$50,000 or more, only 11.6% of gardeners have an income of \$47,451 or more. Along the same lines, 51.3% of GLFB gardeners have an income less than \$23,100 whereas the city as a whole has 33.9% of its residents earning less than \$24,999. The gardener clientele clearly shifts to the lower end of the income spectrum when compared to the city as a whole.

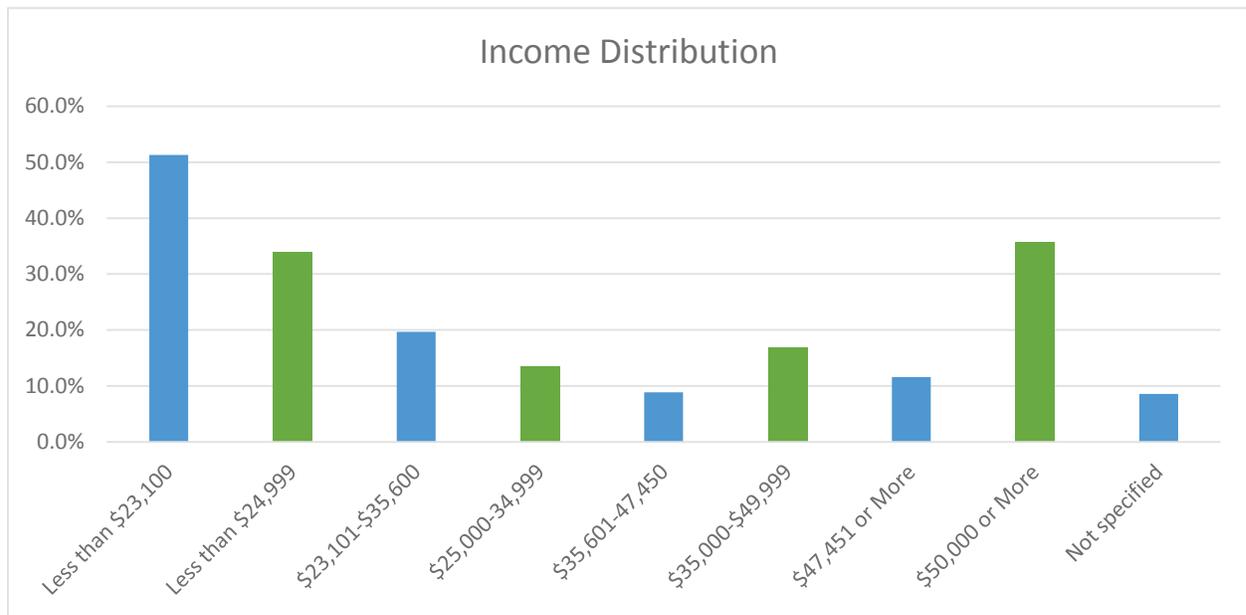
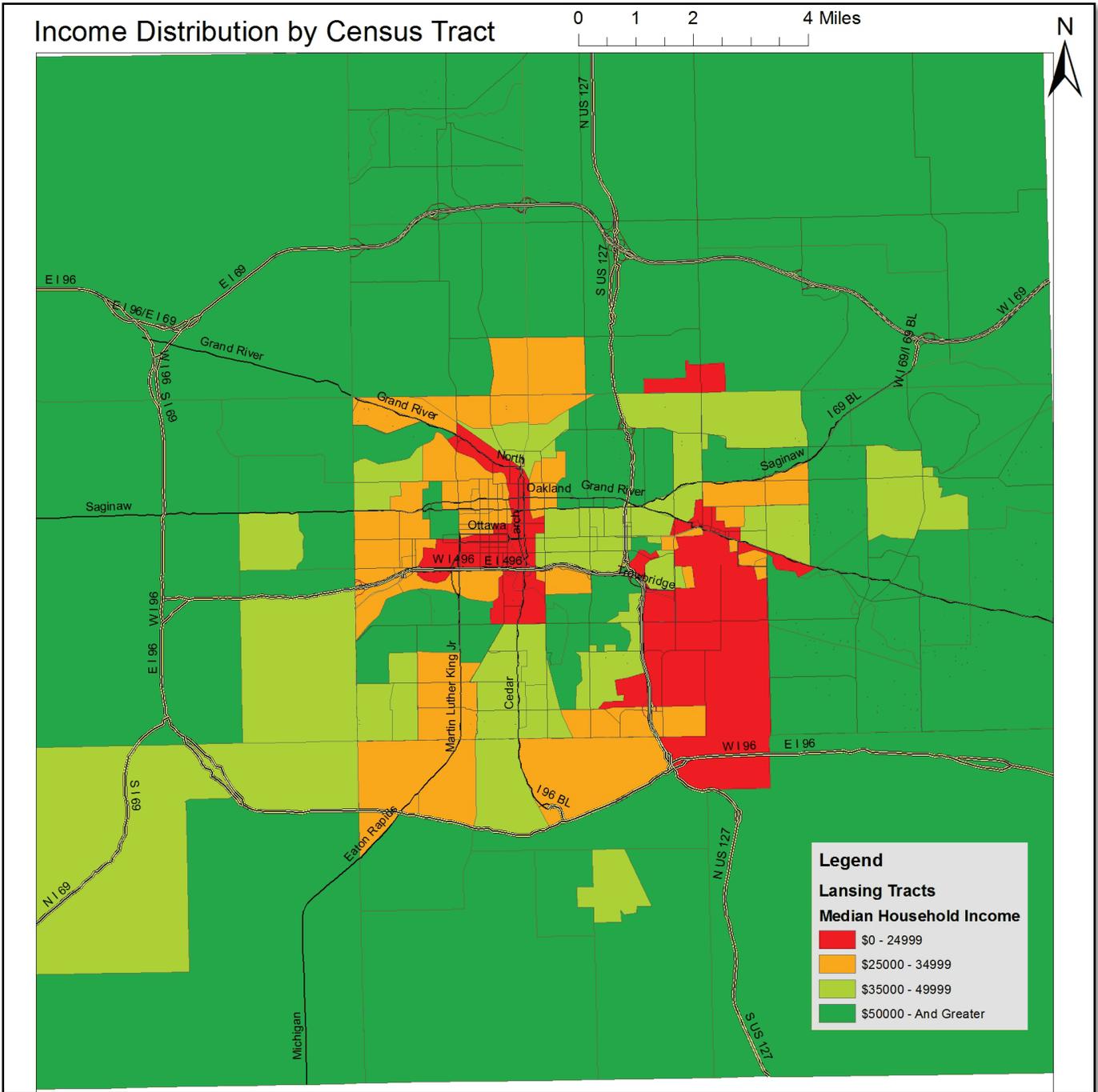
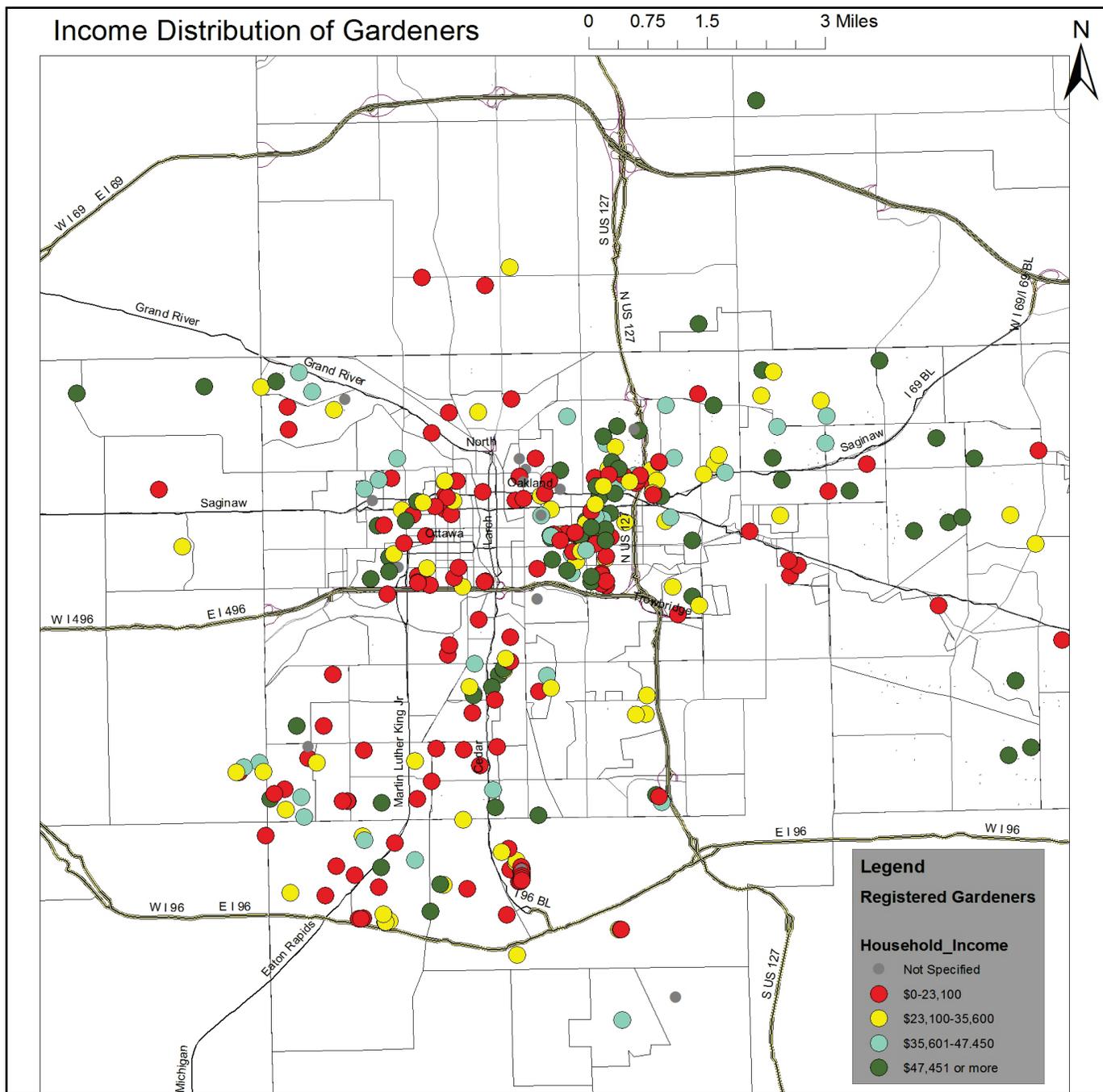


Figure 6: Income Distribution of Lansing Residents vs. GLFB Garden Project Users
 Source: US Census Bureau, 2012; Greater Lansing Food Bank



Map 3: Income Distribution of Lansing Area by Tract
 Source: Greater Lansing Food Bank

Map 3 shows the median yearly household income as estimated by the 2012 American Community Survey by the US Census Bureau within census tracts in the Lansing Area. Dark red represents census tracts where median household income is the least in the region from \$0-24,999. Orange represents the 2nd tier of incomes that fall between \$25,000-34,999. Light green represents the 3rd tier of incomes that fall between \$35,000-49,999. Dark green represents the wealthiest areas of the region that make over \$50,000 a year.



Map 4: Income Distribution of Gardeners
 Source: Greater Lansing Food Bank

Map 4 shows the location registered gardener residences in the Lansing area highlighted by income level. Red represents gardeners who reported to earn the lowest yearly income of \$0-23,100. Yellow represents gardeners that earn 23,101-35,600 annually. Light blue represents gardeners who earn \$35,601-47,450 annually. Dark green represents gardeners who earn \$47,451 and higher. The smaller grey points represent gardeners who did not enter their income information.

Literature Review

The following literature review highlights three key elements that community gardens bring to Lansing, MI. Specifically by focusing on the health, economic and social impacts of community gardening we were able to provide the GLFB with an oversight into the ways that community gardens have been studied across the country and the impacts that these gardens have had upon different populations. Materials and resources contributing to this section were gathered both by our client Mr. Bryan and through independent research. The literature review also provides the lead into how we formed our recommendations for a tool and the impacts that can be experienced by communities that actively engage and participate in a community garden program.

Sense of Place

Creating a sense of place, through placemaking is important, in order to strengthen a community, and define a location. "Placemaking is the creation of unique places that people want to use, to be in, to enjoy, to be a part of, to remember- because they have a strong sense of place. Placemaking creates livable neighborhoods and urban places that attract talented people. In a presentation Weikal (2014) cites that "The attraction of talented people generates and enhances economic prosperity".

Placemaking is used a means to shape the built environment through sociability, access & linkages, uses & activities, and comfort & image (Project for Public Spaces, 2014). It is significant within a built environment to generate a place in which members of a community take pride in and invest their time and efforts toward a common goal. This allows for a community to be more concerned of its surroundings making certain it is a place that is desirable to families, and brings a community together (Kurtz, 2001). Community gardens are intended not only for the supplemental production of food, but are also envisioned and maintained as green spaces for neighborhood sociability (Hynes 1996; Nemore, 1998; Bentley, 1998).

Diversity

In low-income communities it is more likely to find a more diverse group of people than in middle to upper income communities (Galster, G. C., Booza, J. C., & Cutsinger, J. M. 2008). There are significant differences in demographics that can be found in these communities. One issue presented by these different demographic groups is a communication barrier through language (Patel, 1994). Language is key in a person's presentation of self-identification. It enables a person to express emotions, share feelings, tell stories, and convey complex messages, show knowledge, and more (Imberti, 2007). This form of barrier prevents researchers or organizations, such as the Greater Lansing Food Bank, from obtaining data, that can be useful, in order to help a community.

Identity & Independence of Low-Income Communities

Community gardens can provide a unique educational opportunity for youth and serve as a means of helping to create a sense of self, identity, and ownership for their neighborhood (Ohmer, Meadowcroft, Freed & Lewis, 2009). Most people desire to feel a sense of safety in a community in which they call home, especially in lower income communities in which crime rates are known to be high and where many urban gardens are located (Ohmer, Meadowcroft, Freed & Lewis, 2009). Community gardens located in low-income areas have been found to be four times more likely to lead to addressing other neighborhood issues, these issues have included other beautification efforts, crime watch programs, and tree planting (Ohmer, Meadowcroft, Freed, & Lewis, 2009).

Community gardens serve as a means of self-help and independence for low-income communities (Kurtz, 2001). According to Kurtz (2001), urban farming was implemented in Detroit as early as 1893, when city and philanthropically sponsored garden programs were implemented in vacant lots in the city during an economic downturn in order to promote self-respect and independence among the poor. Although these gardens didn't last, they began to reappear during times of economic stress, including the Great Depression (Kurtz, 2001). Urban farming has been found to give children of low-income areas a sense of empowerment and efficacy. Their garden plots are something in their lives that they have control over, which gives them pride and a sense of ownership (Armstrong, 2000). This sense of empowerment and independence transfers over the adults in the community, and allows the community to use gardening as a way to help itself.

Safety

Removing and avoiding crime are critical to the success of a community. Gardens can allow for a community to build trust amongst neighbors. Community gardens are commonly regarded as safe havens in the city, and gardeners go to some lengths to keep these spaces free of unlawful behavior such as drug trafficking and use (Schemlzkopf, 1996). Salvidar-Tanaka and Krasny (2004) found that 20% of the volunteer gardens, within their study, engaged in political activism as a result of their involvement in the community garden program, including forming coalitions to work on fundraising, workshops, rallies, outreach, and other local campaigns (Ohmer, Meadowcroft, Freed & Lewis, 2009). Civic engagement is important in order for social interaction to occur and for safety to take place. Civic engagement creates trust amongst neighbors that are all looking for a common ambition, which is to create a safer and more vibrant community (Kurtz, 2001).

Self-Awareness and Personal Effort

A community garden must have leadership and workers in the community in order to sustain the garden (Ohmer, Meadowcroft, Freed & Lewis, 2009). The community can become more involved in the gardening process through volunteer hours and programming to encourage greater levels of participation. The act of volunteerism can have positive mental, psychological, and social effects on individuals (Ohmer, Meadowcroft, Freed & Lewis, 2009). Volunteering can also establish personal validation for the individual that can promote self-efficacy, and foster a belief that an individual can make a difference (Wilson J, Musick M, 2000). The feeling of accomplishment is a reward within itself. Some communities do not have the tools necessary to succeed; providing the means for success will insure a sense of morale in a community (Ohmer, Meadowcroft, Freed & Lewis, 2009). Urban gardens are a means that community's use in order to improve its atmosphere, by introducing a new food source, look, and sense of pride. Not only can Urban Gardening improve the surroundings of a community, it can also improve the self-awareness of community members by allowing them to demand for something better.

Connecting Generations

Gardening projects reach beyond simple production of fruits or vegetables in many ways, and one of them is by providing a safe place for children to interact with older generations (Kurtz, 2001). Since gardens are sometimes associated with efforts of community members to improve the neighborhood, gardeners go to greater lengths to keep unlawful or unwanted activity out of the space they are cultivating (Kurtz, 2001). These efforts include the organization of neighborhood watch groups, and beautification efforts and tree planting (Armstrong 2000). Communities also use the gardens in an educational capacity, to introduce children to the natural cycles of growth, fruition and decay, to teach them the benefits of cooperation and collective effort, and provide mentoring opportunities by the adults (Kurtz, 2001). As a New York City gardener put it: "[we're] not just growing plants, we're growing people" (Hynes, 1996).

Town Square and Social Forum

With the disappearance of the market square from times of old, community gardens and garden-related activities have begun to fill that void by providing a space in which community members can gather and exchange goods (crops) (Armstrong, 2000). In a study of New York City gardens, Armstrong (2000) found that over half of them had some sort of bulletin board or announcement-posting area. Gardens also typically feature benches or a similar social gathering space (Armstrong, 2000). Community gardens provide a physical space where residents can socialize and network with one another, allowing them to strengthen the fabric of their community, and address issues beyond farming (Armstrong, 2000).

Glover (2004) found that cooperative and collective gardening improved social capital, which can be defined as the extent and strength of a person's social network. While Armstrong (2000) had already established that 87% of the gardeners in the study shared tools or crops, Glover (2004) found that social connections between collective gardeners were deeper and more long lasting than those between home gardeners or non-gardeners (Armstrong, 2000). The spontaneity of gardeners was another factor that Armstrong identified. Most of the cooperative activities that occurred at the gardens were unplanned (Armstrong, 2000).

Conclusion

The articles mentioned above found that urban gardening has a strong impact on the fabric of communities in various aspects. Gardening gives community members ownership over the plots that they cultivate, and also over what happens around those plots. That sense of ownership extends beyond the garden plot to the lives of gardeners. Greening has been linked to decreases in reported crime in surrounding areas. Furthermore, gardening is a means through which people of varying ethnic, racial and national backgrounds can come together, in an activity that can bypass linguistic and cultural barriers. However, gardening also provides communities with a public gathering space that they may not have had before. Gardens give members the opportunity to congregate and socialize, without necessarily engaging in garden-related activities.

Key Variables

Social impacts can best be measured in terms of safety through civil engagement and youth engagement. Civil engagement is an easily visible and quantifiable, allows us to gauge the level of commitment that citizens have for their community. When community members become civically engaged, it shows that they have are invested in its well-being, and seek to improve it through their own work. Youth engagement is a way to assess the intergenerational bonds and levels of communication in a community. Through this variable, it is possible to assess the extent to which people are reaching out beyond their immediate peers.

Health Impacts of Community Gardens

Introduction

Health practitioners are increasingly concerned about rising rates of serious physical and psychological conditions such as cancer, heart disease, diabetes, asthma, depression and emotional stress in city populations. Many of these illnesses are exacerbated by obesity which is, in turn, linked to low levels of physical activity and poor eating habits – particularly the over-consumption of fats and sugar and insufficient intake of fresh vegetables and fruit. There is a substantial amount of research on the health and well-being benefits of community gardening. The existing literature on the influence of community gardens on a person's mental, physical and emotional health is reviewed in this section. The following review will help to gain a better understanding of how community gardens can catalyze positive, and potential harmful changes in community health and determine how to catalog the impacts.

Chronic Health Problems and Physical Activity

A study done by the Michigan Department of Community Health (MDCH) notes that Michigan is currently ranked 13th worst in the nation in mortality from cardiovascular disease and has the 9th highest rate of obesity in the United States. Chronic diseases are not only expensive to the health of Michigan residents, these conditions also cost Michigan billions of dollars annually in medical expenses and lost wages due to illness and premature death (Reed, 2009, 6). To obtain these results, the Michigan Department of Community Health completed a nutrition environment assessment to determine target areas and opportunities for improving nutrition in their communities. After performing the nutrition environment assessment and gathering input from community residents, the local health departments applied for funding to implement environmental interventions designed to increase healthy eating in Michigan. The interventions included: establishing new farmers markets and/or community gardens in communities; providing incentive coupons to populations that receive food assistance benefits to encourage fruit and vegetable purchases at farmers markets; expanding space of existing community gardens; and securing water supplies as well as building structures to enhance community gardens (Reed, 2009, 8). In performing the environmental interventions MDCH created an opportunity to work with local groups to implement, evaluate, and collect useful data on community gardens.

The National Center for Chronic Disease Prevention and Health Promotion states that fruits and vegetables contribute important nutrients for the human body that reduce chronic indicators. Adults in the United States consume fruit about 1.1 times per day and vegetables about 1.6 times per day. The Dietary Guidelines for Americans, 2010 recommends that Americans eat 5 or more servings of vegetables per day. A national, cross-sectional random phone survey of 766 urban adults found that those with a household member who is active in a community gardens ate fruits and vegetables 1.4 more times per day than those who did not participate, and they were 3.5 times more likely to eat fruits and vegetables at least 5 times daily (Okvat, 2011, 379). Regular access to fresh fruit and vegetables does not serve as the only positive health impact of community gardens. Daily physical activity is also essential for a healthy life. Physically inactive people are almost twice as likely to develop coronary heart disease as people who engage in regular physical activity. Physical inactivity poses almost as much risk for heart disease as cigarette smoking, high blood pressure, or a high cholesterol level, but is more prevalent than any of these other risk factors (Macera, 1). People with other risk factors for coronary heart disease, such as obesity and hypertension, may particularly benefit from physical activity.

Physical activity is especially crucial for youth development, but a study performed by professors from the Department of Horticulture, Forestry, and Recreation Resources at Kansas State University looks at the effects on gardening on the elderly populations who are suffering with chronic illnesses. To determine how long the subjects (five women, nine men ages 63 to 86 years) gardened and the kinds of gardening tasks performed, two trained observers conducted a study, and weekly logs were completed by the subjects to keep track of their health conditions. A survey was distributed after the study to investigate the subject's physical and mental health. The subjects reported gardening an average of 33 hours in a typical week in May and almost 15 hours in a typical week in June and July. During the gardening observation, a monitor was worn on subject's skin and a wireless storage device on their wrist continuously measured each subject's heart rate. Heart rate data was recorded in the wireless storage from start to finish of their gardening. After two observational periods, each subject wore the same heart rate monitor while walking on a treadmill at different speeds and elevations until reaching the heart rate that had been measured while they gardened. Results indicated that the subjects were physically and mentally healthy as a result of the gardening activity. The study found that overall, older gardeners can meet the Centers for Disease Control and Prevention recommendation of 30 minutes of physical exercise per day from their daily gardening, a factor leading to good physical and mental health. Community gardens provide an opportunity for elderly population to engage in regular physical and social activity that is crucial to their health.

Psychological Effects of Gardening

The field of environmental psychology has focused on the link between humans and the physical environment. Environmental stressors such as noise, pollution, and climatic extremes have been found to contribute to numerous negative behavioral outcomes such as physical illness, helplessness, and attentional fatigue. A study by Brown and Jameton in the city of Atlanta, GA examines the hypothesis that psychosocial health of urban dwellers is related to characteristics of the physical environment in which they reside. The purpose of the study was to note the associations between independent variables such as the physical and sociocultural environment and a person's psychosocial health. Results indicate that characteristics, such as open dumps, parks, fenced yards, marked crosswalks, trees, and gardens, of the physical environment are equally as important as characteristics of the sociocultural environment in explaining variation in psychosocial health (Brown, 2000, 28). In addition to an increased sense of individual well-being and resiliency, as characterized by quality of health and happiness, community gardening also affected gardeners' psyche through the development of interpersonal relationships with other members of the community. Finally, gardening helped to create noticeable, physical changes in the immediate environment. Community gardens enhance the overall character of a neighborhood and generate an increase levels of societal and individual well-being for the residents that are active in gardening.

There is evidence that community gardens benefit the psychological well-being of gardeners and local residents. A study done by two professors from Department of Psychology at Arizona State University looks at the role of community gardens in community psychology. The effects of community gardening on mood and stress were examined in a program evaluation of California domestic violence shelters' community gardening programs. The psychologists conducted surveys and structured interviews with 81 residents (74% women, 26% children; 34% white, 30% Hispanic, 23% African-American, 4% Asian, 4% Native American, 5% other) of the approximately 1,500 program participants. Comments indicated that gardening soothed adjustment to the shelter, relieved stress, absorbed negativity, was motivating, provided a peaceful retreat, and engendered hope upon seeing new growth. The data also indicated that nurturing a plants growth and producing food provided empowerment, a connection to one's own cultural heritage in some cases, and a cross-cultural unifier (Okvat, 2011, 378).

Role of Community Garden in Mental Illness

The act of gardening can serve as a therapeutic tool for those who suffer from mental illness. Rethink is a charity in Southwest England that runs allotment projects across Wiltshire, Somerset and Dorset for people with mental health disorders. The mission of Rethink is to facilitate the best quality of life for people with mental health problems and strive to ensure that all people suffering mental illness have access to the best support to meet their individual needs. The charity values the nutritional argument for getting people with mental health problems to review their diets. Eating food with carbohydrates, such as oats and bran cereals, helps to keep their mood stable because of the slow release of carbohydrates, says the charity. The main mechanism through which fruit and vegetable consumption is likely to influence mental health is through the absorption of water-soluble minerals such as potassium and vitamins such as folic acid which have an impact on adrenaline and serotonin receptors (Duffin, 2008). The Mental Health Foundation (MHF) published a report, *Feeding Minds*, in 2006, which stated that high levels of depression in some countries are linked to low fish intake. People with schizophrenia have low levels of polyunsaturated fatty acids in their bodies compared to those with no experience of the illness (Duffin, 2008). Although the act of gardening does not lower the incidences of schizophrenia, it is known to have a positive effect on the symptoms of the illness. All of the allotment keepers at Rethink are people with illnesses ranging from mild depression to schizophrenia. The charity has found that working the land not only builds self-esteem, but also helps to improve diets as those involved are likely to eat more fresh fruit and vegetables. Rethink manages five garden allotments, each with 20 to 30 plots. The charity's officials offer individual support to patients, who are encouraged to develop the necessary skills for tending the plots themselves (Duffin, 2008).

Robyn Francis, a professor from the Permaculture College in Australia notes in her article from 2010, "Why Gardening Makes You Happy and Cures Depression," that putting your hands in contact with the soil in the garden can increase your serotonin levels. Due to contact with soil and specific soil bacteria, *Mycobacterium vaccae*, triggers the release of serotonin in our brain according to research. Serotonin is a natural anti-depressant that strengthens the immune system. Lack of serotonin in the brain can lead to depression. The second part of Francis' research relates to the release of dopamine in the brain when we harvest products from the garden. The researcher's hypothesis that this response evolved over nearly 200,000 years of hunter gathering, that when food was found (gathered or hunted) a flush of dopamine released in the reward center of brain triggered a state of bliss or mild euphoria. The dopamine release can be triggered by sight (seeing a fruit or berry) and smell as well as by the action of actually plucking the fruit (Francis, 2010). Access to land and gardening materials in a community can have a tremendous influence on those who suffer from mental illness and depression. Community gardens have the unique ability to serve a diverse population within a city.

Healthful food distributors

Community gardens create a place for urban and suburban residents to cultivate fruits, vegetables, herbs, and spices that can be used for a bounty of different things. A primary benefit that comes from the ripening plants in every garden is the fresh food they provide. Tomatoes, Beans, Corn, Potatoes are all items considered nutrient rich and part of a healthy diet that can be grown in a Lansing Michigan community garden. Community gardens are in essence localized food distributors that provide food directly to the participants households. Fresh produce not only becomes more readily available for the gardeners. Many studies have mentioned observed distribution of food through sharing of harvests between gardeners and donations of excess yields to food banks (2012, Harvest).

An interesting dynamic of a community garden is they are often found in areas where other healthy food distributors are not otherwise available. In today's America fresh produce and nutritious eating options are typically found in large supermarkets or grocery stores that house a plethora of fresh fruits, vegetables and perishable food items. The United States Department of Agriculture (USDA) has classified a full service grocery store or supermarket as store with over 2 million dollars in annual sales containing all major food departments including fresh produce, fresh meat and poultry, dairy, dry and packaged foods and frozen foods (Ver Ploeg, 2013). Full service grocery stores originally developed to cater to consumers shifting habits from service based delivery methods of the early 20th century, to that of more self-service and cash and carry methods encouraged by automobile ownership (Thomas, 2010). Building larger stores on the fringe of urban areas was a common occurrence because the cost of land was lower and they could attract a larger range of motor traffic. By the late 1980's full service grocery stores located in urban neighborhoods felt the pressure of even larger supercenters such as Wal-Mart and Meijer stores which have huge floor space available for grocery and general merchandise items. During this time period supercenters have had a substantial effect on traditional neighborhood grocery stores. In the 1980's traditional neighborhood grocery stores accounted for 80% of national grocery sales by the 1990's that number fell to 50%. A 2003 study now shows that 1 out of 5 dollars spent on groceries in America is spent at Wal-Mart (Thomas, 2010). Local neighborhood grocery stores, which are vital to communities because of the fresh produce and nutrient rich foods they provide have had trouble competing with supercenter giants. Current literature on this topic discusses the increasing awareness of side effects that are born out of conglomeration and the outsourcing of fresh food options in established urban neighborhoods.

Accessibility of Healthy Options

The changing landscape of healthful food sources has had a significant effect on those who dwell in urban areas. The phenomenon is coined by urban geographers as a food desert. Food deserts are defined as "an area where people do not have access to healthy, fresh foods particularly if they are poor and have limited mobility (Thomas, 2010)." The USDA defines food deserts as low-income census tracts where a substantial number or share of residents has low access to a supermarket or large grocery store. Low-income census tracts are those tracts where the poverty rate is twenty percent or higher or the median family income is below eighty percent of the metropolitan area's median family income (Leib, 2013). Of the 91 Tracts in the Lansing study area 44 tracts are considered low income by the USDA.

Many of the communities that lack healthy food retailers are also oversaturated with fast-food restaurants, liquor stores, and other sources of inexpensive, processed food with little to no nutrient value (Mora, 2013). A national cross-sectional study found that low-income, urban neighborhoods of color have the least availability of grocery stores and supermarkets compared with both low- and high-income white communities (Mora, 2013). That discrepancy continues to grow with the number and percentage of people living in low-income areas who are at least 1 mile from the nearest supermarket rising to 9.7 percent of the population in 2010 from 8.4 percent in 2006 (Ver Ploeg, 2013). Given that urban ecologies are produced by influences of political and economic processes the result has created unequal distribution of costs and benefits among areas. Supermarkets primarily base their locational decisions on revenue projections based on the number of targeted customers they can reach within the trade area. The trade area in dense urban areas is smaller because of the lower speed limits on streets and the prevalence of zero-car households. This often causes them to be located in wealthy, predominantly white areas with relatively few in poor, black neighborhoods (Thomas, 2010).

Living a greater distance from a grocery store puts more emphasis on transportation methods needed to gain access to food. Data from a USDA study indicated over 93 percent of people travel to shop for groceries in a vehicle that they or another household member drove. However 8.8% of all US households do not have access to a vehicle and roughly 2.1 million households (1.8%) do not own a vehicle and live more than one mile from the nearest supermarket (Ver Ploeg, 2013). In the Lansing study area 20 of the 91 tracts are identified by The USDA as low-income tracts in which at least 100 households are located more than ½ mile from the nearest supermarket and have no vehicle access.

Lack of transportation is frequently cited as a barrier to accessing a full-service supermarket or grocery store (Mora, 2013). The 2001 Current Population Study revealed nearly 6 percent of U.S. households did not always have the food they wanted or needed because of access-related problems (Ver Ploeg, 2013). A causal effect linked to not having convenient access to a grocery store is diet change. In a study of metropolitan areas, utilizing national data set regarding individual behaviors, findings revealed that as distance to a supermarket increased; consumers are less likely to eat five or more servings of fruits and vegetables per day and are more likely to be obese (Mora, 2013). A 2010 study in The World Academy of Science, Engineering and Technology mapped the physical distribution of food retailers in relationship to users in the Lansing Michigan area. The underlying motivation behind studies of this nature is interest in the relationship between certain locales and nutritional options.

A self-administered survey was mailed to residents on Lansing's eastside. The survey was four pages and included a six question assessment of household food security status based on USDA measures and a series of questions regarding when, where, and why households purchased food at nearby locations. Addresses were included in the survey form and a GIS program was used to geocode their locations on a map. Additional geocoding was performed marking the locations of food retailers within a 5 mile radius of the target area. Distance between survey respondents and the closest of type of food retailer and the distance between respondents and the food retailer most frequently used was assessed using straight-line measurement. Distance to home was clearly the most important thing respondents considered in deciding what retailer in which to shop (89% of the sample indicated that distance to home influenced their decision to shop at least one store in the past month). The importance of distance to home was also evident in primary store choice (75% of respondents indicated that this was one of the factors behind their decision to obtain food from their primary retailer). Despite the apparent emphasis on selecting a primary retailer based on distance to home, less than 9% of the sample actually shopped at the food retailer that was closest to their home. This indicates that proximity is clearly being balanced against other factors and is not the only concern influencing primary store choice.

Rather than being based solely geographical distance, decisions about where to shop may depend on the "social distance" to stores, influenced by socio-demographic characteristics and by what residents consider to be the boundaries of their own neighborhood (Leib, 2013). The price, selection, quality, convenience and other perceptions of safety, and familiarity, can be highly correlated as factors when residents select a primary store. The Lansing study utilized established food venues based on a yellow page search of local food retailers including convenience stores, small grocers and supermarkets, where purchases result in food for at home consumption. It omitted food served at establishments such as fast food retailers and restaurants, which typically, provide foods of lower dietary quality (Volpe 2012). Also omitted are locations of non-brick and mortar venues such as community gardens and farmers markets. Using similar geographical methods of comparing the locations of community gardens with demographic data of the neighborhoods a Philadelphia study found that 50% of community

gardens growing food came from the lowest income neighborhoods in the city with average income of \$18,000 or less. While studies directly correlating food access needs and community gardens are lacking, by their nature they are food production/distributing locations that have the ability to create access in food deserts.

Affordability of healthy food options

The locational effect behind accessing fresh foods is coupled with the ability low income groups have in purchasing higher quality foods. Evidence suggests that individuals of low socioeconomic status have significantly less healthy diets than those with a higher socioeconomic status (Power, 2005). In 2003-04, people in low-income families had significantly lower intakes of total vegetables, dark green and orange vegetables and legumes, and whole grains than did higher income families (Mora, 2013) Using educational achievement as a socioeconomic measurement studies have shown those that have reached higher educational levels have diets that include more fruits, vegetables, low fat milk, fewer fats and oils and more lean meats than their counterparts with lower education levels. Educational level has a direct impact on income and income is regarded as the most important determinate of food insecurity and hunger (Volpe, 2012).

The definition of someone who is food insecure is someone whom often has no reliable source of food and not sure when or where their next meal will come from. Data from 2005-2007 indicate that nearly 12% of Michigan residents are food insecure slightly higher than the national average of 10% (Flachs, 2010). For a food insecure individual or family the option of eating healthy is overshadowed by the necessity of finding any food at all. Eating a healthy diet refers to eating practices and behaviors that consist of improving, maintaining and enhancing health (Flachs, 2010). It is suggested that regular consumption healthful foods has been associated with a decreased risk of diabetes, cardiovascular disease, cancer, and obesity (Hendrickson, 2006). Being unable to purchase and consume healthful foods and substituting hunger voids with cheap fast and processed foods can be detrimental to an individual's long term health. There's significant evidence that early life circumstances will have a substantial effect on health into ones adulthood.

It is well established that social inequalities in health when economic and social circumstances decline people have much shorter and sicker lives. (Power, 2005). To curb this trend new initiatives are focused on improving ecology and sustainability at the local level which in turn leads to improved long-term health (Wakefield, 2007). The Michigan Good Food Charter is a guideline of goals the state of Michigan has developed to help food insecure populations through a variety of initiatives. Among the Charters goals is to increase the percent of Michigan residents that have easy access to affordable, fresh, and healthy food. Community gardens can provide an important measure of self-reliance for low-income urbanites.

A 2007 study of southeastern Toronto, a diverse ward with many low income minority residents sought to answer questions regarding the perceived health benefits of community gardens. Three primary techniques were used to collect information on the gardens; participant observation, focus groups and in-depth interviews (Wakefield 2007). Gardens were visited almost daily, and researchers were able to attend garden meetings, community barbeques, harvest events and canning and composting workshops. Participant observation was complemented by focus groups. Involvement was encouraged through posters at the gardens and by the participant observer and the garden coordinators. Group discussions were structured by a set of questions related to the role of community gardening in people's lives. Overall, 55 people participated in focus groups, and 13 in interviews. While relatively robust for qualitative research, these numbers are not large enough to be generalizable. Instead, the research is

intended as a window into the experiences of the particular gardeners. Many of the questions were open ended allowing gardeners to specifically name ways the gardens provided health benefits. One of the central benefits of community gardening mentioned by gardeners was, not surprisingly, better access to fresh wholesome food (Wakefield, 2007). Most participants spoke of improved food access and cost-saving in some way (Wakefield, 2007). In some cases, substituting garden-grown produce for store-bought foods was seen to make a significant difference in household food costs (Wakefield, 2007). Although some culturally appropriate foods were available in local shops, participants commented that these foods were often exorbitantly expensive and they were not fresh. The freshness of the produce from the garden was seen as a benefit (Wakefield, 2007). Not only do community gardens grow food for those that are hungry but they also provide fresh healthful foods that support diverse and atypical diets. In multiple cities where community garden research has occurred woman and minorities have shown to be active participants (Wakefield, 2007). Creating a local venue for these at risk groups to harvest fruits and vegetables at low costs could be an essential mechanism to reach out to families and neighborhoods that are in the highest of need.

Harms Associated with Urban Gardening

An article written by members of the Community Food Security Coalition's North American Initiative on Urban Agriculture discuss potential negative effects of urban soils. The researchers note that polycyclic aromatic hydrocarbons (PAHs), a known carcinogen, have been found in urban soils that cause air pollution. PAHs are residues from incomplete combustion. They may exist in gardens and other urban soils due to vehicle pollution from adjacent roads and railways, past wood or coal burning on or near the site, or the extensive use of creosote railroad ties as garden plot dividers during the 1970s & 80s (Bellows, 2003). More research needs to be done to determine the extent of harm caused by PAHs and how to detect the carcinogen in soil.

Summary of Health Literature Review

A great deal of information behind understanding the health benefits that community gardens provide has come from qualitative research of the gardeners that use them. Using methodologies such as interviews, focus groups and surveys, researchers have gained valuable insights regarding the participant's perceptions of garden activities. Community gardens have a specific niche within the arena of public green space which includes city parks and other recreational venues. The studies presented in this section worked to delineate between them while identifying potential tools to study the health impacts specifically found in community gardens. As expressed in the Michigan Good Food Charter Our economy, our environment, and our personal and community health are all connected through the food system. Michigan is a place with unparalleled potential for sustainable urban and rural economic development with the goal of meeting more residents' good food needs from local sources. The articles mentioned in this section present the case for stronger public policies in support of urban gardening as a means to improve public health.

Recommendations for Further Study

As supported by the literature, urban gardening has potential as an important element of urban public health. Community gardens benefit both the individual and their neighborhood, contributing to better overall community health. When used well, community gardens can be a key element in health programs and initiatives. Local government leaders are in a position to promote healthy eating and active living in their communities by supporting community gardens. The findings outlined in these studies serve as potential tools to study the health impacts of community gardens. Calculating the creation and perception of food access due to gardens is rooted in varying aspects that gardeners may consider. Decisions such as proximity to gardens

in relation to other fresh food sources and the value of fresh food harvested in relationship to household food budgets are some paramount questions that would help assess why individuals choose to garden. Also it may be pertinent to identify any differences in gardener diets during the growing season and afterward during the winter months which could create potential insight into how gardens change participants eating habits. Determining the greatest underlying factor behind a participant's motivation to garden may be beyond the scope of this research. However understanding that any of these factors may create a food access benefit will undoubtedly be a valuable impetus for strengthening the garden programs mission of feeding those who are hungry.

Key Variables Identified in the Health Literature Review

There were a number of variables that were used to determine the health improvements of experienced by gardeners. The studies measured specific health indicators gardening may impact such as chronic disease prevention, improving energy levels, dietary change, increased vegetable intake, productive physical activity and elevation of happiness levels. Additionally, advocates for food justice point to community gardens as an opportunity for increasing food access in neighborhoods where need is great. In order to look at these key variables in relation to the GLFB Garden Project, health condition of gardener's must be collected to determine the impact of community gardens in Lansing.

Economic Impacts of Community Gardens

Defining, quantifying and measuring the economic impact of the GLFB Garden Project on the Lansing region is a complex and multi-faceted process. The costs and benefits that coincide with the preparation and production of the land that yields fresh produce vary greatly from plot to plot, and these factors may also present a multiplier effect, whether positive or negative, for the food-related expenditures of garden users. In addition, the mere presence of a garden may be a distinct economic impact as it relates to the land use of that plot, which in turn may affect property values of the surrounding neighborhood. By surveying existing data and studies on urban gardening and community food sources, the goal of this section is to explore methods of gauging economic impact of community gardening and applying it to the Lansing region.

For the purposes of our study, it is important to note that “economic impact” is not an exact science, nor can it be entirely measured using one single metric. The existing literature on the economic impact of community gardening offers a varied and wide-ranging spectrum of articles and case studies, the majority of which relate to urban farming and regional food systems. This limits opportunity for direct correlation to the GLFB Garden Project, but there still exists a great deal of relevant findings that can be applied here. As a result, our research encompasses a varying spectrum of tangential readings related to the economic effects of community gardening, so as to avoid defining our study with some arbitrary parameter of economic impact.

The economic benefits of community gardens have been expressed in a number of different areas ranging from cost saving benefits on groceries to job creation and training opportunities, for the community, as well as going as far as revitalization of low-to-moderate income neighborhoods (Pottharst, 1995). A major trend that has emerged throughout history (Okvat & Zautra, 2011, 374) has been for increased growth of community gardens in times of crisis. This has been highlighted by efforts to increase opportunities for low-income individuals and families to grow their own food and “...increase the supply of food with minimal transport” (Okvat & Zautra, 2011, 374).

Economic Impacts of Community Gardens

In recent years there has been an increasing demand for locally grown foods. This has been a result of several prominent issues including the increasing prominence of the environmental movement, food security concerns, and the slow foods movement (Martinez et. al., 2010, 2). The desire for local food has coincided with the appeal for fresh food as “... freshness (80 percent), support for the local economy (75 percent), and knowing the source of the product (58 percent)” (Food Marketing Institute, 2009) has emerged as the key reasons for local food markets.

Not only have community gardens been beneficial socially and for health purposes but they have also served to encourage residents during difficult times as “...in times of economic downturn or worse, community organization can stimulate cooperation and local self-reliance, at little or no cost, thus cushioning and protecting the community from outside adversity” (Berkowitz, 2000, 332). This protection can come in many different forms but can include cost saving benefits as well as job creation and training opportunities (Okvat & Zautra, 2011).

Gardening as an Economic Development & Urban Revitalization Effort

Efforts have been made around the world for gardens to serve as economic hubs in low-income urban areas. In some countries, such as South Africa, community gardens have been used as a means of providing jobs for low-income families while "...North American gardens produce fresh food that is not otherwise available to families and elderly neighbors" (Tiball & Krasny, 2007, 155). The implications of this level of production is especially important to the Greater Lansing Food Bank (GLFB) as its mission is to provide "...emergency food to individuals and families in need in Ingham, Eaton, Clinton, Shiawassee, Clare, Isabella and Gratiot counties" (GLFB, 2014).

Impacts of community gardens have been heavily studied in Southeast Michigan (Score & Young, 2008) with special focus paid to the purchase of local system of gardening serves to both create jobs and keep local dollars in the state and local economy. The study notes that there has been a great plethora of data on large-scale productions however the implications of small-scale community farms have increasing effects on the levels of economic benefits that neighborhood or families receive (Score & Young, 2008, 3). Prior research has suggested that there is a correlation between increasing property values and proximity to community gardens. One such study (Voicu & Been, 2008) conducted in New York City has provided data on a correlation between new gardens and home ownership and found that community gardens have the greatest positive impact in the most disadvantaged neighborhoods.

The study on Southeast Michigan also provided key information on what urban gardeners use the product produced for. Of those that responded to the survey 94% indicated that they produce for personal consumption, 41% produce for charitable organizations, and 24% produce to sell (Score & Young, 2008, 12). Respondents to Score & Young's study (Table 3) also reported that there was a 62% decrease in the cost of fresh produce and a 73% increase in fresh produce consumption (2008, 12).

	Increase	Neutral	Decrease
Cost of Fresh Produce in Household	17%	22%	62%
Fresh Produce Consumption	73%	26%	1%

Table 3: Urban Gardeners Use of Food Produced
Adapted from: Score & Yount, 2008

The Relationship of Community Gardens & Property Values

While there have been few studies on the direct impact of community gardens in relation to property values Voicu & Been's (2008) study, titled *The Effects of Community Gardens on Neighboring Property Values*, has explored the influence that open and green spaces have upon property values. The researcher's hypothesized that community gardens "...could have both positive and negative impacts on surrounding communities" (2008, 247). The effects on property values thusly may be a result of the upkeep and level of activity that surround the gardens. Voicu & Been also theorize that gardens may and can have an impact beyond the immediate are, though to a lesser magnitude (2008, 247).

To measure the direct impact that community gardens have upon property values Voicu & Been conducted a study "...of properties that are within designated distances— such as 1,000 feet— of community gardens to prices of comparable properties that are outside the designated ring,

but still are located in the same neighborhood” (2008, 248). Through the study of property values before and after a community garden is introduced it is possible to determine the effects, if any, that the garden has upon the surrounding land value. The impacts of gardens can be measured in respect of the socio-economic make-up of the surrounding neighborhood and the quality of the garden.

Community gardens have been shown to increase property values in the immediate vicinity where they are located. In Milwaukee, properties within 250 feet of gardens experienced an increase of \$24.77 with every foot and the average garden was estimated to add approximately \$9,000 a year to the city tax revenue (Bremer et al, 2003, p. 20; Chicago, 2003, p. 10; Sherer, 2006).

In Lansing, the Garden Project allows land that might otherwise sit vacant to serve a purpose while also increasing the natural aesthetics of the grounds. A 2008 study in New York City found that the presence of community gardens can have a profound real estate impact: “We find that community gardens have, on average, significant positive effects on surrounding property values, and that those effects are driven by the poorest of host neighborhoods (where a garden raises neighboring property values by as much as 9.4 percentage points within five years of the garden’s opening) (Voicu and Been, 277).”

Community Gardens as Urban Renewal

Community garden projects have been seen as a useful and successful response to suburbanization, disinvestment, and urban decay (Kurtz, 657, 2001; Fox, Koepfel, and Kellam, 1985). These gardens are seen as a means of “...neighborhood improvement and empowerment, as well as self-sufficiency and a desire to bring nature into the city” (Kurtz, 658, 2001; Fox, Koepfel, and Kellam, 1984; Malakoff, 1994; Warner, 1987). Economically a community garden provides an opportunity for families to produce food for themselves at a low cost and in turn removes the necessity to purchase produce at the store. This element can serve to generate more income in an area to be spent locally and in turn help a blighted area to grow. Combined with potential property values increasing this can be a very powerful component of community gardens.

A recent study of community gardens in Cleveland, OH, conducted by Flachs (2010), cites that “...the most consistent gardening rationale given to contemporary researchers has become more pressing in the current financial climate: gardening saves money” (2). The money saved is demonstrated in a 1991 study of Newark community gardens in which “...vegetable gardens produced an average of \$504 worth of produce on a \$25 investment” (Patel, 1991). The ability of communities to produce this level of food is highly important especially as it is often at a fraction of the cost of produce in a supermarket (Ferris, Norman, and Sempik, 2002).

Economic Implications of Community Gardens

The relocation of farming from distant locations to community and urban plots has a diverse range of goals. The introduction of community gardens to urban areas provides an opportunity “to strengthen local economies against dependence upon external forces, avoid unnecessary global food transportation (cutting ‘food miles’) and reconnect local communities with farmers and the landscape” (Seyfang, 2005, 300). This element creates the potential not only for residents to be more directly invested and involved in food production but also provides an inexpensive means of producing food. By tying food more directly into a community these community gardens can serve to save money for the residents that choose to participate in the programs.

Determining economic value of food

A 2012 report drafted by KPMG for Feeding America yielded numerous metrics that assign value to food produced and in turn donated to the charity organizations within the Feeding America system. KPMG states that their objectives in this study were to determine with 95% confidence the wholesale value of the Feeding America national product donations (KPMG, 3). KPMG utilized price catalogs from the Nash-Finch Electronic Reference Catalogs as the foundation for prices of items donated (KPMG, 3). The types of donations received are divided into 29 categories for the purpose of inventory, and these categories provide reasonable division for determining value of donations (KPMG, 8). Of the 29 categories, the three that are relevant to our study are 'fruit' (10), 'vegetable' (27), and 'produce' (28). Further research would be necessary to discern the difference between category 28 and the previous two, as standard definitions of produce usually include fruits and vegetables. Nevertheless, each of these labels provides a price per pound, which can be easily applied to the GLFB Garden Project. In the case of Feeding America, KPMG uses these price quotes along with the gross weight of donations to determine the total value of the organization's work.

Applying this food value data to community gardens becomes tough because dollar value of donations is more quantifiable than freshly grown product. However, an example of quantifying garden yield was published just last year. A 2012 study by students at Loyola Marymount University, working with an organization called Farming Concrete, explored methods of quantifying food production in community gardens.

Farming Concrete attempts to determine the amount of food produced in New York City's community gardens by involving gardeners throughout the process. Gardens interested in weighing produce receive a small kitchen scale and printed forms on which they record pounds per crop and the number of plants per crop for the duration of the growing season. Using some rudimentary techniques to weigh samples of crop production and estimate the total yield across a series of gardens in New York, the students then utilized a series of analyses and surveys to arrive at the following results (Gittleman, 6):

A total of 67 gardens with a cumulative 1.7 acres under production were inventoried in 2010 with an estimated yield of 87,690 pounds, worth approximately \$214,060. This is about 1.2 pounds and \$3 per square foot. In 2011, a total of 43 gardens participated, 35 of which were inventoried. For the 35 inventoried gardens, there was a total of 13,000 pounds of fresh produce grown on 0.94 acres, worth \$47,000. This is about a third of a pound and \$1.15 per square foot. This study worked with a grassroots science project called Farming Concrete, which the authors describe as, "a project utilizing citizen science strategies to measure the amount of food produced in community gardens in New York City" (Gittleman, 1). Farming Concrete published its third and final results study after measuring food production in New York City community and school gardens. It summarizes the yield measurements, and their main findings are as follows (2012 Harvest Report, 2):

Estimated total yields for participating gardens: 87,000 lbs

Estimated total dollar value: \$330,000

Total Reported Area Under Production: 4.5 acres

This data provides a tremendous baseline for establishing the economic impact Farming Concrete can have on the New York City community. Much like many of the other methods and findings in this literature review, certain ideas and executions could be utilized by the Garden Project. The existing literature on the economics of community gardening, both in the academic and the practical setting, paint a clear picture of potential but tell a vague story of concrete measurement, but by taking some segments from many different sources, it may be seen how the Greater Lansing Food Bank can formulate a template that could be followed through on a yearly or seasonal basis.

Summary of Economic Literature Review

Different populations can experience the economic impacts of community gardens to varying degrees. From the literature we have identified key variables that have been measured and show how they can be influenced by a strong community gardening program. Specifically for the population that gardens, there have been shown to be specific impacts on the levels of food that a gardener purchases at the grocery store when in season as they are producing an amount that can support them. The New York study (Voicu and Been, 2008) on the effects of community gardens on property values displays one way that garden programs can boost a locality and encourage growth.

Recommendations for Further Study

Another important element has been the impact of community gardens on local dollars as through these programs more money is available to be spent locally on things besides food (e.g., coffee shops, movie theaters, clothing, etc.). To study these elements it would be necessary to assess the dollar value of food that is being produced by individual farmers in order to properly garner the amount of money that has been saved through the program.

The impacts of community gardens on larger farms is another element that we would recommend as being an area that could use further study. This is especially important for large farms in close proximity to community gardens that may have the intent of producing for the local population versus at a national level.

Key Variables Identified in the Economic Literature Review

There were a number of key variables pulled from the economic literature review that we further expand upon in our recommendations. These variables include: property values and proximity to gardens, food value added to gardener, money saved on travel, and income level of effected gardeners.

Presentation of Relevant Case Studies

In addition to the information already gathered in the literature review, the practicum team sought to solicit information on how other cities or organizations attempted to measure the impact of community gardens. Members of the practicum team began their research by exploring the presence of community gardening in comparable Midwest cities. The scope of search then expanded to any American cities with a significant presence of community garden promotion. Information contained in this section was collected through a combination internet research and direct electronic contact with employees working within the organizations mentioned. The following six cases present various opportunities for the Greater Lansing Food Bank to improve its understanding of the impact of the Garden Project.

Effects of Community Gardens on Food and Vegetable Intake An Analysis of Flint, MI

With an estimated population of 102,434, close to that of Lansing at 113,996, the City of Flint serves as useful comparison in terms of community-level garden initiatives. Flint is within Genesee County, which comprises the entirety of Flint's metropolitan area. The city is home to the University of Michigan-Flint, Mott Community College, and Baker College. A collaborative study was done in 2008 by the Prevention Research Center of Michigan, which includes the University of Michigan's School of Public Health, the Genesee County Health Department, and Greater Flint Health Coalition on social determinants of health in Genesee County. Data was collected to determine the impact of fruit and vegetable consumption of Genesee County residents and the usage of community gardens. The study was based off of a cross sectional phone survey his survey was administered to a sample of Genesee County residents aged 18 years and older; the data represents 766 respondents.

Methods

Fruit and vegetable intake was measured using 8 questionnaire items routinely employed by the Behavioral Risk Factor Surveillance System (BRFSS) to assess frequency (per day, week, month, and year) of intake of fruit juice, other fruit, green salad, non-fried potatoes, dark green leafy vegetables, dark yellow or orange vegetables, beans, and other vegetables. Household participation in a community garden was assessed by asking the respondent if he or she, or any other family member, had participated in a community garden project in the last year. All demographic and health behavior variables, including age, gender, race, marital status, number of children present in the household, socio-economic status, smoking, alcohol intake, physical activity, health status, height, and weight were self-reported. Socio-economic status was measured using education, employment status, and health insurance status.

Table 4 shows the overall characteristics of the study population and characteristics by household participation in a community garden.

Key Findings

The association between fruit and vegetable intake and participation in community gardens was assessed. Results found that adults with a household member who participated in a community garden consumed fruits and vegetables 1.1 more times per day than those who did not participate, and they were twice as likely to consume fruits and vegetables at least 5 times daily. Respondents also reported drinking less than 1 alcoholic beverage per day reported a higher average fruit and vegetable consumption of 3.7 times per day, as compared to 2.7 times for those who reported drinking more than 1 alcoholic drink per day.

The study provides evidence that community gardens may have potential as a nutrition intervention to increase fruit and vegetable intake as well as address a primary barrier some urban residents face when trying to eat a healthful diet, that is, limited availability of fresh produce.

	Household Participation in Community Garden	No Household Participation in Community Garden
Fruit and Vegetable Consumption		
Mean Times Consumed Daily	4.4	3.3
Consuming at Least 5 times Daily	32.4%	17.8
Demographic Information		
Average Age	46.4	43.4
Gender		
Male	49.9%	47.8%
Female	51.1%	52.2%
Race		
African American	61.5%	46.6%
White	26.4%	43.8%
Other	12.1%	9.6%
Insurance Coverage		
Has Insurance Coverage	90.0%	79.7%
Does not have Insurance Coverage	10.0%	20.3%
Neighborhood Participation		
Household Member Participated in Neighborhood Cleanup of Beautification Project	79.6%	25.6%

Table 4: Fruit and Vegetable Intake, Demographic Information and Neighborhood Participation
Source: Alaimo, Katherine.

Measuring Social Capital in Community Gardens An Analysis of Denver, CO

Although Lansing is much smaller than Denver, Denver Urban Gardens, or DUG, is an organization very similar size, scope, mission and history to the Greater Lansing Food Bank. DUG was founded in 1985 with the mission of providing sustainable food sources for Denver residents. In 1997, DUG operated 32 gardens, but today, that number has increased to well over 120. The format on which they operate is by providing land and tool for residents interested in growing their own food. Their gardens are a collection of small individual plots on larger pieces of land. DUG has integrated an educational component into their operations, by working closely with schools and creating youth gardens, targeting low to moderate-income families. They have also developed a close partnership with the Colorado School of Public Health to assess the impacts that urban gardening has on community health and food security.

Methods

Litt et al. (2011) used random sampling methods to select 58 households, chosen from an original number of 1151 households, which had been selected by block group. The number was narrowed down to 58 after controlling for lack of access to properties, and setting a minimum number of households per block, so as to prevent blocks with low numbers of respondents from influencing the results. The households selected were all within one mile of one of 13 randomly selected gardens.

Those surveyed were asked about which of six types of vegetables they ate, and how often they did so. They were also asked to report on whether or not the vegetables were processed or raw. Furthermore, respondents were asked whether or not they gardened, what their level of physical activity was. They were asked to rate their health on a scale from 1 to 5, from low to high. The survey also inquired about body mass index of respondents. Respondents were asked assess the aesthetic condition of their neighborhood, as measured by perceived proliferation of trees, litter and attractive buildings. They were also asked to report how attached they were to their neighborhood, if it was an “ideal” place to live, or how closely the neighborhood was linked to their identity. Race or ethnic background, age and gender were self-reported as well as socio-economic status, as assessed by educational attainment by rates of college degrees.

Key Findings

The study found that fruit and vegetable consumption was statistically higher among residents with at least a college degree. Consumption of fruits and vegetables was also higher among respondents who reported higher levels of physical activity and has a normal Body Mass Index (BMI) and who rated their health as either very good or excellent. Results also indicated that people who participated in community and home garden reported higher levels of fruit and vegetable consumption than non-gardeners. Compared to 37% of home gardeners and 25% of non-gardeners, the study found that 56% of community gardeners consumed fruits and vegetables at least 5 times per day.

Effects of Community Gardens on Property Values An Analysis of New York City

Voicu and Been (Real Estate Economics, 2008) seek to determine the impacts of community gardens on neighboring residential property values in New York City. The desire of the research is to better understand how the use of vacant land in cities impacts neighborhoods and, likewise, how the introduction of a community garden affects property values. Using a hedonic regression model, to estimate the demand or value, the researchers have analyzed the impacts of vacant land and community gardens upon property values.

Methods

To determine the impacts of community gardens on neighboring property values the researchers worked from a number of key hypotheses. The starting point of the researchers' assumptions began with the fact that "...gardens, parks and other open spaces could have both positive and negative impacts on surrounding communities" (Voicu and Been, 247, 2008). These impacts are often positively related to providing access to green space, creating a forum for community interaction and improvement of life and quality of life. On the other hand the researchers note that a poorly maintained garden is likely to attract undesirable behavior and decrease property values by being an eyesore to visitors and residents.

The researchers also note that depending on distance from the garden that the impacts may or may not be experienced by residents. This is especially important as the benefits may vary over time as garden usage may become more prevalent as neighbors get to know one another. Another important element that the researchers noted is the nature of the residents that live near the garden. This nature is typified as being in two categories 1) permanent residents are likely to be more willing to invest their time into garden activities whereas 2) rental units may be less invested (Voicu and Been, 248, 2008). One of the final methods of measurement was to determine who participates in the gardens through analyzing the organizations that coordinate programs and other efforts around the gardens. These programs provided a means through which the community was encouraged, together, to interact in the garden setting.

By using a hedonic regression model Voicu and Been were able to examine price that a piece of property in relation to its physical characteristics (e.g., lot size, surrounding buildings, etc.). To further carry out their research the Voicu and Been designated distances (248, 2008) from which they were going to measure the impacts of community gardens on property values. This was done before and after a garden was opened to properly assess the direct impact that the garden has upon the location. This method allowed the researchers to not rely on similar property data and avoided bias that might have arisen due to neighborhood characteristics (Voicu and Been, 249, 2008).

In order to determine the impacts of community gardens on low-income neighborhoods the researchers test the relationship between the location of green spaces and their impact on property values. To determine the relationship between distance and impacts experienced the researchers focused on an impact on homes within a distance of 1,000 feet of the garden. Over a couple of years the researchers were able to determine the level of impact that the garden had based off of how people use it and also the relationship between distances.

To test the impact of garden quality the researchers qualitatively examined the effects of garden types on property values (252, 2008). Through a ranking system the researchers were able to identify the attributes that made a garden a desirable destination. The criteria that the researchers relied upon were: "accessibility to the general public, fencing attractiveness and

permanence, cleanliness, landscaping quality, presence of decorations, existence of social spaces and overall condition of the garden” (252, 2008). By assessing and determining how users utilize the garden and what works for them the researchers were able to create variables pertaining to the existing or future garden area that is understood to be acceptable quality for users.

Key Findings

The researchers discovered that there was a positive correlation between the opening of a garden and a rise in surrounding property values. Prior to the gardens opening the researchers noted that properties within 1,000 ft. of the land sold for “... 11.1% less than comparable properties located outside of the 1,000-foot ring” (Voicu and Been, 265, 2008). This finding led to a study of the impact experienced between those within the 1,000 ft. ring and those that were without in terms of value. Whereas the gap prior to the garden opening was 11.1%, after the garden opened the gap decreased to 7.5% (Voicu and Been, 265-266, 2008). This indicates that there was a slight rise in property values after the garden was opened.

Voicu & Been (266, 2008) also note that there is a positive correlation between the number of years that a garden is in place and a rise in property values. The researchers acknowledge that the increasing value “may result from greater certainty about the garden’s maintenance, or perhaps may reflect neighbors’ increasing awareness of, or involvement in, the garden (266, 2008).

Food Harvesting in Community Gardens An Analysis of Philadelphia, PA

The city of Philadelphia has long been a center for community gardening. Dating back to 1897 and the founding of the Vacant Lot Cultivation Association which helped people access land, involved children in gardening, and encouraged adults to start market gardens. In the 1940's after World War II with consumer goods in short supply victory gardens arose and supplied a large portion of household diets. In the 1970's community gardens really took off correlating with population loss and increasing vacant property provided a key impetus for residents to band together to "take back" derelict land and beautify their neighborhoods with gardens. The majority of community gardeners in the 1970s, 80s, and 90s came to Philadelphia in the Second Great Migration of African Americans after World War Two, the contemporaneous Great Migration of Puerto Ricans, and the Southeast Asian migrations following the Vietnam War (Vitiello, 2009). In 1996 Congress cut the funding for USDA's urban gardening programs, and by 2000 Penn State's Philadelphia Extension office effectively ended its support of community gardens. This led to a decline in Philadelphia's active community and squatter vegetable gardens from 501 in 1994 to 226 in 2008

Goals

The Philadelphia Harvest report was published in 2009 by University of Pennsylvania Urban Studies Program and seeks to identify the impacts and implications community gardens have on community food security, food access, food justice and urban resilience. Essential to the report was first creating comprehensive assessment of the geography of community gardens in the city and then estimate the volume of food they are capable of producing.

Methods

During the summer of 2008 arrangements were made with gardeners and support organizations at 6 gardens to weigh the harvest from the plots. Gardens were selected based on having a diversity of soils, growing conditions and gardeners. Calculations were performed that created an estimate of average productivity of different crops. The square footage of each crop under production, for example corn (a relatively low-value crop) and peppers (which cost much more per pound) was multiplied by the value of produce found at local farmers' markets. Price of products at farm markets was used because the production methods were deemed to be similar.

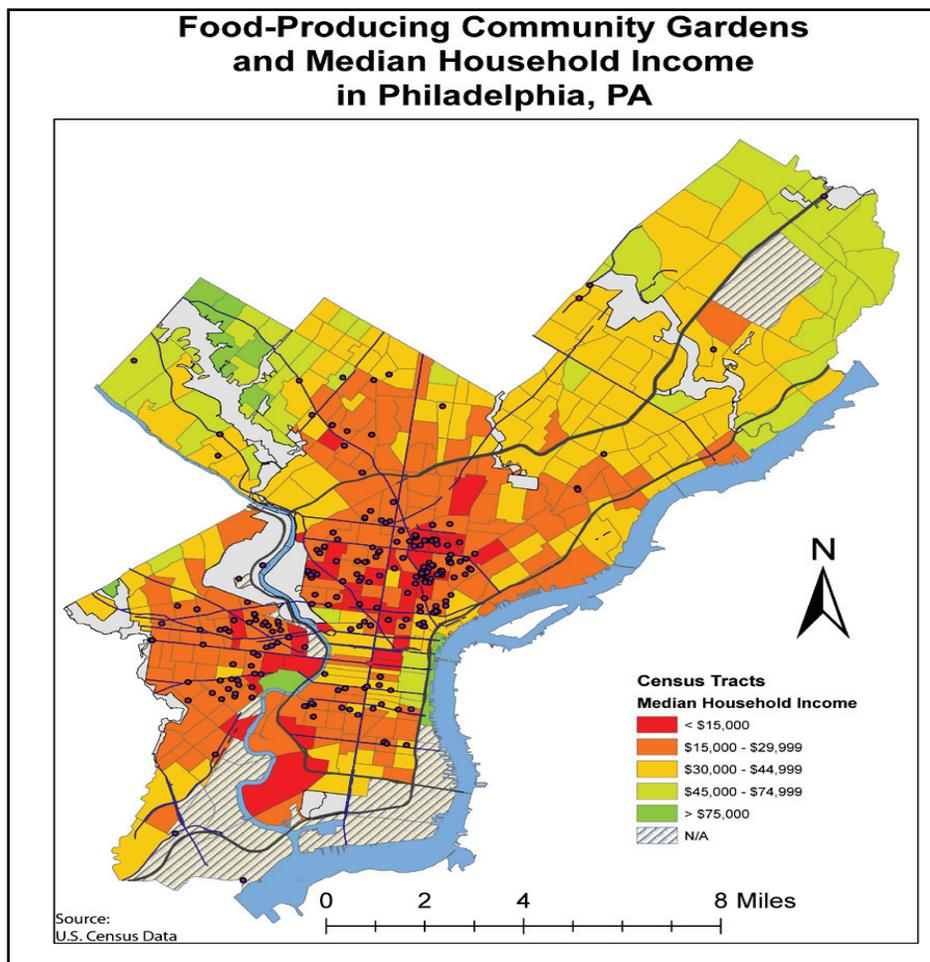
Key Findings

An estimated \$4.9 million worth of summer vegetables were produced in the city's community and squatter gardens. Tomatoes were by far the largest crop, with approximately 837,550 pounds or 41% of the total. Other important crops included cabbage (218,556 lbs, 10.7%), collards (151,830 lbs, 7.5%), beans (139,557, 6.9%), and squash (110,662 lbs, 5.4%). These five crops accounted for two-thirds of the total crop.

No. of Gardens	Gross Area/ Lot Size	Net Area/ Growing Area	Crop Area	% Crop area to Gross area	Estimated Pounds Grown	Estimated Value of Crops Grown
226	2,433,734 sf 55.9 acres	1,656,885 sf 38 acres	1,454,890 sf 33.4 acres	60%	2,037,143	\$4,860,364

Table 5: Philadelphia Community Garden Produce
Source: Harvest Report, 2012.

There were 212 food-producing gardens under one-half acre in size, 94% of the city's total number of gardens. Together they grew nearly \$1 million worth of vegetables and herbs. Of these smaller gardens, 161 (71%) are between 1,000 square feet and 10,000 square feet Citywide. The greatest concentrations of community and squatter vegetable gardens are found in North and West Philadelphia, in neighborhoods of lower wealth, much vacant land and limited healthy food retailers.



Map 5: Food Producing Community Gardens and Median Household Income in Philadelphia, PA
Source: 2008 Harvest Report

Map 5 was created by researchers in the Philadelphia Harvest report and represents the geographical boundaries of the City of Philadelphia Pennsylvania. Median household income is provided at the census tract level and the locations of community gardens are shown by the purple dots.

Conclusion

Community gardens can produce a measurable amount of food value often in areas that are poor and otherwise lack retail options. A great majority of vegetable gardeners spoke of sharing their harvest with people who are hungry. Gardening is labor intensive, but not capital intensive, mainly involving investment of labor and improvement of the soil. It is one of many ways that people work to address the food needs and wants of their families and neighbors, an important part of building healthier, more resilient cities and communities.

Measuring Impact of Community Gardens on Users An Analysis of Mother Hubbard's Cupboard - Bloomington, IN

Bloomington, Indiana provides an excellent opportunity for a case study for a number of reasons. First of all, its comparable Midwest climate allows for a reasonable expectation of similar crop yields when compared to community gardens in Lansing. Second, the presence of Indiana University in Bloomington compares well with the presence of Michigan State University just down the road from Lansing. Third, and most importantly, the city of Bloomington contains a significant network of community gardening organizations, which is supported by an impressive public support system, mainly through the city's Parks and Recreation department.

Through this department, the city occasionally conducts a citywide interest survey that asks for feedback on what current programs, facilities and services that citizens use and their satisfaction with them. Also, the public is asked to say of what service they would like to see more. This data is used to form longer term master plans for projects and spaces. In the case of the development of Butler Park Community Gardens, neighborhood forums were conducted to gather data on what people wanted with the available open parks space. When a garden was indicated by residents' feedback, the City proceeded with environmental assessment, soil profile testing, and other standard procedures (Judy Seigle).

Bloomington also supports community gardening through a financial aid program (Robin Hobson). The financial assistance is awarded through our Parks Foundation with funds from a private donor earmarked for community gardening. Scholarship recipients are allowed assistance for one garden plot and the scholarship covers 85% of the program while the participant is responsible for the 15% balance. Applicants must provide us with proof of income (up to 150% of federal poverty guidelines) and proof of residing within Monroe County.

The largest entity supporting community gardening in Bloomington is Mother Hubbard's Cupboard (mhcfoodpantry.org), which operates in a very similar manner to the GLFB Garden Project. Mother Hubbard's Cupboard (MHC) is a non-profit organization offering three major programs: (1) a food pantry offering emergency food assistance five days a week, (2) a community garden program, and (3) a nutrition education program.

Methods

In the spring of 2013, Kendra Brewer, Garden Coordinator for Mother Hubbard's Cupboard, partnered with members of Indiana University's Public Sociology Forum (PSF), a group that conducts research in collaboration with community organizations, to help evaluate the program via surveys in the public housing complex where the largest community garden in the system is located.

There were four main purposes of this survey. First, it was designed to gather basic descriptive statistics on members of the Crestmont community. Second, the survey assessed who was using the garden, how they were using the garden, and why some people did not use the garden. Third, the survey asked residents for their general feedback on the garden, including what types of fruits and vegetables they would like to see grown in the garden, what they liked and dislike about the garden and ways to improve the garden. Finally, this project measured what effects the garden has had on community members' overall quality of life by exploring the relationship between community gardens and food security.

In October and November of 2012, a team of 10 researchers distributed the survey door-to-door to all 250 households in the Crestmont neighborhood. Of those 250 units, 134 completed the

survey, resulting in a 54 percent response rate. The survey was able to quantify some important metrics on the impact of the gardens that could definitely be applied to users of the gardens of the Greater Lansing Food Bank.

Key Findings

In 2011, the Crestmont Community Garden was turned over entirely to the care of MHC. Prior to this, the Crestmont Community Garden was comprised of privately maintained and harvested gardening plots. When MHC began caring for the space, the garden was made completely communal, and residents were encouraged to visit and harvest from the garden anytime they pleased. Despite efforts to spread the word of this change, at the time of the survey, 35 percent of respondents did not know that the garden was a communal space. Of survey respondents, less than 30 percent reported using the community garden.

Respondents who reported visiting the garden were asked a series of subjective questions about how the garden impacted their lives. The item began with, “Because I have been to the garden I...” and was followed by a series of statements. Figure 10, seen below, displays the results of this set of questions.

Because I have been to the garden...

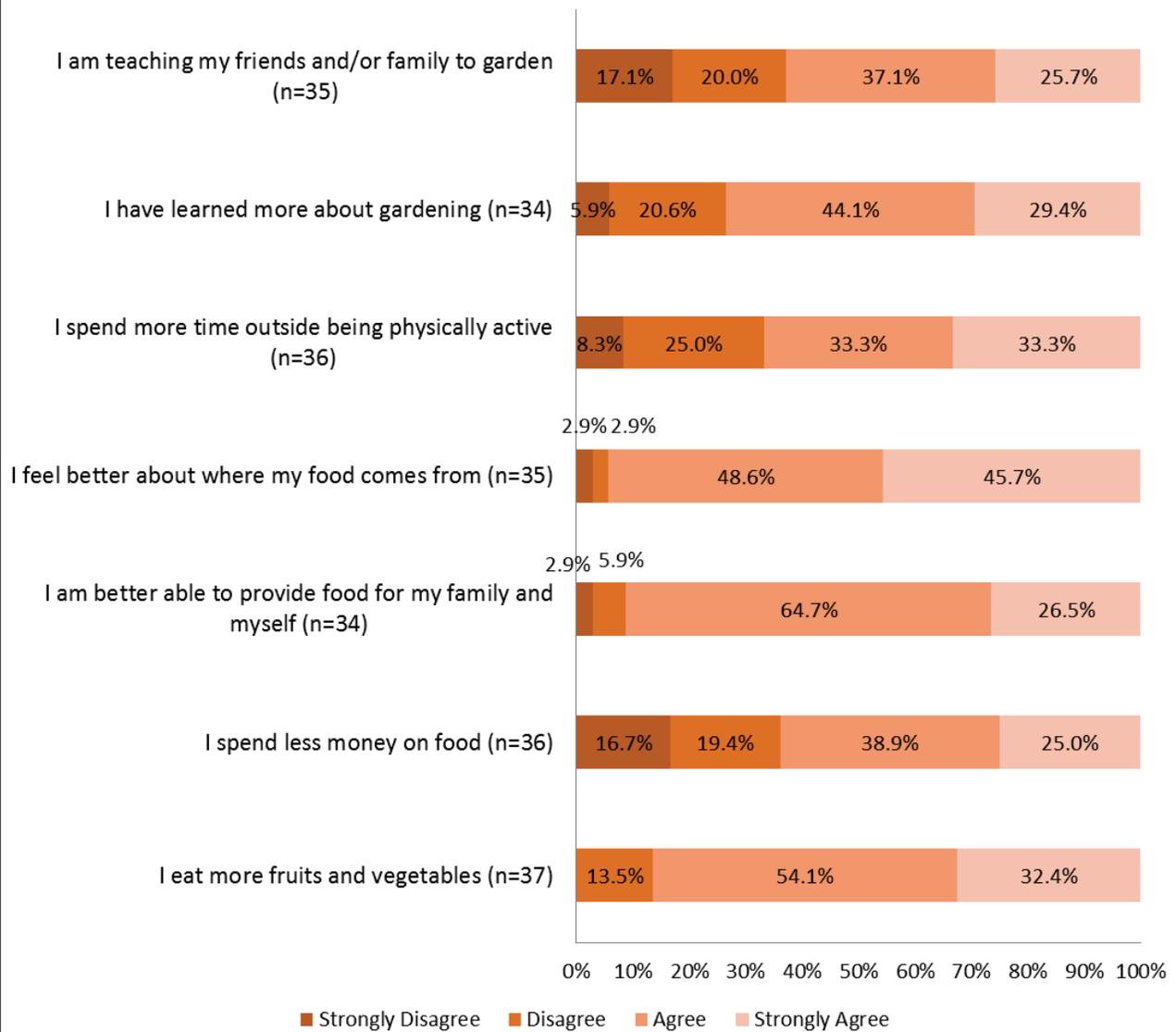


Figure 8: Gardeners Responses to Community Garden Questionnaire
 Source: Taliaferro; Indiana University Public Sociology Forum (IU PSF)

The results of this survey provide Mother Hubbard’s Cupboard with an excellent understanding of how their community garden affects the users in the community. By using questions that are answered in the form of a scale, it is easy to see how the Cresmont Garden is viewed by its users, and the pantry can cater its future services to meet these needs.

Community Gardens Interrelation to Crime An Analysis of Chicago, IL

Safety creates a place of attractiveness and is important in terms retaining people in neighborhoods and forming a bond between neighbors. This case study was done by two professors one being Frances E. Kuo an assistant professor and co director of the Human-Environment Research Laboratory at the University of Illinois in 2001. The second professor is William C. Sullivan an associate professor and co director of the Human-Environment research laboratory at the university of Illinois. The two professors published an article called Environment and Crime in the Inner city does Vegetation Reduce Crime. The study shows that Residents living in "Greener" surroundings report lower levels of fear, fewer incivilities and less aggressive and violent behavior (Kuo & Sullivan 2001).

This study can be used as a method for people to find ways to measure the social aspect of Urban gardening by determining the safety ones feel in a community. Social interactions plays a big role in a community and urban gardening forms a sense of place, you need a safe place in order to create positive interaction and create a stronger neighborhood (Kurtz, Sullivan 2001).

Methods

In this case study both professors used police crime reports to examine the relationship between crimes in an inner-city neighborhood. The location is Ida B. Wells a large public housing development in Chicago. They examined the relationship between the vegetation outside of the apartment buildings and the number of crime reports for those buildings over a 2-year period (Kuo & Sullivan 2001). Crime data for 98 apartment buildings with varying levels of nearby vegetation were compared. The data collected was a part of the vital neighborhood common spaces archive, a multistudy research effort examining the effects of the physical environment on the functioning of individuals, families and communities resident in urban public housing (Kuo & Sullivan 2001).

Key Findings

At the time of this study 2001, approximately 93% of the people living at the Ida B Wells Public housing Development wells were officially unemployed and roughly 50% of the families received aid to families with dependent children (Chicago housing authority 1995 and Kuo & Sullivan 2001). Results found in the study was that, the greener a buildings surrounding are, the fewer total crimes were reported. This pattern holds for both property crimes and violent crimes (Kuo & Sullivan 2001).

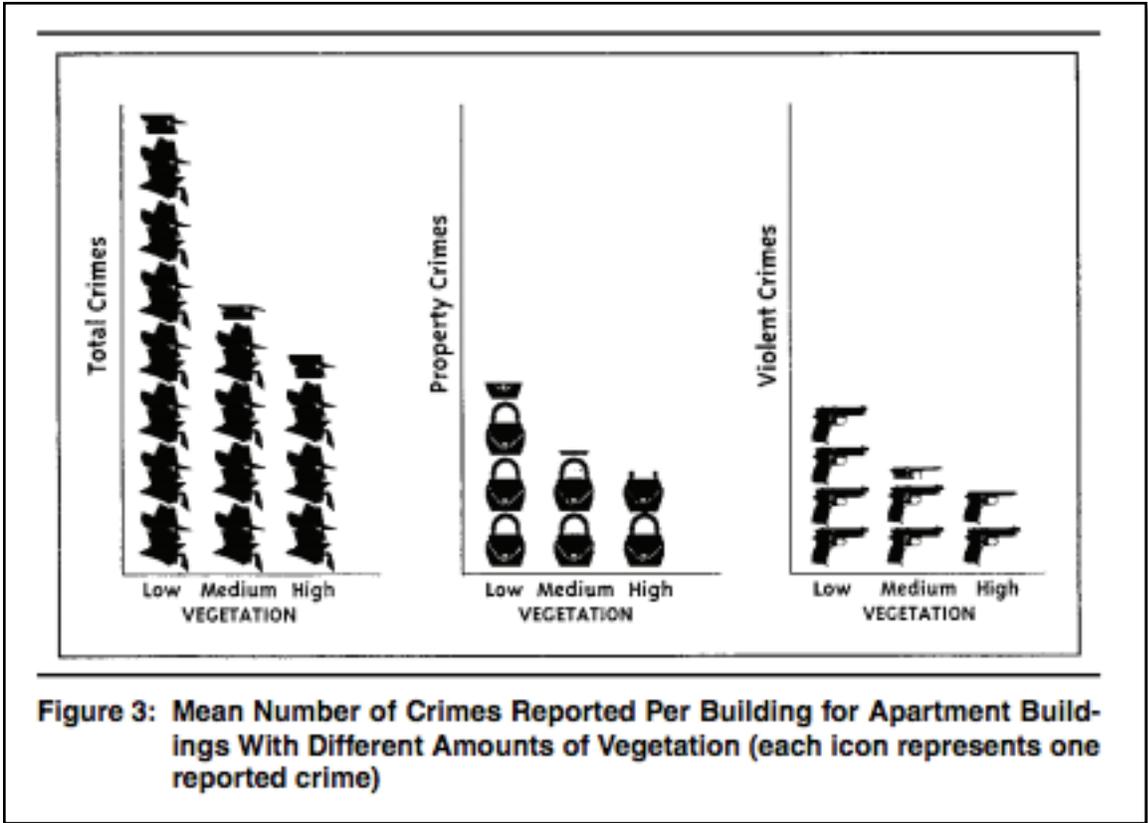


Figure 9: Mean Number of Crimes Reported and Amounts of Vegetation
 Source: Kuo & Sullivan (2001)

The figure above shows the number of crimes reported from low, medium to high vegetation and it evidently shows that less crime was reported in greener spaces. So in terms of urban gardening, creating these vacant lots into green spaces, a place for a community to grow has the potential to transform neighborhoods into safer communities.

Tool Recommendations for Measuring Social, Health and Economic Impacts of Community Gardens

The following are recommendations based off of the compiled literature review for ways in which the effects of community garden programs can have on the Lansing community. These recommendations are broken down, much like the literature review into three main categories that the researchers focused on: social, health and economic.

Social Recommendations

Measuring the social impacts of community gardening.

The social impacts of community gardening are a series of variables, which are difficult to measure quantifiably. From social capital to safety, creating a sense of place, youth empowerment, diversity, and strength and morale, each variable requires interaction with a certain number of people. Possible measureable social impacts from community gardening can range from increasing safety that leads to less use of police force, meaning more money is saved in the local economy. Creating a sense of place that leads to more people wanting to move into a community with gardening, therefore increasing the attractiveness of the neighborhood, and possibly increasing property values, and keeping current residents there. Youth empowerment leads to better schools in the neighborhood, and strength and morale, which leads to a community working together to create a more vibrant community.

Methods

With a survey designed for evaluation on a Likert Scale, social impacts can be measured based on data from people affected by community gardening. A likert scale is a hierarchy numbered range system from low to high, typically low being bad and high being excellent (e.g. 1 – 5 or 1 – 10). This type of scale can be used to measure, socially, how community gardens affect people who use it. This type survey can be used by the Greater Lansing Food bank to determine how effective community gardening is socially on a local scale.

The survey can be in written form, or administered in a face-to-face setting, over the phone, or electronically. Given that many of the Greater Lansing Food Bank's members and participants are non-native English speakers from all over the world, the survey will have to get translated into several languages before administration.

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Variables

Safety

Safety can be measured by looking at crime reports in the area, through local police department, and by comparing the proximity of crime reported near a community garden or a vacant lot. Quantifiably, safety can be measured by number of crimes, and proximity of crimes in the community near community gardens. Community gardens can also provide residents with a perceived sense of safety, through interviews we can determine how safe residents feel.

Sample Question: Has crime decreased since the implementation of a community garden in your neighborhood?

Creating a sense of place

A possible method of measuring sense of place is by collecting the number of years lived in the neighborhood with community gardening. Another possible method is by asking residents of the community, when they moved in, how long they planned on living in the community, and how long they are planning on staying in the community, and why. This data collected can be used to determine the value of the unique characteristics through the neighborhood in which the resident resides.

Sample Question: How much do you enjoy living on the block since the implementation of community gardening?

Social Capital

Social Capital is a very broad concept that includes variables like socio economic diversity, touches on efficacy and self-determination, and has a close relationship with neighborhood attachment and local identity. Assessing social capital will allow for the Greater Lansing Food Bank to measure the effect that community gardens has on the strength of relationships within its host communities.

Sample Question: How many families/households working in community gardening do you know by name?

Socio Economic Diversity

Socioeconomic data can be collected through self-reported surveys. Through demographic data covering racial and ethnic background, and country of origin, income and educational attainment, the Greater Lansing Food can assess the role community gardens plays in bridging social divides.

Sample Question: Is English the primary language used in your household?

Recommendations to measure safety in community gardens

There is not one way to measure or put a price on social aspects when it comes to safety, creating a sense of place, youth empowerment, morale and strength, these are all attributes that you cannot put a price on. A study done in Houston Texas, although it did not prove difference of crime in community gardening it proved residents' perceptions of their neighborhoods as safer and healthier. Residents link the presence of gardens to neighborhood revitalization. They feel that gardens contribute to a decrease in, or elimination of, anti-social behavior, illegal dumping, and drug (City Mayors, 2014).

The way safety can be measured or an impact of community gardening is by interviewing a community and looking at police reports in a greener neighborhood compared to a lot that is vacant. The case study done in Texas, keeping in mind that it was only data used for the year of 2005, used these methods in order to come to the conclusion that crime may have not have been lowered, residents felt a lot safer. The study built on previous studies, which indicated that the presence of community gardens could attract people with higher incomes to urban neighborhoods, leading to increases in owner-occupied housing and higher rents (City Mayors, 2014.)

Measuring safety can be done by interviews with community garden representatives and were conducted in person, email, letter or telephone. Crime data can be collected from the police department and would be more feasible to use a report over a five-year span. Each of the crime data could then be mapped to show where the crimes are occurring (Gorham, 2014).

Measuring safety is a way to attract people to a community, poring the point that if you feel safe the community will be more welcoming,

Measuring Social Capital in Community Gardens

Measuring the effect of urban gardening on neighborhood attachment, socioeconomic diversity and social capital can be best done with a survey, which can be written or verbal, electronic, or over the phone. Reaching non-native English speakers, or low-proficiency English speakers with a survey could be a challenge, and interpreters may be needed. However, it is important to ensure that this survey reach as many people as possible.

The survey is designed for evaluation on a Likert Scale. These results will give a complete set of data on the social impacts that the community gardens have, facilitating data-driven decision making in the future. While the social impacts of community gardens have already been researched and analyzed in other locations, having a study specifically focusing on the Greater Lansing Food Bank will facilitate decision making on a local scale.

Health Recommendations

Recommendations to Measure the Health Impact of Community Gardens

The Greater Lansing Food Bank (GLFB) has an opportunity to demonstrate that their gardens expose gardeners to a variety of fruits and vegetables that can help prevent the onset of obesity, related chronic conditions, and other diseases. The GLFB should demonstrate that community gardens serve as a nutrition intervention because they address a barrier some Lansing residents face when trying to maintain a healthy diet with limited availability of fresh produce. Survey data collected by the Greater Lansing Food Bank has been able to confirm some *qualitative* effects of community gardening. To communicate the overall health impact of community gardening, the GLFB must collect key health indicators and demographic data of Lansing community gardeners over an extended period of time to begin to quantify their impact.

The utilization of a health measurement tool is limited by a lack of quality data and the type of indicators gardener information that the GLFB has collected. Health condition questions could help to provide the GLFB with the data necessary from gardeners in order to better measure the health impacts of community gardening in the City of Lansing. The questions will obtain the information necessary to communicate the positive health conditions of the gardening population. Survey questions were adopted from questions identified after conducting the literature review and are designed to gather information and identify key outcomes such as fruit and vegetable consumption, hours of physical activity, energy levels and accessibility to healthy food options. The questions in the appendix were adapted from a survey conducted by the Ingham County Health Department in 2008. In collecting data similar to the Health Department, the GLFB will be able to draw comparisons between their gardens and the county as a whole. The questions serve as a tool to collect and track the necessary data to measure the impact of gardening on individuals and community health.

The GLFB must also measure availability of fresh food and vegetable consumption on a larger scale to demonstrate the overall productivity of the Greater Lansing Food Bank Garden Project. A tool to measure the gardens fruit and vegetables output production should be utilized on a regular basis to better quantify the amount available for GLFB gardeners to consume. Weekly harvest totals by weight and by vegetable type could be recorded by using a combination of digital produce scales and visual estimates. The weekly measurements should be recorded in individual community garden logs that each garden leader digitally sends to the GLFB at the end of the week. The GLFB should consider placing a digital scale at each community garden that gives the gardeners the ability to measure the amount of produce they pick at the end of each week. In collecting this data, the GLFB can better communicate the opportunities their gardens provide for healthy lifestyles and diets. The El Cerrito Community Garden Network in California utilizes a similar data collection method. An example of the organizations community garden produce log be found in the appendix of the report.

Methodology

Using information gathered regarding locations of gardens, location of garden user households and census tract data, locations throughout the city can be pinpointed that are in a higher need for food sources. Since community gardens serve as venues providing fresh healthful food and localized food access situating them in locations that best accommodate their users may be beneficial. If community gardens look to supplant the needs of low access residents they may look into expanding availability in areas that have traits identified as low access. The USDA food access criteria for adequate distance to grocery stores access in urban areas is between one half to one mile. From the user data collected; 60% of gardeners travel over ½ of a mile to access their garden plots and the average distance travel by all registered garden users is 1.69 miles.

Economic Recommendations

Determining Value of Food

The research publishing's of I.C. Patel remain some of the preeminent sources for the study of community garden impact. As County Agricultural Agent for the Rutgers Urban Gardening Program, Patel spent a great deal of time in the late 20th Century measuring the economic impacts of gardens. As of 1996, Rutgers Urban Gardening (RUG) in Newark, the most populous city in New Jersey, was one of only 23 city urban gardening programs in the nation (Patel 38). RUG was established in 1978, just three years prior to the GLFB Garden Project, and charged with the task of teaching gardening skills and motivating city residents to establish vegetable/food gardens on city vacant lots. RUG is part of a network of urban garden programs founded by the Extension Service of the United States Department of Agriculture (ES-USDA). ES-USDA created their own formula to estimate dollar value of food production in a given growing season (see figure 12):

$$\begin{array}{c} \text{Dollar Value of Production} \\ \\ = \\ \\ \text{Area (ft}^2\text{)} \\ \\ \times \\ \\ \text{Crop intensity (distance between rows)} \\ \text{Less than 1' = 1.2} \\ \text{1' to less than 2' = 1.0} \\ \text{2' to less than 3' = 0.8} \\ \text{3' or more = 0.7} \\ \\ \times \\ \\ \text{Crop quality} \\ \text{Good = 0.7} \\ \text{Fair = 0.4} \\ \\ \times \\ \\ \text{Length of season (frost-free days)} \\ \text{200 or more = 1.2} \\ \text{Less than 200 = 1.0} \end{array}$$

Figure 10: Formula to Estimate Dollar Value of Production (USDA)

Source: Patel (1991)

In the case of RUG,

(A) Total area of community gardens in square feet = 1,308,579

(B) Crop intensity (distance between rows of 1' to 2') = 1.0

(C) Crop quality (good) = 0.7

(D) Frost free days (less than 200) = 1.0

Dollar value of 1994 production = (A) * (B) * (C) * (D) = \$916,005

Metrics like this could easily be applied to the Garden Project, especially if the USDA has updated its formula to more closely match modern dollar value. However, using this metric on community gardens is only possible if gardeners report their yield to the GLFB, which is where the survey could prove so valuable. Determining crop quality would most likely only be able to be collected via gardener self-reporting.

Economic Impact on Public Maintenance of Land

The Ingham County Land Bank is another organization in the Lansing region that maintains a program to encourage and support community gardening. The ICLB's garden program oversees approximately 75 gardens, of which 11 operate in collaboration with the GLFB Garden Project. John Krohn serves as the garden program coordinator for the Ingham County Land Bank, and when asked why they sponsor the program and what economic impact it may have, he stated:

“Our response would be that for every parcel that is being gardened and maintained by a private citizen or a group, that saves the Land Bank \$400 per month on average because county workers don't have to come out and mow the grass or shovel the snow. The more money the Land Bank saves, the more it can spend on neighborhood stabilization and housing for low income people in Lansing. So, the Garden Program doesn't cost money, it saves money.”

This provides an example of how the presence of community gardens in Lansing have an estimated economic impact on the Lansing region.

Measuring the Impact of Community Gardens on Property Value

The impact of community gardens on property values can be experienced in many different forms from taking an empty or abandoned lot and turning it into a garden or using a garden to create a social environment and increase activity in a neighborhood that is experiencing crime. The location of gardens can be haphazard or strategic and these decisions can have both positive and negative impacts on any location.

The City of Lansing makes public land value data available online through the website of the city assessor (http://www.lansingmi.gov/City_Assessor). The Greater Lansing Food Bank could access this information on an annual basis and then record changes in property value in neighborhoods surrounding community gardens. The New York City study referenced in our literature review used five year windows to analyze changes in property value within close proximity to gardens. For example, if the Greater Lansing Food Bank installs a new community garden in 2015, property value data on land plots within one-half of a square mile of the garden can be recorded every year until 2020, thus allowing the Garden Project to glean any changes.

Methods

One means of measuring the impact of community gardens on neighboring property values is to examine neighboring property values before and after a garden is introduced to an area. Specifically by designating a distance (i.e., 1,000 sq. ft.) at which impacts can be measured can provide the means of assessing impacts before and after the garden is introduced. By designating a circumference from the garden, that is to be measured, the impacts can be further assessed by moving out of the ring to determine whether impacts were experienced at greater intervals. An important element of this form of assessment is to conduct a longitudinal study that will allow for a greater understanding of the implications experienced over a period of time. By structuring a longitudinal study the impact of programs and familiarity can be judged. To assess the impacts of garden size one means of assessing the impacts is through qualitative interviews.

Different Elements for Consideration regarding Economic Impact

Neighborhood Types

To better understand a gardens potential impact on the community it is important to analyze the neighborhood in which the garden is located. The gardens managed by the Garden Project are located in a variety of sites throughout the Lansing area. For instance Airport and Towar gardens are found on the northern edge of town with ample space and few residences in close proximity. Other's such as Armory and Foster gardens are located in urban areas with greater population density. The density and surrounding land uses around each garden are different which means their impact on the surrounding neighborhood may also differ. The neighborhoods where community gardens are situated can be assessed in a variety of ways.

Resident Proximity & Density

Table 6 was produced by averaging the distance registered gardeners travel to the garden they use. This table works to provide an initial framework for identifying the gardens in urban, suburban and rural settings based on the number of gardeners they serve and how many residences are in the surrounding neighborhood.

Garden	Average Distance Users Travel (Miles)	# Registered Gardeners
Slater	0.379	27
ELF	0.539	6
Clifford	0.547	10
Letts	0.865	17
Armory	0.944	54
Grace	1.01	3
Orchard	1.04	57
Foster	1.31	28
Risdale	1.37	25
Otto	1.92	5
Paradise	1.92	24
Towar	2.11	23
North School	2.35	48
Lilac	2.66	21
Pine	3.78	6
Airport	4.27	36

Table 6: Average Distance Gardeners Travel to Gardens
Source: Greater Lansing Food Bank

Visual assessment

You can further analyze the types of housing in a neighborhood with the visual imagery of Google Street View.

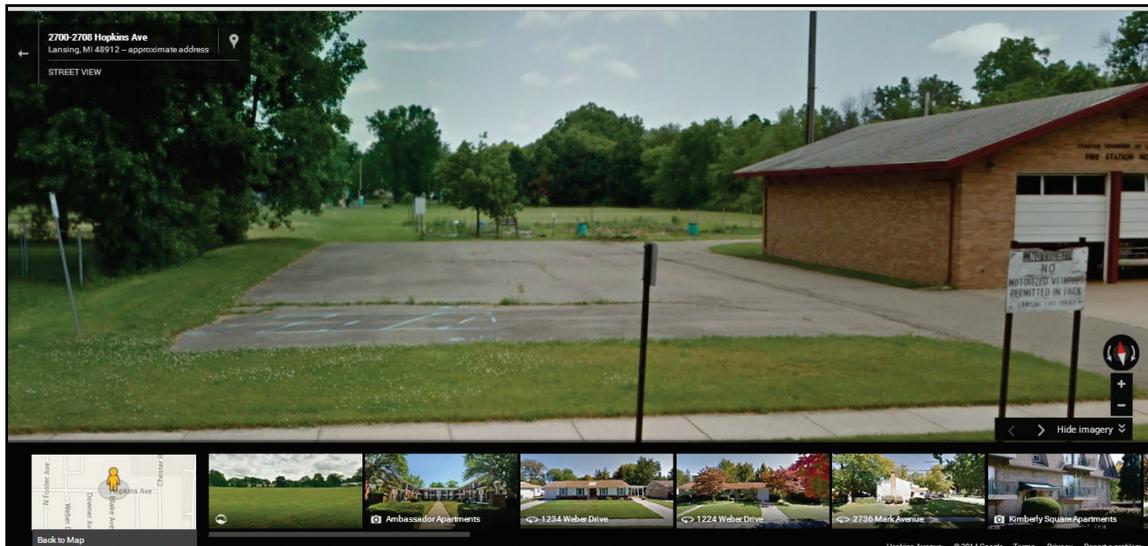


Figure 11: Google Street View of Clifford Park Garden
Source: Google Street View

Figure 13 is an image of Clifford Park Garden site obtained through Google Street View and provides a visual of the physical setting surrounding the garden. You can also view adjacent properties to examine traits such as types of housing units (Apartment, detached single family) and the size of lots nearby to determine the feasibility of home gardening in the area. There is extensive available imagery in the Lansing Area that allows for all gardens to be viewed.

Census Maps

Census data can also be used as a tool to assess the variables of neighborhoods. The most detailed geographic data available is at the tract and block level. Both levels vary in size depending on population density within an area, blocks are smallest unit but lack more specific datasets. Census tracts are designed, when established, to be homogeneous with respect to population characteristics and provide the most detailed datasets such as specific housing characteristics (average household size, ownership status) as well as socioeconomic characteristics (average age, educational attainment) of the residents within those areas. The central city of Lansing consists of roughly 54 census tracts that are on average 1.14 square mile areas. Maps 7-9 in the appendix demonstrate some ways to analyze the demographic diversity of Lansing neighborhoods

Future neighborhood assessments

The discussed methods can be used individually or in combination to gain a sense of the neighborhoods. If housing units surround that provide no spare land for home gardening, space created for community gardens in these areas will foreseeably have the greatest impact. Gardens such as Slater, ELF and Clifford have the shortest distances traveled by users signifying adjacent neighborhoods utilize the gardens the most. Gardens such as Armory, Paradise and North School where the amount of users is greatest could represent neighborhoods that don't have space for home gardening, creating greater reliance on the community garden plots.

Garden Quality & Size

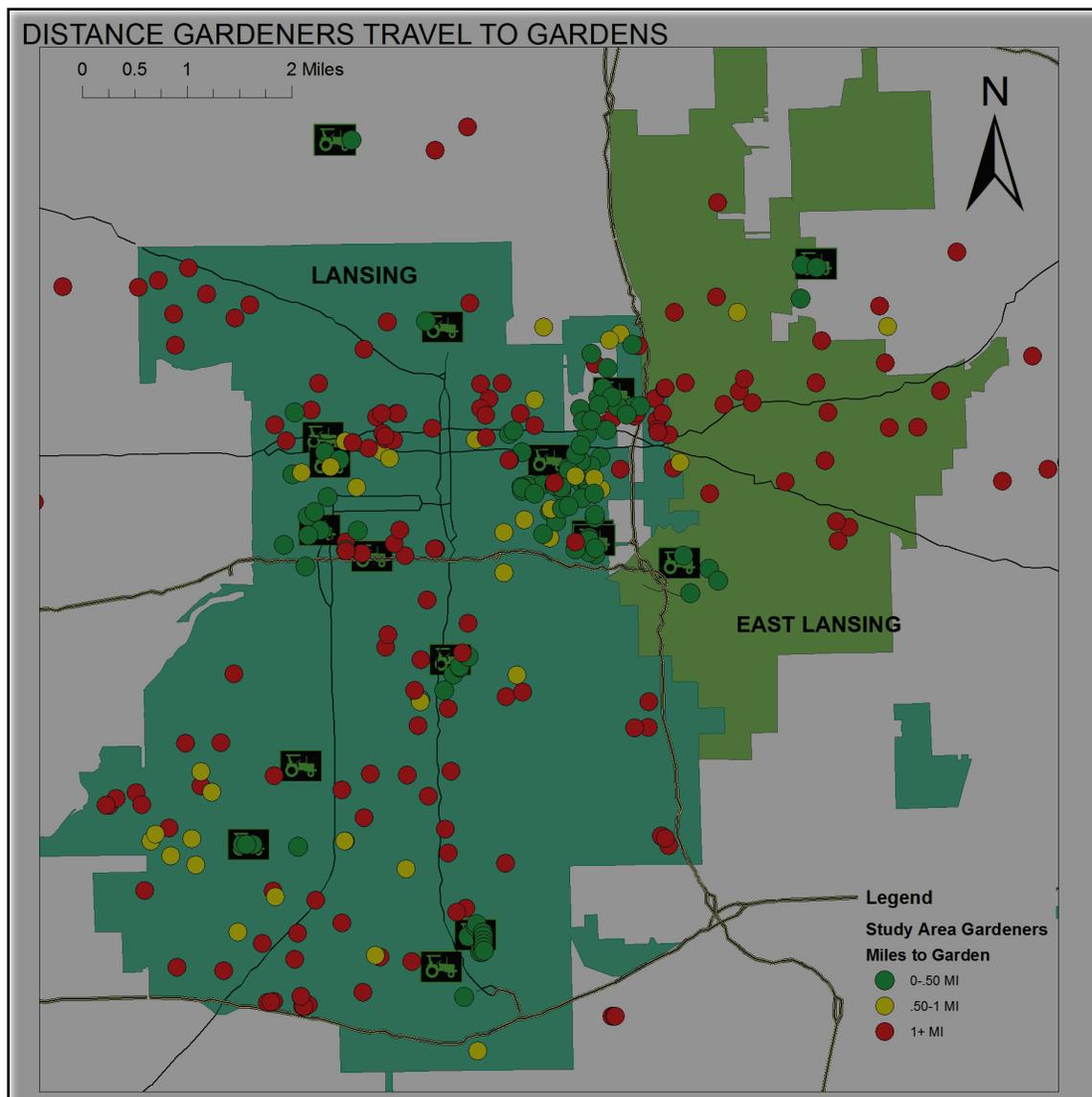
When determining if any economic impacts are experienced is through an assessment of the size of the gardens and whether there is a correlation to impacts experienced. To measure this variable it is possible to examine the data gathered by GLFB on garden size and users in order to assess the size of gardens. Combining this data with property values over a period of time could show a correlation between garden size and property values.

One deficiency in the Greater Lansing Food Bank's understanding of its impact is its lack of precise data on the amount of land managed in the system. The central staff of the Garden Project must undertake an effort to measure the square footage of the garden plots within its control.

Distance Traveled and Money Saved

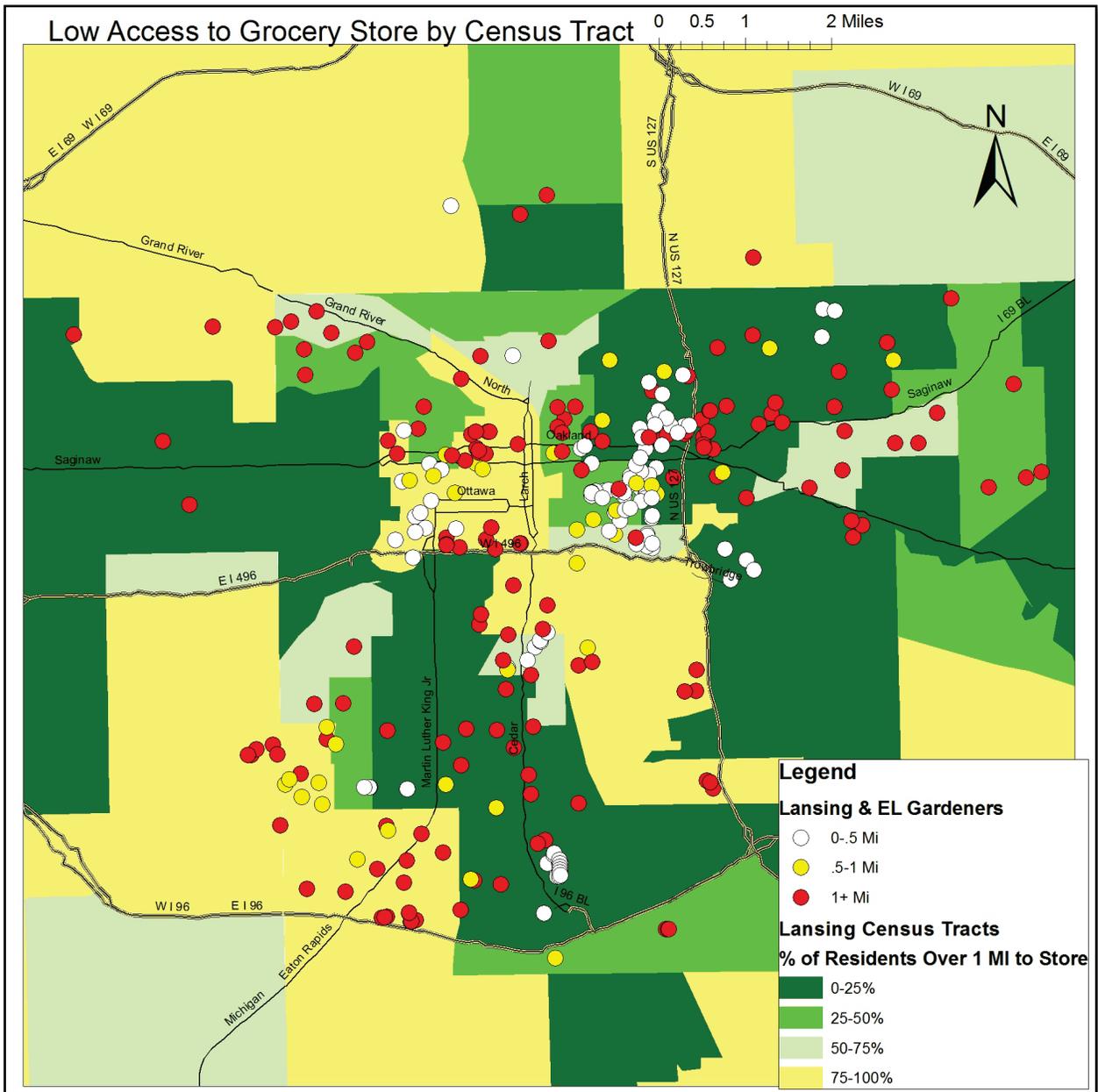
Findings

Community gardens serve as local food distributors and the product of their harvest serve a great number of gardeners and households. Gardeners who utilize community gardens may notice cost saving benefits by growing produce they would otherwise purchase at a grocery store. Community gardens also fill a void in areas of Lansing that lack adequate access to grocery stores. In urban areas, the US Department of Agriculture defines adequate distance to a grocery store is 1 mile or less.



Map 6: Distance Gardeners Travel to Gardens
 Source: Greater Lansing Food Bank

Map 7 shows the distance registered gardeners travel to access their garden plots; nearly half (49%) of all gardeners travel over 1 mile to access their plots. The average distance traveled by Lansing and East Lansing registered garden users is 1.69 miles. It is assumed gardeners who live over 1 mile from their plot rely on transportation methods aside from walking to get to their plots. (Ver Ploeg, 2009).



Map 7: Distance Traveled by Gardeners to Gardens and Grocery Stores
Source: USDA & GLFB

Map 8 combines maps 6 and 7. Areas in Lansing where 75% or more of residents live 1 mile from a grocery store are shaded in yellow. Garden users that live over 1 mile from their garden plot are represented by red points. This map allows you to pinpoint areas of Lansing that could benefit most from the Garden Project.. It can also be used to locate gardeners who may have the greatest reliance on the Garden Project to provide a source for fresh foods.

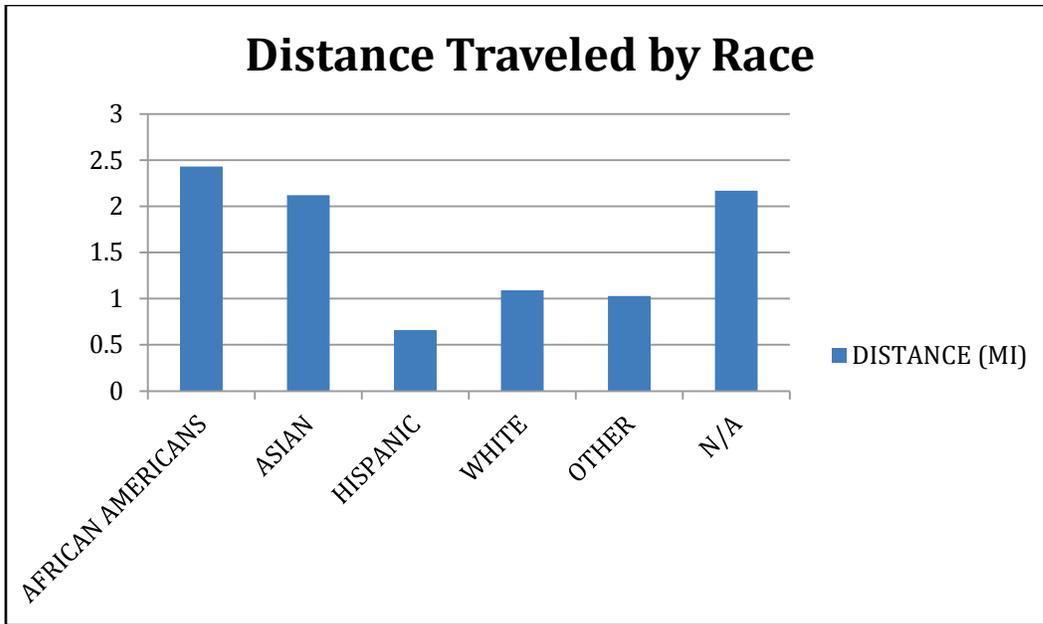


Figure 12: Distance Traveled by Race
Source: GLFB

Figure 12 shows that Asian and African American gardeners who reside in Lansing and East Lansing travel on average 2.21 miles to their plots. This is a substantially greater distance (1.12 miles) than white gardeners who travel on average 1.09 miles.



Figure 13: Distance Traveled by Income
Source: GLFB

Figure 13 shows the distance gardeners with varying income levels travel to their plots. Gardeners who earn the highest level travel slightly shorter distances than lower earning

groups. Gardeners who did not provide income data travel 2.89 miles which is much further than any other group.

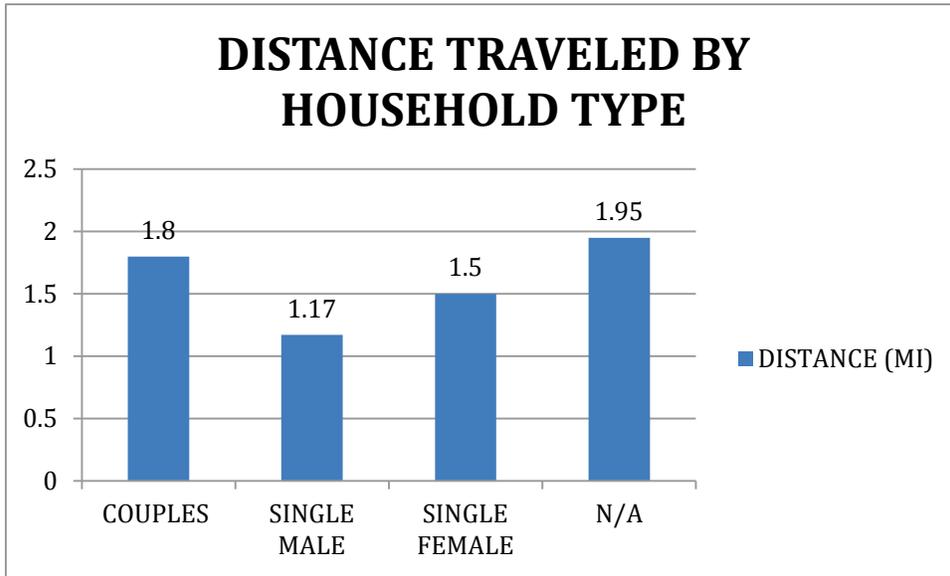


Figure 14: Distance Traveled by Household Type
Source: GLFB

Figure 14 shows the distance traveled to plot by household type. Couples tend to travel further than single female and male households. Similar to Figure 15, gardeners who did not provide information traveled the greatest distance.

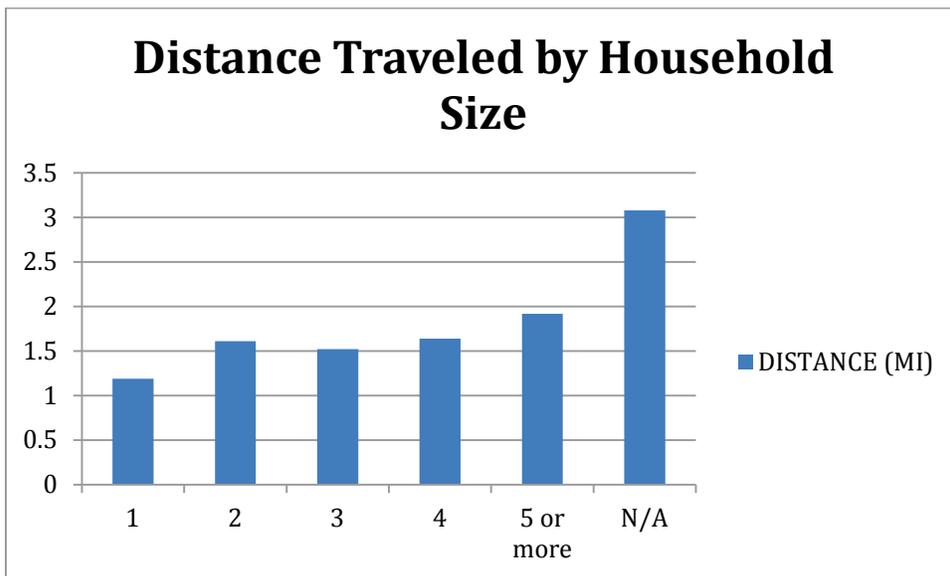


Figure 15: Distance Traveled by Household Size
Source: GLFB

Figure 15 shows the distance traveled by household size. Single gardener households travel the shortest distance at 1.19 mile. The distance traveled has an increasing trend

as the household size increases. Once again gardeners who did not report household size travel substantially further distances.

Figures 12-15 are examples of how demographic data provided by gardeners can be observed and compared. Implementing the proposed survey questions from this report could provide further comparisons. Gardeners who neglected to fill out all the fields of the survey live substantially further from their plots than any other group, this could be caused by them being disenfranchised from the Garden Project due to the great distance they travel to garden.

Recommendations:

- Determine how important distance to the garden is for gardeners by asking them questions regarding travel methods to the garden and the perceived convenience of accessing their garden plot. This will create a greater understanding of the role gardens have in providing an alternative source for fresh food.
- Identify target groups that utilize gardens due to financial hardship or lack of space at home for gardening. These groups may have highest dependence or need for the garden space.
- Minimize the distance traveled by those most in need such as households with no car, single parents with children, the elderly, households with no space to garden and households with lowest income by giving them the highest consideration in garden selection.
- Examine the findings from the maps to identify areas with least grocery store access and work to implement new garden space in these areas. If gardens in perceived “food deserts” are established the linkage between community gardens and their users food security needs may become much more evident.

Carrying out these recommendations will allow gardeners to be paired more closely with the garden that best meets their needs. Reducing the distance user’s travel to garden will limit the expense of plot management. The easier a garden is to access the greater the feasibility will be for gardeners to be active participants at their plots. Gardeners that rely on gardens for food security should be given highest consideration in providing garden space. The recommendations work to determine the extent of which the Garden Project supplies users basic food needs. If gardens are serving as an alternative to grocery stores for residents who lack access or can’t afford fresh produce the need for community gardens becomes more evident and more vital.

Recommended Questionnaire for Community Garden Users

Throughout the analysis of community gardening for the Greater Lansing Food Bank and review of the case studies, it's determined that the best to approach for an impact analysis of gardening through a community is to get information from the users of the garden. In order to quantitatively measure the relationship between the garden user individually and the impact it has on the community, GLFB should distribute a series of questions that tracks the data needed to produce quantitative results for the social, health and economic impacts. The questions developed have been collected and chosen for the sole purpose of measuring the impact of community gardening.

Data Collection Recommendations

The two most significant tools currently utilized by the Garden Project to better understand its users are the registration form and the end-of-season survey. We recommend the continued use of both of these mechanisms, and the recommendations contained in this section seek to build upon these existing methods and to further the Greater Lansing Food Bank's analysis of its impact.

The Garden Project allows gardeners to register for the program on the Greater Lansing Food Bank website, and the demographic information required on that form includes name, contact information, household income, household type, race/ethnicity, and age. It remains unclear why the Garden Project database does not contain age information as would be expected from the registration form. Each of these variables is crucial to understanding the reach of the Garden Project, and it remains important to maintain a detailed gardener registration process. Another crucial aspect of data collection is following a uniform standard. The American Community Survey provides an excellent template for defining variables, dividing categories, and creating scales. In addition, following the existing standard established by the U.S. Census Bureau allows the Greater Lansing Food Bank to make direct comparisons between its clientele and the information available for the greater Lansing region as a whole.

Another available resource for data collection is the American Community Garden Association, which offers templates on their website for a wide range of documents and forms that can help organizations operating community gardens. They include a sample registration form and sample garden evaluation tools (<https://communitygarden.org/resources/>).

Gaps in the user data collected by the Garden Project include age and gender of the gardener. This limits the ability to contextualize the user base of the community gardens within the Lansing region. Another possible alternative could be to ask for gardeners to note if their children are going to be joining them in the gardening process. Understanding the family dynamic of the community gardeners could offer greater insight into the goals of the gardeners.

A major barrier faced by the Greater Lansing Food Bank in its efforts to manage community gardens is the fact that a significant portion of the gardeners are not native English speakers. However, neither the registration nor the survey administered by the Garden Project address language as part of their questions. This presents a tremendous opportunity to increase outreach to gardeners in the Lansing region. We recommend that Garden Project registration include an inquiry into English language proficiency.

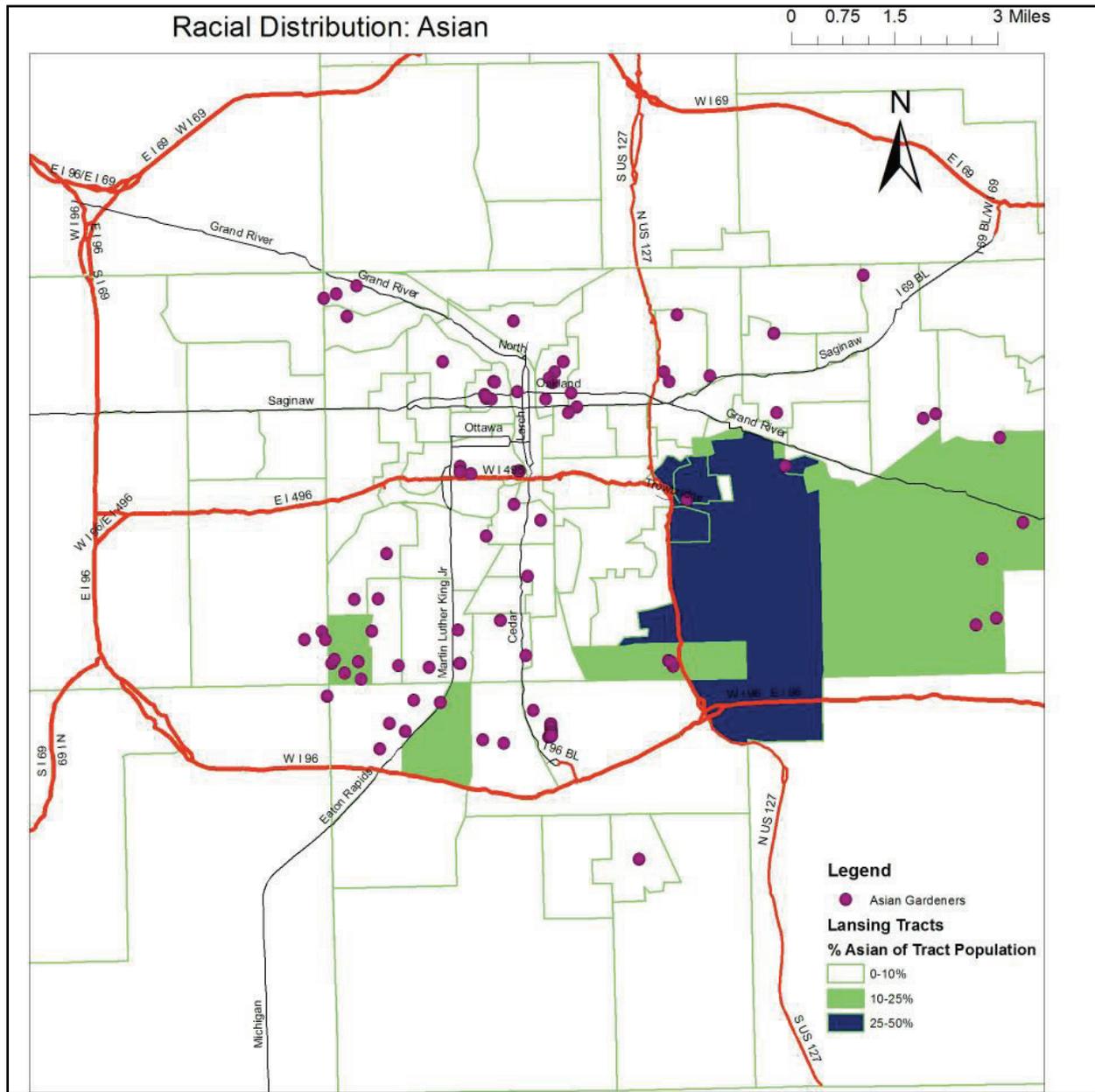
Use of the resources provided by the Garden Project is one of the strongest assets that the GLFB has to offer to gardeners. We recommend that the Garden Project install a policy that the use of free seeds, tools, and other resources be made available only if the gardener has properly registered with the Greater Lansing Food Bank. The registration fee can still be waived,

but this assures that information about the people that the Garden Project serves remains accurate and updated.

Surveys are a critical tool in data collection, and both our literature review and our case studies repeatedly demonstrate the value in administering surveys to those involved in the community garden system. The questions recommended in this report were formulated based on the variables that emerged as important in our literature review and case studies.

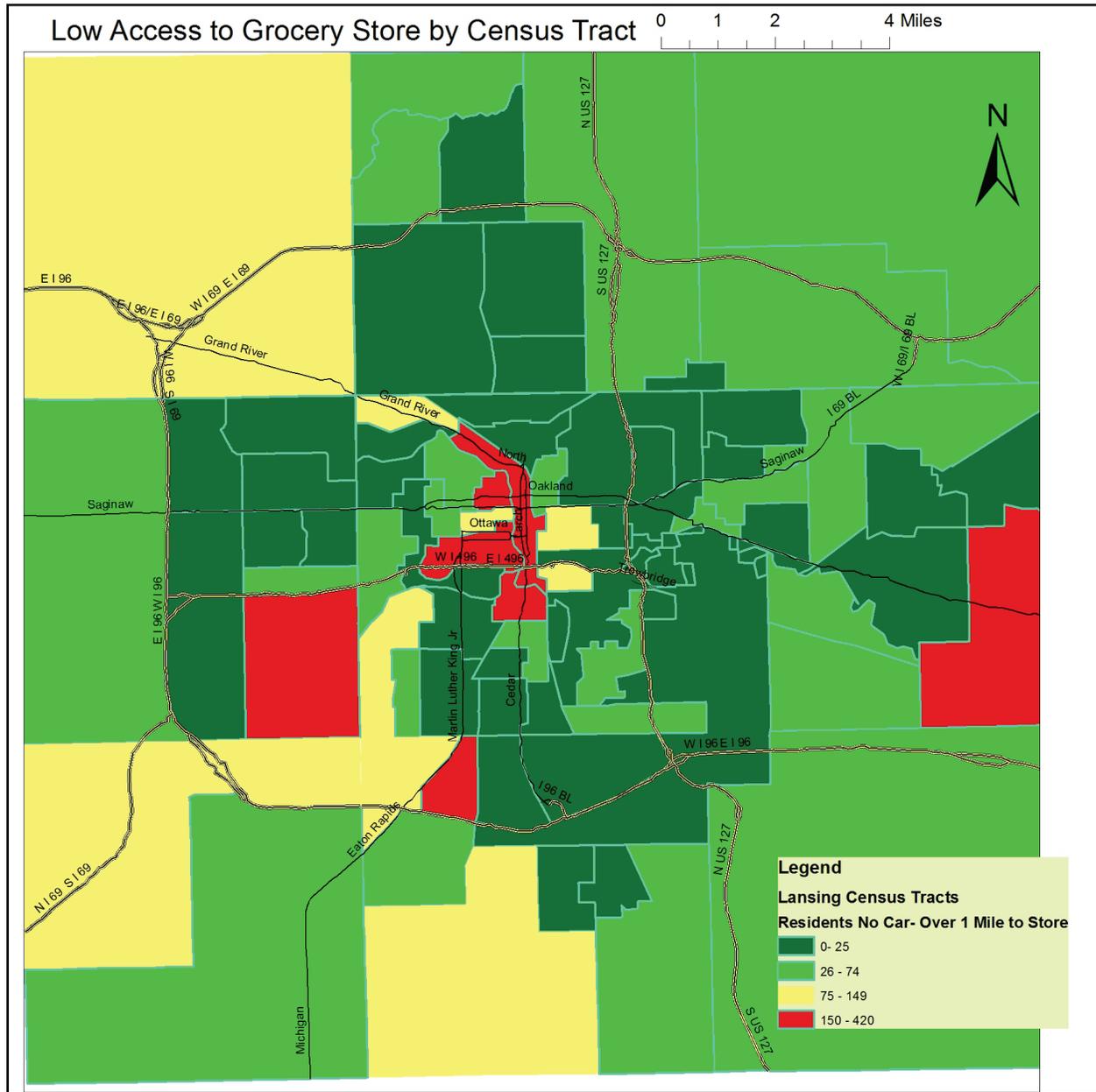
Appendix

Map 9-10 show the distribution of registered Asian and African American gardeners in the Lansing Area. The maps work to find correlation between the demographics characteristics of the Lansing region and community garden users.



Map 8: Racial Distribution of Asian Gardeners
 Source: Greater Lansing Food Bank

Map 11 shows the census tract boundaries in the Lansing area. Using USDA data regarding access to supermarket, areas in red are representative of tracts that have between 150-420 households that have no car and live over 1 mile from a grocery store. These tracts signify areas where a large a number of individuals have difficultly accessing fresh food sources.



Map 10: Tracts with Low Grocery Store Access
 Source: USDA

Crop Production Log		Date Started Planting				
		Latest Harvest				
TOTAL (pounds)	0.00	Total dollar value	\$0.00	1 oz =	28.3495	grams
TOTAL (kilograms)	0.00	dollar/sf not including paths	\$0.00	1 gram =	0.035274	ounce
Green Leaf Lettuce						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		
Broccoli						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		
Cucumber						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		
Zucchini						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		
Arugula						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		
Collards						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		
Turnip						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		
Beets and Beet Greens						
	Date	Harvest Description	Ounces	Grams	Who	Use
	TOTAL		lbs. 0.0	0 g		

Table 7: Crop Production Log
Source: El Cheritto Community Garden Network

Example Data Collection Log

Garden Yields per 100 Grams												
Crop	Total Grams Yield	\$(in grams)	Calories	Vitamin A (ug)	Vitamin C (ug)	Vitamin E (ug)	Vitamin K (ug)	Fiber (g)	Proteins (g)	Carbohydrates (g)	Fe (mg)	Ca (mg)
Green Leaf Lettuce												
Broccoli												
Cucumber												
Zucchini												
Arugula												
Collards												
Turnip												
Beets and Beet Greens												

Table 8: Garden Yields per 100 Grams
Source: El Cheritto Community Garden Network

Nutritional Value: Per 100 Grams										
Crop	Calories	Vitamin A	Vitamin C	Vitamin E	Vitamin K	Fiber (g)	Proteins	Carbohydrates	Fe (mg)	Ca (mg)
Green Leaf Lettuce										
Broccoli										
Cucumber										
Zucchini										
Arugula										
Collards										
Turnip										
Beets and Beet Greens										

Table 9: Nutritional Value Per 100 Grams
Source: El Cheritto Community Garden Network

Dollar Value	
Crop	Date of cost reference: \$/lb organic
Green Leaf Lettuce	
Broccoli	
Cucumber	
Zucchini	
Arugula	
Collards	
Turnip	
Beets and Beet	

Table 10: Dollar Value of Produce
Source: El Cheritto Community Garden Network

Recommendations for Social Questionnaire

The social section of this questionnaire was developed using social capital surveys from the World Bank.

Social Capital

How many families/households working in community gardening do you know by name?

Few/Many/Most

How much time do you spend gardening each week during growing season?

How many of the people you interact with regularly did you meet at the garden or at garden related events/activities?

Most / Some / Few / None

If English is not your first or primary language, has community gardening helped your proficiency in English?

Yes / No

Efficacy

Do you believe that you can make a difference in the community?

Agree strongly / Agree / Neutral / Disagree / Strongly disagree

Do you sign petitions?

Yes / No

Do you attend community/neighborhood meetings?

Yes / No

Do you vote regularly?

Yes / No

Do you think your voice is heard in your community?

Yes / No

Neighborhood/Local Identity/Attachment

Do you trust your local institutions?

Agree strongly / Agree / Neutral / Disagree / Strongly disagree

How often do you volunteer with community organizations like schools or religious congregations?

Weekly / Monthly / Semiannually / Annually

Has your involvement in community/neighborhood groups changed since you joined a community garden?

Yes / No

Self Determination (Questions that would address this would almost be the same as for the Efficacy section)

People in your neighborhood look out mainly for the welfare of their own families and they are not much concerned with community welfare?

Agree strongly / agree / neutral / disagree / strongly disagree

Safety

Do you trust local law enforcement?

Yes / No

How has neighborhood safety changed since you began gardening?

Very much / Some / A little / None

Diversity

What is your gender?

Female / Male / Other

Are you a native English speaker?

Yes / No

Are you a single parent?

Yes / No

Describe your race or ethnicity

Black/African American / Asian / White / Hispanic

Recommendations for Health Questionnaire

How would you describe your general health status?

Excellent/Very Good/Good/Poor

How would you describe your mental health status?

Good/Poor

Do you participate in physical activity during your leisure time?

Yes/ No

How would you describe your weight status?

Normal and Underweight/Overweight/Obese

How many servings of fruit and vegetables do you consume daily?

<5 servings per day/ 5 or more servings per day

Which of the following best describes your capacities to perform everyday activities? (1 being very capable and 5 being not very capable)

Scale 1-5

Do you have reasonable daily access to a full-service grocery store?

Yes/No

What types of fruits and vegetables do you grow in your garden? (Please check all that apply)?

Tomatoes/beets/carrots/potatoes/peppers/berries/Other

Frequency that adults in household eat vegetables.

Several times a day/Once a day/A few times a week/Almost never

Frequency that children <18 years old in your household eat vegetables.

Several times a day/Once a day/A few times a week/Almost never

Other questions regarding the uses of food harvests from garden plots.

What uses did you make of your harvest? Select all that apply.

Prepare Fresh meals/Can for later use/Freeze for later use/Share or Donate/Sell/Other

You balance your household meals with vegetables harvested in garden.

Strongly Disagree/Disagree/Agree/Strongly Agree/Unsure

In what form do you eat vegetables in the winter? Select all that apply.

Fresh from store/canned at home/canned from store/frozen from store/home grown/other

Questions regarding Food Security & Hunger

In past month has your household worried food would run out before money was available to buy more:

Never/Sometimes (at least once)/Frequently (more than once)/All the time

In past month have members in your household skipped meals due to lack of money to buy food:

Never/Sometimes (at least once)/Frequently (more than once)/All the time

In past month has your household been able to afford to eat balanced meals?

Never/Sometimes (at least once)/Frequently (more than once)/All the time

In the past month were you ever hungry but didn't eat because you couldn't afford enough food?

Never/Sometimes (at least once)/Frequently (more than once)/All the time

Recommendations for Economic Questionnaire

Estimate how much money you have saved per month because of the Garden Project?

0-50/51-100/101+

Would you have been able to garden without the assistance of the Garden Project?

Y/N

Do you think your neighborhood has improved because of the garden presence?

Y/N

Estimate the weight of food produced this growing season.

Questions Regarding Access to Gardens

What is the travel distance to garden?

1 mi. /1-5mi./5 or more miles

What is travel distance to nearest grocery store?

1 mi./1-5mi./5 or more miles

Does your household have access to a car?

Yes/No

How do you travel to your garden plot?

Walk/Drive/Bicycle/Carpool/Other

Accessing your garden plot is convenient?

Strongly Disagree/Disagree/Agree/Strongly Agree

Is the garden where you participate your first selection?

Yes/No/Not applicable

Is there a garden you would rather participate at? If so, which one?

Yes _____/No/Unsure

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