

March 2013

# Worcester Food Assessment -- Production and Distribution

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## **Worcester Community Food Assessment**

An Interactive Qualifying Project Report  
Submitted to the Faculty of

**WORCESTER POLYTECHNIC INSTITUTE**  
In partial fulfillment of the requirements for the  
Degree of Bachelor Science

And to the  
Worcester Advisory Food Policy Council, Hunger-Free and Healthy Division

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**Project Code:** RH-01



## **ABSTRACT**

Community food assessments constitute a first step in planning for food security. This study for the Worcester Food & Active Living Policy Council, examined food production resources in Worcester as well as distribution networks, such as farmers markets, community-supported agriculture, and community gardens. Our goal was to help our sponsor better understand the local food system and to identify opportunities to increase the availability of nutritious and healthy food in low-income neighborhoods.

## EXECUTIVE SUMMARY

Food is an essential part of life. It is a basic human need on par with water, housing, transportation and other essential urban infrastructure. In North America, cities are becoming increasingly concerned with how food relates to the urban environment and are encouraging the development of “sustainable food systems” that contribute to quality and livable neighborhoods, meet the health and nutrition needs of residents, and promote economic vitality, social justice, local self-reliance, and environmental sustainability. (Koc, MacRae, Mougeot, and Welsh, 1999)

Food insecurity, defined by United States Department of Agriculture (USDA), is “[a] limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (Cohen, 2002). A food desert is an area in the industrialized world where healthy, affordable food is difficult to obtain, or in other words, a food-insecure area. Using USDA’s food desert locator we have located five food deserts in Worcester.

Several local groups have taken the initiative to address food insecurity in Worcester and its consequences. However, there have been few comprehensive evaluation of the food system currently exists for the City of Worcester. Food resources such as Worcester county farms, farmer’s markets, community-supported agriculture (CSA) drop-off points, and community gardens have not been analyzed in social space, that is, in the context of race, ethnicity and income levels.

The goal of this study was to provide an assessment of food production in the Worcester County food system, and to identify opportunities to increase the availability of nutritious and healthy food in low-income neighborhoods, as well as develop policy recommendations in order to facilitate this availability. This goal was accomplished through data analysis, farmer interviews, and mapping food sources in a geographic information system.

The following is a list of objectives that helped us accomplish our goal.

- Assess trends in Worcester County food production through analysis of USDA census of agriculture data;
- Identify locations of community gardens, urban farms, CSA farms and their drop-off points, and other food production sources and map them in a geographic information system (GIS);
- Identify the challenges and opportunities of distributing food to outlets in specified low-income and underrepresented neighborhoods in Worcester, through interviews with farmers.

In addition, we employed the following methods to accomplish our objectives:

- We accessed trends in local food production using data from the USDA Census of Agriculture. Agricultural census data is crucial to our agricultural trend analysis because it is a reliable source of agricultural record of county- and state-level data. The agricultural trends we focused on included land use for food production, number of farms, types of produce and production volumes, and farmer income.
- We interviewed selected food producers within the Worcester County. We interviewed three groups of farmers: farmers who participate in local farmer's markets, farmers who participate in Worcester County-based CSA programs, and Worcester community garden farmers. Our interviews focused on their current production level, incentives for their choice of distribution method, their opinion on farmer's markets and CSA, as well as challenges they face when selling produce to the city of Worcester.
- We used mapping software to identify the locations of community gardens, farmers markets, CSA farms and CSA drop-off points within Worcester.
- Once we geocoded these data points (e.g., transferring addresses to latitude/longitude coordinates), we used 2000 U.S. Census socio-economic data to look for relationships between distributions of farmers markets, CSA Farms and Community Gardens with respect to income, race and poverty.

After conducting our assessment on the Worcester Food System we identified opportunities to improve the accessibility of fresh, nutritious food for the Worcester community. Based on our analysis of regional agricultural trends, farmers' attitudes toward selling produce in low income neighborhoods; we produced a list of recommendations that addressed our various findings.

Our findings indicate that land in production has declined in the past 20 years on both Massachusetts state level and Worcester County level. However, there has been a 41% increase in number of farms in Worcester County between 2002 and 2007. This marks the emergence of new small-scale farms in Worcester County, which is the result of a wave of new farmers entering food production. Our analysis on farmer profitability showed that 14.6% more farms in Worcester County are reporting net losses in income in 2007 compared to 1997. We also continue to find that while the number of small farms have increased, the average farms net income is about \$8,000. This suggests that many farmers cannot make a living on farming alone and must rely on other jobs as well.

We found that currently there are 62 active community gardens within the city of Worcester, including 14 school gardens. These community gardens are independently run by local individuals who have an interest in farming and helping their community. One of the biggest challenges faced by urban farmers is finding suitable land for establishing a community garden. Most garden land leasing works on a verbal

agreement where community residents simply hope their use of the garden will not be terminated if the land owner has other opportunities to develop the land.

Through our research we have identified 43 declared CSA farms within Worcester County. Even with this relatively large number of farms, we have identified only six CSA drop-offs points in Worcester. The online database for CSA drop-off points is still somewhat limited.

A good way to reach underprivileged communities in Worcester is through direct marketing models such as farmer's markets. In order to sell at the markets, the farmers prepare their merchandise and travel to the markets while spending the majority of the day at the market, which means they have less time to attend to food production. This trade-off is one of the major reasons why farmers tend to sell to immediate neighborhoods or the closest town. Only 4% of CSA farms in Worcester County are located 11 miles or closer to Worcester, meaning a substantial commute for any prospective farmers possibly interested in distributing in Worcester. Several farms we interviewed that didn't participate in any Worcester farmer's markets stated that the profit from selling in Worcester wouldn't cover the travel expenses and opportunity cost of staying in their respective towns. Some that did travel stated that they prefer the Boston area because of its well established farmer's market system. Boston farmer's markets are also larger, in high traffic areas, and customers tend to have more disposable income. Farms located between Worcester and Boston tend to sell in the Boston area as they observed from experience that selling in Boston farmer's markets was more profitable.

In this report, we have been able to analyze the Worcester foodshed, its challenges and opportunities in a general way. Our recommendations are similarly broad but, hopefully, are a blueprint for moving forward in addressing food insecurity and further investigation.

Our recommendations:

- Implement EBT payment system at all farmers' markets
  - Key Challenges
    - Demonstrating benefits outweigh hassle
    - Adoption by Farmers
  - Strategies
    - Aid farms in enrollment process
    - Share insight from existing EBT Farms
- Creation of local growers network
  - Key Challenges
    - Requires technical and labor resources
    - Database upkeep required to remain useful

- Strategies
  - Online/Web database simplifies process
  - Collaboration with existing online food databases to unify information
- Expand mobile market's route to cover more food insecure areas
  - Key Challenges
    - More research needed to be successful
    - Needs more collaborations with local farmers
  - Strategies
    - Utilize "National Mobile Market" framework
    - Utilize GIS maps to target underserved areas within Worcester
- Establish a unified Worcester Foodhub
  - Key Challenges
    - Bringing all portions of Worcester's food system together will be difficult
    - Will require massive restructuring of current food system
  - Strategies
    - Utilize a hybrid model combining boutique, education, and online models
    - Delegation and talks to help bring all aspects of Worcester's food system together.



## **ACKNOWLEDGMENTS**

Our team would like to thank the individuals who gave their time to work with us for this project since its beginning. It is through their support, assistance, and guidance that we were able to complete this project.

We would first like to thank Liz Sheehan Castro, who provided us with the opportunity to work on this project. The Hunger-free and Healthy final report that she co-authored provided helpful information for our background research.

We want to thank our advisor, Professor Robert Hersh, for his continued support and constructive comments on numerous drafts of our report.

We would like to thank Casey Burns, Food Justice Program Director, for providing us with important information regarding the Regional Environmental Council and Worcester community gardens.

We would like to thank the farmers who provided us with the interview opportunities and important information regarding local food production and distribution.

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# 1. INTRODUCTION

In 2010, 48.8 million people in the U.S. lived in food-insecure households. (Coleman-Jensen, Nord, Andrews, and Carlson, 2011). The United States Department of Agriculture (USDA) defines food insecurity as “[residents who do] not have access at all times to enough food for an active and healthy life, with no need for recourse to emergency food sources or other extraordinary coping behaviors to meet their basic food needs.” (USDA Community Food Security Assessment Toolkit 2002, 2) Food insecurity can be caused by the lack of one or more of the following: availability, access, proper utilization. Food availability is “the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).” (FAO Agricultural and Development Economics Division Food Security Policy Brief, 2006, 1) Food access means having sufficient resources, both economic and physical, to obtain appropriate foods for a nutritious diet. Proper utilization means appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

In an ideal world, fresh and nutritious food would be easily accessible to all members of a community. There would be more outlets that sell healthy and nutritious foods in low-income neighborhoods, closer ties between producers and consumers through farmer’s markets and community-supported agriculture (CSA); opportunities for people to grow their own food in community gardens or to start urban farms; and effective education and outreach to inform people about food preparation. Our current situation, however, is far from ideal. According to a recent study by the Worcester Food Advisory Council, out of the 14 low-income neighborhoods in Worcester, one in three children lives in a family that cannot meet its basic nutritional requirements (Hunger-Free & Healthy). Hunger in Worcester County grew dramatically between 2001 and 2005, with a 40% increase in the number of people served by the food pantries and soup kitchens associated with Worcester County Food Bank (Castro, Landers, & Man, 2012).

Hunger-Free & Healthy is a project developed by the Worcester Food & Active Living Policy Council (WFALPC) to address hunger and obesity as a community-wide public health issue with creative, community-based approaches that emphasize access to and availability of food at the community level. The WFALPC seeks to make systemic changes in the local and regional food systems. The information presented in this report will help Hunger-Free & Healthy better understand production trends in Worcester County, the locations of food resources in Worcester County, food producer attitudes, and the potential for food security improvements. The findings and recommendations are aimed to aid community leaders and other stakeholders in developing appropriate strategies to improve food security in the Worcester community.

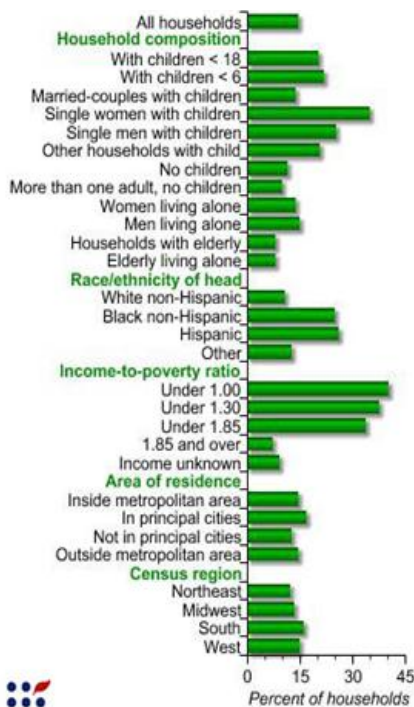
## 2. BACKGROUND

Community food security assessments have been conducted to analyze food production, distribution, consumption, and disposal in different scales around the United States. In this section we examine food insecurity in the United States. We then discuss the principles of community food security assessments and review key studies. We will then investigate the use of geographic information systems in community food security assessment, and conclude with a background on food security in Worcester.

### 2.1 Food Insecurity

In the recent decades the United States' food system has evolved the ability to stock shelves with large

**Figure 1 - Prevalence of Food Insecurity**



Source: Calculated by ERS using data from the December 2010 Current Population Survey Food Security Supplement.

amounts of nutritious food. With this abundance of food, nutritional deficiencies such as iron and vitamin deficiencies of the early 1900s have essentially vanished (Insel, 2010). Between the years 1980 and 2000, per capita food consumption in the U.S. grew from 1,800 lbs to 2,000 lbs per year (Potukuchi, 2004). We have seen, however, an increase in the number of food insecure households throughout the country. Statistics from the USDA show that 14.5% of households in the U.S. were food insecure in 2010.

Food insecurity has been defined by the USDA in its food assessment as “[a] limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (Cohen, 2002). Food insecurity can result in starvation, although rare, nutritional deficiencies, and diet-related medical conditions, such as Type II Diabetes and obesity (USDA).

Food insecurity is strongly associated with household income, household status, and race/ethnicity. The United States Census Bureau uses income thresholds that vary by family size and composition to

determine who is in poverty. Each household is assigned a threshold according to the size of the family and the ages of family members. Total household income divided by the assigned threshold is called the *Ratio of Income to Poverty*. The U.S. Census Bureau defines that a family is in poverty if total family income is less than the threshold appropriate for that family. In other words, a household is in poverty if its income-to-poverty ratio is less than one. Figure 1 displays household type related prevalence of food insecurity. Several

household types had significantly higher food insecurity rates compared to national average of 14.5%. 40.2% of food insecure households in 2010 had income below the Federal poverty line. Single parents with children were especially vulnerable to food insecurity, with 35.1% and 25.4% food insecure rate for single women and men respectively. Black and Hispanic households also had higher rates of 25.1% and 26.2% respectively. Overall food insecurity is prevalent in households with children, as they had nearly twice the rate of food insecurity as those without children. (USDA Economic Research Service)

## 2.2 Community Food Assessments

In her food security guide, "A First Step in Planning for Community Food Security", Pothukuchi (2004) states that a widely used definition of community food security is "a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice" (p. 357). This approach redefines food security in a broader framework: it seeks to revitalize locally grown foods as well as strengthening and analyzing local agriculture. Mark Winne (2003) further expands upon this definition by noting "Community Food Security, in its fullest expression, draws on a range of community food system resources, invites the participation of many individuals and sectors, and promotes solutions that reduce food insecurity and build the health and well-being of the wider community" (pg. 1). In contrast to focusing on food access for individuals and households, community food security considers how all residents in a community can obtain a safe and nutritious diet through a sustainable food system that maximizes community self-reliance.

The USDA Community Food Security Assessment Toolkit defines that communities may be considered to be food insecure if

- There are inadequate resources from which people can purchase foods;
- The available food purchasing resources are not accessible to all community members;
- The food available through the resources is not sufficient in quantity or variety;
- The food available is not competitively priced and thus is not affordable to all households;
- There are inadequate food assistance resources to help low-income people purchase foods at retail markets;
- There are no local food production resources;
- Locally produced food is not available to community members;
- There is no support for local food production resources;
- There is significant household food insecurity within the community. (USDA Community Food Security Assessment Toolkit, 2002)



Community food system assessments (CFAs) are a relatively new way of analyzing a set of community concerns around some aspect of food. CFAs are activities to collect and disseminate information on selected community characteristics so that community leaders and agencies may devise appropriate strategies to improve local food security. CFAs typically examine community food production resources, food resource accessibility, food availability and affordability, and community socioeconomic and demographic characteristics. According to the Community Food Security Coalition, components of CFAs' need assessments include information on access to food; hunger, nutrition, and local agriculture data; an inventory of community food resources; and policy perspectives (Joseph, 1997). CFAs are usually conducted by nonprofits, community-based organizations and coalitions, and academic institutions. The assessment's goal is to collect information to identify gaps and needs in the community and the resources, services, and systems that could be used to fill the gaps, and meet the needs of residents. Some common threads to CFA planning are needs of low-income residents, sustainability of the food system, and the community as a unit of solution to food system problems.

We undertook case studies on three CFAs conducted in different regions (San Francisco, Philadelphia and Oakland) in the United States to discover common themes in CFAs and draw references for this study. Similar to this study, the San Francisco study examined the challenges of distributing healthy local produce to population that lived on the edge of poverty by examining possible linkages between low income communities and local/regional growers. The Philadelphia study examined agricultural characteristics of the Philadelphia foodshed to explore its food supply potential. The study also included a stakeholder analysis and interviews to better understand the current state of the food system and detect gaps in research, food security related support services and nonprofit activities. The Oakland study is of interest to us because it examines in depth the opportunities and potentials of supplying a city's food needs with local food, paying special attention to urban agriculture. Similar to our study, the Oakland study utilized a Geographic Information System to analyze locations of farmer's markets, community gardens, food retail stores in respect to social economic variables. See Figure 2 for brief comparison of the three assessments.

**Figure 2 - Previous Food Assessment Summaries**

Location	Goal of Assessment	Scope	Issues Examined	Methods	Major Findings
<b>San Francisco</b>	How much food is produced in San Francisco foodshed, and how much is entering the city, and if it would be possible to be completely self sufficient.	San Francisco and a custom defined foodshed of 100 mile radius from the Golden Gate Bridge.	Where local food is going, consumption in city, where production is happening, land types in foodshed, other factors stopping farm development (e.g. flooding, etc.)	Statistical research of production, documentation review, interviews of personnel involved.	Food origins are difficult to trace; however good distribution network would enable foodshed to support the area.
<b>Oakland</b>	Evaluation of food system, to better help all players in system to work more efficiently together.	Custom foodshed that spans 32 counties.	Assessing local food consumption, urban gardening, food production, processing, distribution, and waste.	Research of existing statistical data, informed estimation on missing data, interviewed major participants in food local food system.	Most locally produced food is exported out of the foodshed; with policy changes Oakland could become center of food distribution to local sector including to low income communities.
<b>Greater Philadelphia</b>	Understand local food system and its relation to global food system, fill in gaps of information and break down the food system into a more understandable idea.	Philadelphia and custom foodshed of 100 mile radius from Philadelphia.	Amount of agricultural resources in foodshed, general transportation and distribution of food, city food demand, food economy (e.g. supermarkets, food wholesalers), stakeholder analysis.	Analyzing agricultural census data, federal highway data, food freight frameworks, analyzing all food distribution centers/stores of the city and compare to demand, interview and surveying stakeholders of the local food system.	Demand for cheap food is threatening healthy local foods; foodshed is not large enough for population in the area; majority of food is exported out of foodshed; the growing influence of large private distributors makes it very difficult to trace food supply lines; current policy on strengthening local food sales needs to be scaled up.

## ***SAN FRANCISCO***

The San Francisco food assessment was initiated by the local division of American Farmland Trust in order to increase the interest of all city consumers in locally grown food and to conserve the land from which food comes. Three organizations sponsored it: American Farmland Trust (AFT), Sustainable Agriculture Education and Agriculture in Metropolitan Regions. AFT is the nation's leading advocate for farm-and-ranch land conservation. Sustainable Agriculture Education (SAGE) is a nonprofit organization dedicated to engaging regional diverse populations with the sustainable agriculture movement and developing urban edge agriculture as a vital urban-rural interface. Agriculture in Metropolitan Regions is a program within the Center for Global Metropolitan Studies at the University of California, Berkeley.

The goal of the study was to explore how San Francisco could increase the amount of locally-produced food it eats, if not to the level of regional self-sufficiency, at least to the point where it would demonstrably improve the city's quality of life while reducing its impact on the environment.

The following is a list of key questions of the study:

- Could the City of San Francisco feed itself entirely from what is produced by farms and ranches within 100 miles of the Golden Gate?
- What are the specific obstacles to increasing local production of commodities for local, as opposed to global, markets?
- What are the challenges of distributing healthy, local produce, not only to the well-off, but to the substantial proportion of San Francisco's population that lives on the edge of poverty?
- What opportunities are there to increase the interest of all City consumers in locally grown food?

The production side of the study encompassed 25 counties, all or part of which fall within 100 miles from the Golden Gate Bridge.

The study has three basic parts: The first is a statistical analysis of food production within 100 miles of the Golden Gate, the resource base from which it comes, and food consumption in the City of San Francisco and the Bay Area. Second, they reviewed publications, Web sites and other documents, and interviews with experts in food, agriculture, environment and business to understand how food moves from farms to consumers, as well as of the organizations that are working to promote more locally grown and marketed food in the region. Finally, they used the same approach to investigate the obstacles to, and

opportunities for, expanding both local consumption of locally produced food and the production of locally grown food specifically for local consumers.

The study found that food produced within the San Francisco foodshed each year is more than enough to supply the consumption need of the city. However, it is impossible to determine precisely how much locally grown food is consumed in the city. They also found that farmers markets, CSAs and other self-consciously local food outlets constitute the fastest-growing segment of the food system. However, they remain a small fraction of overall food production and seem to appeal mainly to consumers with more disposable income.

The final report recommended that in order to increase consumer linkage to producers, distributors and food outlets should help make the provenance of food more transparent so that food can be traced from farm to fork. It suggested that private sector companies, schools, hospitals should consider buying and facilitating transportation of locally grown food to for cafeterias. It also suggested that the infrastructure for storing and transporting local food in-season, and for processing and preserving local food for out-of-season consumption, should be expanded.

## ***PHILADELPHIA***

The Delaware Valley Regional Planning Commission (DVRPC) conducted the Philadelphia Food Assessment. It addressed numerous challenges and opportunities facing the food system, including: land constraints and development pressures; contradicting health effects of malnutrition and obesity; food access in urban and rural areas; food distribution; and economic development.

The study's goal was to better understand the complicated regional food system that feeds Greater Philadelphia. The committee recommended a 100-mile foodshed as a geographic area in which Greater Philadelphia could source its food. Some of the key research questions in the study were:

- What are the characteristics of the 100-Mile foodshed's agricultural industry?
- How does food travel through the country and to Greater Philadelphia?
- What are the gaps in research, support services, programs, and nonprofit activities?

Using data from the Census of Agriculture, National Resource Conservation Services, and other sources, this study focused on the characteristics of the 100-Mile foodshed's agriculture industry, which is the supply side of the regional food system. To paint a general picture of how food travels throughout the country and to Greater Philadelphia, it utilized data compiled by the Federal Highway Administration (FHWA) to create a Greater Philadelphia Food Freight Analysis Framework (Food FAF), which identifies the region's largest trading partners, its competitive advantages, and its exports. They also undertook a Stakeholder Analysis. By surveying many different people through a variety of methods, DVRPC learned

about the food system's complex issues; collected information about other projects, reports, programs, and efforts.

The assessment found that since the 100-mile foodshed is one of the densest regions in the country, with more than 10 percent of the nation's population on 1% of the nation's land, Greater Philadelphia has an amazing market opportunity for the region's diverse agricultural producers. However, low-density development threatens the viability of agriculture close to population centers and the retention of valuable soils in the area.

The 100-Mile foodshed's local food supply is not sufficient to meet Greater Philadelphia's consumer demand. Producers often distribute their products to larger metropolitan areas, such as New York City and Washington, D.C. The study found four main challenges for Philadelphia's local food production. The first was land use and how food systems take up a significant amount of land in metropolitan areas. Another is bringing access to affordable healthy foods to low income urban areas. Continuing, transportation was a major issue as food is a high turnover commodity. Finally is the challenge of the significant amount of energy required to produce, process and transport the food. Also, the amount of food consumed is greater within the inner-city. Their proposed strategy is that the government should provide policy support to ensure the long-term viability, while maintaining relationships with a larger network of markets and producers.

## ***OAKLAND***

The Oakland Food Assessment was conducted by Oakland Mayor's Office of Sustainability and the Department of City and Regional Planning at the University of California, Berkeley. It was initiated in 2006 by then-Mayor Jerry Brown's Office of Sustainability in order to begin a process of evaluating each element of the food system in Oakland, and to provide key baseline information on the various activities that represent it.

The goals of this study were to: assess the capacity for the immediate region surrounding Oakland to serve as a foodshed, as well as the capacity within Oakland to produce local food.

The agricultural region surrounding Oakland includes three distinct agricultural regions: the Central Valley, Central Coast and Bay Area. These regions are immediate neighbors to the city of Oakland; researchers defined the total of these regions as Oakland's foodshed.

The research team conducted profiling and analysis on the three region's regional agriculture data. This included a census of categorized food producers in the regions. They examined direct marketing from the regional foodshed. They also conducted profiling and analysis on urban agriculture in the three regions. With Geographic Information System, they identified the spatial relationship between urban garden locations to demographic variables.

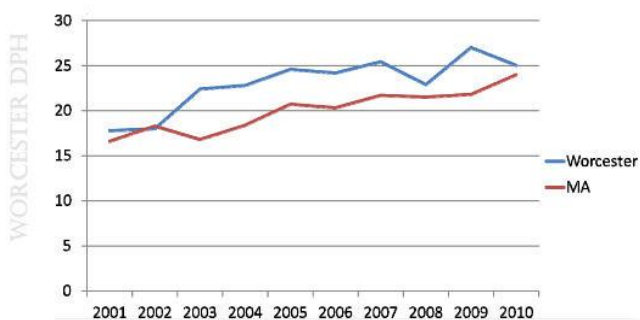
The study found that the agricultural region surrounding Oakland produces enough food to provide Oakland residents with more than 30 percent of their consumption. The study also determined that long-term land security for urban gardens can be improved by giving these gardens a special zoning designation and developing explicit land-use policies that support urban agriculture, which integrates urban food production with residential development. It suggests that underutilized parcels in the city to be served as long-term garden spaces. A first step is to establish a database of public and private available land, which facilitates administrative organizations to systematically manage the use of the land.

### 2.3 Food Security in Worcester

In North America, cities are becoming increasingly concerned with how food relates to the urban environment and are encouraging the development of “sustainable food systems” that contribute to quality and livable neighborhoods, meet the health and nutrition needs of residents, and promote economic vitality, social justice, local self-reliance, and environmental sustainability. (Koc, MacRae, Mougeot, and Welsh, 1999)

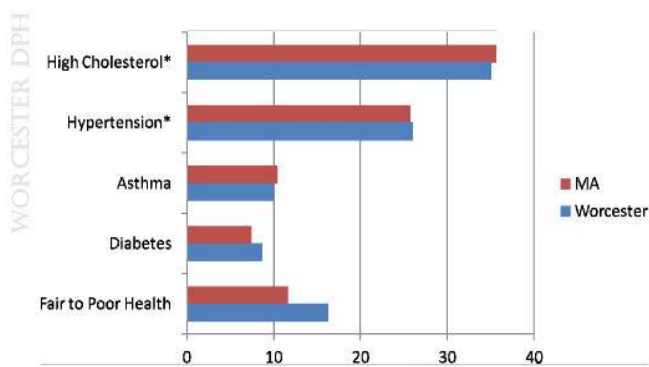
An indicator of a city’s food security is its residents’ health. Studies show that Worcester residents have higher prevalence of diseases that are related to diet. Figure 3 shows that throughout the years 2001 to 2010, Worcester’s obesity rate was constantly higher than the Massachusetts average. Worcester adults have higher prevalence of Hypertension, Diabetes and Fair to Poor Health compared to Massachusetts average, as shown in Figure 4. (MassCHIP 2009 Health Report)

**Figure 3 - Obesity among Adults: Worcester vs. Mass Average**



Source: MassCHIP 2009 & CDC

**Figure 4 - Chronic Disease of Worcester Adults**



Source: MassCHIP 2010 \*2009 data

Another indicator of food security is the existence of food deserts. A food desert is an area, typically a populous urban environment, in the industrialized world where healthy, affordable food is difficult to obtain. We used the USDA food desert locator to locate potential food deserts in the city of Worcester. The USDA defines a food desert as “a low-income census tract where either a substantial number or share of

residents has low access to a supermarket or large grocery store.” The Food Desert Locator includes characteristics only for census tracts that qualify as food deserts. All store data come from the 2006 directory of stores, and all population and household data come from the 2000 Census of Population and Housing. When calculating, the locator chooses key census information such as vehicle ownership, income level, household proximity to store, food access of children and elderly to provide an estimate for level of food access in 1-km square grids. Using the USDA food desert locator, five food deserts were found in Worcester. (See Figure 5)

**Figure 5 - Worcester Food Deserts**



The food deserts concentrate in three general areas of Worcester: the southwest, the north east and main south.

Several local groups have taken the initiative to address food insecurity in Worcester and its consequences. The Regional Environmental Council (REC), a grassroots environmental justice organization located in Worcester, is dedicated to building healthy, sustainable and just communities in Worcester. Their Food Justice Program focuses on promoting community leadership and creating access to food for Worcester’s most food insecure communities. The program includes a community gardens network (UGROW), an urban agriculture project for youth development (YouthGROW), farmer’s markets, and a cooking education project.

The REC established Main South and Great Brook Valley farmers’ market in 2009 and 2010 respectively. Both markets are able to accept payments using Supplemental Nutrition Assistance Program (SNAP) benefits, Women Infants and Children (WIC) coupons and senior coupons. The REC also works with local and statewide organizations to improve public policy on food security and urban environmental issues as well as educate the general public on environmental justice issues including food security.

The Worcester Advisory Food Policy Council aims to “work with the Worcester community to reduce hunger and increase food security and the overall health of residents of Worcester.” (Castro, Landers & Man, 2012, p.11) The organization currently focuses on improving food security through increasing SNAP enrollment, improving the quality of nutrition in the Worcester Public Schools and initiatives to support farmers’ market, community gardens and nutrition classes.

Hunger Free and Healthy was a project of the Worcester Food and Active Living Policy Council. From 2007 to 2012, Hunger Free and Healthy helped residents acquire knowledge of healthy food as well as assistance in receiving SNAP benefits. A report by Hunger Free and Healthy discovered that 80% of children

in the Worcester public school system met requirements for free or reduced lunch. (Castro, Landers & Man, 2012) With a focus in childhood hunger, Hunger Free and Healthy improved the nutrition of meals in Worcester Public Schools. They have ensured that bread products are 90% wheat, and offering a fruit or vegetable at least four days a week.

Hunger Free and Healthy (HFH) also worked on promoting school garden programs within the public school system. This project aimed to educate teens and young adults about the importance of maintaining a healthy diet.

The late farmers' market organizer Adam O'Keefe and Worcester County Food Bank are also actors in the city's effort to improve food security. Local groups such as Worcester Food Bank have all made great progress in the past five years in improving Worcester food security. However, no comprehensive evaluation of the food system exists for the city of Worcester. Within Worcester County, many different actors are working within the food system, such as health professionals, school officials, waste management companies, food retailers and processors, farmers, community- and faith-based organizations, and various city and county staff. However, increased coordination and collaboration would allow these actors to better understand the food system as a whole. Some links in the Worcester food system were still unknown. Food resources such as farms, farmer's markets, CSA drop-off points, and community gardens have only been mapped a few times and few spatial analysis of these resources have been carried out. The incentives for farmers to sell in the city of Worcester had never been investigated. Therefore, our team decided to focus our research on the mentioned unknowns.

## **2.4 Geographical Information System**

Geographical Information System, or GIS, is a mapping system designed to capture, store, manipulate, analyze, manage, and present all types of data that are linked to location. GIS has recently gained popularity in many community food assessments (Clarke et al. 1996). GIS is used by researchers to understand structural variables within specified environments (Kistemann et al. 2002). GIS technology is valuable to community food assessments due to its ability to expand available data and provide powerful visual evidence for decision makers (Sieber 2006).

Though sometimes considered "a simple extension of statistical analyses" (Ricketts 2003, 3), GIS actually comprises a broad range of functions: "collect, store, manipulate, analyze, and display information" (Jankowski 2009, 1966). In community food assessment research, GIS has been used as a tool to visualize relationships between variables, and to investigate hypothetical relationships between variables (Carr et al. 2005). In this study, GIS is a visualization tool that serves as the foundation for interpreting spatial data.

GIS is commonly used as a research tool, but its value also lies in its ability to inform decision-making processes. Two types of data are involved in GIS mapping: (1) geometric data that has a coordinate based reference, and (2) attribute data containing the factual information (Kistenmann et al. 2002). For example,



GIS analysis of food deserts and the median income of a certain neighborhoods would require both food availability statistics and geographical information. The two data types complement each other to display geographical relationships within the defined area. This feature of GIS ties together two important concepts of food security: availability and accessibility. For example, while the exact number of grocery stores in a city indicates the number of available food sources, the location and service radius of the grocery stores tells us about how accessible they are to the city residents. Combined with social-economic variables such as percentage in poverty and concentration of minority groups, GIS maps can offer powerful information for decision makers.

The following three case studies demonstrate how GIS helped food security researchers understand their local food systems and how it provides valuable information for decision makers. A summary of GIS application in these cases can be seen in Figure 6.

Summary of GIS Applications in Food Assessments				
Study	Key Questions	Methods	Census Geography Used	Findings
San Francisco Collaborative Food System Assessment (Food Production Component)	What's the frequency and distribution of community gardens within open spaces and neighborhoods?	Formal document reviews, data collection, GIS mapping	Locations of Community Gardens - Open Space in San Francisco	Although San Francisco is a dense city, there is potential for food production within community and school gardens, as well as in other open spaces.
	What's the current state of food distribution in San Francisco?		Locations of Community Gardens - Percentage Poverty	There are many opportunities for urban food production in lower-income neighborhoods to improve residents' diet and nutrition.
San Francisco Collaborative Food System Assessment (Distribution Component)	How accessible are community gardens in Oakland?	Research of existing statistical data, informed estimation on missing data, GIS mapping	CSA Drop off Sites - Median Income	Drop off sites concentrated in the wealthier neighborhoods in center of San Francisco. The areas with the lowest median household income contained close to none CSA drop off sites.
A Food System Assessment for Oakland	How accessible are Food Retail in Oakland?		Locations of Community Gardens - Population Density - 1/4 Mile Service Radius	Locations of Full Service Grocery Stores - Percentage of Household Without Car
	Think Globally, Eat Locally: San Francisco Foodshed Assessment	What is the accessibility of food outlets for different neighborhoods?	Sizes and Locations of Retail Food Markets - Population per Square Mile - 1/2 Mile Service Radius of Large Stores	In some neighborhoods, food accessibility is low due to the lack of retail outlets that carry a full range of healthy foods. Though the most densely populated areas are well served by retail food markets, some communities have no or very limited options of retail food markets.

Figure 6 - GIS Case Studies Summary

### **Case 1: San Francisco Collaborative Food System Assessment**

This study was conducted by the San Francisco Food Alliance (SFFA) in 2005. The assessment analyzed several characteristics of community food security in San Francisco to influence local policies and programs. Four components of the local food system were examined: production, distribution, consumption, and recycling. We focused on the production and distribution components since they are the more relevant to our project.

In the Production section, the assessment examined the frequency and distribution of community gardens within open spaces and neighborhoods. The first map compared the locations of community gardens to open space areas in the city. In the map analysis, the researchers reminded readers that it's important to understand "not only how much of San Francisco's open space is dedicated to community gardens, but to identify opportunities for gardening." (San Francisco Food Alliance 2005, 22). The map indicated that many community gardens concentrated in a few of the western neighborhoods and a central southern area. In this case, the GIS map can help decision makers identify the exact areas of the city where urban gardening potential exist. Another map illustrated San Francisco community gardens in relationship to the concentration of populations at or below 185% of the federal poverty level. The researchers found that some neighborhoods with high percentage of population in poverty contain few to none community gardens. In their analysis, the researcher tied the map to food accessibility by noting that "residents in poverty are more vulnerable to hunger and food insecurity" (San Francisco Food Alliance 2005, 23), and suggested efforts to be put into developing urban food production in the neighborhoods with higher percentage of residents in poverty.

In the Food Distribution section, the SFFA assessment examined spatial trends between the location and frequency of CSA drop off sites, and median income by census tract. The map illustrates that the drop off sites concentrated in the wealthier neighborhoods in center of San Francisco. The areas with the lowest median household income contained close to none CSA drop off sites. Though no further analysis is written about the map, the map itself is a clear illustration of how the two variables relate. It is also a helpful tool to identify target areas in which new CSA drop off sites should be established.

### **Case 2: A Food System Assessment for Oakland**

A collaborative effort between Oakland Mayor's Office of Sustainability and University of California, Berkeley, this 2006 food assessment is an overall evaluation of the Oakland food system. It examines local food production, processing, consumption and waste.

In order to illustrate the accessibility of community gardens in Oakland, the study utilized GIS technology to visualize locations of community gardens in comparison to population density. In addition, a ¼ mile service radius defined as the distance a person would normally walk to reach food sources is shown

around each garden. This indicator gives the reader a better idea of to what extent the community gardens are effecting food accessibility of nearby neighborhoods. Researchers remarked that “some of the more densely populated areas where community gardens could provide much needed opportunities for engaging with green space and fresh, nutritious produce lack community gardens.” (Unger et al. 2006, 29) This observation, along with the map, provides valuable information for decision makers to evaluate the impact of existing gardens on the nearby communities and pin-point areas where opportunities for improvement exist.

Another application of GIS in the Oakland study compares the locations of full service grocery stores to percentage of household without car. Two “buffers” around each location are shown: the ¼ mile and the 1 mile service area boundaries. Both radii are walking distances, while the ¼ mile being the more reasonable walk. The researchers observed that households in three specific neighborhoods are “more likely to lack access to full service grocery”. (Unger et al. 2006, 58) The researchers reasoned that proximity to full-service grocery outlets is even more critical to the neighborhoods with low vehicle access rates, which in turn impact their accessibility to fresh, nutritious produce. After locating the underserved communities in GIS, the researchers were able to conduct an in-depth and accurate analysis on the feasibility and barriers of improving the food retail landscape in these areas.

### **Case 3: Think Globally, Eat Locally: San Francisco Foodshed Assessment**

This study is conducted by associates of three organizations that promote sustainable agriculture: American Farmland Trust, Sustainable Agriculture Education, and Agriculture in Metropolitan Regions Program of UC Berkeley. The study investigates the possibility of making the San Francisco foodshed self-sufficient.

One of the key issues examined is the availability and accessibility of fresh food retail sources for communities in San Francisco. In their analysis, the researchers displayed locations of retail food stores of three sizes (large, medium and small) and their respective service radii with all neighborhoods color coded by population per square mile. In some neighborhoods, food accessibility is low due to the lack of retail outlets that carry a full range of healthy foods. From the map, it was concluded that although the most densely populated areas are well served by retail food markets, some communities have no or very limited options of retail food markets. Underserved communities are clearly displayed in the map. Combined with survey results on the residents’ preference in choosing food sources, the researchers further argued that the lack of retail outlets is the most prominent factor of food insecurity in these communities.

Our Worcester Community Food Assessment utilized GIS in a similar fashion as the proceeding examples to identify trends between social and geographical relationships. Similarly, the GIS-generated maps helped us understand the availability and accessibility of Worcester food sources.

### 3. METHODOLOGY

This study's goal was to provide an assessment of food production in Worcester County food system, and identify opportunities to increase the availability of nutritious and healthy food in low income neighborhoods. This was accomplished through data analysis, farmer interviews and mapping food sources in a geographic information system. The following is a list of objectives to help us accomplish our goal:

- Assess trends in Worcester County food production through analysis of USDA census of agriculture data.
- Identify locations of community gardens, urban farms, Community Supported Agriculture (CSA) farms and drop off point and map them in a Geographic Information System (GIS)
- Identify the challenges and opportunities of distributing of food to outlets in specified low income and minority neighborhoods in Worcester through interviews with farmers.
- Develop plans to improve food access for food insecure neighborhoods.

This chapter describes the approaches that we took to carry out this project and achieve these four objectives.

#### 3.1 Assessing Trends in local food production

The amount of land in agricultural production can serve as both a measure for farmland capacity and the health of the regional agricultural industry. A decrease in land in production can result from decisions by a farmer to keep certain land out of production; it can also indicate farmland loss to development (Hastings, 2001). To analyze food production trends, we used data from the United States Department of Agriculture's (USDA) Census of Agriculture. This survey, undertaken every five years, asks farmers for detailed information about their farming operations. Agricultural census data is crucial to our agricultural trend analysis because it is a reliable source of agricultural record of county level data.<sup>1</sup>

These are the research questions that we focused on:

- How has land use for farm production changed in Worcester County in the past 20 years?
- How many farms are within the county? How has this number changed over the past 20 years?
- What types of produce are being grown on these farms and in what volumes?

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<sup>1</sup> The USDA aims for a 75% response rate in each of the 3,076 counties in the United States reporting one or more agricultural operations. By the end of June 2008, the USDA calculated an 85% response rate.

- What are Worcester County farmers' income levels?
- How many farms in Worcester County are CSA participants?

### **3.2. Identifying Food Resources in Worcester County.**

We interviewed two groups of farmers: farmers who participate in local Farmer's Markets and farmers who participate in CSA programs within Worcester County. We visited farmers markets in Worcester during the fall of 2011 and interviewed farmers at the Main South farmer's market. To contact farmers whom we could not interview at the markets, we obtained contact information from a farmer's market organizer, the Regional Environmental Council (REC), and through public sources such as the Massachusetts Department of Agriculture and The Local Food Guide by FarmFresh Rhode Island. We selected 6 farmers who participate at Worcester farmer's markets from the list for interviews.

By accessing databases of CSA drop-off points, we compared the list of drop-off points with the Worcester County farms list from Massachusetts Department of Agriculture to identify CSA farmers within Worcester County. We based our selection of CSA farms on proximity to Worcester. We located 11 CSA farms within Worcester County. These farms have different backgrounds and sizes. We decided to interview all 11 CSA farms to fully understand Worcester County's CSA scene. Our questions fell into three categories: production; marketing; and challenge and opportunities to increase markets in low income neighborhoods in Worcester.

#### 1) Production

- What do you produce on your farm?
- What is your annual production volume?
- How do you decide what to grow on your farm?
- What was your reason for going into farming and/or food production?

#### 2) Marketing

- How do you sell your produce and why did you choose this method?
- What type of market(s)/distributor(s) do you sell your produce to?
- Why do you participate in farmer's markets? Do you know the reasons why some other farmers don't participate?
- Do you donate your produce? If yes, up to what portion and to what organization?

### 3) Challenges and Opportunities

- What are some barriers to selling your products to markets in Worcester?
- What do you think should be changed to increase the current market share of local food?
- If provided appropriate and convenient channels, are you willing to sell more of your produce to the lower income neighborhoods?
- What do you think will encourage interest in farmers markets on both producer and consumer ends?
- Do you participate in Community Support Agriculture (CSA) programs? Why or why not?

To identify inner city food producers, we gathered a list of community gardens from the city of Worcester's Department of Public Works and Parks, and the REC which supports Worcester community gardens. We then entered the location data into GIS for further analysis which we discuss in the mapping section below.

### **3.3 Spatial Analysis of the Worcester County Food System**

We used mapping software to identify the locations of community gardens, farmers markets, and CSA drop off points. Once we geocoded these data points (e.g., transferring addresses to latitude/longitude coordinates), we used 2000 Census socio-economic data to look for relationships between variables such as median household income, ethnicity, and poverty level and the locations of CSA drop-off points, community gardens and farmers markets.

In our analysis we addressed the following questions:

- To what extent are direct food marketing mechanisms (CSA, Farmers Markets, Community Gardens) operating in low income and minority neighborhoods?
- Where are the food production resources, such as community gardens, located in the city and in what social space do they operate?
- To what extent are local food production resources and direct markets located in areas with high percentage of minorities?

### **3.4 Developing recommendations to improve food security**

After conducting our assessment on the Worcester Food System we identified opportunities to improve the accessibility of fresh, nutritious food for the Worcester community. Based on our analysis of regional agricultural trends, farmers' attitudes toward selling produce in low income neighborhoods, we produced a list of recommendations that addressed the following questions:

- What can be done to encourage more farmers to participate in CSA?
- What can be done to encourage more farmers to bring their produce to Worcester farmer's markets?
- What can be done to encourage the establishment of more community gardens in food insecure neighborhoods?
- What can be done to encourage farms to participate in EBT/CSA programs directed towards local income and minority neighborhoods that face food access challenges?



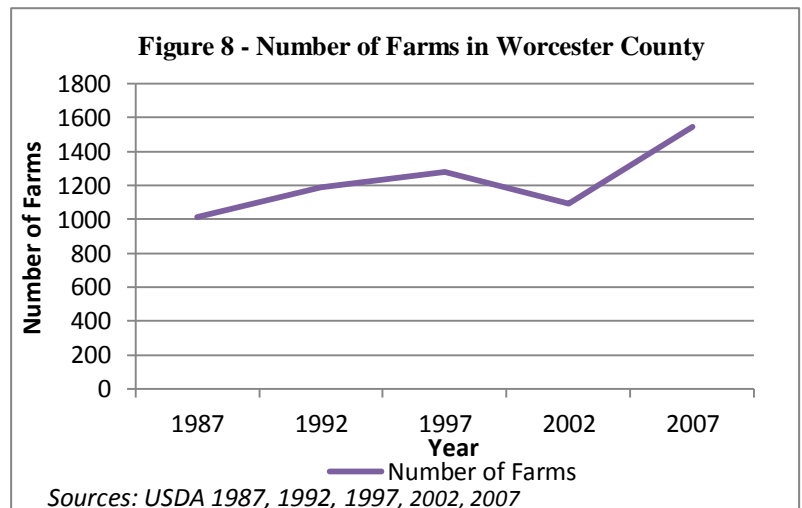
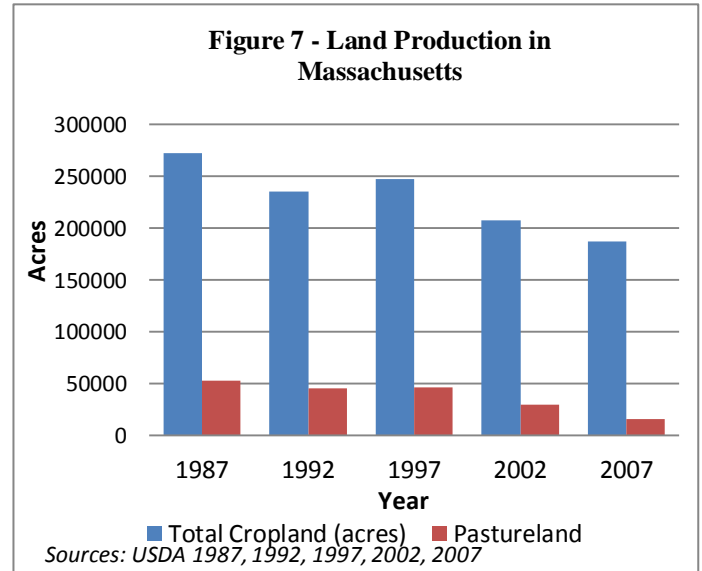
## 4. RESULTS

This chapter contains our results. The chapter is divided into sections with each section titled after one of our major findings and then followed by a larger explanation of said finding.

### 4.1 Increase in Small Farms in Worcester County

USDA agricultural census data indicates that Massachusetts has experienced a steady decline in farmland since 1987. Land in production is defined as cropland and permanent pastureland, but excludes woodlands and land in farm buildings. In 2007 1.2 percent of Massachusetts land was considered land in production. As shown in Figure 7, Massachusetts's land in production decreased by 37.4 percent, from 325,472 acres in 1987 to 203,625 acres in 2007. Between 2002 and 2007, Massachusetts saw a 45.7 percent loss of pastureland.

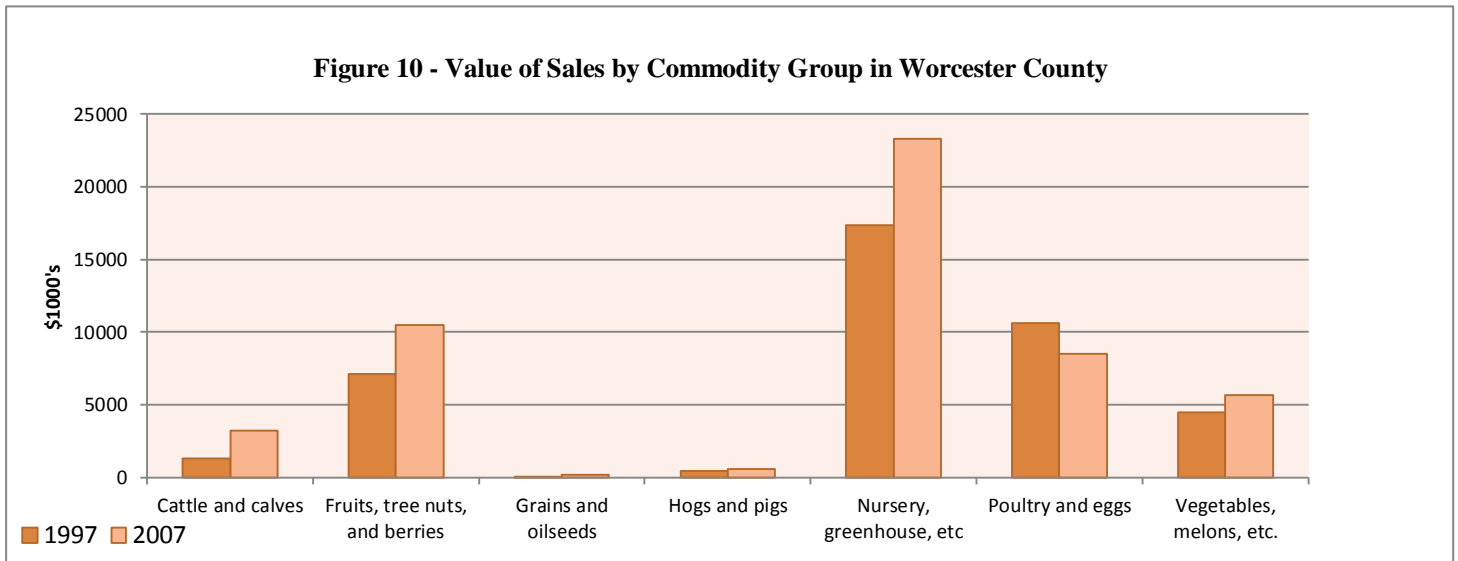
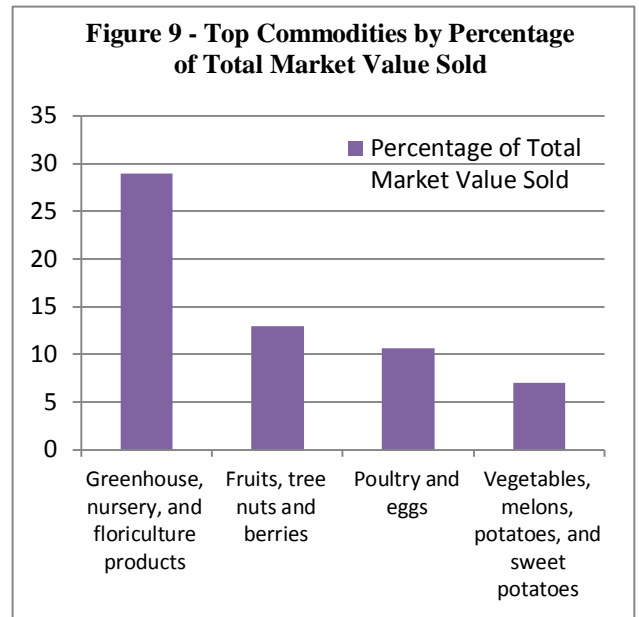
While land in production has decreased, the number of Massachusetts farms grew a surprising 27 percent between 2002 and 2007. "We're seeing what's been referred to as an agricultural renaissance," said Scott J. Soares, assistant commissioner of the state Department of Agricultural Resources. "One of the reasons is that there's a lot more demand for locally grown food, for local food security." (Freeman, 2011) If we look specifically at Worcester County, the finding is even more significant. As shown in Figure 8, between 2002 and 2007 Worcester saw a rapid 41 percent increase in the number of farms. During the same time period, average farm size in Worcester County decreased by 27.4 percent, suggesting the emergence of many small-scale farms. This can be further proven by looking at Worcester County's production data, where between 2002 and 2007, the value of production



increased 14.9 percent in Worcester County. Worcester County's top commodities in 2007 shown in Figure 9 as well as listed below:

- Greenhouse, nursery, and floriculture products;
- Fruits, tree nuts and berries;
- Poultry and eggs;
- Vegetables, melons, potatoes, and sweet potatoes.

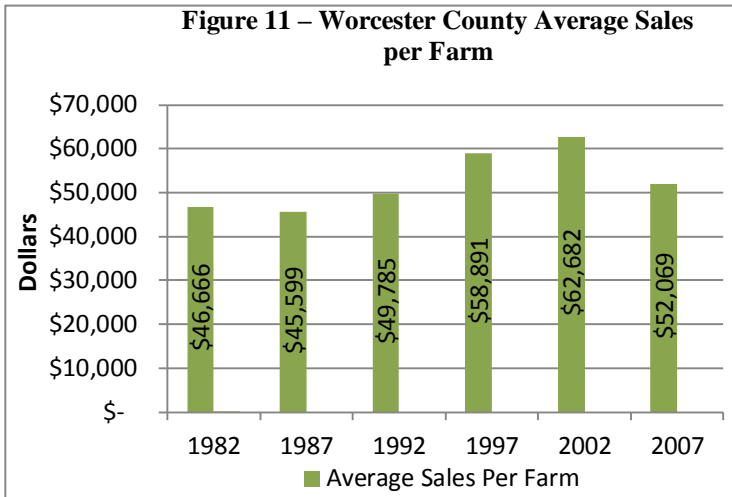
All this indicates that the Worcester County agriculture area specializes in high-value products that can be grown on smaller farms. Figure 10 illustrates this specialization. This supports the move from larger scale farms to small, specialized farms in Worcester County.



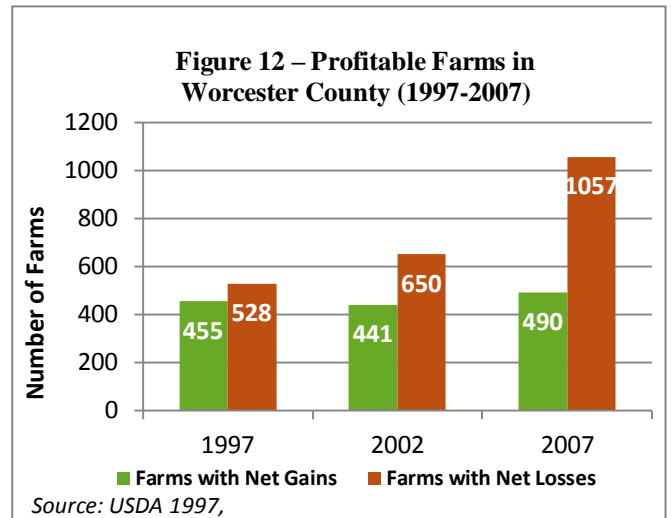
#### 4.2 Small Farms are not profitable enough for Self Sufficiency.

An indicator of the economic scale of farms in a region is average sales per farm. Between 1987 and 2002, average sales per farm in Worcester County have been on an upward trend (Figure 11). USDA's Census of Agriculture provides a simple measure of farm profitability: the number of farms reporting net gains and net losses. "Net gains" are defined as farm sales outweighing expenses, without including government payments. In 2007, Worcester County had proportionally more farms reporting net losses than in 1997 (Figure 12). In 1997, 53.7 percent of all farms reported net losses, while in 2007, 68.3 percent reported losses.

**Figure 11 – Worcester County Average Sales per Farm**



**Figure 12 – Profitable Farms in Worcester County (1997-2007)**



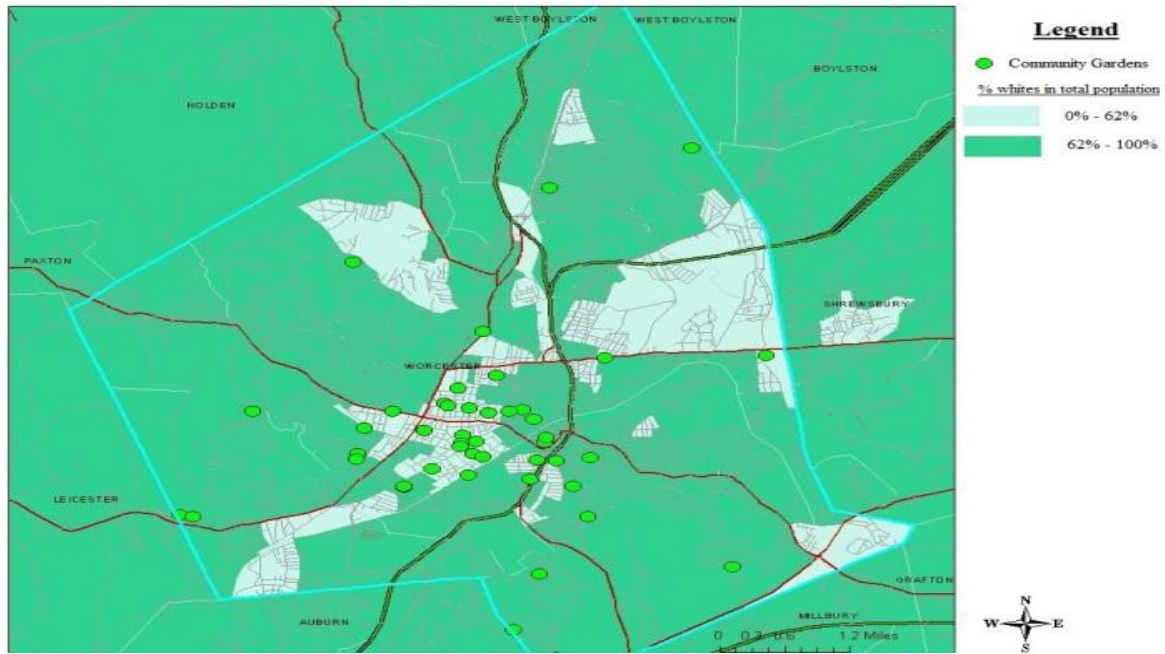
Similarly in Massachusetts, 48.6 percent of all farms reported net losses in 1997 and the percentage of farm with net losses rose to 61.6 percent in 2007.

Net income per farm is another indicator of farmer income. Average net income per farm fell 41.4 percent from \$13,984 in 1997 to \$8,192 in 2007. These numbers may be misleading, as it includes farms of all different sizes, with different ownership structures, and those with gains of over \$1 million. The decrease in Worcester County farmers’ profitability shows the need for finding new markets and channels for local produce.

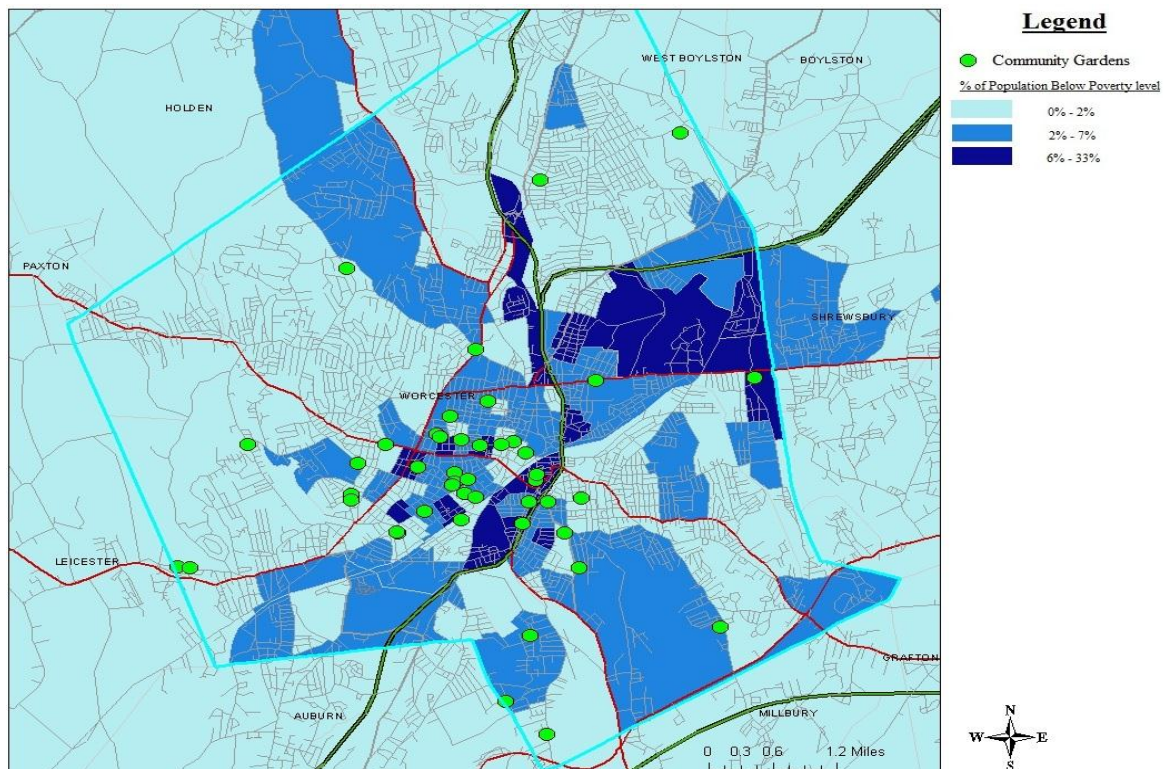
### 4.3 The Majority of Worcester’s Community Gardens are located in low income and minority neighborhoods

Community gardens are small-scale plots of land within city limits that allow members of the community to grow fresh produce directly in the city in low quantities and then to distribute to the local neighborhood.

The Regional Environmental Council of Central Massachusetts (REC) has been providing start up assistance in these gardens by sending compost and initial setup help to community garden start-ups as well as acting as a centralized contact for the gardens. They are also involved in soil testing and provide young seedlings. Services are also provided to help to find land on which to establish gardens.



**Figure 13 - Map of Community Gardens in Relation to Ethnic Distribution**



**Figure 14 – Community Gardens in Relation to Percent of Population below Poverty Level**

The latest documented list of Worcester community gardens was published by the REC in 2010. The list shows that there are 62 active community gardens in the city of Worcester, including 18 school gardens. These community gardens are independently run by local individuals who have an interest in farming and helping their community. From Figure 13 we can see that the majority of community gardens are also located in areas with a high concentration of minorities. We can also see from Figure 14 that a large majority of community gardens are either in or bordering areas of high poverty.

#### 4.4 Worcester community gardeners do not have secure land tenure.

Finding suitable land for establishing a community garden is one of the biggest challenges faced by urban farmers. In our interview with the head of the REC, Casey Burns, she explained that only a handful of established gardens have a written lease with the land owner or city. Most garden land leasing works on a verbal agreement where community residents simply hope their use of the land will not be terminated if the land owner has other opportunities to develop the land. Because of these arrangements, many of the people that run these gardens worry about the future of their gardens, especially if the land falls under new owners, meaning their previous land usage agreement may no longer be valid or honored as there is no binding legal agreement or paper work.

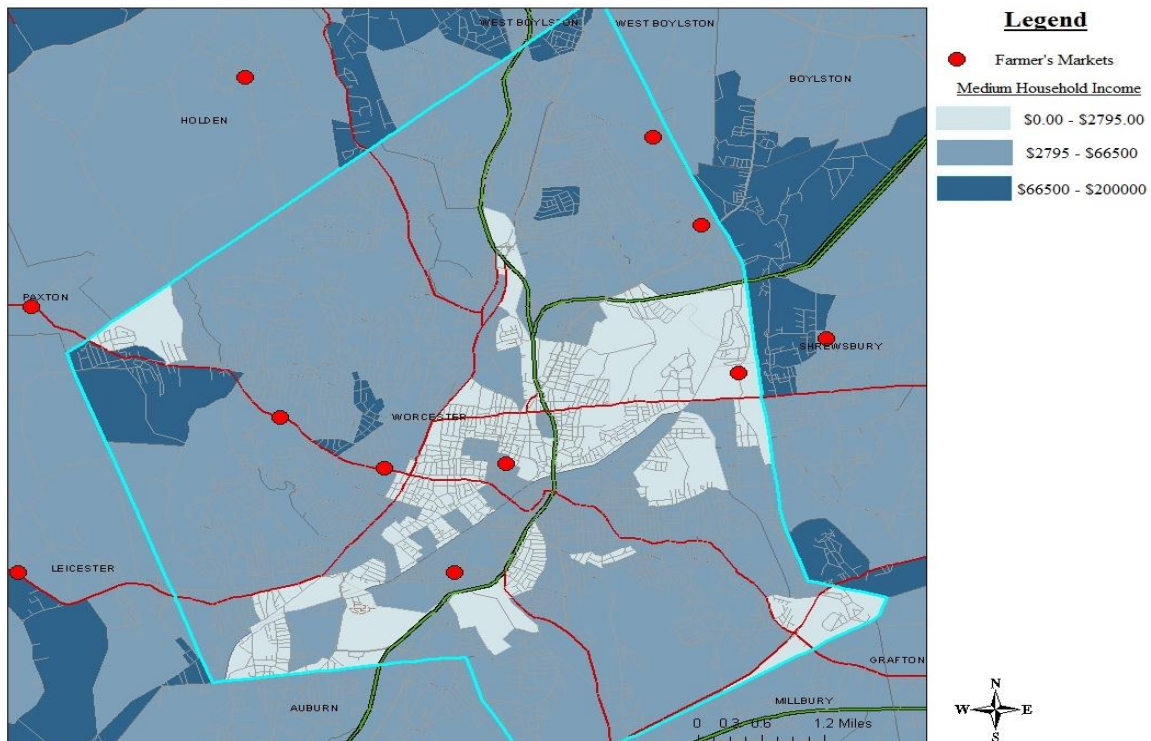


Figure 15 - Farmer's Markets in Relation to Medium Household Income

#### **4.5 Majority of Current Farmer's Markets are located in Higher Income neighborhoods**

There are two main farmer's market organizers in Worcester and they run their markets differently. There are seven farmer's markets in Worcester with sixteen participating farms in total. All of the markets were organized by the late Adam O'Keefe except for the Main South farmer's market and the trial market at Great Brook Valley which are organized by the REC. As seen in Figure 14 the majority of current farmer's markets are located in middle income areas of Worcester MA. Out of the 7 current farmer's markets only two of them either border or are directly in a low income area of Worcester. Both of these markets are also run by the REC, while the rest were under the late Mr. O'Keefe's jurisdiction.

#### **4.6 Few Farmers market accept food stamps**

Farmer's market compatibility with the Supplemental Nutrition Assistance Program (SNAP) is strongly related to customer base. EBT is a digitalized version of the SNAP food stamps. SNAP participants use a "debit card" that contains their monthly allowance. In order for a vendor to accept EBT payments, they must apply for a free permit and obtain an EBT card reader on site (also free with permit). Only the two REC markets out of the seven total Worcester farmer's markets support Electronic Benefit Transfer (EBT) payments. Most of O'Keefe's customers are not SNAP participants and none of the markets are equipped with EBT machines. This indicates that most farmer's markets in Worcester have limited compatibility for catering to underprivileged locals.

#### **4.7 Local farmers interviewed prefer to sell at Boston farmers markets, rather than in Worcester, where they claim profits are higher**

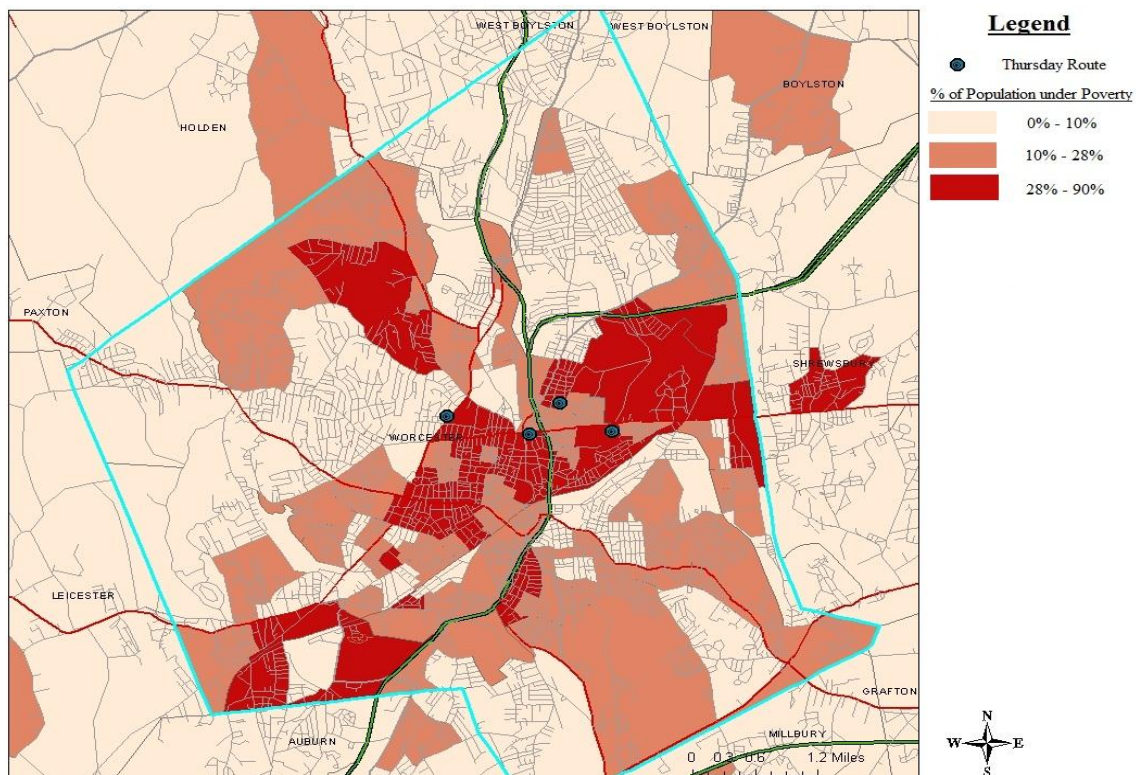
In our interviews with farmer's market participants, we obtained two types of responses on their reason for choosing Worcester farmer's markets. The first are based very close to the city, and the second group is willing to sell at a discounted price for benevolent reasons.

In order to sell at the markets, the farmers prepare their merchandise and travel to the markets while spending the majority of the day at the market, which means they have less time to attend to food production. This trade-off is one of the major reasons why farmers tend to sell to immediate neighborhoods or the closest town. As can be seen in Figure 16, only 4 percent of CSA farms in Worcester County are located 11 miles or closer to Worcester, meaning a substantial commute for any prospective farmers possibly interested in distributing in Worcester. Several farms we interviewed that didn't participate in any Worcester farmer's markets stated that the profit from selling in Worcester wouldn't cover the travel expenses and opportunity cost of staying in their respective towns. Some that did travel stated that they would prefer the Boston area because of its well established farmer's market system. Boston farmer's markets are also larger, in high traffic

areas, and customers tend to have more disposable income. Farms located between Worcester and Boston tend to sell in the Boston area as they observed from experience that selling in Boston farmer's markets was more profitable.

#### 4.8 The Mobile Farmer's market van is an opportunity to make nutritious, fresh, local food available to the city's low income neighborhoods

The REC implemented a mobile farmer's market in summer 2012. The market is a van stocked with produce from partner farms. Taking 1-1.5 hour long stops at selected locations, fresh produce is sold to consumers in select communities. The van is equipped to handle SNAP/EBT transactions. As can be seen in Figure 15 the current market stops target low-income communities that do not have access to fresh food initiatives through conventional farmer's markets. The current route is designed to cover low income communities where there are no farmers markets.



**Figure 16 - Mobile Market Stops in Relation to Percent of Population Under Poverty Level**

## 4.9 Community supported agriculture is a possible mechanism for increasing food access but currently no CSAs have drop off points in Worcester’s low income neighborhoods

Community Supported Agriculture, or CSA, is a direct-to-consumer produce distribution model that some farms offer. The system involves selling shares to interested buyers at the beginning of the season for a certain amount of produce. The farmers will then grow and pick the produce in order to meet the quotas created by the shares. The major attraction of CSA to farmers is its payment model. By getting the payment upfront for their CSA shares, the farmers are able to defer production and initial costs as well as gaining profit as long as they are able to produce the amount of food in their shares.

Through our research we have identified 43 declared CSA farms within Worcester County. A map of all these farms can be seen in Figure 16. Declared CSA farm means that the farm’s main distribution method is CSA. Even with this relatively large number of farms, we only have identified six CSA drop-offs points in Worcester. All Worcester drop-offs are located at farmer’s markets within the city as well as one at the UMass Memorial Medical Center. We realize that there might be more drop-off points in Worcester; however, the online database for CSA drop-offs is extremely limited.



Figure 17 - CSA Farms in Worcester County in Relation to Percentage below Poverty Level

We also found that public information is not well documented or organized such that people can easily access the locations of local CSA farms or their drop-off points. It requires filtering through irrelevant information in order to obtain the limited information regarding local CSAs.



#### **4.10 Farmers' Direct Marketing Programs should identify means to use Supplemental Nutrition Assistance Program (SNAP) as part of a cost share**

The nature of upfront payment in the CSA payment system makes it difficult for the households with lower disposable income to utilize this great source of nutritious produce. Interviews with the REC and combined SNAP/CSA farms show that most EBT users tend to use their monthly allowance in grocery stores and stock up on food for the month. With the current standard CSA model, EBT users can't buy a typical share, months ahead of time.

A modified CSA system may be able to allow EBT users the ability to enroll in a CSA plan and open up an avenue of fresh food. Next Barn Over farm in Western Massachusetts (Hampshire County) is an example of a modified CSA system that also accepts EBT. To overcome the problem of affordability of full upfront payment of conventional CSA plans, Next Barn Over farm has developed several payment plans to include those who cannot pay for an entire share months ahead. Their payment plans include monthly or bi-weekly payments. This allows the interested consumers to efficiently pay for a CSA share with SNAP allowance, which allows them to gain access to a large amount of fresh, local produce at a reasonable price.

The inclusion of SNAP/EBT in a CSA could potentially broaden the markets for different farms, but one may argue that a potential problem comes with this type of modification to the standard CSA model. The greatest strength to the CSA model, the ability to obtain funding before the season begins, becomes partially absent.

The setup to make a farm CSA/EBT compatible is relatively painless and cost free. The initial setup required to make a farm CSA/EBT compatible includes filling out a registration form and then simply receiving a free CSA/EBT card reader. The farm has to complete an application for a SNAP/EBT license and once it is approved, an EBT card reader will be shipped to them free of charge. This, at the very least, making the startup cost for the inclusion of SNAP/EBT into their CSA minimal.

Next Barn Over made this new and unique CSA/EBT model possible by hiring one extra employee specifically for coordinating CSA share membership, bookkeeping and billing. Although this is not practical for every farm, it is a great model to explore for future studies.

## 5. RECOMMENDATIONS

In this report, we have been able to analyze the Worcester foodshed, its challenges and opportunities in a general way. Our recommendations are similarly broad but, hopefully, are a good blueprint for moving forward in addressing food insecurity.

### 5.1 Expand the number of Farmers' Markets, Focusing in Low Income Neighborhoods

- **Implement EBT payment system at all farmers' markets.**

The option to pay with SNAP allowance at farmer's markets is appealing to low-income customers with limited access to fresh produce. Enabling EBT will bring new market potential to existing farmer's markets. As our findings suggested, EBT payment systems are equipped at some of the Worcester farmers' markets but there is still much potential for reaching out to more SNAP recipients.

The most challenging part of implementing EBT payment systems at farmer's markets is convincing the organizer that the benefits from such system outweigh the hassle of the EBT certification process. The certification process is fairly simple but can be time-consuming. To overcome this difficulty, we suggest sharing the EBT certification experience as well as its beneficial impact on the community from farmer's markets that have already been.

- **Create a local growers' network to stimulate growers' interest in selling to the inner-Worcester market.**

A well organized and user-friendly network should be established as a platform for communication and data access. In the form of a Web site and a simple database, this network could be a powerful tool to reach out to farmers who are unfamiliar or unaware of the opportunities the Worcester local food market holds. It would be a platform to advertise Worcester farmer's markets and CSA drop-off points, which also provides information for those who are interested in buying fresh produce from nearby producers.

There are technical and labor resource constraints associated with the establishment of this database. We suggest collaboration with existing online food resource databases such as [farmfresh.org](http://farmfresh.org), or the Worcester City's Planning and Regulatory Services to overcome this issue.

## 5.2 Expanding access to local food in low income/minority neighborhoods

The REC implemented a mobile farmer's market in summer 2012. The market is a van stocked with produce from partner farms. Taking 1-1.5 hour long stops at selected locations, fresh produce is sold to consumers in select communities. The van is equipped to handle SNAP/EBT transactions. Though the current market stops target low-income communities that do not have access to fresh food initiatives through conventional farmer's markets, some food insecure communities in Worcester are yet to be covered in the mobile market route.

- **Expand the mobile farmer's market route to cover more food insecure communities.**

The current REC mobile farmer's market route only covers two of the low food access communities in Worcester. We suggest that new routes to be designed as the program grows to target more underserved locations in Worcester. The GIS maps in this report can provide some baseline information on where these locations are. In order to ensure the new routes' success, more research needs to be done to better understand the target community's food preferences. In addition, collaboration with local farmers, especially those who currently participate in Worcester farmer's markets can be formed to source fresh produce sold at the mobile markets.

A successful mobile farmer's market model has been established by a national organization called "National Mobile Market". A detailed manual on how to establish a similar program is available in the Appendix.

## 5.3 Creating a Central Worcester Foodhub

Currently, local food entering Worcester comes through various means. All of these avenues also are coordinated independently leading to a splintered system of local food distribution. The goal of a Worcester Foodhub would be to unify all the separate distribution systems, leading to a centralized system for local producers and various distribution methods alike. According to the Journal of Agriculture, there are several established models for Foodhubs. According to the Journal the most common model is a hybrid system, which incorporates aspects of several models into one system.

- **Create a centralized hybrid model Foodhub in Worcester.**

A regional food hub in Worcester could help address food access issues in Worcester. A food hub typically aggregates, processes and distributes produce and fruit from farmers in the region to institutional clients (e.g. schools, hospitals, colleges) and can also use direct marketing, such as a CSA, to connect with consumer buyer clubs and other interested parties. Some food hubs have

devised CSA that accept SNAP and have had success bringing nutritious, locally grown food, to low income and minority neighborhoods.

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## II. APPENDIX A – Farmer’s Market Questionnaire

- What do you produce on your farm?
- How do you choose what to grow on your farm?
- What is your annual production volume?
- What type of market(s)/distributor(s) do you sell your produce to? What is the percentage of your produce sold to each of these distributors?
- What are the factors that influence your decision when choosing distributors?
- Do you participate in Community Support Agriculture (CSA) programs? Why or why not?
- Do you donate your produce? If yes, up to what portion and to what organization?



### **III. APPENDIX B - CSA Farmer's Questionnaire**

- What do you produce on your farm?
- How do you choose what to grow on your farm?
- What is your annual production volume?
- What type of market(s)/distributor(s) do you sell your produce to? What is the percentage of your produce sold to each of these distributors?
- What are the factors that influence your decision when choosing distributors?
- What's the distance from your farm to your distributors?
- Do you participate in Community Support Agriculture (CSA) programs? Why or why not?
- Do you donate your produce? If yes, up to what portion and to what organization?

#### IV. APPENDIX C – Supplemental Maps



Figure 18 – Farmer's Market in Relation to Ethnicity

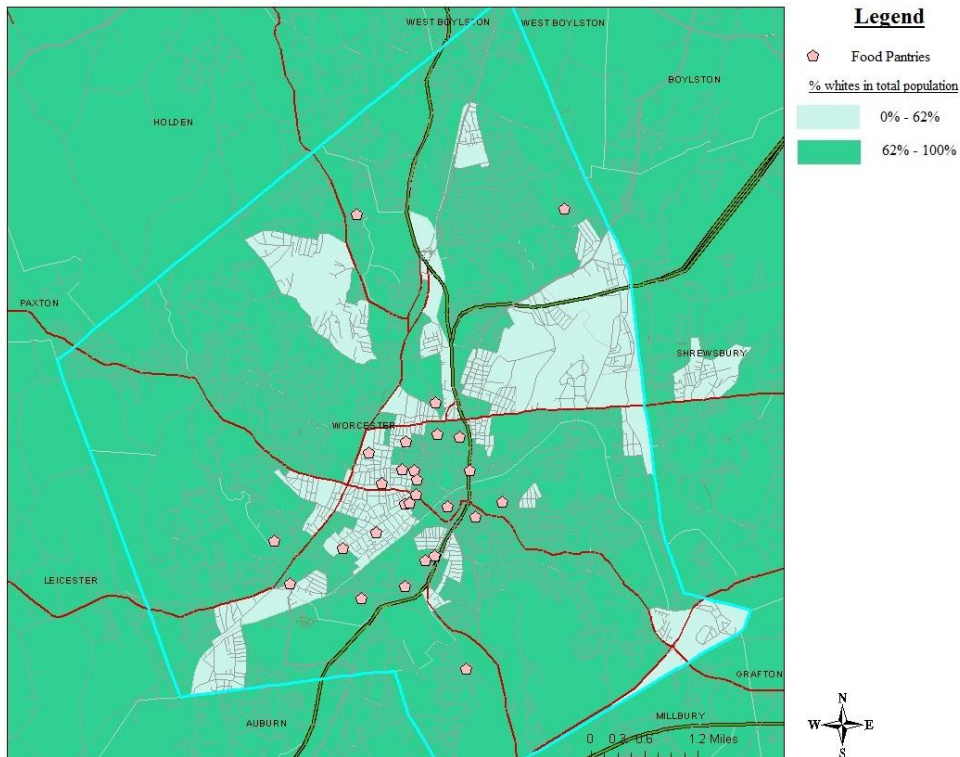
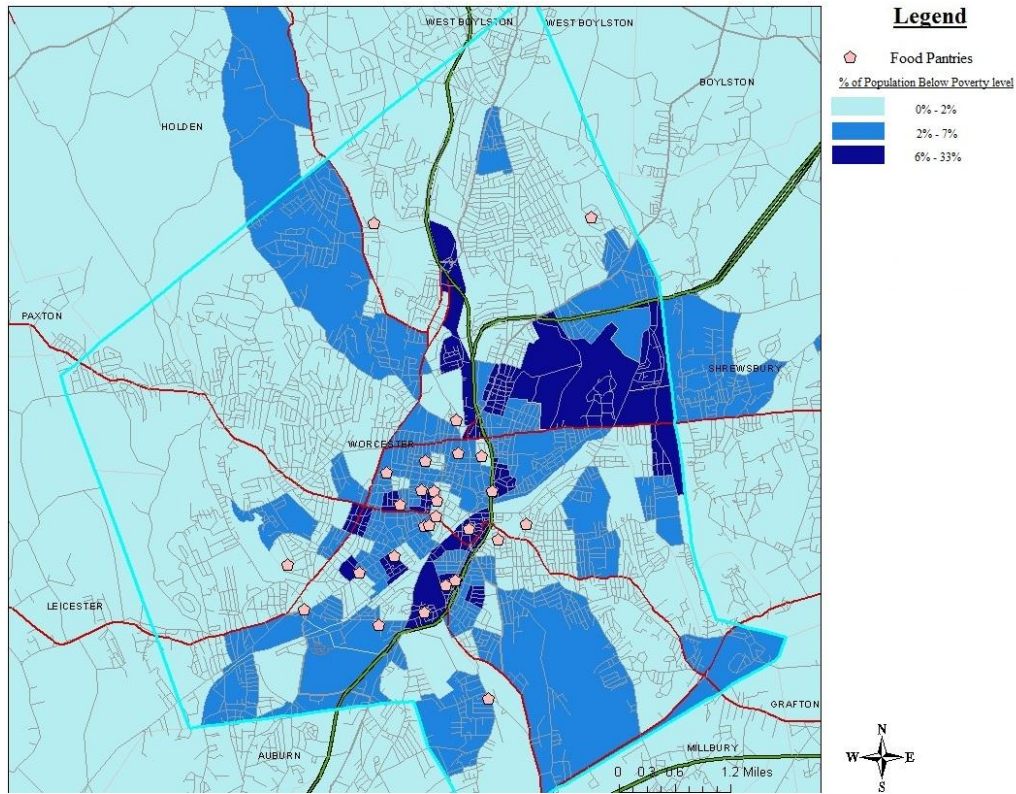
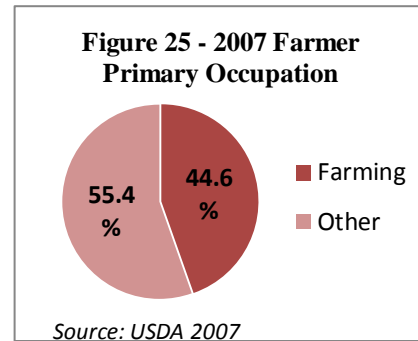
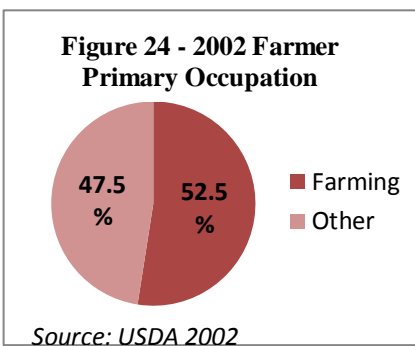
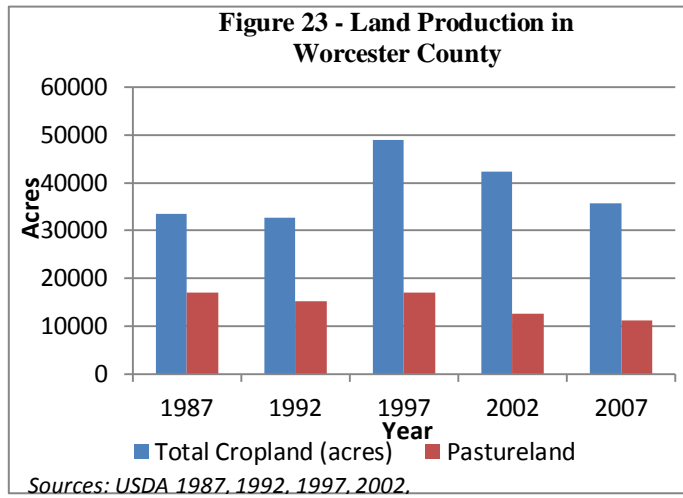
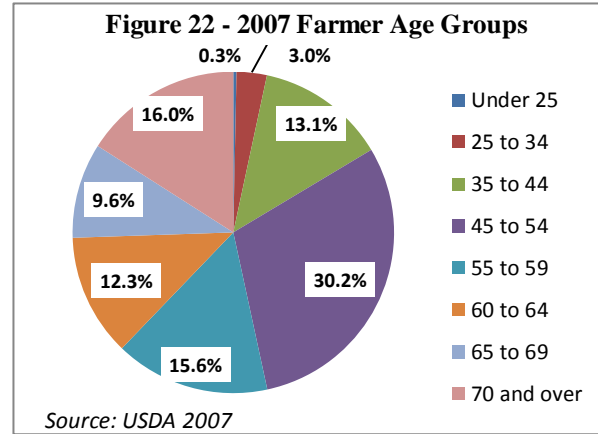
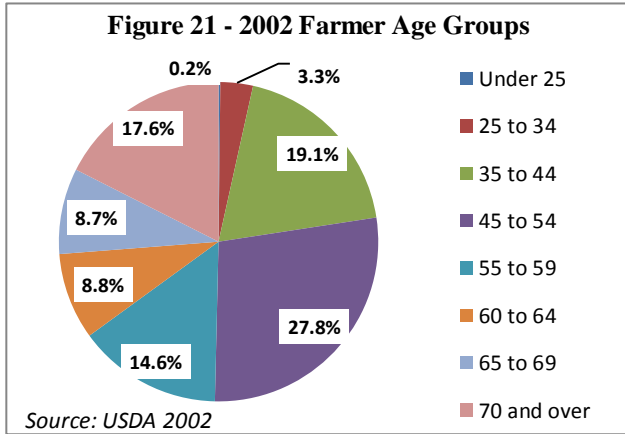


Figure 19 – Food Pantries in Relation to Ethnicity



**Figure 20 - Food Pantries in Relation to Percent of Population below Poverty Level**

## V. APPENDIX D – Supplemental Figures



## **VI. APPENDIX E – National Mobile Market Documentation**

The National Mobile Market Documentation can be found at the following link:

<http://www.vanderbilt.edu/nashvillemobilemarket/nationalmobilemarket/documents/NMMfullmanual.pdf>

The Document spans 105 pages and covers the research necessary, the community development required, the potential financial needs, the implementation, and the operation of a full scale mobile market initiative aimed at helping food insecure areas. The documentation is provided by the National Mobile Market team, who are based in Nashville. Their official site can be found at the following web address:

[www.nationalmobilemarket.org](http://www.nationalmobilemarket.org)