A Spatial and Social Analysis of Food Deserts and Community Gardens in Madison, Wisconsin

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Abstract

Food deserts, areas lacking nutritional food resources, are a critical problem facing modern urban areas. Our research analyzes the socio-spatial relationship between community gardens and food deserts in Madison. This includes visual surveying of community gardens and demographic analysis of Madison to determine the parameters for what constitutes a food desert. We discovered food deserts in Madison to be on the Southside and to a lesser degree on the far Eastside and will use this research to understand how community gardens serve these areas.

As the growing number of people in urban spaces stretches the global food supply ever thinner, the need for nutritious food within urban centers has risen along with poor health and low accessibility to food resources. Community gardens are recognized as a potential solution to the problem of urban food inaccessibility, widely known as "food deserts". This research delves into *the social and spatial relationships of food deserts and community gardens in Madison, WI.* The major focus of the research will determine whether the community gardens in Madison are located in places where the local population is located in a food desert. Affixing a label to an area (i.e. calling it a food desert) is no easy task because food deserts are difficult to quantify. Scholars dealing with food deserts themselves say, "There is no perfect distance" (4, Mayer, 2010). For the purposes of this project, food deserts will be assessed using various methods. Firstly, they will be approximated using the USDA Food Atlas' definition of a food desert, being any area where someone must travel more than one mile without a car for nutritional food like fruits and vegetables. Then, other factors including freeways, wealth relative to location, race and access to transportation will also be taken into consideration.

In order to determine the location of Madison's food deserts, commercial grocers and community co-ops will be identified through a spatial analysis of the Madison area. Plotting these points along with census data will portray where purchasable food resources are in poor supply and where they are most needed. The next step will be to research the history of, identify, visit, and plot Madison's community gardens as a means of determining the spatial relationship between gardens, grocers, and people. Much of the research involves qualitative description of the communities of Madison. A qualitative visual survey in combination with census data and locating community gardens throughout the city will demonstrate the relative poverty or prosperity in regards to the food resources available and show what demographics are being underserved.

In combination with the present day analysis of community gardens, we intend to look at the history of the community garden movement within Madison so that we will be better able to discover

trends within the urban gardening community. A look at gardening in the city from the earliest incarnations, known as victory gardens during WWI and WWII, will contextualize our findings on the modern use of community gardens compared to previous uses and priorities that created gardens in the past.

By putting all these factors together we hope to gain a better understanding of the relationship of the accessibility of grocery stores and gardens to people across Madison.

What are Food Deserts?

Academics, policy makers and community groups are increasingly using the term "food desert" to describe populated urban areas where residents do not have easy access to an affordable and healthy diet (Cummins et. al, 1999). A review of literature on this topic has revealed several theories as to how this uneven spatial distribution might have developed in cities throughout the country. A common explanation (Guy, 2004) posits that the growth of large-scale food retailers, especially those that target high-income car owners, coupled with the simultaneous decline in the number of small independently owned food stores, has left many inner city populations with reduced choice, poorer quality and higher priced food options. The competitive effects of the new large stores have forced the smaller, independent, neighborhood grocery stores to close: places that have traditionally been the main convenience shopping destinations for households that do not have readily available automobiles (Sustain, 2000).

A related theory of how food deserts have formed in the inner city pertains to demographic changes that began in the 1970s and 1980s. Many researchers have speculated that during this period, economic segregation became more prominent with affluent households emigrating from inner cities to suburban areas, causing the median income in the inner city to decline substantially (Bianchi et. al, 1982; Nyden et al. 1998). This shift forced nearly one-half of the downtown supermarkets in the three largest U.S cities to close (Alwitt and Donley 1997; Diesenhouse, 1993), a trend that was repeated in

many urban areas throughout the country.

Other factors making the establishment of food retail businesses in inner cities less desirable are inaccurate perceptions of these areas, declining demand for low-skilled workers, low-wage competition from international markets and zoning laws (Gittell and Thompson, 1999). Alwitt and Donley show that in urban areas, it is difficult for large supermarkets to find land that is appropriate for the size of the supermarket, due to fragmentation of property that results from the ease of selling smaller pieces of land (Alwitt and Donley, 1997). It seems plausible that urban deserts would have a competitive advantage as sites for a supermarket because of its location near the city center and ability to address an unmet demand and access to a large labor force. However, financial gain is often the critical underlying factor that tends to override these characteristics and deter retailers from establishing in urban areas (Gittell and Thompson, 1999).

Problems Stemming from Food Deserts

Recognizing the factors that influence the spatial arrangement of urban supermarkets, we can now look at the major health consequences that stem from this uneven distribution. Researchers have shown that people tend to make food choices based on the food outlets that are available in their immediate neighborhood (Furey et al., 2001), so residence within a food desert poses major barriers to purchasing nutritious foods (Whelan et. al 2002). Poor supermarket access is almost always coupled with a higher density of fast-food restaurants and convenience stores (Drewnowski and Specter, 2004). These outlets increase resident's exposure to energy-dense, processed foods containing high contents of fat, sugar and sodium, that often lead to poorer health outcomes compared to a diet high in complex carbohydrates and fiber (Block et al., 2004; Lewis et al. 2005; Swindburn et al. 2004). Research indicates that neighborhoods with high minority populations have six times more fast-food restaurants and fewer healthy food options compared to predominantly white neighborhoods (Block et al. 2004; Lewis et al. 2005). Grocery stores can alleviate the influence of these outlets because they offer food

items with greater variety and quality at a lower cost (Kaufman et. al. 1997), but in a food desert, this necessary option is simply inaccessible.

Recent empirical studies of food deserts in the United States have focused on the overarching racial/ethnic disparities and income/socioeconomic status of these areas. In an examination of the associations between the availability of food stores in the U.S and race, ethnicity and socioeconomic status, Powel et al. (2007), found that the availability of chain supermarkets in black neighborhoods was only 52% that of their white counterparts (Powell et al. 2007). A similar study used geographic information systems (GIS) to measure spatial accessibility of chain supermarkets with respect to neighborhood racial composition and poverty in Detroit, Michigan. Their findings showed that the most impoverished neighborhoods in which African Americans resided were 1.1 mile farther from the closest supermarket compared to the most impoverished White neighborhoods (Zenek et al. 2005).

The issue of poverty also presents a major barrier to accessing healthy food for many residents of inner city food deserts. Hendrickson et al. (2006) found that food prices are higher and quality is poorer in areas where poverty is the highest. There is also smaller quantity and variety offered at stores in impoverished areas, findings which are consistent with other studies showing that residents living in areas that do not have a supermarket pay more for their food (Chung and Myers, 1999; Freedman, 1991; Hendrickson et al. 2006; Kaufman et al., 1997). Additionally, the lack of transportation is echoed throughout this literature citing that many low-income households do not have access to a car and cannot afford the costs associated with getting to a supermarket outside of their immediate neighborhood (Alwitt and Donley, 1997; Guy et al. 2004, Hendrickson et al. 2006). As a result of this lack of transportation, low-income households are less likely to travel the distance to a supermarket outside of their neighborhood and instead purchase food items from the outlets that are nearby (fast food, convenience stores), thereby sacrificing cost and quality for convenience.

Given the important role that built factors of the neighborhood food environment have in shaping peoples health and diet, we believe it is important to apply this research to our own city,

Madison, Wisconsin, so that the distribution of food stores can be observed and disadvantaged neighborhoods that lack supermarket access (food deserts) can be noted. Although many look at the term food desert and simply assume that a lack of food is all that constitutes a food desert, the depth of this issue and the problems stemming from it, prove to be much larger. Problems including socio-economic status, poor food access, transportation availability, and even childhood obesity all seem to be strongly correlated in areas defined by various researchers as food deserts.

Aside from socio-economic status, it seems that one of the biggest contributing factors to living with the problems presented by food deserts is access adequate transportation options. A study conducted in Adelaide, Australia focused specifically on this issue. While it is often true that the less wealthy a person is the less healthy they can feasibly eat, due to a lack of typically expensive fruits and vegetables and low fat and low sodium foods, this study essentially argued that it is not living in a food desert, but rather how you live in a food desert that affects problems associated with food access.

By looking at people without access to a car, and comparing this to distances from supermarkets and other viable sources of transportation, it was found that simply living in a food desert is not the problem. Interviews showed that walking was the number one source of means to grocery stores, but it was also considered a hassle and dangerous by many of those interviewed. Likewise, there were many complaints surrounding bus usage, including overcrowding, fares, and inconvenient route times. Some noted that shopping over two days via bus was the most feasible option in order to avoid high delivery costs, expensive taxis, or having to carry groceries on foot for miles. It seemed also that those not owning a car due to disability or age were helped considerably more than those unable to afford an automobile (Coveney and O'Dwyer 2007). Poor transportation in food deserts, along with economic status, is not a unique issue. Many food deserts, and the issues surrounding them, stem from poor access to food – a problem that needs to be addressed in order to better alleviate the greater issue of food deserts as a whole.

While obesity at the individual level results in part from genetic determinants, the rise in obesity rates overall is thoroughly environmental (Hill and Trowbridge 1998; Reidpath et al. 2002) and rooted in a complex tangle of individual, household, and community-based factors (Cummins and Macintyre 2006; Lavizzo-Mourey 2007). Environmental conditions have been explored as contributing factors in promoting health disparities, and it is widely accepted that racial/ethnic minority neighborhoods are disproportionately affected by increased rates of morbidity, mortality and adverse health outcomes (Cubbin et al. 2001 and Deaton and Lubotsky, 2003). One explanation of this phenomenon that the following paper will explore is that low-income, minority populations are limited in their access to full-scale grocery stores offering the essential components of a well-balanced diet. When presented with the notion of a food desert, most people will automatically assume a lack of food correlates with malnourishment and a starving population. However, as demonstrated here, another issue is present in that an unhealthy diet leads to childhood obesity and the greater health concerns that are coupled with it, only further establishing the need to find answers to the problems associated with food deserts.

Issues including, but not limited to, socio-economic status, poor food access, and childhood obesity are all trends that have been coupled with the presence of urban food deserts. A growing urban culture and population are reason enough for these problems to be attended to. With an increased acknowledgment of the problems stemming from food deserts, there will be a greater push to alleviate the roots of these problems and perhaps eventually food deserts as a whole.

Operationalizing Food Deserts to Madison, Wisconsin

The term food desert itself is one that carries a lot of subjectivity and room for individual interpretation. Each of the studies described above utilized a slightly different definition, all of which were designed to cater to each individual study. In order for our research to be successfully conducted, we too will need to operationalize food deserts on a local scale, in order to establish a working definition for the city of Madison.

To start, our group has decided to utilize a rough definition provided by the United States Department of Agriculture (USDA). The main concern for the USDA is a household distance to supermarkets of greater than one mile, eventually taking into account socio-economic status of neighborhoods, car ownership, and alternate transportation availability. The USDA looks at the types of supermarkets near the one-mile threshold as well.

In order to make this definition research specific for Madison, Wisconsin, we intend to initially identify food sources in the city. For our purposes, the first guideline of a food desert will be an area farther than one-mile from a full service grocery store (i.e. Copps, Whole Foods, various Co-ops, etc.). We feel it is unrealistic to assume that an individual, or family for that matter, can live solely off of the often preserved or precooked food provided by small-scale convenience stores. By identifying major food outlets in the Madison area, we will use geospatial information systems (GIS), and plot these locations on a map. This will give us an initial idea of where in the city of Madison primary food deserts are located.

We will then conduct field observations to analyze the presence of fast food restaurants, unhealthy food alternatives, and types of housing establishments and infrastructure to better grasp what it means to live in a food desert.

Furthermore, as also analyzed by the USDA, transportation will be essential in developing a localized definition for food deserts. Although time constraints will once again limit what we can analyze in terms of transportation availability, we do intend to draw conclusions based on personal field observations as well as census data containing information on automobile ownership. We will look at potential transportation issues and overall access to supermarkets in order to understand if our defined food deserts are indeed in need of closer or more accessible options such as community gardens.

With Madison's food deserts defined with the above constraints in mind, as is a common trend in previous research, we will then look at both the socio-economic status and racial breakdowns of United States census blocks in Madison to see how much the notions of wealth and race correlate to

food deserts in the city. This will give us a better grasp of who is being nutritionally underserved in the Madison area, and by overlaying this census information onto our plots of grocery stores we will be able to better establish more precise locations of food deserts around Madison, Wisconsin.

By taking this approach we were able to operationalize food deserts for our purposes in Madison, Wisconsin.

Food Deserts of Madison

As previously stated, the first step in determining areas that are potentially underserved by food retailers is an assessment of basic demographic census data. This data at the census block level includes, the percentage of people living below the poverty line (currently just above $10,000 per year) (Figure 1.1), the percent of households without an automobile (Figure 1.2), and the percent of people of Caucasian descent (Figure 1.3). This data will paint a picture of the areas most vulnerable to lacking food resources.

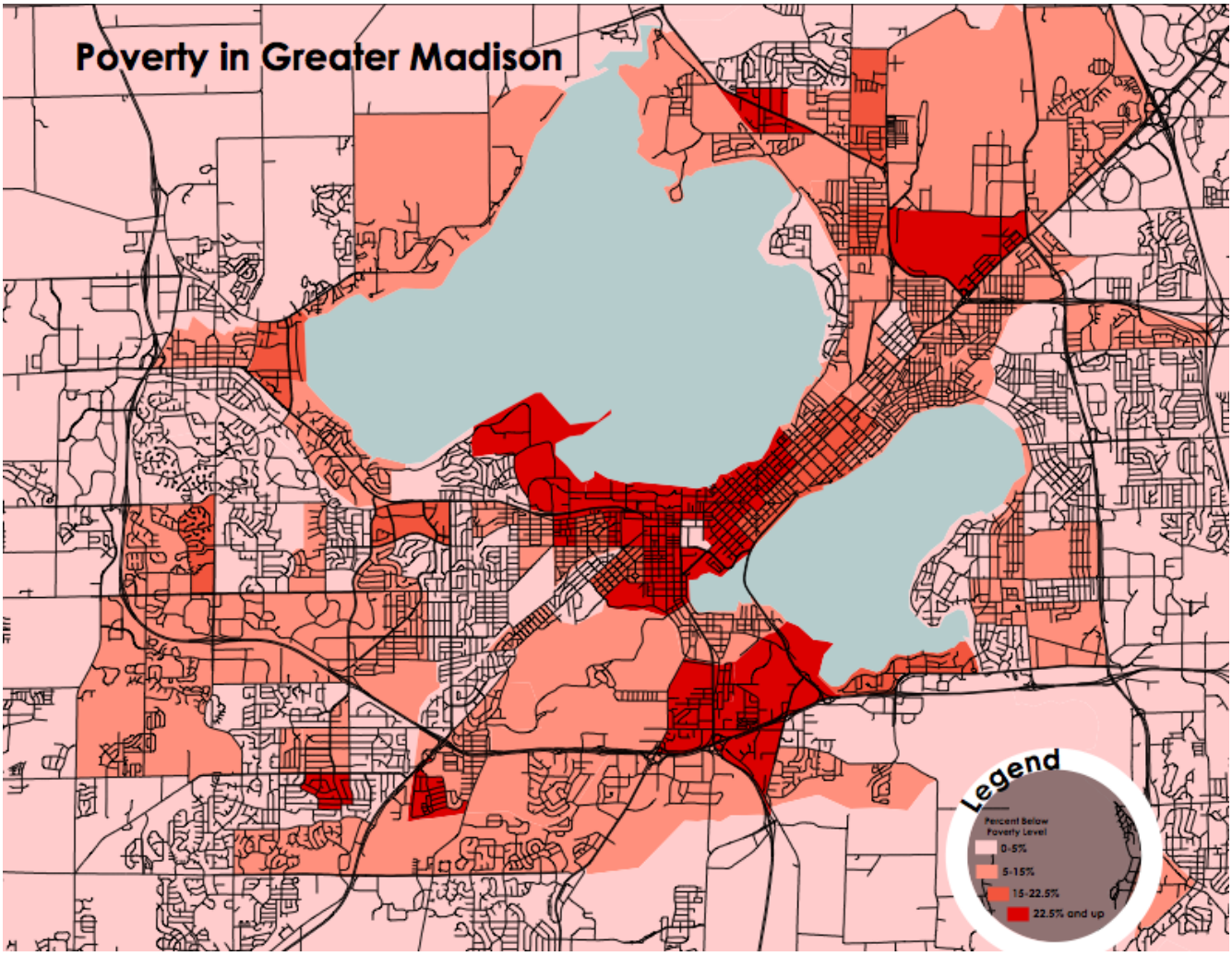

Figure 1.1 Depicting poverty rates in Madison

For the purposes of this study, there are areas of distinguishable poverty, most notably the Southdale, Quann, Truax, and Fitchburg neighborhoods clustered on the Southside and far Eastside. Student communities have the highest rate of documented poverty in the city, however it is difficult to ascertain the actual level of poverty of unemployed college students, and therefore this data will be discussed mostly in passing. The aforementioned neighborhoods are considered "high risk" for having poor access to food, simply by virtue of their relative poverty. The physical appearance of these neighborhoods depicts a landscape often dilapidated and without capital investment (see Figure A in the Picture Appendix). These high poverty areas are located next to highly trafficked roads, such as the Beltline Highway, Highway 30, East Washington Street, and Park Street. High traffic attracts fast food retailers, which have been noted to take the place of other food options in food deserts (see Figure B).

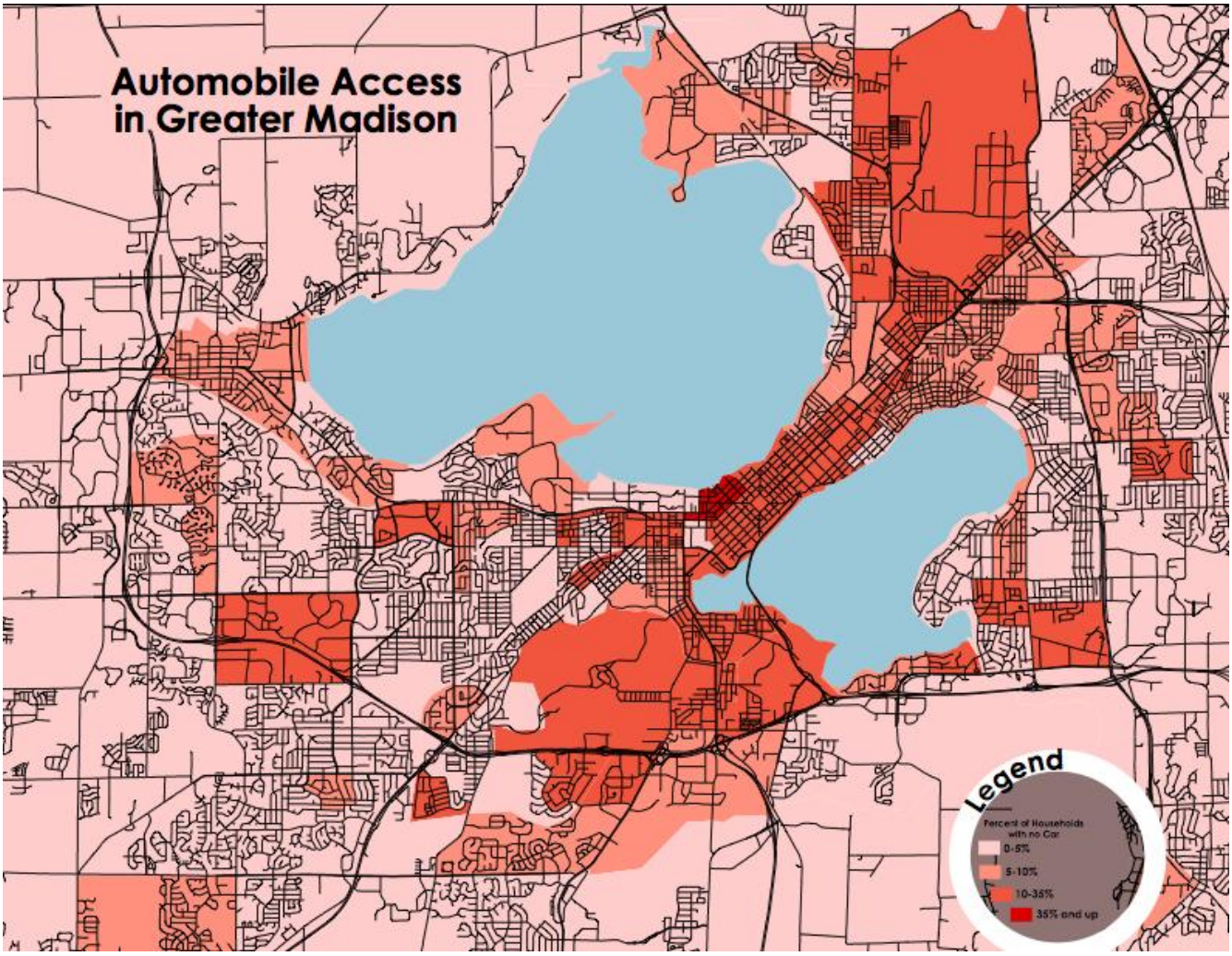

Figure 1.2 Depicts the percent of households with automobile access in Madison

This map highlights neighborhood's access to easy transportation. The isthmus has the highest rate of households with no automobiles, most likely due to the proximity of all necessary resources and the relative accessibility to public transportation. Some of the neighborhoods previously documented as having high rates of poverty, also have alarming rates of low car ownership, which creates a more difficult food accessibility climate. Oftentimes, as noted previously, citizens will be forced to walk long distances, pay for taxicabs, ride the bus, or even in some cases ride a bike to obtain food, which can be seen at the Eastside Woodman's (see Figure C). The areas of lowest car ownership in relation to their poverty include the Southside and the far Eastside – areas most likely to be considered food deserts.

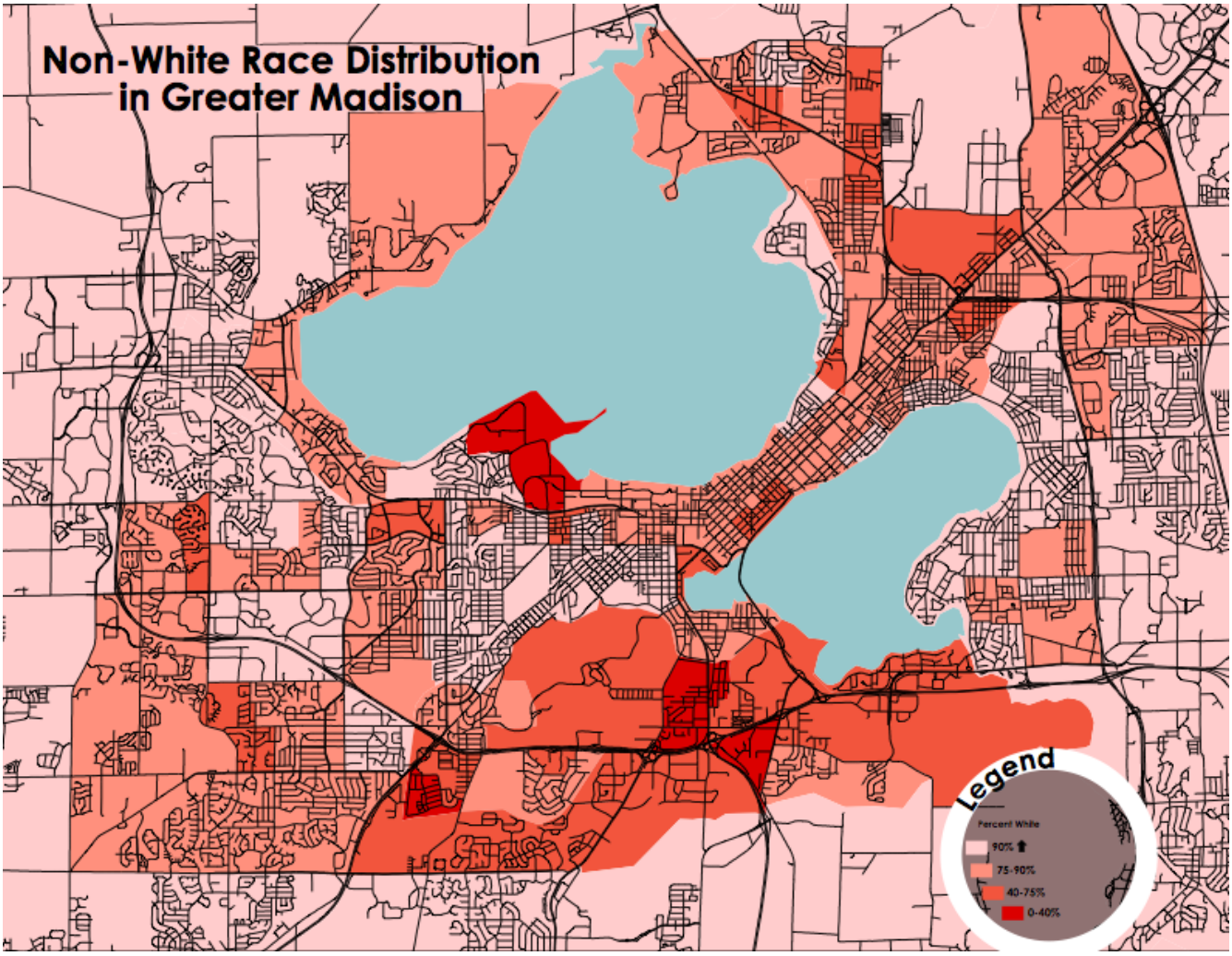

Figure 1.3 Depicting the percentage of white citizens

When comparing all three of these census maps there is a clear coincidence relating to poverty, car availability, and race. Whether these three are causally related is another matter, but despite this the correlation is notable and speaks to the systemic unfolding of our communities. Figure 1.3, which highlights communities with majority populations other than white people, shows the same neighborhoods that have been identified previously as being "high risk" for lacking adequate food resources. Going forward, the neighborhoods that are expected to have the greatest difficulty obtaining healthy food are located on the Southside, and the far Eastside.

The second step in the process of determining food deserts in Madison is to overlay full-service grocery stores. As recognized previously, we have assumed that an individual cannot reasonably live healthily on convenience stores, fast food, or other restaurants. This does not take into account people

who may have other means of obtaining healthy food, which is subsequently addressed in our Further Research section. Also omitted from this full-service distinction are specialty stores (i.e. Greenbush Bakery), and ethnic retailers (i.e. Yue-Wah Oriental Foods or Fraboni's Italian Market), because the scope of our research was unable to determine the livability of their food stock. In addition to overlaying full-service grocery stores, a one-mile radius has been included around each grocery store in order to identify areas that have easy access to the stores, as defined by the USDA. But, as has been previously discussed, this is not the only factor in determining easy access to food. Essentially, the areas not highlighted by a one-mile radius are said to be a "classic" food desert. This will be discussed further in several cases.

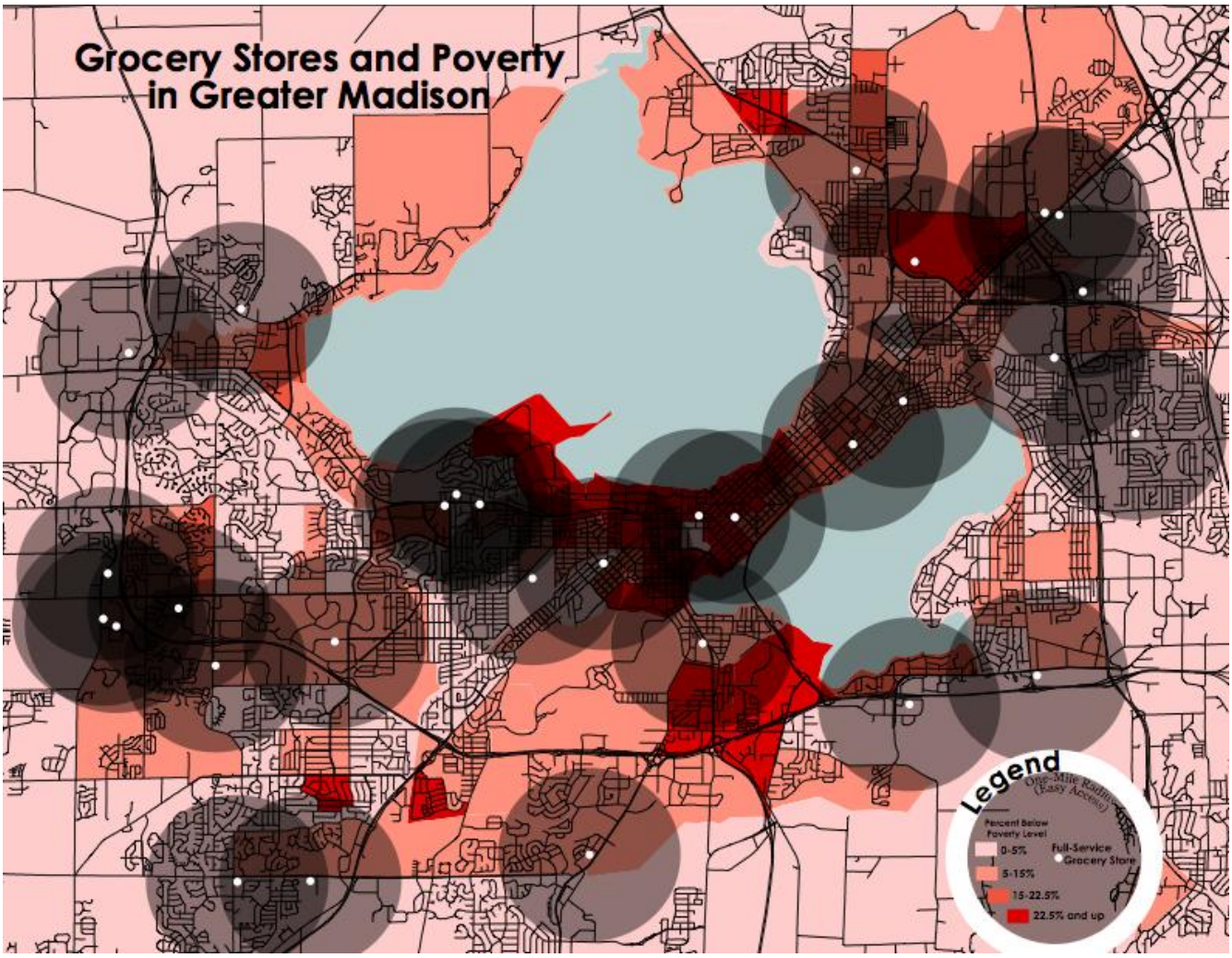

Figure 2.1 Depicting a relationship between poverty and grocery store availability

Figure 2.1 elucidates the areas in Madison that are served by grocery stores. The first point of

intrigue arises from the wealth of grocery options on the near Westside off of University Avenue. Three full-service food retailers, Copp's, Sentry, and Whole Foods service this area, bookmarked by relatively impoverished areas, yet just south of Shorewood Hills, a neighborhood with one of the highest per capita incomes in the city. The relative upkeep and investment in the grocery stores in areas of low poverty (see Figure D) speaks to the availability of fiscal resources and the movement past utilitarian survival.

The second large distribution occurs in Middleton on the Beltline Highway, which seems to allow easy access to the suburban area of relatively low poverty. However, a large section of these Middleton suburbs are not considered as having easy access, despite their relative wealth. This will be addressed with the following illustration. The most alarming gap in grocer's coverage occurs on the Southside where two Copp's stores, and a Wal-Mart sit four miles apart separated by the Beltline Highway and Park Street. In the case of the Park Street Copp's (see Figure E), when juxtaposed with Westside food retailers a physical and aesthetic difference is apparent. This leaves a significant hole in Madison's food resources directly above one of the most impoverished communities. At first glance, the previously noted far Eastside seems to have an adequate distribution of grocery stores, but as we delve further into the data this may not be the case.

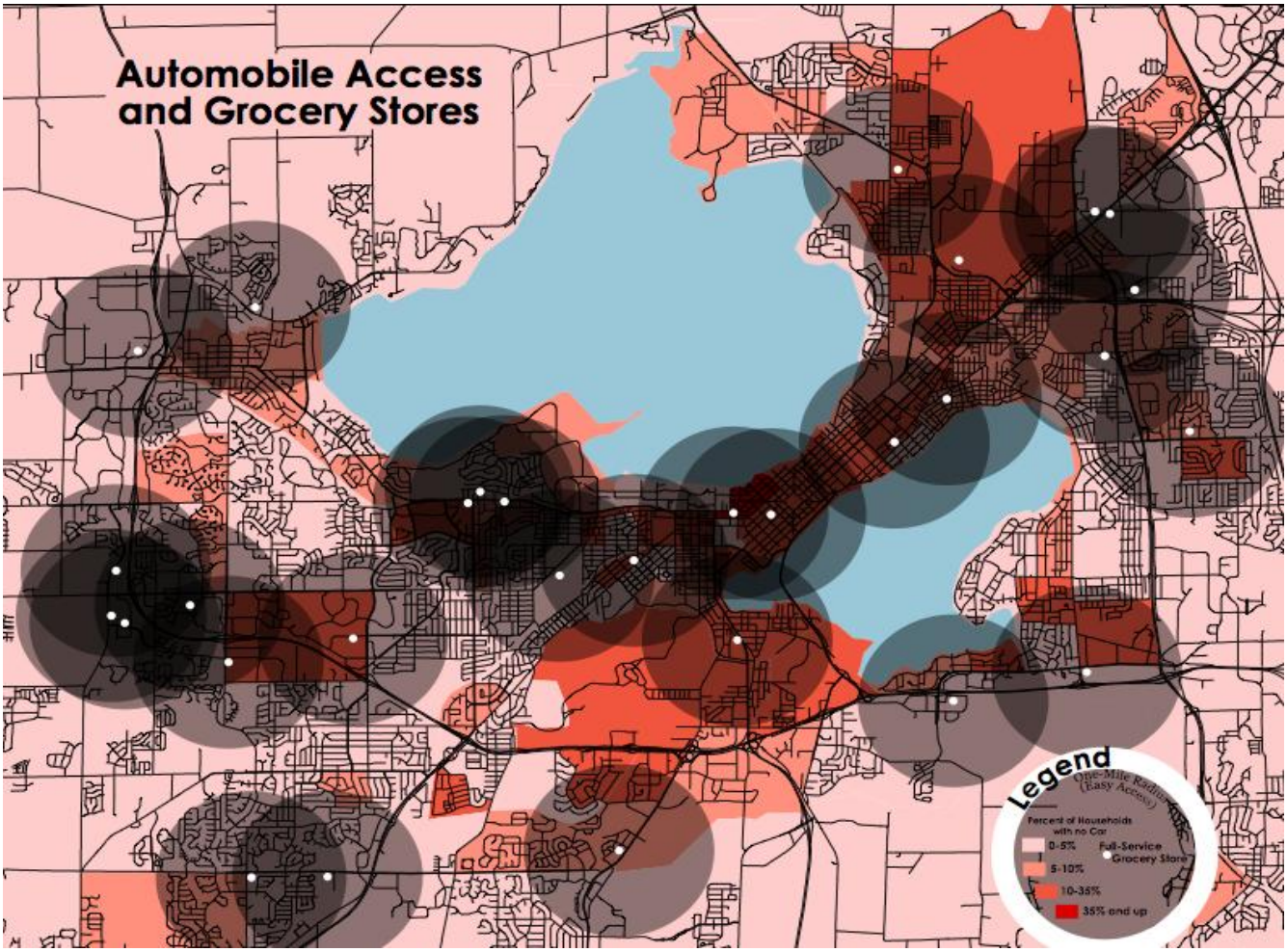

Figure 2.2 Depicting the relationship between automobiles and grocers

Figure 2.2 brings to light the issue of transportation. Again the areas of lowest car ownership are on the isthmus for obvious reasons, but also the Eastside, and the Southside both have relatively low numbers, which further exacerbates the problem of lacking food resources. On the far Eastside, for example, a Copp's sits just north of Highway 30, but a large swathe of low-income, low car accessible homes lies just south, and north of marsh and golf course. This drastically reduces a person's ability to gain access to this grocery store. Recently, a footbridge (see Figure F) has been built over Highway 30 in this area. The people living in this area also have the option of shopping at the Jenifer Street Market, or the Willy Street Co-op, both of which lie across East Washington Street, a highly trafficked road. Nonetheless, this community can be considered at "moderate risk" for lacking food resources. As discussed on the previous map, the large section of Middleton not within one mile of a grocery store, is

clearly not a food desert; one, because of their relative wealth, and two because of their accessibility to automobiles, which is on the order of 0%-5%. This shows how no one definition of food desert can fit all neighborhoods, and for this reason we have attempted to leave our definition open to all variables.

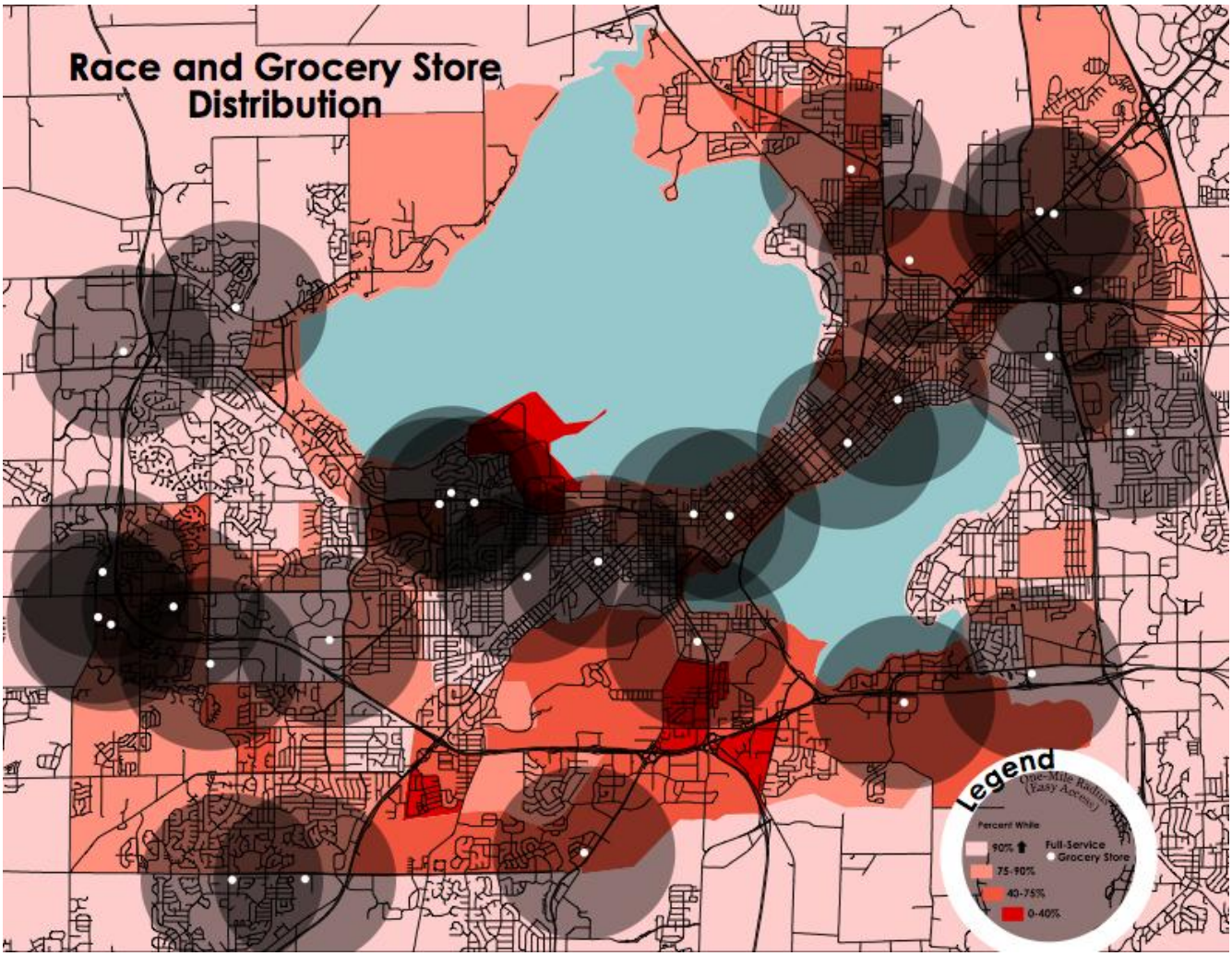

Figure 2.3 Depicting relationships between race and grocers

Figure 2.3 shows perhaps the most stark and distressing correlation. There are only four grocery stores located in Madison communities with 25% or more non-white people. Whether this is a result of systemic discrimination or merely a side effect of other socio-economic factors is a topic for debate. Nonetheless, the trend is alarming and the summation of these six maps establishes the Southside as Madison's major food desert with the far Eastside being an area of moderate concern. The following research will attempt to develop a relationship between the established food deserts and the use of community gardens to see if they helping to alleviate the problems of food deserts.

The Changing Roles of Community Gardens

As cities like Madison have come to recognize the danger of food deserts, the community garden has become a proposed solution to food inaccessibility. The idea for community gardens, especially in Madison, goes back to the turn of the 20th century. The motivation behind and implementation of community gardens throughout Madison's history has changed depending on the perceived need of the surrounding community. An understanding of the historical use of gardens will allow us to better understand how gardens are being used today and if they are helping to alleviate the problems of food deserts.

Some of the earliest examples of community gardens in Madison did not even address the idea of the "food desert" and were instead imbued with strong nationalist motivations during times of national turmoil. Most prominently, during World Wars I and II, the American Department of Agriculture rallied the American populous behind the idea of "victory gardens". Most literature concerning victory gardens assumes that the motivation behind the creation of these gardens was based on a perceived threat facing the country (Schmelzkopf 1995, 364; Herbach, 1998). Although sources from the World War era support the nationalist assumptions of the contemporary writers (Thorne 1943, 186; State Historical Society Photo 1917, 12259), there are some noticeable omissions from modern literature that seemed important for the war-era writers.

Modern writers seem to focus on nationalism without looking at other aspects of the victory gardens that appear to be important to those who grew them during World Wars I and II. One of the most glaring omissions from contemporary writings is an analysis of what was actually grown and the importance of the choice in what was grown. According to Frank Thorne, a writer during World War II, victory gardens were an extension of military efficiency on the home front. In addition to having strong nationalist messages, there was an emphasis put on efficiency. Thorne lauds the virtues of the tomatoes whereas he discourages the planting of "space-consuming crops like potatoes, corn, cabbage" (Thorne

1943, 187). Another example of cultural information that has been overshadowed by modern writers pro-nationalist tendencies comes from the spatial requirements that the Department of Agriculture put out for its ideal community gardens. These plots were significantly larger than the land most Americans had at their private disposal. Any space under 1500 square feet (Thorne 1943, 186) was deemed too small.

Although small gardens were not unheard of, the simple presence of this government mandated size regulation shows that, beyond the nationalist messages sent by victory gardens, there lies other social priorities that the government wanted to convey to the American people such as community building and a military-like efficiency throughout the gardens. These serve as examples of some cultural elements that have been forgotten by the modern writers and remove context from the modern understanding of the role community gardens serve.

Most modern writers of victory gardens seem to assume that once World War II ended, so did the victory/community garden. Both Herbach's "Harvesting the City" and Reinhardt's article "Victory Gardens" assume that the reason that community gardens did not continue after World War II was due to a lack of government support. They do not pay attention, however, to the social mindset around victory gardens. During the war, many Americans considered the gardens to be informal extensions of the military at home. Thorne tells his readers to, "Plant, therefore as if each seed were a cartridge in this critical year's campaign" (Thorne 1943,187). Further evidence can been seen in the Wisconsin State Historical Societies Photo Archive of a Victory Garden Storefront proudly proclaiming during World War I " Both Hoe and gun must defend the flag" (see Figure G).

Once the wars were over in 1945, there was no perceived incentive for Americans to continue this indirect combat in the manner the American government had presented the victory gardens to the public during WWII, the demise of the victory garden symbolized an end of the nationalist garden but it would not be the end of community gardens in Madison.

There is a significant lack of information about community gardens following the end of World

War II. Most of this can be attributed to the fact that most victory gardens were not replanted after the war. However, that does not mean that gardens disappeared altogether. This was a transitional period for the meaning of community gardens. They were no longer being used with the same nationalistic tone that had been instilled during World War II, so they began to address a new need of the American public.

One of the earliest examples of post WWII gardens in Madison appears in the Eagle Heights neighborhood. The garden was originally created in 1962, which is fairly early considering modern writers date the resurgence of community gardens to the 1970's (Schmelzkopf 1995, 364; Doolittle 2004, 392). This seemingly anachronistic community garden shows that community gardens, and the ideas that shaped the gardening movement of the seventies, developed years before the 1970's even began. New points of emphasis attached to these community gardens, such as "Nutritional, Recreational, Educational and Community Based" goals (Eagle Heights Community Garden 2006, http://www.eagleheightsgardens.org/) were absent in their predecessor victory gardens. These new goals of community gardening also represent a spatial shift in urban agriculture. The focus of community gardens during this time moved inward towards American urban cores, which at the time were suffering serious economic decay (Schmelzkopf 1995, 364). These gardens, like their forerunner victory gardens, were being used to address a perceived problem within American society. However, the threat was no longer abroad and was rather perceived as a problem that effects the lives of those in the cities directly, changing the overall message and importance of community gardens.

Since the turn of the 21st century, American cities, including Madison have once again reassessed the need for community gardens. This has led to yet another shift in the usage of said gardens. Although they are built on the perceived importance established by their predecessors, modern community gardens have started to address the growing issue of food deserts within urban areas (Madison City Council 1990, Resolution 46.849). Although the Madison City Council has been active on the issue of community gardens since the early 90's, one of the most prominent documents is a draft

report on the Madison Food System Project from 1999. Here, the City Advisory Committee on Community Gardens defined gardens as, "essential to people and places in urban environments" (Baumann et at, 1999. 5). The report further cites food security and nutritional benefits for the users of community gardens as a tremendously important social issue that faces a growing urban population.

There are similarities between the new community gardens and previous incarnations of community gardens. Like the victory garden era, the Madison city council has also placed size recommendations for the community garden (Madison City Council 1991, Parks & Open Space Plan). This time however, they do not dictate the types of food that should be grown within the gardens, as was common during the World War victory gardens. Although this does pose a difference, the important fact is that governments have once again resumed an interest in community gardens. Writers on modern community gardens seem to believe that once again the new message of community gardens will be a unifying theme throughout the nations urban agricultural circles. Hilda Kurtz says of modern community gardens:

> "While there is an implicit recognition throughout the community gardening literature that community gardens are not all the same, the differences in the way these gardens serve as urban green spaces and arenas for community-building tends to be subsumed within a generalized advocacy for community gardening" (Kurtz 2001, 659).

By looking at the historical narrative of the community gardens we are able to see an ebb and flow of support for the gardens created by the perceived threat to the community. Newly created community gardens created in Madison address the threat of food inaccessibility within the city.

Further sociological diversions between community gardens of the past and present can be seen in the varying methods of utilization. The victory gardens of the World War years were coordinated on a local level with the support of the federal government, most notably the United States Department of Agriculture. Following the war effort, the federal support of victory garden waned and so did public enthusiasm for community gardens. During the 1960's and 70's local community groups such as Troy Gardens and the Eagle Heights Community Garden typically ran the gardens. More recently in

Madison, the duty of community garden organization has fallen to the Community Action Coalition (CAC), which was founded in 1966 to promote more sustainable and community based urban spaces throughout the city. According to the website "In keeping with CAC's mission, we focus our services on gardens with many low-income families" (Community Action Coalition Website, 2010. www.cacscw.org/gardens.php). Logistically, an individual manager administrates each Madison community garden, however, it is worth noting that at many of the CAC gardens, such as Quann Garden on the south side, have different managers to work with gardeners that speak different languages (see Figure H).

Community gardens of Madison have been driven throughout history by the desire to address various perceived problem facing society. The specific reasons behind community gardens, like the gardens themselves, have changed over time. Currently, organizations like the CAC along with the Madison city council have been addressing the danger of food deserts through the promotion of community gardens in these areas. However, there deserves mention that we have seen recent motivations on local and national levels have called for the use of gardens local schools (Figure I). Although there is no indication that the two garden priorities will not be able to survive together. This new priority further highlights the regularly changing motivations of community gardens in dictating the spatial relationship of community gardens to the surrounding area and those who use the gardens.

Community Gardens: Conquering Food Deserts?

The next series of map overlays will continue to show areas of "high risk", and also depict the distribution of community gardens in Madison. This approach will uncover the spatial and social relationships between food deserts and community gardens. Figure 3.1 shows gardens relating to poverty, Figure 3.2 relates gardens to car ownership, and Figure 3.3 shows race relating to the distribution of gardens.

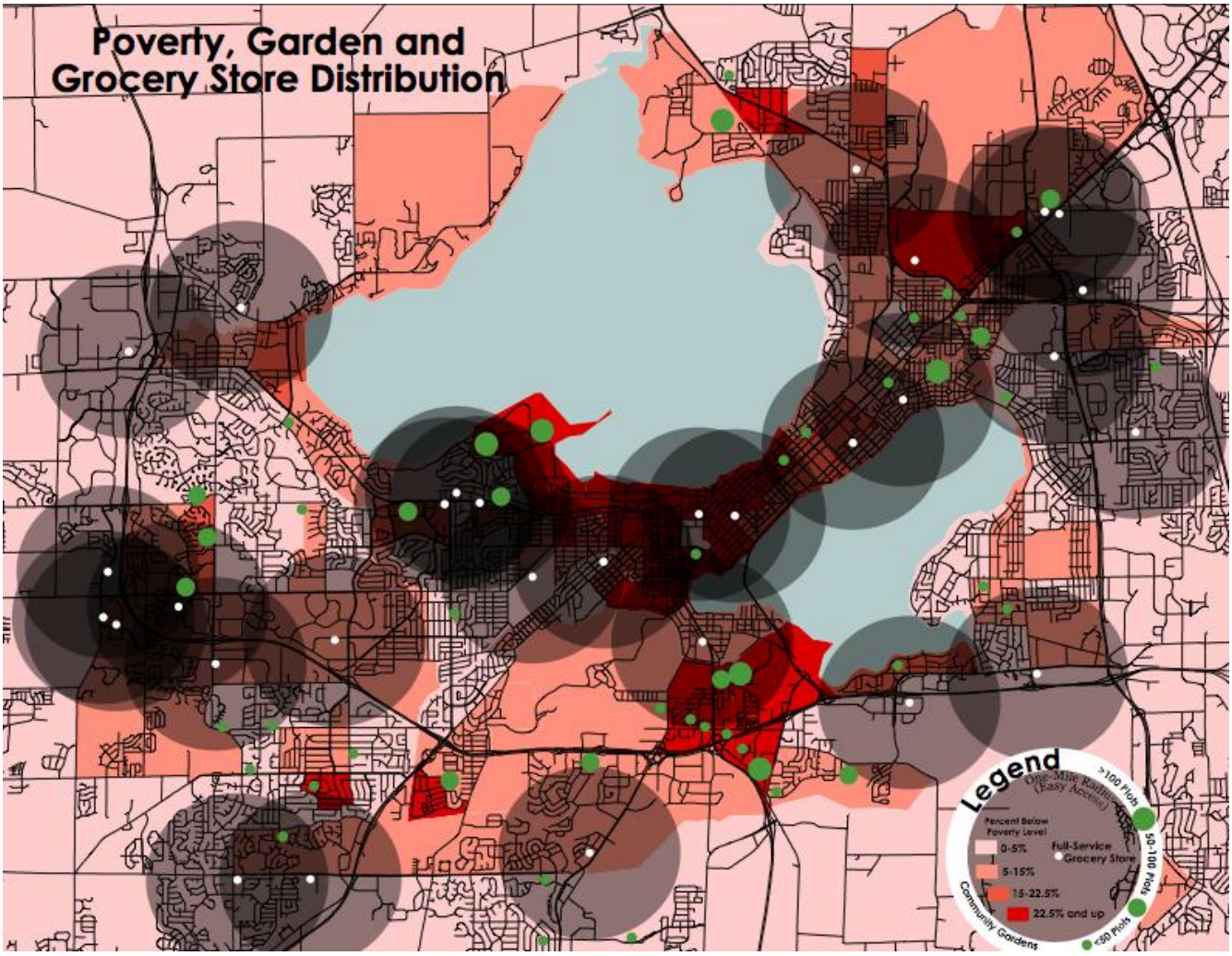

Figure 3.1 Depicting the relationship between poverty, grocery stores, and gardens

Figure 3.1 highlights a strong correlation between the distribution of community gardens and impoverished areas. The areas with the greatest concentration of plots exist on the Southside, in the Eagle Heights neighborhood, and of the far Eastside, all areas with relatively high levels of poverty. The Southdale neighborhood, just south of the Beltline located in the area of highest poverty, utilizes open space next to the Beltline to supplement their diet (see Figure. J).

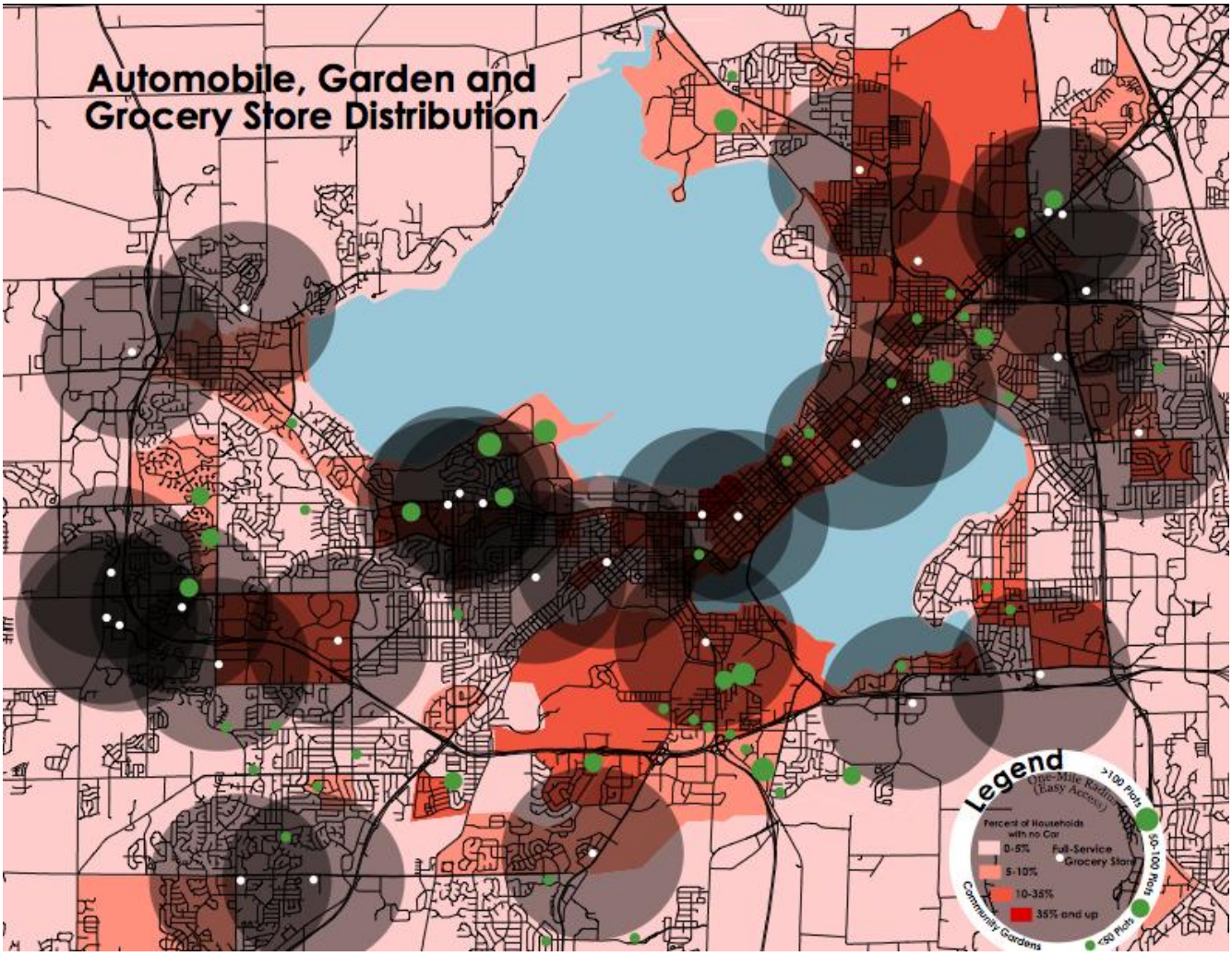

Figure 3.2 Depicting the relationship between automobile ownership, grocery stores, and gardens

This map follows the path of previous assertions, showing the concentration of gardens relating to other food resources, and their accessibility via automobile. Once again areas with low food accessibility due to automobile ownership have a greater distribution of gardens in those areas.

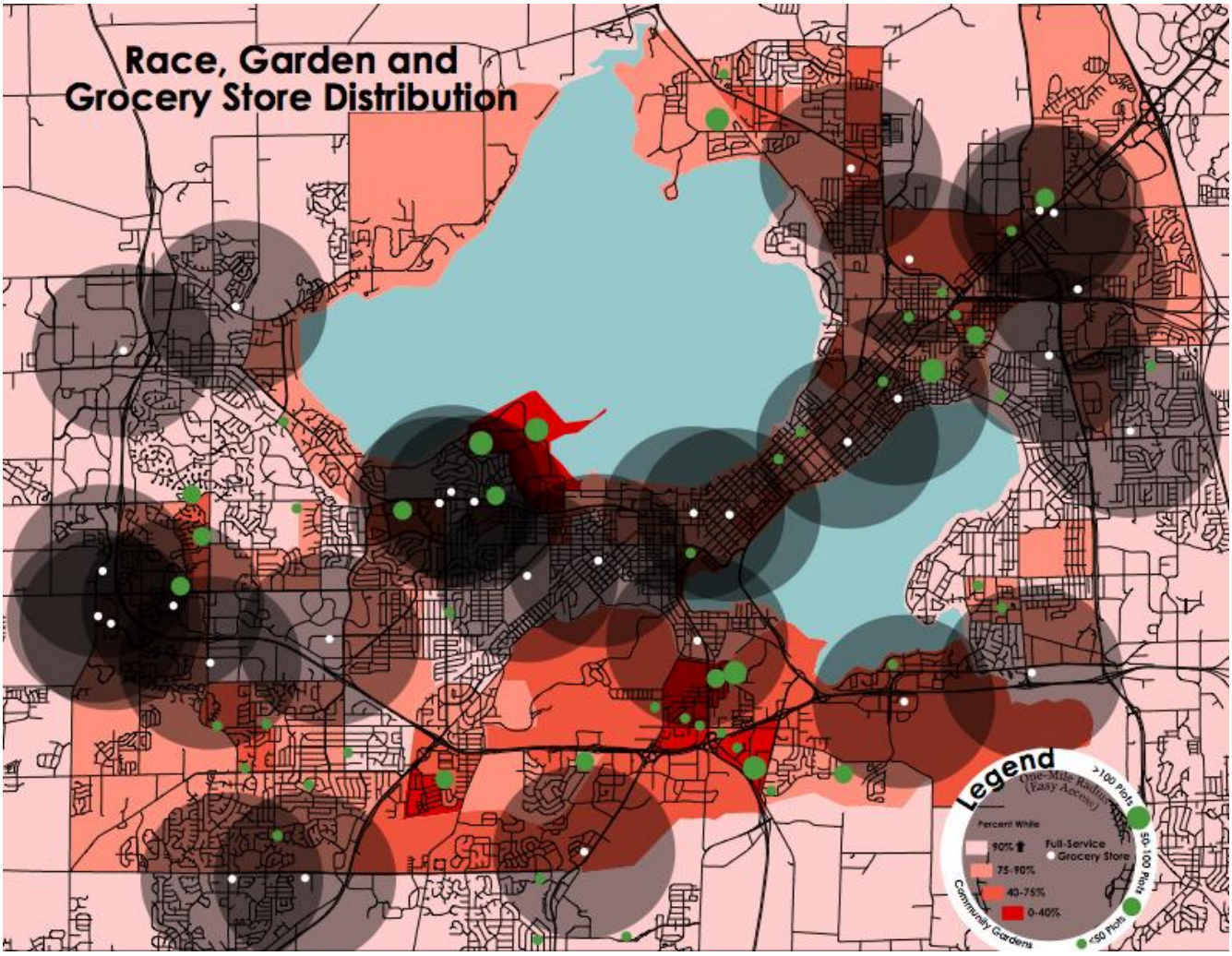

Figure 3.3 Depicting the relationship between race, grocery stores, and gardens

Figure 3.3 highlights the distribution of community gardens in areas with high concentrations of non-white people. The exact cause of this cannot be determined given the scope of our research, but certain peoples in Madison, such as Latinos and Hmong, do have gardening embedded in their culture (see Figure K).

In summary, the narrative presented through this series of maps depicts a strong relationship between available food outlets, the characteristics of the populations these stores inhabit, and the distribution of community gardens. It can be said that gardens are located in the areas of highest need, and this is also demonstrated by the current context of the community garden in Madison. The distributions of gardens show a positive step towards eliminating the inequality of the modern food system, however great strides remain to close the gap.

Further Research

Given the time and financial constraints of a semester's worth of undergraduate research, there are aspects of this project that lend themselves to further discovery. Finding answers to questions including who is using community gardens, potential sites for future gardens, and a general social causation of food deserts would not only be helpful to our research but would situate further research connecting the relationship between food deserts and community gardens.

Through further research, we could ideally establish a complete demographic of those actually utilizing the community gardens in and around Madison, Wisconsin. Our research thus far speaks largely to the spatial distribution of gardens and the larger demographic attributes of census blocks in Madison (i.e. race, socio-economic status, automobile ownership). Given a chance, we would analyze the race, gender, economic status, and family attributes of each individual plot holder in community gardens around Madison. This would allow us to isolate the citizens that are and are not taking advantage of local gardens and, likewise, identify those in need of greater food resources. Additionally, by conducting interviews and surveys, we could analyze the alternative food resources individuals are taking advantage of. Everything from the use of personal gardens and farmers markets to fast food and restaurants offer alternatives to using community gardens for subsistence. Given our allotted timeframe, it is virtually impossible to obtain a complete food access and resource census, yet this information would be crucial to best understand the relationship between food deserts and community gardens in Madison.

Furthermore, by advancing our research into a more spatial framework we could potentially identify areas in Madison where new community gardens could be implemented. Our project thus far has shown areas in the city that are benefiting, and could further benefit, from the presence of community gardens, but with more time and financial backing we would like to find neighborhoods and plots of land capable of housing new gardens. In this regard, a social analysis of the willingness to turn a plot of open land into a community garden would prove helpful. On top of this, a study of land

and zoning ordinances would identify the legal possibilities of instigating additional gardens, and a study of the biophysical breakdown of our suggested plots of land would identify the environmental possibilities of implementing said gardens.

Through our research thus far, we have seen striking patterns regarding the social causation of food deserts and community gardens. We feel that a chain of causation could likely be drawn in the following manner, but obviously would require more research. In the greater Madison area there is generally higher demand for downtown isthmus housing, which raises land values in this area and leaves little open room for gardens. With high demand for land on the isthmus, land uses of lower economic return are forced onto lower valued lands, which tend to be in highly trafficked areas. These high traffic areas create barriers, such as freeways, as well as attract fast food outlets. With high-income communities attracting the majority of full service grocers, low-income communities are left with very little healthy food options but a larger availability of low value land. This land could potentially be left open for the creation of community gardens but, once again, further research would need to be conducted to draw these final conclusions.

With the time and financial backing we were given for our research, our group is proud of what we have uncovered concerning a relationship between food deserts and community gardens in Madison, Wisconsin. However, we also realize that this research is by no means exhaustive. Through further research, the individual use of community gardens, potential sites for future gardens, and a social causation of food deserts would complete a full-scale analysis on the relationship between food deserts and community gardens in Madison, Wisconsin.

Photo Appendix

Figure A) Proposed Site for Badger Rock Middle School

Figure B) Prevalence of Fast Food Options on E. Washington St

Figure C) Difficulties in accessibility personified at a local grocery store.

Figure D) Upkeep and Investment in a wealthier neighborhood on Madison's West Side.

Figure E) Upkeep and Investment in a low-income neighborhood.

Figure F) Footbridge over Highway 30 in Madison.

Figure G) Storefront on State Street from 1917. Wisconsin Historical Society Images. ID: Wi-12259.

Figure H) Sign written in English, Spanish and Hmong indicated the cultural diversity present within the Gardens (Quann Community Garden).

Figure I: Model for a Garden outside the site of the proposed Badger Rock Middle School.

Figure J: Recently Founded Community Garden in the Southside of Madison. (Southdale Community Garden)

Figure K: A more established community garden from the Northside of Madison (Troy Community Garden).

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