

**The relationship among household characteristics, geographic space, and food security in
the Allen Neighborhood**

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Report prepared for
The Allen Neighborhood Center
1619 E. Kalamazoo St
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2/1/2004

Abstract

Food security is a significant problem throughout the United States. This paper examines the extent of food security in the Allen Neighborhood and examines how it relates to both demographic characteristics of the neighborhood and the structure of food retailers in the surrounding area. U.S. Census data indicate that the neighborhood has many of the characteristics that make it at high risk for food insecurity including low-income, many single parent families, high numbers of renters, and a significant minority population. Spatial analysis of food retailers using GIS indicates that while food is readily available through convenience and party stores, the location of grocery stores indicates that the Allen Neighborhood is located within a food desert. Finally, and perhaps most significantly, a survey of neighborhood residents reveals that almost 1 out of 3 households is food insecure.

Introduction

In this paper I assess the food security of the Allen Neighborhood, a small urban neighborhood located in Lansing, Michigan. By examining both the household characteristics of the population and the spatial distribution of food retailers in the neighborhood, I argue that food insecurity in the neighborhood is constructed through a combination of household and environmental characteristics. In other words, food insecurity is a multiscale issue and focusing only on the household or only on the neighborhood overlooks the interaction effect of these two scales. The interaction between households and their neighborhood as a negotiation between people and the place where they live determines their ability to reliably obtain healthy food.

The issue of food availability is one fundamental to demographic research. The ability of a society to produce food is critical to its development (Diamond 1997) and intricately related to basic survival and environmental quality (Ehrlich, Ehrlich, and Daily 1993). It has been examined as a factor related to both fertility and mortality (Basu 1992; Mosley and Chen 1984). It is only relatively recently, however, that researchers have begun to look not simply at availability of food, but also food quality. Authors such as Smil (1994) have argued that simple

calorie counting as a means to determine food sufficiency overlooks issues related to quality as well as social and environmental differences among populations. Efforts to identify the impacts of different nutritional food regimes have for the most part been focused on developing countries (Jenkins and Scanlan 2001). The United States, despite its global political power and economic productivity, is not immune from problems of food availability and recently a food security movement has developed to address many of these issues. Food security is defined by the U.S. Department of Agriculture as access by all people at all times to enough food for an active, healthy life. In 2002 over 11% of the U.S. was still food insecure (Nord, Andrews, and Carlson 2003) and food insecurity has very real social, psychological, and physiological impacts (Hamelin, Habicht, and Beaudry 1999; Morland, Wing, and Roux 2002; Olson 1999; Rose 1999; Travers 1996; Vozoris and Tarasuk 2003). These impacts are not just caused by a lack of food, but also the quality of food that is consumed.

The question that needs to be addressed in the United States as well as elsewhere is what factors are leading to differential food consumption patterns by some populations? In other words, why do some people either not have enough to eat or not have enough quality food to eat? Needless to say the inability to pay for food is a primary obstacle to food access and lack of income is an important factor in assessing food security. After all, the transaction in the checkout line is only one of a set of negotiations that takes place when people select when, where, how and what to buy or not to buy. Several authors have argued that the problem is not only whether or not people have sufficient money for food, but also whether or not they have reasonable access (Blanchard and Lyson 2002; Caraher, Dixon, and Car-Hill 1998; Cummins and Macintyre 1999; Donkin 2000; Donkin, Dowler, Stevenson, and Turner 1999; Furey, McIlveen, and Strugnell 1999; Furey, Strugnell, and McIlveen 2001; Lang and Caraher 1998;

Olson, Rauschenbach, Frongillo Jr., and Kendall 1997). Household characteristics such as physical disabilities, lack of a car, or small children may increase the transaction costs for accessing food from different locations. Furthermore, neighborhood characteristics influence distance that people must travel to purchase food and influence the price they must pay for various commodities (Alwitt and Donley 1997; Hall 1983; Kaufman, MacDonald, Lutz, and Smallwood 1997). In other words, it appears that food security cannot be viewed simply as a household issue, but rather placed within a broader social and environmental context.

This paper involves a case study of a small, urban neighborhood located in Lansing, Michigan. I will draw on three sets of data. First, I will examine basic demographic data for the neighborhood drawn from the 2000 U.S. Census. The purpose of examining this data will be to construct a basic demographic profile of the residents of the area. This profile will be compared to descriptions of household characteristics of food insecure households in other studies. Second, I will utilize GIS to examine the spatiality of food retailers in and around the neighborhood. This will provide us with a sense of the different types of food available to residents (from fresh produce to processed food) and the relative convenience of these types of food (walking versus driving distance) as well as to help identify potential barriers to accessing different types of food. Finally, I will look at a survey that was conducted in the summer of 2003 of neighborhood residents. This survey asked a variety of questions related to food security, shopping location, and health status. By drawing on these three data sets I will demonstrate how food security, in terms of nutritional food availability, is mediated by both the demographic characteristics of a community and the spatiality of the food retailers throughout the area. In other words, people don't just buy low quality food because that is all they can

afford—they also buy it because their neighborhood is constructed in such a fashion that it is easy to access.

The Problem of Food Security

Anderson and Cook (1999) provide a history of the term food security. They note that concerns with “food security” originated during the 1960s and 1970s in reference to international development. The focus of this research was on food supplies and availability and the unit of analysis was often national in scale. Research along these lines continues to be important today (Jenkins and Scanlan 2001). By the 1980s, Anderson and Cook (1999) note a shift towards concern with household and individual food access and a long-term perspective on food availability. In other words, concern with food security had broadened from simple access within a country to encompassing individual and household characteristics which impact people’s long term access to food. By the 1990s the concept of food security had shifted almost entirely towards concern with reliable access, affordability, and quality. The concept of food security was further solidified in 1995 when the US Department of Agriculture accepted it as a funded program and began conducting national surveys of food spending, food access and adequacy, and sources of food assistance.

In 2002, 50,000 people completed the food security portion of the Current Population Census. This survey is the most comprehensive assessment of food security in the United States. In 2002, the USDA survey found that 11.1% of the population was found to be food insecure (Nord, Andrews, and Carlson 2003). This was an increase over the 10.7% that were found to be food insecure in 2001 and a slight increase over 1995 insecurity levels. In the seven years that

the survey has been conducted however, there have not been significant increases or decreases in any given year.

As noted previously, food security is not simply an assessment of quantity of food available. As Smil (1994) has noted, simply measuring the calories of food that are available to a population overlooks the population specific characteristics and the differential nutritional impacts of various food types. Furthermore, the temporal regularity of food availability can have significant impacts on populations (Caldwell, Reddy, and Caldwell 1986). Within the United States and Europe, several researchers have identified specific health problems related to food security.

Moreland et al. (2002) examined the relationship between food retailer availability and consumption of fresh produce in order to identify areas of high risk for atherosclerosis. They found that there was a significant relationship between the density of supermarkets and community atherosclerosis risk. Olson (1999) looked specifically at women of childbearing age and school children and found that for women of childbearing age, there was a correlation between household level food insecurity and a higher body mass index. In other words, obesity and not famine appeared to be correlated with food insecurity. This is much in line with other research demonstrating the relationship between poverty and obesity, which is particularly a problem in industrialized countries (Pena and Baccallao 2002). Olson (1999) also found that children in food insecure households suffered from compromised psychosocial functioning.

While a Canadian study of the relationship between food security and health failed to find a correlation between insecurity and obesity, it identified a large number of other significant variables (Vozoris and Tarasuk 2003). The authors found that food-insufficient households had significantly higher odds of reporting poor/fair health, of having poor functional health, restricted

activity and multiple chronic conditions, of suffering from major depression and distress, and of having poor social support. They also found higher levels of heart disease, diabetes, high blood pressure, and food allergies. We must be cautious about determining causation since other authors have noted that poor functional health is a potential cause of food insecurity (Furey, Strugnell, and McIlveen 2001). However, whether poor health is the initial cause of food insecurity or food insecurity leads to poor health; it is likely that these are two self reinforcing factors for many segments of the population.

Hamelin et al. (1999) divide the consequences of food insecurity into three areas. First, they note physical impairments such as hunger, depletion, and illness. Next they describe psychological suffering such as stress and constraints to go against held norms and values. Finally, the authors describe sociofamilial perturbations that include modification of eating patterns and ritual, disruption of household dynamics, and distorted means of food acquisition and management. The authors demonstrate that the impacts of food insecurity are not simply health related, but also psychological and social. Lack of access to food is not just bad for one's health—it can also be depressing and lead directly to other social problems such as theft or poaching.

Worthen and Weatherspoon(2004) discuss how food insecurity has negative aspects on both individuals and communities. They note that rural areas are often particularly vulnerable due to difficulty with access. They also discuss how chronic food security can impact the entire community by effecting employee productivity, concentration and leaning among school children, erosion of knowledge and food practices to the next generation, decreased participation in social life, and reinforcement of a two-tiered food distribution system. The problem of food

insecurity is not simply one for individual families, but also impacts food secure households in the community.

In addition to looking at the impacts of food insecurity, several studies have sought to identify the socioeconomic and demographic characteristics of food insecure populations. In an analysis of the most recent USDA survey data, Nord et al. (2003) found that food insecurity tended to be associated with families with children, single parent families, low income populations, Blacks and Hispanics, and inner city populations. Olson et al. (1997) conducted qualitative research in upstate New York and came to similar conclusions. They found that food insecurity tended to be associated with single parent families, large household size, low income, unexpected expenses, and insufficient food stamps. In another USDA study, Rose et al. (1998) found that food insufficiency tended to be lower for high school graduates, homeowners, small households, white households, and high income households. Importantly, in this study the authors also found that while there was a relationship between income and food security it was not a one to one relationship. In other words, while many of the socioeconomic characteristics of food insecurity are related to income, income is not sufficient to explain food insecurity. In fact, half of the people in the 1995 USDA survey who experienced hunger had incomes above the poverty line (Rose 1999).

A number of studies have sought to elaborate on the causes of food insecurity by expanding the scale of research from the household to the community level. In particular, many scholars have suggested that the physical structure of a community is of primary importance both to the extent of food insecurity and in determining who is food insecure. In many cases, low cost, healthy food may, quite literally, be out of reach of vulnerable consumers. For instance, in Chicago poor neighborhoods tend to have fewer supermarkets, banks, and large drug stores

(Alwitt and Donley 1997). This spatial inequity in food access can have a particularly strong access on elderly populations and Black populations who are confronted with higher prices, lower food quality, and smaller selection (Hall 1983). Kaufman et al. (1997) suggests that two of the most important reasons why poor populations face higher prices is due to their distance from low-cost suburban supermarkets and proximity to relatively high-priced small grocers. While spatial inequity in food retailers is not the case in all communities and in some areas access may be relatively equitable (Cummins and Macintyre 1999), there is mounting evidence that space plays an important role on the price, quality, and selection of food readily available to consumers (Donkin et al. 1999; Kolodinsky and Cranwell 2000; Morland et al. 2002).

In the late 1990s the term ‘food desert’ developed as a way of addressing this issue of physical access of food. Furey et al. (2001) define a food desert as “an area where people do not have easy access to healthy, fresh foods, particularly if they are poor and have limited mobility.” Researchers have found that even within a relatively small urban area with a 2 km radius, access to food retailers can be significantly limited, in particular for populations without transportation or with physical disabilities (Donkin 2000). Food deserts have been identified in both urban (Alwitt and Donley 1997; Donkin 2000; Furey, Strugnell, and McIlveen 2001; Kolodinsky and Cranwell 2000; Perry 2000) and rural (Blanchard and Lyson 2002; Furey, Strugnell, and McIlveen 2001; Worthen and Weatherspoon 2004) areas. This research makes an important contribution to research on food security because it demonstrates that food security is determined through a combination of both physical and financial factors.

The concept of a food desert is a powerful tool for identifying areas of potential food insecurity; however, as is often pointed out in the literature, food deserts are often primarily a problem for elderly populations, people with disabilities, and people without transportation.

Many segments of the population may think little of driving 15 minutes to a suburban grocery store. In essence, food deserts represent areas where transaction costs are particularly high. These transaction costs are not the same for all segments of the population. Importantly, however, the highest transaction costs often accrue to the very same populations (i.e. low income, elderly, disabled) who are least able to absorb the additional costs. Thus the impact of food deserts, in terms of the transaction costs they represent, is not simply a matter of physical access. It is mediated by the socioeconomic and demographic characteristics of the population.

Understanding the relationship between the physical structure of the neighborhood and the socioeconomic and demographic characteristics of the population is essential to a comprehensive evaluation of the food security of a particular neighborhood. As I have demonstrated in this section, research in food security has often focused on only the characteristics of a population when factors external to individual or household circumstances, such as proximity to a supermarket play an important role in determining food access. At the same time, a model for food security that looks only at the physical layout of a neighborhood might overlook the differential impacts that this has on different individuals or households. Inevitably, it is the combination of these two factors that determines the food security of an area. With this in mind, I will now discuss how physical community structure and population characteristics combine to determine the food security in one urban neighborhood.

Material and Methods

The purpose of this study is to evaluate the extent of food security in one urban neighborhood. As I have argued in the previous section, in order to provide a comprehensive evaluation it is necessary to identify how community physical structure and population

socioeconomic and demographic characteristics interact. Such an analysis requires both a multimethodological and multiscalar approach. Such an approach is not unproblematic since comparisons between scales, such as from census blocks to households, cannot be made. However, since the purpose is to evaluate the entire neighborhood and not individual or household circumstances, it is reasonable to draw on different units of analysis within the bounds of the neighborhood as a means to assess the neighborhood as a whole.

The first set of data utilized in this study consists of a survey of neighborhood residents. This survey was conducted by volunteers and staff of the Allen Neighborhood Center, a 501(c)3 non-profit neighborhood organization, during the summer and fall of 2003. Surveys were conducted within people's homes and people were asked a variety of questions relating to health, food, and nutrition. Questions were both open and closed. Closed questions were thematically coded. A total of 503 households responded to the survey. This represented approximately 20% of the households in the neighborhood.

The next set of data used in this study consisted of food retailer information for all food retailers within a five mile radius of the center of the neighborhood. Names and addresses of retailers were collected from two internet business databases: www.yellowpages.com and www.mapsonus.com. Businesses were categorized into supermarkets, grocery stores, convenience/party stores, specialty stores, and other. Supermarkets included all large chain food retailers such as Kroger and Meijer. Grocery stores included smaller, generally independent food retailers. Convenience and party stores consisted of stores such as Quality Dairy, liquor stores, and gas station based food retailers where food is available but selection is extremely limited. Specialty stores included both health food stores and stores specializing in particular

ethnic foods. Only one store was not included in the above categories. This was a membership based warehouse store.

Tele Atlas' EZ-Locate™ service was used to geocode food retailer and survey respondent addresses which were then imported into ArcView GIS. Half mile buffers were created around each food retailer in order to represent convenient walking distances to each store type. Survey respondent were also mapped in order to examine spatial distribution patterns (i.e. clustering, distance to retailers, etc.). Distances of various major food retailers to the Allen Neighborhood were also compared.

Finally, basic socioeconomic and demographic data was collected from the 2000 US Census. The Allen Neighborhood consists of seven census blocks and all data was collected at the household level. Variables were selected based on criteria that appeared in the literature as influencing food security. Data collected included household ownership, families with children, income, race, vehicle ownership, and education. While this data could not be linked directly to the survey results it provided a profile of the potential food security of the community in terms of socioeconomic characteristics.

Results

The Allen Neighborhood is an urban neighborhood approximately 2 square miles in size. While the neighborhood is primarily residential, there are some small businesses scattered throughout it. It is also bordered by significant commercial activity on its west, north, and east sides. The 2000 U.S. Census provides us with a good profile of the people in the neighborhood. Houses in the neighborhood are approximately half rental and half resident owned. Approximately 1 out of every 10 residents is in college—largely influenced by the close

proximity to Michigan State University. Households typically have a very low income and in 2000, 59% of the households were below the poverty line. 74% of neighborhood residents are white and 13.4% are Black. Transportation is somewhat limited in the neighborhood and 10% of the residents rely on public transportation, walk, or bicycle to work. Over half of the households in the neighborhood consist of families with children (55%) with approximately half of these families consisting of single parent families.

Table 1. Relation of neighborhood income to the poverty line

<u>Income relative to the poverty line</u>	<u>Percent of neighborhood</u>
50 or less of poverty	50.00
50 to 75 of poverty	4.69
75 to 99 of poverty	3.82
Above poverty	41.49

Table 2. Educational attainment of the neighborhood and Michigan

<u>Percent with degrees</u>	<u>Allen</u>	<u>Michigan</u>
high school	26.30	31.34
associate	7.34	6.98
bachelors	13.01	13.70
masters	5.67	5.67
professional	1.34	1.62
doctorate	0.76	0.78
<u>Percent in school</u>		
Working on undergrad degree	9.62	5.50
Working on grad or pro degree	3.31	1.16

Table 3. Tenancy of the neighborhood

<u>Household</u>	<u>Percent of neighborhood</u>
Owner	48.19
Renter	51.81

Table 4. Rent as percent of income for the neighborhood

<u>Percent of income spent on rent</u>	<u>Percent of neighborhood</u>
Less than 10%	5.65
10% to 14%	12.24
15% to 19%	12.94
20% to 24%	7.14
25% to 29%	11.53
30% to 34%	7.37
35% to 39%	6.51
40% to 49%	9.49
50% or more	21.18

The results of the survey indicate that there is a high level of food insecurity in the Allen Neighborhood. In fact, 29.9% of those who responded to that question stated that they either sometimes or often did not have enough food to eat. This is significantly higher than both national and state food insecurity levels which are 11.1% and 9.2% respectively (Nord, Andrews, and Carlson 2003). The vast majority of people in the survey shopped at Kroger and/or Meijer. Notably, however, households that were food insecure also tended to shop at discount supermarkets, namely Aldi and Save-a-lot, much more frequently than food secure households (Table 5).

Table 5. Primary shopping locations

<u>Where do you shop?</u>	Total 439		Food insecure 130		Food secure 309	
	number	percent	number	percent	number	Percent
Kroger	200	45.6	51	39.2	149	48.2
Meijer	221	50.3	53	40.8	168	54.4
L and L	14	3.2	5	3.8	9	2.9
Sam's Club	9	2.1	0	0.0	9	2.9
Aldi	35	8.0	17	13.1	18	5.8
Save-a-lot	46	10.5	24	18.5	22	7.1
Shop Rite	17	3.9	2	1.5	15	4.9
Apple Market	11	2.5	0	0.0	11	3.6
Horrock's	12	2.7	3	2.3	9	2.9
Farmer Jacks	6	1.4	2	1.5	4	1.3
East Lansing Co-op	7	1.6	1	0.8	6	1.9
Walmart	10	2.3	5	3.8	5	1.6
Other	32	7.3	12	9.2	20	6.5

The tendency to seek out discount supermarkets is reflected in peoples' response to how they chose where to shop. While price and convenience were the primary criteria for most people there again appeared a slight difference between food secure and food insecure respondents. Specifically, half of those in food insecure households stated that price was one of the primary reasons they shopped where they did while only 42% of food secure households were concerned with price (Table 6). On the other hand, convenience appeared to be relatively more important for food secure households. We also found that 93.1% of food secure households felt that shopping was very or somewhat convenient, while only 82.2% of food insecure households felt that shopping was very or somewhat convenient (Table 7).

Table 6. Store selection criteria

Why do you go shopping where you do?

	Total 385		Food insecure 108		Food secure 277	
	number	Percent	number	percent	number	percent
Price	170	44.2	55	50.9	115	41.5
Convenience	176	45.7	41	38.0	135	48.7
Work there/know people	12	3.1	2	1.9	10	3.6
Quality of food	31	8.1	4	3.7	27	9.7
Selection of food	43	11.2	7	6.5	36	13.0

Table 7. Food shopping convenience

Shopping convenience?

	Total 408		Food insecure 118		Food secure 290	
	number	percent	number	percent	number	percent
Very easy	299	73.3	70	59.3	229	79.0
Somewhat easy	68	16.7	27	22.9	41	14.1
Neutral	16	3.9	9	7.6	7	2.4
Somewhat difficult	12	2.9	3	2.5	9	3.1
Very difficult	13	3.2	9	7.6	4	1.4

While the response rate to an open ended question regarding obstacles to shopping for food was relatively small (14.9%), some trends were evident in peoples' responses. First of all, access to transportation was the primary obstacle, in particular for food insecure households. Distance to stores, personal disabilities, and problems associated with caring for children or disabled adults were also problems that people encountered. Interestingly, these tended to be problems for food secure households at rates higher than food insecure households (Table 8).

Table 8. Obstacles to shopping for food

Obstacles to food shopping?	Total 75		Food insecure 36		Food secure 39	
	Number	percent	number	percent	number	percent
Transportation	42	56.0	25	69.4	17	43.6
Distance	9	12.0	2	5.6	7	17.9
Personal disability	8	10.7	3	8.3	5	12.8
Child/adult care	4	5.3	2	5.6	2	5.1

Within five miles of the Allen Neighborhood, we identified 95 food retailers listed in internet business directories. 45 of these food retailers were either convenience or party stores. 17 were small grocers, 11 were specialty stores, and 22 were large supermarkets. This large variety of food retailers indicates that for neighborhood residents with convenient access to transportation, there is a wide variety of options. Using a ½ mile radius as a spatial buffer to assess convenient walking distance indicates, however, that the selection of food retailers in close proximity to the neighborhood itself is much more limited. We found only one supermarket, three specialty stores or small grocers, and five convenience stores within ½ mile of the neighborhood. Furthermore, the one supermarket, Kroger, is located in a large strip mall and actually greater than ½ from the majority of the Allen Neighborhood residences. Meijer, the supermarket that was second to Kroger in the survey, is located just over three miles away.

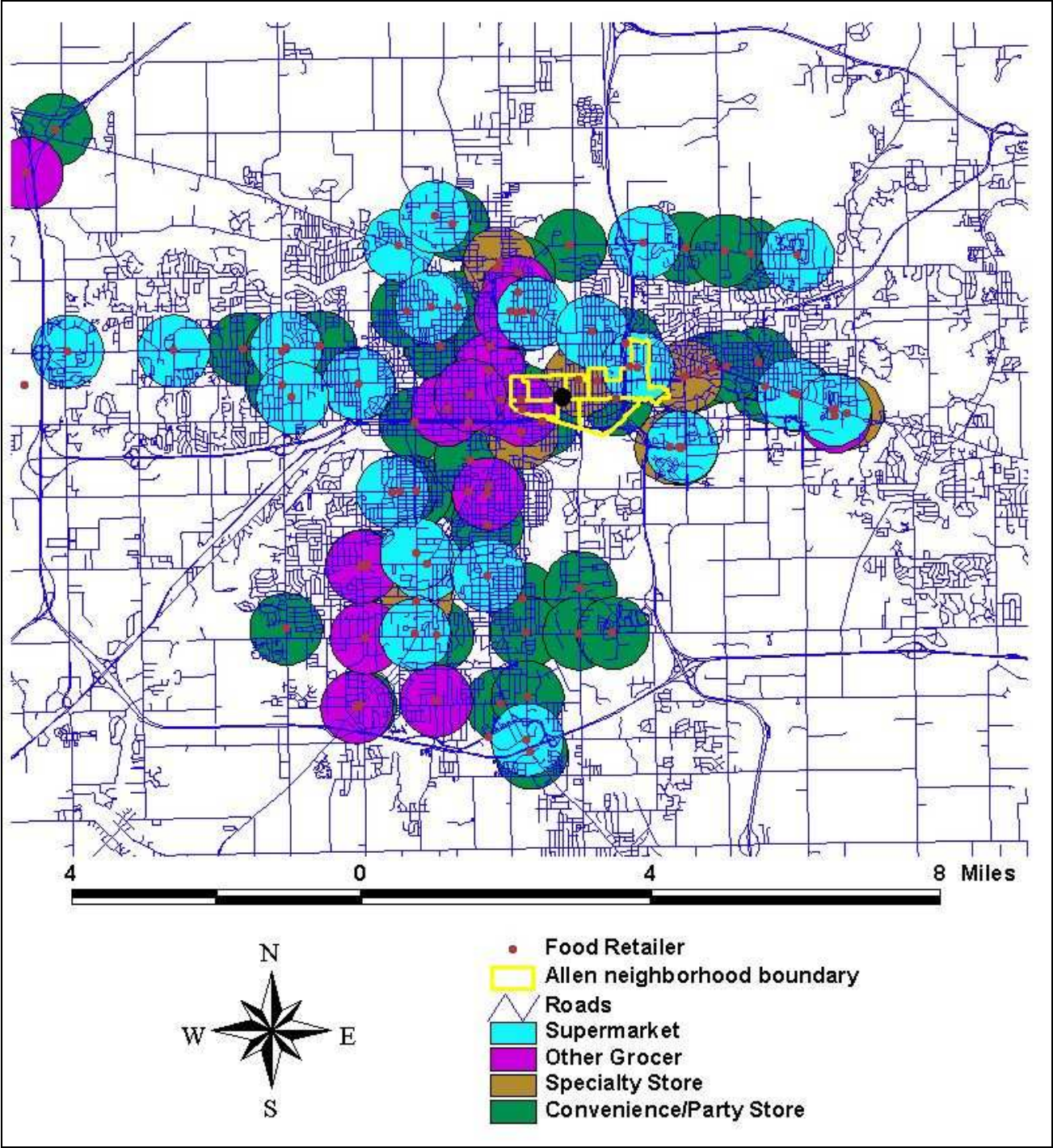


Figure 1. Location of food retailers within five miles of the Allen Neighborhood

Mapping of survey respondents (not shown) demonstrated no apparent pattern in the spatial distribution of survey responses. In other words, people who lived closer to food retailers were no more likely to respond that they were food secure or to state that distance or transportation was a problem than those who lived farther away from food retailers. In fact the rate of food insecurity was spread extremely evenly throughout the neighborhood and there were food insecure respondents with transportation problems who lived less than ½ mile from food retailers.

Discussion

So what then is leading to the high rates of food insecurity that were found in this study? Unfortunately, demographic data was not collected as part of the survey and therefore we were unable to determine whether or not particular demographic or socioeconomic characteristics of particular households were more likely to be food insecure. However, household level research identifying the relationship between demographic characteristics and food insecurity has been conducted in other areas and it is very likely that, if the Allen Neighborhood has similar demographic characteristics to the populations in other studies, that this may be one a factor contributing the neighborhood's food insecurity level.

Nord et al. (2003) and Olson et al. (1997) have found that families with children and single parent families are more likely to be food insecure. In the Allen Neighborhood 29% of the neighborhood consists of two parent families and 25% consists of single parent families, therefore it seems likely that this is one factor contributing to the high rate of food insecurity. Not only does having children mean that there are additional food costs, but it also means that the transaction costs associated with going to the store are higher. This concern was reflected by

survey respondents who noted that the convenience of shopping was impacted by having to care for a child.

Income is also an extremely significant factor contributing to food insecurity (Nord, Andrews, and Carlson 2003; Rose 1999; Rose, Gunderson, and Oliveira 1998). Needless to say, ability to pay mediates both the amount and quality of food that people purchase. Since half of the neighborhood has an income that is 50% of the poverty level, this is certainly a significant factor contributing to the community food security. Since 42% of food secure households and 51% of food insecure households stated that price was one of the primary reasons that they chose where to shop, it is clear that financial access is very important.

Low income populations are also less likely to have access to reliable transportation and more likely to be working in jobs with irregular hours, which makes shopping less convenient. Again, we find consistencies between survey and census data. In this case we find that many survey respondents had difficulties with transportation and, according to the census, one tenth either walk or ride public transportation to work. A few survey respondents noted that use of public transportation was expensive and limited the amount of groceries they could purchase at any one time.

The relationship between education and food security is not readily apparent. Blisard et al. (2003) have identified a relationship between education and food consumption patterns and Rose et al. (1998) have found that people without high school degrees are more likely to be food insecure. We found that the percent of the neighborhood with high school degrees was actually lower than the percent for the state of Michigan (26% versus 31%), which may indicate that a portion of the neighborhood is at higher risk for food insecurity. However, the aggregate effect

of this may be balanced by the high rate of people currently in college (13% for the neighborhood versus 7% for the state of Michigan).

As previously noted access to food must be understood in relation to other expenses, such as housing (Travers 1996). One reason for this is that food expenditures are often more negotiable than other expenses such as rent. According to the census, almost 1/3 of the neighborhood spends 40% or more of their income on rent. Furthermore, since there is evidence that homeowners are less likely to be food insecure (Rose, Gunderson, and Oliveira 1998), the high number of rented houses and the high rent to income ratio likely leaves a significant portion of the neighborhood vulnerable to food insecurity.

Relating survey data to food retailer information also provides us with some useful insights into the causes of food insecurity. Surprisingly, however, the distance between surveyed households and food retailers did not appear to influence whether or not the household was food insecure. This does not mean, however, that space did not play a role. Kaufman et al. (1997) found that low-income households manage to remain food secure by replacing food quality with quantity; for example, buying hamburger instead of steak. In the case of the Allen Neighborhood, we found that food insecure households often shopped at discount supermarkets, namely Aldi and Save-a-lot. Save-a-lot is located 3 miles from the neighborhood and Aldi is located nearly 5 miles away. While such a distance may not be problematic for some residents, it is not a reasonable option for others who do not have sufficient mobility to take advantage of these low priced stores. This distance from discount stores may be another factor contributing to food insecurity rates.

Furthermore, the lack of any spatial clustering in food insecurity or the appearance of 'rings' of food security surrounding food retailers, is indicative of the fact that some type of food

is available to all parts of the neighborhood. Strictly speaking, a food desert, as defined using half mile buffers, is not apparent in the neighborhood. However, we must keep in mind that a food desert is “an area where people do not have easy access to healthy, fresh foods, particularly if they are poor and have limited mobility (Furey, Strugnell, and McIlveen 2001).” The majority of neighborhood is within convenient walking distance of convenience/party stores, but these stores traditionally have higher prices, lower selection, and are unlikely to stock fresh produce and other healthy items. Given the lack of supermarkets that carry fresh produce and other healthy products within ½ mile of the neighborhood, it is our conclusion that a food desert is present for much of the neighborhood.

Finally, it is important to note that while our mapping of the spatial relationship between food insecure respondents and food retailers did not indicate any spatial patterns, this does not mean that distance was not an important factor in food insecurity. At least one food insecure respondent who lived only ½ mile from a supermarket stated that transportation was a problem. At the same time, many respondents stated that while getting to a food retailer was not a problem distance and location did influence which stores they shopped at. Several respondents indicated clear preferences for particular stores which they felt had higher quality food or better selection. So, while food security did not have a particular spatial pattern, the prevalence of convenience stores and the preferences of survey respondents indicate that spatial orientation has a clear impact on the quality of food that is readily available.

Conclusions

In this study we have utilized a multimethodological and multiscalar approach to food security which incorporates a wide variety of data. As we have noted, it is not always possible to

completely reconcile these data sources; however, triangulation of data from different sources is a powerful way of constructing a comprehensive understanding of a particular place. This triangulation has helped us to understand how different factors, and interaction among these factors, have led to such high levels of food insecurity as are indicated in our survey.

By drawing on census data we have demonstrated that the demographic and socioeconomic profile of the Allen Neighborhood is consistent with other studies examining household food insecurity. Low homeownership rates, low income, high rent, lack of transportation, and a high percentage of families make the Allen Neighborhood particularly vulnerable to food insecurity. At the same time, the relatively small number of supermarkets and the high density of convenience stores demonstrate that food retail activity in the region heightens the necessity of shopping elsewhere—in particular if one wishes to shop at a discount store.

Low income or lack of transportation, however, does not mean inevitably that a household is food insecure. At the same time, living several miles from a supermarket does not mean that one is necessarily food insecure. Rather, as I have argued throughout this paper, it is the interaction between these two factors that determines whether a household is food insecure. Often these two factors interact in a negative fashion. For a family without a car, traveling even one mile to a supermarket incurs an extremely high transaction cost. A person with a disability may be unable to reliably access food, despite being a homeowner with relatively high income. At the same time, those able to drive to Aldi or Save-a-lot may be able to maintain a reliable and healthy food supply despite limited income.

Our use of demographic and spatial data demonstrates that the Allen Neighborhood is at high risk for food insecurity. Survey results indicate that food insecurity is, in fact, a significant

problem for a large portion of the neighborhood. It is essential that we seek solutions to this problem through a combined effort that addresses both household circumstances and community structure. Important linkages, such as distance and transportation, must also be addressed in order to avoid negative interactions. Only through such a combined and comprehensive effort can we ensure that everyone in the neighborhood has reliable access to a healthy diet.

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