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EO/AA

**NEIGHBORHOOD FOOD INFRASTRUCTURE, ECONOMIC SHOCKS AND
VERY LOW FOOD SECURITY AMONG CHILDREN**

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Abstract

Concern about spatial access to food retailers and food assistance resources has increased in recent years, placing greater importance on understanding how connections to the local food resource infrastructure shapes food security. This is especially true during the Great Recession era, during which time a greater incidence of economic shocks has contributed to rising food insecurity and rising food assistance caseloads. Using data from the Michigan Recession and Recovery Study (MRRS), a panel survey representative of working-age adults in the Detroit Metropolitan Area, this project explores two primary research questions related to food security of low-income households. First, how does access to the local food resource infrastructure relate to the risk of food insecurity? Second, to what extent is the experience of unemployment associated with increased risk of food insecurity?

Across most measures, we find that many vulnerable population groups have greater or at least comparable spatial access to food resources as less vulnerable populations groups. We also find that in some instances closer proximity to SNAP-certified supermarkets or grocery stores is *negatively* associated with food security, meaning households that are closer to supermarkets and small grocery stores are *more* likely to report food insecurity, than those that are further away. Lower levels of education, experience of unemployment, and the experience of financial hardship over the last year also are broadly associated with greater risk of food insecurity.

Executive Summary

Neighborhood Food Infrastructure, Economic Shocks and Very Low Food Security Among Children

Scott W. Allard and H. Luke Shaefer

Background and Methodology

The extended period of high unemployment following the Great Recession has been marked by a significantly increased incidence of food insecurity, with 14.5 percent of U.S. households being food insecure in 2012, compared to 11.1 percent in 2007. The national food insecurity rate has been at or above 14.5% since 2008. These years have also been marked by an increased incidence of very low food security among children.

In recent years, researchers have become increasingly interested in the importance of spatial access to food retailers and food assistance resources, placing greater importance on understanding the connections between food security and access to the local food resource infrastructure among low-income households. A growing literature examines the phenomena of food deserts, poor urban and rural areas without easy spatial access to large supermarkets. At the same time, though, food assistance resources are important to low-income families and those experiencing periods of unemployment. Nonprofit food pantry use increased substantially during the Great Recession, with an estimated 37 million persons using charitable food programs in 2009. Similarly, SNAP caseloads increased by nearly 60 percent since 2007 and the program now reaches well over 40 million persons. To date, however, little research directly examines how access to food resources—both in the form of access to fresh foods as well as access to food assistance programs—is related to food security, particularly that of children. These relationships may be even more important to understand in the context of the Great Recession era of prolonged high unemployment.

Using data from the first two waves of the Michigan Recession and Recovery Study (MRRS), a unique panel survey of a representative sample of working-age adults in the Detroit Metropolitan Area, this project explores two primary research questions: First, how does access to the local food resource infrastructure shape food security? Second, to what extent is the experience of unemployment associated with increased risk of food insecurity? Special attention is paid to how these factors may be related to very low food security among children, in particular.

The MRRS gathers detailed information about employment history, income sources, food security, safety net program participation, private social support, material hardships, health and mental health, grocery shopping habits, and basic household demographics from a representative sample of households with adults aged 19 to 64 years living in the three-county Detroit metropolitan Area. Wave 1 of the MRRS completed hour-long in-person interviews between late October 2009 and March 2010 with 914 adults between the ages of 19 and 64 (response rate of 82.8 percent). The second wave (also hour-long in-person interviews) was completed between April and August 2011 with 847 respondents (response rate of 93.9 percent). Information about the residential location of each MRRS respondent is used to assess household proximity and accessibility to a number of different food assistance and retail resources: SNAP administrative offices; food pantries; SNAP authorized retailers; and food retailers as reported by InfoUSA marketing data. In doing so, this study is in a unique position to connect household-level and

child food security to the local food resource infrastructure with a precision not found in most published food policy research.

Findings

Across most measures, we find that many vulnerable population groups have greater or at least comparable spatial access to food resources than less vulnerable populations groups. We also find that in some instances closer proximity to SNAP-certified supermarkets or grocery stores is *negatively* associated with food security, meaning households that are closer to supermarkets and small grocery stores are *more* likely to report food insecurity, not less than those that are further away. Households that are food secure are 0.89 miles away from a large chain grocery store, compared to households who experience very low food security who are 0.64 miles away, a statistically significant difference. Substantively this is a difference of about two residential blocks, likely meaningful for those with physical health limitations that make it difficult to walk. This relationship holds for households with children experiencing food insecurity, who are slightly closer to the nearest large chain supermarket than households in which children are food secure. In fact 73.3 percent of households with food insecure children are within a mile of a large chain grocery store, compared to only 60.9 percent of households with food secure children.

In multivariate models, lower levels of education, experience of unemployment, and the experience of financial hardship over the last year are broadly associated with greater risk of food insecurity. The negative relationship between distance to the nearest grocery store and food insecurity is robust and highly significant in models predicting very low household food insecurity and child food insecurity.

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Introduction

The Great Recession, officially lasting from December 2007 to June 2009, had a dramatic and sustained impact on work, earnings, and poverty in most communities in the U.S. Decreases in work activity and median household income following the end of the Great Recession were far more severe than in any other recession since 1970. Increases in poverty following the downturn were much higher than any other recession since 1980, and the rise in deep poverty rates has been much more severe than during any other time in recorded history (DeNavas-Walt, Proctor, Smith, 2011). Even though the recession officially ended in 2009, the effects of the downturn persisted for many low-income households whose work opportunities and earnings have not returned to pre-recession levels. In particular, one of the legacies of the Great Recession has been the rise of long-term unemployment, to a greater degree than any recession in modern times.

Driven in part by the economic downturn, rates of food insecurity have risen significantly in recent years. From 2008 to 2012, over 14 percent of households were food insecure at some time during the year, compared to about 11 percent of households from 1999 to 2007 (Coleman-Jensen, Nord, Andrews, and Carlson, 2013). These years have also been marked by an increased incidence of very low food security among children. At the same time, SNAP participation rates and use of emergency food assistance programs similarly increased in the last five years.

Between 2007 and 2013 the SNAP caseload increased by over 80 percent and reached more than 47.6 million persons during a typical month in 2013. Nonprofit food pantry use increased during the Great Recession and an estimated 37 million individuals received help from charitable food programs in 2009, including a large percentage of SNAP recipients (Mathematica Policy Research, 2010; US Conference of Mayors, 2008).

Not coincidentally there has been a surge in interest around the impact of spatial context on the presence, prevalence, and persistence of food insecurity. Much of the research to date has been focused on the presence of “food deserts,” where limited spatial access to large supermarkets, and more broadly to outlets of affordable and fresh food is thought to be associated with lower household food security for adults and children. Other aspects of place matter as well. For instance, some evidence suggests that the presence of nonprofit food assistance programs also can vary widely by neighborhood and across communities, ironically being less accessible to low-income populations most in need (Allard, 2009b).

Combined, these trends place greater importance on understanding the connections between food assistance, food resource access, and food security (Nord and Golla 2009; Pan and Jensen 2008; Shaefer and Gutierrez 2012; Yen, Andrews, Chen, and Eastwood 2008). Using data from the first two waves of the Michigan Recession and Recovery Study (MRRS), a unique panel survey of a representative sample of working-age adults in the Detroit Metropolitan Area, this UKCPR Research Program On Childhood Hunger supported project explores two primary research questions: First, how does access to the local food resource infrastructure relate to the risk of food insecurity? Second, to what extent is the experience of unemployment associated with increased risk of food insecurity? Special attention is paid to how these factors may be related to very low food security among children, in particular. We hypothesize that greater access to local food resources will be related to reduced risk of food insecurity. We further hypothesize that unemployment, particularly prolonged periods of unemployment job, and health limitations preventing work will increase the risk of food insecurity.

We believe that our findings will be of interest to a wide variety of scholars and and policymakers. With greater precision than most studies to date, we provide evidence about the

extent to which low-income households with children lack access to food retailers and food assistance resources. We believe that improved understanding of the spatial antecedents of food assistance and food insecurity could translate into more efficient allocation of public program dollars, private capital, entrepreneurial activity, and philanthropic resources. Our findings provide insight into how communities might conduct program outreach and efforts to enroll households eligible for different types of public assistance. Although nested within the Detroit metropolitan area, we think these findings will help planning and coordination efforts in a variety of urban and suburban locations.

Background

Amidst rising levels of food insecurity, there is emerging evidence that food insecurity varies spatially to a substantial degree. Food insecure households are more likely to live in higher poverty counties, zip codes, and tracts (Bartfeld, Ryu, and Wang 2010). Data from the late 1990s and early 2000s suggest that nonmetropolitan areas had slightly higher rates of food insecurity (Nord 2002), yet more recent studies find food insecurity to be more prevalent in central cities or areas with greater urbanicity than suburbs and rural areas (Bartfeld, Ryu, and Wang 2010; Coleman-Jensen, McFall, and Nord 2013).

Recent research finds that, among Current Population Survey (CPS) households where location within a metropolitan area is known, children in principal cities were the most likely to be food insecure, followed by children in nonmetropolitan areas, followed by children in suburbs or outlying areas of MSAs. There is consistent evidence that food insecurity is more concentrated and prevalent in the South. For example, 40.6 percent of food insecure children live in the South (47.6% of households with very low food security among children) compared to 17.3 percent in the Midwest, 15.0 percent in the Northeast, and 27.1 percent in the West

(Coleman-Jensen, McFall, and Nord 2013). Similarly, recently estimated rates of food insecurity indicate that most counties in the Southeast and Southwest portions of the U.S. had household food insecurity rates over 15 percent and households with children in these same regions were predicted to have food insecurity rates over 20 percent, rates much higher than in the Midwest or northeastern US (Feeding America 2014; Gunderson, Engelhard, Satoh, and Waxman 2014).

Current survey approaches to measuring food security, however, make it difficult to fully assess the relationship between food insecurity and space. Food security measures most often are gathered from surveys of large nationally representative samples, meaning there are few data sources that collect detailed food security measures and can locate survey respondents with geographic precision. Commonly used datasets, such as the CPS Food Security Survey or SIPP public use files, only contain general measures of geography (i.e., region or state identifiers; inside or outside of metropolitan statistical areas) and these data generally are less accurate at lower levels of geographic aggregation (e.g., county or metropolitan area). Unfortunately, county- or metropolitan-level information about food security is too high a level of aggregation to think precisely about most types of place effects. National surveys also do not contain long enough panels to track spatial variation over time (e.g. CPS) or do not have enough observations in a given place to permit spatial analyses of local place factors (e.g., Survey of Income and Program Participation, SIPP).

Even though the food security literature emphasizes individual- or household-level causal factors, it is also true that food shopping, preparation, and consumption are embedded in the local communities and neighborhoods where people reside, work, and attend school. There are many different features of the spatial context that may shape household experiences with food insecurity, we focus primarily on two features of the local food resource infrastructure: the

contours of the local retail food environment; the presence of public and private safety net programs.

Access to Food Retailers

While the median US household is .81 miles to the nearest supermarket and the average time spent on travel to grocery shopping is about 15 minutes per day (US Department of Agriculture 2009), many studies find access to food retailers to vary by race, ethnicity, and class composition of a community (Bitler & Haider, 2010). Studies often report that predominantly black and Hispanic neighborhoods have less access to supermarkets and large chain grocery stores than predominately white areas (Walker, Kean & Burke, 2010). For example, Gallagher (2006) finds that residents of majority black neighborhoods in Chicago have to travel almost 40 percent farther on average to reach the nearest chain grocery store compared to residents of majority white neighborhoods (.77 miles versus .57 miles on average). Nationally, zip codes with “higher proportions” of African-Americans have half as many chain grocery stores than zip codes with higher proportions of whites (Powell, Slater, Mirtcheva, Bao, and Chaloupka 2007).

Lower income areas also have been found to contain fewer chain grocery stores than middle or upper income areas (Powell, Slater, Mirtcheva, Bao, and Chaloupka 2007; Moore and Diez Roux 2006). A study of three communities located in Maryland, New York, and North Carolina finds that “predominantly white” and affluent census tracts contain twice as many supermarkets on average than predominantly black and poorer areas after controlling for population size (Moore and Diez Roux 2006). Similarly, Zenk et al. (2005) find that high-poverty predominantly African-American census tracts in Detroit are about 1.1 miles farther from the nearest chain supermarket compared to high-poverty predominantly white tracts in Detroit.

The nature of race and class differences in access to food retailers may shift depending on how food store access is conceived. For example, Raja, Ma, and Yadav (2007) compare the number of supermarkets, smaller grocery, and specialty food retailers located within five-minute commutes of white, black, and racially mixed census block groups in Erie County, NY. In contrast to other studies, the authors find that black and racially mixed neighborhoods are within a five-minute drive of roughly the same number supermarkets as white neighborhoods. They also find evidence that areas black and racially mixed neighborhoods tend to have far greater access to smaller grocery or specialty food retailers within a five-minute drive than white neighborhoods.

Powell, Slater, Mirtcheva, Bao, and Chaloupka (2007) and Moore and Diez Roux (2006) find race and class inequalities in access to supermarkets, but each study finds black and low-income areas to have greater access to non-chain groceries than white and higher income areas. Allocating 2000 Census block data to 1-square kilometer grids, a study by the US Department of Agriculture (2009) finds that the median non-white household nationally is 0.63 miles from the nearest supermarket compared to 0.96 for the median white household. Nationally, the same study concludes that 4.1 percent of low-income persons living in low-income areas – about 11.5 million people – are more than 1 mile from a supermarket.

A few studies provide a sense of how food resource access might shape food security. Large chain supermarkets may offer lower prices, either because they are more likely to carry generic brands, or because they carry products in bigger units that may allow savings per unit (Chung & Myers, 1999; Hendrickson et al., 2006; Morris, McGrath, Neuhauser, and Campbell 1992). Self-reported access to public transportation reduces odds of food insecurity among households with elementary-age school children in Wisconsin significantly, but living a very

long distance from the nearest grocery store – 15 to 22 miles – increases the odds of being food insecure by 67 percent (Bartfeld, Ryu, and Wang 2010). Food stamp households living within a mile of the store where they primarily shop are found to consume more than 30 percent more fruit per day than similar households living five miles or more from the grocery or food store where most of the shopping was done (Rose and Richards 2004).¹ Self-reported perceptions of high grocery prices and too few local supermarkets or grocery stores are found to be related to food insecurity among rural residents in two study counties in Iowa. Problems accessing reliable transportation also are related to greater likelihood of food insecurity (Garasky, Morton, and Greder 2006).

Access to Food Assistance Programs

The Supplemental Nutrition Assistance Program (SNAP, formerly food stamps) is one of the largest public assistance programs in place today and is the largest public food assistance program in operation. Nationally, SNAP caseloads increased by 69 percent from 2007 to 2012 and the program reached nearly 45 million individuals in 2012 (Klerman and Danielson, 2012; US Department of Agriculture, 2012a). The average SNAP recipient received about \$133 a month in benefits in 2012 and SNAP program expenditures in that year reached about \$80 billion.

Complementing SNAP and other public food assistance programs are private nonprofit charities and social service organizations that provide food and meals to low-income families in need. Nonprofit food pantry use has increased since the Great Recession and an estimated 37 million individuals received help from charitable food programs in 2009, including a large percentage of SNAP recipients (Feeding America, 2011; Mathematica Policy Research, 2010). About one-third of food pantry clients received help from a program at least once every month in

¹The authors find no significant differences in vegetable consumption.

a calendar year (Feeding America, 2011). Food pantry use is more prevalent in cities and rural places, and in the South – areas where poverty rates tend to be higher and families at greater risk of not having enough food (Nord, Andrews, and Carlson, 2008).

A number of factors shape the spatial accessibility of public and private food assistance programs. While public programs like SNAP should provide benefits to all eligible persons who apply, there may be few administrative office locations in many metropolitan or rural regions. Nonprofit social service providers have discretion over what programs to offer, which client populations to serve, and where to locate operations. Many factors constrain where public and private nonprofit food assistance program offices are located, but chief among them can be considerations about public transit accessibility, the cost of suitable office space, and the location of key partners or funders (Allard, 2009b). Not all neighborhoods or communities will have easy access to public or nonprofit providers, and the presence of such supports varies widely from place to place (Allard, 2009b; Allard and Roth, 2010).

Indeed, there is evidence that nonprofit food assistance programs may not be as well-matched to the location of need as might be imagined. Allard (2009b) finds high-poverty neighborhoods in metropolitan Chicago, Los Angeles, and Washington, D.C. to have about 50 percent less access to emergency food and cash assistance providers than low-poverty neighborhoods. Kissane (2010) underscores that spatial access to community-based social service organizations, many of which offer emergency food assistance, is critical to understanding which programs low-income households utilize. Interviews with low-income women from the Kensington neighborhood in Philadelphia yielded evidence that even distances up to a mile were too far for low-income households to manage. Interviews also underscore that perceived safety and race or ethnic composition of the community, along with other aspects of

social context, powerfully shape which local organizations individuals feel comfortable to visit. In more suburban or rural areas, the distances that clients and providers must travel to receive or deliver food assistance are higher and place greater burdens on individuals or organizations. On top of these considerations, research has found rural and suburban communities to have fewer, less-resourced, and less accessible food assistance providers than urban communities (Allard, 2009a; Allard and Roth, 2010).

There is evidence that greater proximity to safety net program providers will increase the likelihood that low-income households will know about programs of assistance, receive referrals, and be able to commute to those opportunities, which should translate into higher take-up of assistance (Allard, 2009b; Allard, Tolman, and Rosen, 2003; Bartlett, Burstein, and Hamilton, 2004; Kissane, 2003). For example, SNAP clients may be expected to make re-certification visits and submit application materials in-person (McKernan and Ratcliffe, 2003). Challenges finding child care and accessing administrative offices during the workday are associated with lower SNAP take-up among eligible families (Widom and Martinez, 2007). Distance from SNAP offices may increase time or commuting costs and thus discourage participation (Bartlett, Burstein, and Hamilton, 2004; US Department of Agriculture, 2010). Lack of access to a car, lack of information about local programs, and difficulty carrying food home were the most prominently cited reasons that low-income households in Hartford, CT did not participate in local food pantry assistance programs (Martin, Cook, Rogers, and Joseph, 2003).

Economic Shocks

There is considerable evidence that the experience of unemployment is associated with heightened risk of food insecurity, as well as non-food material hardships such as difficulty meeting essential expenses (Sullivan, Turner & Danziger, 2008). The lives of low-income

children are volatile, as they are at heightened risk of parental job loss. Employment instability has increased in recent decades, with the mean job tenure for a male worker falling substantially (Osterman, 1999; Schultze, 2000; Farber, 2005). Economic shocks quickly change a family's circumstances, and thus may be associated with heightened risk of very low food security among children. Analyzing a small sample of 20 households, Campbell and Desjardins (1989) find that many households with limited food resources have recently experienced an economic shock, typically loss of employment, but also family structure changes. Research funded through the current UKCPR grants program focuses on the importance of job loss in understanding child food insecurity (Mills & Davis, 2012). A few studies find that those with earnings declines are less likely to participate in SNAP than those with sustained low incomes (Elkin & Turner, 2008; Moffitt & Ribar, 2008). Yet there is a great deal more work to be done to understand the relationship between job loss, food security, and particularly the risk of very low food security among children.

This is one of the first studies, to our knowledge, that examines directly the relationship between local food infrastructure and food security using representative survey data. This examination may help in assessing whether improving access to food resources would improve household food security, and particularly the food security of children. At the same time, we explore the importance of the experience of unemployment, and particularly the duration of unemployment, in assessing the risk of food insecurity among household with children, and in particular, child food insecurity.

Data

Michigan Recession and Recovery Study (MRRS)

The MRRS is a probability sample of adults between the ages of 18 and 64 residing in the

Detroit Metropolitan Area (Macomb, Oakland, and Wayne counties) in Fall 2009. When survey weights are applied, the MRRS sums to the American Community Survey (ACS) estimated total population count for the three-county metro area and to totals for key sub-population groups (Adams et al., 2011). Wave 1 of the MRRS completed hour-long, in-person interviews between October 2009 and March 2010 with 914 respondents; the response rate was 82.8 percent. Wave 2 was fielded between April and August 2011 and completed interviews with 93.0 percent of Wave 1 respondents who survived until Wave 2.²

Each MRRS wave contains detailed information about employment history, earnings, assets, education and training, income sources, public program participation, material hardships, debts, housing conditions, health and mental health, marital and relationship status, and basic household demographics. Both waves ask about receipt of non-food social support from community-based nonprofits in the past year, but Wave 2 contains unique questions about grocery shopping behaviors. Combined, the two waves of the MRRS have the advantage of allowing us to model the relationship between economic shocks and food security, while also accounting for any moderating effects of the local food infrastructure.

We restrict all samples to households containing minor children and a non-elderly adult head. To focus on households that are more likely to experience an economic shock and to be eligible for food assistance programs, we also restrict the sample to households with low incomes defined as below 300 percent of the federal poverty line across the period they are observed in the panels.

Table 1 reports the characteristics of our sub-sample taken from the MRRS. We find that there were 251 households with minor children in wave 1 of the MRRS; and 250 such households in wave 2. In wave 1, 46.7 percent of these households had a black head, and 31.6

²Twelve MRRS respondents died between Waves 1 and 2.

percent lived within the city of Detroit. Three-fourths had exactly one child and the remainder had more children. Roughly 85 percent of sample households were headed by individuals with less than a bachelors' degree, and almost half of all household heads had been out of work for at least a month over the course of the previous year. The characteristics of households in wave 1 are quite similar to the characteristics in wave 2, except that households in wave 2 seem to have been, on average, a bit worse off than they were in wave 1. Nearly 40 percent had a household income below poverty, and fully 57.7 percent had experienced at least one month out of work over the course of the previous year. We find high rates of car ownership or leasing—three quarters of respondents in wave 1, and 69.7 percent in wave 2.

(Table 1 about here)

At each wave of the MRRS, respondents were asked a series of questions about food purchases and consumption in the 12 months prior to the survey that are used to assess household and child food security. Wave 1 contained only five of six items from the USDA six-item food security scale collected each December in the Current Population Survey (CPS); Wave 2 contained all six items from the December CPS module. Responses were used to assess household food insecurity. Specifically, respondents were asked if “often/sometimes” in the last 12 months:

- 1) The food they bought just didn't last, and they didn't have money to get more.
- 2) They couldn't afford to buy balanced meals.
- 3) They or other adults in household cut the size of their meals or skipped meals because there wasn't enough money for food.
- 4) If yes to question 3, whether this happened almost every month, some months but not every month, or in only 1 or 2 months.

- 5) They ate less than they felt they should because there wasn't enough money to buy food.
- 6) They were hungry but didn't eat because they couldn't afford enough food.

We sum the number of responses indicating “often” or “sometimes” to this battery of questions to create a scale score reflecting household food insecurity. Households with scores of 0 or 1 are defined as having high or marginal food security, households with scores of 2 to 4 indicate low food security, and scores of 5 in Wave 1 or 5 to 6 in Wave 2 are defined as having very low food security. We define food insecure households as those with either low or very low food security (summed scores ranging from 2 to 5 or 6, depending on wave). Households with summed scores of 0 or 1 are defined as food secure. We classify respondents as experiencing persistent food insecurity if they report low or very low food security in both waves of the MRRS. Ideally we would have the full six-item instrument in both waves, but comparison of the five-item instrument to the full six items in Wave 2 indicates that the two instruments provide nearly identical estimates of food insecurity (see Table 2). Unless specified, we use the five-item measure in analyses reported below.

Food Pantry Survey

A list of 407 charitable nonprofit food pantries or emergency food programs located in the study area of the MRRS were compiled from online directory listings and the United Way of Southeastern Michigan 2-1-1 directory in Spring 2012. A letter of invitation to participate in a short survey was sent to each listed pantry. A 10-minute telephone survey instrument collecting information about location, program services, client characteristics, and funding was developed and pilot-tested with 5 Chicago-area food pantries. Survey call attempts began in August 2012

and were completed in April 2013. Surveys were completed at the Population Research Center at NORC and the University of Chicago by a trained telephone survey interviewer.

When reaching a food assistance program, the survey interviewer asked to speak to the program executive or to a program manager that could answer some basic questions about the programs available on-site. Many organizations were not eligible for the survey: 37 were no longer operational; 29 were not food assistance programs; contact information could not be located for 9 other listings. Surveys were completed with 263 of the remaining 332 listed programs for a response rate of 80.2 percent. Twelve programs refused to participate in the survey and 57 programs were never reached to complete calls. All organizations not completing surveys were contacted at least 10 times by the interviewer, but only 37 of the 57 programs not reached appeared to have a functioning phone system. A total of 1,674 call attempts were made.

Providers offered a range of services to low-income individuals on-site. Nearly 90 percent offered groceries – most through a food pantry program. One-third provided meals on-site to low-income and three-quarters provided non-food related benefits (e.g., housing assistance or shelter, utility assistance, clothing or furniture). Some organizations provided job training, health services, and referrals to other social service providers. Nearly half – 49 percent – reported helping clients connect to public assistance programs for which they may be eligible. The average food assistance program served 1,134 individuals in a typical month, although the median provider served 400 in a typical month. Programs averaged 1.5 FTE staff and about 100 volunteer hours per week. More detail about the food pantry survey can be found in Appendix 1.

SNAP Administrative Office Locations

Office locations where applications for SNAP may be submitted and processed in the three-county Detroit metropolitan area. Information about office locations (N=23) were drawn in

March 2011 from the State of Michigan Department of Human Services (DHS) website (<http://www.michigan.gov/dhs/>).

There is reason to expect that most MRRS respondents eligible for SNAP would have applied in person and followed up on applications in person at one of 23 offices listed at the State of Michigan DHS website in 2011. In recent years the State of Michigan has pursued SNAP modernization efforts that include the creation of call centers, implementation of online eligibility screening, and completion of applications online.¹ Although Michigan has modernized its SNAP application process in order to maximize outreach to potential SNAP households while minimizing administrative costs, these modernization initiatives were not in place when the waves 1 and 2 of the MRRS were in the field. For example, in 2009 Michigan opened test call centers, but these only allowed current SNAP clients to report changes (US Department of Agriculture, 2010). In Michigan, online applications did not appear until mid-2010.¹ Finally, in 2010 the Michigan DHS began partnering with community organizations to test self-service sign-up kiosks. Information kiosks and trained staff were placed in nonprofit social service and food pantry locations, but the program did not become fully functional until 2011.¹ Finally, SNAP policy in Michigan still required applicants to appear for face-to-face interviews until 2011. Thus, current and potential SNAP participants in 2008 and 2010 would still have been dependent on local SNAP offices.

SNAP Retailer Data

Lists of authorized SNAP retailers in the State of Michigan for the years 2008 and 2010 were obtained from the USDA's Food and Nutrition Service program³ via email on October 15, 2012. These lists represent retailers in Michigan that were authorized to receive SNAP at the end

³ <http://www.fns.usda.gov/fns>

of the Fiscal Year (09/30/08 for 2008 data and 9/30/10 for 2010 data). These data provide a more comprehensive list of food retailers than is commonly used in studies about food resource infrastructure.

A team of research assistants from the University of Michigan examined each SNAP retailer by entering the address into Google Maps and locating the building in street view. Using the image of the store and the store name, the team coded each retailer into one of seven categories: Grocery store/Chain Grocery (i.e., Kroger); Drug Store/Dollar Store/Chain Retail (i.e., Walgreens, CVS, Target, Dollar Store, Kmart); Gas Station; Mini-mart/Convenience Store/Liquor/Party Store; Bakery/Butcher/Other Specialty Foods; Farmers Market; Other. Only food retailers that provided visual evidence via Good Maps of carrying a full line of groceries, including fresh produce, were coded as a grocery store. If there were 5 separate entries with the same name in the FNS SNAP retailer database, these stores were each considered a large chain supermarket. Otherwise, they were considered a non-chain grocery store. Given the limited parameters of this coding scheme, we believe that our estimates provide a conservative estimate of available grocery stores. That is, stores coded at specialty shops or convenience stores might, in actuality, carry a line of groceries that is broad enough for a family to meet all their food needs. Coding of stores was cross-checked for consistency.

InfoUSA Food Retailer Data

Alternative lists of food retailers operating in the Detroit metropolitan area were obtained from InfoGroup for 2008 and 2010, to be used in sensitivity analyses compared to the SNAP retailer data. Files for both years contain information on businesses operating at the end of each year. The business selection criteria were as follows: (1) geographic area: Wayne, Oakland, and Macomb counties in Detroit Metropolitan Area (Michigan) PLUS the adjacent 32 zip code areas,

and (2) industrial classification codes (NAICS): 44511, 44512, and 4452. In 2008, there were 2,818 food retail businesses fitting our search criteria and 2,860 food retail businesses matching search criteria in 2010. The analyses in this report will focus on SNAP Retailer data, but additional information about the InfoUSA food retailer data can be found in Appendix 2.

Methods

Store addresses for SNAP food retailers, food pantries, and SNAP administrative offices were geocoded and geographic coordinates of each store were then added to the GIS. Store coordinates were used to match food resources to MRRS respondents in terms of distance in miles, and by various methods of commute—walking, driving, and public transit. Analyses described below consider bivariate estimate of the relationship between distance to food access infrastructure by characteristics of MRRS respondents, and multivariate logistic regression models estimating the relationship between respondent household characteristics and food security. Key predictors included in our primary models are race, age, and education of the household head, income as a percent of poverty, marital status, the experience of unemployment and financial hardship, whether the household owns or leases a car, and whether the head has a work-limiting health condition. Model specifications test the relationship between different measures of food insecurity and spatial proximity to food resource infrastructure, as well as the experience of unemployment.

Results

Table 2 present food security estimates for households with children at or below 300 percent of the federal poverty line in the MRRS. In wave 1, 47.8 percent of households below poverty reported food insecurity, while the same was true of 40 percent of households between 100 and 200 percent of poverty and 33.4 percent of households between 200 and 300 percent of

poverty. While consistent with expectations about the relationship between income and food security, these values are not statistically significantly different from one another. In wave 2 we find a lower incidence of food insecurity among households between 200 and 300 percent of poverty. We also find high rates of affirmative responses to the child food insecurity measures included in the MRRS. Among households in poverty, 61.7 percent of them answered affirmatively to one of the child food insecurity measures in wave 1 (when the measures were included) and 13.6 percent answered affirmatively to all 3 items included in the MRRS. As would be expected, fewer households with higher incomes answered affirmatively on these measures, but, even still, in both groups over 30 percent answered at least one child food insecurity measure affirmatively.

(Table 2 about here)

Table 3 presents some findings on the Euclidean or straight-line distance between MRRS sample members and SNAP food retailers. First presented in the lefthand panel is the average distance in miles to the nearest SNAP retailer by household characteristics. SNAP retailers are broken up into all grocery stores, then two subgroups of grocery stores of 1) large chain supermarkets and 2) non-chain grocery stores, and non-grocery SNAP retailers, a group that includes gas stations, dollar stores, convenience stores, farmers markets, and butchers and other specialty shops. The second set of estimates in the right hand panel of Table 3 shows the percent of households within 1 mile of at least 1 SNAP retailer in each of the categories.

Across both panels we find very little evidence that vulnerable households with children are spatially further away from SNAP food retailers—even grocery stores—than less vulnerable households. Black heads of household are not statistically significantly more likely to live further

away from a large-chain grocery store than non-black heads of household, although they are about one-half mile closer to a non-chain grocery store on average (0.95 miles versus 1.44 miles respectively). As shown in the righthand panel, about the same percentage of black and non-black households live within 1 mile of a large chain grocery store, but 72.1 percent of blacks live within 1 mile of a non-chain grocery store, compared to only 33.6 percent of non-blacks.

(Table 3 about here)

Across income groups, there are no statistically significant differences in distance to food retailers of any sort by any measure. We do find that residents of Detroit are, on average, further away from large chain supermarkets than suburban residents, by almost half a mile. But they are also almost a mile closer, on average, to a non-chain grocery store. In fact, 93.8 percent of Detroit resident MRRS sample members live within a mile of a non-chain grocery store, while this is true of only a third of suburban residents.

Perhaps most surprisingly, it appears as though households experiencing very low food security are, on average, closer to the nearest large chain supermarket than households that are food secure. Households that are food secure are 0.89 miles away from a large chain grocery store, compared to households who experience very low food security who are 0.64 miles away, a statistically significant difference. Substantively this is a difference of about two residential blocks, likely meaningful for those with physical health limitations that make it difficult to walk. This relationship holds for households with children experiencing food insecurity, who are slightly closer to the nearest large chain supermarket than households in which children are food secure. In fact 73.3 percent of households with food insecure children are within a mile of a large chain grocery store, compared to only 60.9 percent of households with food secure children.

Table 4 reports the number of stores within a specified commuting time, first by a 10-minute walk, then a 10-minute car ride, and finally a 20-minute ride by public transit. Results are largely consistent with the previous estimates. Black heads of household have roughly the same access to large chain supermarkets as non-black households, but greater access to non-chain groceries and non-grocery SNAP retailers, across all three commuting options. A similar pattern emerges across the income groups, with no statistically significant differences in the number of large chain supermarkets, but greater access to other alternatives for both lower income groups. The magnitude of the differences can be quite large on average. For example, black heads of household are within a 10-minute drive of nearly three times as many non-chain grocery stores as non-black heads of household (29.1 versus 10.6, respectively).

(Table 4 about here)

Detroit residents have, on average, only 0.1 supermarkets within a 10-minute walk, while suburban residents have 0.4 supermarkets within the same distance, which approaches conventional levels of statistical significance. But again, Detroit residents have access to a statistically significant larger number of non-chain grocery stores and non-grocery retailers by walk, drive, or public transit. There are no statistically significant differences by walk time for food secure versus food insecure households. Across drive and public transit commutes, in a few cases food insecure households seem to have access to slightly more food options than food secure households, but the differences are not by any means consistent across the estimates.

Across the operationalization of our access measures and subsamples, we find little evidence that vulnerable respondents have more limited access to grocery stores than more advantaged respondents. In fact, if anything, results from Table 4 suggest that residents or

Detroit, and food insecure households are closer to grocery stores, on average, than suburban residents and food secure households.

It is possible that our unique ability to geocode households in space is leading to our results, perhaps our results would look more comparable to conventional food desert estimates if we used more conventional methods. In table 5 we produce estimates of food resource access by the tract-level, which is more consistent with standard food desert research, to see if our findings hold. Here, we calculate distances and travel times from the centroid of each residential census tract in the three-county metropolitan area with more than 100 persons. Table 5 reports on the average distance in miles to the nearest SNAP retailer by Census tract characteristics, and the percent of tracts within 1 mile of a series of types of SNAP retailers.

Findings are general consistent with the previous tables. High-poverty tracts (defined as those with poverty rates over 20 percent) are 1.35 miles away from the nearest large chain supermarket, a statistically insignificant 0.11 miles farther than low-poverty tracts in the suburbs. But these high-poverty tracts in Detroit are only 0.62 miles away from the nearest non-chain grocery store, while the low-poverty tracts in the suburbs are 1.99 miles away from non-chain grocery stores.

(Table 5 about here)

A smaller percentage of high poverty tracts in Detroit are within a mile of a large chain supermarket, 30.0 percent, compared to slightly more than 50 percent of suburban tracts. At the same time, these high-poverty urban tracts are the most likely to be within one mile of a non-chain grocery store (87.9 percent). These dynamics repeat themselves if city and suburban tracts are divided into majority black and non-black. Majority black tracts in Detroit are on average 1.3 miles from the nearest large chain supermarket, compared to 1.13 miles for majority black

suburban tracts. But majority black tracts in Detroit are on average 0.67 miles away from the nearest non-chain grocery store, whereas such tracts in the suburbs are 1.32 miles away from the nearest non-chain store.

Examining food retailer access by commuting times produces similar results (see Table 6). There are no statistically significant differences in the number of large chain supermarkets within a 10-minute walk between the city and suburbs, high-poverty and low-poverty tracts. High-poverty tracts in the city of Detroit seem to have slightly greater access to non-chain grocery stores within a 10-minute walk. Some differences emerge though when looking at 15-minute commutes by car. High-poverty tracts in Detroit are, on average, within a 15-minute drive of 43.3 large chain supermarkets, more than is true of low-poverty tracts in the suburbs (34.7 large chain supermarkets), High-poverty tracts in Detroit are within a 15-minute drive of more than three times as many non-chain grocery stores as low-poverty tracts in the suburbs. When looking at numbers of stores within a 15-minute drive, majority black tracts seem to have greater access than majority non-black tracts in both Detroit and the suburbs. Access by public transportation findings are a bit mixed. High-poverty tracks in Detroit are within a 20-minute public transit ride of fewer large chain supermarkets than suburban tracts, but are within a 20-minute transit ride of many more non-chain grocery stores than all kinds of suburban tracts.

(Table 6 about here)

Across these tables, we find some evidence that vulnerable households may be slightly further from large chain supermarkets, although the evidence is not definitive on this by any means. In fact, interestingly, food insecure households seem to have greater access to large and small grocery stores, suggesting at least descriptively, there is no relationship between spatial relationship to grocery stores and food security. What is most clear from these tables is that

residents of Detroit are closer to and have more options to choose from in terms of non-chain grocery stores. These are stores that, based on visual evidence, carry a wide assortment of fresh and packaged foods. While this evidence does not speak to the quality or price of the food offered by these stores, it seems pretty definitive that residents of the City of Detroit have more stores to choose from than their counterparts living in the suburbs.

Food Assistance Resource Access

Food retailers are only one form of food infrastructure, and indeed may less directly affect the risk of food insecurity than food assistance resources. By this we mean food pantries, which provide direct food assistance to households, and SNAP offices, which at the time of Wave 1 of the MRRS had to be visited to apply for benefits. If these resources are sufficiently geographically targeted to serve disadvantaged individuals, it may reduce the risk of food insecurity.

In fact we find quite strong evidence that more vulnerable respondents are closer to food assistance resources than less vulnerable respondents. Table 7 reports a number of different access measures related to food assistance resources for MRRS respondents, stratified by various household characteristics. Black heads of household on average are closer in straight-line distance to SNAP offices and food pantries, and closer or at least equally as close to both these types of resources by drive or public transit. For example, black households are almost one mile closer to the nearest SNAP office (2.27 miles versus 3.19 miles, respectively) and about one-half mile closer to the nearest food pantry (0.87 miles versus 1.33 miles, respectively).

(Table 7 about here)

Households with income below the poverty line are closer to both kinds of food assistance resources than households with income above the poverty line, although food pantries

are more accessible to poor and near-poor populations than SNAP offices. This suggests that food assistance resources, at least when looking only at their street location, are more spatially proximate to poor populations than non-poor populations, but this does not mean these resources are accessible to all poor persons. To this point, less than 20 percent of poor households are within 1 mile of a SNAP office and less than one-third are within a 20-minute transit ride of a SNAP office.

Detroit residents are 1.77 miles closer to the nearest SNAP office than suburban residents (1.55 miles versus 3.32 miles, respectively), and about a half mile closer to the nearest food pantry (0.72 miles versus 1.30 miles, respectively). Nearly four in five Detroit residents live within a mile of a food pantry compared to two in five suburban residents. Across food security status, there are few statistically significant differences in access to SNAP offices and food pantries. A greater percentage of food insecure (and indeed very food insecure) households live within a 20-minute public transit commute of a food pantry, and households experiencing child food insecurity are slightly closer, on average, to a food pantry than households in which children are food secure. All told, evidence from Table 7 suggests that vulnerable residents in the Detroit metropolitan area are closer by some measures and certainly no further away from food assistance resources than their less vulnerable counterparts. Vulnerable persons in suburban areas, however, may face significant spatial hurdles to accessing food assistance resources compared to similar persons living in the City of Detroit.

Table 8 examines these same food assistance resource access measures for all census tracts in metropolitan Detroit. Similar patterns emerge as when looking at access. First, we see that high-poverty tracts in Detroit are closer to SNAP offices and food pantries than suburban tracts. We also find that a small fraction of tracts in the metro area are within one mile of a

SNAP office, particularly in suburban areas of Detroit. Again, these results provide additional evidence that vulnerable populations living in suburban areas of Detroit may find it more difficult to access food assistance programs if they do not have regular access to an automobile than those who reside in the City itself.

(Table 8 about here)

Multivariate Analyses

Tables 9 through 11 report on a series of logistic regression models predicting various indicators of food insecurity. Table 9 predicts household food insecurity among households with children and income at or below 300 percent of federal poverty. Four model specifications enter different measures of food resource access into the model, first, distance in miles to the nearest SNAP office, next distance in miles to the nearest food pantry, distance in miles to the nearest SNAP supermarket or grocery store, and finally distance in miles to the nearest SNAP non-grocery store.

Across all four model specifications, having a black household head is not associated with greater risk of household food insecurity, nor is the number of children or household head age. Education is highly associated, with lower education being associated with a greater risk of household food insecurity. Household income is not a statistically significant predictor (although the signs of the coefficients go in the direction we would assume, with higher income associated with lower risk). However, the experience of unemployment is highly associated with the risk of household food insecurity, although our point estimates offer no indication that longer periods of unemployment are associated with greater risk than shorter periods. Finally, as might be expected, financial hardship is highly associated with household food insecurity.

Across the measures of food infrastructure access, none are statistically significant, although all of the coefficients are signed in a way that may indicate a relationship opposite to what might be expected—the further the household is away from food resources, the less the risk of reporting food insecurity. Still, none of these point estimates are statistically significant.

Table 10 reports similarly specified models in which the outcome is household very low food insecurity. The results look similar to those reported in Table 9, with a few interesting exceptions. Black heads of household are less likely to report very low food security than non-black headed households, and the experience of unemployment loses its predictive power. The presence of a work-limiting health condition in this model becomes highly predictive of very low food security, as does the experience of household financial hardship in the previous 12 months. Perhaps most interestingly, distance to the nearest SNAP supermarket or grocery store becomes negatively and statistically significantly associated with the risk of very low food insecurity—net of other factors controlled for in the model, those who further away from the nearest grocery store are less likely to report very low household food security.

In Table 11, we predict child food insecurity. Again, we find education to be predictive of greater risk of food insecurity, although only high school only is significant. Income becomes more clearly related to the outcome, although only 100-200% FPL is significant. Interestingly, in these models, only one category of unemployment is significant, and that negatively so. Reporting a household financial hardship is not significantly associated with the outcome, unlike in the other models. Yet distance to the nearest grocery remains negatively and statistically significantly associated with the risk of child food insecurity. And in specification (4), distance to the nearest SNAP non-grocery food retailer is also negatively signed.

Discussion

Several key findings will guide our future analyses. First, our results indicate that economic shocks, health limitations, and financial hardship are associated with greater likelihood of experiencing food insecurity, even when controlling for other observable household characteristics. While suggestive, these are cross-sectional findings. Taking advantage of the panel features of the MRRS, we intend to examine how changes in economic and health conditions are associated with transitions in food security status over time. Moreover, using data from Wave 2, we will examine how unemployment, health limitations, and hardship are related to self-reported changes in grocery shopping venues.

Our initial findings do not provide much support for most conventional hypotheses about access to food retailers. Across most measures, we find that many vulnerable population groups have greater or at least comparable spatial access to food resources than less vulnerable populations groups. We also find that in some instances closer proximity to SNAP-certified supermarkets or grocery stores is negatively associated with food insecurity. Future analyses will examine a number of sensitivity tests that will provide insight into how robust these findings are within the current sample. Analyses will examine access measures across a larger array of commute-mode times and different distance thresholds. Subsequent work will compare model estimates across different sources of food retailer data. We also will examine how sensitive findings are to removal of outliers. We will generate a series of maps to visualize the distribution of food resources, low-income respondents, and low-income census tracts. Such visualization may assist in subsequent model development. We also may explore how access to food retailers matters for those households without children and for households of complex composition (e.g., multi-generational).

However, if our findings prove to be valid, they may have important implications for

research and policy making in regards to food resource infrastructure. Our findings suggests that proximity to food retailers may not be the critical ingredient to ensuring that people have adequate food for a healthy and active life. It is improbable that our finding that households are more likely to report food insecurity the closer they are to a grocery is more than associational—there is no reason to think that being closer to the nearest grocery store itself would lead households to be at greater risk of food insecurity. Yet it does call into question whether policy prescriptions that hinge on making food resources more spatially accessible to vulnerable households are misplaced.

Conclusion

Moving forward, we anticipate producing several manuscripts to submit to peer-reviewed academic journals and reports targeted at the policy community. First, we will complete work on a manuscript exploring access to food resources in metropolitan Detroit. As a companion piece, we will complete a technical report that outlines how we have calculated access measures. This report also will compare how different measures perform and contrast results using similar measures with different food retailer data sources. Next, we will finish work on a manuscript that examines how household demographic characteristics, economic conditions, and food resource access are associated with food security among households with children. As we move forward with this work, we will continue to present results at major academic conferences and develop working papers for distribution by the UKCPR, or other appropriate poverty research outlets.

Table 1: MRRS Sample Characteristics - Households with Children <= 300% of the Federal Poverty Line (FPL)

Respondent Characteristic	Percentage of Households	
	Wave 1	Wave 2
Income at or below 100% of the FPL	33.1	39.6
Income 100% to 200% of the FPL	35.8	36.6
Income 200% to 300% of the FPL	31.0	23.9
Black	46.7	45.4
Nonblack	53.3	54.6
1 child in HH	74.6	65.8
2 to 3 children in HH	22.1	29.6
4 or more children in HH	3.4	4.5
Age 19-24	18.6	17.1
Age 25-34	34.0	29.0
Age 35-44	26.5	25.0
Age 45+	20.9	28.9
Married	38.0	36.1
Not married	62.0	63.9
Less than HS	16.5	17.9
HS but no BA	70.3	68.7
BA or more	13.1	13.4
No unemployment	52.5	42.2
1-6 mos. Unemployed or NILF	13.7	17.2
7-9 mos. Unemployed or NILF	5.6	7.4
10-12 mos. Unemployed or NILF	28.2	33.1
Health limitation	15.0	16.5
SNAP Recipients	40.2	51.0
Charity Recipients	19.4	18.0
Owens or Leases a Car	74.2	69.7
Urban Resident	31.6	31.2
Suburban Resident	68.4	68.7
N	251	250

Source: Michigan Recession & Recovery Study (MRRS)

Table 2: Food Security among Households with Children <= 300% of the Federal Poverty Line (FPL) in the MRRS

Food Security Measure	<= 100% of FPL	Household Income 100-200% of FPL	200-300% of FPL
Wave 1 Household Food Insecurity			
VLFS (5 items positive)	12.1	20.6	9.0
Percent Food Insecure – 5-Item Measure	47.8	40.4	33.4
Wave 2 Household Food Insecurity			
VLFS (5 items positive)	13.1 ^a	11.1 ^b	1.2 ^{ab}
VLFS (6 items positive)	16.3 ^a	12.7	5.1 ^a
Percent Food Insecure – 5-Item Measure	46.2 ^a	30.2	23.7 ^a
Percent Food Insecure – 6-Item Measure	46.2 ^a	30.2	27.6 ^a
Child Food Insecurity (Wave 1)			
0 Items	38.3 ^{ab}	68.5 ^a	56.2 ^b
1 item	33.3 ^a	11.1 ^a	18.3
2 Items	14.9	11.5	20.9
3 Items	13.6 ^a	8.9	4.6 ^a

Notes: ^{a,b} – Within-row cell-pair comparisons are statistically different at the .10 level or below. Household survey weights applied. Results reflect households that reported income at or below 300 percent of the federal poverty line in both waves. Unweighted Wave 1 N = 251; Unweighted Wave 2 N = 250.

Source: Michigan Recession and Recovery Study (MRRS)

Table 3: SNAP Retailer Access among Households with Children <= 300% of the Federal Poverty Line (FPL) in Wave 1 of the MRRS

Wave 1 Household Characteristics	Average Distance in Miles to Nearest SNAP Retailer				Percent of Households within 1 mile of SNAP Retailer			
	All Grocery Stores	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	All Grocery Stores	Large Chain Grocery	Non-Chain Grocery	Non-Grocery
Black	0.49	0.94	0.95 ^a	0.27 ^a	94.2	65.7	72.1 ^a	99.4
Non-black	0.62	0.79	1.44 ^a	0.45 ^a	79.0	67.4	33.6 ^a	94.3
Income <= 100% of FPL	0.50 ^a	0.92	1.05	0.28 ^a	90.6	63.2	64.8	99.2
Income 100-200% of FPL	0.51 ^b	0.82	1.21	0.37	92.6 ^a	68.4	49.3	99.4
Income 200- 300% of FPL	0.69 ^{ab}	0.84	1.40	0.44 ^a	73.8 ^a	68.0	40.2	90.9
Detroit Resident	0.48	1.17 ^a	0.55 ^a	0.19 ^a	93.8	52.0	93.8 ^a	100.0
Suburban Resident	0.60	0.72 ^a	1.52 ^a	0.44 ^a	82.5	73.3	32.1 ^a	95.2
Household Has No Car	0.56	0.95	1.21	0.36	85.3	60.1	61.0	99.1
Household Has Car	0.56	0.83	1.21	0.37	86.4	68.8	48.4	95.9
By Food Security Status								
Household Food Secure	0.61 ^a	0.89 ^a	1.25	0.39	83.2	64.3	55.1	94.8
Household Food Insecure	0.49	0.82	1.16	0.33	90.3	69.9	46.5	99.4
Household Low Food Security	0.55 ^b	0.91 ^b	1.21	0.34	87.6	64.4	45.0	99.1
Household VLFS	0.37 ^{ab}	0.64 ^{ab}	1.06	0.31	95.4	80.2	49.3	100.0
Children in Food Secure HH	0.63 ^a	0.91 ^a	1.36	0.41 ^a	83.3	60.9 ^a	49.2	94.4
Children in Food Insecure HH	0.48 ^a	0.80 ^a	1.04	0.31 ^a	89.3	73.3 ^a	54.2	99.5

Notes: a,b – Cell-pair comparisons are statistically different at the .10 level or below. Household survey weights applied. Results reflect households with children that reported income at or below 300 percent of the federal poverty line in Wave 1. Unweighted N = 251.

Sources: Michigan Recession & Recovery Study (MRRS); 2008 SNAP Retailer Database

Table 4: SNAP Retailer Access among Households with Children <= 300% of the Federal Poverty Line (FPL) in Wave 1 of the MRRS

Wave 1 Household Characteristics	Number of SNAP Retailers within a 10 Minute Walk			Number of SNAP Retailers within a 10 Minute Drive			Number of SNAP Retailers within 20 Minutes by Public Transit		
	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	Large Chain Grocery	Non-Chain Grocery	Non-Grocery
Black	0.2	0.4 ^a	3.4 ^a	15.6	29.1 ^a	418.0 ^a	1.8	3.2 ^a	43.4 ^a
Non-black	0.3	0.1 ^a	1.0 ^a	15.5	10.6 ^a	161.1 ^a	2.0	0.6 ^a	14.4 ^a
Income <= 100% of FPL	0.3	0.3 ^a	3.2 ^{ab}	14.9	26.1 ^{ab}	378.3 ^{ab}	2.0	3.3 ^{ab}	42.8 ^{ab}
Income 100-200% of FPL	0.2	0.2	2.0 ^{ac}	15.3	18.5 ^a	268.6 ^a	2.1	1.2 ^a	23.8 ^a
Income 200- 300% of FPL	0.3	0.1 ^a	1.1 ^{bc}	16.5	12.7 ^b	191.4 ^b	1.6	1.0 ^b	16.8 ^b
Detroit Resident	0.1	0.6 ^a	4.8 ^a	15.7	42.3 ^a	597.0 ^a	1.2	4.3 ^a	58.8 ^a
Suburban Resident	0.4	0.02 ^a	0.9 ^a	15.5	8.6 ^a	135.4 ^a	2.2	0.7 ^a	13.7 ^a
Household Has No Car	0.2	0.4 ^a	3.1 ^a	13.4 ^a	25.3 ^a	357.4 ^a	1.7	2.8 ^a	35.4 ^a
Household Has Car	0.3	0.2 ^a	1.8 ^a	16.3 ^a	17.1 ^a	254.5 ^a	1.9	1.5 ^a	25.3 ^a
By Food Security Status									
Household Food Secure	0.3	0.2	2.0	15.0	17.9 ^a	261.8	1.7 ^a	1.7 ^a	25.1
Household Food Insecure	0.2	0.3	2.3	16.3	21.2	308.9	2.2	2.1	32.0
Household Low Food Security	0.2	0.3	2.6	16.6	23.4 ^a	332.7	1.6 ^b	2.4 ^a	31.7
Household VLFS	0.3	0.2	1.8	15.9	16.9	264.5	3.3 ^{ab}	1.6	32.7
Children in Food Secure HH	0.2	0.2	1.8	15.1	17.8	257.7	1.6	1.5 ^a	23.2
Children in Food Insecure HH	0.4	0.3	2.4	16.0	21.0	309.2	2.2	2.2 ^a	33.5

Notes: a,b,c – Cell-pair comparisons are statistically different at the .10 level or below. Household survey weights applied. Results reflect households with children that reported income at or below 300 percent of the federal poverty line in Wave 1. Unweighted N = 251.

Source: Michigan Recession & Recovery Study (MRRS); 2008 SNAP Retailer Database

Table 5: SNAP Retailer Access among Census Tracts in Metropolitan Detroit

Wave 1 Tract Characteristics	Average Distance in Miles to Nearest SNAP Retailer				Percent of Tracts within 1 mile of SNAP Retailer				N
	All Grocery Stores	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	All Grocery Stores	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	
City of Detroit									
Low-Poverty	0.57 ^a	1.27	0.88 ^a	0.30 ^a	93.5 ^a	41.9	61.3 ^{ab}	100.0 ^a	31
High-Poverty	0.54 ^{bc}	1.35 ^a	0.62 ^{bc}	0.25 ^b	92.3 ^{bc}	30.0 ^{ab}	87.9 ^{cd}	100.0 ^b	273
Suburbs of Detroit									
Low-Poverty	0.98 ^{abd}	1.24	1.99 ^{abd}	0.74 ^{abc}	64.9 ^{abd}	52.7 ^a	27.6 ^{ace}	80.2 ^{ac}	721
High-Poverty	0.73 ^{cd}	1.10 ^a	1.24 ^{cd}	0.36 ^c	79.8 ^{cd}	49.2 ^b	44.4 ^{bde}	96.8 ^{bc}	124
City of Detroit									
Majority Non-black	0.42 ^{ab}	1.59	0.42 ^{ab}	0.19 ^{ab}	97.2 ^{ab}	30.6 ^a	94.4 ^{ab}	100.0 ^a	36
Majority Black	0.56 ^{cd}	1.30	0.67 ^{cd}	0.26 ^{cd}	91.8 ^{cd}	31.3 ^b	84.0 ^{cd}	100.0 ^b	268
Suburbs of Detroit									
Majority Non-black	0.95 ^{ac}	1.23	1.91 ^{ace}	0.7 ^{ace}	66.8 ^{ac}	52.5 ^{ab}	29.4 ^{ace}	81.6 ^{ac}	793
Majority Black	0.85 ^{bd}	1.13	1.32 ^{bde}	0.45 ^{bde}	71.2 ^{bd}	48.1	40.4 ^{bde}	98.1 ^{bc}	52

Notes: a,b,c,d,e – Cell-pair comparisons are statistically different at the .10 level or below. Tracts with fewer than 100 persons were omitted from the analysis. Distances are calculated from the tract centroid.

Source: 2007-11 American Community Survey (ACS); 2008 SNAP Retailer Database

Table 6: SNAP Retailer Access among Census Tracts in Metropolitan Detroit

Wave 1 Tract Characteristics	Number of SNAP Retailers within a 10 Minute Walk			Number of SNAP Retailers within a 15 Minute Drive			Number of SNAP Retailers within 20 Minutes by Public Transit			N
	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	Large Chain Grocery	Non-Chain Grocery	Non-Grocery	
City of Detroit										
Low-Poverty	0.10	0.10 ^a	2.61 ^{ab}	45.0 ^a	86.2 ^{ab}	1198.4 ^{ab}	2.2	4.2 ^{abc}	70.9 ^{ab}	31
High-Poverty	0.05	0.31 ^{abc}	3.98 ^{acd}	43.3 ^b	91.9 ^{cd}	1299.5 ^{cd}	1.4 ^{ab}	5.5 ^{ade}	77.0 ^{cd}	273
Suburbs of Detroit										
Low-Poverty	0.05	0.03 ^{bd}	0.38 ^{bce}	34.7 ^{abc}	23.5 ^{ace}	353.9 ^{ace}	1.9 ^{ac}	0.7 ^{bdf}	11.2 ^{ace}	721
High-Poverty	0.09	0.13 ^{cd}	1.99 ^{de}	40.3 ^c	39.8 ^{bde}	592.3 ^{bde}	2.6 ^{bc}	1.8 ^{cef}	32.1 ^{bde}	124
City of Detroit										
Majority Non-black	0.03	0.94 ^{abc}	7.00 ^{abc}	39.40	96.9 ^{ab}	1358.0 ^{ab}	0.9 ^a	7.1 ^{abc}	74.1 ^{ab}	36
Majority Black	0.06	0.20 ^{ade}	3.41 ^{ade}	44.0 ^a	90.6 ^{cd}	1280.0 ^{cd}	1.6 ^b	5.1 ^{ade}	76.7 ^{cd}	268
Suburbs of Detroit										
Majority Non-black	0.06	0.04 ^{bd}	0.61 ^{bd}	34.9 ^{ab}	24.8 ^{ace}	372.6 ^{ace}	2.0 ^{ab}	0.9 ^{bd}	13.9 ^{ac}	793
Majority Black	0.04	0.08 ^{ce}	0.67 ^{ce}	45.8 ^b	42.4 ^{bde}	635.6 ^{bde}	1.8	1.2 ^{ce}	18.7 ^{bd}	52

Notes: a,b,c,d,e,f – Cell-pair comparisons are statistically different at the .10 level or below. Tracts with fewer than 100 persons were omitted from the analysis. Distances are calculated from the tract centroid.

Source: 2007-11 American Community Survey (ACS); 2008 SNAP Retailer Database

Table 7: Food Assistance Resource Access among Households with Children <= 300% of the Federal Poverty Line (FPL) in Wave 1 of the MRRS

Wave 1 Household Characteristics	Average Distance in Miles to Nearest . . .		Percent of Households					
	SNAP Office	Food Pantry	within 1 mile . . .		within 15-minute drive . . .		within 20-minute public transit . . .	
			SNAP Office	Food Pantry	SNAP Office	Food Pantry	SNAP Office	Food Pantry
Black	2.27 ^a	0.87 ^a	17.1 ^a	64.8	100.0	100.0	34.9 ^a	81.8 ^a
Non-black	3.19 ^a	1.33 ^a	6.9 ^a	42.6	93.9	100.0	9.4 ^a	51.7 ^a
Income <= 100% of FPL	2.30 ^{ab}	0.87 ^{ab}	19.1 ^a	66.8 ^a	100.0	100.0	31.9 ^{ab}	84.1 ^{ab}
Income 100-200% of FPL	2.81 ^a	1.26 ^a	9.7	41.3 ^a	95.3	100.0	22.5 ^b	54.9 ^a
Income 200- 300% of FPL	3.20 ^b	1.22 ^b	6.1 ^a	51.5	94.9	100.0	8.5 ^b	58.6 ^b
Detroit Resident	1.55 ^a	0.72 ^a	30.7 ^a	79.3 ^a	100.0	100.0	53.2 ^a	97.8 ^a
Suburban Resident	3.32 ^a	1.30 ^a	2.9 ^a	40.8 ^a	95.3	100.0	6.6 ^a	50.9 ^a
Household Has No Car	2.26 ^a	1.00	19.6 ^a	60.6	93.5	100.0	35.4 ^a	74.1
Household Has Car	2.93 ^a	1.16	8.9 ^a	50.3	97.9	100.0	16.4 ^a	62.8
By Food Security Status								
Household Food Secure	2.82	1.16	8.3 ^{ab}	48.8	94.5	100.0	18.0	56.8 ^{ab}
Household Food Insecure	2.57	1.12	17.0 ^a	61.4	100.0	100.0	27.6	71.7 ^c
Household Low Food Security	2.68	1.06	16.6 ^b	59.0	100.0	100.0	26.1	78.8 ^b
Household Very Low Food Security	2.88	0.95	15.9	54.5	100.0	100.0	23.2	92.0 ^{ac}
Children in HH Food Secure	2.84	1.26 ^a	10.1	41.1 ^a	94.0	100.0	16.9	54.3 ^a
Children in HH Food Insecure	2.66	0.95 ^a	13.6	67.5 ^a	100.0	100.0	26.8	79.2 ^a

Notes: a,b,c – Cell-pair comparisons are statistically different at the .10 level or below. Household survey weights applied. Results reflect households with children that reported income at or below 300 percent of the federal poverty line in Wave 1. Unweighted N = 251.

Sources: Michigan Recession and Recovery Study (MRRS); State of Michigan SNAP Office Listings; Survey of Detroit Metropolitan Area Food Pantries

Table 8: Food Assistance Resource Access among Census Tracts in Metropolitan Detroit

Wave 1 Tract Characteristics	Percent of Households								N
	Average Distance in Miles to Nearest . . .		within 1 mile . . .		within 15-minute drive . . .		within 20-minute public transit . . .		
	SNAP Office	Food Pantry	SNAP Office	Food Pantry	SNAP Office	Food Pantry	SNAP Office	Food Pantry	
City of Detroit									
Low-Poverty	1.99 ^a	0.75 ^a	25.8 ^a	80.6 ^a	100.0 ^a	100.0	45.2 ^{ab}	93.5 ^{ab}	31
High-Poverty	1.58 ^{bc}	0.63 ^{bc}	21.6 ^b	86.8 ^{bc}	100.0 ^b	100.0	51.6 ^{cd}	97.8 ^{cd}	273
Suburbs of Detroit									
Low-Poverty	5.09 ^{abd}	1.98 ^{abd}	1.8 ^{ac}	25.2 ^{abd}	83.6 ^{abc}	98.8	4.2 ^{ace}	40.5 ^{ace}	721
High-Poverty	2.82 ^{cd}	1.05 ^{cd}	14.5 ^{bc}	62.9 ^{cd}	99.2 ^c	100.0	17.1 ^{bde}	71.5 ^{bde}	124
City of Detroit									
Majority Non-black	1.45 ^{ab}	0.68 ^a	30.6 ^a	88.9 ^{ab}	100.0 ^a	100.0	47.2 ^{ab}	97.2 ^{ab}	36
Majority Black	1.65 ^{cd}	0.64 ^{bc}	20.9 ^b	85.8 ^{cd}	100.0 ^b	100.0	51.5 ^{cd}	97.4 ^{cd}	268
Suburbs of Detroit									
Majority Non-black	4.86 ^{ace}	1.89 ^{abd}	2.8 ^{ac}	29.6 ^{ace}	85.0 ^{abc}	98.9	5.8 ^{ac}	44.8 ^{ac}	793
Majority Black	3.20 ^{bde}	1.09 ^{cd}	17.3 ^{bc}	48.1 ^{bde}	100.0 ^c	100.0	13.5 ^{bd}	53.8 ^{bd}	52

Notes: a,b,c,d,e – Cell-pair comparisons are statistically different at the .10 level or below. Tracts with fewer than 100 persons were omitted from the analysis. Distances are calculated from the tract centroid.

Source: 2007-11 American Community Survey (ACS); State of Michigan SNAP Office Listings; Survey of Detroit Metropolitan Area Food Pantries

Table 9: Factors Associated with Household Food Insecurity in Households with Children

	(1)	(2)	(3)	(4)
Respondent Race - Black	0.019 (0.10)	0.010 (0.06)	0.003 (0.02)	-0.017 (0.10)
Number of Children	0.010 (0.19)	0.009 (0.18)	0.014 (0.27)	0.010 (0.21)
Respondent Age				
19-24 Years Old	-0.359 (1.22)	-0.355 (1.19)	-0.360 (1.20)	-0.316 (1.07)
25-34 Years Old	0.123 (0.58)	0.130 (0.60)	0.117 (0.52)	0.144 (0.68)
35-44 Years Old	0.141 (0.73)	0.149 (0.79)	0.123 (0.62)	0.155 (0.80)
Respondent Married	0.218 (0.98)	0.212 (0.91)	0.195 (0.83)	0.222 (0.97)
Respondent Completed Education				
Less than High School	0.888 (4.56)**	0.866 (3.88)**	0.899 (4.62)**	0.861 (4.42)**
High School but no BA	0.943 (5.83)**	0.924 (5.20)**	0.940 (5.85)**	0.933 (5.85)**
Household Income				
100-200% FPL	-0.156 (0.71)	-0.159 (0.72)	-0.137 (0.60)	-0.143 (0.63)
200-300% FPL	-0.183 (0.68)	-0.183 (0.67)	-0.124 (0.48)	-0.153 (0.58)
Owns or Leases a Car	-0.001 (0.00)	-0.006 (0.03)	-0.044 (0.23)	-0.018 (0.10)
Respondent Employment Status in Previous 12 Months				
1-6 mos. unemployed or NILF	0.692 (2.86)**	0.695 (2.86)**	0.673 (2.74)*	0.685 (2.83)**
7-9 mos. unemployed or NILF	0.635 (2.71)*	0.647 (2.80)**	0.637 (2.70)*	0.630 (2.64)*
10-12 mos. unemployed or NILF	0.587 (2.07)*	0.589 (2.11)*	0.566 (1.93)	0.580 (2.00)
Work-limiting health condition	0.104 (0.46)	0.102 (0.48)	0.108 (0.48)	0.121 (0.54)
Household Financial Hardship in Previous 12 Months	0.577 (3.11)**	0.575 (3.13)**	0.574 (3.08)**	0.577 (3.10)**
Distance to Nearest SNAP Office	-0.011 (0.20)			
Distance to Nearest Food Pantry		-0.041 (0.31)		
Distance to Nearest SNAP Supermarket or Grocery			-0.278 (1.53)	
Distance to Nearest SNAP Non-grocery				-0.345 (1.06)
Wave 1	0.251 (1.95)	0.254 (2.01)	0.227 (1.67)	0.261 (2.06)*
Constant	-1.948 (4.17)**	-1.911 (4.52)**	-1.767 (3.91)**	-1.856 (4.21)**

Note: * $p < 0.05$; ** $p < 0.01$. Unweighted N = 501. Coefficients are reported on the first line and t-statistics reported in parentheses. Models were estimated using pooled data, household survey weights, and clustered standard errors. Reference categories for categorical predictors are: Age (45 and over), Education (B.A. or more), Unemployment (no unemployment), Below the poverty line (less than 100% of the FPL).

Sources: Michigan Recession & Recovery Study (MRRS); 2008 and 2010 SNAP Retailer Database; State of Michigan SNAP Office Listings; Survey of Detroit Metropolitan Area Food Pantries.

Table 10: Factors Associated with Household Very Low Food Insecurity in Households with Children

	(1)	(2)	(3)	(4)
Respondent Race - Black	-0.481 (2.44)*	-0.543 (3.03)**	-0.567 (3.15)**	-0.597 (2.99)**
Number of Children	0.001 (0.02)	-0.005 (0.08)	0.006 (0.08)	-0.007 (0.11)
Respondent Age				
19-24 Years Old	-0.141 (0.58)	-0.134 (0.55)	-0.126 (0.48)	-0.056 (0.22)
25-34 Years Old	0.514 (2.93)**	0.536 (2.98)**	0.505 (2.35)*	0.547 (2.78)*
35-44 Years Old	-0.079 (0.39)	-0.079 (0.38)	-0.121 (0.56)	-0.092 (0.43)
Respondent Married	-0.028 (0.21)	-0.019 (0.14)	-0.071 (0.46)	0.012 (0.09)
Respondent Completed Education				
Less than High School	1.053 (3.02)**	0.986 (2.80)**	1.064 (3.22)**	1.028 (2.95)**
High School but no BA	0.864 (2.43)*	0.822 (2.25)*	0.876 (2.54)*	0.875 (2.41)*
Household Income				
100-200% FPL	0.120 (0.42)	0.106 (0.36)	0.178 (0.63)	0.151 (0.53)
200-300% FPL	-0.223 (0.59)	-0.225 (0.59)	-0.040 (0.11)	-0.135 (0.36)
Owns or Leases a Car	-0.162 (0.84)	-0.155 (0.80)	-0.262 (1.28)	-0.197 (1.02)
Respondent Employment Status in Previous 12 Months				
1-6 mos. unemployed or NILF	0.472 (2.01)	0.461 (1.95)	0.406 (1.55)	0.430 (1.76)
7-9 mos. unemployed or NILF	0.011 (0.03)	0.032 (0.10)	0.004 (0.01)	-0.040 (0.12)
10-12 mos. unemployed or NILF	0.156 (0.62)	0.150 (0.59)	0.072 (0.25)	0.097 (0.35)
Work-limiting health condition	0.626 (3.85)**	0.612 (3.81)**	0.677 (3.87)**	0.670 (3.85)**
Household Financial Hardship in Previous 12 Months	0.696 (2.56)*	0.669 (2.44)*	0.694 (2.46)*	0.691 (2.49)*
Distance to Nearest SNAP Office	0.019 (0.32)			
Distance to Nearest Food Pantry		-0.118 (1.24)		
Distance to Nearest SNAP Supermarket or Grocery			-0.686 (3.03)**	
Distance to Nearest SNAP Non-grocery				-0.810 (1.52)
Wave 1	0.365 (1.00)	0.356 (0.99)	0.304 (0.81)	0.385 (1.04)
Constant	-2.815 (3.49)**	-2.537 (3.45)**	-2.278 (3.13)**	-2.465 (3.25)**

Note: * $p < 0.05$; ** $p < 0.01$. Unweighted N = 501. Coefficients are reported on the first line and t-statistics reported in parentheses. Models were estimated using pooled data, household survey weights, and clustered standard errors. Reference categories for categorical predictors are: Age (45 and over), Education (B.A. or more), Unemployment (no unemployment), Below the poverty line (less than 100% of the FPL).

Sources: Michigan Recession & Recovery Study (MRRS); 2008 and 2010 SNAP Retailer Database; State of Michigan SNAP Office Listings; Survey of Detroit Metropolitan Area Food Pantries.

Table 11: Factors Associated with Child Food Insecurity (Wave 1 Only)

	(1)	(2)	(3)	(4)
Respondent Race - Black	0.273 (1.04)	0.211 (0.73)	0.192 (0.76)	0.098 (0.36)
Number of Children	0.114 (1.79)	0.110 (1.73)	0.121 (1.87)	0.107 (1.72)
Respondent Age				
19-24 Years Old	-0.218 (0.73)	-0.197 (0.64)	-0.133 (0.42)	0.027 (0.08)
25-34 Years Old	0.017 (0.06)	0.045 (0.19)	0.137 (0.57)	0.215 (0.80)
35-44 Years Old	0.305 (1.25)	0.279 (1.15)	0.318 (1.32)	0.395 (1.57)
Respondent Married	0.179 (0.48)	0.206 (0.62)	0.151 (0.49)	0.230 (0.73)
Respondent Completed Education				
Less than High School	0.537 (1.58)	0.435 (1.23)	0.548 (1.62)	0.464 (1.28)
High School but no BA	0.847 (3.49)**	0.758 (2.66)*	0.825 (3.40)**	0.845 (3.04)**
Household Income				
100-200% FPL	-0.712 (3.62)**	-0.694 (3.33)**	-0.735 (3.47)**	-0.730 (3.58)**
200-300% FPL	-0.456 (1.84)	-0.429 (1.63)	-0.353 (1.29)	-0.384 (1.34)
Owns or Leases a Car	-0.004 (0.02)	0.010 (0.05)	-0.004 (0.02)	-0.015 (0.06)
Respondent Employment Status in Previous 12 Months				
1-6 mos. unemployed or NILF	0.129 (0.34)	0.175 (0.48)	0.063 (0.17)	0.079 (0.22)
7-9 mos. unemployed or NILF	-0.706 (2.30)*	-0.738 (2.33)*	-0.733 (2.35)*	-0.807 (2.73)*
10-12 mos. unemployed or NILF	-0.080 (0.29)	-0.049 (0.18)	-0.084 (0.30)	-0.085 (0.30)
Work-limiting health condition	0.152 (0.54)	0.110 (0.41)	0.150 (0.54)	0.181 (0.69)
Household Financial Hardship in Previous 12 Months	0.249 (1.19)	0.208 (1.08)	0.235 (1.28)	0.248 (1.33)
Distance to Nearest SNAP Office	0.021 (0.21)			
Distance to Nearest Food Pantry		-0.192 (1.51)		
Distance to Nearest SNAP Supermarket or Grocery			-0.610 (2.88)**	
Distance to Nearest SNAP Non-grocery				-1.103 (2.47)*
Constant	-1.073 (2.68)*	-0.715 (1.26)	-0.697 (1.47)	-0.666 (1.30)

Note: * $p < 0.05$; ** $p < 0.01$. Unweighted N = 251. Coefficients are reported on the first line and t-statistics reported in parentheses. Models were estimated using pooled data, household survey weights, and clustered standard errors. Reference categories for categorical predictors are: Age (45 and over), Education (B.A. or more), Unemployment (no unemployment), Below the poverty line (less than 100% of the FPL).

Sources: Michigan Recession & Recovery Study (MRRS); 2008 and 2010 SNAP Retailer Database; State of Michigan SNAP Office Listings; Survey of Detroit Metropolitan Area Food Pantries.

Appendix 2: Services Available through Food Pantries

	Percent of Pantries
Provide Meals	32.8
Soup Kitchen/Hot Meals	26.3
Home Delivered Meals	0.4
Community Kitchens	0.8
Meals/Snacks for Children	4.2
Distribute Groceries	87.6
Food Pantry	81.5
Backpack Program	1.9
Home Delivered Groceries	3.9
Mobile Pantries	1.5
Mobile Markets	0.4
Supply Other Programs	2.3
Community Garden	1.9
Food Related Benefits	49.0
SNAP	3.5
WIC Outreach	2.3
School Lunch/Breakfast	0.4
Gift Cards/Vouchers	6.2
Non-Food Related Benefits	76.1
Job Training	6.2
Housing	13.5
Utility	18.5
Legal	1.2
GED Programs	1.2
Health Services	12.0
Counseling	12.7
Transportation	5.0
Clothing/Furniture	35.5
Referrals	18.9
Medicaid/CHIP	1.2
Financial Assistance	5.8

Note: Respondents could select as many specific types of service within each category as relevant

Appendix 3: Characteristics of Food Pantries

Characteristic	Percent of Pantries
Hours of Operation	
Weekday Mornings	55.2
Weekday Afternoons	59.9
Weekday Evenings	25.9
Weekends	25.1
Organization Type	
Faith-Based Organization	78.4
Secular Nonprofit or Government	21.6
Funding Sources	
Government Funding	29.7
Private Giving	70.3
Corporate Philanthropy	12.7
Nonprofit Philanthropy	40.5
Commercial Revenue	0.8
Largest Source of Funding	
Government Funding	15.1
Private Giving	46.0
Corporate Philanthropy	1.9
Nonprofit Philanthropy	13.5
Commercial Revenue	0.4
Paid Staff (FTEs)	
Mean	1.5
Top Quartile	1.5
Median	0
Bottom Quartile	0
Volunteer Hours	
Mean	100.3
Top Quartile	81.5
Median	37
Bottom Quartile	12.3

Appendix 4: Food Retailer Access among Households with Children <= 300% of the Federal Poverty Line (FPL) in Wave 1 of the MRRS

Wave 1 Household Characteristics	Average Distance in Miles to Nearest Food Retailer		Percent of Households within 1 mile of Food Retailer	
	All SNAP Grocery Stores	All InfoUSA Grocery Stores	All SNAP Grocery Stores	All InfoUSA Grocery Stores
Black	0.49	0.38	94.2	99.4 ^a
Non-black	0.62	0.63	79.0	77.0 ^a
Income <= 100% of FPL	0.50 ^a	0.38 ^a	90.6	98.1 ^a
Income 100-200% of FPL	0.51 ^b	0.54	92.6 ^a	83.3
Income 200- 300% of FPL	0.69 ^{ab}	0.62 ^a	73.8 ^a	81.0 ^a
Detroit Resident	0.48	0.32 ^a	93.8	100.0 ^a
Suburban Resident	0.60	0.60 ^a	82.5	81.7 ^a
Household Has No Car	0.56	0.49	85.3	92.6
Household Has Car	0.56	0.52	86.4	85.7
By Food Security Status				
Household Food Secure	0.61 ^a	0.49	83.2	90.1
Household Food Insecure	0.49	0.54	90.3	83.7
Household Low Food Security	0.55 ^b	0.45	87.6	94.2
Household VLFS	0.37 ^{ab}	0.69	95.4	64.1
Children in Food Secure HH	0.63 ^a	0.55 ^a	83.3	83.7
Children in Food Insecure HH	0.48 ^a	0.46 ^a	89.3	92.0

Notes: a,b – Cell-pair comparisons are statistically different at the .10 level or below. Household survey weights applied. Results reflect households with children that reported income at or below 300 percent of the federal poverty line in Wave 1. Unweighted N = 251.

Sources: Michigan Recession & Recovery Study (MRRS); 2008 SNAP Retailer Database; 2008 InfoUSA Retailer Data

Appendix 1 - Metro Detroit Food Pantry Survey Sample and Response Rate

Survey Outcome	N	Average # of Call Attempts
Completed Survey	263	3.6
Did Not Complete Survey	57	13.0
Refused to Participate	12	3.2
Total Eligible for Survey	332	
Response Rate	79.2%	
Dropped from Sample		
Not in Service	37	1.5
No Phone Number	9	0.0
Not a Food Assistance Provider	29	2.8
Total Number of Providers	407	

Technical Appendix – Calculating Food Resource Access Measures

Food resource access measures were calculated by determining time and distance between each MRRS respondents' home and a given food resource. Food resources include location of SNAP administrative offices, food pantries, SNAP retailers, and food retailers regardless of their authorization to receive SNAP. Addresses of the respondents from two waves are geocoded to 2010 Census geography. To calculate access measures, the sum of the number of food retailers or food assistance programs of a given type located within a reasonable commute time (5-, 10-, 15-, 20-, 30-minute) of each MRRS respondent's home was calculated for three different travel modes: driving; public transit; and walking. In addition, Euclidean or straight-line distance in miles to the nearest food resource of a given type for a given mode also was calculated.

The least cost driving time was calculated in ArcGIS using the routing service data from the StreetMap North America dataset 10.1, and under the following assumptions. To calculate the driving time, we restricted the use of private entryways, waterways and toll roads and asked the software to choose a route to minimize travel time (i.e. time as the impedance), or the quickest route. Walking time was also calculated in ArcGIS and using the same routing service data, and under almost the same assumptions, except one, which restricts the use of limited access roads, namely highways, as it is assumed that pedestrians cannot walk along such roads. The software chose the route that minimized travel distance, or that represented the shortest route. Once the shortest travel route was assigned for each trip between the participant's residence and all destinations, the distance was then translated into travel time, assuming an average comfortable walking speed of 3 miles per hour. Calculation of the public transit travel time was done in Stata, where a "TRAVELTIME" command file retrieves estimated public transit travel time using the Google Transit web service and assuming the Detroit public

transportation system (SMART) as the mode of transportation. It should be noted that public transit travel time varies by time and day of the travel. The time of the travel we used was 9am, and the day of the travel was Wednesday, September 26, 2012.

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