

Placing Food Security in a Spatial Context

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Introduction

Economic shocks produced by the Great Recession have contributed to rising food insecurity in recent years, with 14.7 percent of U.S. households being food insecure in 2009, compared to 11.1 percent in 2007 (Nord, Andrews, Carlson 2008; Nord, Coleman-Jensen, Andrews, and Carlson 2010). Similarly, food insecurity among children increased during the Great Recession, with nearly 25 percent of children in low-income households qualifying as food insecure in 2008 (Coleman-Jensen, McFall, and Nord 2013). The same economic pressures that are driving rising food insecurity also are shaping public and private nonprofit food assistance programs nationwide. The SNAP caseload increased by nearly 60 percent between December 2007 and October 2010, with the program reaching nearly 43 million persons today (Center on Budget and Policy Priorities 2010). An estimated 37 million persons sought help from nonprofit food assistance programs and food pantries in 2009 (Mathematica Policy Research 2010). As a result, a renewed sense of urgency has taken root in the research literature examining individual and household determinants of food security.

A similar surge in interest has emerged 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 grocery stores or 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 communities lack spatial access to good-paying jobs, which may make it difficult for residents to earn enough to provide adequate food for their households and children. 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). Likewise, the strength of social networks and community capacity for collective action can shape the supports available to household coping with food insecurity.

Popular interest and media coverage of how place shapes food security also increased dramatically in the past decade. For example, full-text mentions of “food deserts” in newspaper and magazine stories increased from 47 in 2000 to 133 stories in 2006, and to 1,465 stories in 2012.¹ Since 2009, First Lady Michelle Obama and the Obama administration have emphasized the importance of healthy eating and supported efforts to ensure all Americans are food secure. Private giving to food banks and nonprofit food charities increased by more than 30 percent during the Great Recession and annual revenue for Feeding America nearly tripled between 2005 and 2010 (Reich and Wimer 2012; McCormick 2010). Rising public salience of the relationship between place and food security in part reflects a growing societal concern with hunger, healthy diets, sustainable agriculture, and food-related health disorders.

It is a particularly important time, therefore, to interrogate the causal relationships between place-level factors and food security. Even though the research literature is beginning to mature conceptually and empirically, data limitations persist and many questions remain unanswered. Below, I provide a broad conceptual and empirical overview of the literature, assessing the state of the evidence on place-level factors. Beyond the interests of the research community, it is important that interventions and food assistance program design occur with a better sense of where the strongest empirical evidence lies and where causal relationships may be most likely. Improved understanding of the spatial antecedents of food insecurity could translate

¹Author’s counts of full-text mentions of the phrase “food desert” drawn from All News (English) Outlets in the Lexis-Nexis Academic database.

into more efficient allocation of public program dollars, private capital, entrepreneurial activity, and philanthropic resources.

The review begins with a discussion of key terms and concepts. Next, it considers what is known about spatial variation in the distribution or prevalence of food insecurity. Attention then shifts to the different possible causal pathways linking place to food security. In addition to access to food resources and food deserts, the single largest area of work to date on place effects and food security, the review will explore evidence of other important casual pathways such as the geography of safety net assistance, and local social, economic, and political context. Special attention will be paid to studies that explore household and/or child food security, but this review draws on insights from studies connecting place effects to other food behavioral outcomes (e.g., grocery shopping habits, receipt of food assistance, diet quality, and nutrition intake). When possible, assessments are made about where causal evidence is strongest and where empirical results may be most actionable. The review concludes with a discussion of research priorities and recommended data investments moving forward.

Key Terms and Concepts

Research on place effects and food security has emerged from several different scholarly fields, government and contract research, and studies financed by philanthropy and advocacy groups. The literature has focused on many different urban and rural locations, but it is uncommon for study designs to be replicated across different settings. Conceptual and methodological pluralism has resulted, complicating comparisons of findings across studies. While conventions are beginning to emerge in some areas, it is helpful to examine some of the primary approaches to defining key concepts that underlie the literature on place effects and food security.

Food Security. Following USDA guidelines and much of the existing literature, this review defines *food security* as whether a household has adequate access to food. *Food secure* households are those with reliable and regular access to food adequate for healthy living; *food insecure* households are those with low or very low levels of food security, manifested as limited access to adequate food due to lack of money and other resources. Severe levels of food insecurity involve more frequent disruptions in eating patterns and periods of reduced food intake (see Coleman-Jensen, Nord, Andrews, and Carlson 2012). Recognizing the importance of an adequate diet to proper child development, research also makes the distinction between food security at the household level and food security among children in households.

Food security measures generally are based on self-reports of reduced food quality, variety, or desirability of diet drawn from surveys or interviews. Most often researchers use some or all of the survey items contained in the Current Population Survey (CPS) 18-item Food Security Survey (Coleman-Jensen, Nord, Andrews, and Carlson 2012) to create measures of food security for all household members and for children within households separately. Having become established convention over the past decade, these food security survey items are utilized in a wide variety of surveys and qualitative data collection efforts. Some studies utilize the entire 18-item household food security scale that captures household and child food security, but many studies employ a smaller 6-item household food security scale that is recommended by the USDA and drawn from the larger 18-item scale (U.S. Department of Agriculture 2012).

Food Resources. Food resources can be conceived of as the stores, restaurants, or organizations where people shop for food, eat or purchase a meal, or receive food assistance. The local food resource environment or infrastructure reflects the set of food retailers, restaurants,

nonprofit organizations, and public agencies in a given community. While there are fairly strong conventions around the measurement of food security, researchers take a number of different approaches to the identification of food resources in a given context. Much of the variation reflects either different conceptualizations of food resources or limitations of the data available to researchers in a given study or setting. The most commonly identified food resources are retail stores where food products are sold.² Studies often focus on the locations of supermarkets and chain grocery stores, which are thought to provide the most affordable and freshest food options. Research also examines the location of other retail food outlets, including small or non-chain grocery stores, specialty stores (bakeries, meat markets), ethnic groceries, farmers markets, convenience stores, gas stations, liquor or party stores, and discount stores that sell food products. At times data permit researchers to look beyond simply store locations and explicitly measure whether retailers offer healthy or fresh food options, store size or quality, and prices of key food items or a market basket of items.

The most common sources of information about food retailers, however, often lack this fine-grained detail. Some studies draw upon phone books or business directories to locate food retailers in space, but are left without much information about the characteristics of food stores. Many studies use proprietary data sources that can contain information about the street address, sales volume, and/or staffing of food retailers and restaurants (e.g., Dunn and Bradstreet; InfoUSA; Trade Dimensions TDLinx; Census Bureau ZIP Code Business Patterns Data). Such data rarely include information about variety, pricing, or quality of food items available at stores. The USDA maintains publicly available lists of licensed SNAP retailers. Unlike proprietary food retailer data, however, SNAP retailer data only contains information on street address. Choice of food retailer data matters because each source contains a unique universe of food retailers that does not perfectly overlap and can generate different empirical results using even the same methods. This lack of consistency in data on food retailers is one key factor complicating efforts to compare studies and findings from different geographic areas.³

Thinking beyond private for-profit retailers or establishments, scholars also have defined food resources as sources of assistance that can help low-income or food insecure families provide adequate diets. Public food assistance programs such as the Supplemental Nutrition Assistance Program (SNAP, formerly food stamps) and the Women, Infants, and Children (WIC) program are most commonly examined in the literature. Charitable nonprofit food assistance or emergency assistance programs, such as food pantries, meals programs, and soup kitchens also are key resources for low-income populations and those at-risk of becoming food insecure. Particularly relevant for concerns about child food security, are food assistance resources such as summer food programs for children, weekend backpack programs, and free and reduced lunch programs that target supplemental nutrition resources to low-income children at greater risk of food insecurity. The food resource environment also may include relevant policy or institutional

²Research examining diet or diet-related health conditions, such as obesity or diabetes tend to focus on the location of convenience stores, restaurants and fast food establishments.

³Data may not be regularly or consistently updated across different sources and not all sources remove duplicate entries. Lack of comparability across sources of retailer data likely is a key source of variation in published or reported research findings, even if scholars use the same methodological approach. For example, Kowaleski-Jones et al. (2009) find variation in the number of grocery stores, their street locations, and sales volume information across proprietary and state agency data sources in Salt Lake City, UT, which leads to dramatically different snapshots of food resource accessibility depending on the source of data used. For example, when looking at whether census block groups were within 1 kilometer of any grocery store, the authors found agreement across three different proprietary and public data sets only 35 percent of the time.

arrangements that shape access to food assistance, such as eligibility or recertification rules, presence and capacity of nonprofit food assistance programs, and subsidized or healthy eating programs in schools. Finally, the presence of informal sources of social support, such as friends or family, also may shape observed incidents of food insecurity.

Information on food assistance providers is drawn most often from community social service directories, 2-1-1 listings, online searches, and social service referral guides. As is the case with food retailer data sources, different directories or information resources have different lists of providers and varying degrees of information about food assistance programs. For example, some guides include smaller food pantries operated by religious congregations; other guides only include information about larger programs. Certain data sources provide information on eligible clients and hours of operation, others only list street addresses. Also similar to food retailer data, community social service resource directories and listing of food pantries often provide dated information about the location of assistance programs (Allard 2009b).

In this review, I use the term *food resources* to refer to a broad category of for-profit firms, public and nonprofit organizations, public and private programs of assistance, informal sources of support, or types of food products (i.e., fresh fruits and vegetables). When relevant, discussion of research findings below will distinguish between types of food resources or refer to a specific type of food resource. Effort also is made to clarify how other aspects of spatial context matter or may interact with the contours of the food resource environment.

Local Place and Geography. While the food security literature tends to emphasize individual- or household-level causal factors, it is understood that food shopping and eating behaviors are embedded in the local communities and neighborhoods where people reside, work, and attend school. Research on spatial context and food security presumes that food resources or opportunities nearby matter more to observed outcomes than those farther away, implicitly applying Tobler's (1970) first law of geography that, "everything is related to everything else, but near things are more related than distant things." How researchers define the boundaries and granularity of local place, or what "nearby" means, reflects important assumptions about how spatial context shapes food security. These assumptions in turn powerfully shape subsequent decisions about research design and data (Neckerman, Bader, Purciel, and Yousefzadeh 2009).

It is most common to assume that food behaviors are shaped by the food resources and related opportunities nearby where one lives. Here, local place is thought of as the immediate neighborhood around one's home and what can be accessed within or near that neighborhood. Food shopping and eating can occur in a variety of other places, which suggest that inquiry into place effects should be extended to include the areas in and around workplaces or schools. Place can be the catchment or service area around a food assistance provider or religious congregation that offers emergency assistance or meals programs. Social networks and the exchange of informal social support also are embedded within the neighborhoods and local institutions or organizations where people interact.

Dimensions of local place, however defined, should vary depending on theory or the particular aspect of spatial context at hand. If it is assumed that most food shopping is done within walking distance of one's home then the boundaries of the relevant neighborhood would be whatever is within a 15-minute walk, about a half- to three-quarters of a mile. The bounded area of a "walking neighborhood" may be even smaller for the elderly or disabled, who may face greater limitations in walking distances. Dimensions of local place may be determined by what falls within a typical automobile trip when focusing on rural or suburban populations, who are far less likely to walk to grocery stores or other relevant food resources than urban populations.

Food assistance policy and retail pricing might vary at the county- or regional level. For these aspects of spatial context, local place may not be the several block or several mile area where a household is most likely may shop or seek assistance, but features of the larger regional marketplace or safety net that shape food security.

Often researchers must reconcile textured conceptualizations of place with the limitations of available data or common ways of locating data in space. In these instances, conceptualization of how spatial context might matter to food security may be more sophisticated than the hypotheses empirical research can test. For example, many studies follow the poverty literature's tradition of using census tract or block group geography to define local neighborhood boundaries. This occurs even though there is broad recognition that tract boundaries are only rough approximations of neighborhood contours and do not account for how individuals actually navigate or conceive of what is local to their neighborhood. Similarly, many sources of data are available only at the zip code or county-level, or may only provide broad categorizations of the respondent's community (e.g., metropolitan versus non-metropolitan area). Survey data typically contain only information about the respondent's residential location at the time of the interview, not information about where the respondent or individuals within the household work, go to school, visit family or friends, or engage with community-based organizations. It is often the case, therefore, that researchers must confront limits to the geographic specificity of individual or household data.

Spatial Access to Food Resources. Closely related to definitions of local place are determinations of how close a household or neighborhood is to a given food resource. As is the case with definitions of local place, definitions of spatial access to food resources are shaped by the precision with which food resources and individuals or households can be put into a street grid or a GIS. Because different studies employ different data with different degrees of geographic specificity, measures of spatial access to food resources often vary from study to study.

Access to food resources commonly is defined as the distance or commute time of a residential location or neighborhood centroid to the closest food resource. Determinations of the closest food retailer or resource provide a continuous measure of access, but one that does not take into account the breadth of retailers in a given local place. Thus, alternative definitions of food resource access measure the cumulative capacity, density, or presence of food resources within a reasonable commute of a given neighborhood or location. Studies have incorporated mode of transportation into access measures, as different resources will be accessible depending on if it is assumed individuals walk to food retailers or assistance programs, versus take an automobile or public transit. There are many other ways to conceive of food resource access, each with its own demands for data or information. For example, to the extent that information is available about the types and pricing of food products available in stores, access measures could assess comparative pricing for a specific set of food items or a nutritionally well-rounded food basket. Measures of food assistance resource access also might weigh eligibility or the capacity of programs or types of assistance available.

When evaluating evidence reported in the research on food resource access, this review considers several key dimensions. First, can studies connect measures of access to a household- or individual-level unit of analysis or only to a neighborhood-level unit of analysis? Although examining food resource access across different types of neighborhoods may provide intuitions about the association between food resource access and food security, studies that can link access to individual or household food security outcomes provide stronger evidence. To properly

account for place effects, research on food security should focus on analyses that locate individual or household food security outcomes and food resources within a street grid, census tract, or small neighborhood designation of some kind. Preferably research should be able to compare food secure and food insecure households within the same community or neighborhood, in order to generate accurate estimates of how and to what extent place might matter. Finally, are comparisons made across larger areas, multiple sites, or only within a small bounded area? Research should strive to compare behavior and need across different types of places, or tailor models to reflect the different underlying processes that may be present in urban, suburban, or rural areas.

It is important to remember that place effects are more than just spatial access to food retailers, despite the focus of research on food deserts. Other types of place effects will require different types of measures. At times these may have an element of spatial access. For example, because food security is related strongly to household income, access to good paying jobs may be more important than access to grocery stores. In other cases, different measures are required. Proximity to food pantries and meals programs may matter for households struggling to earn enough to provide adequate food. Researchers also might measure the strength of informal social support networks, reciprocal social ties, social capital, collective efficacy, or trust in neighborhood businesses and organizations.

Spatial Variation in Food Security

Before thinking about how spatial context might be causally related to food security, it is important to establish how food security varies by place. When reviewing the literature, there is consistent evidence that low levels of income, low levels of educational attainment, the presence of disability, and detachment from the labor force are all associated with higher household or childhood risk of food insecurity. Black and Hispanic households also are more likely to be food insecure than white households (Coleman-Jensen, McFall, and Nord 2013). As a result, research on place and food security often focuses on neighborhoods or communities characterized by high rates of poverty or unemployment, and race or ethnic segregation, where it is believed that residents are at-risk for being or becoming food insecure.

Data limitations make it difficult to locate the presence or prevalence of food insecurity in 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 data, such as the CPS Food Security Survey public use files, only contain general measures of geography (i.e., region of the country; inside metropolitan area - in principal cities or not in principal cities; outside metropolitan area) 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).

Nevertheless, there are insights to be gleaned from the extant literature and to be built upon in future research. As we would expect, 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 2000 suggest that nonmetropolitan areas had slightly higher rates of food insecurity

(Nord 2002). More recent studies find food insecurity 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). For CPS households where location within a metropolitan area is known, however, roughly one-third of all food insecure children live in suburban areas (37.0 percent) and another third in cities (33.0 percent). Only about one in seven food insecure children live in nonmetropolitan areas (15.7 percent). 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 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, predicted rates of food insecurity published by Feeding America (2013) reveal that most counties in the Southeast and Southwest portions of the US had household food insecurity rates over 15 percent and child food insecurity rates over 20 percent.

Much of the research to date has examined high-poverty areas or areas characterized by high concentrations of racial and ethnic minorities. These areas often are places where food insecurity is thought to be most prevalent and where access to quality, affordable food resources is thought to be weakest. Although there are many reasons to focus on areas where food insecurity may be most concentrated, persistent, or acute, many non- and near-poor families struggle with food security at some point in the year. By limiting the focus to high-need areas, research may misstate how place matters and may misestimate how different individual-, household-, and place-level factors shape food security status. A focus on neighborhood as the unit of analysis also leads researchers to assume that all residents of a given neighborhood are uniformly at risk of becoming food secure. Not all residents of high-poverty areas are food insecure, however, just as not all residents of more affluent communities are food secure.

Currently, it is the inability to locate adults, children, or households experiencing food insecurity in space at the neighborhood or street-level that constitutes the most important methodological challenge facing research on place and food security today. In addition to thinking about the concentration of food insecurity within a neighborhood or community, we should be interested in areas where food insecurity is more persistent, versus episodic and short-term. It also is important to understand whether the prevalence of food insecurity varies across high-poverty or high-need areas, or whether food insecurity is fairly uniformly distributed across poor neighborhoods within a given metro area or rural region. Finally, it is important to know where the most vulnerable food insecure populations (e.g., elderly, disabled) are located in our communities.

Several possible steps can be taken to remedy this gap in the literature in the near-term and in the long-term. First, research support could be provided to encourage scholars to work with confidential geolocation information to provide more detail about the census tract or block group characteristics of food insecure households in larger national surveys like the CPS or SIPP. Second, the USDA could be proactive in financing food security questions in existing cross-sectional or panel surveys with samples that are representative samples of communities, cities, or regions. Another possible avenue for generating insight into the spatial variation of food insecurity may be to incentivize food pantries and meals programs to bring client data together into a single clearinghouse where more systematic analyses of high-risk client populations could be completed. Finally, effort could be made to support new ethnographic work that examines both food secure and food insecure households in a variety of low- and high-poverty neighborhoods.

Evidence of Possible Causal Pathways through which Spatial Context Matters

Spatial context or place effects might shape food insecurity through a number of different pathways. The spatial features most relevant to food security include retail food environment, access to safety net programs, and the local economic, social, and political context. Even though most of the research to date conceives of place effects as operating through access to food retailers and food assistance programs, other aspects of spatial context may matter even more. Although each causal pathway differs in the exact mechanisms or processes through which place characteristics have influence, spatial context can shape levels of household and child food security in a number of ways. First, spatial context may shape whether a household at-risk of becoming food insecure (e.g., experiencing job loss or significant reductions in income) actually enters a state of food insecurity. Spatial context may shape how a household copes with food insecurity, whether through shifting shopping behavior, finding additional work opportunity, or seeking assistance. Place-level characteristics may influence the likelihood that adults and children in a household will experience persistent food insecurity, or whether food insecurity will be more episodic.

Changes in the spatial context, such as population out-migration or loss of employment opportunities, also might simultaneously affect rates of food security and the presence of food retailers or resources. Improvements in the local food resource environment may reduce food insecurity among adults and children. Moreover, it is possible that the presence of food insecurity in a neighborhood can affect the contours of the food resource environment. For example, concentrated food insecurity in a community may incentivize food retailers to close or carry different products, or different types of food retailers might emerge. Improved food security within a community also may be a signal of rising demand to food retailers and lead to increased choices or options for residents. Food pantries and food assistance programs also may emerge in response to rising or persistent food needs. Schools and community organizations may be more likely to provide meals and snacks to children.

The relationship between food security and place likely is a dynamic one, varying from place to place and shifting over time. In addition to locating household and child food security in space, research must be able to follow place characteristics and food security over time to make proper causal claims of how spatial context affects food security outcomes. Too often, data are cross-sectional and unable to track either food security within households or measures of the food resource infrastructure within a community longitudinally. The research findings discussed below, however, pave the way for cross-time work on food security and spatial context to occur.

Given the large number of recent studies published in many different academic disciplines and non-academic outlets, it is not possible to construct a complete review of every study discussing place and food security. Instead, the review that follows will focus on promising conceptual and empirical developments within the broad literature exploring place effects and food security. Other review papers in this series address the individual- and household-level factors or decision processes that shape food security, but any rigorous inquiry into the factors shaping food security, shopping, budgets, or decisions must account for relevant individual and household characteristics, as well as the role of place effects. Recognizing the disciplinary and methodological pluralism that is a strength of this literature, less time is devoted to technical discussion about study design or model estimation – although there is great value in those debates. The intent here is to discuss how well-crafted research has examined the causal connections between different aspects of local place and food security in households or among

children, then to propose a set of recommendations for how a multi-disciplinary, multi-method research agenda might unfold in the coming years.

Retail Food Environment - Findings. Researchers, advocates, and policymakers have interrogated several spatial features of the retail food environment in recent years. In particular, there has been a significant rise in research examining the prevalence and location “food deserts,” neighborhoods and areas containing no or very few grocery stores or stores carrying fresh food items. Another emergent literature examines spatial variation in and implications of the cost structure of retail food options for low-income communities.⁴ It is thought that the retail food environment is causally connected to food security because it shapes what households can purchase and the extent to which the costs of food shopping are higher for residents of disadvantaged communities. Closer proximity to food retailers should reduce commuting costs and time costs associated with grocery shopping, particularly for households without access to an automobile, which is thought to allow households to spend more income on food and more time on preparation of meals (Fitzpatrick and VerPloeg 2010). It commonly is argued that proximity to supermarkets or large chain grocery stores is more important than proximity to smaller grocery stores, convenience stores, or specialty stores. Supermarkets and chain stores have been found to carry a wider array of fresh food items and to offer lower food prices than other types of food retailers (US Department of Agriculture 2009). Thus, low-income households that live closer to food retailers of all types, but supermarkets and chain stores in particular, should be able to provide more complete meals, more often, and with higher nutritious content than low-income households that live farther from 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 has been found to vary by race, ethnicity, and class composition of a community. Studies often report that predominantly black and Hispanic neighborhoods have less access to supermarkets and large chain grocery stores than predominately white areas. For example, Gallagher (2006) finds that residents of majority African-American 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 when 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

⁴For a more thorough review of the food desert literature, see US Department of Agriculture (2009) and Larson, Story, and Nelson (2009).

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. White neighborhoods are only clearly advantaged in food resource access when looking at number of supermarkets within a five-minute walk. Even though Powell, Slater, Mirtcheva, Bao, and Chaloupka (2007) and Moore and Diez Roux (2006) find race and class inequalities in access to supermarkets, each study finds black and low-income areas to have greater access to non-chain groceries and convenience stores 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.

Given low population densities, lack of economies of scale, and great commuting distances between places, there is reason to believe that access to food retailers is lower in rural than urban communities. For example, the median distance to the nearest supermarket is 0.57 for households in low-income urban areas, compared to 4.1 miles to the nearest supermarket for residents of low-income rural areas (US Department of Agriculture 2009).⁵ Rural food stamp recipients travel much farther than urban food stamp recipients to the store most often used for shopping (14.4 miles versus 2.2 miles) with roundtrip commutes that take more than 60 longer on average (Ohls, Ponza, Moreno, Zambrowski, and Cohen 1999). Drawing on interviews with food pantry clients in Iowa, half of rural clients versus one in five urban clients indicated there are not enough grocery stores in their community (Garasky, Morton, and Greder 2004). Morris, Neuhauser, and Campbell (1992) report the cost of the USDA thrifty food plan market basket to be 36 percent higher in small and medium grocery stores located in persistently poor areas of rural America than the national average. The consolidation of rural food retailers in hub towns and rural regional centers also have left many smaller rural communities without a supermarket or grocery store (Garasky, Morton, and Greder 2006; Morton, Bitto, Oakland, and Sand 2005).

A few studies provide a sense of how food resource access might shape food security. Self-reported access to public transportation reduces odds of food insecurity among households with elementary-age school children in Wisconsin significantly, but that 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).⁶ 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).

There is evidence that food retailer access and pricing is associated with other household food outcomes. Proximity to stores and high food pricing were found to shape where 30 young

⁵Similarly, in looking at chain groceries in Portland, OR, Sparks, Bania, and Leete (2011) find that on average there are 0.5 supermarkets within 0.6 miles of the average tract and that the average distance to a store is about 0.7 mile.

⁶The authors find no significant differences in vegetable consumption.

women in Chicago, IL choose to shop for food (Zenk et al.,2011). A negative association between supermarket and restaurant density factors and infrequent grocery shopping, fast food consumption, BMI, and obesity was found among low-income women interviewed in the 2007–08 National Health and Nutrition Examination Survey (Gibson 2012).⁷ WIC voucher recipients in areas with higher food prices are found to have a more difficult time purchasing fruit and vegetables in adequate or recommended amounts than recipients in areas with lower prices (Leibtag and Kumcu2011).⁸ Higher food prices appear to be positively associated with children’s body mass index (BMI) among households with income below 300 percent of the federal poverty line in the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B), but there were no significant relationship between higher fruit and vegetable prices and food insecurity (Morrissey, Jacknowitz, and Vinopal 2012).

Retail Food Environment – Future Research. While the issue of food deserts or the quality of the local food retail environment has gained traction on policy and philanthropic agendas, the research literature examining these issues is in its early stages and many questions remain open. The conceptual and normative arguments about access to food retailers are far more developed than the accompanying empirical work. Inconsistency in empirical findings reflect the plurality of approaches to defining food deserts and retail food access, which makes it difficult to compare across studies or settings, as much as true differences in the underlying relationship between place effects and food security across different communities. In particular, very few studies published to date directly connect the contours of the retail food environment to food security outcomes among households or children. Proximity to the nearest supermarket becomes interpreted as a proxy for where households are likely to shop and the assumption is made that shopping at this nearest supermarket will reduce food insecurity. While intuitive and possibly correct, such assumptions likely overstate the impact of food resource access on food security.

Imprecision and lack of causal validity within the existing research should not be taken as a rejection of the “food desert” hypothesis altogether. Instead, research findings to date suggest that access to food retailers and affordable healthy food items may matter more for particularly at-risk population sub-groups. One key task for future research, therefore, should be to examine whether and how access to food retailers matters across different population sub-groups and neighborhood locations where distance may matter. For example, proximity to food retailers and affordable food options may be particularly important determinants of food security among households without access to automobile transportation, individuals with physical limitations, and the elderly.⁹ Low-income residents of high-poverty neighborhoods, racially segregated

⁷In models that include separate controls for density of supermarkets, small groceries, convenience stores, fast food, and full-service restaurants in a respondent’s zip code, however, find few significant associations between food resource access and household food outcomes.

⁸Prices for healthy food items relative to less healthy food items also have been found to vary significantly across different metropolitan areas (Todd, Leibtag, and Penberthy 2011). A particularly important development has been the emergence of nontraditional food retailers and the increased market share they hold. Leibtag, Barker, and Dutko (2010) compare food prices at nontraditional food retailers (e.g., supercenters, wholesale clubs) and traditional supermarket stores in 6 metropolitan markets. Prices for more than 80 percent of individual food items were lower in nontraditional retailers compared to traditional retailers, with an average discount of 7.5 percent. These price differences were most pronounced in markets where nontraditional retailers had a smaller share of the market.

⁹Smith and Hoerr (1992) find that low-income female headed households receiving food bank assistance were more likely to report skipping meals in the previous six months than comparable low-income mothers not receiving food bank assistance. The authors also report that single mothers receiving food bank assistance are more likely to shop

areas, and remote rural communities, often areas with low access to a wide range of economic opportunities and community resources, also may be more likely to become food insecure due to limited access to food retailers.

In doing this work, greater attention should be paid to construction of more valid food retailer access measures. Counts or densities of stores across a zip code or census tract are the most common approach to measuring food resource access. Such measures often do not account for size and can be misleading when there is variation in the size of the catchment or geographic areas themselves. Often the radius of a zip code or tract is only a 1/4 to 2/3 of a mile, even though a mile or two may be a more accurate distance for typical grocery shopping trips. Given that only a small share of households walk or take public transit to grocery stores (Ohls, Ponza, Moreno, Zambrowski, and Cohen 1999), measures of access that do not account for mode of transportation and reliance on cars may not generate accurate estimates of food resource accessibility. In addition, the built environment is a critical but rarely operationalized factor shaping variation in spatial accessibility to local food resource infrastructure. Highly urbanized areas, with higher population density, more land zoned to permit commercial use, and more transit stops, are more likely to have high densities of stores and restaurants. The local built environment also is critical to understanding how transportation resources translate into food resource access. Factors such as steep hills, poor sidewalks, and traffic congestion may inhibit distances otherwise easily covered by car, bus, or foot. Placing households in context of walkability indices, street grids, and public transit maps can produce more accurate assessments of how far households can travel for grocery shopping across a range of commute times (Neckerman, Bader, Purciel, and Yousefzadeh 2009).

There also is good reason to focus on access to a broader array of food retailers, rather than the closest store, or at least compare access to different types of retailers so that proximity to supermarkets can be placed in proper context. For example, many urban communities may have greater access to smaller grocers and more high-quality affordable food products than studies of supermarkets would suggest. Ohls, Ponza, Moreno, Zambrowski, and Cohen (1999) find that about 90 percent of food stamp recipients and eligible non-recipients shop for groceries in supermarkets, but most also shopped at neighborhood groceries, convenience stores, and other specialty stores. Slightly less than half of all food stamp recipients – 46 percent -- shopped at least 2 different stores in a typical month.

More work should explore how different types of food retailer access measures perform in models of food security of other food behaviors. It may be the case that different types of access measures are so highly correlated that more complex formulations are unnecessary. This point is made most notably, by Sparks, Bania, and Leete (2011), who compare different count and distance-based approaches to quantifying access to chain groceries in Portland, OR. The authors find that food retailer access measures with different assumptions about distance and shopping habits (all weighting for local population) are highly correlated and behave similarly when comparing relative patterns of food access across different types of neighborhoods.¹⁰ The authors' array of distance-based food retailer access measures also did not appear appreciably sensitive to whether they were calculated at the block group versus tract level. Similarly,

at convenience stores and walk or take public transit to food stores, compared to those not receiving food bank assistance.

¹⁰Gibson (2012) also finds that zip code-based densities of different types of food retailers or restaurants are highly correlated. Because food retailer access measures in a given site may be highly correlated, future research should be mindful that multicollinearity may be biasing estimates.

Euclidean distance and street network distance-based measures performed quite similarly in their analyses. Future research may find that simpler or more cost-effective food resource access measures perform about the same as more sophisticated and costly measures.

Lack of discussion about what constitutes adequate levels of access to food resources remains a significant gap in the research literature. Typically studies exploring access to food stores make relative comparisons of neighborhood proximity to the nearest food store or calculate a cumulative scale score of food stores within a given distance of different neighborhoods. Here, inadequate access is conceived of as inequality or difference in the presence of food resources across neighborhoods with different demographic profiles (e.g., high-poverty versus low-poverty). Normatively we might be concerned with unequal access to the same types of food resources, but inequality does not necessarily translate to inadequacy. It is possible, and perhaps even likely, that adequate access to food resources can exist in a context where there is great variability in overall levels of access. Statistically significant differences in food resource access, therefore, may not be substantively significant.

Another challenge for future research, therefore, is to identify what a meaningful substantive difference in grocery store access might be. It is not clear how having access to .5 fewer grocery stores or to be .2 of a mile closer to the nearest grocery store – common differences reported in the literature – will affect food shopping or food security. Instead, it may only be under extreme circumstances when access to food retailers matters. Thus, the challenge is to find the gradient at which distance to a grocery store or supermarket begins to have a significant effect of household food outcomes. Determining where such thresholds effects lie is difficult in the context of the existing literature, however, because most measures of food retailer access are not connected to shopping behavior or food security. Self-reports on locations, distances, and travel times for grocery shopping might serve as benchmarks. For example, about 60 percent of poor and near-poor households travel distances of less than four miles or round trip travel of 30 minutes or less to visit their most-often-used store (Ohls, Ponza, Moreno, Zambrowski, and Cohen 1999). Moving forward, collecting real-time data from individuals about grocery shopping through mobile devices or GPS units may yield more insight into when food retailer access begins to shape outcomes.

While normative arguments call attention to the absence of food retailers or healthy food options in a community, it may be that food retailers are distributed in a manner that partly reflect the shopping habits and preferences of communities as they have evolved over time. Because food resource access measures often are captured at a moment in time they cannot account for the shifts in demand or changes in food resource supply that have led to the particular array of food resources in a given community. So while researchers are aware that food resource access varies temporally as well as spatially, there are few studies that can examine over time variation in food resource access. Future research should examine changes in food retailer access or presence over time, and the factors that might be driving these changes in the food retail environment. Existing data on food retailers may not be well-equipped to assess changes over time as the data may not be regularly updated or cleaned to permit longitudinal study. Here, work might emphasize the supply and demand functions shaping grocery store location decisions and regional food prices. Specific factors shaping location decisions of supermarkets and new grocery stores include population flows, entry of discount retailers, availability of large parcels of inexpensive land, and access to transportation or distribution networks (Bitler and Haider 2011; Neckerman, Bader, Purciel, and Yousefzadeh 2009; Short, Guthman, and Raskin 2007).

Safety Net Programs - Findings. The accessibility or availability of local safety net and food assistance programs represent another key dimension along which place effects may influence the presence and persistence of food insecurity. A number of public and private safety net programs increase household income and help households cope with the effects of poverty, food insecurity, or job loss. Public cash and in-kind safety net programs such as Supplemental Nutrition Assistance Program (SNAP, formerly food stamps), Women, Infants, and Children (WIC), Temporary Assistance for Needy Families (TANF), the Earned Income Tax Credit (EITC), public health insurance programs, such as Medicaid, and Unemployment Insurance (UI) help delivered more than \$300 billion in benefits to tens of millions of low-income households in 2009 (Center on Budget and Policy Priorities 2012; Isaacs, Vericker, Macomber, and Kent 2009; Kneebone 2009; Simms 2008; Tax Policy Center 2013; U.S. Department of Health and Human Services 2010; U.S. House of Representatives, House Committee on Ways and Means 2004). Other public food assistance programs like the National School Lunch Program and the School Breakfast Program, target assistance to low-income children in schools. Federal food and nutrition assistance programs in total reach about 1 in 4 Americans and spend \$107 billion annually (US Department of Agriculture 2013).

Complementing this public safety net, are private nonprofit charities and social service organizations that assist low-income families with material need, barriers to employment, job search, education and skill development, literacy, and health-related issues. It is estimated that nonprofit social service providers connect low-income populations to roughly \$150 billion in support services and in-kind assistance in a typical year (Allard 2009b; Smith and Lipsky 1993). 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 (Mathematica Policy Research 2010). 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).

Participation in food assistance programs, such as SNAP or WIC, often is hypothesized to improve household and child food security. Food assistance programs provide families with additional resources to purchase food and additional food products. Households receiving food assistance, therefore, should be less likely to become or remain food insecure. A number of methodological considerations, chiefly selection bias and lack of longitudinal data, make it difficult to establish a causal connection between food assistance receipt and food security. Nevertheless, there is emerging evidence that receipt of food assistance improves household and child food security. For example, Nord and Golla (2009) find that households enroll in SNAP in the state of food insecurity, but experience increased food security over time. Bartfeld and Dunifon (2006) find that food insecurity is less prevalent in states where food assistance programs, such as SNAP or summer nutrition programs for children, are more widely used by low-income households.

When considering the impact of safety net and food assistance programs, however, it is important to place such programs in the spatial context where they are administered. Provision of public and nonprofit safety net programs has an inherently local character. Even though public assistance programs are funded and regulated by the federal and state government, program administration often occurs in local offices. While stringent state-level program eligibility policies can depress food assistance program caseloads, such policies may be implemented less consistently or evenly between and within local places (Klerman and Danielson 2011; Soss, Fording, and Schram 2011). Moreover, 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 program offices are located, but chief among them can be considerations about public transit accessibility, the cost of suitable office space, 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.

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; Kissane 2003). Spatial access to public and nonprofit food assistance programs may be particularly important to whether low-income households receive supports. For example, 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 (Rowe, Hall, O'Brien, Pindus, and Koralek 2010). Lack of access to a car, lack of information about local programs, and difficult 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).

Underscoring why spatial access to food assistance programs may be important to understanding participation and household food security, there is evidence that food assistance programs are not 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 well-resourced, and less accessible food assistance providers than urban communities (Allard 2009a; Allard and Roth 2010).

Safety Net Programs – Future Research. Findings to date suggest that future research should further examine the relationship between safety net program access and availability, program utilization, and food security. Research should make a concerted effort to gather information on local variation in public food assistance eligibility, outreach, and program accessibility that may affect food assistance program take-up and thus food security (Crockett and Sims 1995; Klerman and Danielson 2009). It may be useful to think about the accessibility of public food programs targeted at children and child food security levels. For example, formal child care centers and early childhood education programs connect children with meals and snacks during the day. Lack of availability of such services in a community can affect the dietary intake of children who end up in less formal care settings. Similarly, Crockett and Sims (1995)

emphasize that teachers and staff in schools may vary in how they support or facilitate participation in school lunch programs. A related step would be to model the relationship between access to nonprofit food pantries or meals programs and household or child food insecurity. Another advance would be to compare access to safety net resources across urban, rural, and suburban areas, with attention to whether access to safety net resources matters more in certain types of geography. When modeling access to safety net resources, research also should account for non-distance organizational features (e.g., hours of operation, cultural competency, staffing levels) that combine with distance to shape true accessibility of a programmatic resource (Allard 2009b; Allard and Roth 2013).

Although place effects often are conceived of as local in nature, there is evidence that county, regional, and state variation in food assistance policy also may be related to food security. There are many ways that state policy variation may shape food behaviors and outcomes. Klerman and Danielson (2009) find that state variation in the length of the recertification period and the burden of recertification processes are significantly related to changes in SNAP caseloads. Shorter, more restrictive, or more sensitive recertification processes can depress SNAP takeup among low-income households, which in turn may have detrimental effects on food security. Many states have modernized their SNAP programs in recent years by adopting a number of new practices, including call-in centers, electronic application processes, simplified reporting processes, improved outreach, and enhancing customer access to SNAP eligibility offices (Rowe, Hall, O'Brien, Pindus, and Koralek 2010). Some of these modernization efforts may boost program take-up, thus possibly increasing food security among low-income populations. Moving forward, there is greater room to assess how state and county variation in public food assistance program design or availability may be related to trends in food security at higher levels of geography.

Economic, Social, and Political Context - Findings. Given that food security is a function of household resources available to procure food, we should expect the economic, social, and political conditions that affect household income and budgets, provision of food or in-kind assistance, and the presence of community supports also to shape the presence of food insecurity. Despite large literatures exploring how economic, social, and political context affects poverty, program participation, and employment among low-income households, there is comparatively little conceptual and empirical work that links these aspects of local context to food security in households or among children.¹¹ As is true elsewhere, this is due largely to data limitations that make it difficult to locate food security in space. Limited work linking local economic, social, and political characteristics to food security also is due to the lack of conceptual work connecting these features of spatial context to household food outcomes. What work exists, however, suggests there is great promise to examining how household and child food security may be responsive to surrounding economic, social, and political context.

Several studies have examined how state economic and labor market conditions are related to household food security. For example, states with higher rates of unemployment and lower average wages also have higher rates of food insecurity (Bartfeld and Dunifon 2006; Bartfeld, Dunifon, Nord, and Carlson 2006; Tapogna, Suter, Nord, and Leachman 2004).¹²

¹¹See Hanson and Oliveira (2012) for a review of research examining how economic conditions shape food assistance program participation and how the Great Recession shaped program participation.

¹²Tracing data on federal food assistance program participation from 1976 to 2010, Hanson and Oliveira (2012) find that SNAP caseloads more closely track unemployment rates than school lunch or breakfast programs, or WIC – all of which seem to have seen a slow, but steady, increase in numbers of participants since 1976. Yet, the authors also

Higher local costs of living, apart from food prices, can create tighter food budgets for low-income households and increase the likelihood that households are unable to provide adequate meals. Higher state median rent levels are associated with greater prevalence of food insecurity, where an increase in median rent of \$100 is associated with a 17.5 percent increase in the odds of food insecurity (Bartfeld and Dunifon 2006). Likewise, state-level prevalence of food insecurity is positively related to the share of renters paying more than 50 percent of income in rent (Tapogna, Suter, Nord, and Leachman 2004). Looking at the cost of utilities, Nord and Kantor (2006) conclude that households with incomes below the poverty line in high heating-cost states were more vulnerable to very low food security during winter months than summer months; the opposite relationship was found in states with high cooling costs.

The literature has explored the relationship between social context and food security along a few particularly key pathways. First, apart from assistance through formal safety net programs, low-income households also receive cash and in-kind food assistance through networks of informal social support to avoid or cope with spells of food insecurity (Ahluwalia, Dodds, and Baligh 1998; Morton, Bitto, Oakland, and Sand 2008). In face-to-face interviews with a sample of 326 low-income rural families, (Swanson, Olson, Miller, and Lawrence 2008) present evidence that church members, regular participants in church services, individuals with stronger friendship networks, and those who felt capable of building social networks were less likely to report food insecurity.

Community responses to problems of food insecurity in part are a function of the surrounding political context. State and local political conditions can shape how the availability and generosity of food assistance, as well as efforts to bring healthy food options to underserved communities. To date, some of the most promising research on the relationship between local political context and food security in the US has focused on the strength of local civil society to address the food needs of low-income households. The capacity of communities to achieve collective action around food issues has been found to vary according to the problem-solving orientation of local civic structures and the strength of collaborative norms. Greater cooperation between community-based organizations can lead to stronger inter-organizational networks, greater awareness of food security and food resources available in the community, and to new initiatives, which may reduce the prevalence of food insecurity (Morton, Bitto, Oakland, and Sand 2005; Paul 1996; Webb, Hawe, and Noort 2001).¹³

Economic, Social, and Political Context – Future Research. Despite some promising work, there is much room to improve our conceptual and empirical understandings of the relationship between local economic, social, and political context and the presence or prevalence of food insecurity. First, there is reason to believe that local access to jobs, particularly good paying jobs, may powerfully shape food security outcomes in a variety of neighborhood contexts. Understanding local flows in the supply of employment opportunities also should be important features of the local economic context that affects the ability of households to provide adequate food. Some of these flows may reflect broader changes in the economy, but others may be seasonal shifts that affect the presence and prevalence of food security throughout the year. Also, food security research should explore whether low-skill or low-wage workers remain at-

find that WIC has been more responsive to economic conditions in the last decade. Economic factors also partly explain the share of children receiving free versus reduced-price meals at school, which the authors believe is a more accurate way to measure the impact of the economy on child nutrition programs.

¹³Cross-sectional survey data indicate that perceptions that local civic structures is working to address food security issues are positively associated to self-reports of food security, see Morton, Bitto, Oakland, and Sand 2005.

risk for food insecurity even as surrounding economic conditions improve, as these workers often may be the last to benefit from growth or recovery. Finally, more textured information about local food pricing and other costs of living over time may help scholars understand how household food budgets shift in response to rising prices or constrained budgets.

Given that social networks play a critical role in the coping strategies of at-risk or food insecure households, more attention should be given to how the strength of social support networks varies spatially depending on proximity to family and friends, or the presence of community-based organizations that provide regular interactions between families in a neighborhood (Small 2009). We should expect that spatial variation in the availability and use of help from family, friends, and neighbors is related to variation in the degree to which low-income households are buffered from food insecurity. Similarly, there is reason to believe that places with weak social capital, low levels of collective action, limited trust in community organizations or institutions, and high rates of residential instability also may be areas where food insecurity is more prevalent (Bartfeld, Dunifon, Nord, and Carlson 2006). It is important to explore how these social and political features of a community shape food security outcomes.

Finally, as pressing as understanding the spatial distribution of food security, future research should prioritize inquiry into how local economic, social, and political context shape the presence or emergence of food deserts in local communities. Specifically, how does the stock and flow of food retailers respond to changes in local employment and earnings, demographics, population growth or decline, zoning and regulation of the built environment, and the presence of community-based organizations. By understanding why gaps and mismatches in food resource access exist, the research literature may provide communities with insights into how to improve access or prevent food deserts from occurring in the first place.

Conclusion – Setting the Research Agenda

A groundswell of scholarly and public concern about the relationship between place and food security has emerged in the last several years. Several key findings have emerged to suggest that spatial context shapes food security outcomes among low-income adults and children. For example, there is evidence to indicate food insecurity is more prevalent in high-poverty areas and among low-income households. Basic facts about food shopping behavior relevant to understanding the relationship between place and food security are becoming clearer. The vast majority of households uses or borrows an automobile to shop for groceries and many households travel more than one-half mile to the store where they typically shop. Research has shown that residents of rural communities face far greater distances and commutes to food retailers than residents of urban centers. Distance is but one factor shaping decisions of where to shop, however, as prices, food options, and store quality also matter. Lack of economic opportunity powerfully shapes food security, as residents of areas with weaker labor markets have greater difficulty providing adequate food for their families than those in areas with better jobs and earnings prospects.

These key research findings to date suggest several promising leads for future research, as well as a number of conceptual and methodological issues that should be addressed:¹⁴

Locating Food Security in Space. A first-order concern is addressing the data limitations that prevent textured insight into the spatial distribution of food security within

¹⁴See Bitler and Haider (2011), and Neckerman, Bader, Purciel, and Yousefzadeh (2009) for more thorough discussions of the empirical obstacles to identifying the impact of economic shocks, food assistance, food resource infrastructure, on food security.

communities and limit the ability of researcher to examine the impact of spatial context. Most sources of information on household or childhood food insecurity either do not contain readily available geographic identifiers or the samples are not conducive to exploring food security in its spatial context. Moreover, few data sets are able to trace food security, public and private food assistance receipt, food shopping behavior, and other relevant economic or health-related factors across a representative sample of residents in a given geographic in a cross-section or over time in a panel.¹⁵ As proposed above, future research investment should be made in supporting work with confidential geolocation information attached to national surveys like the CPS or SIPP, adding food security questions to existing cross-sectional or panel surveys with representative samples of a specific geographic region, and providing resources to combine public and private administrative data.

Improved Measurement of the Retail Food Environment. The next generation of research on place effects and food security should seek to improve the quality of local food resource measures. Food retailer data can be drawn from a number of sources, but most of these data are not collected with food security or social policy research in mind. Thus, critical information is missing and data sources are not updated regularly enough to be accurate snapshots of the food retail environment. Store listings also may not capture farmers markets or mobile markets that have become increasingly commonplace in urban areas over the past several years. Supporting efforts to conduct audits that compare a market basket of food products across stores within an area and assess store quality characteristics (e.g., variety of items, availability of fresh food, store displays) will help fill in the gaps present in store listings (Baker, Schootman, Barnidge, and Kelly 2006; Miller, Bodor, and Rose 2012; Short, Guthman, and Raskin 2007). Research also should focus on identifying the distance or accessibility thresholds, where place effects are most prominent or significant.

Populations with Limited Mobility. First, while most Americans live within a short walk or drive to a grocery store, there are communities and populations that appear to be most vulnerable to experiencing inadequate access to food retailers. Of particular concern are low-income residents of remote rural, suburban, and isolated urban areas where the nearest supermarket or grocery store may be more than five or ten miles away. Population groups with limited mobility, such as the elderly, disabled, those without a car, and undocumented immigrants, may be more sensitive to limited options within short walking distances of a quarter or half-mile. Finally, the contours of the local food resource environment may disproportionately affect households experiencing more severe food insecurity or persistent spells of food insecurity. Fine-tuning research to focus on these most vulnerable households and those most likely to be reliant on resources in the immediate area should yield insights that are of empirical and policy value.

Access to Local Help and Assistance. Beyond spatial access to food retailers, efforts should be made to connect food security to the local or street-level availability of public programs such as WIC and nonprofit food pantry assistance or meals programs. The rising salience of child food insecurity should prompt researchers to more explicitly account for school-

¹⁵Detailed panel data about household characteristics and behaviors are critical to address potential bias in model estimates caused by other factors that shape food assistance and food security, but which may go unmeasured or unobserved, see Gibson-Davis and Foster (2006) and Gundersen and Oliveira (2001). Large national surveys like the CPS or SIPP have limited ability to advance understandings of local food resource access or other relevant dimensions of place.

based food programs, after-school programs that provide meals or snacks, and weekend and summer feeding programs aimed at children. Research should closely explore whether access to charitable food resources deployed through community-based institutions and organizations affects food security. Access to safety net providers operating outside the emergency food assistance may matter as well, as these organizations can help increase the employment and earnings of low-income populations. Simply having spatial proximity to any program may not reduce food insecurity, rather the focus should be on access to programs that are known to increase food resources, improve self-sufficiency, and address the persistence of poverty (Tarasuk 2001).

Local Economic Context. Because food security is thought to be largely a problem of too few household resources, greater attention in the immediate term should be paid to how changing local economic conditions, broadly conceived, can shape and observed rates of food insecurity. To develop a sense of how household shopping might be affected by pricing and store accessibility, research should focus on which food items are bought in which retailers and for how much. Similarly, research should explore variation in the local pricing of fresh food or a common basket food items that would allow a family to be food secure within a given month. The availability of labor market opportunities and the earnings level of jobs in within a reasonable commute also may help researchers understand how the spatial context of employment opportunity shapes food security.

Social Networks. It also may be that spatial access to informal sources of social support and help-giving social networks matter. To the extent that networks are spatially grounded or bounded, these could present important pathways for exploring how families cope and respond to the pressures of food insecurity. Social networks may be central to the dissemination of information about food assistance program changes, shifts in food prices or availability, and other coping strategies effective at minimizing risk of food insecurity.

Comparing Metropolitan to Rural Geographies. The study of place and food security has occurred in a variety of geographic locations, but much of the strongest empirical work to date has focused on urban areas. Lessons from urban research may not be generalizable to suburban or rural areas. Different underlying processes in different types of places may shape food insecurity. For example, automobile transportation is critical to accessing opportunities of all kinds, but the challenges of commutes without an automobile are different in suburban and rural versus urban areas. Likewise, community-based social service organizations offering food assistance in suburban and rural places do not have the capacity of their urban counterparts (Allard 2009b; Allard and Roth 2010). Even the spatial polygons or boundaries, such as census tracts, upon which urban research in this area often rests, are not of uniform size across cities, suburban areas, or rural communities.

Investing in New Data Sources. As the recommendations for future research suggest, public agencies and private foundations should make strategic investments into new and existing data sources that will lead to significant advances in research on spatial context and food security are to take place:

- Research funding may support the addition of key food security and food behavior questions to panel and cross-sectional surveys that have samples representative of a particular rural or metropolitan area. Support for work that links administrative data from food assistance programs in a rural or metropolitan region to survey data and detailed measures of the food resource environment.

- Research support should be targeted at pilot studies that seek to collect different types of individual or household data on food security, food shopping, food retailers, and food assistance in space. Innovations in the use of data scraping, large publicly available data sets, and handheld or web-based technologies may help provide paths to useful data outside of more traditional survey formats.
- Research funding should support the collection of data on local public and private food assistance resource access (e.g., regulations; eligibility; office locations; capacity; advocacy; and the availability of support services).
- Support efforts to develop promising cost-effective ways to bring food access measures into larger national data-sets where measures of food security and food assistance can be readily found.

Data investments should be made with consideration of which level of geography are specific types of place effects occur. For public assistance questions, county-level data about office locations may be sufficient. But, lower levels of geography are preferable for other resources that are accessed more frequently, such as food pantries, grocery stores, and meals programs. The ability to link individual or household locations to food resources within the road and public transit grid can allow scholars to better capture what exists within feasible commuting zones or distances, rather than make assumptions based on counts over larger geographic areas.

Importance of Qualitative and Mixed Methods Research. A robust research agenda interrogating the meaning of place within food security should embrace and promote methodological pluralism. The data and empirical limitations present in the literature today require that the field be open to different ways of knowing and different ways of uncovering conceptual pathways or causal relationships. Efforts to improve survey measures or other large-scale data collection tools require greater conceptual clarity, which new qualitative or ethnographic research focused on the needs and coping strategies of food secure and insecure households in a variety of neighborhood settings can deliver. Mixed methods research also may be particularly useful at exploring aspects of local place that may affect food security simultaneously and possibly interact with each other. Here, future studies should assess the degree to which different aspects of spatial context matter and whether place disadvantages have cumulative or additive effects. For example, access to food retailers may interact with shape how low-income households draw upon food assistance. Combining proprietary marketing data on food retailers and food retailers accepting SNAP in Leon County, FL (Tallahassee), Rigby et al. (2012) find that 95 percent of supermarkets accepted SNAP, but only 50 percent of all food stores in the lowest-income tracts – supermarkets, smaller grocery stores, and convenience stores – accepted SNAP.

Experiments and Demonstrations. Nationally, there are many efforts by local government, for-profit companies, and nonprofit charities to improve access to food retailers in high-poverty communities. These interventions and socially entrepreneurial activities represent natural experiments that can be used to understand how increased access to food resources shapes food security of community residents. In addition, investment should be made in experimental or demonstration studies that might advance our understanding of place effects and food security. There are many promising angles for behavioral economics experiments to pursue as we seek to understand which aspects of the spatial context affect low-income families' ability to purchase healthier and more adequate food. For example, Todd and Lin (2012) note that subsidies for certain food products may be less effective than coupons at encouraging greater

consumption of healthy food items. Finding ways to promote food shopping behaviors that can stretch food budgets – looking for specials, stocking up on bargains, using coupons – could be important coping behaviors in households facing higher prices or inconsistent availability of healthy food items.¹⁶

Engaging Technology and Social Media. Finally, the research community should be engage web and social media technology around place effects and food security. Today, high-quality research can be promoted through any number of online policy research and advocacy tools that have emerged online in the last several years. For example, the Healthy Food Access Portal (<http://healthyfoodaccess.org>) and the Wisconsin Food Security Project (<http://foodsecurity.wisc.edu>) are recent examples of web resources that transmit information to scholars, policymakers, and advocates. Greater effort should be made to create knowledge products that translate research findings into actionable steps. Knowledge products include videos, blogs, and podcasts that can be shared through social media and reach diverse audiences concerned with improving the availability of food resources to at-risk or disadvantaged communities. Spreading the use of online referral tools such as Purple Binder based in Chicago (<http://http://purplebinder.com>) also can be useful for helping low-income families access real-time data on food assistance resources nearby. Finally, support for crowd sourcing experiments that might draw awareness to food pricing, quality, and availability of fresh food items may not only increase awareness, but improve shopping outcomes for low-income households.¹⁷

Success in this area of research will be developing new data and theory that moves the field past presumptions and intuitions to empirical evidence grounded in better conceptual models, spatially textured information, and rigorous multi-method inquiry. At the same time, the research community should be open to findings that indicate place matters only through certain pathways, in certain settings, for certain population sub-groups, or at extreme disparities in access to resources. The goal should not be to confirm that certain place-level factors must matter to everyone, but rather to find evidence where it matters, how, and to whom. It also may be that other food behaviors or outcomes are more closely related to spatial context. For example, access to a supermarket or grocery store may not matter as much to food security status as household income levels or access to good paying jobs. Instead, food retailer access may affect the quality of food products purchased, the quality of an individual's diet, and other diet-related health outcomes. More precise understandings of how place matters will allow policymakers, social entrepreneurs, and advocates to better invest resources in the areas most likely to be affected by place effects.

¹⁶Although the authors are not able to tie food shopping behaviors to household food security, Hersey et al. (2001) report that cost-saving food shopping practices are associated with improved consumption of recommended nutrients in food stamp recipients.

¹⁷In 2007, WNYC public radio in New York conducted a crowdsourcing experiment entitled, "Are You Being Gouged?" Read more at: <http://www.wnyc.org/shows/bl/are-you-being-gouged-milk>.

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