



Neighborhood effects on food consumption



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ABSTRACT

Food consumption behavior is likely a result of environmental stimuli, access, and personal preferences, making policy aimed at increasing the nutritional content of food consumption challenging. We examine the dual role of the social and physical neighborhood environment as they relate to the eating behaviors of residents of a low-income minority urban neighborhood. We find that both proximity to different types of food sources (a characteristic of the physical neighborhood environment) and dietary intake of neighbors (a characteristic of the neighborhood's social environment) are related to dietary intake. The relationships are most robust for fruits and vegetables consumption. Proximity to fast food sources is related to less fruits and vegetables consumption while the opposite is found for individuals residing closer to fresh food sources. Additionally, individuals whose neighbors report increased fruits and vegetables intake also report higher fruits and vegetables consumption, while controlling for proximity to food sources. Instrumental variable and quasi-experimental robustness checks suggest that correlation in neighbors' fruits and vegetables consumption is likely due to social interactions among neighboring residents. The results elucidate important inter-relationships between access and social norms that influence dietary behavior.

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1. Introduction

Poor nutrition increases the risk of obesity, cancer and cardiovascular disease (Block et al., 1992; Hung et al., 2004; Hill, 2006; Getz and Reardon, 2007; Satija and Hu, 2012; Wang et al., 2012; Jung et al., 2013; Threapleton et al., 2013). The cost of increased obesity is significant. Compared to normal weight individuals, obese individuals will experience 14–25% more physician visits per year, six times more pharmacy dispenses for diabetes medication, and 3.4 times more pharmacy dispenses for cardiovascular medications (Finkelstein et al., 2010). Additionally, studies have found that overweight and obese individuals are valued less in labor markets as evidenced by lower wages (Wada and Tekin, 2010). The paramount importance of adhering to a healthful diet to improve health outcomes and reduce subsequent medical costs has led economists, public health researchers, and policy advocates to study environmental factors impacting dietary consumption (US House of Representatives Select Committee on Hunger, 1987, 1992; Turrell, 1996). The United States Department of Agriculture estimates that

only 2.2% of the U.S. population live further than a mile from a major supermarket or grocery store (Ver Ploeg et al., 2009). However, aggregate measures of food access often fail to account for many factors that impact food accessibility and are often impeded by challenges associated with obtaining timely food source data. Policy focused on decreasing the distance to grocery stores alone may not be effective in addressing nutrition disparities. Additionally, behavioral economists, sociologists, and social psychologists would contend that factors such as social norms jointly influence the food availability in a community and the food choices made by community residents (Elster, 1989; Akerlof, 1997; Azar, 2004; Ioannides, 2012). We analyzed data from a low-income minority community to better understand the social and access-related correlates of food consumption.

To date a significant gap remains in our understanding of how the physical and social environments combine to influence nutrition behavior (Townshend and Lake, 2009). We bridge this gap by examining a unique dataset that includes geographically referenced (e.g. home addresses) nutritional intake of survey respondents and information about the location of all commercial and the largest non-profit food sources in a low-income minority food desert neighborhood. In our analysis, we apply concepts from the rich literature on neighborhood effects (e.g. Manski, 1993; Dietz, 2002; Durlauf, 2004) to the research question. Our research

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question has primarily been examined by public health researchers, and the approaches used have yet to sufficiently incorporate the full set of geographic, social and individual level determinants impacting nutrition behavior. Specifically, our research contributes to the extant literature by examining the role of neighbors' food consumption on individuals' dietary choices.

2. Background

Food expenditure data indicate that habits play a significant role in food purchasing behavior (Naik and Moore, 1996; Zhen et al., 2011). If policy initiatives are going to promote changes in nutrition behaviors, they must effectively overcome the inertia created by habitual behaviors. In a longitudinal study, habitual food consumption was found to account for 50% of all food expenditures (Naik and Moore, 1996).

The determinants of nutrition behavior may be considered from the perspective of identifying key factors influencing nutrition habits. Observed habitual behavior may be rooted in social norms, peer effects, or factors related to food cost or availability (Elster, 1989). One reason habits may develop and strongly influence dietary intake is that food environments, particularly for low-income consumers, often constitute a very limited choice-set due to high prices and limited selection. Additionally, social factors may influence eating habits through a preference for conformity and/or costs imposed by going against social norms. Social factors may also reinforce inertia as long as the peer group or norm remains stable. Finally, individual specific tastes, preferences and demographic characteristics are related to dietary intake and are relatively stable—or at least do not rapidly change.

2.1. Food deserts and access to affordable nutritious food

Disparities in access to healthy food sources exist for minorities and low-income households (Zenk et al., 2005; Powell et al., 2007) who also have a higher prevalence of obesity (Ford et al., 2002; Black and Macinko, 2008). However, a review of the literature linking the availability of neighborhood food sources and obesity revealed no consistent causal relationship between food resources and health disparities (Black and Macinko, 2008). Some studies have linked the presence of large chain grocers to decreased body mass index (BMI) (Morland et al., 2006; Moore et al., 2008; Morland and Evenson, 2009), while others have found the opposite, no association, or associations only for specific subpopulations (Wang et al., 2007; Chen et al., 2010; An and Sturm, 2012; Wen and Maloney, 2014). The results for proximity to unhealthy food sources (such as convenience stores or fast food restaurants) (Burdette and Whitaker, 2004; Maddock, 2004; Simmons et al., 2005; Morland and Evenson, 2009) and the relationship between neighborhood context and BMI (Do et al., 2007; Wen and Maloney, 2014) are similarly mixed.

One explanation for the lack of consensus regarding the relationship between access and nutrition-related health outcomes may be the inability to model neighborhood contexts that shape behavior. For households without private vehicles, the ability to secure alternative travel arrangements was a far greater factor in shopping decisions than distance to food sources (Coveney and O'Dwyer, 2009); and individuals who walk to food sources have been shown to have relatively poorer diets (White et al., 2003; Wrigley et al., 2003). Chen et al., 2010 found a negative relationship between prevalence of chain grocers and BMI only for low-income neighborhoods. In one of the only studies examining an exogenous change in food access, Wrigley et al. (2003) studied the impact of opening a new chain grocery store in a food desert neighborhood

in the United Kingdom. They found that improved access was associated with better nutrition for only certain subgroups within the neighborhood.

Another factor that must be taken into consideration when assessing relationships between the food environment and food consumption is consumer demand. Consumer demand may drive location choices of commercial food sources. Individuals with above average BMI and below average nutrition preferences may sort into neighborhoods with fewer nutritious food resources. However, since large chain grocers generally provide both healthy and non-healthy food, it is unlikely that these factors alone would support associations between lack of commercial food resources and poor nutrition and/or weight gain. Alternately, low-income neighborhoods may not provide sufficient consumer demand for commercial food sources because non-profit food sources are also available. These demand-driven explanations for the spatial distribution of commercial food sources may contribute to the heterogeneity in associations between food source location and health/nutrition outcomes. A recent review of the food desert literature concluded that there is a need for additional research focusing on the causal role of food access disparities on dietary intake. This work acknowledges the need to disentangle the complex supply/demand relationships that shape the food access landscape (Walker et al., 2010).

2.2. Social factors which influence nutrition choices

Studies examining food access have not accounted for social influences (Ichiro et al., 2004; Viswanath, 2006; Viswanath and Bond, 2007), which may be an important aspect of neighborhood context that might explain the variability in results in the food access literature. Other consumption behaviors, such as consumption of environmentally-conscious products, has been associated with peers' consumption behavior (Starr, 2009). Focusing specifically on dietary consumption, evidence is also available. In a large qualitative study of a US multi-ethnic population, African Americans reported that a diet rich in saturated fat served during church functions was a key impediment to a healthful diet (Yeh et al., 2008). A review of the determinants of child nutrition also revealed important family and social correlates (Patrick and Nicklas, 2005), and recent studies observed familial influences on vegetable consumption patterns among African American parent-teen dyads (Zhylyevskyy et al., 2012). In addition, experimental economic evidence has found reciprocal relationships between peers with regards to restaurant selection and food choices (Keane et al., 2012). Further, being part of a social group where other members recently gained weight has been related to an individual's adoption of obesity-related peer behaviors (Eisenberg and Quinn, 2006) and likelihood of obesity (Christakis and Fowler, 2007). However, much controversy remains regarding the causal nature of these associations (Cohen-Cole and Fletcher, 2008a,b; Sainsbury, 2008; Lyons, 2011; Noel and Nyhan, 2011; Shalizi and Thomas, 2011).

Social influence may be reinforced by individual characteristics that are often shared among social peers and residents of similar neighborhoods. For example, first, income is related to differences in food purchasing behavior due to cost concerns (Glanz et al., 1998; Turrell and Kavanagh, 2005); and second, cultural values and traditions more effectively establish and reinforce social norms related to nutrition in neighborhoods that are more homogeneous in terms of race and ethnicity (Habyarimana et al., 2007). Taken together, these factors suggest that preferences or constraints related to individual race/ethnicity and socioeconomic status might be reinforced within peer networks. These factors may be key moderators of the social and access correlates of nutrition behavior.

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