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Food deserts and diet-related health outcomes of the elderly

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ABSTRACT

It is hypothesized that residents of neighborhoods with limited access to affordable and nutritious food face greater barriers to eating a healthy diet, which may in turn, result in worse health outcomes for them. Low-income elderly in urban areas may be uniquely affected by these so-called "food deserts" due to limited transportation options, strong attachments to local neighborhoods, fixed incomes, physical limitations in food shopping and meal preparation, and chronic health problems. Using the 2006, 2010, and 2014 waves of the Health and Retirement Study (HRS), the association between the food environment of elderly individuals living in urban Census tracts and their diet-related health was examined. Within urban areas, we find little evidence that food deserts negatively impact the health of lower income elderly individuals. Policies to address the needs of elderly residents of food deserts should be narrowly targeted and carefully justified.

1. Introduction

The U.S. Department of Agriculture estimated that 39 million persons lived in food deserts in 2015, including about 5 million elderly (Economic Research Service (ERS), 2017). Residing in a food desert – a low-income census tract where a substantial share of residents had low access to a grocery store or healthy and affordable food retail outlet –is hypothesized to negatively affect health, especially diet-related disease, by reducing the consumption of healthy foods, such as fruits and vegetables, because these foods are either unavailable or available only at high prices (Cummins and Macintyre, 2002; National Research Council, 2009; Larson et al., 2009; Morland et al., 2002; ERS, 2009; Rose and Richards, 2004). If true, food deserts could contribute to health disparities across racial, ethnic, and socioeconomic subgroups due to residential location patterns (Sturm and An, 2014; Williams and Collins, 2001).

While early literature, which was largely based on cross-sectional studies, showed positive associations between poor food store access and poor diet and greater obesity (Larson et al., 2009), recent studies that have been able to utilize longitudinal data or research designs that are better able to control for unobserved heterogeneity have often found small or no effects of food deserts on diet and obesity (Boone-Heinonen et al, 2011; Block et al., 2011; Cummins et al., 2014; Dubowitz et al., 2015; Handbury et al., 2015). The existing studies tend to examine dietary intake or obesity and have not fully explored the relationship between food deserts and other measures of health. Furthermore, the literature has paid little attention to the elderly, a large and growing portion of the U.S. population. The elderly may be particularly susceptible to any harmful effects of food deserts because of strong neighborhood attachments that encourage residents to remain in a neighborhood after amenities, such as supermarkets, exit. Without a nearby supermarket, the elderly may rely on small, local stores due to driving or physical limitations that limit their ability to travel outside their neighborhood (Community Development Financing Initiative (CDFI), 2012; Guest and Wierzbicki, 1999; Rose et al., 2009; Xue et al. 2008). These elderly may pay higher food prices at small, local stores that offer fewer healthy options and put them at risk of inadequate diets.

Trends in the grocery industry may further increase this risk. The innovation of larger, big box stores, which bring some benefits in that they contain more goods, are associated with lower prices (Hausman and Leibtag, 2007) and may even improve food security (Courtemanche et al., 2019). But these stores are more sparsely located, which could increase consumer travel distances and costs, as Ellickson and Greic (2013) suggest. The trend towards consolidation in the grocery industry puts upward pressure on prices, but a downward pressure on prices comes from markets with independent stores or competition with nontraditional grocery stores (Cho and Volpe, 2017; Duff and Phelps, 2016). While these trends have an ambiguous impact on grocery prices, fixed incomes and/or mobility difficulties may prevent the elderly from

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accessing lower prices at stores that are farther away. This is worrisome because many low-income elderly who are most vulnerable to limited food retailer access face chronic health problems that are caused or exacerbated by poor diet and nutrition.

An improved understanding of the effects of food deserts and what subgroups are most impacted by limited supermarket access is important as U.S. policymakers design and implement local, state and federal efforts to improve access in some low-income areas. Since 2011, the federal government spent almost $500 million to reduce barriers to accessing healthy food and support food retail development in low-income food desert communities through the Healthy Food Finance Initiative (2014) of the Agricultural Act of 2014 (the 2014 Farm Bill) and its precursors. State and local governments have devoted resources to improve food access in underserved areas, such as Pennsylvania's Fresh Food Finance Initiative (http://www.trfund.com/pennsylvania-fresh-food-financing-initiative/) and the City of New York's Food Retail Expansion to Support Health (FRESH) program (http://www.nyc.gov/html/misc/html/2009/fresh.shtml). As these initiatives grow and evolve, it is important to understand how food deserts affect residents to ensure these programs are well-targeted.

The relationship between food deserts and elderly health outcomes is an important policy question. First, the majority of the literature using panel data and more advanced econometric techniques has found little evidence of the negative effects of living in a food desert, with the exception of Fan et al. (2018). The elderly, however, may be uniquely affected by food deserts because they have higher potential transportation barriers for food, greater health issues, and stronger neighborhood attachments. Our analysis allows us to investigate this affect using national longitudinal data.

This study utilizes the 2006, 2010, and 2014 waves of restricted-use Health and Retirement Study (HRS) data to examine the relationship between food retailer access and health outcomes for a sample of elderly Americans in urban census tracts. The HRS is a biennial, longitudinal study of more than 25,000 Americans over the age of 50 that includes a wealth of information about their demographics, health outcomes, location of residence, and more. With the HRS, we employ fixed effects regressions which control for otherwise unobservable characteristics of individuals and their residential choices to allow for the examination of whether residing in a food desert contributes to diet-related disease and health.

We find that elderly residents of food deserts have relatively similar health outcomes as those elderly not residing in food deserts. Because the official measure of food desert requires residents to live in a census tract with both low access to a supermarket and low income levels, we examine these components separately. We find no statistically significant differences between elderly living in low access areas and those not living in a low access areas, regardless of the income level of the census tract, with one exception–elderly living in low access areas are more likely to report having high blood pressure. In total, our findings using eight years of nationally representative data suggest that food deserts are not a contributor to poor health among low-income elderly Americans. This conclusion comes with several caveats. First, supermarket access earlier in life, especially when food habits and preferences are being formed, may be important for determining elderly health. Additionally, changes in the chronic, diet-related health conditions we measure may take even more time to be affected by access to a supermarket.

We make three important contributions to the existing literature. First, we are among the first to investigate the effects of living in a food desert on health outcomes of the vastly understudied but growing elderly population. Second, rather than study a small geographic area or a short-time period, we examine food deserts in a nationally representative setting over an eight-year period. Our nationwide examination controls for idiosyncratic differences across local areas with the official measure of limited food retailer access used for federal policy purposes. Performing a longitudinal analysis provides the ability to control for fixed individual characteristics that are likely related to both residential choices and individual health, as well as a long time period to measure changes in health outcomes. Lastly, we use more detailed data on the components of the official food desert measure to understand the relative contribution of low-income and low-access on elderly health outcomes.

The remainder of this paper proceeds as follows: Section 2 summarizes previous research; Section 3 presents the empirical strategy used in the analysis; Section 3.2 discusses the data; Section 4 presents the results; and, Section 5 concludes with a discussion of the results.

2. Previous literature

Establishing a relationship between the food environment and diet-related health outcomes, including obesity, diabetes, heart disease, and high blood pressure, is complicated. Diet-related disease is determined by many factors, including individual characteristics and genetic history, health behaviors, education, health care access, and the environment. Diet-related disease may be particularly affected by long-term exposure to the food environment—the proximity of stores and restaurants, the availability and cost of the variety of foods necessary for a healthful diet—because it can affect food purchase and consumption choices that ultimately affect weight and diet-related disease.

The literature examining links between the food environment and health, however, is inconclusive. Individuals have differential access to healthy food options, typically measured by the proximity to retailers that sell a full range of healthy foods such as supermarkets, supercenters and grocery stores (Cummins, 2006; Schuetz et al., 2012; ERS, 2009; Moore and Diez Roux, 2006). The early research, which is largely based on cross-sectional and often local data, finds that supermarket access is positively associated with fruit and vegetable consumption (Larson et al., 2009; Rose and Richards, 2004; Wrigley et al., 2003). But differential access may not *cause* differences in diet quality as food preferences and habits likely play an important role. Later studies, often with improved designs, find little evidence that access to a supermarket changes diet. Several quasi-experimental studies find that opening supermarkets in underserved areas does not translate into greater fruit and vegetable consumption or improved diets (Cummins et al., 2005; Wrigley et al., 2003). A longitudinal study did not find a relationship between supermarket proximity and dietary intake (Boone-Heinonen et al., 2011). In fact, supermarket access explains only a small fraction of differences in the nutritional content of purchased foods for residents of low-income neighborhoods and, holding access constant, disparities in purchases across income and education levels persist (Handbury et al., 2015). One explanation for this could be that social interactions play a more important role in diet quality than the local food environment (Hut, 2018).

A household's income, coupled with the food prices they face, may also influence diet quality. Adults from higher socioeconomic status (SES) households consume higher quality diets, including diets with more whole grains, more fruits and vegetables, lower fat, and less sugar (Darmon and Drewnowski, 2008). Weatherspoon et al. (2014) find that household income was an important determinant of expenditures on fruit by residents of a Detroit food desert and these residents were similarly responsive to fruit prices as other American households. Supermarkets and supercenters typically offer greater variety and lower prices than other types of stores (Broda et al., 2009; Kaufman, 1997; Hausman and Leibtag, 2007) so, holding budgets constant, greater access to these stores may lead to more food variety and quantity. Those with poor access may pay higher prices or pay more to access stores with lower-prices, typically through higher transportation and time costs to access the larger grocery stores with more nutritious offerings. Fan et al. (2018) compute variety-adjusted price indices in urban low-income and low-access areas and their adjacent census tracts and find slightly higher food prices, 3.5%. If tracts adjacent to low-income and low-access tracts are not considered, then variety-adjusted price