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Accessibility and Affordability of Healthy Foods in Food Deserts in Florida: Policy and Practice Implications

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ABSTRACT

Food deserts are areas where people experience limited access to healthy and affordable food. People with limited access to affordable food have been shown to have higher rates of obesity and obesity-related, chronic diseases. The purpose of this study was to assess the availability and affordability of healthy foods in retail outlets of food deserts in Florida. Eighteen food deserts in two large metropolitan areas were assessed using the USDA Food Store Survey Instrument. Overall, stores within food deserts were missing 43.16% of food items and convenience stores were missing food items almost seven times more than supermarkets. Food items most often missing were fruits, vegetables and fresh meat. The average food prices in the food deserts were 36% higher than non-food deserts and the food basket cost was 33% higher than the reference cost allocated for SNAP benefits. The higher food costs further translated to almost three times the national average portion of income spent on food. This lack of availability and higher cost of healthy foods may be contributing to the hunger-obesity paradox and the health disparities seen among food insecure Floridians. Results of this research can be used to inform educational strategies, program development, and policy recommendations.

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BACKGROUND

Food security assures access to sufficient, safe and nutritious food for all people at all times to sustain a healthy and active life (FAO, 2015). By contrast, food insecurity is the result of house-hold level economic and social conditions associated with limited or uncertain access to adequate food (Gundersen et al., 2016). At the community level, food insecurity can emerge from a lack of food availability, food access, food utilization and stability (Ivers, 2015). In 2015, 12.7% of households in the United States (U.S.) were food insecure at some time during the year (Coleman-Jensen, 2016). Groups at greatest risk for food insecurity include single-parent households (34.4%), people at social or geographical disadvantage (26%), the homeless, and children (Rychetnik et al., 2003; Innes-Hughes et al., 2010). In Florida, 3.3 million people or 17% of the population are food insecure (Coleman-Jensen, 2016). Furthermore, 1.1 million or 28% of children in Florida are food insecure (Coleman-Jensen, 2016).

Lack of access to adequate food is paradoxically

associated with obesity in the U.S. The hunger-obesity paradox was first reported by Dietz (1995) who observed that obesity connotes excessive energy intake and hunger reflects an inadequate food supply so that the increased prevalence of obesity and hunger in the same population seemed paradoxical. The food insecurity-obesity paradox has been examined in a literature review by Franklin et al. (2012) that summarized nineteen studies published from 2006-2012 which found mixed evidence of positive associations between food insecurity and obesity across age and gender groups. Specifically, food insecurity-obesity links were consistently positive among women, there was growing evidence among adolescents, there was mixed evidence among children, and there was little evidence among men. In addition to obesity, an association has been demonstrated between food insecurity and obesity-related, chronic diseases including heart disease, hypertension, and other chronic diseases (Seligman et al., 2010). Seligman et al. (2007) demonstrated increasing prevalence of diabetes with increasing

food insecurity level, with the highest prevalence (16.1%) noted among those who were severely food insecure.

Increasingly, studies are focusing on the role that local food environment plays in residents' ability to purchase affordable, healthy and nutritious foods and health outcomes (Walker et al., 2010; Morland et al., 2002; Rose & Richards, 2004). Food deserts are commonly defined as regions lacking (spatial) access to healthy foods, like fruits and vegetables, as well as a range of other nutritious options (USDA, 2016a). Hendrickson et al. (2006) found that the food prices in food deserts were higher and there was a smaller quantity and variety of foods offered. A lack of access to affordable, healthy foods may contribute to why residents of food deserts have high rates of obesity. One study in urban food deserts found that the distance to stores and food prices were positively associated with obesity (Ghosh-Dastidar et al., 2014). Further, after adjusting for individual- and household-level characteristics, Chen et al. (2016) found living in a food desert increased an individual's odds of being obese by about 30%. Food insecurity, obesity and obesity-related, chronic diseases, food availability and access, and other factors should be considered together rather than separately, as these factors may interact in a complex relationship.

Many households residing in food deserts qualify for Supplemental Nutrition Assistance Program (SNAP). SNAP is the largest domestic hunger safety net program in the U.S. (USDA, 2017). SNAP helps low-income people and families buy food they need for good health. SNAP benefits are used to purchase food from food retailers that are authorized by the USDA. SNAP benefits are adjusted for inflation in October of each year, based on food-price data from June of that year (USDA, 2017). By the following September, food prices may have increased. If the food buying power of SNAP benefits has declined over the benefit year, SNAP households would have a reduced ability to acquire adequate food. In order to maximize the effectiveness of federal food assistance programs, it is important that sufficient quantities of healthful foods are available in the marketplace at prices which low income households can afford.

Compared to national averages, Florida has higher rates of food insecurity and a higher prevalence of obesity and obesity-related, chronic diseases. The U.S. Department of Agriculture reports that about 23.5 million Americans currently live in food deserts; of those, 1.25 million Floridians live in a food desert (Ver Ploeg et al., 2012). To date, no studies have quantified the price and availability of food in food deserts in Florida. The purpose of the present research was to assess the availability and affordability of healthy foods in retail outlets of food deserts in two major metropolitan areas of Florida.

METHODS

The present study was cross-sectional. It was conducted in Hillsborough and Duval counties, two of the 67 counties in Florida. The counties were chosen because they represent two of the largest cities in the state. The U.S. Department of Agriculture's Food Access Research Atlas (2016a) was utilized to identify low income, low access census tracts within the counties. The USDA Food Access Research Atlas defines low income as areas with a poverty rate $\geq 20\%$ or a median family income less than or equal to 80% of the state-wide or metropolitan area median family income. The USDA Food Access Research Atlas defines low access as an area where a significant number of residents live more than 1 mile in an urban area or 10 miles in a rural area away from the nearest supercenter. Residents of these areas also have low vehicle access. At the time of the study, the U.S. Department of Agriculture's Food Access Research Atlas (2016a) identified 21 food deserts in Hillsborough County and 15 food deserts in Duval County. Of the total food deserts, 50% or 10 food deserts in Hillsborough County and 8 food deserts in Duval County were selected by systematic random sampling.

The methodology from the USDA Food Store Survey Instrument was followed (Cohen, 2002). Within each of the 18 food deserts, one large grocery store and two small convenient stores were surveyed. For comparative analysis, nine large grocery stores from non-food desert tracts were surveyed. The stores were categorized as supermarkets or convenience/gas/grocery stores based on the definitions provided by Cohen (2002). Once the stores were chosen, permission was obtained from the store manager.

Data collection was conducted by the principle investigator and trained graduate students. The USDA Food Store Survey Instrument (Cohen, 2002) was used to assess the affordability and accessibility of healthy food. The data were collected between May and December 2016. The USDA Food Store Survey includes a list of 87 foods. The foods items on the survey instrument were selected by the USDA to be representative of foods commonly eaten and to meet the Thrifty Food Plan, a Federal dietary guideline (Carlson et al., 2007). No substitutions were made to the list of foods on the survey instrument. The survey instrument included the unit measurement for each food item based on serving recommendations for a family of four for one week. For each food item, availability and price was obtained. If multiple products were available under different brand names, the brand with the lowest price was used.

Percentage of items missing in each store and in individual food categories was calculated by adding

the number of missing items for all stores and food categories and dividing by the total number of stores surveyed or the total number of foods in each category. The average price for each food category in each store was the sum of all of the prices of the individual food items in each store divided by the total number of items in that food category. The total cost of the market food basket was the sum of all the prices of the food items on the Food Store Survey Instrument. Data were recorded on a spreadsheet. The research study was approved by the University of North Florida Institutional Review Board.

RESULTS

Availability of healthy food was based on the evaluation of missing food items. From Table 1 it can be seen that overall, retail stores within food deserts were missing 43.16% food items. The percentage missing food was similar for each metropolitan area – 43.03% in Duval County and 43.3% in Hillsborough County. We found that food items were missing in convenience store almost seven times more than in supermarkets (61.46% versus 8.87%). Food items most frequently missing were fruits and vegetable, including fresh and frozen, at 40.9% total. The difference was more pronounced when comparing supermarkets and convenience store in the food deserts, with missing vegetable in convenience stores as high as 100%.

Affordability of healthy food was based on three measures: (1) average food prices, (2) cost of a Thrifty Food Plan food basket for a family of four, and (3) portion of income spent on food. Table 2 summarizes the affordability measures. The average price of food was calculated for food deserts and non-food deserts. Overall, food prices were 35.7% higher in food desert stores versus in non-food desert stores. Comparing metropolitan areas, the average price of food was higher in Duval County (48.4%) versus Hillsborough County (23.1%). The food groups which were most expensive in the food deserts were frozen vegetables, breads, meats, and fresh fruit.

The Thrifty Food Plan (TFP) is defined by USDA as “a national standard for a nutritious diet at a minimal cost” (Carlson et al, 2007). TFP uses a healthy food basket approach and one of its main purposes is to design SNAP Program benefits. It gets calculated monthly using data collected for the consumer price index. For the present study, TFP for a family of four was used as the reference for food cost. The weekly TFP food basket cost for a family of four in December 2016 was \$146.90 (USDA 2016b). Overall for all food deserts, the average cost of a TFP food basket for a family of 4 for a week in the food dessert stores averaged \$195.13 which is \$48.53 or 33% higher than the USDA reference value. The results between the two metropolitan areas were more pronounced – \$217.96 (48.4% higher than reference)

in Duval County and \$172.30 (17.3% higher than reference) in Hillsborough County.

The proportion of income spent on food was the third criteria used to judge affordability. The price of a TFP food basket for a family of four was compared with the latest standard poverty line income available based on a family of four in the United States in 2015 (\$24,250) (U.S. Department of Health & Human Services, 2015). The poverty line was chosen as the standard income for the households living in the food deserts because these areas are designated as low income/high poverty. According to U.S. Bureau of Labor Statistics (2013), the average amount of income spent by Americans on food was 13%. For Duval County, the \$217.96 average weekly cost to purchase a TFP food basket represents 46.7% of reference household income; for Hillsborough County, the \$172.30 average weekly cost to purchase a TFP food basket represents 36.9% of reference household income. Overall, we found that the \$195.13 average weekly cost to purchase a TFP food basket in all food deserts represents 41.8% of the reference household income. The households living in the food deserts in our study would spend over three times more than the average proportion of income spent on food by Americans.

DISCUSSION

Many important findings emerged from the present research. First, there was less availability of food in the food desert. Previous research has found that people who live in limited access areas often rely on small local grocery or convenience stores, which may not carry all the foods necessary for a healthy diet, and may offer food at higher prices (USDA, 2009). This is a reality that worsens the accessibility to food. The foods most often missing were the foods generally considered “healthy” such as fruits, vegetables, meats and dairy. Previous literature has consistently shown that there is strong association between fruits and vegetable intake and lowering of obesity or maintaining healthy weight (He, Hu, Colditz, Manson, Willett, & Liu, 2004). This lack of availability of healthy foods may be contributing to the hunger-obesity paradox and the disparity seen in rates of diabetes and hypertension among the food insecure (Scheier, 2005).

Overall, the stores in the food deserts were found to be less affordable based on three criteria. The average food prices in the deserts were almost 35.7% higher than non-food deserts and the food basket cost was 33% higher than the reference cost allocated by USDA for SNAP benefits. The higher food costs further translated to portion of income spent on food. The residents of our food deserts would spend over three times more than the average portion of income spent on food found by U.S. Bureau of Labor Statistics. A result of these higher prices is that it may

be cost prohibitive for food insecure households to purchase the foods recommended for health.

Finally, there appears to be a reliance on convenience stores in food deserts. McDermot, Igoe and Stahre (2017) found that 78% of low-income residents lacked access to supermarkets because of the lack of a vehicle. We observed that supermarkets in many of our food deserts were situated far from residential areas and transportation to the

supermarkets was limited. As a result, residents of the food deserts had low access to supermarkets and were often forced to pay the higher prices at convenience stores. This finding could further contribute to the hunger-obesity paradox, consistent with previous research that suggests an association between poor access to supermarkets and a higher risk for obesity (Drenowski et al., 2012).

Table 1. Average number of Missing food items in food desert stores

Food groups (# of items)	Percent missing in Hillsborough County Desert Supermarkets (n = 10)	Percent missing in Hillsborough County Desert Convenience stores (n = 20)	Overall percent missing in Hillsborough County Desert Retailers (n = 30)	Percent missing in Duval County Desert Supermarkets (n = 8)	Percent missing in Duval County Desert Convenience stores (n = 16)	Overall percent missing in Duval County Desert Retailers (n = 24)
Fresh fruits	17.2	84.2	43.7	0.0	88.0	58.7
Fresh vegetables	14.3	100.0	58.9	0.0	100.0	66.7
Canned fruits	10.5	60.0	37.0	0.0	40.0	26.7
Canned vegetables	9.7	49.0	33.9	0.0	40.0	26.7
Frozen fruits & vegetables	21.6	89.4	56.6	4.0	90.0	61.3
Breads & cereal, fresh	25.6	60.3	45.8	0.0	70.0	46.7
Breads & cereals, dry	15.1	38.7	30.5	0.0	36.6	24.2
Dairy, fresh	17	57.4	33.9	4.0	60.0	41.3
Canned dairy	21	27.0	77.8	0.0	60.0	40.0
Meat, fresh	16.3	82.8	54.2	5.7	84.3	58.1
Meat, alternatives	12.8	42.0	29.2	0.0	54.0	36.0
Fats	14.2	40.0	31.4	0.0	42.5	28.3
Sugars and sweets	18.8	44.4	34.8	2.2	61.1	41.5
Others	17.9	51.0	38.7	0.4	68.4	46.3

Table 2. Affordability measures for food deserts

	Duval County	Hillsborough County	Overall
Food group prices in food deserts compared to non-food deserts	+48.4%	+23.1%	+35.7%
Cost of TFP food basket (\$146.90)	\$217.96 (+48.4%)	\$172.30 (+17.3%)	\$195.13 (+33.03%)
Proportion of income spent on food (13% reference)	46.7% (+33.7%)	36.9% (23.9%)	41.8% (+28.8%)

This study is not without limitations. Pricing was based on one point-in-time surveying. Further, basket prices could be skewed by missing items and using average cost. Finally, the non-food desert reference prices were based on market retailers. Overall, though, this snapshot into the cost and availability of foods in the various types of retailers found in food deserts in Florida offer many insights and implications.

IMPLICATIONS FOR PUBLIC HEALTH

Based on our data, we make the following recommendations:

- Dietitians and health educators should be aware that many healthy foods are not as available in food desert markets and their overall costs may be significantly higher. As a result, practitioners need to be innovative in their suggested strategies for eating healthier foods when counseling food insecure individuals. For instance, frozen produce is often cheaper but nutritionally equivalent to fresh.
- Intervention programs should be multilayered – including household, community and policy factors.
- At the level of policymakers, one important implication is to increase the allocations provided by government food assistance programs such as SNAP.
- Another strategy could be developing virtual supermarket program such as the program developed in Baltimore city, which bring groceries to food desert communities. Similarly, current grocery ordering program should accept SNAP benefits to increase access to healthy foods in food deserts.
- Policy initiatives, such as Healthy Food Financing (PolicyLink), that place supermarkets in food deserts offer a method for improving accessibility to and better prices for healthy foods.
- Incentivizing convenience stores in food deserts to carry healthy foods, such as produce, at reasonable prices is yet another policy implication. Lowering prices of healthy foods in convenience stores through a rebate program may increase purchases of healthy foods and decrease purchases of less nutritious foods (Sturm et al. 2013).

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