Austin Food Access

A Multimodal Approach to Identifying Food Deserts

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Center for Sustainable Development
Austin Food Access:
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1. Introduction

Food deserts, according to the USDA, are “urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food.” While there might be some food available, it is often unhealthy and of poor quality. Numerous life-threatening diseases, such as obesity, diabetes, and hypertension are associated with poor diet and a lack of exercise. However, food deserts connect the built environment with the negative health effects of poor diet and exercise and highlight the overlap between public health and urban planning (Adams et al., 2010).

Research on food deserts often focuses on identifying them and addressing the connection between access to healthy foods and low-income and minority populations, which are groups that are disproportionately affected by access to healthy food (Gordon et al., 2011; Smith & Morton, 2009; Raja et al., 2008). Other research also focuses on identifying food deserts in specific geographic areas, such as a particular city or state (Jiao et al., 2012).

This research aims to map food access and identify food deserts in Austin, Texas based on multiple forms of transportation. This establishes the connection between food access and transit access. It is important to add transportation as an additional dimension of food access since many people in American cities are transit dependent and unable to access an area unless it is within walking distance, biking distance, or accessible by transit service. The primary implication of this research is that it provides an alternative method for identifying food deserts so that areas with limited access to healthy food can be identified more precisely and addressed effectively.
2. Data

Data was gathered from multiple sources to complete this analysis, and fell within three categories: food establishment, transportation network, and vulnerable population data. Food establishment data were largely obtained from the City of Austin. This dataset was in spreadsheet form and contained all permitted food establishments within the City of Austin and unincorporated areas of Travis County. Additional data points for good food sources (supermarkets/grocery stores, and farmers’ markets) that fell within the study area, but that were not included in the primary dataset, were identified through a search using Google Maps. The transportation network datasets collected and used for this analysis consisted of GIS data from the City of Austin (streets, bicycle infrastructure, and sidewalks) and from the Capital Metropolitan Transportation Authority (Cap Metro) (transit routes and transit stops). These data sets were primarily used to create the network datasets necessary to perform network analysis in ArcGIS. Finally, vulnerable population data was obtained from the United States Census in the form of a block group GIS file that had been joined with 2012 American Community Survey (ACS) 5-year data. This data collection effort served as the foundation for the analysis described below.
3. Methodology

This analysis was conducted using a multi-step methodology. First, the food establishment data was geocoded using an address locator, developed for this analysis, based on the City of Austin’s streets shapefile. After all addresses were matched to create the most complete and accurate dataset possible, the data was separated into good food sources (supermarkets, grocery stores, farmers markets, and community markets) and bad food sources (convenience stores and fast food restaurants). These two point datasets (shown below in Figures 1 and 2) served as the basis for determining food access in the Austin area.
Figure 1: Good Food Sources

Good Food Sources
Supermarkets, Grocery Stores, Community Markets, Farmers' Markets
Figure 2: Bad Food Sources

Bad Food Sources
Convenience Stores and Fast Food Establishments

Sources: US Census Bureau, City of Austin
Datum & Projection: NAD 1983 StatePlane Texas Central FIPS 4203 (US Feet)
After the food establishment datasets were finalized, the transportation network datasets (NDs) were built in ArcGIS for the following modes: automobile, bicycle, pedestrian, and transit. The automobile ND was generated using the complete City of Austin streets shapefile. The bicycle and pedestrian NDs were also built using the City of Austin streets shapefile. However, highways, freeways, and their ramps were excluded from the bicycle ND because cyclists are not allowed to use those roadways; and only streets with sidewalks and/or a speed limit of 35 miles per hour or less were included in the pedestrian ND for safety reasons. The transit ND was generated from Cap Metro’s transit routes shapefile. This shapefile did not include travel time; therefore, in order to avoid using a distance proxy for the analysis, which may not have accurately represented transit travel time, average route circulation times were calculated from route schedules published on Cap Metro’s website and added to the dataset. Also, because the route shapefile was last updated in 2012, a few routes included in the dataset had been changed or discontinued and thus, did not have a schedule on the website. For those routes, a speed of 13 miles per hour was used to calculate route time; this was the average speed of all routes provided in Cap Metro’s Service Plan 2010 (2010, p. 6-3). These NDs were then ready for utilization of ArcGIS’ network analyst.

Using network analyst, general ten-minute service areas were generated for each set of food establishments using each of the network datasets. Time impedance was used for automobile and transit NDs, while a distance proxy was used for bicycle and pedestrian modes; a two-mile bicycle ride and a half-mile walk represented 10 minutes of travel. For the transit mode, services areas were generated only for food establishments located within a half-mile, in street network distance, of a transit stop, ensuring they were serviceable by transit. This process created overall coverage areas for good and bad food sources in the Austin area for each mode in question.

Because access to food, good food in particular, can be more challenging for vulnerable populations, the last step of the analysis measured food access, based on the service areas produced in the previous step, for four categories of vulnerable population block groups in the study area. Using 2012 ACS data, block groups were designated as vulnerable population areas if they met one of the following conditions:

- 20% or more of the population was below poverty,
- 40% or more of the population was below double poverty,
- 30% or more of households were without a vehicle, or
The median family income (MFI) for the block group was at or below 80% of Travis County’s MFI.

After these block groups were identified and isolated, levels of access were calculated based on the percent of each block group covered by one or more food establishment service areas. For this analysis, the percent of acreage covered by a service area was used as a proxy for percentage of block group population with access to the food establishment(s). The final results from this analysis are described below.
4. Results

Results of this study indicate that, as perhaps expected, drivers have the highest levels of access to good (and bad) food sources with access levels of 96 percent or higher for all groups. Though substantially lower than vehicle access, bicyclists have the second highest levels of access to food in the Austin area, followed by transit users. Pedestrians have the lowest levels of access to food with up to 82% without access to a good food source. For both good and bad food analyses, block groups with at least 40% of their population below double poverty had the lowest levels of access for all modes of transportation when compared to other vulnerable population categories. Additionally, levels of access for all non-auto modes were higher for bad food sources than for good food sources. The complete results are provided in Tables 1 and 2 and Figures 3 and 4 below.

Table 1: Percent of Vulnerable Populations Without Access to Good Food via Transportation Modes

<table>
<thead>
<tr>
<th>Vulnerable Population Block Groups</th>
<th>Population</th>
<th>Walk</th>
<th>Bike</th>
<th>Transit</th>
<th>Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 20% Below Poverty</td>
<td>353,307</td>
<td>79%</td>
<td>18%</td>
<td>23%</td>
<td>2%</td>
</tr>
<tr>
<td>≥ 40% Below Double Poverty</td>
<td>431,704</td>
<td>82%</td>
<td>24%</td>
<td>33%</td>
<td>4%</td>
</tr>
<tr>
<td>≥ 30% No Vehicle</td>
<td>4,271 (Households)</td>
<td>63%</td>
<td>0%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>≤ 80% MFI</td>
<td>376,045</td>
<td>79%</td>
<td>15%</td>
<td>22%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Table 2: Percent of Vulnerable Populations Without Access to Bad Food via Transportation Modes

<table>
<thead>
<tr>
<th>Vulnerable Population Block Groups</th>
<th>Population</th>
<th>Walk</th>
<th>Bike</th>
<th>Transit</th>
<th>Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 20% Below Poverty</td>
<td>353,307</td>
<td>45%</td>
<td>10%</td>
<td>15%</td>
<td>2%</td>
</tr>
<tr>
<td>≥ 40% Below Double Poverty</td>
<td>431,704</td>
<td>52%</td>
<td>17%</td>
<td>24%</td>
<td>4%</td>
</tr>
<tr>
<td>≥ 30% No Vehicle</td>
<td>4,271 (Households)</td>
<td>9%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>≤ 80% MFI</td>
<td>376,045</td>
<td>45%</td>
<td>11%</td>
<td>15%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Figure 3: Access to Good Food Sources

Access to Good Food Sources

<table>
<thead>
<tr>
<th>Walking</th>
<th>Biking</th>
<th>Transit</th>
<th>Driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 20% Below Poverty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;= 40% Below Double Poverty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 80% Median Family Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;= 30% No Vehicle</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Conclusions

This analysis yielded multiple conclusions. Results align with the auto-centric nature of central Texas, and highlight the potential challenges associated with accessing food without a vehicle. These are especially apparent when viewing results for the pedestrian mode. Because, as the results show, options are severely limited without a vehicle in this area, it makes sense that very few block groups met the vulnerable population measure of 30% or more households without a vehicle. Furthermore, the block groups that did fall within this category tended to be located more centrally, where, in general, food access is greater for non-auto modes of transportation. For these reasons, levels of food access for this group may not be as telling as the income categories. Including different modes of transportation when mapping food access and identifying food deserts can be an important tool for future planning and policy efforts that attempt to effectively address the issues of urban mobility and food access.


