A Comprehensive Method for Identifying Optimal Areas for Supermarket Development

TRF Policy Solutions
April 28, 2011
The Reinvestment Fund builds wealth and opportunity for low-wealth communities and low and moderate income individuals through the promotion of socially and environmentally responsible development.

We achieve our mission through:

**Capital**
- Grants, loans and equity investments

**Knowledge**
- Information and policy analysis; Policy Solutions & PolicyMap

**Innovation**
- Products, markets and strategic partnerships
A growing body of research suggests that there are areas in the United States that suffer from poor access to healthy and affordable food. U.S. Department of Agriculture's Economic Research Service reports that:

- People without access to full service grocery stores often depend on small grocery or convenience stores that may not carry all the foods needed for a healthy diet.
- Convenience stores often charge more than grocery stores for the same items, keeping people from eating a balanced diet.
- 23.5 million people live in low income areas (below 200% poverty) that are 1 mile from a supermarket.

Where are these low access areas?

* "Access to Affordable and Nutritious Food: Measuring and Understanding Food Deserts and Their Consequences" (June, 2009)
Methodological limitations of previous research:

- Imprecise definitions (e.g., the many and varied definitions of the term “food desert.”)
- Data quality / coverage
- Use fixed distances for urban, suburban, and rural areas throughout entire counties, metro areas, and even states (does not take account of population density, access to transportation, etc.).
- Use large geographies (zip codes, counties) as unit of analysis.
- Do not establish meaningful benchmarks for defining “adequate access.”
- Based on presence/absence of food retail, not travel distance or other physical or economic impediments to access that retail.
**Assumption:** The degree to which food retail is available in middle and upper income places is the standard against which other locations are measured. Stated differently, *we assume that “the market” is operating well in the higher income areas.*

1. Locate small geographic areas showing the strongest need for additional supermarket development and a sufficiency of demand to support additional development.
2. Create a demographic profile of low access areas.
3. Calculate the food at home expenditures leaked from the low access areas.
4. Establish a valid and reliable method for measuring low grocery access nationwide.
5. Provide CDFIs and policymakers operating at the city, metro, state, regional or national level summaries of inadequate supermarket access problem.
Data Sources / Strategy

• Location of all supermarkets, sales and square footage: Trade Dimensions

• Population and Car Ownerships rates: Claritas / Census

• Estimates of demand and employment opportunities: Census, Claritas and BLS Consumer Expenditure Survey

- Census block population data used to calculate the populated weighted centroid for each block group.

- The weighted centroid is the point at which the population has the smallest possible sum of squared distances.

• Population weighted block group centroids
Block Group Population Density and Car Ownership

- Obtain location data for food stores in all lower 48 states and DC.

- Geocode those food stores categorized as supermarkets, supercenters, natural/gourmet foods or wholesale clubs (i.e., stores with a full selection of all foods).

- Calculate the distance from each population weighted centroid to the nearest supermarket, natural foods or wholesale club.

- Calculate population density for all block groups with population > 250 population in households.

- Adjusted each block group’s square mile total for non-residential area.

- Classify into 7 population density groups.

- Divide density groups based on % car ownership:
  - Density 1 (lowest density) High car
  - Density 2 High car
  - Density 3 High car
  - Density 4 High car
  - Density 4 Moderate car
  - Density 5 High car
  - Density 5 Moderate car
  - Density 6 High car
  - Density 6 Moderate car
  - Density 6 Low car
  - Density 7 (highest density) High car
  - Density 7 (highest density) Moderate car
  - Density 7 (highest density) Low car

- Obtain location data for food stores in all lower 48 states and DC.

- Geocode those food stores categorized as supermarkets, supercenters, natural/gourmet foods or wholesale clubs (i.e., stores with a full selection of all foods).

- Calculate the distance from each population weighted centroid to the nearest supermarket, natural foods or wholesale club.
Calculating Access Score

**Market Distance:** 1.13 miles
**Reference Distance (6L):** .21 miles
**Access Score:** \( \frac{(1.13 - 0.21)}{1.13} = 0.81 \)

*This block group’s travel distance would have to be decreased by 81% to equal the distance traveled by its non-LMI counterparts.*

**Market Distance:** 1.25 miles
**Reference Distance (6H):** .64 miles
**Access Score:** \( \frac{(1.25 - 0.64)}{1.25} = 0.49 \)

*This block group’s travel distance would have to be decreased by 49% to equal the distance traveled by its non-LMI counterparts.*

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**Access Score**

- 0% - 20%
- 21% - 40%
- 41% - 60%
- 61% - 97%
- Distance < reference

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Supermarket, Natural Foods, or Wholesale Club
Identifying Low Access (Clusters)

- Conduct Local Indicators of Spatial Association (LISA) to identify where areas of high access scores are surrounded by neighboring high score areas.
- Spatial neighbors defined as the 4 nearest neighbors to each population weighted centroid – spatial correlation.
- Cluster membership is based on the spatial correlation.
## Low Access Area Aggregate Estimates

<table>
<thead>
<tr>
<th>Location</th>
<th>Population Living in Occupied HH</th>
<th>LAA Population</th>
<th>% Total Pop in LAA</th>
<th>% LAA Pop Non-white</th>
<th>% of LAA Pop in low income area</th>
<th>% of LAA Pop below 200% of poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Metro (1 million or &gt;)</td>
<td>145,982,206</td>
<td>11,839,533</td>
<td>8%</td>
<td>43%</td>
<td>49%</td>
<td>37%</td>
</tr>
<tr>
<td>Other Metro (&lt; 1 million)</td>
<td>80,585,268</td>
<td>6,343,807</td>
<td>8%</td>
<td>26%</td>
<td>37%</td>
<td>38%</td>
</tr>
<tr>
<td>Micropolitan</td>
<td>28,416,833</td>
<td>2,724,681</td>
<td>10%</td>
<td>14%</td>
<td>15%</td>
<td>37%</td>
</tr>
<tr>
<td>Rural</td>
<td>18,647,141</td>
<td>2,291,872</td>
<td>12%</td>
<td>14%</td>
<td>49%</td>
<td>42%</td>
</tr>
<tr>
<td><strong>Nationwide</strong></td>
<td><strong>273,631,448</strong></td>
<td><strong>23,199,893</strong></td>
<td><strong>9%</strong></td>
<td><strong>32%</strong></td>
<td><strong>42%</strong></td>
<td><strong>38%</strong></td>
</tr>
</tbody>
</table>
Estimated typical (median) income of a household between 2005-2009.

Estimated median household income in the past twelve months, as reported between 2005-2009. A household includes all the people who occupy a housing unit as their usual place of residence. Medians were suppressed in cases where the sample of the average was less than 10 of the unit that is being described (e.g., households, people, households, etc.). Such areas are represented as having "Insufficient Data" in the map. ACS employs values to indicate top and bottom ranges of income. A value of $200,001 indicates a value of 200,000 or greater, whereas a value of 2,499 indicates a value of 2,500 or less.
Map with TRF Supermarket Study of LAA (Subscriber-only) and Total Grocery Retail Demand, as of 2010.

**Total Grocery Retail Demand, as of 2010.**
Total grocery retail demand is the dollar amount of grocery demand estimated for a given Low Access Area (LAA) for a given year. Grocery retail demand is determined by income (Census) and percent of income spent on food prepared at home (Bureau of Labor Statistics), weighted by number of households. Block groups with fewer than 250 households or those with insufficient data are shown as grey areas on the map. For a detailed description of how TRF calculated the family of LAA indicators, please see the Data Directory.

**Legend**
- **Year:**
  - 2010
- **Variable:**
  - $1,499,999.99 or less
  - $1,500,000 - $1,999,999.99
  - $2,000,000 - $2,499,999.99
  - $2,500,000 - $2,999,999.99
  - $3,000,000 or more
- Shaded by: Block Group
- Source: TRF

**Sites**
- TRF Supermarket Study of LAA (Subscriber-only)
- Mass Transit Lines
- Source: Esri Mapping, Inc.

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PolicyMap is a service of The Reinvestment Fund

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Characteristics of Low Access Areas

Current Report: Community Profile Report of Polygon: 240380050983

Characteristics of Low Access Areas

Polygon Details
- Low Access Area (LAA) Name: 2403380050983
- Average LAA Score (population weighted): 54
- Block Groups in LAA: 1
- Grocery Retail Leakage Amount: $3,775,409
- Grocery Retail Leakage Rate: 100%
- Total Grocery Retail Demand: $3,775,409
- Grocery Retail Sq Ft Leaked: 5,022
- Limited Service Stores in LAA: 0

Population Trends:
- As of 2009, this area was home to an estimated 2,082 people

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>1,752</td>
<td>2,092</td>
<td>20.79%</td>
</tr>
<tr>
<td>Counties (Prince George's)</td>
<td>801,515</td>
<td>834,966</td>
<td>4.18%</td>
</tr>
<tr>
<td>State (Maryland)</td>
<td>5,296,486</td>
<td>5,637,418</td>
<td>6.44%</td>
</tr>
</tbody>
</table>

Race
- White: 174, 126, 115 (4.39% of total population in 2010)
- African American: 1,558, 2,691, 2,974 (58.03% of total population in 2010)
- Asian: 0, 22, 29 (0.76% of total population in 2010)
- Native Hawaiian or Pacific Islander: 0, 0, 1 (0.05% of total population in 2010)
- American Indian or Alaskan Native: 0, 11, 15 (0.3% of total population in 2010)
- Some Other Race: 0, 9, 13 (0.31% of total population in 2010)
- Two or More Races: 0, 31, 33 (1.0% of total population in 2010)

Ethnicity
- Hispanic: 0, 115, 176 (3.99% of total population in 2010)

2010 Annual Income Category

<table>
<thead>
<tr>
<th>Income Category</th>
<th>Number of Households</th>
<th>Percent of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $25,000</td>
<td>8</td>
<td>9.05%</td>
</tr>
<tr>
<td>Less than $50,000</td>
<td>34</td>
<td>4.06%</td>
</tr>
<tr>
<td>Less than $75,000</td>
<td>98</td>
<td>11.69%</td>
</tr>
<tr>
<td>Less than $150,000</td>
<td>417</td>
<td>49.76%</td>
</tr>
<tr>
<td>$150,000 or more</td>
<td>421</td>
<td>50.24%</td>
</tr>
</tbody>
</table>

According to Nielsen estimates, the median income for a family in 2009 was $150,100, compared to the state median family income of $82,923.

Employment by Industry

<table>
<thead>
<tr>
<th>Employment by Industry</th>
<th>People Employed</th>
<th>Percent Employed in this Industry</th>
<th>Percent Employed in this Industry in Maryland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation and Food Services Industry Employment</td>
<td>46</td>
<td>2.84%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Administrative and Support and Waste Management Services Industries Employment</td>
<td>49</td>
<td>3.02%</td>
<td>4.04%</td>
</tr>
<tr>
<td>Agriculture, Forestry, Fishing and Hunting Industry Employment</td>
<td>0</td>
<td>0%</td>
<td>0.49%</td>
</tr>
<tr>
<td>Arts, Entertainment, and Recreation Industries Employment</td>
<td>36</td>
<td>2.22%</td>
<td>1.82%</td>
</tr>
<tr>
<td>Educational Service Industry Employment</td>
<td>213</td>
<td>13.14%</td>
<td>9.28%</td>
</tr>
<tr>
<td>Finance, Insurance, Real Estate and Rental and Leasing Industries Employment</td>
<td>84</td>
<td>5.18%</td>
<td>6.85%</td>
</tr>
<tr>
<td>Health Care and Social Assistance Industry Employment</td>
<td>236</td>
<td>14.56%</td>
<td>12.67%</td>
</tr>
<tr>
<td>Information Industry Employment</td>
<td>62</td>
<td>5.06%</td>
<td>2.62%</td>
</tr>
<tr>
<td>Manufacturing Industry Employment</td>
<td>20</td>
<td>1.33%</td>
<td>5.37%</td>
</tr>
<tr>
<td>Management of Companies and Enterprises Industry Employment</td>
<td>0</td>
<td>0%</td>
<td>0.06%</td>
</tr>
<tr>
<td>Other Services Industry Employment</td>
<td>66</td>
<td>4.07%</td>
<td>5.39%</td>
</tr>
<tr>
<td>Professional, Scientific, and Technical Services Industry Employment</td>
<td>218</td>
<td>13.45%</td>
<td>10.12%</td>
</tr>
<tr>
<td>Public Administration Employment</td>
<td>260</td>
<td>16.04%</td>
<td>10.67%</td>
</tr>
<tr>
<td>Retail Trade Industry Employment</td>
<td>111</td>
<td>6.85%</td>
<td>9.92%</td>
</tr>
<tr>
<td>Construction Industry Employment</td>
<td>68</td>
<td>4.19%</td>
<td>7.74%</td>
</tr>
<tr>
<td>Transportation and Warehousing, and Utilities Industries Employment</td>
<td>83</td>
<td>5.12%</td>
<td>4.64%</td>
</tr>
<tr>
<td>Wholesale Trade Industry Employment</td>
<td>49</td>
<td>3.02%</td>
<td>2.33%</td>
</tr>
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The Reinvestment Fund
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