COMPARISON OF PRIMARY CARE SERVICE AREAS AND ESTIMATED DRIVE TIMES

An Evaluation of the Geographic Accessibility to Primary Care Services for the Populations within Primary Care Service Areas

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BACKGROUND AND OBJECTIVE

• Healthcare service areas allow for the measurement of health outcomes, assessment of health care services utilization and healthcare shortage area designation.

• Healthcare service areas have been at the center of policy decisions and are vital for the efficient distribution of federal and state funds.

• This research compared rural Primary Care Service Areas (PCSAs) to estimated 30-minute drive-time polygons centered on a primary care service access point within each PCSA.
PRIMARY CARE SERVICE AREAS (PCSA)

- Developed by the Dartmouth Institute 2003
- Service areas defined primarily from Medicare claims data
- Comprised of ZIP Code Tabulation Areas (ZCTAs)
- Plurality of services dictate which ZCTA belongs to which group
- ZCTAs reassigned for contiguity
- Currently only consider distance in 2 ways:
  - ZIP Code Centroid distances between Provider ZIP and Beneficiary ZIP
  - Land Area of 1,256 square miles
STUDY AREA

- Missouri
- Oregon
- North Carolina
- Rural PCSAs with a Rural Urban Commuting Area classified as “Small Rural” or “Isolated”
- Containing a single primary care physician from which to calculate the estimated drive times
DATA

National Provider Identifier

Esri Road Network

Primary Care Service Areas
DATA AND METHODS

- National Provider Identifier Data from CMS
- Primary Care Service Areas
- Rural Urban Commuting Area Data (USDA and WWAMI)
- Road Network Data

Primary Care Physician Locations

- Road Networks Projected to an Equidistant Projection

Rural PCSAs

- Estimate Travel Times Calculated based on FCC Codes
- 30 (.5 hour) Minute Travel Time Service Area Polygons Built

Rural PCSAs with Single Primary Care Physician

- Rural PCSAs Projected to an Albers Equal Area Projection and Area Calculated

Primary Care Physician Locations

- Drive Time Polygons Projected to an Albers Equal Area Projection and Area Calculated

Rural Primary Care Service Areas

- 2010 United States Census

Calculate Block Centroids XY Coordinates in Albers Equal Area Projection

Select Block Centroids Completely Within Rural PCSAs

- Record Population Counts
- Remove from Rural PCSA Selection Block Centroids Completely Within Estimated Drive Time Polygons

Select Block Centroids Completely Within Estimated Drive Time Polygons

- Record Population Counts
MISSOURI

Eligible Primary Care Service Areas and Corresponding 30 Minute Estimated Drive Time Service Areas in Missouri

Primary Care Service Areas
30 Minute Estimated Drive Times
Primary Care Access Points

Eligible Primary Care Service Areas and Corresponding 30 Minute Estimated Drive Time Service Areas in North Carolina

QUANTITATIVE COMPARISON

- Areas of each PCSA and corresponding estimated drive time
- Populations within each PCSA and drive time
- Population within the PCSA that did not fall within the drive time
- Correlation between the total populations in PCSAs and the Populations outside of the estimated drive times
- Additional Comparison of 20 and 40 minute drive time polygons
## RESULTS

### Missouri

<table>
<thead>
<tr>
<th>N=28</th>
<th>PCSA Area (Sq Miles)</th>
<th>Drive Time Area</th>
<th>Area Difference</th>
<th>PCSA Population</th>
<th>Drive Time Population</th>
<th>Population Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>8,846.69</td>
<td>12,677.62</td>
<td>3,830.93</td>
<td>194,118</td>
<td>496,673</td>
<td>302,555</td>
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<tr>
<td>Average</td>
<td>315.95</td>
<td>452.77</td>
<td>136.82</td>
<td>6,933</td>
<td>17,738</td>
<td>10,806</td>
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<tr>
<td>SD</td>
<td>214.04</td>
<td>141.27</td>
<td>301.05</td>
<td>5,045</td>
<td>12,910</td>
<td>7,865</td>
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### Oregon

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<th>N=9</th>
<th>PCSA Area (Sq Miles)</th>
<th>Drive Time Area</th>
<th>Area Difference</th>
<th>PCSA Population</th>
<th>Drive Time Population</th>
<th>Population Difference</th>
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</thead>
<tbody>
<tr>
<td>Sum</td>
<td>10,015.42</td>
<td>2,470.39</td>
<td>-7,545.03</td>
<td>53,613</td>
<td>66,032</td>
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<tr>
<td>Average</td>
<td>1,112.82</td>
<td>274.49</td>
<td>-838.34</td>
<td>6,957</td>
<td>17,337</td>
<td>10,380</td>
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<td>SD</td>
<td>1,465.49</td>
<td>101.43</td>
<td>1,371.08</td>
<td>5,375</td>
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### North Carolina

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<thead>
<tr>
<th>N = 10</th>
<th>PCSA Area (Sq Miles)</th>
<th>Drive Time Area</th>
<th>Area Difference</th>
<th>PCSA Population</th>
<th>Drive Time Population</th>
<th>Population Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>2,223.79</td>
<td>5,452.02</td>
<td>3,228.23</td>
<td>122,472</td>
<td>758,140</td>
<td>635,668</td>
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<td>Average</td>
<td>222.38</td>
<td>545.20</td>
<td>322.82</td>
<td>1,225</td>
<td>75,814</td>
<td>63,567</td>
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<tr>
<td>SD</td>
<td>249.04</td>
<td>134.11</td>
<td>320.98</td>
<td>7,435</td>
<td>64,494</td>
<td>59,475</td>
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RESULTS

PCS A Population
Pop Outside Drive Time
Percent of Population in PCSAs not within the 30 Minute Estimated Drive Time Service Area

Percent of the Population within a PCSA not within the 30 Minute Estimated Drive Time Service Area

- 0%
- Greater than 0 to 2.2%
- 2.2 to 7.3%
- 7.3 to 21.4%
- Greater than 21.4%
- PCSAs, or Areas, not Eligible for the Study
- Primary Care Access Points

Percent of Population in PCSAs not within the 30 Minute Estimated Drive Time Service Area in North Carolina

# 20, 30 AND 40 MINUTE DRIVE TIMES

<table>
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<tr>
<th></th>
<th>N = 11</th>
<th>Population Outside 30 Minutes</th>
<th>Percent Outside 30 Minutes</th>
<th>Population Outside 20 Minutes</th>
<th>Percent Outside 20 Minutes</th>
<th>Population Outside 40 Minutes</th>
<th>Percent Outside 40 Minutes</th>
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<tbody>
<tr>
<td>Sum</td>
<td>45,533</td>
<td>-</td>
<td></td>
<td>68,537</td>
<td>-</td>
<td>28,755</td>
<td>-</td>
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<tr>
<td>Average</td>
<td>4,139</td>
<td>42.42%</td>
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<td>6,231</td>
<td>70.86%</td>
<td>2,614</td>
<td>24.32%</td>
</tr>
<tr>
<td>SD</td>
<td>4,690</td>
<td>22.93%</td>
<td></td>
<td>5,451</td>
<td>28.10%</td>
<td>4,687</td>
<td>25.64%</td>
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</table>
Estimated 20, 30 and 40 Minute Drive Time and the Corresponding Primary Care Service Area in North Carolina
KEY FINDINGS

- 72 percent of the PCSAs analyzed had populations that could have potential geographic accessibility issues for primary care
- More than 14 percent of the population of the PCSAs in the study area were outside of the drive time polygons
- In the poorest performing PCSAs, greater than 42 percent of the population fell outside of the estimated 30 minute drive time polygons
- The area of the PCSAs sampled in Oregon was greater than the area of the polygons based on estimated drive times
CONCLUSIONS

• While PCSAs may be a good start at defining actual primary care service areas there are some that may not be appropriately representing the population actually served in these areas

• Some consideration to distance, such as estimated drive times, should be considered to address the geographic accessibility for populations within PCSAs
Larger PCSAs may be a result of primary care service shortages (Health Professional Shortage Areas) and therefore may need policy interventions to encourage additional primary care services.

In order to ensure access to health care for all citizens as outlined in the Patient Protection and Affordable Care Act, more consideration needs to given to geographic accessibility to health care services.
FUTURE RESEARCH

- Evaluation of data used in the PCSA project to assess whether an element of travel time would increase the outcomes of the PCSAs original goals
- The evaluation of estimated drive times and their accuracy compared to actual drive times
- An evaluation of estimated drive time polygons and Euclidian distance buffers to see how well their population coverage is correlated
- Dartmouth has decided to recreate PCSAs with Census Tracts
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QUESTIONS?

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