Using GIS to Identify Behavioral Healthcare Underserved Areas

Monterey County Health Department

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Monterey County Stats

- 2006 population = 433,782 (DOF 2004)
  - 52% Hispanic/Latino
  - 35% White, Non-Hispanic
  - 6% Asian and Pacific Islander
  - 4% African-American
  - 3% Other
- Major industries: agriculture, fishing, & tourism
- 71% have high school diploma (ACS 2005)
Mental Health Services Act

- Effective 2005 in California
- Systems transformation for Monterey County
  - Consumer & family driven
  - Accessible & timely services
  - Wellness & recovery
  - Culturally & linguistically competent services
  - Strength & resilience
  - Integrated & coordinated services
- Monterey County funds ($9M over three years)
Project Goals

- Explore patterns of service utilization and need at sub-county scale
- Provide information for program planning and policy development

*Must be relatively quick, inexpensive, reliable, and easy to interpret*
Methods

1. Research existing methods
2. Gather ecological and individual data
3. Calculate index of need
4. Map and explore spatial patterns
5. Explore differences between actual service patterns and predicted need
6. Share results
Types of Methods

• Direct measures
  – Surveys
  – Focus groups
  – Interviews

• Indirect measures
  – Apply direct measures from another population
  – Existing service patterns
  – Provider ratios
  – Social indicators
Data Layers

- Race/Ethnicity (ESRI)
- Median age (ESRI)
- Roads (MCITD)
- Cities/Towns (LAFCO)
- Monterey County service provider locations (geocoded)
- ZIP code boundaries (ESRI)
- Family income (ESRI)
- MST lines (MCITD)
- Hospitals (geocoded)
- Residential location of 2005-2006 FY clients (geocoded)
- Calculated index of need ($I_z$)
Index of Need ($I_z$)

\[ I_z = p_z \times e_z \times i_z \]

- $z = $ Zip code
- $p = $ proportion of total Monterey County population
- $e = $ proportion of population who are non-white
- $i = $ proportion of families with income below 2006 Federal Poverty Level ($20,000 for family of four)
## Correlations

<table>
<thead>
<tr>
<th>Variable</th>
<th>% Total</th>
<th>% Non-White</th>
<th>% in Poverty</th>
<th>% Served</th>
<th>Index</th>
<th>Median Age</th>
<th>Moran’s I (z score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Total ($r_P$)</td>
<td>1.00</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.13 (3.30)</td>
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<td>(p-value)</td>
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<td></td>
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<tr>
<td>% Non-White ($r_P$)</td>
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<td>1.00</td>
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<td>0.12 (3.10)</td>
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<td>(p-value)</td>
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<td>-</td>
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<tr>
<td>% in Poverty ($r_P$)</td>
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<td>0.62</td>
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<td></td>
<td>-</td>
<td>-0.17 (-3.36)</td>
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<tr>
<td>(p-value)</td>
<td>0.93</td>
<td>&lt;0.01</td>
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<td>% Served ($r_P$)</td>
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<td>0.40</td>
<td>0.12</td>
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<td>0.10 (2.80)</td>
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<td>0.04</td>
<td>0.49</td>
<td>-</td>
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<td>Index ($r_P$)</td>
<td>0.84</td>
<td>0.66</td>
<td>0.43</td>
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<td>0.02 (1.47)</td>
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<td>&lt;0.01</td>
<td>0.03</td>
<td>&lt;0.01</td>
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<tr>
<td>Median Age ($r_P$)</td>
<td>-0.23</td>
<td>-0.95</td>
<td>-0.68</td>
<td>-0.34</td>
<td>-0.34</td>
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<td>&lt;0.01</td>
<td>0.08</td>
<td>0.08</td>
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</table>

$r_P = $ Pearson's correlation coefficient (SAS). Moran’s $I = $ measure of spatial autocorrelation (ArcGIS).
Family Income Below the Federal Poverty Level*: 2006

Percent Living in Poverty
- <5%
- 5% - 9%
- 10% - 14%
- 15% +

*2006 Federal Poverty Level is $20,000 for a family of four.
Results Summary

• Regional differences in service need exist
• Simply calculated index identifies highest needs
  – Uses readily available data
  – Accomplished with basic GIS skills and technology
  – Easy to interpret/understand
• Additional analyses required to site facilities within regions
Progress

• Community feedback
  – Travel time
  – Cultural issues influence patterns

• Castroville Child & Family Resource Center

• King City service “hub”

• Continued planning and evaluation
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