CDRI Cancer Disparities Geocoding Project

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CDRI Cancer Disparities Geocoding Project

• Purpose:
  – To describe and understand variations in cancer incidence, treatment and survival in Idaho.

By:

• Individual-Level
  – Race/Ethnicity

• Area-Level
  – Poverty
  – Urban/Rural gradient

• Geographic
  – Location
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• How do we do that?

1. Use combination of medical records, Indian Health Service and Northwest Portland Area Indian Health Board linkages, and NAACCR place of birth/surname algorithm to determine race and ethnicity of cancer cases.
2. Geocode address of residence at time of diagnosis and assign Census Tract 2000 based on location.
3. Estimate annual Census Tract population by age group, sex, race, ethnicity.
4. Calculate Area-Based Socioeconomic Measures for Census Tracts.
5. Add county-level BRFSS screening and risk factor estimates.
6. Aggregate over areas into strata by categorical ABSM.
7. Conduct multilevel modeling.
8. Create maps of results.
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- Geographic Level of Analysis for Project
  - Census Tract
    - Subdivision of county
    - Contains on average about 4,000 persons.
    - Drawn such that population covered is relatively homogenous.
    - Idaho has 280 Census Tracts (2000 Census).
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• Area-Based Socioeconomic Measures
  
  – Poverty
    • From 2000 Census, calculate percent of population with incomes below federal poverty guidelines by Census Tract.
    • Categorize Census Tracts into 4 categories:
      Less than 5%
      5% to 9.9%
      10% to 19.9%
      20%+ (Federally Designated Poverty Area)
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• Area-Based Socioeconomic Measures

  – RUCA
    • Rural Urban Commuting Areas refer to a Census Tract-based classification scheme that utilizes the standard Bureau of Census urban area and place definitions in combination with commuting information.
    • Categorize Census Tracts into 3 categories:
      – Urban (50,000+ population OR 30% or more of residents of Census Tract commuted to an urban core)
      – Large Towns (10,000 – 49,999 population AND <30% of residents of Census Tract commuted to an urban core)
      – Small Rural Towns (<10,000 population AND <30% of residents of Census Tract commuted to an urban core)
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• Example:
  – Colorectal Cancer Incidence, Ages 50+, Idaho, 1996-2004
Age-Adjusted Invasive Colorectal Cancer Incidence Rates, Ages 50+, Idaho, 1996-2004

Race/Ethnicity

- API (any ethnicity)
- AIA (any ethnicity)
- Black (any ethnicity)
- Hispanic (any race)
- non-Hispanic White
- Total

Age-Adjusted Rate Per 100,000
Age-Adjusted Colorectal Cancer Incidence Rates, Ages 50+, Idaho, 1996-2004

Age-Adjusted Rate Per 100,000

Census Tract % Poverty

Less than 5%  5% to 9.9%  10% to 19.9%  20%+ (Poverty Area)

Total Invasive
Late Stage
## Population-Attributable Fraction

- What percent of cases *WOULD NOT HAVE OCCURRED* if all groups had the same rates as the low poverty group?

### Poverty Status-Related Population Attributable Fraction
Invasive Colorectal Cancer Cases, Ages 50+, Idaho, 1996-2004

<table>
<thead>
<tr>
<th>Area Poverty Status</th>
<th>Person-Years</th>
<th>Cases Counts</th>
<th>Potentially Averted Cases</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Observed</td>
<td>Expected</td>
<td>Cases</td>
</tr>
<tr>
<td>Less than 5%</td>
<td>324,129</td>
<td>394</td>
<td>394</td>
<td>0</td>
</tr>
<tr>
<td>5% to 9.9%</td>
<td>858,067</td>
<td>1,179</td>
<td>1,175</td>
<td>4</td>
</tr>
<tr>
<td>10% to 19.9%</td>
<td>1,696,614</td>
<td>2,742</td>
<td>2,534</td>
<td>208</td>
</tr>
<tr>
<td>20%+ (Poverty Area)</td>
<td>149,871</td>
<td>263</td>
<td>235</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>3,028,681</td>
<td>4,578</td>
<td>4,338</td>
<td>240</td>
</tr>
</tbody>
</table>

Expected counts = age-specific rates from low poverty area applied to populations of other areas.
### Stage-Specific Age-Adjusted Colorectal Cancer Incidence Rates by Urban/Rural Category, Ages 50+, Idaho 1996-2004

<table>
<thead>
<tr>
<th>SEER Summary Stage</th>
<th>Urban Rate</th>
<th>Urban Cases</th>
<th>Large Town Rate</th>
<th>Large Town Cases</th>
<th>Small Rural Town Rate</th>
<th>Small Rural Town Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Invasive</td>
<td>157.4</td>
<td>2,685</td>
<td>135.8</td>
<td>583</td>
<td>160.4</td>
<td>1,310</td>
</tr>
<tr>
<td>In situ</td>
<td>5.1</td>
<td>86</td>
<td>10.2</td>
<td>44</td>
<td>7.3</td>
<td>60</td>
</tr>
<tr>
<td>Localized</td>
<td>60.2</td>
<td>1,024</td>
<td>48.3</td>
<td>207</td>
<td>48.2</td>
<td>394</td>
</tr>
<tr>
<td>Regional</td>
<td>60.6</td>
<td>1,032</td>
<td>52.5</td>
<td>224</td>
<td>67.8</td>
<td>555</td>
</tr>
<tr>
<td>Distant</td>
<td>26.6</td>
<td>457</td>
<td>24.4</td>
<td>104</td>
<td>27.1</td>
<td>223</td>
</tr>
<tr>
<td>Unstaged</td>
<td>10.0</td>
<td>172</td>
<td>10.6</td>
<td>48</td>
<td>17.3</td>
<td>138</td>
</tr>
<tr>
<td>Late Stage</td>
<td>87.2</td>
<td>1,489</td>
<td>76.9</td>
<td>328</td>
<td>94.9</td>
<td>778</td>
</tr>
</tbody>
</table>

Rates are per 100,000 and age-adjusted to the 2000 US Std Population (18 age groups - Census P25-1130) standard.
### Invasive Colorectal Cancer Incidence
**Ages 50+, Idaho, 1996-2004**
**Results from Multilevel Poisson Regression Modeling**

Incidence Density Ratios and 95% Confidence Intervals for Fixed Parameters

<table>
<thead>
<tr>
<th>Main Effect</th>
<th>IDR*</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-Hispanic</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.16</td>
<td>0.95 - 1.40</td>
</tr>
<tr>
<td><strong>Tract-Level Poverty</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5%</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>5% to 9.9%</td>
<td>1.05</td>
<td>0.92 - 1.20</td>
</tr>
<tr>
<td>10% to 19.9%</td>
<td>1.12</td>
<td>0.99 - 1.27</td>
</tr>
<tr>
<td>20%+ (Poverty Area)</td>
<td>1.19</td>
<td>0.99 - 1.42</td>
</tr>
<tr>
<td><strong>Tract-Level RUCA Code</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Large Town</td>
<td>0.86</td>
<td>0.78 - 0.96</td>
</tr>
<tr>
<td>Small Rural Town</td>
<td>0.99</td>
<td>0.91 - 1.08</td>
</tr>
</tbody>
</table>
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Invasive Colorectal Cancer Incidence
Idaho, 1996-2004

Legend
Census Tracts 2000
Empirical Adjusted Rates
- Less than 75.5
- 75.5 - 138.8
- 138.9 - 196.2
- 196.2 - 313.2
- 313.3 or Higher
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Invasive Colorectal Cancer Incidence
Idaho, 1996-2004

Legend
Census Tracts 2000
Spatially Smoothed Rates
- 104.2 - 133.7
- 133.8 - 149.4
- 149.5 - 166.3
- 166.4 - 187.5
- 187.6 - 231.2
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Invasive Colorectal Cancer Incidence
Idaho, 1996-2004

Legend
Census Tracts 2000
Adjusted Spatially Smoothed rates
- 137.5 - 147.5
- 147.6 - 153.0
- 153.1 - 158.2
- 158.3 - 164.3
- 164.4 - 175.5

[Map of Idaho showing colorectal cancer incidence rates]
Future Directions

• Questions?? Comments??

• I would like a prioritized list of topics to analyze using this framework.
• One list per CCAI Work Group.
• Only Cancer Registry data are available for this type of analysis:
  – Incidence
  – Stage-Specific Incidence
  – Treatment
  – Survival