CONGENITAL ANOMALIES IN LOS ANGELES COUNTY: WHY PLACE MATTERS

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Background

Does where you live impact your risk of having a poor birth outcome?
Environment varies

- Encompass the places and situations/circumstances that have an effect on an individual
  - Social
  - Spatial
  - Genetic/epigenetic
Defining birth outcomes

- Traditionally limited to gestational age and birth weight
- Birth defects and congenital anomalies
- Surveillance efforts limited
  - Example: California Birth Defects Monitoring Database
- Causation is hard to prove
Mothers are exposed to many things in the environment:

- Carbon Monoxide
- Aerosolized Chemicals
- Ozone
- Industrial Waste
- Pesticides
So, does where you live impact your risk of having a poor birth outcome?
Assessing the Effects of Environmental Exposures on Birth Outcomes

An epidemiological survey using spatial statistics to assess patterns of congenital anomalies in Los Angeles County
## Congenital Anomalies

- Anencephaly
- Meningomyelocele/Spina bifida
- Cyanotic congenital heart disease
- Congenital diaphragmatic hernia
- Omphalocele
- Gastroschisis
- Limb reduction defect
- Cleft palate and cleft lip
- Down’s syndrome
- Suspected chromosomal disorder
- Hypospadias
- Aortic stenosis
- Pulmonary Stenosis
- Atresia
- Additional and unspecified congenital anomalies not listed
Hot Spot Analysis

- Vital Statistics Birth Master File 2006-2010
- Geocoded by maternal home address
- Aggregated to Public Use Micro Areas (PUMA)
  - 100K – 500K residents each
- Non Smoking Mothers
- 15-34 years
Hot Spot Analysis – Births with congenital anomalies for non-smoking mothers (15 through 34)
Relative Risk for Births with Congenital Anomalies within Hot Spots

<table>
<thead>
<tr>
<th>Los Angeles County</th>
<th>Hot Spots</th>
<th>Ratios</th>
<th>Significance Level</th>
<th>Increased Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Births</td>
<td>Rates</td>
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<td>Rates</td>
<td>OR</td>
</tr>
<tr>
<td>All Races and Ethnicities</td>
<td>583,992</td>
<td>0.93</td>
<td>67,654</td>
<td>2.26</td>
</tr>
</tbody>
</table>
## Relative Risk by Race/Ethnic Groups for Births with Congenital Anomalies within Hot Spots

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<tr>
<td><strong>All Races and Ethnicities</strong></td>
<td><strong>OR</strong> 2.98</td>
<td><strong>RR</strong> 2.98</td>
<td><strong>P &lt; 0.0001</strong></td>
<td>197.88%</td>
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</tr>
<tr>
<td><strong>RR</strong></td>
<td>2.98</td>
<td></td>
<td><strong>P &lt; 0.0001</strong></td>
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<tr>
<td><strong>Hispanic</strong></td>
<td>412,299</td>
<td>41,086</td>
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<tr>
<td><strong>Rates</strong></td>
<td>0.94</td>
<td>2.36</td>
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<tr>
<td><strong>OR</strong></td>
<td>3.03</td>
<td><strong>RR</strong> 3.02</td>
<td><strong>P &lt; 0.0001</strong></td>
<td>202.21%</td>
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<tr>
<td><strong>White</strong></td>
<td>71,194</td>
<td>14,907</td>
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<tr>
<td><strong>Rates</strong></td>
<td>1.17</td>
<td>2.15</td>
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<tr>
<td><strong>OR</strong></td>
<td>2.37</td>
<td><strong>RR</strong> 2.37</td>
<td><strong>P = 0.0001</strong></td>
<td>136.92%</td>
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<tr>
<td><strong>Black</strong></td>
<td>34,962</td>
<td>4,656</td>
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<tr>
<td><strong>Rates</strong></td>
<td>0.66</td>
<td>2.79</td>
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<tr>
<td><strong>OR</strong></td>
<td>8.48</td>
<td><strong>RR</strong> 8.46</td>
<td><strong>P &lt; 0.0001</strong></td>
<td>746.17%</td>
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<tr>
<td><strong>Asian</strong></td>
<td>48,447</td>
<td>4,419</td>
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<td><strong>Rates</strong></td>
<td>0.74</td>
<td>2.04</td>
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<tr>
<td><strong>OR</strong></td>
<td>3.33</td>
<td><strong>RR</strong> 3.32</td>
<td><strong>P = 0.0018</strong></td>
<td>232.11%</td>
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<tr>
<td><strong>Other or Not Stated</strong></td>
<td><strong>OR</strong> 0.80</td>
<td><strong>RR</strong> 0.80</td>
<td><strong>P = 0.7693</strong></td>
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</tr>
<tr>
<td><strong>Rates</strong></td>
<td>0.94</td>
<td>0.77</td>
<td></td>
<td></td>
<td>-19.88%</td>
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Hot Spots – Births with congenital anomalies for non-smoking mothers (15-34) with Land Use
Hot Spots – Births with congenital anomalies for non-smoking mothers (15-34) with Median Income
Hot Spots – Births with congenital anomalies for non-smoking mothers (15-34y) with Elevation
Place matters

- Congenital anomalies cluster in LA county
- Possible explanation – topography
- Limitations
  - Birth certificate data
- Next steps
  - look further out in southland (Inland Empire, San Bernadino)
  - Public health and policy implications
Thank you

- Efren Aguilar
- Josh Bader
- Karen Singh
- Julie Friedman
- Dr. Janet Pregler
- Iris Cantor Women’s Center
- Lucille Packard Foundation