Portland's 2008 road deaths fewest since 1925
by Joseph Rose, The Oregonian
Thursday April 02, 2009

- Portland saw just 20 traffic deaths in 2008, the lowest number since the city began recording fatalities in 1925, transportation officials said today.

- And what big-city mayor promising "safer city streets" wouldn't like those stats? Mayor Sam Adams released a statement crediting a long list of his own transportation initiatives - from green bike boxes to helping neighborhoods get speed bumps -- for the good news.

But one has to wonder if his staff bothered briefing him on this simple fact about modern commuting: People are driving less -- and, thus, dying less -- almost everywhere in the U.S.

Background

• USEPA Risk Management Program: offsite consequences of accidental release of regulated substances need to be analyzed.
• Environmental justice movement: studies the disproportionate distribution of risk on people and places.

Objectives

• Assess the potential exposure of people with special needs to accidental release of hazardous chemicals.
• Target population groups: people with physical disabilities and health concerns
• Study area: Cedar Rapid metropolitan, Iowa
Methods Overview

Potential exposure model
- Spatial unit of vulnerable area
  - Administrative units
  - Circular buffer
  - Dispersion model output

Population model
- Spatial unit of population distribution
  - Census units
  - Individual locations

Overlay analysis
- Mismatch of spatial units – areal interpolation

Spatial pattern analysis
- Spatial randomization

Methods

- Geocoding
  - EHS facilities
  - Self-identified individuals with special needs

- Geographic masking
  - Affine transformation
  - Random perturbation
  - Aggregation
Methods (cont.)

• Chemical Dispersion Model (ALOHA)
  – Worst-case release
  – Specified weather condition
  – Buffer distance (IDLH)
• Exposure risk analysis
  – Summarizing using point-in-polygon (554)
• Spatial distribution of SNP

Measurement of Disproportion

• Observed pattern
  – Locations of 903 individuals
• Candidate locations for neutral pattern
  – Based on street nodes (6260 points)
  – Node densities are strongly positively correlated to census block group population density
  – Randomly selected 1000 sets of 903 nodes
  – Summarizing using point-in-polygon
Results

Table 2: Analysis of Disproportionate Impacts Based on 1,000 Randomly Simulated Location Patterns of the Special Needs Population.

<table>
<thead>
<tr>
<th>Number of Vulnerable Zones</th>
<th>Population at Risk* ($P_{max}$)</th>
<th>Population at Risk in Simulated Location Patterns ($P_{sim}$)</th>
<th>Patterns with $P_{sim} &lt; P_{max}$</th>
<th>Significance Level</th>
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<tbody>
<tr>
<td></td>
<td>Max</td>
<td>Min</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>At least 1</td>
<td>554</td>
<td>567</td>
<td>436</td>
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<tr>
<td>2 or more</td>
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<td>3 or more</td>
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</tr>
<tr>
<td>4 or more</td>
<td>140</td>
<td>161</td>
<td>89</td>
<td>120</td>
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</table>

* Based on assignment to nearest TIGER/Line file node.
Normal Distribution

- 68.2% within +/- one standard deviation of the mean
- 95.4% within +/- two StDev of the mean
- 99.6% within +/- three StDev of the mean

Comments/Critiques

- Historical weather data not used
- Buffer Distance (IDLH) not adjusted for people with physical conditions.
- Possibility vs. probability
Randomization
Field Calculator

Fields:
- FID
- NAME
- ADDRESS
- CITY
- STATE
- ZIP
- Rnd_No
- Selected

Functions:
- Abs
- Atn
- Cos
- Exp
- Fix
- Frac
- Log
- Sin
- Sqr

Pre-Logic VBA Script Code

random_number = rnd

Rnd_No =
random_number

Calculate selected (records only)

Attributes of Library_Points

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<tr>
<th>Shape</th>
<th>NAME</th>
<th>ADDRESS</th>
<th>CITY</th>
<th>STATE</th>
<th>ZIP</th>
<th>Rnd_No</th>
<th>Selected</th>
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<td>WA</td>
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<td>0.379536</td>
<td></td>
</tr>
</tbody>
</table>
Count Points in Polygons
Join by Location

1. Choose the layer to join to this layer.
2. You are selecting Points-to-Poly.
   - Select a join feature class and choose join options based on geometry type and the join feature class.
   - Each polygon will be given a list of points that fall inside it, and points that fall inside it.
   - How do you want to define the distance? Use Chord, Distance, or Straight.
   - Each polygon will be joined at each point on the boundary of the polygon. If the point is not on the boundary, it will be discarded.
   - The result of the join will be a new table.

Attributes of Join Output

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<th>FB</th>
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<th>AREA</th>
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