suicide geography

what about the whole causal web —

- social: yes
- cultural: yes
- physical: yes
- economic: yes
- demographic: yes
- psychological: yes

after adjusting for these factors the spatial pattern remains
suicide pattern - white males

variables:

✓ latitude no
✓ longitude no
✓ precipitation no
✓ vegetation no
✓ elevation no
✓ sunlight no
✓ season no
population density  ?

deaths per 100,000  1  2  3  4 quartiles

literature review


critique –

1. conceptualization  begs question, theoretical
2. literature review  none provided
3. spatial unit  county
4. aggregation  across states rural to urban
5. significance  relative risk 1.05 –2.30, p < 0.05
6. conclusions  δrural = δsocial disintegration
7. validation  none provided
**USDA classification system appropriate?**

<table>
<thead>
<tr>
<th>Level</th>
<th>Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NY, SF, LA, Seattle, Portland, 29 Palms, Molalla</td>
</tr>
<tr>
<td>1</td>
<td>San Juan Islands, St. Helens, Camas</td>
</tr>
<tr>
<td>2</td>
<td>Fresno, Carmel, Eugene</td>
</tr>
<tr>
<td>3</td>
<td>Redding, Nooksack</td>
</tr>
<tr>
<td>4</td>
<td>Walla Walla</td>
</tr>
<tr>
<td>5</td>
<td>Bandon</td>
</tr>
<tr>
<td>6</td>
<td>Hood River</td>
</tr>
<tr>
<td>7</td>
<td>Baker City</td>
</tr>
<tr>
<td>8</td>
<td>Stevenson</td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**research question:**
Is there an urban-rural gradient in white male suicide rates?

**data sources:**
CDC - suicide rates; US Census Dept - population statistics

**method:**
sensitivity analysis - three spatial levels, three age-groups

**age-groups:**
20 - 64, 65 - 74, 75+

**spatial levels:**
- state: 48 contiguous
- county: Oregon, Wyoming, Pennsylvania
- individual: Oregon, Wyoming
hypothesis, distributions, techniques

\[ \text{Ho: no urban-rural gradient in male suicide rates} \]
\[ \text{Ha: urban-rural gradient in male suicide rates} \]

\[ \text{distributions – state averages:} \]

\[ \frac{\text{density}_{Sr}}{\text{density}} = 1 \]

\[ \frac{\text{density}_{Sr}}{\text{density}} \neq 1 \]

\[ \text{suicide rate/100,000} \quad \text{population/sq mile} \]

\[ \text{techniques: exploratory data analysis, correlation, visualization} \]

32,000 suicides in USA 2002

men: 80% of all suicides (92% white)
guns: 54% of young
73% of elderly
8th leading cause of death for all men
3rd leading cause of death 15-24 men

white men

Suicide Rates by Population Density

all states \( r = -0.64 \)
results - state level analysis (population tertiles, suicide quartiles)

- < 50 people/sq mile  \( r = -0.18 \)
- > 50 < 140 /sq mile  \( r = +0.20 \)
- > 140 people/sq mile  \( r = -0.74 \)  \( p = 0.001 \)

results - county level analysis (tertiles)

- **Wyoming**
  - 1–27/sq mile  \( r = +0.07 \)
    - low  \( r = +0.06 \)
    - medium  \( r = -0.29 \)
    - high  \( r = -0.08 \)

- **Oregon**
  - 1–1,350/sq mile  \( r = -0.07 \)
    - low  \( r = +0.44 \)
    - medium  \( r = -0.12 \)
    - high  \( r = +0.14 \)

- **Pennsylvania**
  - 11–11,000/sq mile  \( r = -0.06 \)
    - low  \( r = -0.08 \)
    - medium  \( r = +0.18 \)
    - high  \( r = +0.14 \)
## results – individual level analysis

<table>
<thead>
<tr>
<th>Location</th>
<th>Authors</th>
<th>Period</th>
<th>Data Source</th>
<th>Predictors</th>
<th>Demographic</th>
<th>Urban/Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon</td>
<td>L. Stevenson, OHSU</td>
<td>1 year</td>
<td>death certificates, medical records</td>
<td>divorced, disabled, ill</td>
<td>no association with SES or occupational level</td>
<td>non-significant increase in mid-size towns</td>
</tr>
<tr>
<td>Wyoming</td>
<td>R. Pasewark, J Fleer, U of W</td>
<td>16 years</td>
<td>death certificates</td>
<td>divorced, widowed, ill</td>
<td>no association with SES, occupational level or population changes of -25% to +115%</td>
<td>3x higher rates in towns/cities than rural areas</td>
</tr>
</tbody>
</table>

## conclusions

**errors –**
- conception, measurement, aggregation, analysis, interpretation

**results of sensitivity analysis –**
- no urban-rural gradient in suicide at any scale or any age group
  - cannot reject the null hypothesis
  - reject the study

**lessons –**
- take GIS II
- confirm biologic / social plausibility
- assess potential errors at each stage
- explore alternative explanations for results
- check validity before publishing
alternative explanations

combination and interaction of other factors

- **migration** - recent and historic western trend, rural shift to slower pace, cheaper living, less crowding, “freedom”

- **culture** - inter-mountain west more physically oriented, willing and able to take life when it is “not worth living”

- **genetics** - Northern European ancestry e.g., Finnish-Ugrian; novelty seeking, alcohol intolerant, pragmatic

sources

articles –


Regional variations in suicide rates (1997), MMWR, CDC

Suicide in Oregon (2001) L Stevenson, MPH Thesis OHSU

Suicide in Wyoming (1993) Pasewark RA, Fleer JL, U of WY

data –

USDA, US Census Dept, Centers for Disease Control

maps –

ESRI ArcGIS 9
questions?