Exploratory Spatial Analyses of Sexual Assaults in Anchorage

André B. Rosay and Robert H. Langworthy
Justice Center, University of Alaska

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Rates of Forcible Rape in U.S., Alaska, and Anchorage

Source: Crime in the United States, 1982 to 2002
Descriptive Analysis of Sexual Assaults in Anchorage

- 541 police reports of sexual assaults in 2000 and 2001
- Collected over 200 variables
- Includes detailed information on pick-up locations, assault locations, drop-off locations, and report locations
- Report available at http://www.uaa.alaska.edu/just

- For this presentation, focus on assault locations (N=585)
- 536 (91.6%) were known
- 428 (79.8% of known) were successfully geocoded
Presentation Outline
Part I – Sexual Assault Maps

• Sexual assault densities
• Sexual assault densities by race, age, relationship, and alcohol use
• Sexual assault densities and bar locations
• Policy implications
Density of Sexual Assault Locations in Anchorage: 2000-2001

Density of Assault Location
- 0 - 5
- 5 - 11
- 11 - 16
- 16 - 22
- 22 - 27
- 27 - 32
- 32 - 38
- 38 - 43
- 43 - 49

Legend:
- Road
- Water
- Park
Sexual Assault Densities by Age

LESS THAN 21

N=140

21 OR MORE

N=275

Density of Assault Locations

- 0 - 4
- 4 - 8
- 8 - 11
- 11 - 15
- 15 - 19
- 19 - 23
- 23 - 26
- 26 - 30
- 30 - 34

Road
Water
Park
Sexual Assault Densities by Relationship

NON-STRANGER

N=143

STRANGER

N=68

Density of Assault Locations

- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 15
- 15 - 17

Road

Water

Park

0 2 4 Miles
Sexual Assault Densities by Alcohol Use

ALCOHOL

N=118

Density of Assault Locations:
- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 19

NO ALCOHOL

N=90

Density of Assault Locations:
- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 19

Legend:
- Road
- Water
- Park

N=140 N=143
Sexual Assault Densities and Bar Locations in Anchorage: 2000-2001
Sexual Assault and Bar Densities

SEXUAL ASSAULT

BAR

N=424

N=155

Density of Assault/Bar Locations

- 0 - 5
- 5 - 11
- 11 - 16
- 16 - 22
- 22 - 27
- 27 - 32
- 32 - 38
- 38 - 43
- 43 - 49

Road
Water
Park
Summary

The epidemiology of sexual assault varies by geography.

<table>
<thead>
<tr>
<th>Most Typical Victim</th>
<th>Mt. View</th>
<th>Northeast</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>15-19</td>
<td>35-44</td>
</tr>
<tr>
<td>RACE</td>
<td>Native</td>
<td>White</td>
</tr>
<tr>
<td>RELATIONSHIP</td>
<td>Stranger</td>
<td>Non-Stranger</td>
</tr>
<tr>
<td>ALCOHOL USE</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Policy Implications

Successful interventions must take into account geographical variations in the epidemiology of sexual assault.

Bars must be part of the intervention.
Presentation Outline – Part II
Exploratory Spatial Data Analysis

- Aggregating by census block group
- Box maps and plots
- Global spatial autocorrelation
- Local spatial autocorrelation
- Relationship between assault and bar locations
- Policy implications
Number of Sexual Assaults by Census Block Group: 2000-2001

Number of Sexual Assaults

- 0 - 1
- 2 - 4
- 5 - 9
- 10 - 17
- 18 - 24
Number of Bars by Census Block Group

Number of Bars

- 0 - 1
- 2 - 4
- 5 - 9
- 10 - 17
- 18 - 24

0 2 4 Miles
Number of Sexual Assaults and Bars by Census Block Group

SEXUAL ASSAULTS

BARS

Number of Sexual Assaults

- 0 - 1
- 2 - 4
- 5 - 9
- 10 - 17
- 18 - 24

Number of Bars

- 0 - 1
- 2 - 4
- 5 - 9
- 10 - 17
- 18 - 24

Distance Scale: 0, 2, 4 Miles
BOX PLOT

- Above high inner fence
- Third quartile to upper inner fence
- Second to third quartile
- First to second quartile
- Lower inner fence to first quartile
- Below low inner fence

BOX MAP
Census Block Group

Nearest Neighbor #1

Nearest Neighbor #2

Nearest Neighbor #3

Nearest Neighbor #4

Nearest Neighbor #5

Nearest Neighbor #6
Moran’s $I = 0.3155$
Cluster Map of Sexual Assault

![Cluster Map of Sexual Assault](image)

- **High-High**
- **Low-Low**
- **Low-High**
- **High-Low**
Relationship Between Assault and Bar Locations

- Scatterplot of assault and bar locations
- Conditional plots of bar locations
- Multivariate spatial autocorrelation
Assault and Bar Locations

Number of Assaults vs. Number of Bars

Slope = 0.8425
Conditional Plots of Bar Locations

- Assaults without Alcohol Only
- No Sexual Assaults
- Assaults With and Without Alcohol
- Assaults With Alcohol Only

Assault Without Alcohol
- Yes
- No

Assault With Alcohol
- No
- Yes
Conditional Histograms of Bar Locations

Assault Without Alcohol

No

Yes

No Bar

Bar

N=31

N=22

N=99

N=36

Assault With Alcohol

No

Yes
Census Block Group

Nearest Neighbor #1

Nearest Neighbor #2

Nearest Neighbor #3

Nearest Neighbor #4

Nearest Neighbor #5

Nearest Neighbor #6
Moran’s $I = 0.1010$
SUMMARY AND POLICY IMPLICATIONS

• There is a relationship between assault locations and bar locations. However,
  – Relationship between assault locations and bar locations is far from perfect.
  – Whether a causal mechanism exists remains unknown.

• Nonetheless, successful interventions must involve bars. Targeting bars, however, will be:
  – Inefficient, and
  – Insufficient.