Better Understanding of the Spatial Extent of Motor Vehicle Fatalities Occurring in Rural Areas Using Geo-coded FARS Data

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Agenda

Background on rural fatalities
Research Question
Data and Methodology
Results
Further Studies
Percentage of Fatalities in Rural Areas

![Bar chart showing the percentage of fatalities in rural areas from 1999 to 2008. The chart indicates a general decrease in the percentage of fatalities over the years.]
Percentage of Fatalities in Rural Areas
Variation across States

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Urbanized Area Boundaries in the US

Urban Areas in Red, any area outside classified as Rural

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Research Question

Vast stretches of rural areas and roadways
Spatial extent of rural fatalities
Fatalities in rural areas near urban areas
  • Commuting ties
  • Urban sprawl
Why Do This?

Isolate problem areas within vast rural expanse

Better focus rural enforcement
‘Sub-Urban’ Roadways
Rural Roadways

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Rural Areas close to Urban Areas
Analytical Interest

How many rural fatalities occur in close proximity to Urban Areas

Compute percent of overall fatalities within 2.5, 5, 7.5 and 10 mile buffers around urban areas

Compute percentages for each state
Examine variation

Guidance to Highway Safety Planners / Enforcement involved in Rural Highway Safety
Data and Methodology Used

FARS only codes Binary Indicator of Land Use (Rural versus Urban)

No way to capture fatalities close to urban areas with FARS variable

FARS has latitude/longitudes

Use GIS software to determine spatial extent of rural fatalities
  • Especially proximity to Urbanized Areas
Rural versus Urban Fatalities
### Fatalities in Urban Areas by various sub-categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Urban</th>
<th>Urban+2.5 mi.</th>
<th>Urban+5.0 mi.</th>
<th>Urban+7.5 mi.</th>
<th>Urban+10 mi.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>44%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Speeding-Related</td>
<td>43%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Motorcyclist</td>
<td>53%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>74%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Involving Large Trucks</td>
<td>35%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Alcohol-Impaired Driving Fatalities</td>
<td>44%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Unbelted Passenger Vehicle Occupants</td>
<td>37%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Fatalities during the Weekend</td>
<td>45%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Nighttime Fatalities</td>
<td>49%</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

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Buffers around Urbanized Areas

Created Using Buffering Tool in GIS Software (ESRI)
Fatalities within Urban Areas and Surrounding Buffers
% of Total Fatalities in Urbanized Areas and Various Buffers around the Urban Areas

![Bar chart showing the percentage of total fatalities in urbanized areas and various buffers around the urban areas. The chart displays data for different buffer zones: Urban, Urban+2.5 miles, Urban+5.0 miles, Urban+7.5 miles, and Urban+10 miles. The percentages are as follows: Urban = 44%, Urban+2.5 miles = 63%, Urban+5.0 miles = 73%, Urban+7.5 miles = 81%, and Urban+10 miles = 86%.]

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% of Speeding-Related, Alcohol-Impaired Driving and Unbelted PV Occupant Fatalities in Urbanized Areas and Buffers around the Urban Areas
% of Motorcyclist Fatalities in Urbanized Areas and Buffers around the Urban Areas

- Urban: 53%
- Urban+2.5 miles: 71%
- Urban+5.0 miles: 80%
- Urban+7.5 miles: 86%
- Urban+10 miles: 90%

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% of Pedestrian Fatalities in Urbanized Areas and Buffers around the Urban Areas

[Bar chart showing percentages of pedestrian fatalities in different urban areas and buffers]

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% of Fatalities in Large Truck Crashes in Urbanized Areas and Buffers around the Urban Areas

- Urban: 35%
- Urban+2.5 miles: 55%
- Urban+5.0 miles: 67%
- Urban+7.5 miles: 75%
- Urban+10 miles: 81%

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# Fatalities in Urban Areas by various sub-categories

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<th>Urban+10 mi.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>44%</td>
<td>63%</td>
<td>73%</td>
<td>81%</td>
<td>86%</td>
</tr>
<tr>
<td>Speeding-Related</td>
<td>43%</td>
<td>61%</td>
<td>71%</td>
<td>79%</td>
<td>85%</td>
</tr>
<tr>
<td>Motorcyclist</td>
<td>53%</td>
<td>71%</td>
<td>80%</td>
<td>86%</td>
<td>90%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>74%</td>
<td>88%</td>
<td>92%</td>
<td>94%</td>
<td>95%</td>
</tr>
<tr>
<td>Involving Large Trucks</td>
<td>35%</td>
<td>55%</td>
<td>67%</td>
<td>75%</td>
<td>81%</td>
</tr>
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<td>44%</td>
<td>63%</td>
<td>73%</td>
<td>81%</td>
<td>86%</td>
</tr>
<tr>
<td>Unbelted Passenger Vehicle Occupants</td>
<td>37%</td>
<td>56%</td>
<td>68%</td>
<td>76%</td>
<td>83%</td>
</tr>
<tr>
<td>Fatalities during the Weekend</td>
<td>45%</td>
<td>64%</td>
<td>73%</td>
<td>81%</td>
<td>86%</td>
</tr>
<tr>
<td>Nighttime Fatalities</td>
<td>49%</td>
<td>67%</td>
<td>77%</td>
<td>84%</td>
<td>88%</td>
</tr>
</tbody>
</table>
State by State breakdowns

Methodology

Identifies states with largest changes between Urban and Urban+Buffer
Useful NHTSA Resources

STSI: State Traffic Safety Information

CATS: Customer Automated Tracking System

STSI Google-Earth Maps (e.g., Arizona)

GIS Resources
- www.gis.com