Fatal Road Injuries in the Adult Population of Gauteng, South Africa 2007-2011

Akhona Tshangela

Supervisors: Anesh Sukhai, Lazarus Kuonza
Introduction

• Road traffic injuries remain a major public health concern
  – 1.3 million deaths globally

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cause</th>
<th>Global burden of disease</th>
<th>Burden attributable to motorized road transport</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Deaths</td>
<td>DALYs</td>
</tr>
<tr>
<td>1</td>
<td>Ischemic heart disease</td>
<td>7,029,270</td>
<td>129,795,464</td>
</tr>
<tr>
<td>2</td>
<td>Stroke</td>
<td>5,874,181</td>
<td>102,238,999</td>
</tr>
<tr>
<td>3</td>
<td>COPD</td>
<td>2,899,941</td>
<td>76,778,819</td>
</tr>
<tr>
<td>4</td>
<td>Lower respiratory infections</td>
<td>2,814,379</td>
<td>115,227,062</td>
</tr>
<tr>
<td>5</td>
<td>Lung cancer</td>
<td>1,527,102</td>
<td>32,405,411</td>
</tr>
<tr>
<td>6</td>
<td>HIV/AIDS</td>
<td>1,465,369</td>
<td>81,549,177</td>
</tr>
<tr>
<td>7</td>
<td>Diarrheal diseases</td>
<td>1,445,768</td>
<td>89,523,909</td>
</tr>
<tr>
<td>8</td>
<td>Road injury</td>
<td>1,328,536</td>
<td>75,487,102</td>
</tr>
<tr>
<td>9</td>
<td>Diabetes mellitus</td>
<td>1,281,345</td>
<td>46,857,136</td>
</tr>
<tr>
<td>10</td>
<td>Tuberculosis</td>
<td>1,195,990</td>
<td>49,399,351</td>
</tr>
<tr>
<td></td>
<td>All other causes</td>
<td>24,207,527</td>
<td>1,682,995,639</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>52,769,676</td>
<td>2,482,258,070</td>
</tr>
</tbody>
</table>

Note: In the “burden attributable to motorized road transport” column, emissions from road transport contribute to deaths and DALYs from ischemic heart disease, stroke, COPD, lower respiratory infections, and lung cancer. Road transport accidents contribute to deaths and DALYs from road injury.

Estimated Road Traffic Fatal Injury Death Rate (Per 100,000 People)

Introduction

• Overall, economically active population (15-59 year old age group)

• 15-29 year old age group
  – 1 in 10 male deaths
  – The 4th leading cause of death in females

• Alcohol: In 2010, nearly a third (31%) of fatal road accidents were attributable to alcohol intake (United States)
Fatalities in South Africa

- Worst number of road traffic fatalities out of 36 other countries worldwide—2013 report
- Second leading cause of injury related fatalities
- In 2011, death toll was 27.6/100,000
  - A decrease from 2000 (39.1/100,000, double global rate)
- Economic burden: USD 31-billion/year
- Alcohol abuse is responsible for more than 50% of these deaths (Arrive Alive, South Africa)
Rationale

• Few studies focus on economically active population

  – Most studies focus on pedestrian fatalities and childhood injuries

  – Household and country financially impacted
Rationale for Gauteng Province

- Economic hub of South Africa (Johannesburg and Pretoria)
- Smallest land area in square kilometres, 18178 km$^2$ (1.4% of South Africa)
- Has 25% of country’s population
- Largest number of vehicles
- Road injuries are the third leading cause of death for both males and females in the 15-44 year-old age group;
  - 95 150 years of lost life (YLL)
Objectives

• To examine variations among the disaggregated adult population age groups in Gauteng, South Africa from 2007 to 2011 by:

  – Person
  – Place
  – Time
  – Association with alcohol intake
Methods

• Retrospective descriptive analysis of fatal road injury data

• National Injury Mortality Surveillance System (NIMSS),
  – Injury related mortality from forensic pathology service facilities (FPS) - previously known as mortuaries
The Electronic National Injury Mortality Surveillance System (eNIMSS): An Innovation for Injury Mortality Surveillance in South Africa

The National Injury Mortality Surveillance System (NIMSS) provides a profile of fatal injuries in South Africa, and is currently focused in the provinces of Gauteng and Mpumalanga.

The ultimate goal is an online integrated system providing access to anyone and everyone who needs information on the nature and extent of injuries in South Africa.
Methods

• Analyzed data for Gauteng Province, 2007-2011

• Analysis focused on 15-64 year old age group
  – Legal driving age limit: 18 years old

• ArcGIS (Geographic Information Systems) mapping used to determine the hotspots
  – 10 local municipalities
  – 509 wards

• Blood alcohol content (BAC) levels tested
  – Only 2008 samples from NIMSS
  – Legal BAC limit: 0.05g/100ml

• Statistical analysis:
  – STATA version 12
  – Microsoft Office Excel 2007 software
Results
Demographic characteristics of fatal road traffic injuries in Gauteng, South Africa, 2007-2011 \((N=14,647)\)

<table>
<thead>
<tr>
<th>Variables</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11935 (82)</td>
</tr>
<tr>
<td>Unknown</td>
<td>22 (0.2)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>682 (5)</td>
</tr>
<tr>
<td>20-24</td>
<td>1756 (12)</td>
</tr>
<tr>
<td>25-29</td>
<td>2225 (15)</td>
</tr>
<tr>
<td>30-34</td>
<td>2230 (15)</td>
</tr>
<tr>
<td>35-39</td>
<td>2006 (14)</td>
</tr>
<tr>
<td>40-44</td>
<td>1570 (11)</td>
</tr>
<tr>
<td>45-49</td>
<td>1012 (7)</td>
</tr>
<tr>
<td>50-54</td>
<td>953 (7)</td>
</tr>
<tr>
<td>55-59</td>
<td>664 (5)</td>
</tr>
<tr>
<td>60-64</td>
<td>421 (3)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1128 (8)</td>
</tr>
</tbody>
</table>
Distribution of fatal road traffic injuries by road user category, Gauteng, South Africa, 2007-2011 (N=14,647)

- Pedestrian: 40% (N=5,866)
- Driver: 20% (N=2,857)
- Passenger: 18% (N=2,623)
- Bi/Motorcyclist: 5% (N=755)
- Unspecified: 17% (N=2,546)
Road Accident Fatalities in Gauteng Province
Distribution of road traffic fatalities by year and month of death in Gauteng, South Africa, 2007-2011 (N = 14,647)

Percentage decrease: 37% from 2007 to 2011

X^2 = 104.1, p < 0.05
Distribution of fatal road traffic injuries by day and time of death
(N = 14,531)
Distribution of fatal road traffic injuries by day of death and age group, Gauteng, South Africa (N = 15,092)
Distribution of fatal road traffic injuries by time of death and age group, Gauteng, South Africa ($N = 15,092$)
Distribution of fatal road traffic injuries by day, time and age group, Gauteng, South Africa (N = 13,401)
Distribution of fatal road injuries by day of death and road user (N = 15,028)
Distribution of fatal road injuries by time of death and road user (N = 15,092)
Distribution of fatal road traffic injuries by day, time and road user

(N = 14,133)
Distribution of fatal road traffic injuries by day, time and road user
(N = 14,133)
Distribution of fatal road traffic injuries by day, time and road user
(N = 14,133)
<table>
<thead>
<tr>
<th>Variables</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>854 (54)</td>
</tr>
<tr>
<td>&lt; 0.05g/100ml</td>
<td>77 (9)</td>
</tr>
<tr>
<td>&gt;= 0.05g/100ml</td>
<td>777 (91)</td>
</tr>
<tr>
<td>Males</td>
<td>765 (89.5)</td>
</tr>
</tbody>
</table>

**Road user groups**

<table>
<thead>
<tr>
<th>Road user groups</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td>361   (42)</td>
</tr>
<tr>
<td>Drivers</td>
<td>234   (27)</td>
</tr>
<tr>
<td>Passengers</td>
<td>124   (15)</td>
</tr>
<tr>
<td>Cyclists</td>
<td>36    (4)</td>
</tr>
<tr>
<td>Unspecified</td>
<td>102   (12)</td>
</tr>
</tbody>
</table>

**Age group (n=808)**

<table>
<thead>
<tr>
<th>Age group</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-29 year old</td>
<td>309   (38)</td>
</tr>
<tr>
<td>30-44 year old</td>
<td>328   (41)</td>
</tr>
<tr>
<td>45-64 year old</td>
<td>171   (21)</td>
</tr>
</tbody>
</table>
Distribution of fatal road traffic injuries by BAC, day and time of death \( (N = 854) \)
Summary

• Decrease in road fatalities
• 15-44 year age group still remain the most vulnerable
• Males remained the most affected
• Most deaths are still pedestrians and these occur on Saturday nights
• Most driver deaths occurred on Sunday early morning
• No significant month of death but long weekends and holidays are the most implicated
• Most BAC tested cases had a positive result
  – Highest proportion are pedestrians, followed by drivers
Limitations

- The time of death can only be an approximation to time of injury
- Pretoria is not included in NIMSS surveillance
- Can only be generalised to an urban setting
Conclusion

• Road traffic fatalities have decreased during the study period

• Targeted resource-efficient intervention strategies focused on vulnerable groups and at most risky times

• Alcohol intake remains an important contributor to these fatal accidents
Recommendations

• Improvement of the surveillance systems
  – Increase surveillance on interventions implemented
  – Include Pretoria in the surveillance

• Interventions should focus more on pedestrians

• Further research
  – Focus on risk factors associated with pedestrian deaths
Acknowledgements

• Forensic pathologists
• Personnel at the participating FPS.
• Karin Pretorius from Violence, Injury and Peace Research Unit (VIPRU)
Thank you
Population density of Gauteng