Firearm Violence: A Public Health Issue

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9/29/14
Leonard Davis Institute of Health Economics

Criminology

Biostatistics

Social Policy

Sociology

Epidemiology

Nursing

Wharton School of Business

FICAP: Firearm & Injury Center at Penn

Cartographic Modeling Laboratory

CHOP

HUP

FICAP: Interdisciplinary Research
Epidemiology

The study of the distribution and determinants of disease in populations, and the application of this study to the control of disease.
Vector, Agent & Host in Environment
Vectors
Agents

*P. falciparum*

*F. tularensis*
Environments
Age-Adjusted Firearm Mortality Rates for “High Income” Nations of 5 Million or More
Based on single year available data between 1990 and 1995

Schwab et al, 2002
## United States Firearm Death Profile

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Firearm Deaths</td>
<td>31,224</td>
<td>10.3</td>
</tr>
<tr>
<td>Suicides</td>
<td>17,352</td>
<td>(56%) 5.6</td>
</tr>
<tr>
<td>Homicides</td>
<td>12,632</td>
<td>(40%) 4.2</td>
</tr>
<tr>
<td>Unintentional</td>
<td>613</td>
<td>(2%) 0.2</td>
</tr>
<tr>
<td>Legal Intervention</td>
<td>351</td>
<td>(1%) 0.1</td>
</tr>
<tr>
<td>Undetermined</td>
<td>276</td>
<td>(&lt;1%) 0.09</td>
</tr>
</tbody>
</table>

*Death rate per 100,000 population.

Source: National Vital Statistics Report, CDC
Firearm Suicide Rate
Gender and Age – U.S.

Rate* per 100,000 population

Source: National Center for Injury Prevention and Control, CDC

*Age-adjusted rates per 100,000 population based on year 2000 standard
Firearm Homicides by Age, Race, and Sex

Source: National Vital Statistics Data, CDC

*Age-adjusted rate per 100,000 U.S. standard population based on year 2000 standard.
Firearms in the U.S.

- 65 million
- 70 million
- 49 million
- 8 million

> 200 million
Average wounds-per-gun

- All Handguns: 4.01
- Pistols: 4.47
- Revolvers: 2.00
- All Long-guns: 2.72
- Rifles: 3.00
- Shotguns: 2.33
Fatalities: Tip of the Iceberg

Nonfatal unintentional gunshot injuries outnumber fatalities by 16:1

Nonfatal firearm assaults outnumber gun homicides by 4:1

In contrast, firearm suicide attempts result in death in approximately 85% of cases

Medical costs of gunshot injuries

• 140,000 gunshot injuries in US annually

• Mean medical cost per injury = $17,000

• Gunshot wounds (GSW) produce $2.3 billion in lifetime medical costs
  – 49% is paid by US taxpayers

• Assault-related GSWs accounted for 74% of total costs
Firearms in Households

One in every three households contains a firearm(s)
Who Owns Guns and Why?

National Survey of Private Ownership of Firearms:

Men: 4 in 10 (41%)
Women: 1 in 10 (67%)

For protection:
- Men: 41%
- Women: 67%
Q: Do you have guns at home?
A: Y / N (depends on whom you ask)

• When asking husband-wife pairs:
  80% of husbands reported guns in the home,
  vs 72% of wives

• Most often, the husband owned the guns

Coyne-Beasley et al  Pediatrics 2005
Azrael et al  Pediatrics 2000
Homicide Deaths in 2006: Who Was Killed and How?

<table>
<thead>
<tr>
<th>Gender</th>
<th>Homicides</th>
<th>% by Gun</th>
<th>% by Intimate</th>
<th>% by Intimate Using Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>3,945</td>
<td>1,795 (46%)</td>
<td>1,247 (32%)</td>
<td>735 (19%)</td>
</tr>
<tr>
<td>Male</td>
<td>12,820</td>
<td>9,006 (70%)</td>
<td>440 (3%)</td>
<td>226 (2%)</td>
</tr>
</tbody>
</table>

Centers for Disease Control, Bureau of Justice Statistics
Case-Control Study of Homicide

- Method (case-control)
  1. **Identify Cases**: persons killed (homicide) at home
  2. **Identify Control**: living persons
  3. **Compare**: did gun ownership differ between groups?

- United States population samples
  - National Mortality Followback Survey (cases)
  - National Health Interview Survey (controls)

- Exposure: presence of gun(s) in the home

Wiebe. Accid Analysis Prev 2003
Homicide: Gun in Home as Risk Factor

Mortality odds ratio (95% CI) associated with having a gun in home

1.7  0.8
Killed with a gun  Killed with another weapon

Linking Guns and Gun Violence

People with guns in their homes are almost twice as likely to be killed by guns as people who do not keep them at home, researchers reported yesterday in The Annals of Emergency Medicine.

And, the researchers found, people with guns are 16 times as likely to commit suicide using guns.

The explanation may lie in the unforgiving nature of firearms, said the author of the study, Dr. Douglas J. Wiebe, who conducted the research at the University of California at Los Angeles and is now at the University of Pennsylvania.

"People who are shot are substantially more likely to die than people injured with nongun weapons," Dr. Wiebe said.

The study was based on a review of the deaths of 1,720 homicide victims and 1,959 suicide victims and a sampling of American adults.

It found that most of the victims, over 56 percent, knew their assailants. A fifth of the homicides occurred during robberies, 6 percent during drug deals and about 15 percent during family arguments.

The study also found that women were significantly more likely than men to be victims of gun homicides. "This likely reflects the singular danger faced by women in abusive relationships," Dr. Wiebe wrote.

Odds ratio (95% CI) for gun in the home
Variation in Pediatric and Adolescent Firearm Mortality Rates in Rural and Urban US Counties

AUTHORS: Michael L. Nance, MD,a Brendan G. Carr, MD, MS,b,c Michael J. Kallan, MS,b Charles C. Branas, PhD,b and Douglas J. Wiebe, PhDb

CONCLUSIONS: Children in the most-rural US counties had firearm mortality rates that were statistically indistinguishable from those for children in the most-urban counties. This finding reflects a greater homicide rate in urban counties counterbalanced by greater suicide and unintentional firearm death rates in rural counties. Nonfirearm mortality rates were significantly greater outside the most-urban US counties. Pediatrics 2010;125:1112–1118
10 Leading Causes of Death, US
10-19 years old

1. Unintentional Injury  8,679  (Guns, 2%)
2. Homicide  2,108  (Guns, 82%)
3. Suicide  1,773  (Guns, 46%)
4. Malignant Neoplasms  1,258
5. Heart Disease  568
6. Congenital Anomalies  466
7. Chronic Low. Resp. Disease  188
8. Influenza & Pneumonia  128
9. Cerebro-vascular  111
10. Septicemia  102

Deaths from motor vehicle crash and gunshot injuries, US (all ages)
Motor Vehicle Crash Prevention: example of a “passive intervention”
Bott’s Dots
<table>
<thead>
<tr>
<th></th>
<th>Host</th>
<th>Equipment</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Event</strong></td>
<td></td>
<td><img src="image" alt="Pistol" /></td>
<td><img src="image" alt="First Aid Kit" /></td>
</tr>
<tr>
<td><strong>Event</strong></td>
<td><img src="image" alt="Body Armor" /></td>
<td></td>
<td><img src="image" alt="Hammer and Gavel" /></td>
</tr>
<tr>
<td><strong>Post-Event</strong></td>
<td></td>
<td><img src="image" alt="Ambulance" /></td>
<td></td>
</tr>
</tbody>
</table>
“None of the funds made available for injury prevention and control at the Centers for Disease Control and Prevention may be used to advocate or promote gun control. CDC’s funds may not be spent on political action or other activities designed to affect the passage of specific Federal, State, or local legislation intended to restrict or control the purchase or use of firearms”.

Table 1  Major NIH research awards and cumulative morbidity for select conditions in the US, 1973–2002

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total cases</th>
<th>NIH research awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td>373</td>
<td>101</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>1337</td>
<td>54</td>
</tr>
<tr>
<td>Polio</td>
<td>266</td>
<td>106</td>
</tr>
<tr>
<td>Rabies</td>
<td>55</td>
<td>59</td>
</tr>
<tr>
<td>Total of four diseases</td>
<td>2031</td>
<td>320</td>
</tr>
<tr>
<td>Firearm injuries</td>
<td></td>
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</tr>
</tbody>
</table>

SUPREME COURT OF THE UNITED STATES

Syllabus

MCDONALD ET AL. v. CITY OF CHICAGO, ILLINOIS, ET AL.

CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT

No. 08–1521. Argued March 2, 2010—Decided June 28, 2010
Strict Gun Laws in Chicago Can’t Stem Fatal Shots

The funeral for a 14-year-old boy who was killed Jan. 11 in Chicago, where there were more than 500 homicides last year and at least 40 killings already in 2013.

By MONICA DAVEY
Published: January 29, 2013

CHICAGO — Not a single gun shop can be found in this city because they are outlawed. Handguns were banned in Chicago for decades, too, until 2010, when the United States Supreme Court ruled that was going too far, leading city leaders to settle for restrictions some describe as the closest they could get legally to a ban without a ban.