

# MOTOR VEHICLE-RELATED INJURIES

## DESCRIPTION:

All unintentional motor vehicle-related deaths, including those involving drivers, passengers, pedestrians, motorcyclists, and bicyclists.



## Washington State Goal Statement

To decrease deaths and hospitalizations due to motor vehicle traffic crashes

## National Healthy People 2020 Objectives

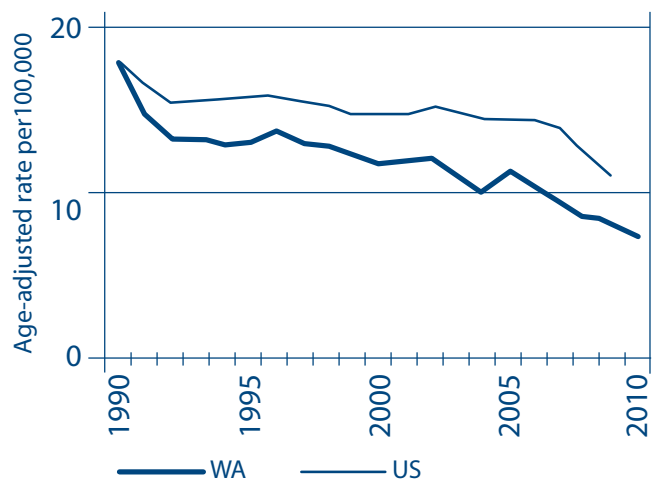
- Reduce motor vehicle death rate from 13.8 to no more than 12.4 per 100,000 and reduce from 1.3 to 1.2 deaths per 100 million vehicle miles traveled.
- Reduce pedestrian deaths on public roads from 1.4 pedestrian deaths to 1.3 deaths per 100,000.
- Reduce pedal cyclist deaths on public roads from 0.24 pedal cyclist deaths to 0.22 deaths per 100,000.
- Reduce nonfatal injuries caused by motor vehicle crashes from 771.5 to 694.4 nonfatal injuries per 100,000.
- Reduce nonfatal pedestrian injuries on public roads from 22.6 to 20.3 nonfatal injuries per 100,000.
- Increase use of safety belts from 84 percent to 92.4 percent.
- Increase age-appropriate vehicle restraint system use in children:
  - Increase the percent of children aged 0 to 12 months who are restrained in rear-facing child safety seats from 86 to 95.
  - Increase the percent of children aged 1 to 3 years who are restrained in front-facing child safety seats from 72 to 79.
  - Increase the percent of children aged 4 to 7 years who are restrained in booster seats from 43 to 47.
  - Increase the percent of children aged 8 to 12 years who are restrained in safety belts from 78 to 86.

- Increase the proportion of motorcycle operators and passengers using helmets from 67 percent to 73.7 percent.
- Increase the number of states and the District of Columbia with “good” graduated driver licensing (GDL) laws from 35 to 51 states.
- Increase the number of states and the District of Columbia with laws requiring bicycle helmets for bicycle riders from 19 to 27 states.

## Statement of the Problem in Washington State

In Washington State, motor vehicle crashes are the second leading cause of unintentional injury death (after poisonings), and the leading cause of major trauma.<sup>1</sup> Motor vehicle injuries are largely preventable and are mainly due to human behavior rather than poor road design, vehicle issues, or weather.

**Motor Vehicle Traffic Deaths**  
Washington State & United States Death Certificates, 1990–2010



According to the Washington Traffic Safety Commission (WTSC), driver and occupant behavior is responsible for the majority of all motor vehicle crashes. WTSC's Strategic Highway Safety Plan (*Target Zero*) reports that between 2009 and 2011, 71.4 percent of traffic fatalities involved driver impairment, speed, and/or run-off-the-road collisions. These three areas were often in play together and resulted in 1,006 deaths during the three year period.

### Washington State Data

The motor vehicle related death rate in Washington State is lower than the national rate. Starting in the early 1990s, motor vehicle deaths leveled off nationally while our state rate continued to decline. National death rates have declined in the last couple of years. In 2010, the most recent year of national death data, the age-adjusted national death rate was 10.65 per 100,000. The rate in Washington State was 7 per 100,000. The death rate per 100 million vehicle miles of travel in 2010 was 0.8 in Washington. Our state has seen consistent declines since 1995 when the death rate per 100 million vehicle miles of travel was 1.3.<sup>2</sup>

### Age and Gender

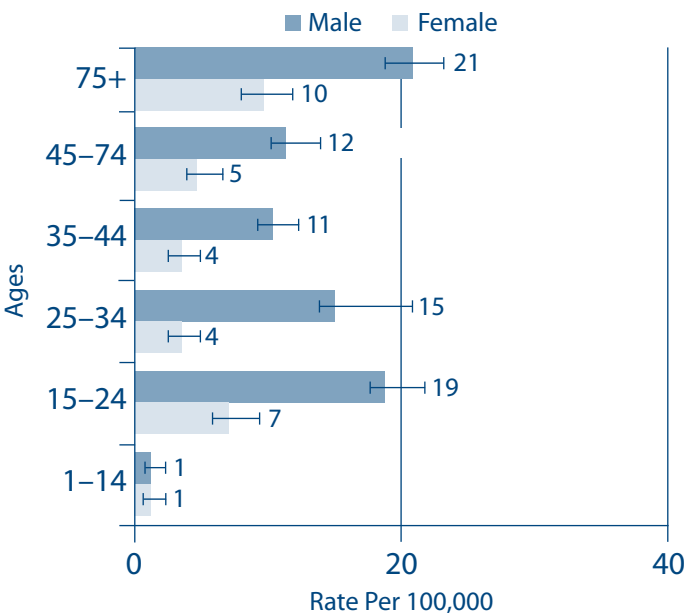
From 2008–2010, 71 percent of residents who died in crashes were males. The highest death rates were among younger males ages 15–34 and older men ages 75 and older.

In crashes of the same severity, older drivers are more likely to die. The prevalence of medical impairments increases with age and the strength of bones and internal organ function decreases, which may increase risk of injury.<sup>3</sup>

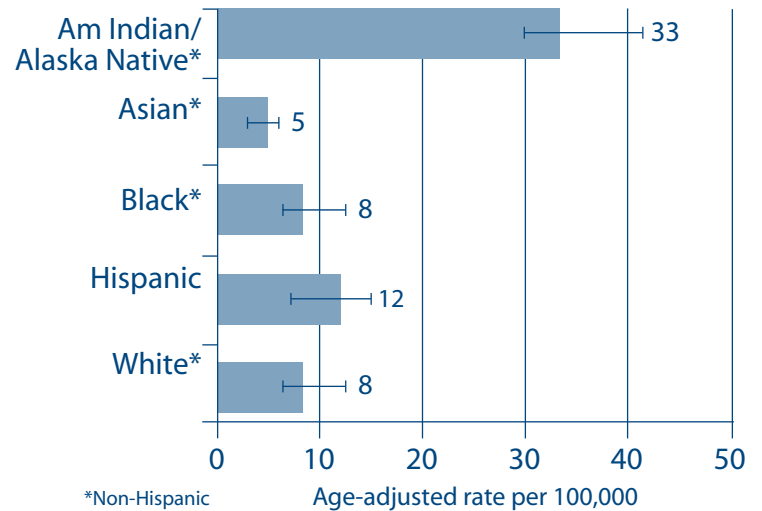
### Race and Ethnicity

From 2007–2009, American Indians and Alaska Natives had the highest motor vehicle traffic death rates, followed by Hispanics. Pacific Islanders had fewer than 20 deaths, and were not included in the chart. Motor vehicle related death rates are higher in low income neighborhoods and among those with lower education.

**Motor Vehicle Traffic Deaths**  
Age and Gender, Death Certificates, 2008–2010



**Motor Vehicle Traffic Deaths**  
Race and Hispanic Origin  
Death Certificates, 2007–2009



### Risk and Protective Factors

Washington's Strategic Highway Safety Plan (*Target Zero*) was approved by Governor Gregoire in 2010. The plan guides traffic safety work for several years. Since most motor vehicle crashes are related to human behavior, the priorities focus on people and the need for some drivers to change their behavior. This section is organized by the *Target Zero* priorities.

### Leading Reasons for Fatal Crashes

The top three factors cited in fatal crashes in Washington State are:

- 1) impairment, which includes alcohol, illicit drugs, and prescription and over-the-counter medications;
- 2) run-off-the-road collisions; and
- 3) vehicle speed.

From 2009 to 2011, 71.4 percent of traffic fatalities involved one of these three factors. Impaired driving claimed 682 lives (48.4 percent of deaths). Speeding claimed 551 lives (39.1 percent of deaths). Run-off-the-road collisions claimed 621 lives (44.1 percent of deaths). Considerable overlap exists between these categories.<sup>2</sup>

### Alcohol impaired driving

From 2009–2011, the most common drinking driver fatality involved:

- Males (79.5 percent)
- 16–25 year olds (56.1 percent)
- Single motor vehicle occupants or riders (66.8 percent)
- Driving on rural roads (60.3 percent)
- Driving at night (51.6 percent)<sup>2</sup>

### Speeding

Speeding is the number one factor in fatal crashes for drivers 16–25 years old. Many speed related deaths occur on the weekends, and most often in the summer months. Although speed related crashes occur most often on freeways, speed related deaths happen most frequently on rural roads.<sup>2</sup>

### Run-off-the-road collisions

Run-off-the-road collisions are especially high on county roads, making up 57.3 percent of all fatalities on county roads from 2009–2011. Once a vehicle leaves the roadway, the most harmful event is the vehicle overturning, followed by impact with an object such as a tree, utility pole, or a ditch. Speeding and impairment overlap significantly in run-off-the-road collisions.<sup>2</sup>

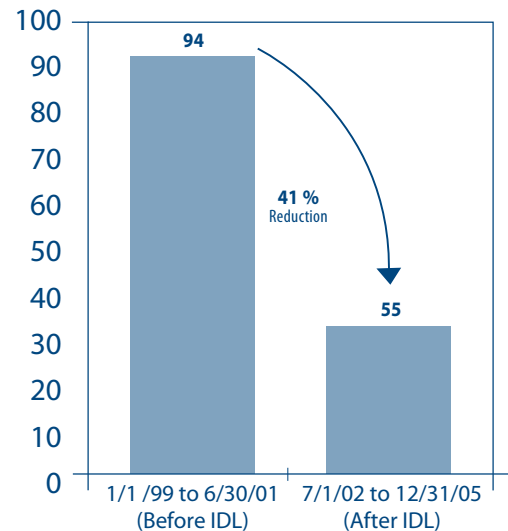
### Young drivers

Young drivers made up only 14.2 percent of all licensed drivers from 2009 to 2011, yet they represented 25.3 percent of drivers in fatal and serious injury crashes. In Washington State, 16–25 year old drivers were twice as likely to be speeding or passing improperly compared to older drivers, and one-third more likely to be impaired while driving. Nationally, two out of three teen passenger deaths occur when another teen is driving.

Newly licensed drivers with less than one year of driving experience have the highest number of crashes and crash rate. Nearly half of the newly licensed driver's fatal crashes were single vehicle crashes.

Washington state issues an Intermediate Driver License (IDL), or a graduated license, to a driver under the age of 18. IDL works by progressively developing and improving the skills of younger, inexperienced drivers in a safer environment. When traffic offenses occur during IDL, there is tiered punishment.

**16–17 Year Old Drivers Involved in Disabling and Fatal Injury Crashes Before/After Study, Annual Average**



Since the IDL law took effect in Washington State in July 2001, there has been a 41 percent drop in the number of fatal and disabling injuries among new 16 and 17 year old drivers.<sup>2</sup>

According to the Healthy Youth Survey, Washington 10th graders who reported driving after they had been drinking alcohol decreased significantly from 10 percent in 1992 to 7 percent in 2010. This still means about 5,700 10th graders in 2010 reported driving after drinking alcohol.

Tenth graders who reported riding in a vehicle driven by someone who had been drinking alcohol declined significantly from 29 percent in 1992 to 22 percent in 2010. This represents about 18,000 10th graders in 2010 who reported riding in the car with a driver who had been drinking alcohol.

These are slow and steady decreases, but many teens still need to stop driving after using alcohol and/or drugs, and should not ride with an impaired driver.

### Protective-Correct Use of Occupant Restraints

Proper use of seatbelts reduces motor vehicle deaths by 60 percent.<sup>4</sup> One of the leading factors in the steady decline in motor vehicle crash deaths in Washington State has been increased seat belt usage.

Seat belt enforcement efforts in Washington State began in 1986 (when seat belt usage was 36 percent) with the passage of the secondary seat belt law. This was followed by a primary seat belt law in 2002.<sup>2</sup> Click-It-or-Ticket campaigns were used extensively and increased enforcement. In 2010, 98 percent of drivers wore seatbelts in Washington State.<sup>5</sup>

Two- and three-year-olds restrained in a child car seat in the rear seat of a vehicle have an 82 percent lower risk for injury than children in lap-shoulder belts.<sup>6</sup> In 2000, 92 percent of children younger than nine rode with some type of restraint system. However, about half of the children were not using appropriate restraints for their age and size.<sup>7</sup>

The current child passenger restraint law in Washington State (RCW 46.61.687) requires:

- When practical, children who are not yet 13 years old will be transported in the back seat.
- Children, prior to 8 years of age, unless already 4'9" tall (57 inches), will be transported in the child restraint system that is appropriate for the child's age and size. Examples include a child car seat, booster seat, or other restraint that is federally-approved for use in the vehicle.
- The restraint system will be used according to the car seat and vehicle manufacturer's instructions.
- Vehicles equipped with lap-only seat belts will be exempt from the requirement to use a booster seat.
- Children eight years of age or at least 4'9" tall who wear a lap/shoulder seat belt will wear it correctly, not under the arm or behind the back.

## Motorcycles

Motorcycles are the most dangerous type of motor vehicle. They are involved in fatal crashes at a rate of 35 per 100 million VMT, compared to a rate of two per 100 million VMT for passenger vehicles.<sup>8</sup> Since 2002, motorcyclist crashes and fatalities have increased significantly. In 2002, there were 54 fatalities and in 2010 there were 68 fatalities. The principle causes for the fatality increases are:

- Rider impairment (60 percent in single-vehicle and 37 percent in multi-vehicle crashes)
- Rider speeding (47 percent in multi-vehicle crashes)
- Inattention of motorcycle riders (18 percent in single-vehicle and 12 percent in multi-vehicle crashes)

- Right-of-way violations by other vehicles in multi-vehicle crashes (25 percent)

Most fatalities are among males and are single vehicle crashes, with the motorcycle leaving the roadway. In 2006, the Washington State Department of Licensing convened a Motorcycle Safety Task Force to assess the problems and to make recommendations. The recommendations focus on improving rider behavior and skill through training, public awareness, and accountability.<sup>9</sup>

## Pedestrians

Even though the number of pedestrians killed in Washington State has declined in the past few years, pedestrian safety is still a concern. Between 2009 and 2011, 193 pedestrians were killed.

Pedestrian fatalities occurred more often:

- In urban areas (68.4 percent)
- Among adults 46 years of age or older (54.9 percent)
- Outside of crosswalks on roadways where crosswalks were available (65.3 percent)
- Among those impaired by alcohol or drugs (51.8 percent)

## Older drivers

By 2030, at least 20 percent of Americans will be age 65 or older. Age itself does not determine driving capabilities, but older drivers can experience declines in their sensory, cognitive, and physical functioning that puts them at an increased risk of motor vehicle crashes. Also, their physical systems are generally less resilient. Because older drivers are more likely to have other health conditions, their risk of death or severe injury in a crash is higher than that of younger people.<sup>3</sup>

## Drowsy drivers

In Washington State, between 2009 and 2011, drivers who were drowsy contributed to 3 percent of fatalities. This is likely to be an underestimate because of the difficulty identifying drowsy drivers. Rumble strips, cable median barriers, and encouraging the use of rest areas may help to reduce fatalities involving drowsy drivers.<sup>10</sup>



## Bicyclists

In bicycle crashes, head injury is the most common cause of death and serious disability. Correctly wearing a bicycle helmet reduces the risk of head injury by 85 percent. Every year about 14 Washington residents die in a bicycle crash, and there are another 610 hospitalizations as a result of a bicycle crash.

For every dollar spent on bicycle helmets, \$30 is saved in direct medical costs. Data from the 2010 Washington Healthy Youth Survey show that 44 percent of 6th graders reported they wear a bicycle helmet either always or most of the time when they ride. However, by the 12th grade, only about 20 percent of students report wearing a helmet always or most of the time when riding.

## Recommended Strategies

### Evidence-Based Strategies

#### Reducing impaired driving

To reduce alcohol impaired driving, evidence-based strategies include a legal blood alcohol concentration limit for adult drivers of .08 percent, maintaining the minimum legal drinking age at 21 years, mass media campaigns, ignition interlocks, multi-component interventions with community mobilization, and using sobriety checkpoints.<sup>11</sup> In addition, it is recommended that school-based instructional programs include reducing riding with alcohol-impaired drivers. In Washington, sobriety checkpoints are illegal, and implementation would require legal changes.

#### Use of speed cameras

Studies show that the use of speed cameras reduces speed, road traffic injuries, and deaths. The amount of reduction in injury and death is difficult to determine because the studies used different methods.<sup>12</sup>

#### Increasing seatbelt use

To increase seatbelt use, it is recommended that laws mandate use, and that there are primary enforcement and enhanced enforcement programs. These programs increase enforcement at specific locations and times, and publicize this effort.<sup>13</sup>

#### Increasing use of child passenger restraints

To increase child safety seats, it is recommended that laws mandate use; that community-wide information is combined with enhanced enforcement; and that education programs are combined with distribution of child safety seats or incentives to buy the seats.<sup>14</sup>

#### Using Intermediate Drivers Licensing (IDL) laws

IDL laws help reduce the number of motor vehicle crashes, injuries, and deaths among young drivers.<sup>15,16</sup> IDL laws with the following components provide the greatest benefit:

- Restriction of night time driving except for work, school, or other sanctioned activities
- Limit the number of teen passengers
- Encourage involvement and support by parents
- Mandate at least 50 hours of supervised driving, including at night, with a licensed adult driver prior to getting the IDL
- Understanding and consistent enforcement of the IDL law by law enforcement agencies

More strategies to encourage and enforce compliance with the law need to be developed. Such strategies need to include more effective education of teen drivers and their parents about:

- IDL restrictions
- Driving responsibilities
- Penalties
- Parental help with driving practice
- Proper restraint of everyone in the vehicle

#### Helmet laws

Motorcycle helmets reduce the risk of death and head injury in motorcycle riders who crash.<sup>17</sup> Bicycle helmet laws appear to be effective in increasing helmet use and decreasing head injury rates in the populations for which they are implemented.<sup>18</sup>

### Promising or Experimental Strategies

#### Use of traffic calming

Traffic calming in towns and cities might reduce the number of road traffic injuries and deaths.<sup>19</sup> Traffic calming includes integration of roundabouts, neighborhood speed bumps, road surface treatment, and specific road designs to discourage speeding.

#### Drowsy drivers

The use of rumble strips to alert inattentive drivers when they deviate from their lane has limited evidence of decreasing crashes when used both on the edge and center of the lane.<sup>20</sup>

## Target Zero teams

Washington has implemented a Washington State Traffic Commission funded project in three populous counties to reduce impaired driving deaths and serious injuries. This enforcement and public information program involves concentrated state and local law enforcement teams whose sole mission is to stop and arrest impaired drivers. Results after two years exceed goals.

## Older adults

There are several screening tests that might help determine driving ability for older drivers.<sup>21</sup>

## Pedestrians

To prevent pedestrian injury in children, the best way is likely making changes to the roads.<sup>22</sup>

## Increase community capacity

Build community capacity with local people and organizations to address specific, local, traffic safety problems.

## For More Information

### Washington State

AAA Foundation for Traffic Safety  
[www.aaafoundation.org](http://www.aaafoundation.org)

Harborview Injury Prevention and Research Center  
[www.hiprc.org](http://www.hiprc.org)

Washington State Booster Seat Coalition  
[www.boosterseat.org](http://www.boosterseat.org)  
Spanish-language resources available

Washington State Safety Restraint Coalition (WSSRC)  
[www.800BUCKLUP.org](http://www.800BUCKLUP.org)

Washington Traffic Safety Commission (WTSC)  
[www.wtsc.wa.gov](http://www.wtsc.wa.gov)

### National

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control  
[www.cdc.gov/ncipc](http://www.cdc.gov/ncipc)

Insurance Institute for Highway Safety  
[www.iihs.org](http://www.iihs.org)

National Highway Traffic Safety Administration (NHTSA)  
[www.nhtsa.gov](http://www.nhtsa.gov)

NHTSA Traffic Safety Marketing  
<http://trafficsafetymarketing.gov/>

Traffic Injury Research Foundation  
<http://trafficinjuryresearch.com/index.cfm>

## Endnotes

- <sup>1</sup> Major trauma is that subset of injuries that encompasses the patient with or at risk for the most severe or critical types of injury and therefore requires a systems approach in order to save life and limb.
- <sup>2</sup> Washington Traffic Safety Commission, *Washington State Highway Safety Performance Plan: Target Zero*, Olympia, WA: Washington Traffic Safety Commission, 2010, <http://targetzero.com/PDF/TargetZeroPlan.pdf>, accessed December 10, 2010.
- <sup>3</sup> E. R. Braver and R.E. Trepel, "Are older drivers actually at higher risk of involvement in collisions resulting in deaths or non-fatal injuries among their passengers and other road users?" *Injury Prevention*, 10; 27-32, 2004.
- <sup>4</sup> C.J. Kahane, *Fatality Reduction by Safety Belts for Front-Seat Occupants of Cars and Light Trucks*. Report Number DOT HS 809 199. Washington, DC: National Highway Transportation Safety Administration, 2000.
- <sup>5</sup> Washington Traffic Safety Commission, *Observed seat belt use rates in Washington counties*, Olympia, WA: Washington Traffic Safety Commission, 2012, <http://www-stage.wtsc.wa.gov/wp-content/uploads/downloads/2012/03/1986-2011-seat-belt-use-by-county.pdf>, accessed June 13, 2012.
- <sup>6</sup> E. Zaloshnja, T.R. Miller, and D. Hendrie, "Effectiveness of child safety seats vs. safety belts for children aged 2 to 3 years," *Archives of Pediatrics and Adolescent Medicine*, 161, 65-68, January 2007.
- <sup>7</sup> Washington Traffic Safety Commission, *2000 Survey of Passenger Restraint Use among Children*, Olympia, WA: Washington Traffic Safety Commission, 2001.
- <sup>8</sup> L.J. Paulozzi and R. Patel, R, "Trends in motorcycle fatalities associated with alcohol-impaired driving—United States—1983, 2003," *Morbidity and Mortality Weekly Report*, 53(47), 1103-1106, 2004.
- <sup>9</sup> Washington Department of Licensing, *Motorcycle Rider Safety Task Force Final Report, 2006*, [www.dol.wa.gov/about/docs/mototaskforce.pdf](http://www.dol.wa.gov/about/docs/mototaskforce.pdf), accessed on July 27, 2012.
- <sup>10</sup> B.C. Tefft, "Prevalence of motor vehicle crashes involving drowsy drivers, United States, 1999-2008," *Accid Anal Prev*. 45: 180-6, 2012.
- <sup>11</sup> Guide to Community Preventive Services, "Motor Vehicle-Related Injury Prevention: Reducing Alcohol-Impaired Driving," [www.thecommunityguide.org/mvoi/AID/index.html](http://www.thecommunityguide.org/mvoi/AID/index.html), accessed on June 13, 2012.
- <sup>12</sup> C. Wilson et al, "Speed cameras for the prevention of road traffic injuries and deaths," *Cochrane Database Syst Rev*. 10:CD004607, 2010.
- <sup>13</sup> Guide to Community Preventive Services, "Motor Vehicle-Related Injury Prevention: Use of Safety Belts," [www.thecommunityguide.org/mvoi/safetybelts/index.html](http://www.thecommunityguide.org/mvoi/safetybelts/index.html), accessed on June 13, 2012.
- <sup>14</sup> Guide to Community Preventive Services, "Motor Vehicle-Related Injury Prevention: Use of Child Safety Seats," [www.thecommunityguide.org/mvoi/childsafetyseats/index.html](http://www.thecommunityguide.org/mvoi/childsafetyseats/index.html), accessed on June 13, 2012.
- <sup>15</sup> K.F. Russell et al, "Graduated driver licensing for reducing motor vehicle crashes among young drivers," *Cochrane Database Systematic Reviews*, 10:CD003300, 2011.
- <sup>16</sup> J.C. Fell et al, "An evaluation of graduated driver licensing effects on fatal crash involvements of young drivers in the United States," *Traffic Inj Prev*. 12(5):423-31, 2011.
- <sup>17</sup> B.C. Liu et al, "Helmets for preventing injury in motorcycle riders," *Cochrane Database Systematic Reviews*, 1:CD004333, 2008.
- <sup>18</sup> A. Macpherson and A. Spinks, "Bicycle helmet legislation for the uptake of helmet use and prevention of head injuries," *Cochrane Database Systematic Reviews*, 3:CD005401, 2008.
- <sup>19</sup> F. Bunn et al, "Area-wide traffic calming for preventing traffic related injuries," *Cochrane Database of Systematic Reviews*, 1, CD003110, 2003.
- <sup>20</sup> J. Hatfield et al, "The effectiveness of audio-tactile lane-marking in reducing various types of crash: a review of evidence, template for evaluation, and preliminary findings from Australia," *Accid Anal Prev*. 41(3):365-79, 2009.
- <sup>21</sup> J.L. Mathias and L.K. Lucas, "Cognitive predictors of unsafe driving in older drivers: a meta-analysis," *Int Psychogeriatr*. 21(4):637-53, 2009.
- <sup>22</sup> C. DiMaggio and G. Li, "Roadway characteristics and pediatric pedestrian injury," *Epidemiol Rev*. 34(1):46-56, 2011.