



FAQ on Pedestrian Safety

1. Are pedestrian deaths and injuries a big problem?

In 2007, 70,000 pedestrians were injured in motor vehicle crashes in this country,¹ and 4,654 pedestrians were killed. Pedestrians comprise about 11 percent of motor vehicle crash deaths each year.

2. Is the pedestrian/motor vehicle crash problem improving?

Yes. Since 1975, the annual number of pedestrian deaths has declined 38 percent, compared with an 8 percent decline in all motor vehicle crash deaths. Pedestrian deaths comprised 17 percent of all crash deaths in 1975 and only 11 percent in 2007. The per capita pedestrian death rate declined 56 percent since 1975 (from 3.5 to 1.5 deaths per 100,000). During the same period, pedestrian death rates decreased 86 percent for ages 0-12, 59 percent for ages 13-19, 33 percent for ages 20-34, 37 percent for ages 35-59, 63 percent for ages 60-69 and 71 percent for people 70 and older.

Reasons for these steep declines are not fully known, but they probably reflect changes in the amount of pedestrian exposure to motor vehicles due to decreased walking, especially among children. A 2001 survey found that less than 15 percent of children ages 5-15 walked to school and 1 percent biked; in 1969 less than 48 percent of children either walked or biked to school.² Traffic engineering improvements also may have reduced the number of pedestrian deaths.

3. Which pedestrians are most likely to be killed or injured in crashes?

Based on population, children younger than 13 years have the lowest pedestrian death rate of all ages, 0.5 per 100,000 people. This represents 19 percent of all motor vehicle crash deaths for this age group. Elderly pedestrians, although struck less frequently than children, are more likely to die after being struck. In 2007, the pedestrian death rate among those 70 and older was 2.7 per 100,000 people, 88 percent higher than the death rate for those younger than 70.

Male pedestrians are more commonly injured and killed in collisions. In 2007, there were 40 percent more injured male pedestrians than females, and more than twice as many male deaths. The gender difference exists among pedestrian deaths of all ages; it is greatest among those 75 and older.¹

4. To what extent does alcohol contribute to pedestrian deaths?

The contribution of alcohol to pedestrian deaths is major. In 2007, 37 percent of fatally injured pedestrians 16 and older had blood alcohol concentrations (BACs) at or above 0.08 percent. Fifty-four percent of pedestrians 16 and older who were fatally injured in nighttime crashes (9 p.m. to 6 a.m.) had high BACs. Fourteen percent of pedestrian deaths involved drivers with a BAC at or above 0.08 percent.¹

5. Where are pedestrian crashes most likely to occur?

Most pedestrian crashes occur in urban areas where pedestrian activity is concentrated. In 2007, 72 percent of pedestrian deaths occurred in urban settings, although there is a higher ratio of deaths to injuries in rural areas because of higher impact speeds on rural roads.³ Seventy-one percent of all pedestrian deaths in 2007 occurred on major roads, including interstates and freeways. A substantial proportion of pedestrian deaths occur at intersections — 24 percent in 2007, and a greater percentage of older pedestrian deaths occurred at intersections when compared to deaths of pedestrians under age 70 (40 percent compared to 21 percent). This is partly because older pedestrians generally cross intersections more slowly.⁴ Diminished vision, hearing, and reaction time also contribute.⁵ The majority of pedestrian crashes occur at locations other than intersections, where vehicle speeds may be higher and where drivers do not expect to have to stop. One common type of collision can be characterized as a dart out, when a pedestrian appears suddenly from the roadside, allowing the driver little time to react. An example is a child running out from between cars parked on a residential street.⁶ A 1993 Institute study of fatal pedestrian crashes in 4 US cities during 1986-90 found that 40 percent of the crashes involving vehicles other than large trucks and 51 percent of the crashes involving large trucks occurred at intersections.⁷

6. When are pedestrians most likely to be struck?

Fatal pedestrian/motor vehicle collisions occur most often between 6 p.m. and midnight. Pedestrian deaths are most likely to occur on Friday, Saturday, or Sunday.

7. Who is at fault in most pedestrian crashes?

A 2002 Institute study of pedestrian deaths in Baltimore and Washington, DC, revealed that pedestrians were more likely than drivers to be judged at fault in these collisions (50 percent versus 39 percent with the remainder being either

shared or unknown fault).⁶ Pedestrians were almost always judged culpable in midblock and intersection dash crashes, the kind involving a pedestrian who appears suddenly in the path of a vehicle. Drivers were usually at fault in other crash types such as when a vehicle is turning or backing up, or when a vehicle leaves the road and strikes a pedestrian.

8. How do most pedestrian injuries occur?

Most pedestrians are struck by the front of a passenger vehicle. What happens next depends on a number of factors including the speed of the vehicle and the relative heights of the pedestrian, the front end of the vehicle, and the bumper. For a pedestrian struck by a passenger car, the initial contacts are with the vehicle bumper and/or the front edge of the hood, depending on the shape of the vehicle front structure. When pedestrians are struck by taller vehicles such as SUVs or pickup trucks, the impact is higher on the body.⁸ Typically, larger vehicles mean worse injuries and higher risk of death.⁹ Generally, for a young child, the bumper will strike the thigh and the front edge of the hood will strike the torso. For an adult, the bumper will strike the knee, and the front edge of the hood will strike the thigh. At low impact speeds (e.g., below 10-12 mph), these may be the only contacts between a pedestrian and vehicle, but at higher speeds, a pedestrian usually slides over the front edge of the hood before the upper body strikes the vehicle hood or windshield. With larger vehicles, the pedestrian may instead be thrown to the ground.¹⁰ As crash speeds increase, the pedestrian's severity of injury is likely to increase.¹¹ Pedestrians' heads, legs, and arms are most frequently injured.¹²

9. How can the frequency of pedestrian crashes be reduced?

Roadway Design: A 2003 Institute review of traffic engineering measures to reduce pedestrian/motor vehicle crashes identified several effective approaches.¹³ Engineering modifications generally can be classified into three broad categories: separation of pedestrians from vehicles by time or space, increasing the visibility and conspicuity of pedestrians, and reduction of vehicle speeds.

Effective countermeasures involving separation include sidewalks, overpasses and underpasses, refuge islands in the medians of busy two-way streets, and exclusive traffic signal phasing that stops all vehicle traffic for part or all of the pedestrian crossing signal duration. Effective measures to increase pedestrian visibility and conspicuity include increased intensity of roadway lighting, diagonal parking, and relocation of bus stops at traffic signals from the near to the far side of the intersection. Higher vehicle speeds are strongly associated with both a greater likelihood of pedestrian crashes and more serious pedestrian injuries. Effective engineering measures to reduce vehicle speeds in urban areas include construction of modern roundabouts in place of stop signs and traffic signals,

traffic calming devices such as speed humps, and multiway stop signs. Speed limits should be strictly enforced in areas of pedestrian activity. Allowing right turns at red lights has been shown to increase pedestrian collisions at intersections, especially in urban areas, so curbing this practice in areas of high pedestrian activity likely would reduce pedestrian collisions.¹⁴ Extending the time available for pedestrians to cross at intersections with signals can be beneficial, especially for older pedestrians.⁴ A 2000 Institute study found that providing pedestrians a 3-second head start through a leading pedestrian interval (a signal that allows pedestrians to begin crossing before the release of turning vehicles) reduces conflicts between pedestrians and turning vehicles.¹⁵ Pedestrian countdown signals, which show the amount of time remaining to cross the street, have been shown to reduce conflicts between vehicles and pedestrians at urban intersections.¹⁶ Special warning signs and pavement markings to encourage or prompt pedestrians to look for turning vehicles as they cross the street may help at signalized intersections. A 1996 Institute study found that sign prompts and crosswalk warning messages increased the percentage of pedestrians looking for threats from turning vehicles and decreased the number of conflicts.¹⁷

Vehicle Design: Vehicle design can influence the type and severity of pedestrian injuries. Modifying the front structures of passenger vehicles to reduce the severity of pedestrian injuries has been the subject of worldwide research.¹⁸ Current front bumper systems produce blunt trauma leg injuries in a high percentage of pedestrian crashes. Bumper stiffness and height also affect the impact severity on other body regions including the head, chest, and pelvis. A 2004 study found that knee injuries are more likely to occur when vehicle bumpers are one-quarter to one-third as tall as pedestrians.^{8,10} Vehicles with bumpers 17-21 inches tall caused the most knee injuries among adults.¹⁰ Lower bumpers on vehicles with square front-end designs appeared to reduce the likelihood of pelvis and leg fractures among pedestrians.¹⁰

Altering a vehicle's hood/fender design can reduce the severity of forces on the heads of test dummies. A 1984 study by the National Highway Traffic Safety Administration (NHTSA) indicated that adult pedestrian head injuries could be significantly reduced if there were at least 2-3 inches of clearance between the hood and engine.¹⁹ The study also found that aluminum hoods may be more flexible and thus able to absorb more pedestrian impact energy than steel hoods. In the early 1990s, NHTSA decided not to proceed with regulatory action that would have required vehicle modifications to lessen pedestrian injuries.

The European Union has set a goal of cutting pedestrian deaths in half by 2010. EuroNCAP (New Car Assessment Program) has been conducting pedestrian impact testing since 1997 to assign safety ratings to vehicles, and starting in 2005 vehicle manufacturers must meet government regulations. The requirements will be phased in: the first phase established 2 crash tests assessing the risk of injury to an adult and a child pedestrian's lower leg and head. The second phase, going into effect September 2010, will include 4

additional crash tests assessing the risk of injury to the upper leg and head. To meet these new requirements, automakers are putting more room between the hood and engine, installing pop-up hoods to soften head impacts, or designing flatter bumpers with more give. It is too soon to tell whether or not these new designs will reduce pedestrian injuries.

Education Programs: Public education programs generally have not been effective in reducing pedestrian crashes. Children however are an exception: A 2002 systematic research review found that safety education could improve children's knowledge and change their observed road crossing behavior.²⁰ Educational messages that instruct children about street crossings have reduced midblock crashes involving kids darting out into the street. In particular, the federal "Willy Whistle" program to teach youngsters how to cross between intersections was associated with a 12 percent reduction in overall child pedestrian collisions and a 21 percent decline in the incidence of motorists striking children who dashed out midblock or from between parked cars.²¹ Tested in Los Angeles, Milwaukee, and Columbus, Ohio, during 1976-78, the program included a film, posters, and media advertisements.²¹

Community-based Programs: A 2004 systematic research review examined the effects of 4 community programs in preventing pedestrian injuries among children.²² Community programs combine education, roadway engineering, and other types of interventions to address a community issue. The programs identified in this review incorporated initiatives such as building and refurbishing playgrounds in an urban area to reduce the number of children playing in the streets, construction of pedestrian roads, establishment of supervised recreation programs, mass media campaigns, and education. All 4 community programs showed improvements in pedestrian safety, ranging from improved traffic control at pedestrian locations to substantial decreases in pedestrian injury.

Daylight Saving Time: Institute research has shown that extending daylight saving time year round could help prevent pedestrian deaths and injuries.²³ Adding an hour of light to the afternoon increases the visibility of both vehicles and pedestrians. Researchers estimated that about 900 fatal crashes (727 involving pedestrians and 174 involving vehicle occupants) could have been avoided during 1987-91 if daylight saving time had been in effect throughout the year. The US Energy Policy Act of 2006 extended daylight saving time by one month. While intended to address long-range energy concerns, the extended daylight saving time has the potential benefit of improving pedestrian safety.

10. Does a trend toward quieter cars represent a problem for pedestrians?

A vehicle's sound helps pedestrians, especially those who are visually impaired, detect a vehicle's presence and movements. Hybrid electric vehicles emit less sound than vehicles with combustion engines, especially when powered solely by electricity as can occur at speeds below 25 mph. Concerns that these vehicles will be hazardous for pedestrians have led to efforts by the federal government

and the automotive industry to investigate the extent of any problem and potential solutions.