CHAPTER 6

Transportation Safety

Highlights

- In 2013, on average, about 95 people were killed and nearly 6,400 people injured per day in transportation-related crashes.
- Transportation safety has been improving in recent decades, averaging 27 fewer fatalities and almost 2,400 fewer injuries per day in 2013 than in 2000.
- Almost 95 percent of transportation fatalities and more than 99 percent of transportation injuries involved highway motor vehicles. In 2013, there were more than 32,700 fatalities and 2,313,000 injuries on the Nation's highways.
- In 2013 nearly 4,700 pedestrians and more than 740 pedalcyclists were killed. Alcohol involvement either by the driver or the pedestrian was reported in 49 percent of all pedestrian crashes in 2013.
- Motor vehicle crashes caused an estimated $242 billion or nearly $784 per person in economic costs in 2010.
- Comparing injury rates, crash victims in cars and other light-duty vehicles were 10 times more likely to be injured than crash victims in large trucks. A motorcyclist is 5 times more likely to be injured than a passenger car occupant when involved in a crash.
- Almost 600 people were killed when they were struck by trains while trespassing on railroad property or at public highway-rail grade crossings. Recreational boating and general aviation accounted for more than 550 and about 400 fatalities, respectively.
- Human factors, such as operating a vehicle while under the influence of alcohol or while distracted, are some of the more common contributing factors to transportation fatalities. Cellphone use contributed to 71 thousand motor vehicles crashes. Many people also fail to use safety equipment, such as seat belts or DOT-compliant motorcycle helmets.

There were about 34,500 transportation-related deaths in 2013, a 3.3 percent improvement from the more than 35,700 transportation-related deaths recorded in 2012. Highway motor vehicle crashes accounted for about 94 percent of the fatalities, followed distantly by the rail, water, and air modes of transportation (table 6-1). In 2013 transportation accounted for 1.5 percent of deaths from all causes and 29.1 percent of the total deaths resulting from injury in the United States [USDHHS CDC VITALITY 2015]. There were 2.3 million nonfatal transportation-related injuries in 2013, down about 2.0 percent from 2012 [USDOT BTS NTS 2015]. Transportation-related injuries accounted for 13.5 percent of unintentional, nonfatal injuries that required a visit to the emergency room in 2013 [USDHHS CDC WISQARS 2015].

In recent decades transportation safety has improved, resulting in a considerable decline in fatalities and injuries. In 2013, despite growth in the U.S. population, the number of licensed drivers, and travel (as discussed in Chapter 1), transportation-related fatalities were down 22.1 percent from 2000 (figure 6-1). Even with the improvements, an average of about 95 people died and nearly 6,400 people were injured per day in motor vehicle crashes in 2013 (tables 6-1 and 6-3).

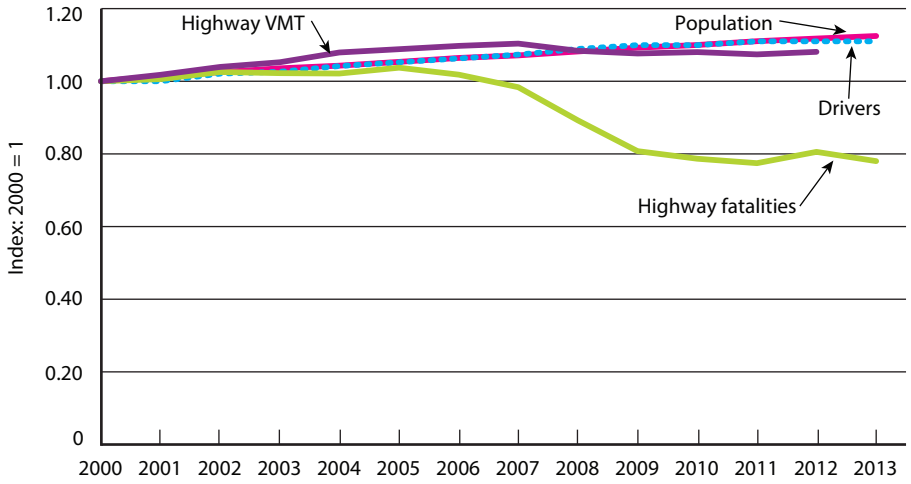
The timeframe and definitions used to attribute a fatality to a transportation crash or accident differ among modes according to their data collection methods, reporting periods, and information management systems. For example, a death that occurs within 30 days of an incident involving highway vehicles is considered a highway fatality, while a death that occurs within 180 days of a rail incident is considered a rail death. Such definitional differences pose challenges when comparing safety records across modes of transportation.

TABLE 6-1 Transportation Fatalities by Mode: 2000, 2010–2013

	2000	2010	2011	2012	2013
Total fatalities	**44,276**	**35,034**	**34,568**	**35,699**	**34,509**
Air	764	476	489	449	429
Highway	41,945	32,999	32,479	33,782	32,719
Railroad	937	734	691	677	706
Transit	295	221	228	264	266
Water	701	821	904	765	642
Pipeline	38	19	12	10	9
Other counts, redundant with above					
Railroad, killed at public crossing with motor vehicle	306	136	139	134	140
Transit non-rail	98	100	96	114	122
Transit rail	197	121	132	150	144

KEY: N = data do not exist; P = preliminary; U = data are unavailable.
NOTES: Please see the *National Transportation Statistics* table 2-1 for complete source notes and an expanded time-series. To reduce double counting, the following adjustments are made to *Total Fatalities*: For Railroad, fatalities involving motor vehicles at public highway-rail grade crossings are excluded because such fatalities are assumed to be included in Highway fatalities. For *Transit, non-rail* modes, including aerial tramway, motor bus, bus rapid transit, commuter bus, demand response, demand taxi, ferryboat, jitney, publico, trolleybus, and vanpool fatalities are excluded because they are counted as Water and Highway fatalities. *Other counts,* redundant with above help eliminate double counting in the *Total Fatalities*. Water fatality data for 2001 and before is not comparable with later year due to a change in the reporting system.
SOURCES: Various sources as cited U.S. Department of Transportation, Bureau of Transportation, *National Transportation Statistics*, table 2-1. Available at www.bts.gov as of September 2015.

FIGURE 6-1 Licensed Drivers, Resident Population, Highway Fatalities, Highway Vehicle-Miles Traveled (VMT): 2000-2013



SOURCES: Drivers and Resident Population: U.S. Department of Transportation (USDOT), Federal Highway Administration, *Highway Statistics 2013*, tables DL-1C and MV-1, available at http://www.fhwa.dot.gov/policyinformation/statistics/2013 as of June 2015. **Highway Fatalities** and **Highway VMT**: USDOT, Bureau of Transportation Statistics, *National Transportation Statistics*, tables 1-35 and 2-1, available at www.bts.gov as of November 2015.

Box 6-A shows fatality reporting requirements for several modes of transportation.

Fatalities by Mode

Table 6-1 shows that in 2013 transportation-related fatalities decreased by almost 10,000 (22.1 percent) from the number tallied in 2000. Despite this improvement, about 34,500 people died in transportation-related incidents in 2013. Many preventive measures, such as child safety seats, graduated driver licensing, increased seat belt use, expanded enforcement of drunk-driving and driving under the influence laws, and education and enforcement, contributed to declines in highway vehicles deaths and injuries [USDHHS CDC NCI 2010]. Improvements in emergency medical response capabilities also played a role.

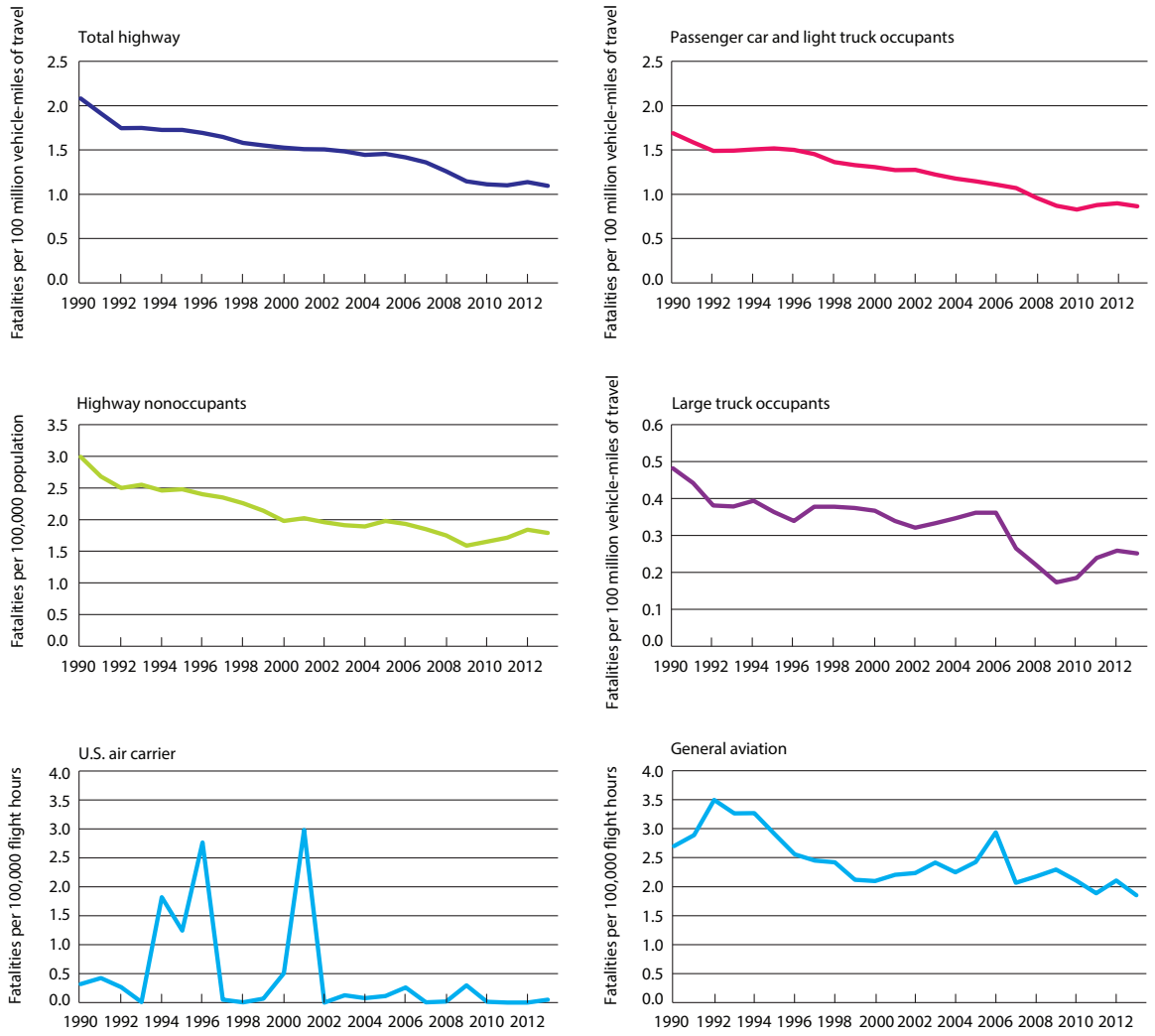
From 1990 through 2013, the overall rate of highway fatalities per vehicle-mile of travel (VMT) declined by 47.6 percent as the highway modes, except for motorcycles, showed across-the-board reductions. Fatalities per 100 million VMT for light-duty vehicle occupants (passenger cars and light trucks), as shown in figure 6-2, decreased 49.1 percent, followed by decreases in the fatality rates of large-truck occupants and highway nonoccupants (e.g., pedestrians, pedalcyclists,

BOX 6-A Fatality Definition by Mode

Mode (Source)	Definition	Citation
Air	Fatal injury means any injury which results in death within 30 days of the accident.	49 CFR 830.2
Hazardous Material	Fatalities must be reported as soon as practical, but no later than 12 hours after the incident and death resulting from injury must be reported within one year of the date of incident	49 CFR 171.15 and 49 CFR 171.16
Highway	Fatality means any injury which results in the death of a person at the time of the motor vehicle accident or within 30 days of the accident.	49 CFR 390.5
Pipeline	Fatalities reported as soon as practical but not more than 30 days after detection of an incident.	49 CFR 191.3 and 195.50
Railroad	Fatality means the death of a person within 24 hours of an accident. Also if an injured person dies within 180 days from the date of the injury.	49 CFR 840.2 and FRA Guide for Preparing Accident/Incident Reports
Rail Transit	A fatality at the scene; or where an individual is confirmed dead within 30 days of a rail transit-related incident;	49 CFR 659.33
Recreational Boating	Fatalities means a person dies within 24 hours of the accident. 10 days of the occurrence or death if an earlier report is not required	33 CFR 173 and 174

KEY: USDOT = U.S. Department of Transportation; USDHS = U.S. Department of Homeland Security.

FIGURE 6-2 Fatality Rates for Select Modes of Transportation: 1990–2013



NOTES: Graphs with same color trend lines have identical scales. *Air carrier* fatalities resulting from the Sept. 11, 2001 terrorist acts include only onboard fatalities. *Nonoccupant* includes pedestrians and riders of nonmotorized bicycles and other pedal-powered vehicles and is measured on a per capita basis because exposure based estimates are not available.

SOURCE: Calculated by U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS) based upon multiple sources as cited in USDOT, BTS, *National Transportation Statistics*. Tables 2-9, 2-14, 2-17, 2-19, 2-21, and 2-23. Available at www.bts.gov as of March 2015.

BOX 6-B Fatality Reporting

There are two major sources for national reporting of transportation fatalities, most notably for highway fatalities—the U.S. Department of Health and Human Services, Centers for Disease Control's National Vital Statistics System (NVSS) and the U.S. Department of Transportation, National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS). Each data source has its own unique data collection and reporting criteria designed to fulfill the particular needs of the collecting agency. For example, the NVSS reported 35,400 highway fatalities and FARS reported over 32,700 highway fatalities in 2013 [USDHHS CDC VITALITY 2015].

The NVSS is based on death certificates recorded according to the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* (ICD–10) specifications and include not only fatalities that occurred on public roads, but off-road fatalities such as those attributed to bulldozers on non-highway construction sites and harvesters on farms. FARS is based on police accident reports and mostly includes highway fatalities that occurred on public roads. Such differences in data collection, coding schemas, and reporting criteria lead to differing numbers.

and other fatalities per 100,000 population) of 47.9 and 40.1 percent, respectively. Human factors, advances in vehicle design, and improved road design all contributed to these improvements [USDOT NHTSA 2012].

While reductions in fatalities and injuries have been the greatest on the highway, other modes, including general aviation, railway, and recreational boating, have also improved safety records. Figure 6-2 shows that the safety record of air carriers (as measured by fatalities per departure) has remained stable and low. But despite the fact that the general aviation fatality rate (as measured by fatalities per flight hour) decreased by 31.4 percent from 1990 to 2013, over 400 people died in general aviation crashes in 2013.

Highway

In 2013 passenger car and light truck (e.g., sport utility vehicle, minivan, and pickup truck) occupants comprised 61.2 percent of all transportation fatalities (table 6-2). Passenger car and light truck fatalities have declined about 11,100 since 2000, with the reduction in passenger car fatalities accounting for 8,700 of the decrease [USDOT BTS 2015].

In 2013 nearly 4,700 motorcyclists died. While the miles logged by motorcycles represented less than 1 percent of total highway vehicle-miles traveled in 2013, motorcycle fatalities accounted for 13.5 percent of total transportation-related fatalities, increasing nearly 1,800 from 2000 when they accounted for 6.5 percent of transportation-related fatalities. Several factors contributed to this increase, which are discussed later in the chapter (e.g., growing ridership, failing to wear a DOT-compliant helmet). The rise in the percentage share of motorcyclist fatalities also reflects the drop in the share of deaths attributable to other highway categories and nonhighway modes of transportation.

TABLE 6-2 Distribution of Transportation Fatalities: 2013

	2000		2010		2011		2012		2013	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
TOTAL fatalities	**44,276**	**100.0**	**35,034**	**100.0**	**34,568**	**100.0**	**35,699**	**100.0**	**34,509**	**100.0**
Passenger car occupants	20,699	46.7	12,491	35.7	12,014	34.8	12,361	34.6	11,977	34.7
Truck occupants, light	11,526	26.0	9,782	27.9	9,302	26.9	9,418	26.4	9,155	26.5
Pedestrians	4,763	10.8	4,302	12.3	4,457	12.9	4,818	13.5	4,735	13.7
Motorcyclists	2,897	6.5	4,518	12.9	4,630	13.4	4,986	14.0	4,668	13.5
Pedalcyclists	693	1.6	623	1.8	682	2.0	734	2.1	743	2.2
Highway, other incident	591	1.3	709	2.0	699	2.0	729	2.0	702	2.0
Truck occupants, large	754	1.7	530	1.5	640	1.9	697	2.0	691	2.0
Recreational boating	701	1.6	672	1.9	758	2.2	651	1.8	560	1.6
Railroad, trespassers	463	1.0	440	1.3	405	1.2	413	1.2	432	1.3
General aviation	596	1.3	457	1.3	448	1.3	440	1.2	387	1.1
Highway-rail grade crossing	425	1.0	261	0.7	250	0.7	230	0.6	231	0.7
Transit, other incident	N	N	166	0.5	189	0.5	192	0.5	196	0.6
Transit passenger/occupant	N	N	49	0.1	36	0.1	67	0.2	60	0.2
Water, passenger	N	N	87	0.2	96	0.3	84	0.2	57	0.2
Bus occupants	22	0.0	44	0.1	55	0.2	39	0.1	48	0.1
Rail, other incidents	39	0.1	25	0.1	30	0.1	25	0.1	32	0.1
On-demand air taxi	71	0.2	17	0.0	41	0.1	9	0.0	27	0.1
Water, industrial/other	N	N	40	0.1	32	0.1	16	0.0	17	0.0
Train accidents	10	0.0	8	0.0	6	0.0	9	0.0	11	0.0
Train employee/worker	N	N	6	0.0	3	0.0	5	0.0	10	0.0
U.S. air carrier	92	0.2	2	0.0	0	0.0	0	0.0	9	0.0
Water, freight	N	N	22	0.1	18	0.1	14	0.0	8	0.0
Gas pipeline	37	0.1	18	0.1	11	0.0	7	0.0	8	0.0
Commuter carrier	5	0.0	0	0.0	0	0.0	0	0.0	6	0.0
Hazardous liquid pipeline	1	0.0	1	0.0	1	0.0	3	0.0	1	0.0
Other counts, redundant with above										
Rail, freight	717	1.6	519	1.5	497	1.4	478	1.3	509	1.5
Rail, passenger	220	0.5	215	0.6	194	0.6	200	0.6	198	0.6
Transit, rail	197	0.4	120	0.3	132	0.4	150	0.4	144	0.4
Railroad, killed at public crossingwith motor vehicle	306	0.7	136	0.4	139	0.4	134	0.4	140	0.4
Transit, non-rail	98	0.2	100	0.3	96	0.3	114	0.3	122	0.4

KEY: N = data do not exist.

NOTES: Please see the *National Transportation Statistics* table 2-4 for complete source notes and an expanded time-series. To reduce double counting, the following adjustments are made to *Total Fatalities*: For Railroad, fatalities involving motor vehicles at public highway-rail grade crossings are excluded because such fatalities are assumed to be included in Highway fatalities. For *Transit, non-rail* modes, including aerial tramway, motor bus, bus rapid transit, commuter bus, demand response, demand taxi, ferryboat, jitney, publico, trolleybus, and vanpool fatalities are excluded because they are counted as Water and Highway fatalities. Other counts, redundant with above help eliminate double counting in the *Total Fatalities*. Water fatality data for 2001 and before is not comparable with later year due to a change in the reporting system.

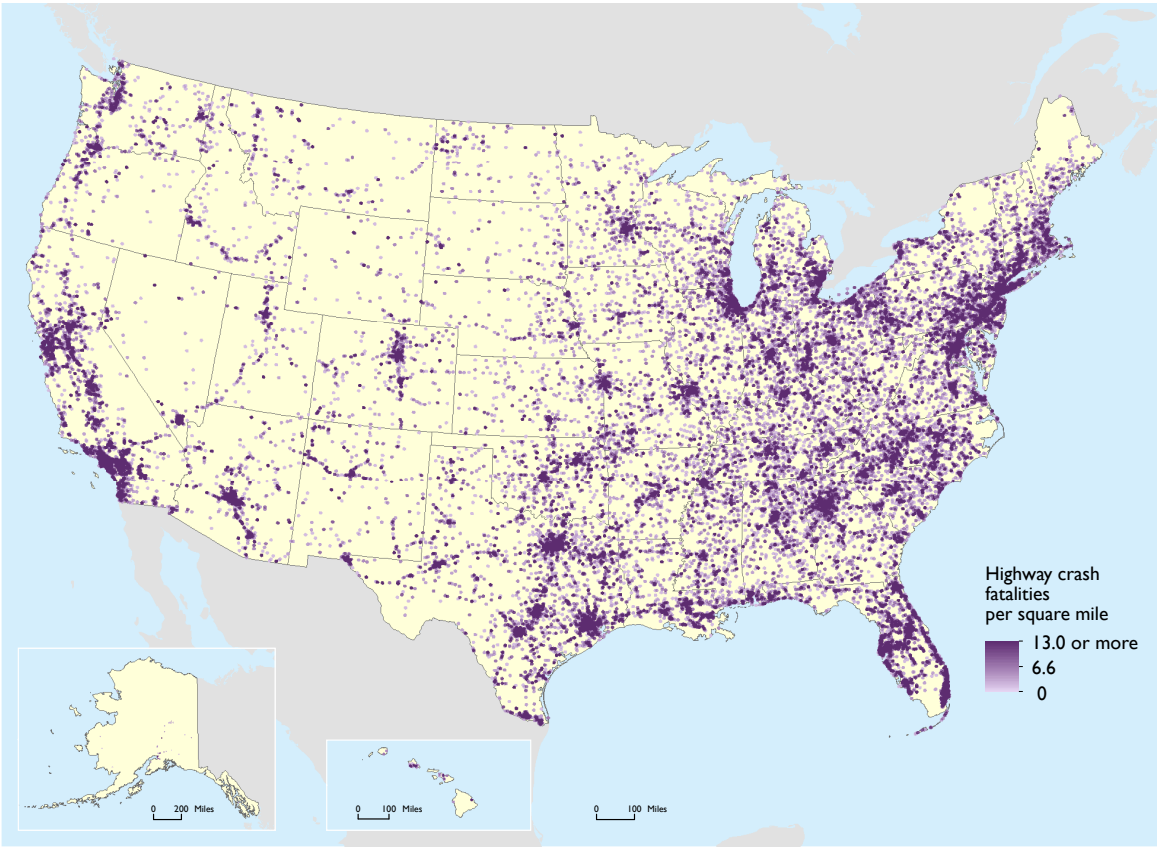
SOURCES: Various sources as cited U.S. Department of Transportation, Bureau of Transportation, *National Transportation Statistics*, table 2-4. Available at www.bts.gov as of July 2015.

In 2013 nearly 5,500 pedestrians and pedalcyclists were struck and killed by motor vehicles, up from about 5,100 in 2010. Pedestrians and pedalcyclists—who increasingly share the roads with motor vehicles—accounted for 15.9 percent of total transportation-related deaths in 2013, thus they account for a larger share today than in 2000 (12.3 percent).

Highway fatalities in 2013 were concentrated along the major corridors in the populated areas of California, Florida, Illinois, Texas, and throughout the populous and heavily traveled Northeast region near Boston, MA, down to the Middle Atlantic region, near Washington, DC. In addition, fatalities were also highly concentrated along major highway corridors and around urban areas in the South Atlantic region (figure 6-3).

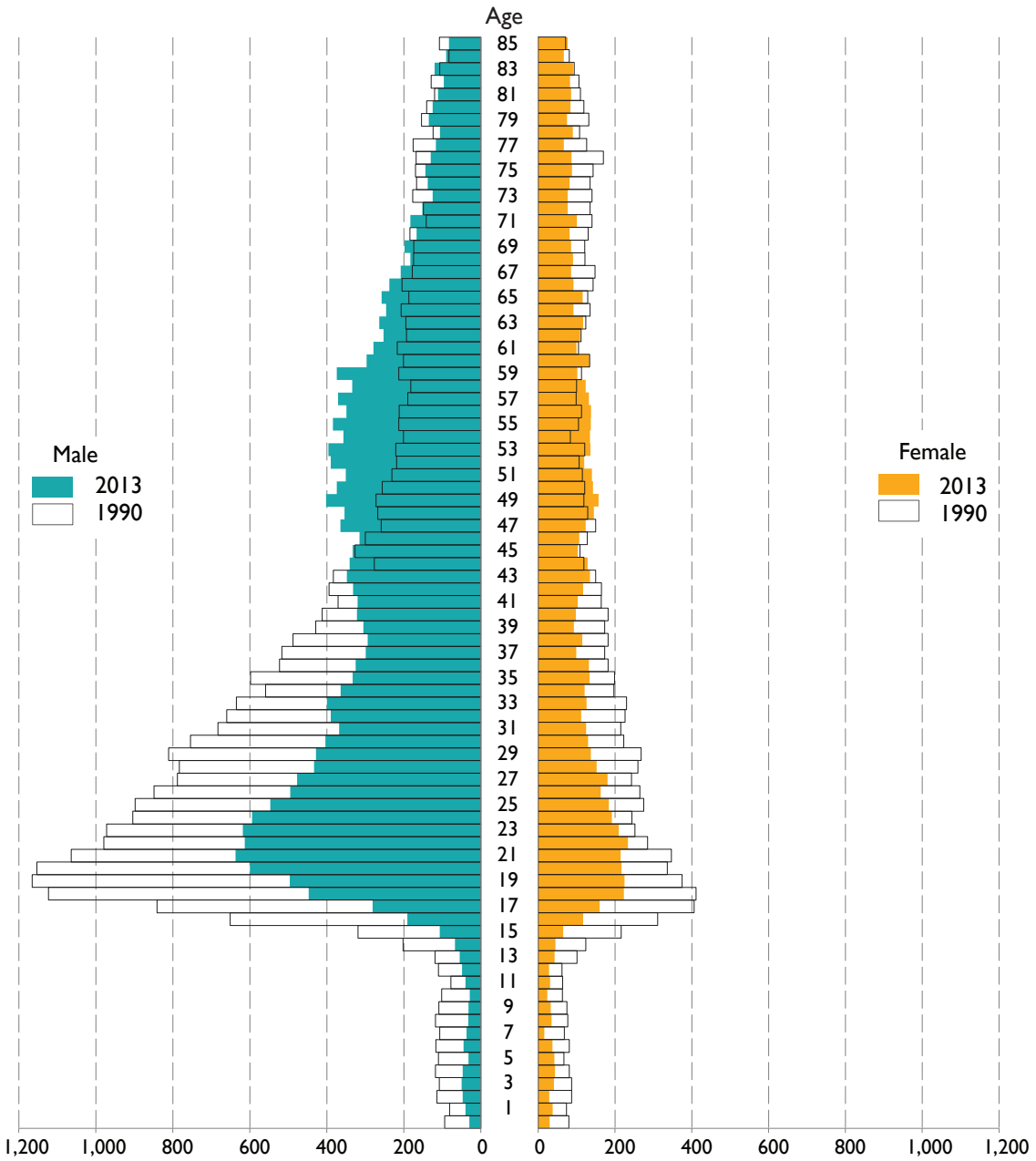
In 2013 the ratio of males to females in the total U.S. population was 0.97, with females outnumbering males by about 5 million [USDOC CENSUS 2014]. However, the number of males killed on the highway exceeded the number of females killed for most age groups in 1990 and 2013 (figure 6-4). This difference is partially due to the fact that males, on average, drive more than females and thus have a higher rate of exposure to accidents.

FIGURE 6-3 Highway Crash Fatalities: 2013



SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Fatality Analysis Reporting System*, available at www.fars.nhtsa.dot.gov as of March 2015.

FIGURE 6-4 Fatalities Number by Age and Sex: 1990 and 2013



SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Fatality Analysis Reporting System*, available at ftp.nhtsa.dot.gov as of March 2015.

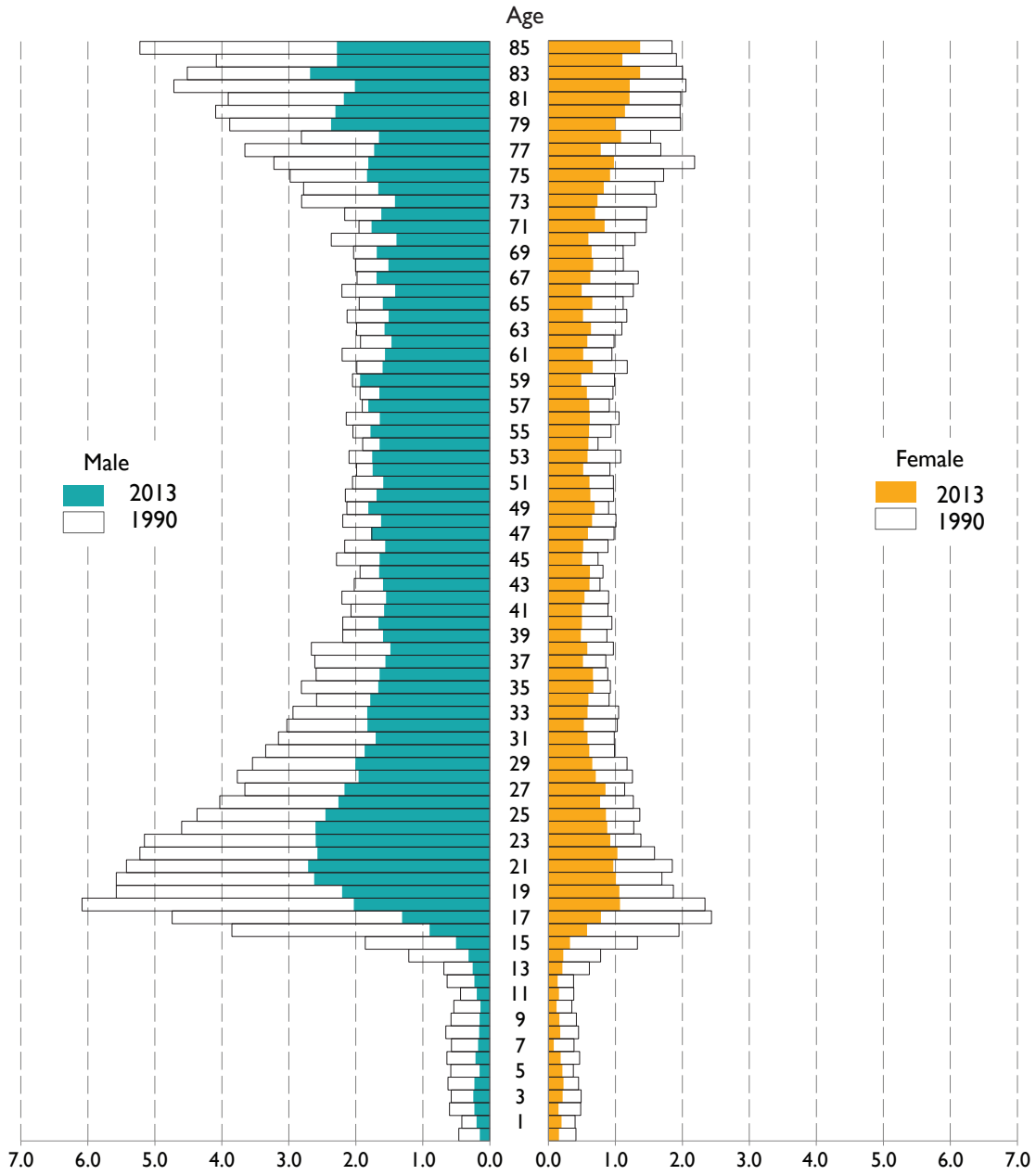
Teenagers and younger adults had the highest fatality numbers in 2013, although their deaths have declined considerably since 1990. A potential contributing factor is that those under age of 30 in 2013 drove significantly less miles than their 1990 counterparts, reducing the exposure to highway crashes.

In 2013 males comprised 70.7 percent of highway fatalities, up slightly from 69.3 percent in 1990. The greatest numbers of highway fatalities by age and gender in 2013 were among 21-year-old males and 22-year-old females (figure 6-4). Motor vehicle crashes are the leading cause of death for teens aged 16 to 20 years [USDHHS CDC WISQARS 2015]

Graduated driver licensing (GDL) programs were established to help inexperienced, young drivers safely gain experience while limiting their exposure to high-risk driving conditions, such as night driving and carrying teen passengers during early months of licensure. GDL programs along with other factors have contributed to a considerable reduction in teenage and young adult fatal and nonfatal injury crashes [USDHHS CDC PHLP 2014].

Since 1990 there has been a considerable decrease in highway fatalities per capita across all age groups for both genders. The greatest numbers of fatalities per capita in both 2013 and 1990 were among males between the ages of 18 and 29, followed by those 79 and older. Female fatalities per capita in both 2013 and 1990 peaked for those between 16 and 27 years of age, followed by those over the age of 80. The 1990 rates were again higher (figure 6-5).

FIGURE 6-5 Fatalities Rate by Age and Sex: 1990 and 2013

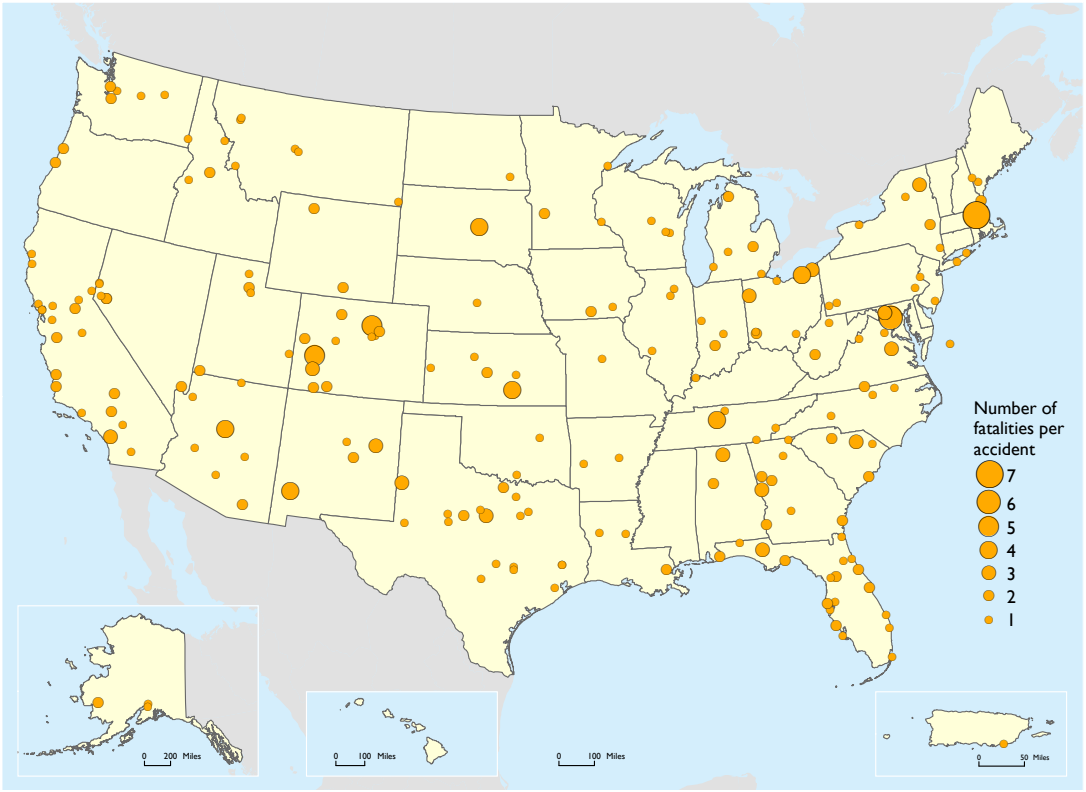


SOURCES: Fatality Data: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Fatality Analysis Reporting System*, available at ftp.nhtsa.dot.gov as of March 2015. **Population Data**: U.S. Department of Commerce, U.S. Census Bureau, available at www.census.gov as of March 2015.

Aviation

Unlike the large U.S. air carriers and commuter airlines, which combined had less than 20 fatalities in 2013, each year general aviation fatalities number in the hundreds. In 2013 about 390 people were killed in general aviation accidents (table 6-1), but even this relatively high number represents a significant drop from previous years. In the 10 years spanning 1990 to 1999, general aviation accidents killed an average of 716 persons per year and then dropped to 567 deaths per year in the following decade. Most general aviation accidents involved single-engine, piston-powered airplanes, which account for the majority of general aviation aircraft and flight hours [USDOT FAA 2013]. The loss of control inflight contributed to the majority of fatalities, whereas loss of control on the ground and engine-related system malfunctions were associated with the majority of nonfatal accidents [NTSB 2014a]. Ballistic parachutes are a standard feature on some general aviation airplanes and are retrofitted to others. They can help prevent fatal or serious injuries from mid-air collisions, loss of engine power, loss of airplane control, structural failure, pilot disorientation, or pilot incapacitation with a passenger on board [GPO FR 1997].

FIGURE 6-6 General Aviation Fatalities: 2014



SOURCE: National Transportation Safety Board, *Aviation Accident Database*, available at http://www.ntsb.gov/ as of July 2015.

BOX 6-C Drones Pose New Aviation Threat

The rising popularity of unmanned aircraft systems (UAS), commonly known as "drones," presents a major safety risk to manned aircraft crews, airline passengers, and anyone below their flight paths. For example, unauthorized UAS flights recently interfered with aerial tankers battling wildfires, which grounded the manned aircraft and put firefighters on the ground at greater risk [USDOT FAA 2015a].

In all of 2014, pilots reported 238 unmanned aircraft sightings. But as of Aug. 9, 2015, pilots of all aircraft types, including large, commercial passenger aircraft reported more than 650 UAS sightings. In June 2015 alone, 138 pilots reported seeing drones at altitudes up to 10,000 feet, up from 16 reported sightings in June 2014. Unauthorized drone operators may be subject to fines of up to $25,000 and 20 years in jail [USDOT FAA 2015b].

On October 19, the U.S. Department of Transportation announced plans to develop an Unmanned Aircraft Systems (UAS) registration process, which helps hold unsafe operators accountable and responsible for ensuring public safety in the air and on the ground [USDOT FAA 2015c].

References

U.S. Department of Transportation (USDOT), Federal Aviation Administration (FAA):

—2015a. FAA: Wildfires and Drones Don't Mix. Available at http://www.faa.gov/ as of August 2015.

—2015b. Pilot Reports of Close Calls With Drones Soar in 2015. Available at http://www.faa.gov/ as of August 2015.

—2015c. U.S. Transportation Secretary Anthony Foxx Announces Unmanned Aircraft Registration Available at https://www.transportation.gov/ as of October 2015.

Fatal general aviation accidents were widely dispersed across the country in 2014. Nearly two-thirds of general aviation accidents resulted in a single fatality, another quarter resulted in two fatalities, and the remainder yielded multiple fatalities (figure 6-6). The popularity of unmanned aircraft systems (UAS), commonly known as "drones," poses several challenges, which are discussed in box 6-C.

Recreational Boating

Recreational boating accounted for 560 transportation-related fatalities in 2013, second to number of fatalities occurring in highway crashes (table 6-1). According to the U.S. Coast Guard, many boating fatalities occurred on calm protected waters, in light winds, or with good visibility. Alcohol use, operator distraction, or the lack of training played key roles in fatal recreational boating accidents [USDHS USCG 2014].

Other Modes

Pipeline fatalities averaged about 15 per year between 2000 and 2013. Transit fatalities in 2013 were about 30 less than they were in 2000 (a 9.8 percent drop). In 2013 rail fatalities—primarily those killed when they were struck by trains while trespassing on railroad property—decreased 24.7 percent from 2000. Rail transit accounts for most of the decline in transit fatalities, but still accounts for slightly more than half all transit fatalities (table 6-2).

Injured People by Mode

All transportation-related injuries declined about 885,000 (27.5 percent) in 2013 from 2000 (table 6-3), which was largely due to an 876,000 (27.5 percent) reduction in highway-related injuries over that time period. All modes of transportation showed a decline in injuries between 2000 and 2013. Highway modes accounted for 99.1 percent of 2013 transportation injuries.

According to National Highway Traffic Safety Administration (NHTSA) estimates, there were more than 2.3 million people injured in highway crashes in 2013. In contrast to fatalities, which are pulled from police accident reports and a census of all fatal accidents, NHTSA estimates the total number of people injured from a sample because an exact number from the many millions of accidents that occur each year is impracticable to tally. This estimate indicates that about 6,300 people per day are injured in motor vehicle crashes.

In addition to the people injured on the Nation's highways, in 2013 about 21,000 people were injured in nonhighway-related incidents. Rail and rail transit accounted for the greatest number of injuries (about 9,100 and 8,800, respectively), followed by water (about 3,400)—mostly from recreational boating.

The injury rate for highway crashes per vehicle-miles traveled in 2013 was 66.4 percent of that in 2000. Comparing injury rates, crash victims in cars and other light-duty vehicles were 10 times more likely to be injured than crash victims in large trucks (figure 6-7). The air carrier injury rate (measured by the number of injuries per departure) remained relatively low and stable, including the general aviation injury rate (measured by the number of injuries per flight hour) between 2000 and 2013.

TABLE 6-3 Transportation Injuries by Mode: 2000, 2010–2013

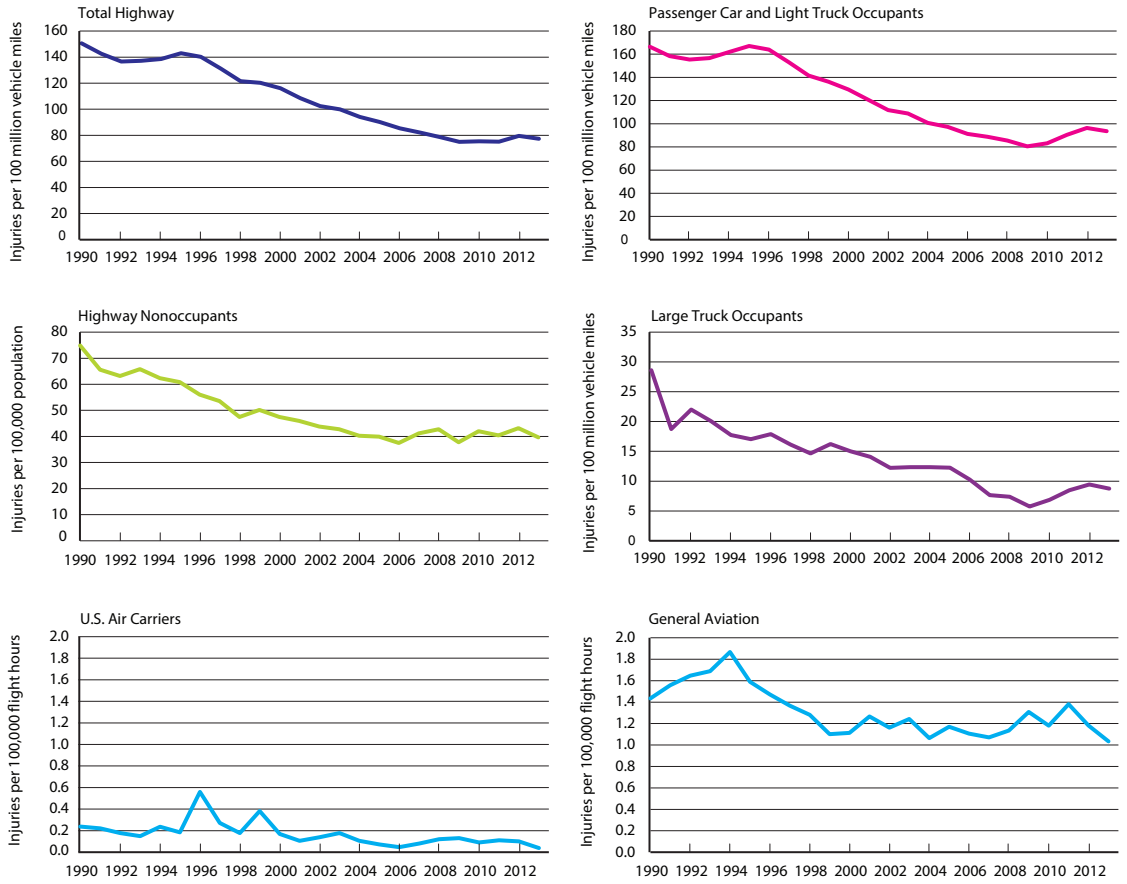
	2000	2010	2011	2012	2013
Total	**3,218,900**	**2,259,731**	**2,237,378**	**2,382,010**	**2,333,903**
Air	359	278	363	274	250
Highway	3,188,750	2,239,000	2,217,000	2,362,000	2,313,000
Railroad	12,057	8,767	8,790	8,836	9,135
Transit	56,697	25,222	22,919	23,325	24,622
Water	N	3,770	3,823	3,327	3,432
Pipeline	81	109	56	58	44
Other counts, redundant with above					
Railroad, injured at public crossing with motor vehicle	1,029	718	827	763	775
Transit non-rail	42,713	16,697	14,746	15,047	15,805
Transit rail	13,984	8,525	8,173	8,278	8,817

KEY: N = data do not exist.

NOTES: Please see the *National Transportation Statistics* table 2-2 for complete source notes and an expanded time-series. To reduce double counting, the following adjustments are made to *Total Injuries*: For *Railroad, injuries involving motor vehicles at public highway-rail grade* crossings are excluded because such injuries are assumed to be included in Highway injuries. For *Transit, non-rail* modes, including aerial tramway, motor bus, bus rapid transit, commuter bus, demand response, demand taxi, ferryboat, jitney, publico, trolleybus, and vanpool fatalities are excluded because they are counted as Water and Highway injuries. *Other counts, redundant with above* help eliminate double counting in the *Total injuries*. Water injury data for 2001 and before is not comparable with later year due to a change in the reporting system.

SOURCES: Various sources as cited U.S. Department of Transportation, Bureau of Transportation, *National Transportation Statistics*, table 2-2. Available at www.bts.gov as of September 2015.

FIGURE 6-7 Injury Rates for Select Highway Modes: 1990–2013



SOURCE: National Transportation Safety Board, *Aviation Accident Database*, available at http://www.ntsb.gov/ as of July 2015.

Costs of Motor Vehicle Crashes

Motor vehicle crashes caused an estimated $242 billion in economic costs in 2010 (the latest year for which estimates are available), up by $11.4 billion (4.9 percent) over the nearly $231 billion estimated for 2000. Approximately 27 percent (or about $3.1 billion) of the increase is attributed to inflation. The $242 billion in economic costs can be broken down as follows:

- lost productivity accounted for $77.3 billion (31.9 percent);
- property damage losses totaled $76.1 billion (31.4 percent);
- congestion impacts reached $28 billion (11.6 percent);
- medical expenses amounted to $23.4 billion (9.7 percent); and
- other crash-related costs, such as insurance administration and legal fees, accounted for the remaining 37.2 billion (15.4 percent) [USDOT NHTSA 2015b].

If averaged across the U.S. population in the study year, motor vehicle crashes cost nearly $784 per person in 2010. When factoring in the $594 billion in comprehensive costs from the loss of life, pain, and injuries, the cost of 2010 motor vehicle crashes totaled about $836 billion. Of this total, economic costs represent 29 percent and lost quality of life represent 71 percent [USDOT NHTSA 2015b].

Motorcycles accounted for less than 1 percent of the vehicle-miles traveled but 14 percent of highway fatalities in 2010, largely due to the lack of protection available to occupants of other highway vehicles and the increase in motorcycle vehicles-miles traveled. Per vehicle-mile of travel, a motorcyclist was about 30 times more likely than a passenger car occupant to die in crash and 5 times more likely to be injured. In 2010 motorcycle crashes cost $12.9 billion in economic impacts and $66 billion in comprehensive costs. Compared to other motor vehicle crashes, these costs are disproportionately caused by fatalities and serious injuries [USDOT NHTSA 2015b].

Selected Contributing Factors

Human, environmental, and vehicle factors contribute to transportation crashes. Human factors are the most common cause and involve driver errors or risky behaviors, such as speeding, driving while under the influence of alcohol or drugs, while distracted, or while fatigued. Environmental factors include roadway design (e.g., narrow lanes, no shoulders), roadway hazards (e.g., utility poles at the side of the road, plants or branches blocking views, and potholes), and operating conditions (e.g., wet roads). Vehicle factors include equipment- and maintenance-related failures (e.g., tire separations and worn out parts) [GAO 2003].

In 2013 one or more (driver-related) human factors were recorded for 70.9 percent of the drivers of passenger vehicles (cars, vans, pickup trucks, and sport utility vehicles) involved in single-vehicle fatal crashes and 51.6 percent of the passenger vehicle drivers in multi-vehicle fatal crashes. For comparison, one or more (driver-related) human factors were recorded for 55.6 percent of the drivers of large trucks involved in single-vehicle fatal crashes and for 28.1 percent of the drivers of large trucks involved in multi-vehicle fatal crashes [USDOT FMCSA 2015a].

Speeding was the most frequently coded driver-related factor for both driver types, while distracted/inattentive driving was the second most common factor for large-truck drivers, and impairment (fatigue, alcohol, illness, etc.) was the second most coded factor for passenger vehicle drivers. In 2013 vehicle factors, most commonly truck tires, were recorded for 4.3 percent of the large trucks involved in fatal crashes and 3.4 percent of the passenger vehicles involved in fatal crashes [USDOT FMCSA 2015a].

Alcohol Use

All 50 states and the District of Columbia limit Blood Alcohol Concentration (BAC) to 0.08 percent while operating a highway vehicle [USDHHS NIH NIAAA 2014]. Table 6-4 shows that about 10,100 people were killed in alcohol-impaired motor vehicle crashes in 2013. Figure 6-8 shows that over 6,500 (64.7 percent) were drivers with BACs of 0.08 or

TABLE 6-4 Fatalities by Highest Blood Alcohol Concentration (BAC) in Highway Crashes: 1990, 2000, 2010–2013

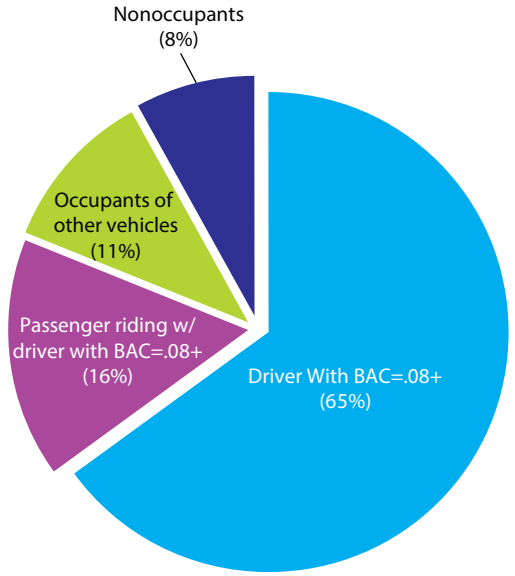
	1990	2000	2010	2011	2012	2013
Total fatalities	**44,599**	**41,945**	**32,999**	**32,479**	**33,782**	**32,719**
Fatalities in alcohol-related crashes (BAC = 0.01+)	**20,607**	**15,746**	**11,906**	**11,527**	**12,118**	**11,896**
Percent	46.2	37.5	36.1	35.5	35.9	36.4
BAC = 0.00						
Number	23,823	26,082	21,005	20,848	21,563	20,713
Percent	53.4	62.2	63.7	64.2	63.8	63.3
BAC = 0.01 - 0.07						
Number	2,901	2,422	1,771	1,662	1,782	1,820
Percent	6.5	5.8	5.4	5.1	5.3	5.6
BAC = 0.08+						
Number	17,705	13,324	10,136	9,865	10,336	10,076
Percent	39.7	31.8	30.7	30.4	30.6	30.8

KEY: BAC = blood alcohol concentration.

NOTES: *Total fatalities* include those in which there was no driver or motorcycle rider present. BAC values have been assigned by U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA) when alcohol test results are unknown. *Alcohol-related crashes* pertain to the BAC of the driver and nonoccupants struck by motor vehicles. For some years, numbers for *Fatalities* in alcohol-related crashes (BAC = 0.01+) may not add to totals due to rounding.

SOURCE: U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration, *Traffic Safety Facts: Alcohol-Impaired Driving* (Annual Issues). Available at http://www-nrd.nhtsa.dot.gov/ as of September 2015, as cited in USDOT, Bureau of Transportation Statistics, *National Transportation Statistics*, table 2-26, available at http://www.bts.gov as of October 2015.

FIGURE 6-8 Fatalities, by Role, in Crashes Involving at Least One Driver With a BAC of .08 or Higher: 2013



SOURCE: Fatality Analysis Reporting System 2013 Annual Report File (ARF) as cited in U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration (NHTSA). *Impaired Driving 2013* (December 2014). DOT HS 812 010 Available at http://www.nhtsa.gov/ as of October 2013.

higher, about 1,600 were passengers of an impaired driver, nearly 1,200 were occupants of other vehicles (27.0 percent), and more than 800 were pedestrians or other nonoccupants (8.3 percent) [USDOT NHTSA 2014c]. A combination of awareness, educational, and enforcement efforts (e.g., the Drive Sober or Get Pulled Over campaign and sobriety checkpoints) has helped to raise awareness [USDOT NHTSA 2014b].

All 50 states and the District of Columbia have adopted the legal drinking age of 21 years [USDHHS NIH NIAAA 2014]. As previously mentioned, motor vehicle crashes continue to be the leading cause of death for teens aged 16 to 20 years; alcohol-impaired driving was a contributing factor in 17.2 percent of fatal crashes involving drivers aged 16 to 20 in 2013. In 2013, 666 drivers age 16 to 20 with a BAC of 0.08 or higher were killed in alcohol-impaired crashes. In 2013, 31 percent of total traffic fatalities involved a driver with a BAC of 0.08 or higher [USDOT NHTSA 2014a]. Alcohol involvement either by the driver or the pedestrian was reported in 49 percent of all fatal pedestrian crashes in 2013 [USDOT NHTSA 2015d].

In 2013 alcohol-impairment was listed as a contributing factor in 305 boating accidents, 94 fatalities, and 250 boating injuries; it was listed as the primary factor in 16.8 percent of deaths [USDHS USCG 2014]. As of Jan. 1, 2014, 47 states and the District of Columbia limit BAC to 0.08 percent for operators of recreational boats. The remaining four states, Michigan, North Dakota, South Carolina, and Wyoming, all have a 0.10 percent standards [USDHHS NIH NIAAA 2014].

Distraction and Fatigue

In 2013 about 2,900 fatal crashes and an estimated 284,000 motor vehicle crashes involving distracted drivers. That year distracted driving accounted for 9.7 percent of fatal crashes, 17.9 percent of injury crashes, and 15.2 percent of all property damage only crashes involving a motor vehicle (table 6-5). Those 20 to 29 years of age accounted for the largest share (27.0 percent) of distracted driving crashes [USDOT NHTSA 2015c]. Figure 6-9 shows the trend on the percent of distracted driving related highway fatalities and injuries.

Although many activities (e.g., cellphone use, eating, sipping coffee, smoking, grooming, adjusting a radio) are distracting to drivers and pedestrians, cell phone usage and texting have received the most attention as these devices have attained nearly universal usage in the last few years. Distraction-affected crashes involving cell phones increased from 5.2 percent in 2010 to 7.9 percent in 2013 [USDOT NHTSA 2015c].

According to a 2012 AAA Foundation for Traffic Safety survey, 88.5 percent of licensed drivers reported that they considered drivers talking on cell phones to be a "somewhat" or "very" serious risk to their personal safety. In addition, 95.7 percent of respondents considered text messaging or emailing behind the wheel risky. Further, 90.3 percent of respondents believe that distracted drivers are "somewhat" or a "much bigger" problem compared to responses given 3 years earlier [AAA 2013]. Figure 6-10 shows the 14 states and the District of Columbia that prohibit drivers' use of handheld cell phones; and the 43 states plus

TABLE 6-5 Distraction-Affected Motor Vehicle Crashes and Distraction-Affected Crashes Involving Cell Phone Use: 2010–2013

Total Crashes Crashes

	Fatal crash	Injury crash	PDO crash	Total
2010	30,296	1,542,000	3,847,000	5,419,000
2011	29,867	1,530,000	3,778,000	5,338,000
2012	31,006	1,634,000	3,950,000	5,615,000
2013	30,057	1,591,000	4,066,000	5,687,000

Distraction-Affected Crashes

	Fatal crash	% of fatal crashes	Injury crash	% of Injury crashes	PDO crash	% of PDO crashes	Total	% of total
2010	2,993	9.9%	279,000	18.1%	618,000	16%	900,000	16.6%
2011	3,047	10.2%	260,000	17.0%	563,000	15%	826,000	15.5%
2012	3,098	10.0%	286,000	17.5%	619,000	16%	908,000	16.2%
2013	2,910	9.7%	284,000	17.9%	616,000	15%	904,000	15.9%

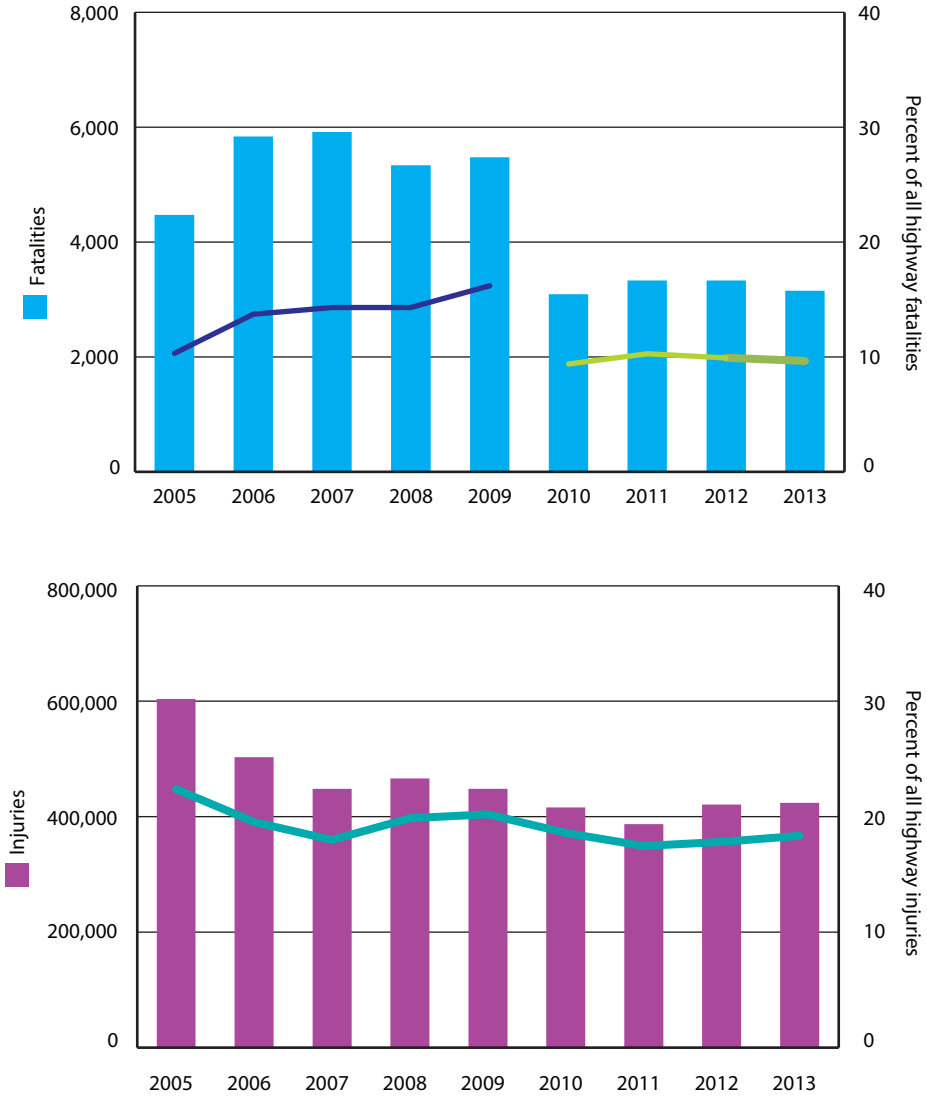
Distraction-Affected Crashes Involving Cell Phone Use (% of D-A Crashes)

	Fatal crash	% of fatal crashes	Injury crash	% of injury crashes	PDO crash	% of PDO crashes	Total	% of total
2010	366	1.2%	16,000	1.0%	30,000	1%	47,000	5.2%
2011	354	1.2%	15,000	1.0%	35,000	1%	50,000	6.1%
2012	380	1.2%	21,000	1.3%	39,000	1%	60,000	6.6%
2013	411	1.4%	24,000	1.5%	47,000	1%	71,000	7.9%

KEY: D-A = distraction-affected; PDO = property damage only.

SOURCE: U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration (NHTSA). *Distracted Driving 2013* (April 2015), Table 6. Available at http://www-nrd.nhtsa.dot.gov/ as of July 2015.

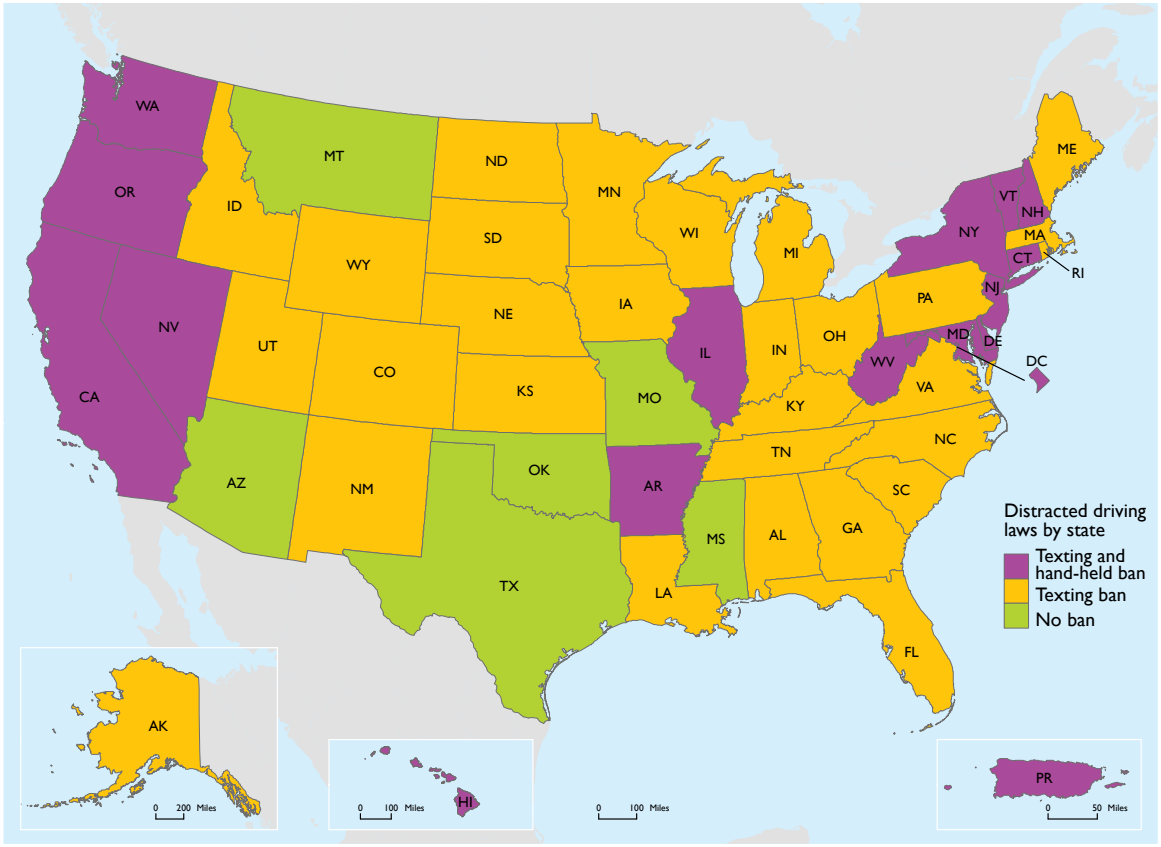
FIGURE 6-9 Distracted Driving Fatalities and Injuries: 2005–2013



NOTES: Distracted driving involves any activity that could divert a person's attention away from the primary task of driving, such as texting, using a cell phone, eating and drinking, grooming, using a navigation system, adjusting a radio, etc. Distracted driving fatality data for 2010 and on are not comparable with previous years due to changes in methodology.

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, available at www.nhtsa.gov as of September 2015.

FIGURE 6-10 State Laws on Distracted Driving Ban on Hand-Held Devices and Texting While Driving: March 2015



SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, State Laws on Distracted Driving, available at http://www.distraction.gov/ as of June 10, 2015.

the District of Columbia that ban texting while driving.

Distracted driving by commercial motor vehicle drivers was a contributing factor in 5.9 percent of fatal crashes involving large trucks in 2013 [USDOT FMCSA 2015a]. Distracted driving is not just limited to motor vehicles, distracted vehicle operators are found in all modes of transportation, including airline pilots, bus drivers, train engineers, and tugboat operators [NTSB 2014b]. Operator inattention is first among the primary contributing factors in recreational boating accidents, contributing to 14.0 percent of recreational boating accidents, 10.2 percent of related fatalities, and 14.2 percent of injuries [USDHS USCG 2014].

In 2013 drowsy and fatigued driving was a factor for 1.6 percent of drivers and motorcycle riders involved in fatal crashes, down from 2.8 percent in 2012. Steps have been taken to reduce the risk. Distraction/inattention was the second most common driver-related factor, contributing to 5.9 percent of fatal crashes, involving large trucks. In addition, truck driver

impairment (e.g. fatigue, drugs/alcohol, illness, etc.) was a factor in 3.8 percent of fatal crashes [USDOT FMCSA 2015a].

Lives Saved by Occupant Protection Equipment

When properly used, safety devices significantly reduce the risk of death or serious injury. NHTSA estimated that almost 16,900 lives were saved on the highways in 2013—up from about 7,500 in 1990—by occupant protection devices, including seat belts, frontal air bags, child restraints, and motorcycle helmets, as shown in table 6-6. Seat belts saved almost 12,600, frontal air bags about 2,400, child restraints almost 300, and DOT-compliant motorcycle helmets more than 1,600 lives in 2013 (table 6-6).

Another 3,500 lives could have been saved had these devices been used universally—an estimated 2,800 more lives could have been saved if seats belts were used 100 percent of the time and about 715 more from 100 percent use of DOT-compliant motorcycle helmets [USDOT NHTSA 2015a]. In total, vehicle safety technology (e.g., advanced safety technologies such as airbags, stability control, and collision warning systems, as well as preventing motorists from driving under the influence) can help prevent impending crashes by alerting drivers to dangers or helping the driver recover control of a vehicle [KAHANE 2015].

Despite such estimates, many people choose not to use seat belts or helmets. Eighty-seven percent of occupants of cars, vans, and sport utility vehicles (SUVs) used safety belts in 2013, up from 71 percent in 2000 and 85 percent in 2010. In 2013 vans and sport utility vehicles occupants had the highest seat belt usage at 90 percent, and pickup trucks occupants had the lowest at 78 percent (table 6-7).

DOT-compliant helmets are an effective safeguard, reducing the risk of dying in a motorcycle crash by 37 percent. Moreover, wearing a helmet reduces the need for emergency medical care, hospitalization,

TABLE 6-6 Estimated Lives Saved by Occupant Protection, Motorcycle Helmets, and 21-Year-Old Minimum Legal Drinking Age Law: 1990, 2000, and 2010–2013

	Child restraints	Seat belts	Frontal air bags	Motorcycle helmets	Minimum drinking age law
	Lives saved, age 4 and younger	Lives saved, age 5 and older	Lives saved, age 13 and older	Lives saved, all ages	Lives saved
1990	222	6,592	37	655	1,033
2000	479	12,882	1,716	872	922
2010	303	12,670	2,403	1,551	560
2011	262	12,071	2,341	1,622	543
2012	285	12,386	2,422	1,715	537
2013	263	12,584	2,388	1,630	504

SOURCE: U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration, National Center for Statistics and Analysis, *Traffic Safety Facts* (Washington, DC: Annual Issues). Available at http://www-nrd.nhtsa.dot.gov/ as of March 2015 as cited in USDOT, Bureau of Transportation Statistics, *National Transportation Statistics*, table 2-31. Available at http://www.bts.gov as of April 2015.

TABLE 6-7 Safety Belt and Motorcycle Helmet Use: 2000, 2010–2013

Percent

	2000	2010	2011	2012	2013
Overall Safety Belt Use	**71**	**85**	**84**	**86**	**87**
Drivers	72	86	84	87	88
Right-Front Passengers	68	83	82	84	85
Passenger cars	74	86	85	87	88
Vans and sport utility vehicles	U	88	87	89	90
Pickup trucks	U	75	74	77	78
Motorcycle Helmet Use[a]	**71**	**54**	**66**	**60**	**60**
Operators	72	55	67	63	62
Passengers	62	51	64	46	50

[a] Only those operators and riders wearing safety helmets that met U.S. Department of Transportation (DOT) standards are counted. Those safety helmets that do not meet DOT standards are treated as if the operator/rider were not wearing a helmet.

KEY: U = data are unavailable.

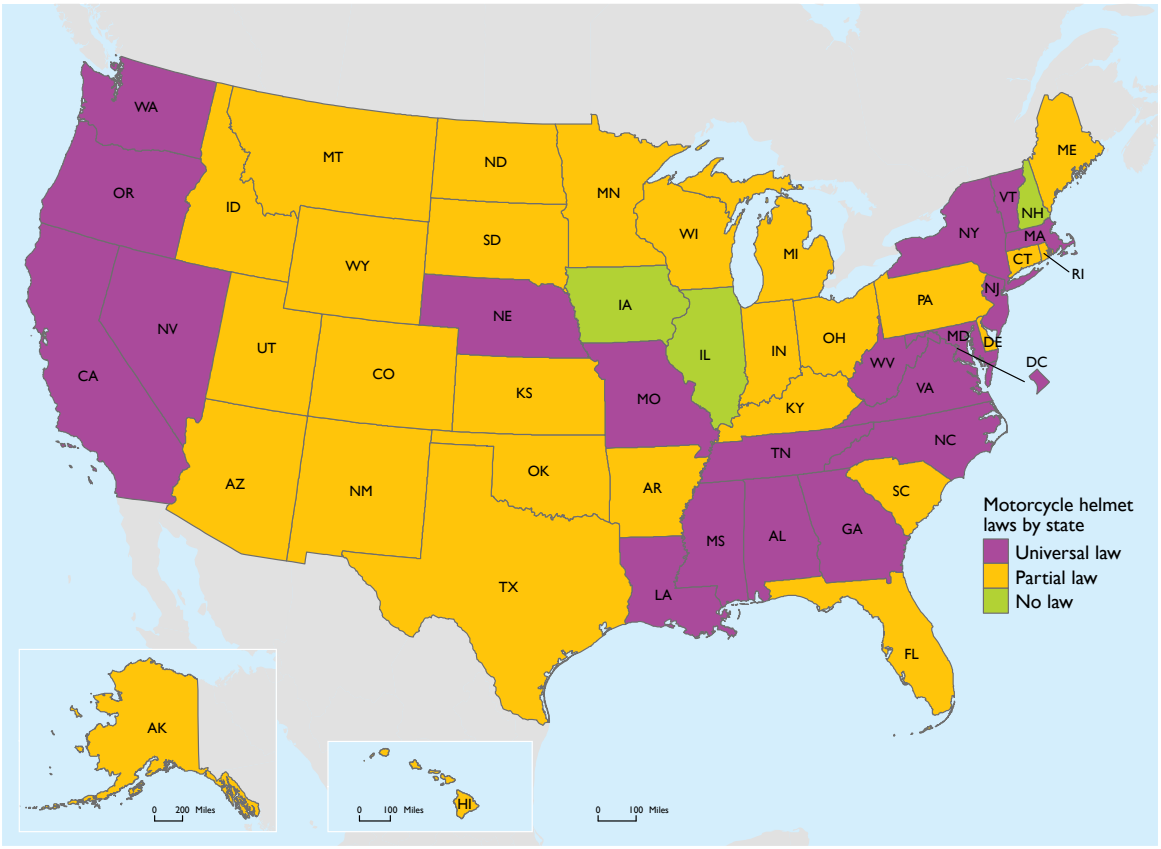
NOTE: Occupants of commercial and emergency vehicles are excluded.

SOURCES: U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration, Traffic Safety Facts: Research Notes, *Seat Belt Use* (Annual issues); and *Motorcycle Helmet Use—Overall Results* (Annual issues). Available at http://www-nrd.nhtsa.dot.gov as of June 2014 as cited in USDOT, Bureau of Transportation Statistics, *National Transportation Statistics*, table 2-30, available at http://www.bts.gov as of March 2015.

intensive care, rehabilitation, and long-term care following crashes involving a motorcycle [NTSB 2010]. Overall usage of DOT-compliant helmets by motorcyclists stood at 60 percent in 2013, down from 71 percent in 2000 (table 6-7). Only 19 states and the District of Columbia have a universal helmet law, 28 states have a partial law covering certain riders and passengers (e.g., those under the age of 18), and 3 states (Illinois, Iowa, and New Hampshire) have no motorcycle helmet law (figure 6-11). In 2014, 89 percent of riders wore DOT-compliant helmets in states that required helmet use, while 48 percent of riders wore DOT-compliant helmets in states that do not require their use [USDOT NHTSA 2014c]. By 1975, 47 states and the District of Columbia had adopted universal helmet use laws, which required motorcycle helmets for all riders. However, many states repealed such laws in the following years after the adoption of helmet laws as a prerequisite for attaining Federal highway construction funds was withdrawn in 1975 [COSGROVE 2007].

Most states require mandatory recreational boating education and safety training courses, but eight states do not (Alaska, Arizona, California, Idaho, Maine, South Dakota, Utah, and Wyoming). Boater education helps reduce the risk of boating accidents and death [NTSB 2013], and about 42.6 percent of U.S. boat owners have taken a boating safety course [USDHS USCG 2013]. In 2013, 89.3 percent of boating deaths took place on boats operated by someone who was not known to have received boating safety education [USDHS USCG 2014].

FIGURE 6-11 State Laws on Motorcycle Helmet Use: 2015



SOURCE: Insurance Institute for Highway Safety, Highway Loss Data Institute, *Motorcycle and Bicycle Helmet Use Laws*, available at www.iihs.org as of October 2013.

Drowning accounted for 71.1 percent of all fatal boating accidents in 2013. Of these, 82.4 percent of victims were not wearing a life jacket [USDHS USCG 2013]. As of January 2013, 48 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands had laws or regulations requiring children to wear life jackets [NTSB 2013].

Traffic Safety Enforcement

Traffic safety enforcement promotes good driving habits (e.g., wearing a safety belt) and discourages unsafe behaviors (e.g., impaired driving) [USDOT NHTSA 2014b]. According to the Bureau of Justice Statistics, in 2011 about 10.2 percent of the Nation's 212.3 million drivers were stopped by police while operating a motor vehicle, 5.3 percent of drivers were ticketed, 3.4 percent were given a verbal or written warning, and 1.4 percent were allowed to proceed with no enforcement action taken [USDOJ BJS 2013].

Speeding was cited, as the leading reason by far for the traffic stop, accounting for 46.1 percent, followed by vehicle defects (e.g, broken tail light) with 14.1 percent. Males

were more likely to be stopped and ticketed than females, accounting for 58.5 percent of ticketed drivers. Drivers who were 25 to 34 years of age accounted for about 22.4 percent of stopped drivers, which is the highest percentage among all age groups [USDOJ BJS 2013]. However, this age group accounts for only 13.7 percent of vehicle-miles traveled [USDOT FHWA NHTS 2009].

In 2013, according to the Federal Bureau of Investigation, law enforcement agencies across the country made an estimated 1.2 million arrests for driving under the influence. Males accounted for three out of four DUI arrests [USDOJ FBI 2013]. Studies have shown sobriety checkpoints are an effective countermeasure to reduce alcohol-impaired driving, saving an estimated 1,500 to 3,000 lives annually [USDHHS CDC NCI 2011].

Commercial Motor Vehicles

The Federal Motor Carrier Safety Administration (FMCSA) has a mission to reduce crashes, injuries, and fatalities involving the Nation's approximately 503,000 interstate freight carriers[1], 13,000 interstate buses, and 16,000 interstate hazardous material carriers [USDOT FMCSA 2015b]. FMCSA issued over 20,500 warning letters in 2014 to commercial motor carriers whose safety data showed a lack of compliance with motor carrier safety regulations and whose safety performance had fallen to an unacceptable level [USDOT FMCSA 2014]. Over 3.4 million roadside inspections were conducted in fiscal year 2014 (table 6-8). Vehicle violations put 20.4 percent of inspected vehicles out-of-service, while driver violations put 5.1 percent out-of-service, which commonly include hours-of-service noncompliance. Vehicle violations outnumbered driver violations 1.4 to 1, which commonly include defective lights, worn tires, or brake defects. Such violations must be corrected before the driver or vehicle can return to service.

[1] Most of these are independent truckers or small trucking firms.

Hazardous Materials Transportation

Transporting hazardous materials requires special precautions, handling, and packaging. There are specialized safety regulations, and standards, and reporting systems in place for pipelines, rail, highway, air, and marine vehicles that transport hazardous materials. These special requirements recognize that incidents involving the transportation of hazardous materials can affect the environment in addition to potentially risking injury and death. Table 6-9 shows more than 17,000 hazardous materials incidents in 2014, excluding pipeline. Hazardous materials shipments by mode and hazard class are discussed in chapter 3. Only 1.9 percent of these incidents are vehicle related with the remaining 98.1 percent related to other incidents, such as chemical spills from package failure or lithium ion and metal battery fires.

In 2014 less than 2 percent of hazardous materials transportation incidents were the result of an accident (e.g., vehicular crash or train derailment). Almost 90 percent of incidents related to the movement of hazardous materials occur on highways or in truck terminals. Most hazardous materials incidents occur because of human error or package

TABLE 6-8 Activity Summary of Roadside Safety Inspection By Motor Carrier Inspection Type: 2010 and 2014

	2010	2014
Roadside Inspections	**3,569,373**	**3,413,211**
With no violations	1,225,324	1,363,261
With violations	2,344,049	2,050,106
Driver inspections	**3,470,871**	**3,292,651**
With OOS Violations	183,350	166,305
Driver OOS Rate	5.3%	5.1%
Vehicle inspections	**2,413,094**	**2,341,352**
With OOS Violations	480,416	476,871
Vehicle OOS Rate	19.9%	20.4%
Hazardous material inspections	**211,154**	**196,164**
With OS Violation	9,210	7,791
Hazmat OOS Rate	4.4%	4.0%

KEY: OOS = out-of-service.
NOTES: *Driver Inspections* were computed based on inspection levels I, II, III, and VI. *Vehicle Inspections* were computed based on inspection levels I, II, V, and VI. *Hazmat Inspections* were computed based on inspection levels I, II, III, IV, V, and VI when hazardous materials were present. Roadside inspection OOS rates depicted in this table include both large trucks and buses. For more information on roadside inspections and inspection levels, please refer to https://csa.fmcsa.dot.gov.
SOURCE: U.S. Department of Transportation, Federal Motor Carrier Safety Administration, Motor Carrier Management Information System (MCMIS), *Roadside Inspection Activity Summary for Fiscal Years*, special tabulation, August 2015.

TABLE 6-9 Hazardous Materials Transportation Incidents: 2010–2014

	2010	2011	2012	2013	2014
Total Incidents	**14,795**	**15,029**	**15,445**	**16,051**	**17,123**
Total Vehicular Accident / Derailment Incidents	**358**	**377**	**398**	**367**	**323**
Vehicular Accident-related Percent of Total Incidents	**2.4%**	**2.5%**	**2.6%**	**2.3%**	**1.9%**
Air	**1,295**	**1,401**	**1,460**	**1,442**	**1,321**
Vehicular Accident-related	2	2	2	3	3
Highway	**12,648**	**12,812**	**13,254**	**13,880**	**15,045**
Vehicular Accident-related	320	335	363	333	303
Rail	**747**	**745**	**661**	**666**	**711**
Vehicular Accident-related / Derailment Incidents	35	40	33	31	17
Water[1]	**105**	**71**	**70**	**63**	**46**
Vehicular Accident-related	1	0	0	0	0

[1] Water include only packages (nonbulk) marine. Non-packaged (bulk) marine hazardous material incidents are reported to the U.S. Coast Guard and are not included.
NOTES: *Incidents* are defined in the Code of Federal Regulations (CFR): 49 CFR 171.15 and 171.16 (Form F 5800.1). Each modal total also includes fatalities caused by human error, package failure, and causes not elsewhere classified. *Accident-related* are the result of a vehicular crash or accident damage (e.g., a train derailment).
SOURCE: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Materials Safety, *HAZMAT Intelligence Portal* (as of Mar. 18, 2015). Available at https://hip.phmsa.dot.gov/ as of March 2015.

failure, particularly during loading and unloading.

Table 6-10 provides a summary of the over 700 hazardous liquid-related and gas-related pipeline incidents reported in 2014, which resulted in 19 fatalities, 96 injuries, and more than $310 million in property damage, down from $1.5 billion. Hazardous liquid accounts for about half the incidents and the majority of the property damage, down from $1.1 billion in 2010. Nearly 47,000 barrels of hazards liquids were spilled in 2014, of which 48.4 percent was recovered. Gas distribution accounts for the majority of the fatalities and injuries. Oil spills from pipelines and railroad tanker cars are discussed in more detail in chapter 7.

Statistics show that the U.S. transportation system has become safer over the past few decades, even as use increases. This improvement is true across all modes. However, despite this progress, transportation remains a leading cause of death and injury each year. To continue the reduction in the number of deaths and injuries, USDOT has established safety improvement as its top priority. As part of these efforts, several agencies within the department have established data programs to gauge the safety performance of the transportation system, and new data programs to identify potential risk factors (box 6-D).

TABLE 6-10 All Reported Hazardous Liquid and Gas Incidents: 2010–2014

Total - All reported

Year	Number	Fatalities	Injuries	Property damage as reported	Barrels spilled (Haz Liq)	Net barrels lost (Haz Liq)
2010	588	22	108	$1,509,635,198	100,558	49,452
2011	594	14	56	$426,819,470	89,111	57,374
2012	572	12	57	$228,447,641	45,884	29,247
2013	620	10	47	$347,806,517	117,467	85,696
2014	702	19	96	$310,272,540	47,297	22,913

Gas distribution

Year	Number	Fatalities	Injuries	Property damage as reported
2010	122	11	44	$21,289,283
2011	120	13	53	$27,789,531
2012	90	9	46	$25,557,235
2013	107	9	39	$18,426,443
2014	113	18	94	$74,859,503

Gas gathering

Year	Number	Fatalities	Injuries	Property damage as reported
2010	9	0	0	$2,120,878
2011	10	0	0	$1,786,922
2012	12	0	0	$2,937,821
2013	6	0	0	$1,977,657
2014	9	0	0	$5,965,427

continued next page

TABLE 6-10 All Reported Hazardous Liquid and Gas Incidents: 2010–2014 (continued)

Gas tranmission

Year	Number	Fatalities	Injuries	Property damage as reported
2010	107	10	61	$411,031,047
2011	118	0	1	$123,710,870
2012	103	0	7	$55,031,817
2013	105	0	2	$48,962,098
2014	132	1	1	$51,233,578

Hazardous liquid

Year	Number	Fatalities	Injuries	Property damage as reported	Barrels spilled	Net barrels lost
2010	350	1	3	$1,075,193,990	100,558	49,452
2011	346	1	2	$273,532,147	89,111	57,374
2012	366	3	4	$144,910,768	45,884	29,247
2013	401	1	6	$278,438,819	117,467	85,696
2014	445	0	0	$105,534,704	47,297	22,913

LNG

Year	Number	Fatalities	Injuries	Property damage as reported
2010	U	U	U	U
2011	U	U	U	U
2012	1	0	0	$10,000
2013	1	0	0	$1,500
2014	3	0	1	$72,679,328

KEY: *Haz Liq* = Hazardous Liquid, *LNG* = Liquefied Natural Gas, U = Data unavailable.

NOTES: *Hazardous Liquid* includes crude oil; refined petroleum products (e.g., gasoline, diesel, kerosene); highly volatile, flammable, and toxic liquids (e.g., propane); liquid carbon dioxide; and biodiesel. *Gross Barrels Spilled* is the amount before clean-up, whereas *Net Barrels Lost* is the amount after clean-up is attempted.

Incident means any of the following events: 1) An event that involves a release of gas from a pipeline, or of liquefied natural gas, liquefied petroleum gas, refrigerant gas, or gas from an LNG facility, and that results in one or more of the following consequences: i) A death, or personal injury necessitating in-patient hospitalization; ii) Estimated property damage of $50,000 or more. *Accident* is a failure in a pipeline system in which there is a release of the hazardous liquid or carbon dioxide transported resulting in any of the following: a) Explosion or fire not intentionally set by the operator. b) Release of 5 gallons (19 liters) or more of hazardous liquid or carbon dioxide.

Please see the Pipeline and Hazardous Materials Safety Administration's Incident Report Criteria History for a complete definition of past and present reporting requirements, which is availbale at https://hip.phmsa.dot.gov/Hip_Help/pdmpublic_incident_page_allrpt.pdf as of November 2015.

SOURCE: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Materials Safety, *HAZMAT Intelligence Portal* (as of November 12, 2015). Available at https://hip.phmsa.dot.gov/ as of November 2015.

BOX 6-D Close Call Data Program

The Close Call Data Program (CCDP) is a confidential, voluntary collection of precursor safety data, such as near-miss or close call data. A close call is an accident that could have happened but did not. If ignored, close calls can lead to serious consequences. CCDP's goal is to improve safety by learning from near-miss or close call incidents and unsafe conditions. CCDP identifies the root causes of close calls and develops preventative measures or corrective actions that, when implemented, can reduce the risk of a serious accident. Ultimately, the goal is to develop a safety culture in which safety critical data can be reported confidentially without the threat of administrative discipline. BTS protects data and information collected under the Confidential Information Protection and Statistical Efficiency Act of 2002, which established uniform confidentiality provisions for the disclosure and use of data for statistical purposes.

BTS operates CCDP under agreements with the Washington Metropolitan Area Transit Authority (WMATA) and the Department of the Interior's Bureau of Safety and Environmental Enforcement (BSEE), allowing employees in the transportation and energy sectors to report confidentially on close call events without the fear of disciplinary action. Based on knowledge gained from employee close call reports, WMATA has implemented a number of preventative safety actions aimed at making movements of heavy equipment safer and improving overall safety while performing various tasks on the track system by strengthening the employee training program, by supporting more thorough recordkeeping, and by enforcing stronger compliance with established procedures.

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