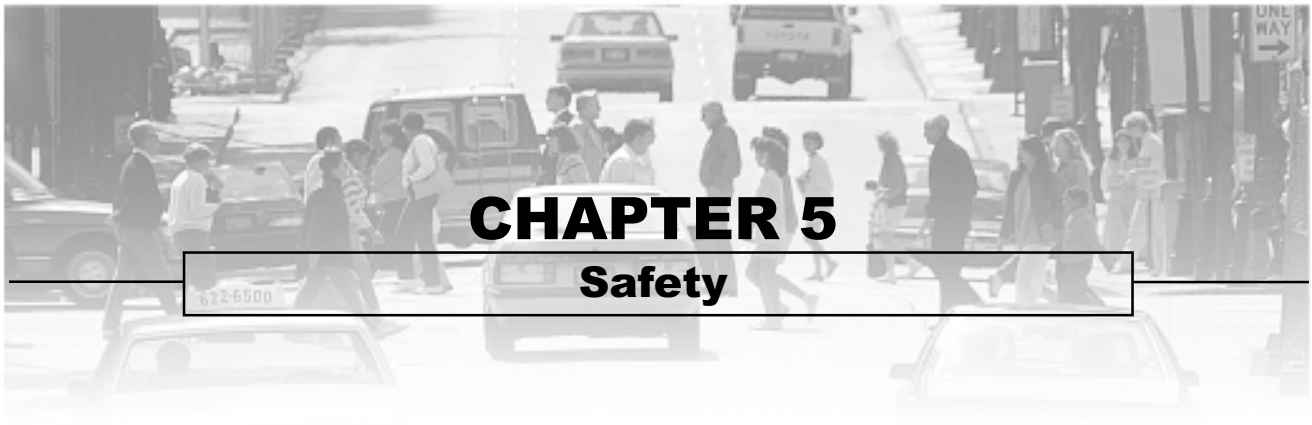


CHAPTER 5
Safety

Introduction

This chapter describes safety statistics for the Nation's highway and transit systems. It begins by summarizing safety characteristics, including the national fatality and injury rates; fatalities by functional class; and fatalities from single vehicle run-off-the-road crashes, pedestrian crashes, speed-related crashes, and large truck crashes. The high incidence of fatal crashes among young and older Americans is noted. The highway portion of this chapter concludes with a discussion of some of the contributing factors that have made the Nation's highways safer. The transit portion discusses the general safety trends by transit mode: Bus, Heavy Rail, Commuter Rail, Light Rail, and Demand Response.

Summary

This section summarizes the trends in both highway and transit related fatality and injury information. In Exhibit 5-1 highway data are represented in "vehicle-miles-traveled" (VMT) and transit data are represented in "passenger-miles-traveled" (PMT).

Highway fatalities rose slightly from 1995 to 1997, from 41,817 to 42,013. Despite this increase, both the number of fatalities and the fatality rate have sharply declined since 1966. In 1966 the fatality rate was 25.9 per 100,000 people. By 1997, that rate had declined to 15.7 per 100,000 people. This plummeting fatality rate occurred even as the number of licensed drivers grew by nearly 80 percent. Similarly, the number of injuries and injury rate have diminished, although not as dramatically as fatalities.

A number of factors have contributed to these improvements in highway safety, including increased safety belt use, reduced alcohol-impaired driving, and infrastructure-related safety improvements (e.g. roadway and roadside improvements and improvements at highway-rail grade crossings) at locations with known or potential crash problems. Surveys showed that 69 percent of vehicle occupants used seat belts by 1997. An aggressive education and law enforcement campaign had reduced the percentage of fatalities attributable to alcohol to 39 percent by 1997. Among the infrastructure-related improvements which have helped contribute to improved highway safety include the installation and upgrading of traffic signs and pavement markings, traffic signals, guardrails, median barriers, impact attenuators, and roadway lighting; improvements to pavement skid resistance; and the installation of lights, gates and other warning devices at highway-rail grade crossings. While safety advocates can take comfort in an improved driving environment, there are several disturbing trends on the Nation's highways, including the increasing numbers of young and older Americans involved in fatalities.

Transit related fatalities remained nearly the same with 274 in 1995 and 275 in 1997. Among the transit modes, Commuter Rail Service has one of the highest fatality rates, reflecting the higher speeds at which these vehicles operate. Discussion on the general transit-related safety trends are addressed in the Transit Safety section.

Exhibit 5-1

Comparison of Safety Statistics with Those in the 1997 C&P Report

	1995 Data		
Highway Safety	1997 Report	Revised	1997 Data
Fatalities	N/A	41,817	42,013
Fatality Rate per 100,000 People	N/A	15.91	15.69
Fatality Rate per 100 million VMT	N/A	1.7	1.6
Injuries	N/A	3,465,000	3,348,000
Injury Rate per 100,000 People	N/A	1,319	1,250
Injury Rate per 100 million VMT	N/A	143	131
Percent of Fatalities on Rural Highways	58%	N/A	57%
Percent of Fatalities on Urban Highways	41%	N/A	43%
Percent of Fatalities Attributed to Alcohol	N/A	41.2	38.6
Transit Safety			
Transit-Related Fatalities	N/A	274	275
Fatality rate per 100 million PMT (by mode)			
Bus	N/A	0.50	0.65
Heavy Rail	N/A	0.75	0.64
Commuter Rail	N/A	1.21	1.13
Light Rail	N/A	1.75	0.29

Highway Safety

The U.S. Department of Transportation has long made safety one of its highest priorities. Over 90 percent of all transportation-related deaths and injuries are highway-related, and the economic cost of highway-related crashes exceeds $150 billion annually. The Department has aggressively worked with other Federal agencies, business leaders, and its state and local partners to reduce highway fatalities and injuries. Through such measures as education programs, aggressive law enforcement, and the implementation of infrastructure-related safety improvements, fatalities on the Nation's highway system have been sharply reduced. This is one of the most important transportation "success stories" of the 1990s.

Exhibit 5-2 describes the considerable improvement in highway safety since Federal legislation first addressed this issue in 1966. That year, the fatality rate was 25.9 per 100,000 people. By 1997, the fatality rate was 15.7 per 100,000 people. **This plummeting fatality rate occurred even as the number of licensed drivers grew by nearly 80 percent**. Some of the contributing factors for this reduced rate will be discussed later in this chapter.

While the fatality rate has sharply dropped, the number of traffic deaths also decreased between 1966 and 1997—despite the increase in motor vehicle traffic on the nation's highways. As Exhibits 5-3 and 5-4 describe, the reduction in the number of fatalities has not been as consistent as the fatality rate. In 1972 and 1973, the number exceeded 54,000. In 1974, following the implementation of a national maximum speed limit, the number of fatalities declined by 16 percent to 45,196. Fatalities began to increase in 1976 and exceeded 51,000 in both 1979 and 1980 before declining significantly in the early 1980s. The number of fatalities generally increased from 1984–1988. Between 1989 and 1992, the number of fatalities declined each year, achieving a 30-year low of 39,250 in 1992. However, the number of fatalities increased steadily from 1993 through 1996 before declining slightly in 1997. The Federal Highway Administration's Strategic Plan targets a 20 percent reduction in highway-related fatalities and injuries by 2008. Appendix F describes the motor carrier safety plan in greater detail. In addition to the agency's safety goal, the Department of Transportation has specifically identified a 50 percent reduction in the number of truck fatalities over the next ten years. FHWA has identified four focus areas: single vehicle run-off-the-road crashes; pedestrian crashes; speed-related crashes; and large truck crashes. Many States have identified similar priorities.

Single vehicle run-off-the-road crashes account for 36 percent of all highway-related fatalities. This represents about 15,000 fatalities each year. To reduce these crashes, FHWA is promoting devices to keep vehicles on the road (rumble strips to alert fatigued and distracted drivers, pavement markings, signs and delineation) and devices to reduce crash severity if the vehicle does leave the roadway (guardrails, breakaway devices, and crash cushions). These crashes occur on all types of roadways. *[See Exhibit 5-5].*

Pedestrian crashes represent 13 percent of all highway-related fatalities. About 5,300 pedestrians are killed and approximately 77,000 pedestrians are injured each year. The number of pedestrian fatalities exceeds the combined total of fatalities related to air, sea, and train crashes each year. Crashes can be reduced by implementing available countermeasures, such as far side bus stops and pedestrian barriers. These accidents can also be reduced by better accommodating pedestrians through sidewalks, clearly-marked crosswalks, and grade separations. *[See Exhibit 5-6].*

Exhibit 5-2

Summary of Fatality and Injury Rates, 1966-1997

Year	Fatalities	Resident Population (Thousands)	Fatality Rate per 100,000 Population	Licensed Drivers (Thousands)	Fatality Rate per 100 Million VMT	Injured	Injury Rate per 100,000 Population	Injury Rate per100 Million VMT
1966	50,894	196,560	25.89	100,998	5.5			
1967	50,724	198,712	25.53	103,172	5.3			
1968	52,725	200,706	26.27	105,410	5.2			
1969	53,543	202,677	26.42	108,306	5.0			
1970	52,627	205,052	25.67	111,543	4.7			
1971	52,542	207,661	25.30	114,426	4.5			
1972	54,589	209,896	26.01	118,414	4.3			
1973	54,052	211,909	25.51	121,546	4.1			
1974	45,196	213,854	21.13	125,427	3.5			
1975	44,525	215,973	20.62	129,791	3.4			
1976	45,523	218,035	20.88	134,036	3.2			
1977	47,878	220,239	21.74	138,121	3.3			
1978	50,331	222,585	22.61	140,844	3.3			
1979	51,093	225,055	22.70	143,284	3.3			
1980	51,091	227,225	22.48	145,295	3.3			
1981	49,301	229,466	21.49	147,075	3.2			
1982	43,945	231,664	18.97	150,234	2.8			
1983	42,589	233,792	18.22	154,389	2.6			
1984	44,257	235,825	18.77	155,424	2.6			
1985	43,825	237,924	18.42	156,868	2.5			
1986	46,087	240,133	19.19	159,486	2.5			
1987	46,390	242,289	19.15	161,816	2.4			
1988	47,087	244,499	19.26	162,854	2.3	3,416,000	1,397	169
1989	45,582	246,819	18.47	165,554	2.2	3,284,000	1,330	157
1990	44,599	249,439	17.88	167,015	2.1	3,231,000	1,295	151
1991	41,508	252,127	16.46	168,995	1.9	3,097,000	1,228	143
1992	39,250	254,995	15.39	173,125	1.7	3,070,000	1,204	137
1993	40,150	257,746	15.58	173,149	1.7	3,149,000	1,222	137
1994	40,716	260,289	15.64	175,403	1.7	3,266,000	1,255	139
1995	41,817	262,765	15.91	176,628	1.7	3,465,000	1,319	143
1996	42,065	265,190	15.86	179,539	1.7	3,483,000	1,314	140
1997	42,013	267,744	15.69	182,709	1.6	3,348,000	1,250	131

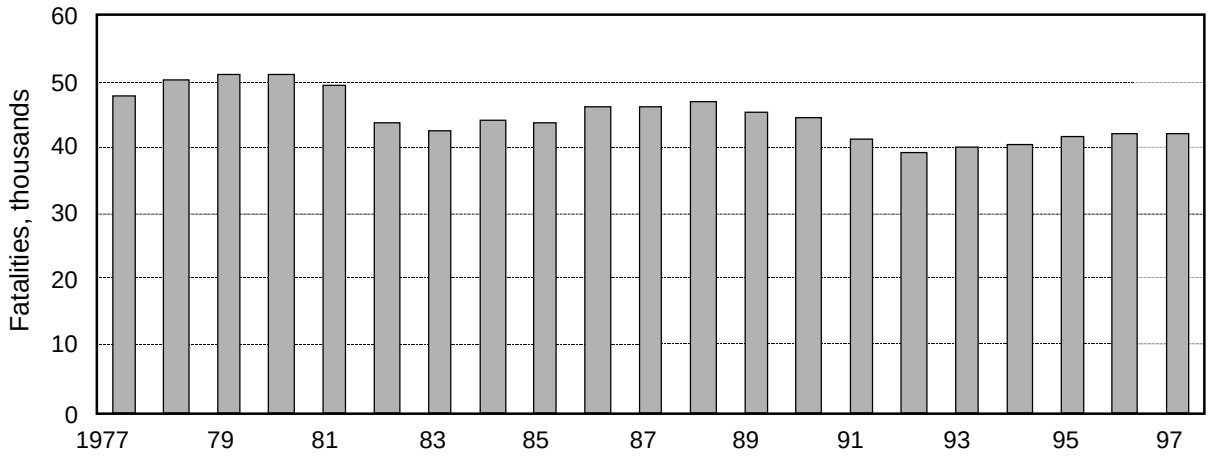
Source: National Highway Traffic Safety Administration, Fatality Analysis Report System, 1997.

Pedestrian fatalities have been decreasing since 1984; however, this may just mean that more people are driving because they consider walking inconvenient or dangerous. TEA-21 has increased funding for pedestrian and bicycle safety, and it requires that bicyclists and pedestrians be given due consideration in the long-range transportation plans for states and metropolitan planning organizations.

Speeding is a contributing factor in a third of all fatal crashes. This represents about 13,000 fatalities and 742,000 injuries annually. The 1995 National Highway System Designation Act ended Federal involvement in setting maximum speed limits for States; however, FHWA provides research and guidance to its State and local partners. For example, FHWA has supported the development of new

Exhibit 5-3

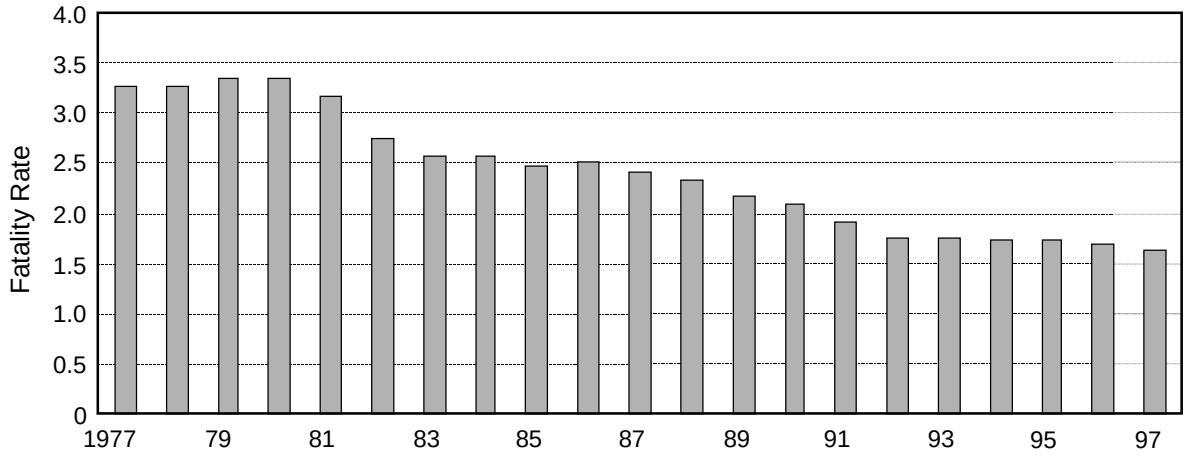
Fatalities, 1977-1997



Source: National Highway Traffic Safety Administration, Fatality Analysis Report System, 1997.

Exhibit 5-4

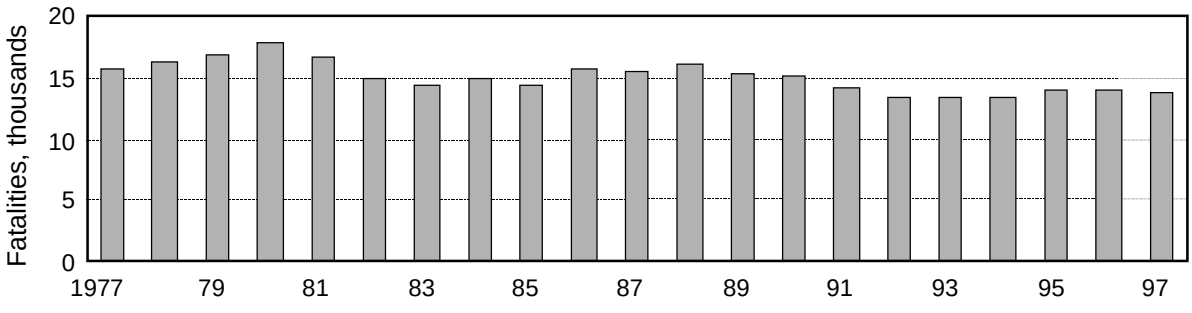
Fatality Rate, 1977-1997



Source: National Highway Traffic Safety Administration, Fatality Analysis Report System, 1997.

Exhibit 5-5

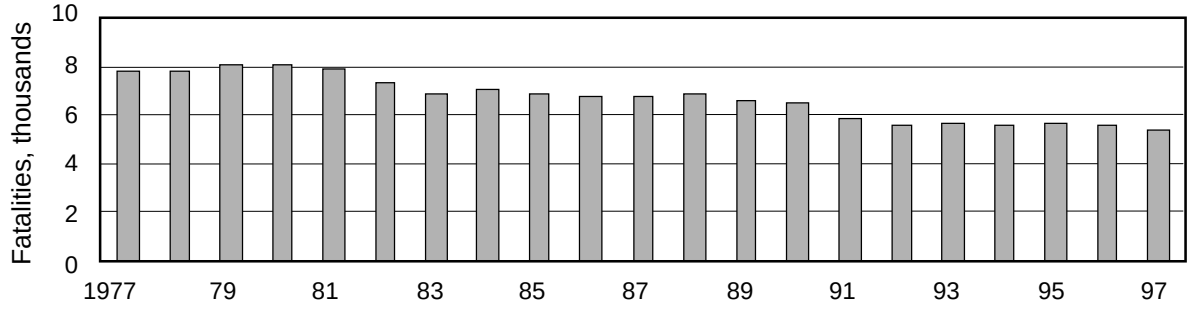
Single Vehicle Run-Off-The-Road Fatalities, 1977-1997



Source: National Highway Traffic Safety Administration, Fatality Analysis Report System, 1997.

Exhibit 5-6

Pedestrian Fatalities, 1977-1997



Source: National Highway Traffic Safety Administration, Fatality Analysis Report System, 1997.

speed management techniques. The concept of variable speed limits—moving away from a posted speed limit with its "one size fits all" approach—is a promising concept for the future. Iowa, Colorado, and Washington all have VSL tests that adjust speed to weather conditions. Additionally, FHWA is also examining the use of advanced technologies to combat speeders, red light runners, and other aggressive drivers.

Large truck crashes resulted in about 5,350 fatalities and 133,000 injuries in 1997. This represents a 20 percent increase since 1992, which might be explained by a growth in motor carrier traffic. The deployment of Intelligent Transportation System (ITS) technologies represents one possible solution to this problem. ITS will also probably first be tested on trucks before being made available for use on passenger cars. There are two reasons for this. First, many trucking fleets are committed to safety and believe that safety is good business. Second, the cost of installing ITS technology on trucks is proportionally much smaller than it would be for cars. Though the number of crashes has risen, the fatality rate per drivers and occupants of large trucks has dropped significantly, from 3.7 fatalities per 100 million VMT in 1988 to 2.6 fatalities per 100 million VMT in 1997.

Q. **What has contributed to the decline in the fatality rate for truck drivers?**

A. This decline is not a result of any single factor, but may be a result of a combination of factors including an increase in seat belt usage, a shifting of truck travel from other arterials to the Interstate, a decrease in alcohol-related truck crashes, and an increase in an overall truck safety awareness.

When driver fatality rates are calculated on the basis of estimated annual travel, the highest rates are found among the youngest and oldest driving drivers. Compared with the fatality rate for drivers aged 25 through 69 years old, the rate for teenagers is about 4 times as high and the rate for the oldest group (70 years and older) is almost 9 times as high. State officials are trying to reduce the teenage crash rates through changes in driver licensing. Currently, 20 States have enacted legislation in this area and another 9 have partial graduated licensing systems. Additionally, States are trying to combat drunken driving, a major cause of teenage death on the highways.

On the other side of the age spectrum, the solutions for older driver safety are not as obvious. Americans older than 85 years have the highest fatality rate—approximately 7.9 persons killed per 100 million vehicle miles traveled. Men aged 85 and older have a rate of 9.9, while the rate for women in this demographic group is 5.5. Older drivers have a relatively low crash rate, but their fatality rate is twice that of teenagers. As the "baby boom" generation ages, older driver safety will become an even greater concern.

Safety Belt Use

The public's acceptance of safety belts and child safety seats represents one of the great success stories of government policy in past two decades. This resulted from a two-pronged effort of education and enforcement. Prompted by an intense public service campaign, surveys showed that 69 percent of vehicle occupants used seat belts by 1997. Additionally, 49 States had mandatory safety belt laws by 1997, and 13 States and the District of Columbia had primary enforcement laws that allow police to stop a car when they observe a safety belt violation. Safety belt use is 79 percent in those jurisdictions with primary enforcement, compared to 62 percent in the 36 States that only allow police to issue citations if a vehicle is stopped for another offense.

Q. **Have air bags been a factor in reducing fatalities and saving lives?**

A. Yes. Seat belt usage in conjunction with vehicular air bag systems provide additional protection in potentially fatal crashes. In general, air bags can reduce the risk of driver fatality by 31 percent for direct frontal crashes and 11 percent for all types of crashes. According to the National Highway Traffic Safety Administration, it is estimated that air bags have saved 2,263 lives from 1987 through 1997, including 842 lives in 1997 alone.

The 1995 National Personal Transportation Survey provides information about the frequency of safety belt use. Exhibit 5-7 shows that overall 73 percent of respondents said that they "always" wear a seat belt, but that those less likely to wear one are men, teenagers, and respondents with a high school education or lower.

Exhibit 5-7

Frequency of Safety Belt Use by Selected Variables, 1995

	How Often Do You Wear a Seat Belt? (%)			
	Always	Most of the Time	Sometimes	Never
Overall	**73.3**	**14.8**	**7.9**	**3.9**
By Gender				
Men	68.1	16.8	9.9	5.1
Women	78.1	12.9	6.1	2.9
By Age Group				
5-15	75.8	15.8	6.7	1.7
16-19	68.2	17.1	10.0	4.8
20-29	70.1	15.7	9.5	4.7
30-49	73.2	14.2	8.4	4.2
50-64	73.4	14.5	7.4	4.7
65-74	74.9	14.0	6.9	4.2
75+	77.0	12.1	5.4	5.3
Education Level of Respondent				
Some high school or high school grad	68.0	16.2	10.0	5.7
Some college or college grad	76.1	13.5	7.0	3.3
Graduate school	82.4	14.8	7.9	3.9

Source: National Personal Transportation Survey, 1995.

Alcohol Involvement in Crashes

Alcohol-impaired driving is a serious public safety problem in the United States. The National Highway Traffic Safety Administration estimates that alcohol was involved in 39 percent of fatal crashes and in 7 percent of all crashes in 1997. There are three main groups involved in alcohol-impaired driving:

- The largest group, **21 to 34-year-old young adults**, is responsible for approximately 50 percent of all crashes. Recent studies also indicate these drivers tend to have much higher levels of intoxication than other age groups.
- While **chronic drunk drivers** represent only 1 percent of all drivers on weekend nights, they represent nearly 50 percent of fatal crashes at that time.
- **Underage drinkers** are disproportionately overrepresented in impaired driving statistics. Not only are they inexperienced new drivers, but they are inexperienced drinkers.

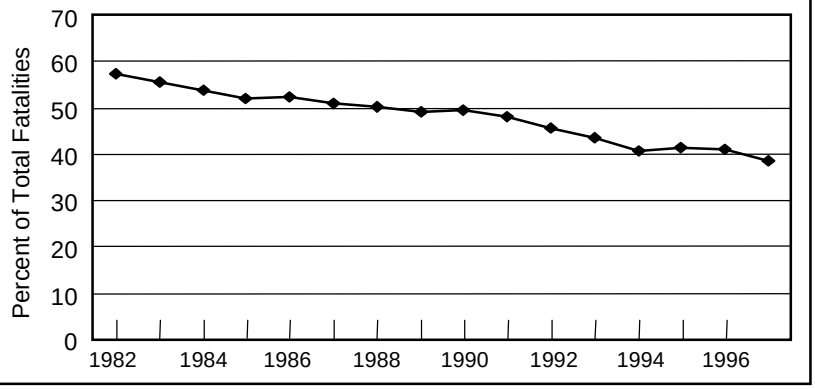
In addition to the problems caused by alcohol-impaired drivers, alcohol is also a significant factor in pedestrian-related fatalities. In nearly 30 percent of pedestrian fatalities, the victims were alcohol-impaired.

Since the 1980s, officials at every level of government have worked with the private sector to aggressively reduce alcohol-impaired driving. Like the safety belt campaign, this effort has used a combination of education and law enforcement to curtail the problem. Additionally, all States and the District of Columbia now have 21-year-old minimum drinking age laws. NHTSA estimates that these laws have reduced traffic fatalities involving drivers 18 to 20 years old by 13 percent, and that these statutes have saved over 17,000 lives since 1975.

While the campaign against impaired driving continues, evidence suggests that this has profoundly reduced fatalities in the United States. The number of alcohol-impaired fatalities has plummeted in the United States, from 25,165 in 1982 to 16,189 in 1997. The proportion of fatalities attributable to alcohol dropped from about 57 percent in 1982 to 39 percent in 1997. Exhibit 5-8 describes this trend.

Exhibit 5-8

Fatalities Attributed to Alcohol, 1982-1997



Source: National Highway Traffic Safety Administration, Fatality Analysis Report System, 1997.

Conclusion

Safety has long been a high priority for the Department of Transportation. The fatality rate has declined over the past 30 years even though the number of drivers and the miles driven has increased substantially over the same period. The FHWA Strategic Plan targets a 20 percent further reduction in highway-related fatalities and injuries by the year 2008. Many factors contribute to highway crashes and injuries, such as driver behavior, driving while intoxicated, vehicle condition, roadway geometrics and clearances, and weather conditions. Vehicle safety features such as seat belts and air bags and the proper use of child safety seats help to reduce the severity of injuries. With emphasis on all of these factors, serious injuries and fatalities can be further reduced.

Transit Safety

National data on public transit safety are reported in the National Transit Database. This data includes the total number of incidents, fatalities, and injuries reported by transit operators. The figures here are for directly operated service only; reporting of safety data for purchased transportation services has only recently begun. Comparable data on transit safety are available since the 1990 reporting year.

Reportable transit safety incidents include all incidents involving injuries, deaths, fire, or property damage over $1,000. Property damage includes both damage to transit vehicles and facilities and other vehicles that may be involved. Injuries and fatalities include those suffered by *both riders and non-riders*. Injuries and fatalities to riders may be sustained while boarding, alighting, or waiting for transit vehicles, as well as traveling inside transit vehicles. Non-rider injuries and fatalities include those sustained by pedestrians, trespassers, bicyclists, and the occupants of other motorized vehicles involved in a collision with a transit vehicle.

Exhibit 5-9 shows annual transit incidents, injuries, and fatalities for the period 1990 to 1997, expressed both as annual totals and as rates per 100 million passenger miles. The data show that safety incidents involving transit have declined considerably since 1990, falling from 251 per 100 million PMT to 165. Injuries sustained in transit incidents, however, have remained relatively stable over the same time period, at roughly 150 per 100 million PMT. Fatality rates have also declined considerably over the 7-year period, from .89 per 100 million PMT to .73.

Exhibit 5-9

Annual Transit-Related Incidents, Injuries, and Fatalities, 1990-1997
Directly Operated Service

	Incidents		Injuries		Fatalities	
Year	Total	Per 100 million PMT	Total	Per 100 million PMT	Total	Per 100 million PMT
1990	91773	251	53844	148	325	0.89
1991	87346	245	51625	145	296	0.83
1992	73795	210	54518	155	277	0.79
1993	66233	192	53057	154	270	0.78
1994	71429	200	58794	164	318	0.89
1995	62938	176	57589	161	274	0.77
1996	59709	165	55643	154	265	0.73
1997	62009	165	56535	151	275	0.73

Source: National Transit Database.

Exhibit 5-10 shows incident, injury, and fatality rates for the five largest transit modes. Incident and injury rates have consistently been highest for demand response services. Commuter rail service has the lowest injury and incident rates, but has one of the highest fatality rates, reflecting the higher speeds at which these vehicles operate. Buses, on the other hand, have consistently had above-average injury and incident rates coupled with below-average fatality rates. Fatality rates for light rail have shown considerable year-to-year variation over the period, while heavy rail fatality rates have been consistently decreasing.

Exhibit 5-10

Transit Incidents, Injuries, and Fatalities
Annual Rates Per 100 Million Passenger Miles by Mode, 1990-1997
Directly Operated Service

Incidents	1990	1991	1992	1993	1994	1995	1996	1997
Bus	409	378	314	277	296	264	252	242
Heavy Rail	114	142	144	147	150	136	119	126
Commuter Rail	51	47	47	33	42	38	34	44
Light Rail	282	257	217	168	170	148	141	115
Demand Response	1790	1435	946	766	801	785	964	627
Injuries	1990	1991	1992	1993	1994	1995	1996	1997
Bus	224	218	237	233	257	254	248	234
Heavy Rail	89	89	97	103	109	106	96	102
Commuter Rail	34	33	37	24	32	31	27	34
Light Rail	221	189	181	139	142	152	168	106
Demand Response	709	611	581	511	549	627	662	482
Fatalities	1990	1991	1992	1993	1994	1995	1996	1997
Bus	0.63	0.50	0.59	0.51	0.65	0.50	0.63	0.65
Heavy Rail	0.98	0.95	0.85	0.81	0.80	0.75	0.64	0.64
Commuter Rail	1.44	1.34	1.17	1.35	1.52	1.21	1.01	1.13
Light Rail	0.88	1.97	1.00	2.13	1.56	1.75	0.63	0.29
Demand Response	0.00	2.95	0.00	1.57	1.52	4.04	8.26	3.00

Source: National Transit Database.