

**Colorado Department of Transportation
Office of Transportation Safety**

FY 2001 Problem Identification Report

An Analysis of Highway Traffic Problems in the
State of Colorado

June 2000

Table of Contents

Introduction	3
Overview of Crash Statistics	4
Reduction in Traffic Fatalities	5
Location of Drivers With High Crash Rates.....	7
Age and Traffic Crashes	10
Alcohol-Related Crashes	21
Occupant Protection	31
Appendices	41
Analysis Methodology	Appendix A
Number of Crashes Occurring in Colorado Cities	Appendix B
Number of Crashes Occurring in Colorado Counties	Appendix C

Introduction

Purpose. The purpose of the Problem Identification Report is twofold:

1. to provide the staff of the Office of Transportation Safety (OTS) with an information resource to be used in the design of projects that will increase highway safety in Colorado;
2. to provide a compilation of highway safety data for use by the public and other interested parties.

The Problem Identification report was principally prepared by BBC Research & Consulting (BBC) under contract to the Office of Transportation Safety.

Data sources. The data used in these analyses comes from various sources:

- **Crash data** come from crash reports completed by officers investigating the crash. By Colorado law, all crashes resulting in a fatality, injury, or property damage in excess of \$1,000 must be investigated. The resulting reports are submitted to the Colorado Department of Revenue, Motor Vehicle Division (MVD), which is the legal custodian of records for crash reports. The Office of Transportation Safety then acquires the data from the Motor Vehicle Division.
- **Fatal Analysis Reporting System (FARS).** Crashes that result in a fatality are investigated in greater detail in accordance with this federally-funded program. Information includes more detailed information about drivers, as well as information about other occupants. This is the best source of reliable data about a driver's alcohol use. The database also gives information about the make and model of vehicles involved. This level of detail is not available in the MVD crash data.
- **Population data** come from the Colorado Division of Local Government and from the U.S. Census Bureau.
- **Vehicle miles traveled.** The OTS provided the number of vehicle miles traveled (VMT) statewide for the years 1975 through 1998, with the exception of 1985 and 1986. These two years, 1985 and 1986, were obtained from the Federal Highway Administration, Office of Highway Information Management, *Highway Statistics Summary to 1995*. CDOT documents referred to for the remaining years include Colorado Division of Highway Safety, *Highway Safety Plans* (1984, 1985 and 1996) and CDOT *Problem Identification Reports* (FY 1996 through FY 1999). The 1998 VMT value was obtained from OTS directly.
- **Licensed drivers.** The MVD provided the number of licensed drivers statewide by gender and by age. Because of the nature of its database, MVD cannot report the number by county or by city. Due to changes made in the database, no information is (or will ever be) available for the number of licensed drivers for the years 1995 and 1996.
- **Market research data.** The OTS is in the process of developing an approach to program development and public education that targets particular demographic and geographic groups. This process was initiated in FY 1997, and has continued during the past three fiscal years. In FY 1998, the OTS contracted with BBC Research & Consulting to design and implement telephone surveys and focus group research aimed at gathering additional quantitative and qualitative information about certain market segments and communities identified as being over-represented in various types of traffic crashes. The results of this research were used to develop pilot traffic safety programs in three Colorado communities. This document contains selected findings from this research.

Overview of Crash Statistics

Exhibit 1 below summarizes Colorado crash statistics for 1993-1998. Calendar year 1998 saw an increase in the number of traffic fatalities in Colorado (a 2.4% increase from 1997). Most of the increase in fatalities from 1997 to 1998 can be attributed to growth in vehicle miles traveled during this period. Vehicle miles traveled (VMT) grew 2.1%, resulting in a slight increase in fatalities per 100 million VMT.

In 1998, the number of reported traffic crashes increased by 2.8%, somewhat higher than the rate of growth in population or VMT. This trend is consistent with what has been observed since 1993. In 1998, the number of injuries from crashes returned to levels seen from 1994 through 1996.

Exhibit 1.								
Colorado Crash Data and Measures of Exposure								
1993 – 1998								
	1993	1994	1995	1996	1997	1998	Average Annual % Change 1993-1998	% Change 1997-1998
Total Crashes	90,430	94,610	95,778	101,886	107,844	110,866	22.6%	2.8%
Fatal Crashes	511	523	572	552	534	551	7.8%	3.2%
Injury Crashes	28,153	30,134	30,455	30,263	28,252	31,080	10.4%	10.0%
Property Damage Crashes	61,757	63,821	67,366	71,069	79,078	79,263	28.3%	0.2%
Fatalities	559	586	645	617	613	628	12.3%	2.4%
Injuries	43,007	45,862	46,099	45,448	42,878	45,488	5.8%	6.1%
Fatalities per 100 Million VMT	1.72	1.73	1.83	1.71	1.62	1.63	-5.2%	0.6%
Injuries per 100 Million VMT	132.2	135.6	130.7	126.1	113.6	118.1	-10.7%	4.0%
Alcohol-Related Fatal Crashes	188	202	232	202	163	175	-6.9%	6.8%
Alcohol-Related Fatalities	204	232	262	215	186	184	-9.8%	-1.1%
Population (thousands)	3,566	3,656	3,721	3,823	3,893	3,952	10.8%	1.5%
Vehicles Miles Traveled (billions)	32.52	33.83	35.27	36.04	37.74	38.52	18.5%	2.1%
Licensed Drivers (thousands)	2,592	2,733	2,815	2,849	2,996	3,014	16.3%	0.6%
Registered Vehicles (thousands)	3,450	3,619	3,556	3,841	3,961	4,053	17.5%	2.3%

Source: Colorado Department of Revenue — Motor Vehicle Division, CDOT, Colorado Division of Local Governments — Colorado Economic and Demographic Information System. U.S. Department of Transportation, National Highway Traffic Safety Administration, Fatal Accident Reporting System (FARS), final reporting through 1998.

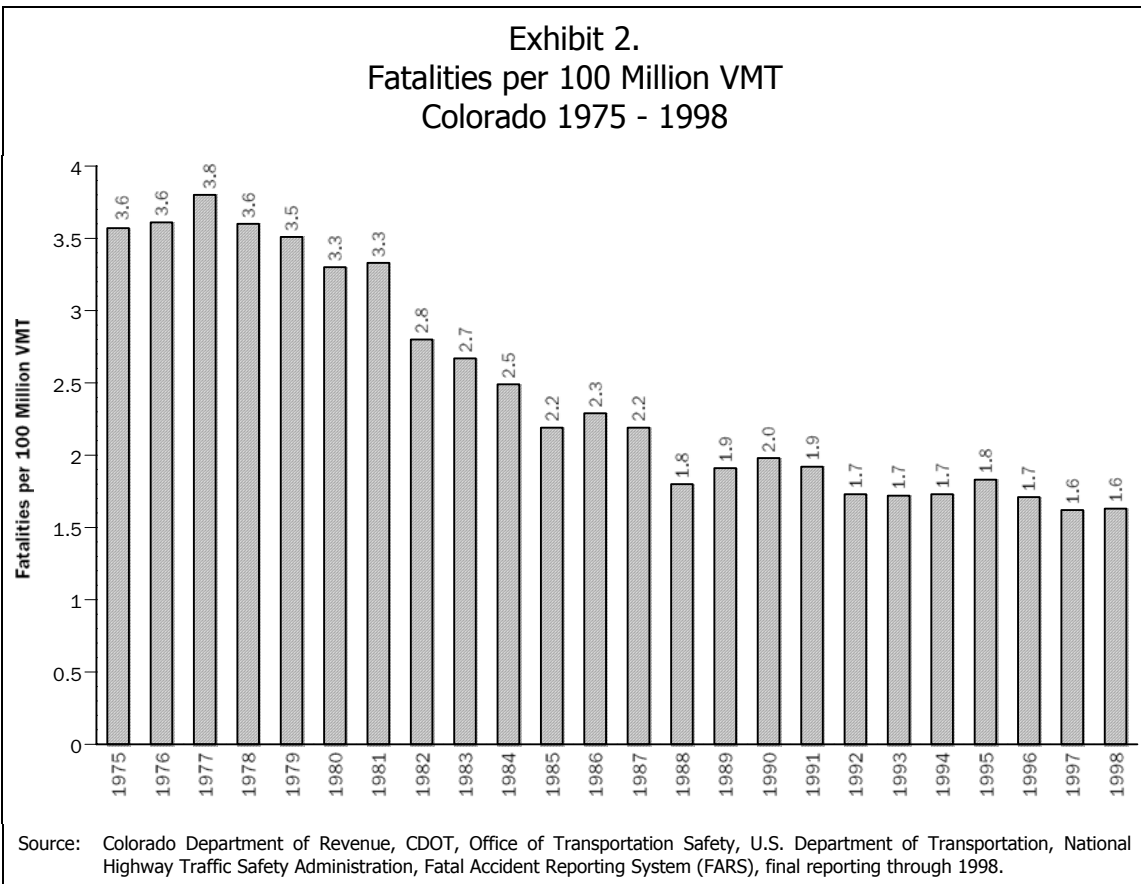
The Colorado OTS views the state's traffic safety problems as falling into two general types: "classic" and "emerging."

- Classic problems are those that have been historically persistent and continuing. The major classic problems are young drivers, drinking and driving, and non-use of occupant protection. For these problems, the OTS searches for creative and effective interventions, while tracking the impacts of its programs.
- "Emerging" problems are those that begin to appear along with changes in demographic, geographic, economic, transportation, or behavioral patterns in the population. Some emerging problems are aggressive driving and the effects of the aging population. For these problems, OTS is attempting to construct the operational definitions that will be used to identify and track the problems while monitoring any available data.

Much of the balance of this report is comprised of analyses of the current state of the three major classic Colorado traffic safety problems.

Reduction in Traffic Fatalities

Fatalities per 100 million vehicle miles traveled (VMT) peaked at 3.80 traffic fatalities per 100 million VMT in 1977, as shown in Exhibit 2. By 1998 the fatality rate had been more than cut in half to 1.63 traffic fatalities per 100 million VMT. Three years in particular saw dramatic decreases in the traffic fatality rate: a 16% reduction occurred in 1982, a 12% reduction occurred in 1985, and an 18% reduction in the number of fatalities per 100 million VMT occurred in 1988.

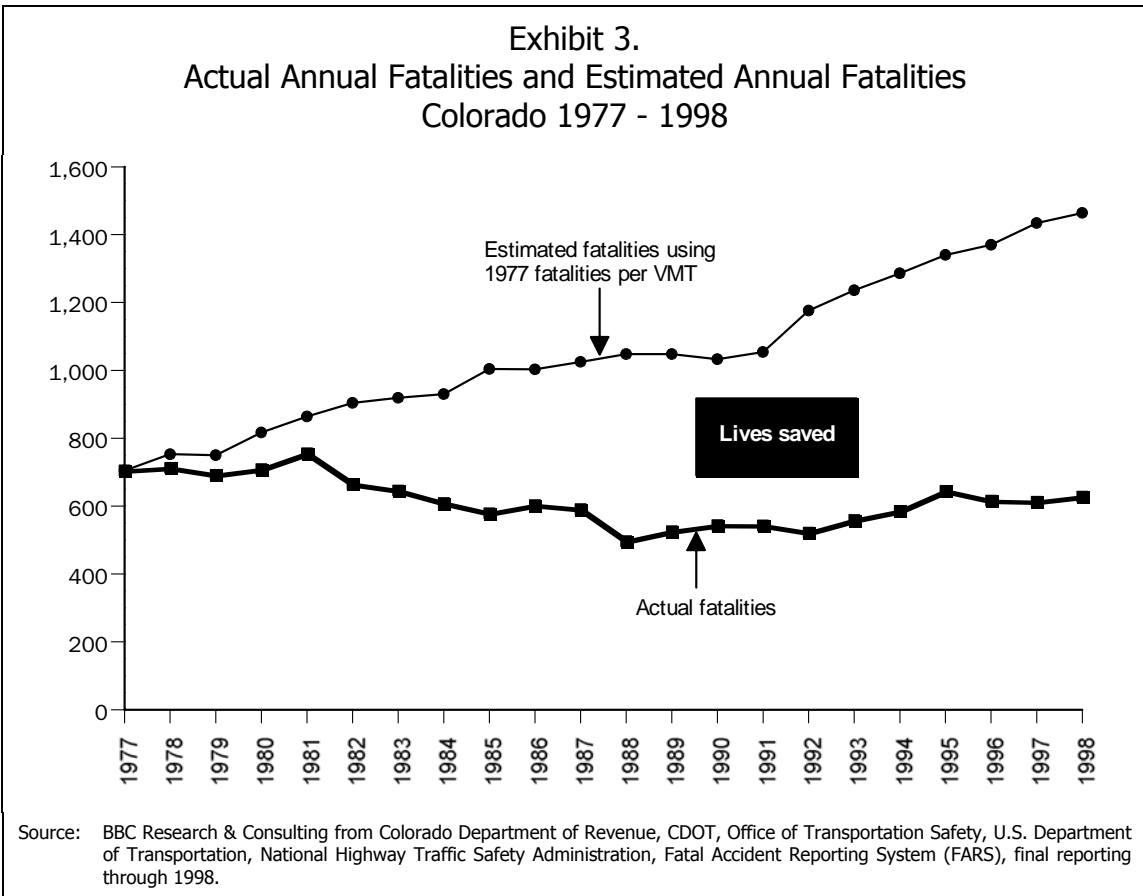


A number of legislative measures can be credited with some of these decreased rates of traffic fatalities.

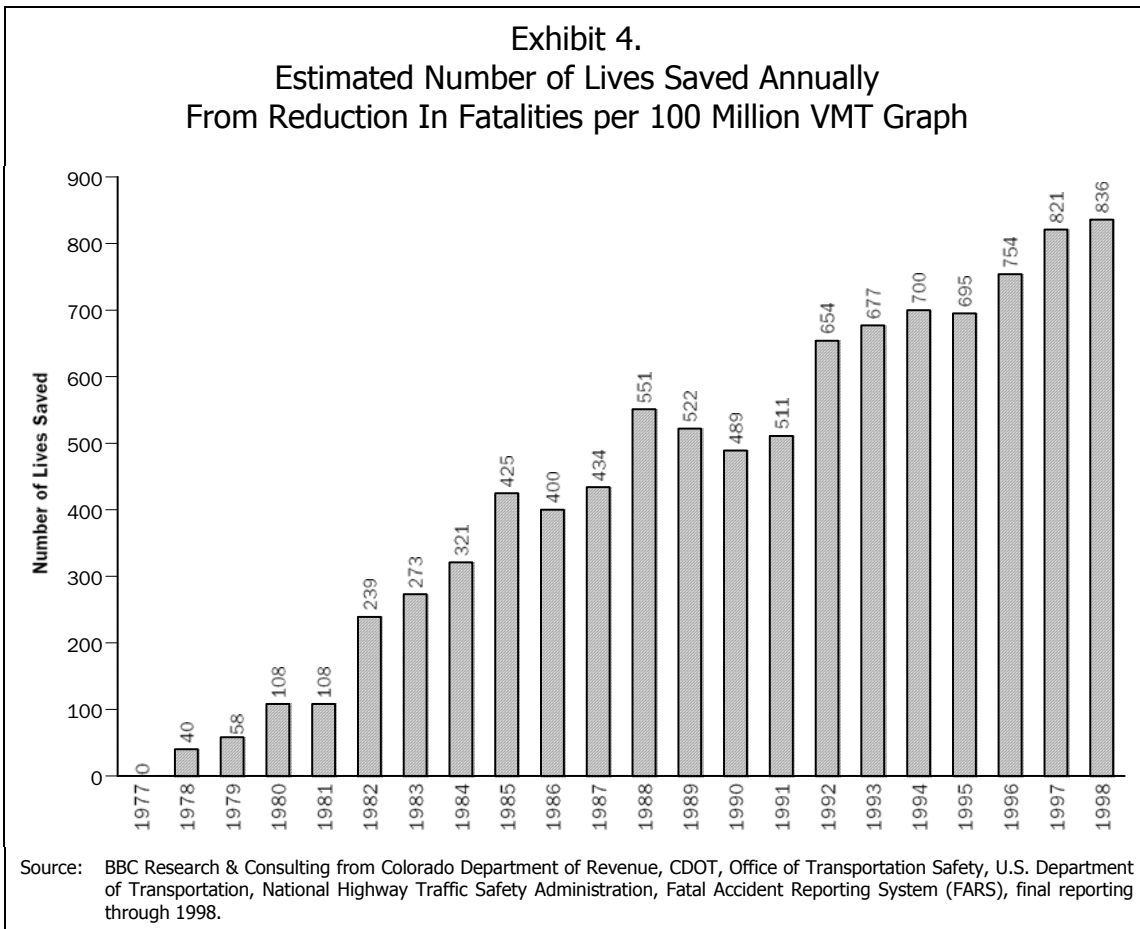
- The Colorado Safety Belt Law, made effective July 1, 1987, required persons in the front seat of a vehicle to “buckle up.”
- Major changes in the laws affecting drinking and driving occurred in 1982, 1983 and 1986. Among these was the Law Enforcement Assistance Fund (LEAF) for the prevention of Drunken Driving, which became effective July 1, 1982.
- The Child Safety Law, beginning in 1995, required all children under the age of 16 to be restrained while riding in a vehicle.

An estimate of the number of lives saved annually through the reduced traffic fatality rate is shown in the following graph. The number of actual traffic fatalities is compared with the estimated number of traffic fatalities had the number of fatalities per 100 million VMT remained at 1977 levels.

The top line in Exhibit 3 shows the number of annual fatalities in Colorado if the rate of fatalities had remained at the 3.80 traffic fatalities per 100 million VMT found in 1977. As shown, annual fatalities would have doubled if the fatality rates remained at 1977 fatality levels. Actual fatalities dropped since 1977.



If the rate of 3.80 fatalities per 100 million VMT had persisted through 1998, given actual annual VMT, an estimated 9,616 additional fatalities would have occurred. In 1998 alone, the reduction in the traffic fatality rate saved 836 lives. Exhibit 4 (on the following page) provides the estimated number of lives saved annually through the reduction in fatalities per 100 million VMT.



Location of Drivers with High Crash Rates

Driving safety varies between drivers living in different areas of the state. In past Problem Identification reports, crash involvement of drivers has been examined using a market segmentation system (Prizm). The 2001 report examines, for the first time, drivers involved in serious crashes by the specific cities and counties in which the drivers live using data from three years. The data include all serious crashes by Colorado drivers from 1996 through 1998. Only those cities with 1998 total populations greater than 10,000 are included in city-specific analyses as there are too few crashes for smaller cities to present meaningful results (also a caution for very small counties).

These data are much more meaningful than analyses of crash rates by location of the crash, which have been produced for some time. For example, community-based programs to change driving behavior can focus on those communities with populations of drivers exhibiting high-risk behavior. These analyses can help individual cities and counties understand driving outcomes for their residents compared with other communities and the state as a whole.

Exhibit 5 shows the percentage of drivers in each large Colorado city that were involved in a serious crash from 1996 through 1998 (assuming that a driver was not involved in more than one serious crash). As shown, about 10% of drivers living in Commerce City were involved in serious crashes within this three-year time frame, substantially above the state average of 5%. Relatively few drivers in Boulder, Durango and Sterling were involved in serious crashes during this time period. The crash index compares the crash rates of drivers in each city with the overall rate for the state. (An index of 1.00 means that local drivers have the same rate of involvement in serious crashes as the state overall.) It is important to note that any differences in how police in different parts of the state coded the severity of crashes may influence these rankings and any other city and county comparisons presented in this report.

Exhibit 5. Drivers Involved In Serious Crashes, 1996-1998, by City of Residence

Rank	City of Residence	All Serious Crashes	16+ Population	Percentage of the 16+ Population Involved In Serious Crashes 1996-1998	Index of Drivers In Serious Crashes (State Average = 1.00)
1	Commerce City	1,226	12,545	10%	1.92
2	Greenwood Village	943	10,174	9%	1.82
3	Fountain	808	9,341	9%	1.70
4	Aurora	13,963	190,709	7%	1.44
5	Castle Rock	786	11,077	7%	1.39
6	Thornton	3,409	48,873	7%	1.37
7	Brighton	857	12,319	7%	1.36
8	Parker	737	10,743	7%	1.35
9	Denver	26,133	383,089	7%	1.34
10	Littleton	2,011	31,859	6%	1.24
11	Loveland	2,037	34,216	6%	1.17
12	Pueblo	4,771	80,165	6%	1.17
13	Englewood	1,516	25,651	6%	1.16
14	Lafayette	822	13,964	6%	1.15
15	Wheat Ridge	1,481	25,964	6%	1.12
16	Westminster	4,012	71,162	6%	1.11
17	Longmont	2,509	44,721	6%	1.10
18	Golden	740	13,265	6%	1.09
19	Fort Morgan	439	7,901	6%	1.09
20	Lakewood	6,323	114,346	6%	1.08
21	Colorado Springs	14,139	257,713	5%	1.08
22	Montrose	530	9,726	5%	1.07
23	Arvada	4,072	76,951	5%	1.04
24	Federal Heights	396	7,652	5%	1.01
25	Northglenn	1,215	23,737	5%	1.00
26	Greeley	2,682	52,574	5%	1.00
27	Canon City	624	12,789	5%	0.96
28	Broomfield	1,177	24,430	5%	0.94
29	Louisville	575	12,798	4%	0.88
30	Fort Collins	3,809	86,701	4%	0.86
31	Grand Junction	1,440	32,869	4%	0.86
32	Boulder	3,456	79,848	4%	0.85
33	Durango	503	11,730	4%	0.84
34	Sterling	<u>280</u>	<u>8,863</u>	<u>3%</u>	<u>0.62</u>
	Total Large Cities	110,421	1,850,465	6%	1.17

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: City percentage of drivers in serious crashes divided by city percentage of statewide 16+ population.

Exhibit 6 compares serious crash rates by county. As with Colorado municipalities, crash rates vary substantially by the counties in which Colorado drivers live. Drivers in Denver had serious crash rates one-third above the state average, while drivers living in Mineral, Lincoln and Rio Blanco counties crashed at one-half the rate of the state as a whole. If crash rates for drivers in the highest crash rate counties could be reduced to the state average, serious crashes in Colorado could be reduced by 9%.

Exhibit 6. Drivers Involved In Serious Crashes, 1996-1998, by County of Residence

Rank	County of Residence	All Serious Crashes	16+ Population	Percentage of the 16+ Population Involved In Serious Crashes 1996-1998	Index of Drivers In Serious Crashes (State Average = 1.00)
1	Custer	93	1,275	7%	1.43
2	Denver	26,133	382,288	7%	1.34
3	Park	588	9,696	6%	1.19
4	Adams	14,073	232,751	6%	1.19
5	Pueblo	5,973	104,131	6%	1.13
6	Gilpin	177	3,195	6%	1.09
7	Arapahoe	19,365	356,507	5%	1.07
8	Grand	403	7,767	5%	1.02
9	Teller	779	15,206	5%	1.01
10	Costilla	135	2,644	5%	1.00
11	El Paso	18,424	363,273	5%	1.00
12	Elbert	672	13,262	5%	1.00
13	Jefferson	18,981	391,745	5%	0.95
14	Prowers	473	10,099	5%	0.92
15	Weld	5,502	117,952	5%	0.92
16	Boulder	9,588	209,375	5%	0.90
17	Clear Creek	313	6,839	5%	0.90
18	Eagle	1,081	23,699	5%	0.90
19	Summit	667	14,683	5%	0.89
20	Larimer	7,995	176,597	5%	0.89
21	Lake	275	6,169	4%	0.88
22	Morgan	857	19,301	4%	0.87
23	Douglas	4,208	95,543	4%	0.87
24	Garfield	1,234	28,622	4%	0.85
25	Conejos	244	5,673	4%	0.84
26	Mesa	3,683	85,987	4%	0.84
27	Montezuma	710	16,850	4%	0.83
28	Montrose	955	23,750	4%	0.79
29	San Juan	17	426	4%	0.78
30	La Plata	1,257	31,757	4%	0.78
31	Pitkin	466	11,855	4%	0.77
32	Alamosa	455	11,679	4%	0.77
33	Dolores	51	1,350	4%	0.74
34	Fremont	1,285	34,362	4%	0.73
35	Jackson	52	1,398	4%	0.73
36	Las Animas	444	12,335	4%	0.71
37	Cheyenne	63	1,752	4%	0.71
38	San Miguel	156	4,360	4%	0.70
39	Otero	572	16,085	4%	0.70
40	Moffat	317	9,319	3%	0.67
41	Routt	458	13,504	3%	0.67
42	Ouray	88	2,595	3%	0.67
43	Archuleta	219	6,501	3%	0.66
44	Kit Carson	187	5,673	3%	0.65
45	Rio Grande	291	8,965	3%	0.64
46	Chaffee	410	12,769	3%	0.63
47	Bent	147	4,590	3%	0.63
48	Saguache	136	4,290	3%	0.62
49	Washington	131	4,162	3%	0.62
50	Delta	640	20,415	3%	0.62
51	Logan	432	14,374	3%	0.59
52	Gunnison	285	9,744	3%	0.57
53	Hinsdale	17	584	3%	0.57
54	Yuma	206	7,401	3%	0.55
55	Phillips	98	3,592	3%	0.54
56	Kiowa	38	1,396	3%	0.53
57	Huerfano	157	5,988	3%	0.51
58	Sedgwick	57	2,202	3%	0.51
59	Baca	93	3,600	3%	0.51
60	Crowley	93	3,612	3%	0.51
61	Rio Blanco	141	5,507	3%	0.50
62	Lincoln	133	5,242	3%	0.50
63	Mineral	9	533	2%	0.33
	Total State	153,182	3,008,796	5%	1.00

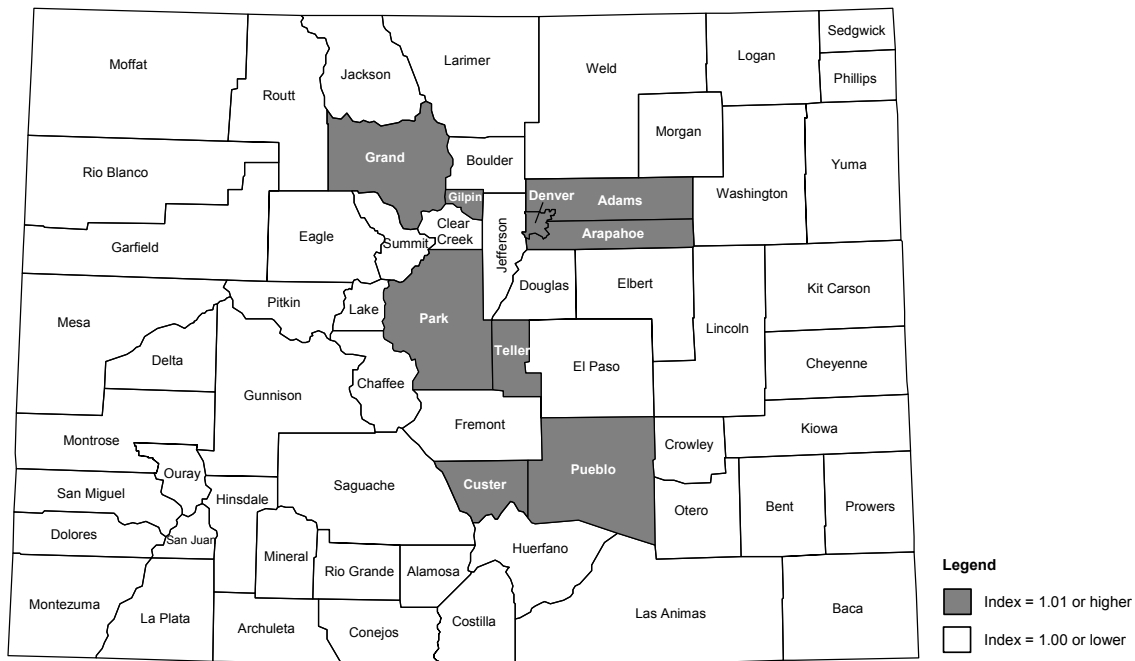
Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: County percentage of statewide drivers in serious crashes divided by county percentage of statewide 16+ population.

Exhibit 7 presented below identifies the counties in which drivers have serious crash rates above the Colorado average. Serious crash rates are particularly high for drivers living in certain parts of the Denver Metropolitan Area, Pueblo drivers, and drivers in several mountain counties bordering Colorado's major urban areas. Other analyses in this report further explore the geographic patterns of specific driving problems: young driver crashes, drivers in crashes who were suspected of alcohol or drug use, and unbelted drivers in very serious crashes. Each of these specific problem areas show different geographic patterns. Appendix A to this report presents the methodology for each of these analyses. Tables showing crashes by where they occurred are provided in Appendix B (cities) and Appendix C (counties).

Exhibit 7.

Counties with Population-Adjusted Serious Crash Rates Above the State Average



Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

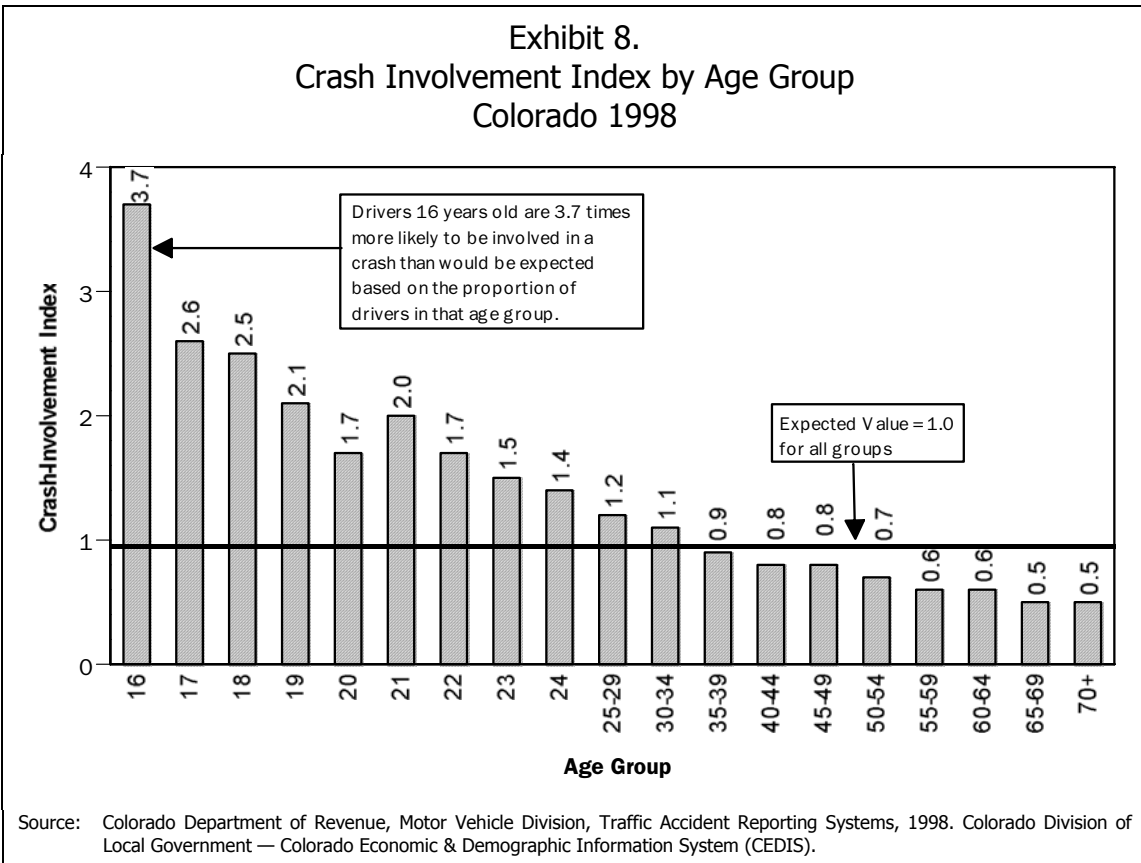
Age and Traffic Crashes

The probability of getting into a crash varies substantially with driver age. Young drivers are more likely to crash than middle-age drivers. Very old drivers are also more likely to crash, but are less likely to drive.

All crashes. Driver involvement rates measure the driver's probability of being involved in a traffic crash. Exhibit 8 on the following page uses an "index" as an indicator of over- or under-involvement. The index is the ratio of two percentages. In this case, the numerator is the percentage of drivers involved in crashes who are from this age group. The denominator is the percentage of all licensed drivers who are from this age group. If an age group has 10% of the drivers, the "expected" proportion of crashes is also 10%. Therefore, "1.0" (10% divided by 10%) is the expected crash involvement rate. An index over 1.0 indicates over-involvement for an age group. An index under 1.0 indicates under-involvement.

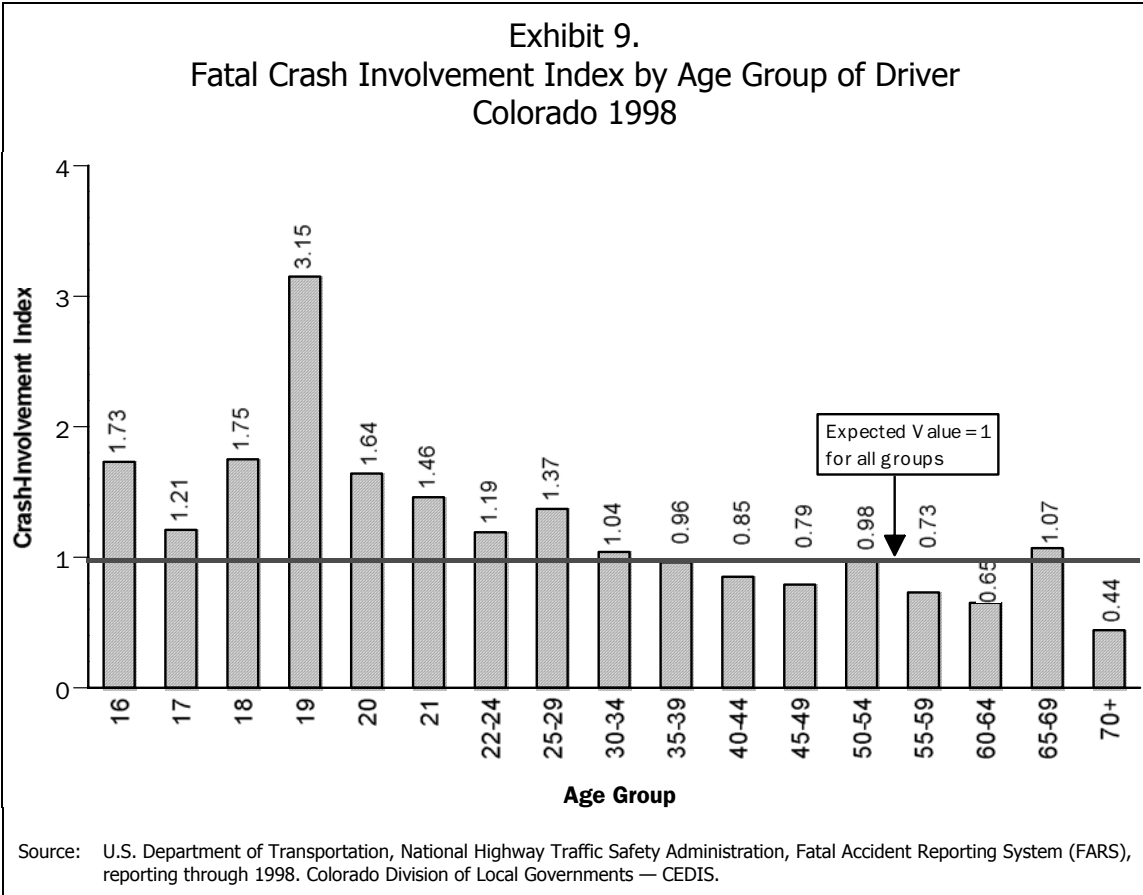
Exhibit shows the following:

- Very young drivers have the highest crash-involvement rates. Sixteen-year-olds are nearly four times more likely to be involved in a crash than would be expected based on the number of licensed drivers who are 16.
- As drivers gain experience, their probability of being in a crash diminishes. This pattern holds from 16 to 20. At 21, crash involvement increases slightly, probably due to the ability of drivers to legally drink, supposedly when they are not driving. Then the “learning curve” and the process of maturation take over to again reduce crash involvement with age.
- On the upper end of the age scale, rates stay low because many older people quit driving even though they retain their driver’s license. Also, those who do drive reduce their exposure by driving only when necessary.



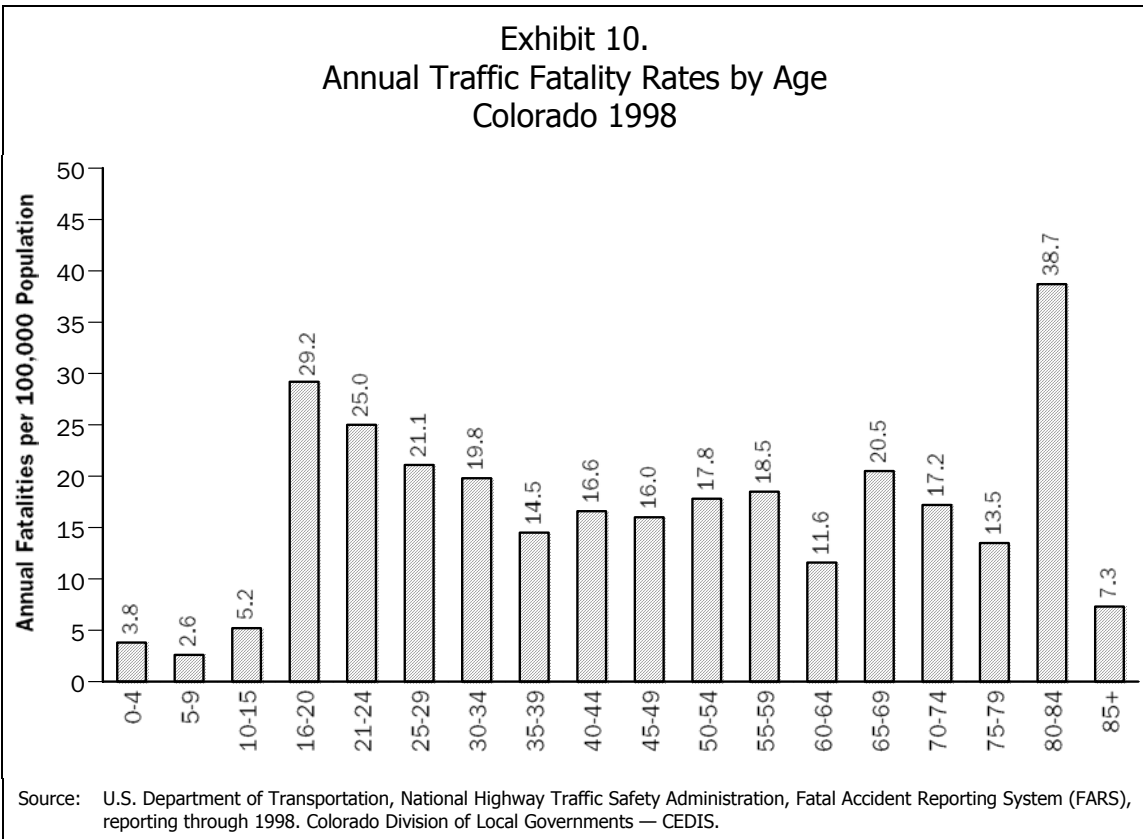
Fatal crashes. Exhibit 9 examines relative rates of fatal crash involvement for Colorado drivers in 1998. The index is constructed using the same steps as described previously for total crashes.

- Driver involvement in fatal crashes is relatively high for ages 16 to 21 and substantially declines in cohorts over age 30.
- Involvement rates for drivers over 30 are at or below the state average.



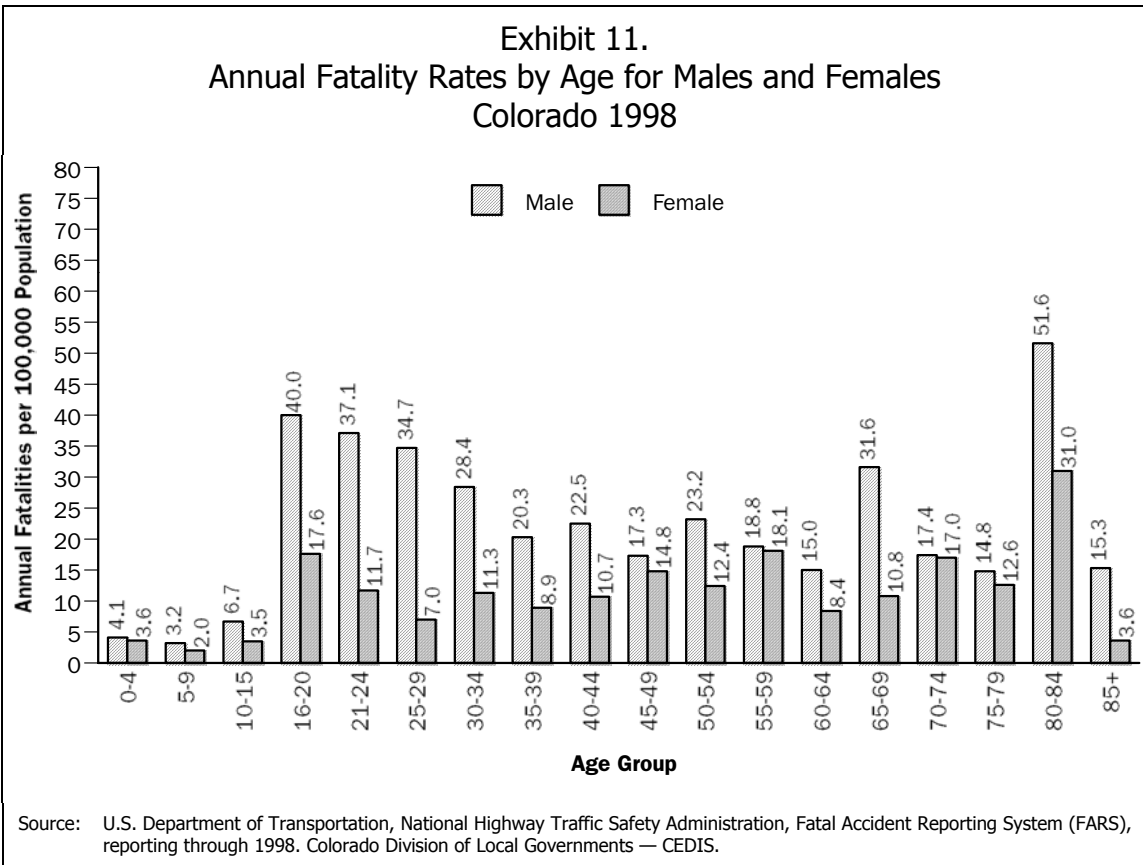
Fatality rates. Fatality rates measuring the probability of being killed in a traffic crash for a given population. Fatalities include passengers, pedestrians, and bicyclists in addition to drivers. Exhibit 10 displays fatality rates expressed as the number of fatalities per 100,000 population in each age group.

- Rates are very low for children under the age of 16 due to their very limited exposure. No other period in life has such low traffic fatality rates.
- At age 16, when young people begin to drive and ride with other young drivers, fatality rates soar and then gradually decline. Fatality rates begin to level off as individuals reach their 30s.
- Beyond 60 years of age, fatality rates begin to rise again, as driving skills decline and physical fragility increases. In 1998, individuals between 80 and 84 had the highest traffic fatality rate.



Further analysis of fatality rates reveals large differences between males and females (see Exhibit 11).

- The overall traffic fatality rate for males is double that of females.
- Males have higher traffic fatality rates than females in every age group.
- The disparity between male and female fatality rates is smallest in mid-life (between ages 45 and 64).
- Part, but not all, of the difference in fatality rates by gender is due to the fact that males drive more than females. Males also tend to drive more aggressively and are more likely to drink and drive.



Cities and counties with high rates of young driver crashes. In past Problem Identification reports, crash involvement of young drivers has been examined using a market segmentation system (Prizm). In this report, crashes by young drivers are examined by the cities and counties in which the young drivers live. The data include all serious crashes by Colorado drivers from 1996 through 1998.

The following results are based on analysis of the residences of young drivers (ages 16 to 20) who were involved in serious crashes from 1996 through 1998. Two analyses were employed to identify those regions that are more likely to have serious crashes that involve young drivers.

- Exhibits 12 and 13 show the young drivers' share of serious crashes for all drivers living in a particular city or county. The first table examines large cities; the second analyzes Colorado counties.
- Exhibit 14 shows a young driver crash index created for each large city in Colorado. An index of "1.0" for a city means that the number of young drivers involved in serious crashes living in that city was what would be expected given the number of people 16 through 20 living in the city and the statewide young driver crash rate. An index of "2.0" means that the number of young drivers in serious crashes was double the rate expected given the city's young driver population. An index of "0.5" means that the young driver crash rate was half what was found for the state. Exhibit 15 presents these same results for Colorado counties.

Similar analyses conducted for crashes involving alcohol or drugs and use of occupant protection by drivers are presented later in this report.

Statewide, young drivers accounted for nearly one in five drivers in serious crashes from 1996 through 1998. Across counties and cities, there is a wide variation in young driver involvement in serious crashes. Much of these county and city differences likely result from lifestyle differences (e.g. access to cars, number of miles driven).

- Among drivers who live in Sterling who were involved in serious crashes in Colorado from 1996 through 1998, 30% were young drivers. Young drivers living in Parker and Castle Rock accounted for nearly one-quarter of the drivers involved in serious crashes from these communities. (See Exhibit 12.)
- Considering drivers from Kiowa, Lincoln and Kit Carson counties who experienced serious crashes, one in three were drivers 16 through 20 years of age. Among larger Colorado counties, young drivers accounted for a larger than average share of drivers involved in serious crashes in Mesa, Weld, Larimer, Douglas and Pueblo counties. (See Exhibit 13.)
- Greenwood Village and Parker residents between the ages of 16 and 20 were involved in nearly twice as many serious crashes as expected given their population. In contrast, young Durango and Boulder residents were in far fewer serious crashes than expected from their population. (See Exhibit 14.)
- Crash rates vary substantially by county. For example, young drivers living in Gunnison County were more than two-thirds less likely to be involved in a serious crash than young drivers statewide. Young drivers in Prowers, Lincoln, Park and Elbert counties were at least 30% more likely to be involved in serious crashes than young drivers living in other counties. (See Exhibit 15.)

Exhibit 16 maps those counties with per-capita young driver crash rates above the state average. As shown, young drivers in the Denver Metropolitan Area, Pueblo, Central Mountain and Eastern Plains counties were more likely to be involved in serious crashes than young drivers in other parts of Colorado. Young drivers in El Paso County, the northern Front Range and on the West Slope were far less likely to be involved in serious crashes.

Exhibit 12.
 Young Drivers as a Percentage of All Drivers In Serious Crashes,
 1996-1998, by City of Residence

<u>Drivers In Serious Crashes Living In City</u>				Young Drivers as a Percentage of All Drivers In Serious Crashes
Rank	City of Residence	Drivers 16-20	All Drivers	
1	Sterling	83	280	30%
2	Parker	168	736	23%
3	Castle Rock	179	786	23%
4	Montrose	117	530	22%
5	Durango	110	502	22%
6	Greeley	585	2,682	22%
7	Loveland	436	2,034	21%
8	Fountain	172	808	21%
9	Fort Morgan	92	439	21%
10	Grand Junction	300	1,439	21%
11	Fort Collins	781	3,808	21%
12	Longmont	512	2,509	20%
13	Greenwood Village	187	943	20%
14	Pueblo	923	4,770	19%
15	Canon City	119	624	19%
16	Thornton	640	3,409	19%
17	Arvada	751	4,072	18%
18	Broomfield	217	1,177	18%
19	Westminster	707	4,009	18%
20	Brighton	148	857	17%
21	Colorado Springs	2,419	14,137	17%
22	Littleton	330	2,011	16%
23	Commerce City	201	1,226	16%
24	Golden	121	740	16%
25	Louisville	94	575	16%
26	Lafayette	134	822	16%
27	Northglenn	194	1,214	16%
28	Aurora	2,220	13,961	16%
29	Lakewood	1,001	6,321	16%
30	Boulder	546	3,455	16%
31	Wheat Ridge	228	1,481	15%
32	Englewood	212	1,516	14%
33	Federal Heights	55	396	14%
34	Denver	<u>3,260</u>	<u>26,127</u>	<u>12%</u>
	Total Large Cities	18,242	110,396	17%

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation.

Exhibit 13.
Young Drivers as a Percentage of All Drivers In Serious Crashes,
1996-1998, by County of Residence

<u>Drivers In Serious Crashes Living In County</u>				Young Drivers as a Percentage of All Drivers In Serious Crashes
Rank	County of Residence	Drivers 16-20	All Drivers	
1	Kiowa	13	38	34%
2	Lincoln	45	133	34%
3	Kit Carson	61	187	33%
4	Prowers	133	473	28%
5	Conejos	68	244	28%
6	Logan	118	432	27%
7	Rio Blanco	38	140	27%
8	Baca	23	92	25%
9	Moffat	77	317	24%
10	Yuma	50	206	24%
11	Otero	136	572	24%
12	Alamosa	108	455	24%
13	Washington	31	131	24%
14	Dolores	12	51	24%
15	Rio Grande	68	291	23%
16	Montezuma	165	710	23%
17	La Plata	283	1,256	23%
18	Phillips	22	98	22%
19	Mesa	824	3,682	22%
20	Mineral	2	9	22%
21	Montrose	211	955	22%
22	Fremont	282	1,285	22%
23	Elbert	146	672	22%
24	Weld	1,191	5,501	22%
25	Morgan	184	857	21%
26	Delta	136	640	21%
27	Larimer	1,691	7,989	21%
28	Cheyenne	13	63	21%
29	Garfield	251	1,234	20%
30	Douglas	852	4,206	20%
31	Chaffee	81	410	20%
32	Pueblo	1,174	5,972	20%
33	Las Animas	86	444	19%
34	Crowley	18	93	19%
35	Saguache	26	136	19%
36	Gunnison	54	285	19%
37	Park	111	588	19%
38	Archuleta	41	218	19%
39	Teller	144	779	18%
40	Custer	17	93	18%
41	Jefferson	3,390	18,977	18%
42	El Paso	3,282	18,419	18%
43	Routt	81	457	18%
44	Boulder	1,687	9,587	18%
45	Sedgwick	10	57	18%
46	Huerfano	27	157	17%
47	Arapahoe	3,301	19,363	17%
48	Gilpin	30	177	17%
49	Adams	2,367	14,071	17%
50	Grand	67	402	17%
51	Eagle	179	1,080	17%
52	Lake	45	275	16%
53	Bent	24	147	16%
54	Clear Creek	49	313	16%
55	Costilla	21	135	16%
56	Ouray	13	87	15%
57	Jackson	7	52	13%
58	Denver	3,260	26,127	12%
59	Summit	83	666	12%
60	San Miguel	19	155	12%
61	Hinsdale	2	17	12%
62	San Juan	2	17	12%
63	Pitkin	50	466	11%
Total State		26,982	153,141	18%

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation.

Exhibit 14.
Population-Adjusted Index of Young Drivers In Serious Crashes,
1996-1998, by City of Residence

Rank	City of Residence	Drivers 16-20 In Serious Crashes	Population 16-20	Index of Young Drivers In Serious Crashes per 1,000 Population 16-20 (State Average = 1.00)
1	Greenwood Village	187	957	2.17
2	Parker	168	901	2.07
3	Fountain	172	974	1.96
4	Castle Rock	179	1,026	1.94
5	Loveland	436	2,851	1.70
6	Commerce City	201	1,327	1.68
7	Fort Morgan	92	629	1.63
8	Lafayette	134	953	1.56
9	Louisville	94	678	1.54
10	Wheat Ridge	228	1,667	1.52
11	Montrose	117	886	1.47
12	Aurora	2,220	16,957	1.45
13	Thornton	640	4,889	1.45
14	Littleton	330	2,568	1.43
15	Longmont	512	4,010	1.42
16	Englewood	212	1,743	1.35
17	Brighton	148	1,305	1.26
18	Canon City	119	1,060	1.25
19	Denver	3,260	29,296	1.24
20	Pueblo	923	8,509	1.21
21	Colorado Springs	2,419	22,424	1.20
22	Westminster	707	6,564	1.20
23	Sterling	83	784	1.18
24	Lakewood	1,001	9,475	1.17
25	Arvada	751	7,745	1.08
26	Broomfield	217	2,253	1.07
27	Federal Heights	55	599	1.02
28	Northglenn	194	2,405	0.90
29	Grand Junction	300	3,948	0.84
30	Greeley	585	7,923	0.82
31	Golden	121	2,011	0.67
32	Fort Collins	781	14,089	0.62
33	Durango	110	2,168	0.56
34	Boulder	<u>546</u>	<u>13,326</u>	<u>0.46</u>
	Total Large Cities	18,242	178,900	1.13

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: City percentage of statewide young drivers in serious crashes divided by city percentage of statewide 16-20 population.

Exhibit 15.
Population-Adjusted Index of Young Drivers In Serious Crashes,
1996-1998, by County of Residence

Rank	County of Residence	Drivers 16-20		Index of Young Drivers In Serious
		In Serious Crashes	Population 16-20	Crashes per 1,000 Population 16-20 (State Average = 1.00)
1	Prowers	133	1,037	1.41
2	Lincoln	45	361	1.37
3	Park	111	933	1.30
4	Elbert	146	1,228	1.30
5	Gilpin	30	263	1.25
6	Denver	3,260	30,435	1.17
7	Pueblo	1,174	11,127	1.16
8	Morgan	184	1,761	1.15
9	Arapahoe	3,301	31,721	1.14
10	Adams	2,367	22,903	1.13
11	Kit Carson	61	597	1.12
12	Grand	67	666	1.10
13	Conejos	68	680	1.10
14	Fremont	282	2,848	1.09
15	Logan	118	1,193	1.08
16	Teller	144	1,476	1.07
17	Eagle	179	1,839	1.07
18	Kiowa	13	136	1.05
19	Jefferson	3,390	35,474	1.05
20	Douglas	852	9,149	1.02
21	Garfield	251	2,728	1.01
22	Otero	136	1,486	1.00
23	Summit	83	916	0.99
24	Montrose	211	2,329	0.99
25	Montezuma	165	1,832	0.99
26	El Paso	3,282	36,833	0.98
27	Pitkin	50	570	0.96
28	Mesa	824	9,415	0.96
29	Costilla	21	245	0.94
30	Las Animas	86	1,011	0.93
31	Washington	31	369	0.92
32	Baca	23	275	0.92
33	Weld	1,191	14,737	0.89
34	Clear Creek	49	607	0.88
35	Dolores	12	150	0.87
36	Phillips	22	277	0.86
37	Cheyenne	13	165	0.85
38	Rio Grande	68	873	0.84
39	Larimer	1,691	22,049	0.83
40	Delta	136	1,795	0.80
41	Chaffee	81	1,106	0.79
42	Yuma	50	694	0.79
43	La Plata	283	3,952	0.79
44	Custer	17	243	0.77
45	Moffat	77	1,104	0.76
46	Mineral	2	29	0.76
47	Lake	45	656	0.75
48	Boulder	1,687	24,845	0.74
49	Crowley	18	274	0.72
50	Bent	24	368	0.71
51	Archuleta	41	630	0.71
52	Routt	81	1,275	0.70
53	Rio Blanco	38	600	0.69
54	Saguache	26	426	0.67
55	Alamosa	108	1,866	0.63
56	San Miguel	19	335	0.62
57	Jackson	7	127	0.60
58	Huerfano	27	499	0.59
59	Sedgwick	10	187	0.59
60	Ouray	13	254	0.56
61	Hinsdale	2	42	0.52
62	San Juan	2	55	0.40
63	Gunnison	54	1,728	0.34
Total State		26,982	295,784	1.00

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: County percentage of statewide young drivers in serious crashes divided by city percentage of statewide 16-20 population.

Exhibit 16. Counties with Population-Adjusted Young Driver Crash Rates Above the State Average



Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Market research. In 1998, BBC conducted a telephone survey and held focus groups with young drivers and their parents. This research was conducted in clusters showing high young driver crash rates in 1995-1996. (Clusters were identified using the market segmentation system. See the FY 1999 and FY 200 Problem Identification reports for more information.) Key findings include the following:

- Teens have different worries about the dangers of driving than their adult counterparts. They worry less about getting killed and injured, although they worry more about killing someone else. For the most part, they think they're above-average drivers, and that they're less likely to be involved in a crash than the average driver out on the road.
- Young men and women differ as drivers in three significant ways. Peer influences seem to have a stronger effect on the driving habits of young women. Young men who drink are much more likely to be involved in a crash than non-drinkers (not true for young women).
- Formal driver's training, whether through school or a private course, did not appear to have an effect on young driver crash rates. However, if their parents had extensive involvement in teaching them to drive, young women were much less likely to be in a crash (not true for young men).
- About the same proportion of teens in the high-risk clusters drink heavily as found for adults in Colorado, who do so legally. Like adults, teens who are heavy drinkers have an inflated sense of their ability to drive after drinking, and report that it's okay for the designated driver to have a few drinks. For other teens, however, a designated driver is a person who doesn't drink or drinks very little.

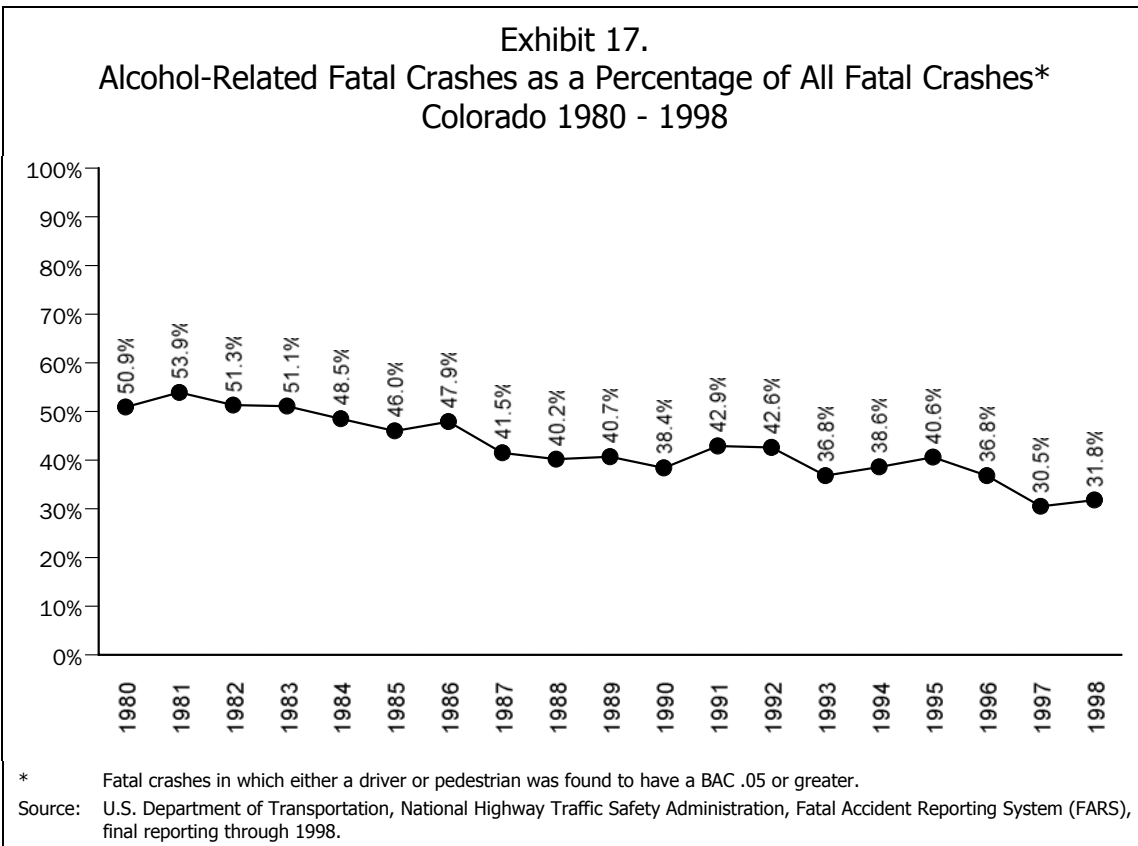
In 1999, BBC conducted focus groups with parents and teens from Parker, Castle Rock and Highlands Ranch. This research is being used by CDOT and a community coalition to create pilot programs designed to reduce young driver crashes in Douglas County.

In addition to the Douglas County research, BBC conducted focus groups with parents and teens in Denver, Pueblo, Montrose and Greeley. This research is being used to refine the public information and education campaign that will educate Colorado’s parents and teens about the new Graduated Licensing law.

One key finding from all of the teen and parent research was that, in general, teens across Colorado are very similar in their attitudes and experiences with driving and learning to drive. Because of this, programs that reduce young driver crashes in one part of the state (e.g. Douglas County) may have success elsewhere.

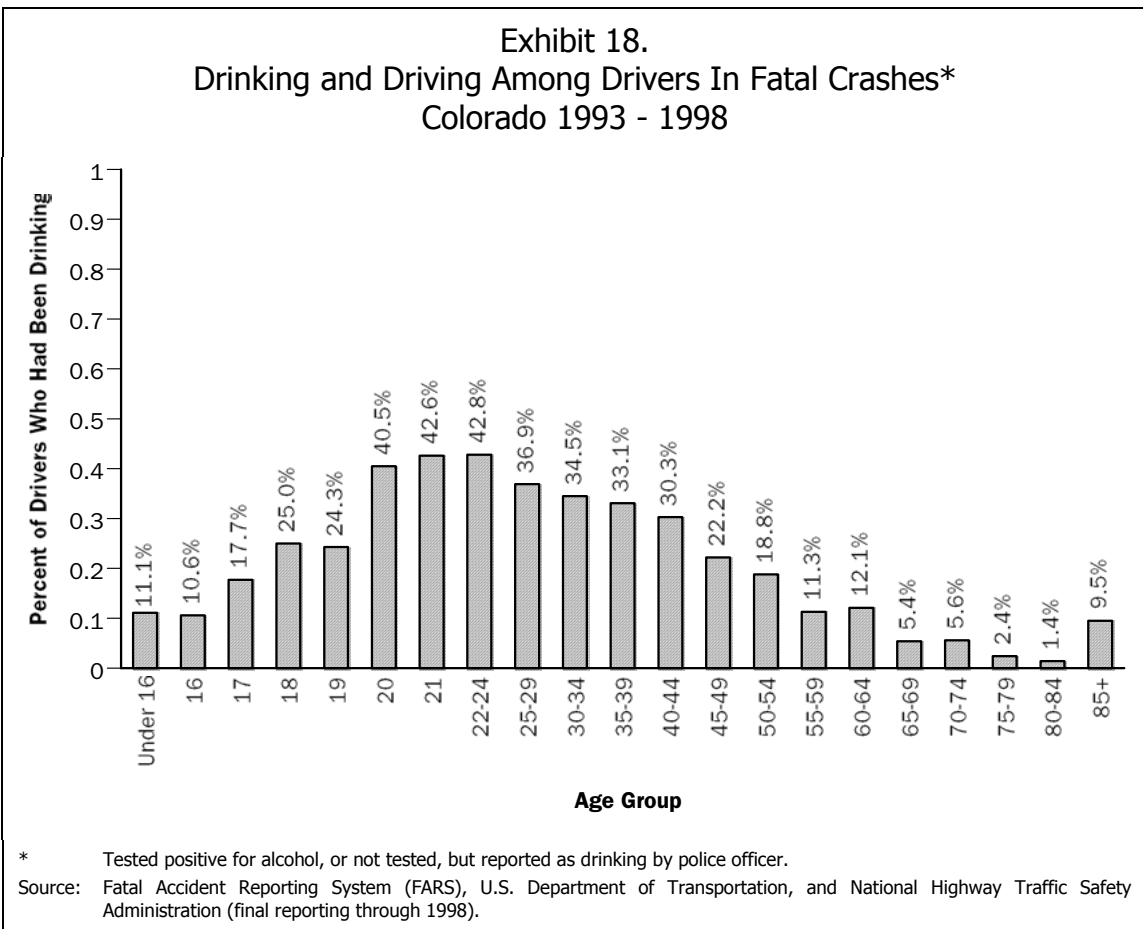
Alcohol-Related Crashes

Share of total crashes. Since 1980, the proportion of fatal crashes where alcohol is involved has dramatically decreased. In particular, 1996 and 1997 saw significant decreases in alcohol-related fatal crashes, although the proportion of fatal crashes that were alcohol-related increased slightly in 1998. The 1998 figure of 23.2% was lower than all years prior to 1997. The line chart below shows alcohol-related fatal crashes as a proportion of all fatal crashes by year. “Alcohol-related” in Exhibit 7 means that one or more drivers in the crash had a blood alcohol level of at least .05. For this measure, crashes where drivers were not tested, or where the tested results were less than .05 are not considered to be alcohol-related.



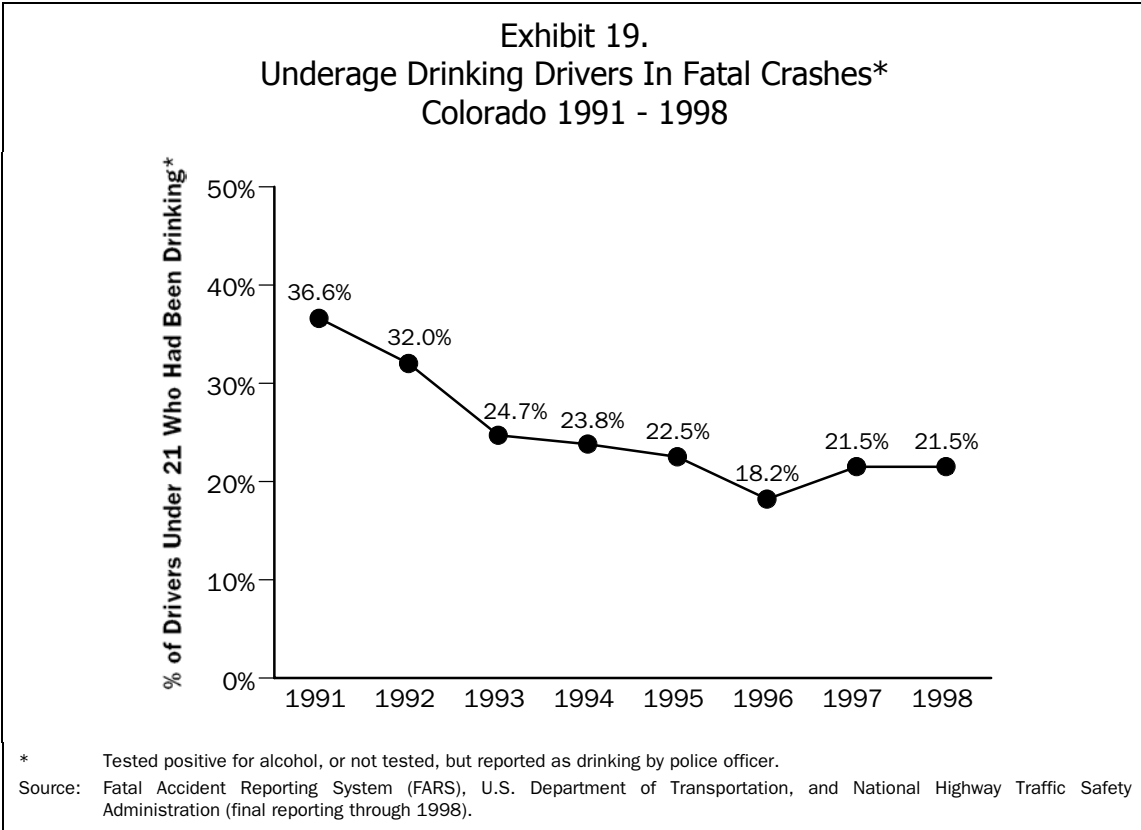
Alcohol-related crashes by age. Exhibit 18 below shows the percentage of drivers involved in fatal crashes (by age group) who had been drinking. For this analysis, a driver was considered to be drinking if (a) there was a positive result from a breath or blood test (.01 BAC or greater), or (b) no test was given, but the investigating officer reported that there was evidence that the driver had been drinking.

- Drinking is most likely to be involved in a fatal crash for drivers in their 20s.
- After the 20s, the probability of drinking and driving and then being involved in a fatal crash steadily diminishes.
- In spite of the fact that drinking is illegal for people under 21, more than one-fifth of the drivers 16 to 20 who were involved in fatal crashes had been drinking.
- The youngest drivers (16 years old) are not likely to have been drinking, but alcohol use increases steadily from then until the mid-twenties.



Underage drinking. Underage drinking is a priority problem for the Office of Transportation Safety. Youthful drivers are more likely to be involved in a crash even when unimpaired, and drinking alcohol makes their driving even more dangerous.

Exhibit 19 shows that significant progress has been made since 1991 in reducing the percentage of underage drivers who drink and drive. One indicator is the proportion of young drivers in fatal crashes that were considered to be drinking (a positive result from a breath or blood test or the investigating officer reported that there was evidence that the driver had been drinking). About one in every five drivers under 21 who were involved in a fatal crash had been drinking, which is substantially below levels found in the early 1990s.



Cities and counties with high rates of alcohol-related crashes. As with young driver crashes, this report analyzes the place of residence of drinking drivers involved in serious crashes. Drivers in this analysis were either tested for or suspected of alcohol or drug use. Exhibits 20-23 demonstrate the scope of drinking drivers in serious crashes in individual Colorado cities and counties and how those areas are different from the state average.

- Exhibits 20 and 21 compare the number of drivers who were suspected of alcohol or drug use involved in serious crashes with total drivers involved in serious crashes who live in a city or county.
- Exhibits 22 and 23 rank cities and counties by a population-weighted drinking and driving crash index. The index for the state as a whole is “1.0.” An index of “2.0” means that the number of drivers in serious crashes suspected of alcohol or drug use living in a city or county was double the rate expected given that city or county’s driving population. Similarly, an index of “0.5” means that an area had an alcohol-related crash rate one-half that of the state.

In Colorado, 7% of all drivers in serious crashes from 1996 through 1998 were suspected of alcohol or drug use (this is lower than what was found for fatal crashes because of lower severity of crashes and possibly less rigorous investigation of alcohol use). Previous research conducted both by CDOT and nationally often links drinking and driving behavior to younger, low-income, blue-collar males. The differences seen across cities and counties in Colorado may result from many factors. Some of those factors may be demographic (e.g. age of driver, income), attitudinal or behavioral (e.g. fewer heavy drinkers who drive drunk, correct use of designated drivers or alternative transportation) or the result of successful enforcement and education campaigns (e.g. DUI patrols, certain and severe punishment of offenders, targeted messaging and outreach).

- More than 10% of drivers in serious crashes living in the City of Montrose were suspected of drinking or drug use compared to 3% in Greenwood Village. Drinking drivers accounted for a higher than average share of drivers living in Greeley, Pueblo and Denver who were involved in serious crashes. Relatively few drivers involved in serious crashes from Colorado Springs, Aurora, Lakewood and Boulder were suspected of drinking or drug use. (See Exhibit 20.)
- In Douglas County, fewer than one in twenty-five drivers involved in serious crashes were drinking. (See Exhibit 21.)
- Eagle County ranks fifth-highest among all counties with alcohol-related crashes. It is also the county with the largest population among the ten counties with the highest per capita rates of drunk driver involvement in serious crashes. (See Exhibit 22.)
- The number of drivers living in Costilla County who were in serious crashes and were suspected of alcohol or drugs was nearly triple what would be expected given the County's population. (See Exhibit 23.)
- Relatively few of the drivers in serious crashes who live in Douglas County were suspected of alcohol or drug use based upon the data in the crash reports. Residents of Boulder, Jefferson and Arapahoe counties also had below-average drunk driver crash rates. (See Exhibit 23.)

Exhibit 24 maps the counties for which the index of drivers in serious crashes suspected of alcohol or drug use was more than 10% above the state average. This map clearly shows that alcohol-related crashes are a particular problem in Southwest Colorado, the San Luis Valley, mountain resort communities, the City of Denver, Pueblo, and in the Adams, Weld and Morgan County corridor.

Exhibit 20.
Percentage of Drivers In Serious Crashes Suspected of Alcohol or Drug Use,
1996-1998, by City of Residence

Rank	City of Residence	<u>Drivers In Serious Crashes Living In City</u>		Drivers Suspected of Alcohol or Drug Use as a Percentage of All Drivers In Serious Crashes
		Drivers Suspected of Alcohol or Drug Use*	All Drivers	
1	Montrose	46	411	11%
2	Fort Morgan	43	414	10%
3	Brighton	78	762	10%
4	Commerce City	99	1,050	9%
5	Greeley	203	2,325	9%
6	Durango	40	461	9%
7	Pueblo	363	4,371	8%
8	Canon City	47	574	8%
9	Golden	52	662	8%
10	Denver	1,720	22,470	8%
11	Federal Heights	28	367	8%
12	Lafayette	55	724	8%
13	Grand Junction	100	1,322	8%
14	Fort Collins	249	3,387	7%
15	Loveland	126	1,739	7%
16	Longmont	161	2,227	7%
17	Englewood	91	1,321	7%
18	Sterling	18	268	7%
19	Thornton	206	3,091	7%
20	Wheat Ridge	81	1,327	6%
21	Westminster	221	3,631	6%
22	Colorado Springs	797	13,499	6%
23	Arvada	200	3,532	6%
24	Aurora	675	12,106	6%
25	Northglenn	61	1,095	6%
26	Littleton	100	1,812	6%
27	Lakewood	305	5,545	6%
28	Boulder	169	3,122	5%
29	Castle Rock	35	712	5%
30	Fountain	35	756	5%
31	Broomfield	48	1,096	4%
32	Parker	23	666	3%
33	Louisville	18	530	3%
34	Greenwood Village	<u>26</u>	<u>839</u>	<u>3%</u>
	Total Large Cities	6,519	98,214	7%

* Tested positive for alcohol or drug use, or not tested but reported as drinking by a police officer.

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation.

Exhibit 21.
Percentage of Drivers In Serious Crashes Suspected of Alcohol or Drug Use,
1996-1998, by County of Residence

Drivers in Serious Crashes Living in County				
Rank	County of Residence	Drivers Suspected of Alcohol or Drug Use*	All Drivers	Share of Serious Crashes Involving Alcohol or Drugs
1	Mineral	2	8	25%
2	Costilla	22	127	17%
3	Dolores	8	48	17%
4	Ouray	12	73	16%
5	Saguache	21	132	16%
6	Custer	13	84	15%
7	San Miguel	21	136	15%
8	Archuleta	30	199	15%
9	Lake	37	246	15%
10	Eagle	129	954	14%
11	San Juan	2	15	13%
12	Crowley	11	83	13%
13	Sedgwick	7	54	13%
14	Montezuma	86	673	13%
15	Rio Grande	34	275	12%
16	Summit	70	582	12%
17	Conejos	27	230	12%
18	Pitkin	47	425	11%
19	Washington	13	119	11%
20	Delta	63	578	11%
21	Garfield	124	1,145	11%
22	Gunnison	28	259	11%
23	Montrose	85	790	11%
24	Moffat	32	299	11%
25	Rio Blanco	14	131	11%
26	Otero	56	526	11%
27	Chaffee	39	375	10%
28	Clear Creek	29	289	10%
29	Prowers	43	429	10%
30	La Plata	116	1,168	10%
31	Las Animas	36	381	9%
32	Bent	13	139	9%
33	Weld	455	4,878	9%
34	Baca	8	87	9%
35	Morgan	73	804	9%
36	Yuma	17	189	9%
37	Alamosa	37	430	9%
38	Kiowa	3	35	9%
39	Kit Carson	15	175	9%
40	Jackson	4	47	9%
41	Phillips	8	95	8%
42	Routt	35	422	8%
43	Pueblo	448	5,490	8%
44	Huerfano	12	149	8%
45	Grand	28	348	8%
46	Denver	1,720	22,470	8%
47	Fremont	89	1,185	8%
48	Adams	937	12,582	7%
49	Larimer	505	7,045	7%
50	Teller	52	734	7%
51	Mesa	240	3,404	7%
52	Park	35	535	7%
53	Gilpin	10	157	6%
54	Hinsdale	1	16	6%
55	Logan	25	413	6%
56	Lincoln	7	116	6%
57	Boulder	520	8,662	6%
58	El Paso	1,007	17,585	6%
59	Elbert	34	595	6%
60	Jefferson	954	16,848	6%
61	Arapahoe	854	17,044	5%
62	Cheyenne	3	62	5%
63	Douglas	145	3,863	4%
	Total State	9,551	137,437	7%

* Tested positive for alcohol or drug use, or not tested but reported as drinking by police officer.
Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation.

Exhibit 22.
**Population-Adjusted Index of Drivers In Serious Crashes Suspected
of Alcohol or Drug Use, 1996-1998, by City of Residence**

Rank	City of Residence	Drivers In Serious Crashes Suspected of Alcohol or Drug Use Living In City*	16+ Population	Index of Drivers In Serious Crashes Suspected of Alcohol or Drug Use per 1,000 Driving Age Population (State Average = 1.00)
1	Commerce City	99	12,545	2.49
2	Brighton	78	12,319	1.99
3	Fort Morgan	43	7,901	1.71
4	Montrose	46	9,726	1.49
5	Pueblo	363	80,165	1.43
6	Denver	1,720	383,089	1.41
7	Thornton	206	48,873	1.33
8	Lafayette	55	13,964	1.24
9	Golden	52	13,265	1.23
10	Greeley	203	52,574	1.22
11	Fountain	35	9,341	1.18
12	Loveland	126	34,216	1.16
13	Canon City	47	12,789	1.16
14	Federal Heights	28	7,652	1.15
15	Longmont	161	44,721	1.13
16	Englewood	91	25,651	1.12
17	Aurora	675	190,709	1.11
18	Durango	40	11,730	1.07
19	Castle Rock	35	11,077	1.00
20	Littleton	100	31,859	0.99
21	Wheat Ridge	81	25,964	0.98
22	Westminster	221	71,162	0.98
23	Colorado Springs	797	257,713	0.97
24	Grand Junction	100	32,869	0.96
25	Fort Collins	249	86,701	0.90
26	Lakewood	305	114,346	0.84
27	Arvada	200	76,951	0.82
28	Northglenn	61	23,737	0.81
29	Greenwood Village	26	10,174	0.81
30	Parker	23	10,743	0.67
31	Boulder	169	79,848	0.67
32	Sterling	18	8,863	0.64
33	Broomfield	48	24,430	0.62
34	Louisville	18	12,798	0.44
	Total Large Cities	6,519	1,850,465	1.11

* Tested positive for alcohol or drug use, or not tested but reported as drinking by police officer.

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: City percentage of statewide drinking drivers in serious crashes divided by city percentage of statewide 16+ population.

Exhibit 23.
Population-Adjusted Index of Drivers In Serious Crashes Suspected
of Alcohol or Drug Use, 1996-1998, by County of Residence

Rank	County of Residence	Drivers In Serious Crashes Suspected of Alcohol or Drug Use		Index of Drivers In Serious Crashes Suspected of Alcohol or Drug Use per 1,000 Driving Age Population (State Average = 1.00)
		Living In City*	16+ Population	
1	Custer	13	1,275	3.21
2	Costilla	22	2,644	2.62
3	Lake	37	6,169	1.89
4	Dolores	8	1,350	1.87
5	Eagle	129	23,699	1.71
6	Montezuma	86	16,850	1.61
7	Saguache	21	4,290	1.54
8	San Miguel	21	4,360	1.52
9	Summit	70	14,683	1.50
10	Conejos	27	5,673	1.50
11	San Juan	2	426	1.48
12	Ourray	12	2,595	1.46
13	Archuleta	30	6,501	1.45
14	Denver	1,720	382,288	1.42
15	Garfield	124	28,622	1.36
16	Pueblo	448	104,131	1.36
17	Prowers	43	10,099	1.34
18	Clear Creek	29	6,839	1.34
19	Adams	937	232,751	1.27
20	Pitkin	47	11,855	1.25
21	Weld	455	117,952	1.22
22	Rio Grande	34	8,965	1.19
23	Morgan	73	19,301	1.19
24	Mineral	2	533	1.18
25	La Plata	116	31,757	1.15
26	Park	35	9,696	1.14
27	Grand	28	7,767	1.14
28	Montrose	85	23,750	1.13
29	Otero	56	16,085	1.10
30	Moffat	32	9,319	1.08
31	Teller	52	15,206	1.08
32	Sedgwick	7	2,202	1.00
33	Alamosa	37	11,679	1.00
34	Gilpin	10	3,195	0.99
35	Washington	13	4,162	0.98
36	Delta	63	20,415	0.97
37	Chaffee	39	12,769	0.96
38	Crowley	11	3,612	0.96
39	Las Animas	36	12,335	0.92
40	Gunnison	28	9,744	0.91
41	Jackson	4	1,398	0.90
42	Larimer	505	176,597	0.90
43	Bent	13	4,590	0.89
44	Mesa	240	85,987	0.88
45	El Paso	1,007	363,273	0.87
46	Kit Carson	15	5,673	0.83
47	Routt	35	13,504	0.82
48	Fremont	89	34,362	0.82
49	Elbert	34	13,262	0.81
50	Rio Blanco	14	5,507	0.80
51	Boulder	520	209,375	0.78
52	Jefferson	954	391,745	0.77
53	Arapahoe	854	356,507	0.75
54	Yuma	17	7,401	0.72
55	Phillips	8	3,592	0.70
56	Baca	8	3,600	0.70
57	Kiowa	3	1,396	0.68
58	Huerfano	12	5,988	0.63
59	Logan	25	14,374	0.55
60	Cheyenne	3	1,752	0.54
61	Hinsdale	1	584	0.54
62	Douglas	145	95,543	0.48
63	Lincoln	7	5,242	0.42
Total State		9,551	3,008,796	1.00

* Tested positive for alcohol or drug use, or not tested but reported as drinking by police officer.

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: County percentage of statewide drinking drivers in serious crashes divided by county percentage of statewide 16+ population.

Exhibit 24.
Counties with per Capita Drivers Suspected of Alcohol or Drug Use
Crash Rates 8% Above the State Average



Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Market research. The Office of Transportation Safety retained BBC to conduct telephone surveys and focus groups with drivers in clusters that were over-represented in alcohol-related serious crashes. (See the FY 1999 and FY 2000 Problem Identification reports for a detailed discussion of these high-risk clusters.) Key findings from this 1998 research included the following:

- Drivers in high-risk clusters are much more likely than other drivers to believe they're okay to drive after three drinks or more (35% of respondents in target clusters).
- Drivers have a high degree of awareness of the designated driver concept, but for many in high-risk clusters, the designated driver is only the one who is least drunk at the end of the evening.
- Within the high-risk clusters, drinkers who drive after more than three drinks often have grown up in a social environment that promotes drinking. They are familiar with the potential painful consequences of driving under the influence. However, their peers may reinforce this behavior.
- Both drinkers and non-drinkers believe that there is a good chance you'll get caught if you drive after having too much to drink. The financial consequences of a DUI are the main concern of most of the drinkers in the high-risk clusters, not the dangers of drinking and driving or social stigmas.

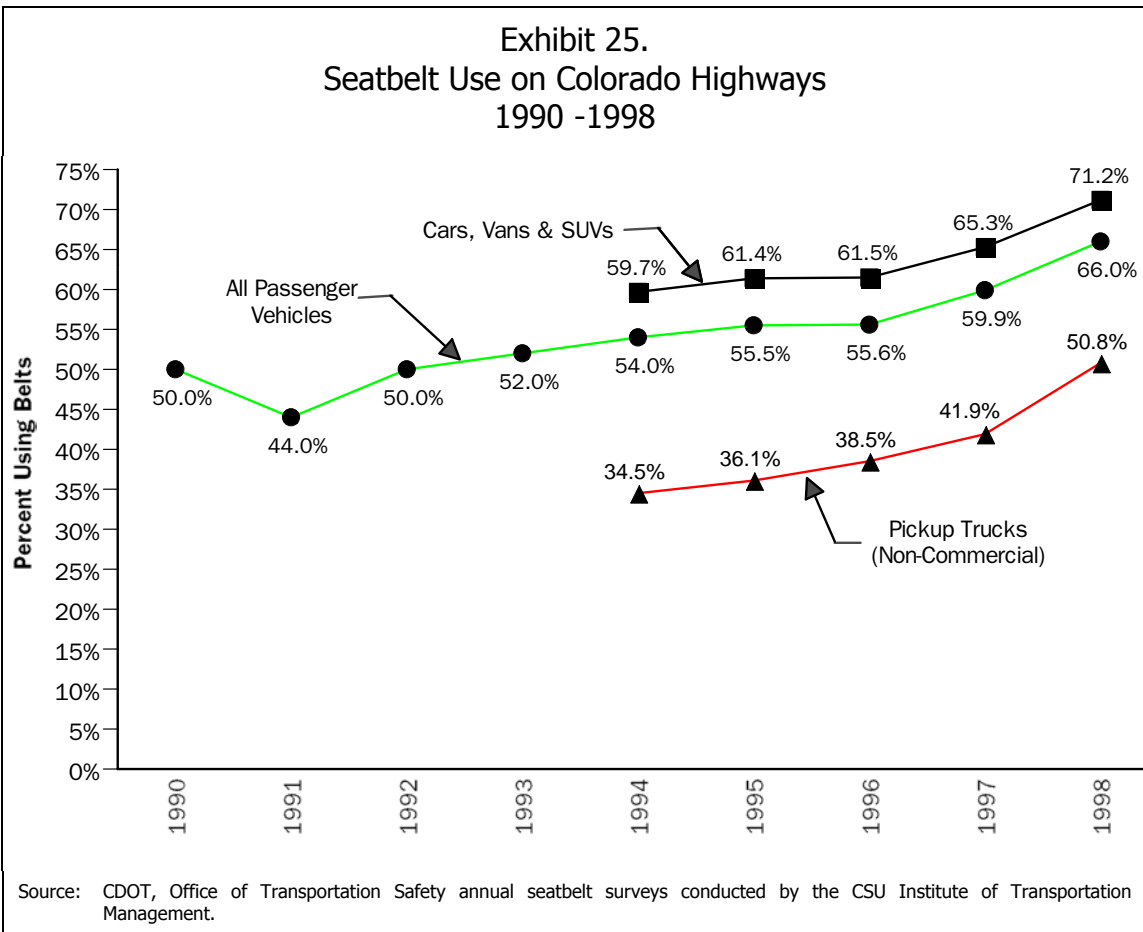
In 2000, OTS and BBC are working with Pueblo community groups to develop a pilot program addressing drinking and driving in Pueblo. As part of this effort, a telephone survey and focus groups were conducted in summer 1999 with men who live in the Pueblo clusters associated with alcohol-related crashes. Key findings from this research include:

- The men in the Pueblo clusters are no more likely than men statewide to report drinking alcohol. Men who are under 55, do not have children living at home, and are Hispanic are more likely to be frequent heavy drinkers. (Heavy drinkers were defined for the purposes of this research as individuals who report drinking three or more drinks in one sitting at least once a month.)
- Drinking is an important complement to social activities with friends and family, and many drive after drinking.
- Men in Pueblo worry about getting DUIs, and are more likely than men statewide to think they'll get caught if they drive drunk.
- They admire designated drivers. Some think they use them, but most believe it's ok for the designated driver to drink.

Occupant Protection

Although the failure to use occupant protection devices does not *cause* traffic crashes, their use protects the occupants of a vehicle from physical injury or death if there is a crash. Research performed under the sponsorship of the National Highway Traffic Safety Administration (NHTSA) has produced estimates that seat belts double the chance of surviving a serious crash. Because of this, the OTS promotes the use of occupant protection devices.

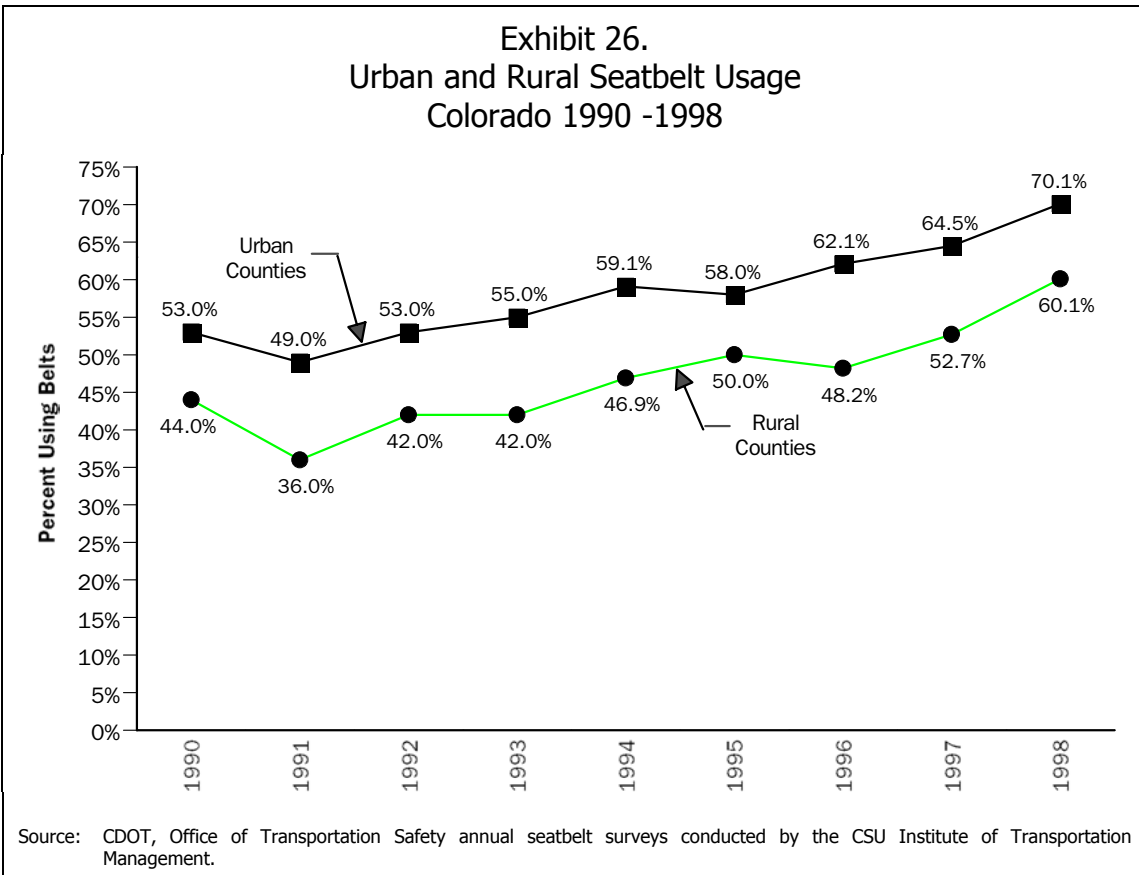
Trends in seat belt use. Since the first annual seat belt survey was performed in 1990, usage rates have steadily increased. In July 1998, the date of the most recent statistics, 66% of all front-seat occupants in vehicles on Colorado highways were belted. Exhibits 25-28 display different seat belt trends.



Vehicle type seat belt use. People in cars, vans, and sports utility vehicles (as a group) are much more likely to be wearing belts than people in pickup trucks (71% vs. 51% in 1998). This difference is true for both urban and rural areas.

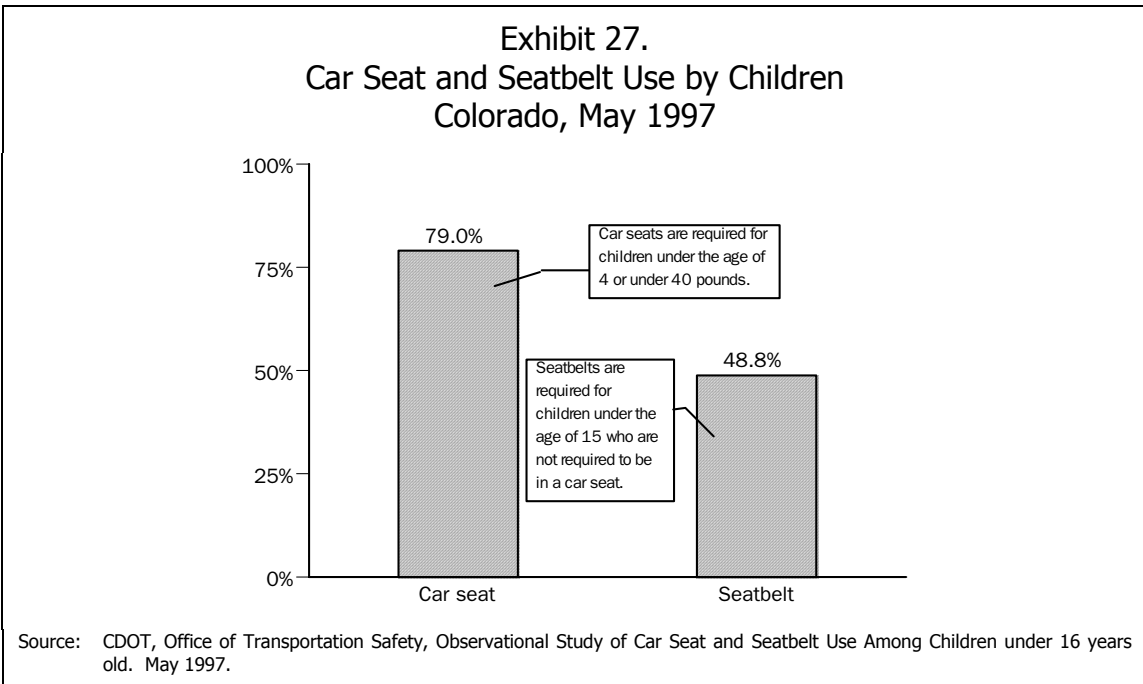
Urban versus rural seat belt use. The annual seat belt survey divides counties in the state into three broad areas: The Front Range, the Eastern Plains and Western Colorado. Classifying the Front Range counties as urban and counties in the other two areas as rural yields the following results:

- Although rates for all areas have been increasing, drivers and front seat passengers in Colorado's urban counties are more likely to be using their belts than in rural counties.
- The gap between observed rural and urban seatbelt use has been consistent over the past seven years.

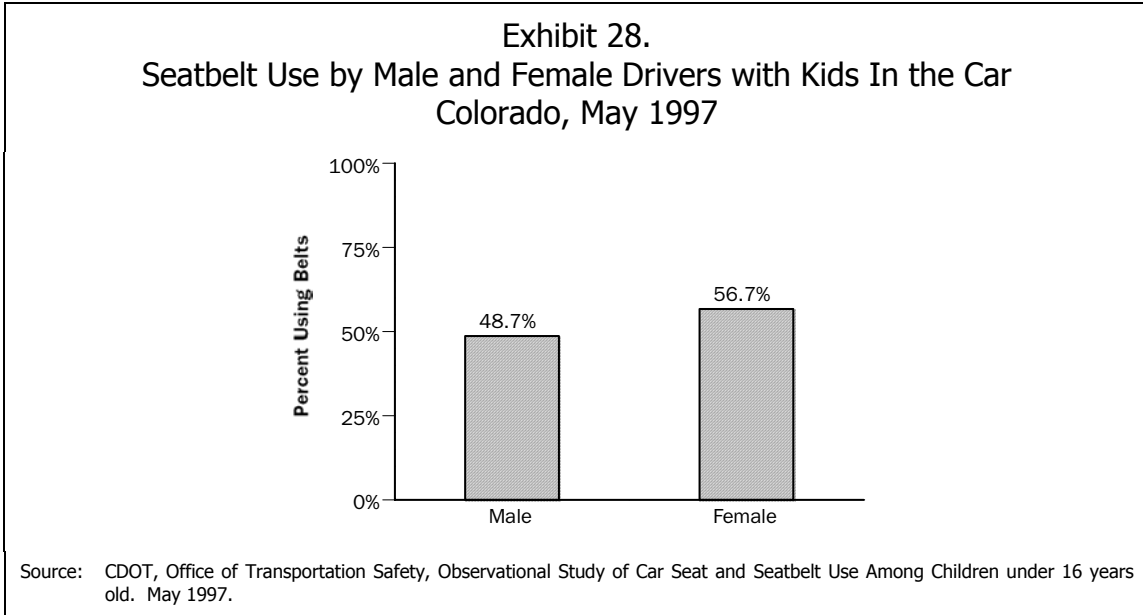


Use of occupant protection among children under 16. Statistics on use of seatbelts and car seats among children under 16 years of age come from a May 1997 OTS-funded observational study. The study was conducted at signalized intersections in a randomly selected group of localities throughout the state. Key findings were:

- For children under four years old or under 40 pounds in weight, 79% were in car seats.
- For older and heavier kids up through age 15, use of occupant protection was much lower (49%).



Gender differences in use of occupant protection. The May 1997 observational study also found female drivers with children in the car were significantly more likely to be wearing a seat belt themselves than were males with kids in the car. This pattern results from the fact that males in general are less likely to wear seatbelts when driving.



Cities and counties with high rates of unbelted drivers in very serious crashes. The study team also examined cities and counties whose residents were more likely to be involved in a very serious crash while not wearing occupant protection. These data only include drivers in crashes in which there was a fatality or where an occupant had an incapacitating injury. (The reason for this additional restriction on the data is that information on the seat belt use of occupants increases in accuracy for the most serious crashes.) Exhibits 29-32 on the following pages show the variation in the percentage of drivers not using seat belts in very serious crashes across cities and counties.

Rural residents of Colorado who were involved in very serious crashes from 1996 through 1998 were far less likely to be wearing seat belts than urban residents. Lower income areas also demonstrated low use of occupant protection.

- In Durango, three out of five drivers in the most serious crashes were not wearing seat belts, the highest proportion across all larger cities. (See Exhibit 29.)
- In Lake and Sedgwick counties only one in five drivers in the most serious crashes were wearing seat belts. (See Exhibit 30.)
- Saguache County drivers were four times more likely than drivers statewide to be in very serious crashes and not be wearing a seat belt. (See Exhibit 32.)
- The rate of drivers in Montezuma County being involved in very serious crashes and not wearing a seat belt is double the expected rate given the County's population. (See Exhibit 32.)

The likelihood of drivers being involved in very serious crashes and not using occupant protection was highest in Southwest Colorado, the San Luis Valley, Central Mountains and Eastern Plains. Exhibit 33 maps those counties in which local residents were over 50% more likely to be involved in very serious crashes and be unbelted.

Exhibit 29.
 Percentage of Drivers In Very Serious Crashes Not Wearing Seat Belts,
 1996-1998, by City of Residence

<u>Drivers In Very Serious Crashes Living In City</u>				Unbelted Drivers as a Percentage of All Drivers In Serious Crashes
Rank	City of Residence	Unbelted Drivers	All Drivers	
1	Durango	23	38	61%
2	Brighton	48	82	59%
3	Grand Junction	62	106	58%
4	Loveland	61	106	58%
5	Montrose	24	43	56%
6	Canon City	31	56	55%
7	Fort Morgan	18	33	55%
8	Commerce City	56	103	54%
9	Lafayette	21	40	53%
10	Federal Heights	15	29	52%
11	Sterling	16	31	52%
12	Louisville	15	30	50%
13	Fort Collins	101	203	50%
14	Greeley	76	155	49%
15	Longmont	79	162	49%
16	Thornton	119	261	46%
17	Pueblo	141	312	45%
18	Littleton	46	103	45%
19	Fountain	17	39	44%
20	Westminster	105	242	43%
21	Colorado Springs	238	568	42%
22	Northglenn	31	74	42%
23	Lakewood	131	319	41%
24	Golden	15	37	41%
25	Boulder	52	130	40%
26	Arvada	86	219	39%
27	Englewood	35	91	38%
28	Denver	618	1,671	37%
29	Aurora	348	963	36%
30	Wheat Ridge	24	72	33%
31	Broomfield	20	62	32%
32	Greenwood Village	14	45	31%
33	Parker	16	57	28%
34	Castle Rock	11	40	28%
	Total Large Cities	2,713	6,522	42%

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation.

Exhibit 30.
Percentage of Drivers In Very Serious Crashes Not Wearing Seat Belts,
1996-1998, by County of Residence

<u>Drivers in Very Serious Crashes Living in County</u>				Unbelted Drivers as a Percentage of All Drivers In Serious Crashes
Rank	County of Residence	Unbelted Drivers	All Drivers	
1	Lake	29	35	83%
2	Sedgwick	9	11	82%
3	Hinsdale	3	4	75%
4	Saguache	26	35	74%
5	Baca	11	15	73%
6	Phillips	11	15	73%
7	Yuma	26	38	68%
8	Cheyenne	4	6	67%
9	Mineral	2	3	67%
10	Moffat	16	24	67%
11	Costilla	13	20	65%
12	Las Animas	16	25	64%
13	San Miguel	15	24	63%
14	Montrose	54	87	62%
15	Prowers	29	47	62%
16	Bent	8	13	62%
17	Crowley	9	15	60%
18	Dolores	3	5	60%
19	Gilpin	6	10	60%
20	Otero	35	59	59%
21	Delta	42	71	59%
22	Conejos	20	34	59%
23	Huerfano	7	12	58%
24	Montezuma	49	84	58%
25	Rio Grande	30	53	57%
26	Morgan	40	71	56%
27	Custer	5	9	56%
28	Pitkin	26	47	55%
29	Fremont	67	125	54%
30	Chaffee	23	43	53%
31	Logan	23	43	53%
32	Mesa	139	263	53%
33	Weld	212	407	52%
34	Larimer	232	452	51%
35	Archuleta	21	41	51%
36	Jackson	5	10	50%
37	Ouray	4	8	50%
38	Teller	30	60	50%
39	Garfield	64	130	49%
40	Gunnison	16	33	48%
41	Washington	12	25	48%
42	Park	23	48	48%
43	Pueblo	187	392	48%
44	Lincoln	8	17	47%
45	Adams	493	1,061	46%
46	Boulder	212	485	44%
47	Rio Blanco	10	24	42%
48	Clear Creek	19	46	41%
49	El Paso	334	817	41%
50	Kit Carson	12	30	40%
51	Jefferson	404	1,022	40%
52	Grand	27	69	39%
53	Summit	26	68	38%
54	Elbert	21	55	38%
55	Eagle	41	108	38%
56	Denver	618	1,671	37%
57	La Plata	43	123	35%
58	Routt	15	43	35%
59	Arapahoe	414	1,213	34%
60	Alamosa	16	47	34%
61	Kiowa	2	6	33%
62	Douglas	59	237	25%
63	San Juan	0	0	0%
	Total State	4,376	10,094	43%

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation.

Exhibit 31.
Population-Adjusted Index of Unbelted Drivers In Very Serious Crashes,
1996-1998, by City of Residence

Rank	City of Residence	Unbelted Drivers In		Index of Unbelted Drivers In Very Serious Crashes per 1,000 16+ Population (State Average = 1.00)
		Very Serious Crashes	16+ Population	
1	Commerce City	56	12,545	3.07
2	Brighton	48	12,319	2.68
3	Montrose	24	9,726	1.70
4	Thornton	119	48,873	1.67
5	Canon City	31	12,789	1.67
6	Fort Morgan	18	7,901	1.57
7	Durango	23	11,730	1.35
8	Federal Heights	15	7,652	1.35
9	Grand Junction	62	32,869	1.30
10	Aurora	348	190,709	1.25
11	Fountain	17	9,341	1.25
12	Sterling	16	8,863	1.24
13	Loveland	61	34,216	1.23
14	Longmont	79	44,721	1.21
15	Pueblo	141	80,165	1.21
16	Denver	618	383,089	1.11
17	Lafayette	21	13,964	1.03
18	Parker	16	10,743	1.02
19	Westminster	105	71,162	1.01
20	Greeley	76	52,574	0.99
21	Littleton	46	31,859	0.99
22	Greenwood Village	14	10,174	0.95
23	Englewood	35	25,651	0.94
24	Northglenn	31	23,737	0.90
25	Louisville	15	12,798	0.81
26	Fort Collins	101	86,701	0.80
27	Lakewood	131	114,346	0.79
28	Golden	15	13,265	0.78
29	Arvada	86	76,951	0.77
30	Castle Rock	11	11,077	0.68
31	Wheat Ridge	24	25,964	0.64
32	Colorado Springs	238	257,713	0.63
33	Broomfield	20	24,430	0.56
34	Boulder	<u>52</u>	<u>79,848</u>	<u>0.45</u>
	Total Large Cities	2,713	1,850,465	1.01

Source: BBC Research & Consulting 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: City percentage of statewide unbelted drivers in serious crashes divided by city percentage of statewide 16+ population.

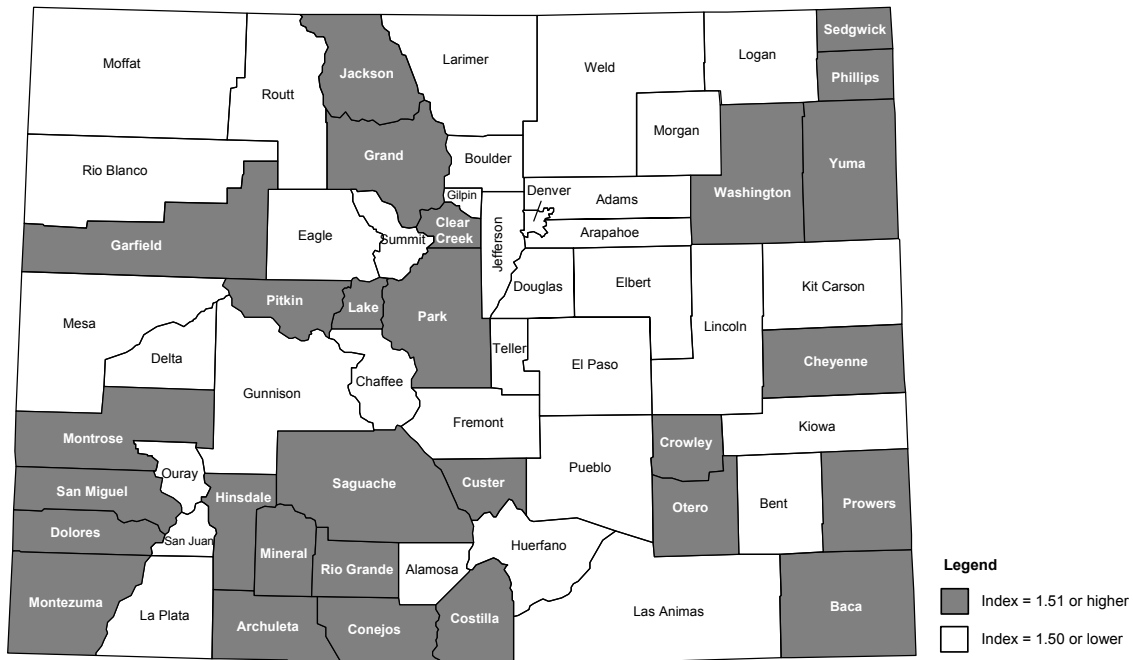
Exhibit 32.
Population-Adjusted Index of Unbelted Drivers In Very Serious Crashes,
1996-1998, by County of Residence

Rank	County of Residence	Unbelted Drivers In Very Serious Crashes	16+ Population	Adjusted Index of Unbelted Drivers In Very Serious per 1,000 16+ Population (State Average = 1.00)
1	Saguache	26	4,290	4.17
2	Hinsdale	3	584	3.53
3	Costilla	13	2,644	3.38
4	Lake	29	6,169	3.23
5	Sedgwick	9	2,202	2.81
6	Custer	5	1,275	2.70
7	Mineral	2	533	2.58
8	Jackson	5	1,398	2.46
9	Conejos	20	5,673	2.42
10	Yuma	26	7,401	2.42
11	Grand	27	7,767	2.39
12	San Miguel	15	4,360	2.37
13	Rio Grande	30	8,965	2.30
14	Archuleta	21	6,501	2.22
15	Phillips	11	3,592	2.11
16	Baca	11	3,600	2.10
17	Montezuma	49	16,850	2.00
18	Washington	12	4,162	1.98
19	Prowers	29	10,099	1.97
20	Clear Creek	19	6,839	1.91
21	Crowley	9	3,612	1.71
22	Park	23	9,696	1.63
23	Cheyenne	4	1,752	1.57
24	Montrose	54	23,750	1.56
25	Garfield	64	28,622	1.54
26	Dolores	3	1,350	1.53
27	Pitkin	26	11,855	1.51
28	Otero	35	16,085	1.50
29	Adams	493	232,751	1.46
30	Kit Carson	12	5,673	1.45
31	Morgan	40	19,301	1.42
32	Delta	42	20,415	1.41
33	Teller	30	15,206	1.36
34	Fremont	67	34,362	1.34
35	Gilpin	6	3,195	1.29
36	Rio Blanco	10	5,507	1.25
37	Chaffee	23	12,769	1.24
38	Weld	212	117,952	1.24
39	Pueblo	187	104,131	1.23
40	Summit	26	14,683	1.22
41	Bent	8	4,590	1.20
42	Eagle	41	23,699	1.19
43	Moffat	16	9,319	1.18
44	Gunnison	16	9,744	1.13
45	Denver	618	382,288	1.11
46	Mesa	139	85,987	1.11
47	Logan	23	14,374	1.10
48	Elbert	21	13,262	1.09
49	Ouray	4	2,595	1.06
50	Lincoln	8	5,242	1.05
51	Kiowa	2	1,396	0.99
52	Alamosa	16	11,679	0.94
53	La Plata	43	31,757	0.93
54	Larimer	232	176,597	0.90
55	Las Animas	16	12,335	0.89
56	Huerfano	7	5,988	0.80
57	Arapahoe	414	356,507	0.80
58	Routt	15	13,504	0.76
59	Jefferson	404	391,745	0.71
60	Boulder	212	209,375	0.70
61	El Paso	334	363,273	0.63
62	Douglas	59	95,543	0.42
63	San Juan	0	426	0.00
	Total State	4,376	3,008,796	1.00

Source: BBC Research & Consulting 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Index: County percentage of statewide unbelted drivers in serious crashes divided by county percentage of statewide 16+ population.

Exhibit 33.
Counties with Population-Adjusted Unbelted Drivers Crash Rates More Than 50% Above the State Average



Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation and 1997 population data from the Colorado Division of Local Government.

Market research findings. BBC's telephone survey and focus group research for OTS in 1998 included research with drivers in clusters disproportionately associated with non-use of occupant protection. (For a detailed discussion of these clusters see FY 1999 and FY 2000 Problem Identification reports.) Key findings include the following.

- One-third of a random cross-section of drivers throughout the state admitted they don't always use seat belts or recalled not using seat belts within the past year.
- Nearly one-half of drivers in rural clusters at high risk for not using seat belts reported that they do not consistently use their belts.
- Many rural drivers believe that with fewer cars on the road, seat belts are not as important for rural driving as when driving in urban, congested areas. Many rural drivers don't believe a seat belt is necessary for quick trips between farms or on a back road. These same drivers will buckle up to fight heavy traffic or drive on the freeway at higher speeds. Nearly all rural drivers report wearing seat belts when driving in the city.

Even though they may not wear them consistently, many rural non-belt users do buckle up if they have kids in the car. Children influence seat belt use among non-belt wearers not only because adults worry about their children's safety, but because children also encourage adults to wear seat belts by reciting lessons from school. When children aren't in the car, however, non-belt users revert to their old ways.

- Although most non-belt users believe a seat belt can make you safer in a crash, many are not convinced. Some part-time users see seat belts as a safety enhancement, but worry about being trapped or injured by their seat belt.

- Inconsistent belt users in high-risk rural clusters are less likely than others to follow rules just because they are rules. When it comes to using seat belts, these non-belt users will often buckle up if they know there is a fine for not doing it, or if they believe there is a reasonable chance they could be in an accident.

OTS and BBC are currently working with groups in Montezuma County to develop a pilot seat belt program designed for the specific needs of that community. As part of the program development, BBC conducted a telephone survey and focus groups with Montezuma County residents. Key findings from this research include:

- Half of the drivers in Montezuma County are part-time or inconsistent seat belt users.
- Men, single people, and drivers under 65 are more likely to be inconsistent seat belt users.
- Inconsistent seat belt users employ various criteria to determine whether or not to wear a seat belt on a particular driving trip. Some commonly used criteria include length of trip, bad weather and highway driving. The presence of wildlife or tourists makes some Montezuma County residents put on a seat belt.

Working with Cactus Communications, CDOT and BBC, the Montezuma County Clicks! coalition developed a signage campaign aimed at increasing consistent seat belt use. The signs, tested in focus groups with local residents, will be posted throughout the County and in the County's three main cities: Dolores, Cortez and Mancos. The signs will be posted in Summer 2000 and the message will be reinforced through the use of radio and print advertisements and outreach and education by the coalition.

Appendices

Appendix A
Analysis Methodology

Appendix A

Analysis Methodology

BBC obtained 528,667 driver addresses from CDOT relating to reported crashes from 1996 through 1998. Approximately 22,488 addresses were outside Colorado or were otherwise unusable. Of the remaining 506,000 addresses, 153,182 were classified as belonging to drivers involved in injury or fatal crashes. These serious crashes are the focus of the geographic segmentation analysis as data on age of drivers, alcohol use and occupant protection is more complete and consistent for these crashes.

BBC matched approximately 94% of driver addresses from these serious crashes to a specific geographic location. In the 1996 and 1998 crash databases, geographic location was identified based on the driver's address as well as a 12-digit geographic code (Block Group) that was assigned to each driver as part of the market segmentation research in the past. In the 1997 database, the reported driver's address information was verified using GIS software. Because of use of post office boxes, rural route numbers and other problems, a smaller proportion of driver addresses in rural areas were matched to Block Groups than in urban areas.

The specific driving problems of age, alcohol use and occupant protection were created using different conditions for each. The young driver population consisted of drivers aged 16 to 20. The all driver population consisted of any driver with a numeric age; in this case some records were excluded where the age information was missing. However, even drivers aged 15 and younger were included. Alcohol use included four conditions where the officer recorded; (1) alcohol involved, (2) prescription drugs or medication involved, (3) illegal drugs involved, and (4) alcohol and drugs involved. The all driver comparison numbers for alcohol use included one more condition, no impairment, in addition to the other four described. Our occupant protection numbers were narrowed down to include only the most serious of accidents, in which either a person was killed or a driver's injuries were evident and incapacitating. This "injury severity" stipulation lowered the total number of records substantially. From these records, two subgroups were found. One in which the driver was not wearing a seat belt; the other where the driver was wearing a seat belt.

Appendix B
Number of Crashes Occurring in Colorado Cities
1998

Appendix C
Number of Crashes Occurring in Colorado Counties
1998

Number of Crashes Occurring in Colorado Counties - 1998

County Name	1998 PDO Crashes	1998 Injury Crashes	1998 Fatal Crashes	1998 Total Crashes
Adams	5,730	2,564	39	8,333
Alamosa	334	118	2	454
Arapahoe	8,118	3,404	35	11,557
Archuleta	148	74	1	223
Baca	67	38	2	107
Bent	86	43	1	130
Boulder	4,489	1,927	20	6,436
Chaffee	269	118	4	391
Cheyenne	50	23	0	73
Clear Creek	496	210	8	714
Conejos	97	58	1	156
Costilla	72	50	3	125
Crowley	40	21	3	64
Custer	41	39	5	85
Delta	221	125	5	351
Denver	19,690	5,874	33	25,597
Dolores	25	28	1	54
Douglas	2,249	851	23	3,123
Eagle	869	324	8	1,201
El Paso	8,511	3,362	36	11,909
Elbert	165	92	7	264
Fremont	583	282	6	871
Garfield	934	341	12	1,287
Gilpin	128	75	1	204
Grand	259	106	3	368
Gunnison	295	87	2	384
Hinsdale	9	6	0	15
Huerfano	193	88	6	287
Jackson	65	27	2	94
Jefferson	7,535	3,073	29	10,637
Kiowa	33	11	1	45
Kit Carson	179	85	3	267
La Plata	667	335	10	1,012
Lake	62	41	4	107
Larimer	4,052	1,589	19	5,660
Las Animas	334	146	9	489
Lincoln	135	57	2	194
Logan	237	143	6	386
Mesa	2,024	768	15	2,807
Mineral	60	20	2	82
Moffat	237	74	1	312
Montezuma	290	206	6	502
Montrose	503	184	7	694
Morgan	332	201	5	538
Otero	244	103	4	351
Ouray	78	35	0	113
Park	250	134	9	393
Phillips	30	15	1	46
Pitkin	592	153	3	748
Prowers	227	102	5	334
Pueblo	2,555	1,208	27	3,790
Rio Blanco	118	49	5	172
Rio Grande	144	62	2	208
Routt	532	135	4	671
Saguache	79	40	5	124
San Juan	19	20	1	40
San Miguel	170	50	2	222
Sedgwick	73	26	0	99
Summit	695	222	6	923
Teller	365	143	8	516
Washington	55	51	4	110
Weld	2,025	1,202	42	3,269
Yuma	<u>99</u>	<u>42</u>	<u>7</u>	<u>148</u>
Totals	79,263	31,080	523	110,866

Source: BBC Research & Consulting using 1996-1998 crash data from the Colorado Department of Transportation.