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**Crash Trends of Older Drivers  
in Michigan: 1998-2002**

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16. Abstract <p>Michigan crash data from 1998 to 2002 were analyzed for trends in motor-vehicle crashes that involved motorists and pedestrians age 65 and older. The number of crashes and crash rates were obtained for all older drivers and for older drivers by sex and by age. Injury severity, safety belt use, and hazardous actions in single and multi-vehicle crashes were examined. The results show that over the 5-year period the number of crashes involving older drivers decreased by 6%, fatal and serious injury crashes decreased by 23%, and crashes in which an older driver had been drinking decreased by 27%. The number of older persons fatally or severely injured in motor vehicle crashes decreased by 23%. The proportion of fatal and serious injury crashes and had-been-drinking crashes that involved older drivers did not change over the 5-year period and the trends were similar to the overall crash trends in Michigan, indicating stability in the crash patterns of older drivers. Safety belt use among older motorists, already very high in 1998, increased to 98% by 2002. Of the older drivers and passengers killed over the five year period, 34% were not using safety belts. The number of crash-involved older pedestrians decreased by 5% over the 5-year period, but their proportion among all crash-involved pedestrians remained at 2-3%.</p>					
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## INTRODUCTION

This report examines trends in Michigan motor vehicle crashes from 1998 through 2002 involving motorists and pedestrians 65 years of age and older. This study is part of a larger project sponsored by the Michigan Office of Highway Safety Planning (OHSP) on elderly mobility (Molnar, Eby, and Miller, 2003). The objective of this report is to monitor statewide trends in vehicle crashes involving older persons so that OHSP, and other interested organizations can continue to identify opportunities for reducing crash-related deaths and injuries among this population.

This report describes the data and methods used in the analysis of crashes and presents results for the following categories: crashes for drivers age 65 and older by age group; fatal and serious-injury crashes involving drivers age 65 and older; crashes in which a driver age 65 or older had been drinking; Use of safety belts by drivers and passengers age 65 and older; and crashes that involved pedestrians age 65 and older. The report concludes with a description of notable trends.

## DATA AND METHODS

Michigan Vehicle Crash Data from 1998 through 2002 (University of Michigan Transportation Research Institute, UMTRI, Transportation Data Center, 1999, 2000, 2001, 2002, and 2003) are used for most of the analyses reported. These data cover all police-reported motor vehicle crashes in Michigan for the 5-year period (1998-2002) and come from information coded on police crash reports (UD-10 forms). In this report, drivers, passengers, and pedestrians have been defined as *older* if they are at least 65 years of age. Fatal and serious injury crashes are defined as crashes in which the most serious injury was coded as a K (fatal) or A (incapacitating) level injury on the UD-10 form, and are referred to as KA crashes. Crashes in which one of the involved drivers was flagged for alcohol use are referred to as *had been drinking* (HBD) crashes.

Most analyses in this study examines change in distributions of key variables from the Michigan Vehicle Crash Data files. The data files for each year contain three linked files: the crash file with descriptive information about the crash itself; the vehicle/driver file with information on the vehicle and the driver; and the person file with information on the occupants of the vehicles in the crash. Choices about which files to use when similar information was contained in more than one file were based on the amount of missing data for the variable in each file. Information about

drivers involved in a crash came from the vehicle/driver file, which includes information about driver injuries and safety belt use. Information about injuries and safety belt use of passengers were obtained from the person file.

Rates for crash occurrence were based on the population of Michigan, and the number of licensed drivers for each year. The numbers of licensed drivers by age and sex were obtained from the Michigan Department of State. Michigan’s population by age and sex was obtained from the U.S. Census Bureau for the years 1998 through 2000 (U.S. Census Bureau, 2000, 2001). The U.S. Census Bureau did not publish state-level population estimates by age and sex for 2001 and the estimates for 2002 were not released at the time of this analysis. Therefore, crash rates by age and sex are not reported for 2001 and 2002. The distributions of licensed drivers and population age 65 and older used in this report are in Appendix A.

## ALL CRASHES

In year 2002, of the 395,515 police-reported vehicle crashes in Michigan, 44,011 (11 %) involved an older driver. Table 1 shows the overall number of police-reported crashes, and the number and percentage involving older drivers for the 5-year period from 1998 through 2002. There were small decreases in the number of all police reported crashes and in the number of crashes involving older drivers over the 5-year period. However, the proportion of crashes involving older drivers remained relatively constant at about 11% throughout this time period.

Year	All Crashes	Crashes Involving Older Drivers	
		Number	Percent of All
1998	403,766	46,682	11.6%
1999	415,675	46,633	11.2%
2000	424,852	46,059	10.8%
2001	400,813	44,477	11.1%
2002	395,515	44,011	11.1%

## Severity

The distribution of the severity of these crashes is shown in Table 2. Two points are evident from this table. First, the proportions of fatal, non-fatal-injury, and property-damage-only crashes remained relatively constant over the 5-year period for all crashes and for crashes involving older drivers. Second, for each year, the proportion of fatal and injury crashes among crashes involving older drivers was greater than the proportion of fatal and injury crashes among all crashes. While the proportions of fatal and injury crashes among all crashes were about 0.3% and 21% respectively over the 5-year period, the proportions of fatal and injury crashes among crashes involving older drivers were about 0.5% and 24%. This indicates that outcomes of crashes involving older drivers are more likely to be more severe than outcomes of crashes involving younger drivers.

Year	All Crashes				Older Driver Crashes			
	Fatal	Non-fatal Injury	Property-Damage-Only	Total	Fatal	Non-fatal Injury	Property-Damage-Only	Total
1998	1,235 (0.31%)	91,137 (22.57%)	311,394 (77.12%)	403,766 (100%)	226 (0.48%)	12,379 (26.52%)	34,077 (73.00%)	46,682 (100%)
1999	1,249 (0.30%)	87,820 (21.13%)	326,606 (78.57%)	415,675 (100%)	252 (0.54%)	11,618 (24.91%)	34,763 (74.55%)	46,633 (100%)
2000	1,237 (0.29%)	87,043 (20.51%)	336,472 (79.20%)	424,852 (100%)	221 (0.48%)	11,219 (24.40%)	34,619 (75.16%)	46,059 (100%)
2001	1,206 (0.30%)	80,922 (20.19%)	318,685 (79.51%)	400,813 (100%)	237 (0.53%)	10,738 (24.14%)	33,501 (75.32%)	44,476 (100%)
2002	1,175 (0.30%)	80,567 (20.37%)	313,773 (79.33%)	395,515 (100%)	212 (0.48%)	10,662 (24.23%)	33,162 (75.33%)	44,011 (100%)

The total number of people killed and injured in motor vehicle crashes from 1998 through 2002 and the number and proportion of older persons among them is shown in Table 3. A downward trend in the number of deaths and injuries, both overall and among older persons, can be seen in this table.

Table 3. People Killed and Injured in Vehicle Crashes by Year						
		1998	1999	2000	2001	2002
Number of Persons Killed	All Ages	1,367	1,386	1,382	1,328	1,279
	Age 65+ (% of all)	203 (14.9%)	222 (16.0%)	210 (15.2%)	201 (15.1%)	182 (14.2%)
Number of Persons Injured	All Ages	131,578	124,601	121,826	112,294	112,484
	Age 65+ (% of all)	8,899 (6.8%)	8,699 (7.0%)	8,312 (6.8%)	8,008 (7.1%)	7,820 (7.0%)

In the 5-year period, there was approximately a 6% decrease in the number of all people killed in motor vehicle crashes and a 10% decrease in the number of older people killed. During that period the number of all people injured decreased by about 15% and the number of older people injured decreased by 12%.

The proportion of people age 65 and older killed in vehicle crashes varied from 14% to 16% and the proportion of people age 65 and older who were injured was 7% over the 5-year period. Because people age 65 and older account for about 12% of Michigan's population and 13% to 15% of all licensed drivers in Michigan (see Appendix A), it appears that older people are slightly over represented in the fatalities and under represented in the injuries resulting from motor vehicle crashes. However, this should be taken as a rough indication only, because the number of deaths or injures per vehicle miles of travel (VMT) is a more realistic measure for determining representativeness. VMT data are not available by age groups, and this measure could not be obtained.

### **Older Drivers by Sex and Age**

The number of crashes involving older drivers from 1998 through 2002 by sex of driver are shown in Table 4. The crash rate for population and licensed driver are also shown.

Table 4. Older Driver Crashes by Sex and Year									
	Number of Crashes			Crashes per 1,000 Population*			Crashes per 1,000 Licensed Drivers		
	Men	Women	Total**	Men	Women	Total	Men	Women	Total
1998	23,660	16,475	46,682	26.2	13.4	21.9	54.8	32.2	42.5
1999	23,666	16,520	46,633	26.3	13.5	21.9	54.6	31.8	42.1
2000	23,354	16,286	46,059	26.0	13.3	21.7	53.8	30.9	42.2
2001	21,942	15,853	44,477	--	--	--	50.5	29.7	39.0
2002	21,879	15,743	44,011	--	--	--	49.9	29.8	45.0
%change	-7.5%	-4.4%	-5.7%	-1.1%†	0%†	-0.9%†	-9.0%	-7.4%	-9.4%

\* Population data by sex and age are not available for 2001 and 2002

\*\* The sum of men and women may not add to total due to missing data on sex.

† % change from 1998 to 2000

The table shows that over the 5-years from 1998 through 2002 approximately 56% of older drivers involved in crashes were men. Over this time there was a decrease in the number of crashes for both men and women, with men experiencing the larger decrease (7.5% for men compared to 4.4% for women). There was a decrease of 9% in the number of crashes per 1000 licensed drivers for men, and a 7% decrease for women. The 5-year change in the population crash rate could not be determined as state-level population data was not available by sex and age. However, the change in the population crash rate from 1998 to 2000 was minimal.

Table 5 shows the number and rates of older driver crashes by age categories for 1998 through 2002. The number of crashes decreased for each age group below age 80, with the largest decrease (13%) for the 65-69 age group and the smallest decrease (2.8%) for the 75-79 age group. There was an increase of 5% in the number of crashes by drivers age 80 and older.

		1998	1999	2000	2001	2002	% change
Number of Crashes	65-69	8,970	8,483	8,432	7,933	7,802	-13.0%
	70-74	12,965	12,965	12,723	11,768	11,454	-11.7%
	75-79	9,734	10,106	9,866	9,495	9,458	-2.8%
	80+	8,466	8,632	8,619	8,599	8,908	5.2%
Crashes per 1000 Population*	65-69	26.4	25.7	25.6	--	--	-3.0%†
	70-74	41.0	41.2	40.5	--	--	-1.2%†
	75-79	38.0	38.9	37.9	--	--	-0.2%†
	80+	27.3	27.1	27.3	--	--	0%†
Crashes per 1000 Licensed Drivers	65-69	31.3	29.9	30.0	28.3	27.6	-11.8%
	70-74	47.9	48.3	47.7	44.9	44.7	-6.7%
	75-79	47.4	47.6	45.8	44.0	43.2	-8.9%
	80+	46.8	45.6	42.3	41.4	40.5	-13.5%

\* Population data by age and sex are not available for 2001 and 2002

† Change from 1998 to 2000

The number of crashes per 1000 licensed drivers decreased for each age category, including that of the oldest age group. The decrease in the crash rate per licensed driver together with the increase in the number of crashes for the oldest drivers indicates that many licensed drivers in this age group may have reduced driving or stopped driving altogether. The change in the population crash rate was calculated for the three-years between 1998 and 2000 and showed small decreases for the age groups under age 80.

### **Time, Location, and Environment**

The patterns in the occurrence of older driver crashes by the time, location, and environmental conditions are examined next. Table 6 shows the number and distribution of older driver crashes from 1998 through 2002 by month. Figure 1 shows the same information graphically.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1998	3,707 (7.94)	2,715 (5.82)	3,346 (7.17)	3,593 (7.70)	3,994 (8.56)	3,847 (8.24)	3,947 (8.46)	3,908 (8.37)	3,944 (8.45)	4,583 (9.82)	4,252 (9.11)	4,846 (10.38)
1999	4,060 (8.71)	2,860 (6.13)	3,346 (7.18)	3,362 (7.21)	3,947 (8.46)	4,058 (8.70)	3,742 (8.02)	4,001 (8.58)	4,119 (8.83)	4,497 (9.64)	4,288 (9.20)	4,353 (9.33)
2000	3,648 (7.92)	3,102 (6.73)	3,027 (6.57)	3,250 (7.06)	4,176 (9.07)	3,946 (8.57)	3,639 (7.90)	3,859 (8.38)	3,950 (8.58)	4,227 (9.18)	4,377 (9.50)	4,858 (10.55)
2001	3,977 (8.94)	2,696 (6.06)	2,948 (6.63)	3,206 (7.21)	3,813 (8.57)	3,861 (8.68)	3,531 (7.94)	3,741 (8.41)	3,629 (8.16)	4,413 (9.92)	4,416 (9.93)	4,245 (9.54)
2002	3,504 (7.96)	3,086 (7.01)	3,030 (6.88)	3,060 (6.95)	3,839 (8.72)	3,854 (8.76)	3,798 (8.63)	3,870 (8.79)	3,717 (8.45)	4,101 (9.32)	3,831 (8.70)	4,321 (9.82)

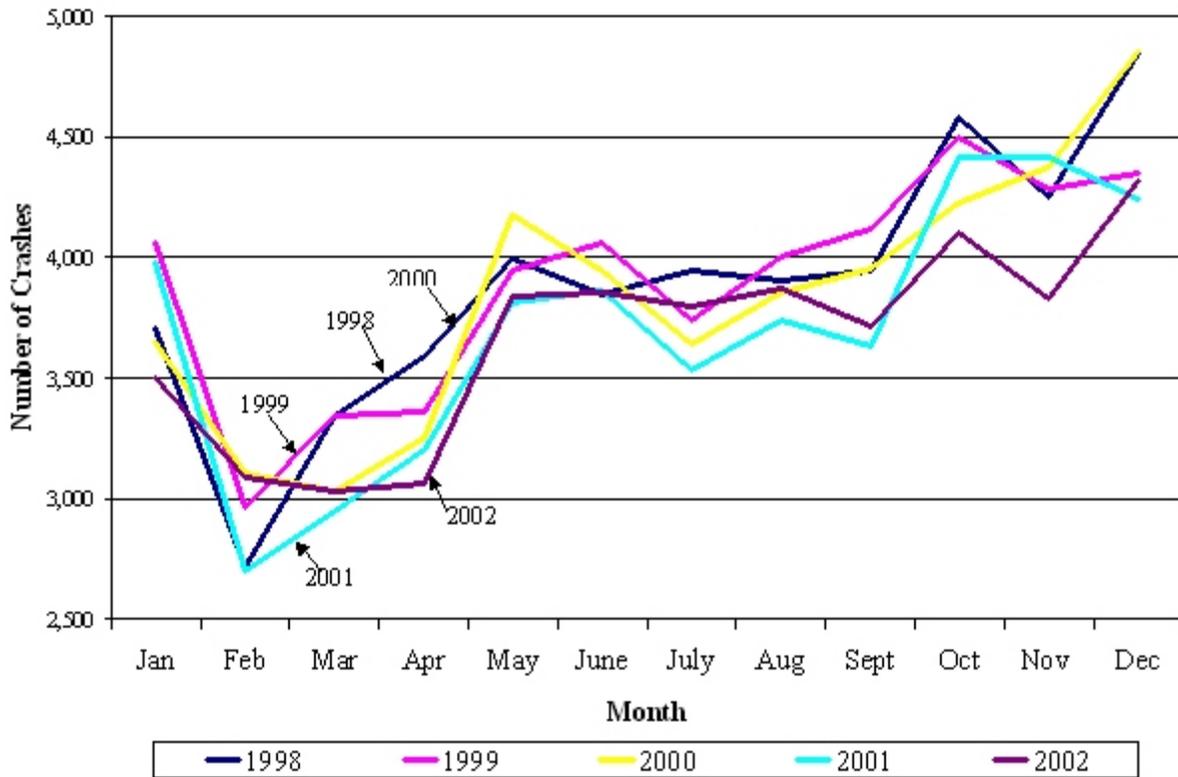


Figure 1. Older Driver Crashes by Month and Year

The pattern of older driver crashes by month shows that the decrease in crashes was relatively uniform over the years. The months of highest crash occurrence were October, November, and December. This pattern was roughly consistent from 1998 to 2001. (In 2002, the peak crash months were December, October, and August.) Possible reasons for this peak may be that the months of November and December coincide with holidays, less daylight, and/or a higher likelihood of bad weather.

Table 7 and Figure 2 show the patterns of older driver crashes by day of week. The pattern of crash occurrence did not change over the 5-year period. Friday remains as the day with the most crashes, and Sunday remains as the day with the least crashes.

Table 7. Older Driver Crashes by Day of Week and Year							
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1998	4,096 (8.77)	6,969 (14.93)	7,520 (16.11)	7,467 (16.00)	7,248 (15.53)	8,005 (17.15)	5,377 (11.52)
1999	3,988 (8.55)	7,042 (15.10)	7,479 (16.04)	7,269 (15.59)	7,150 (15.33)	8,350 (17.91)	5,355 (11.48)
2000	3,963 (8.60)	6,991 (15.18)	7,129 (15.48)	7,150 (15.52)	7,210 (15.65)	8,339 (18.11)	5,277 (11.46)
2001	4,087 (9.19)	6,715 (15.10)	6,781 (15.25)	7,051 (15.85)	6,909 (15.53)	7,943 (17.86)	4,990 (11.22)
2002	3,712 (8.43)	6,939 (15.77)	6,783 (15.41)	6,938 (15.76)	6,778 (15.40)	7,807 (17.74)	5,054 (11.48)

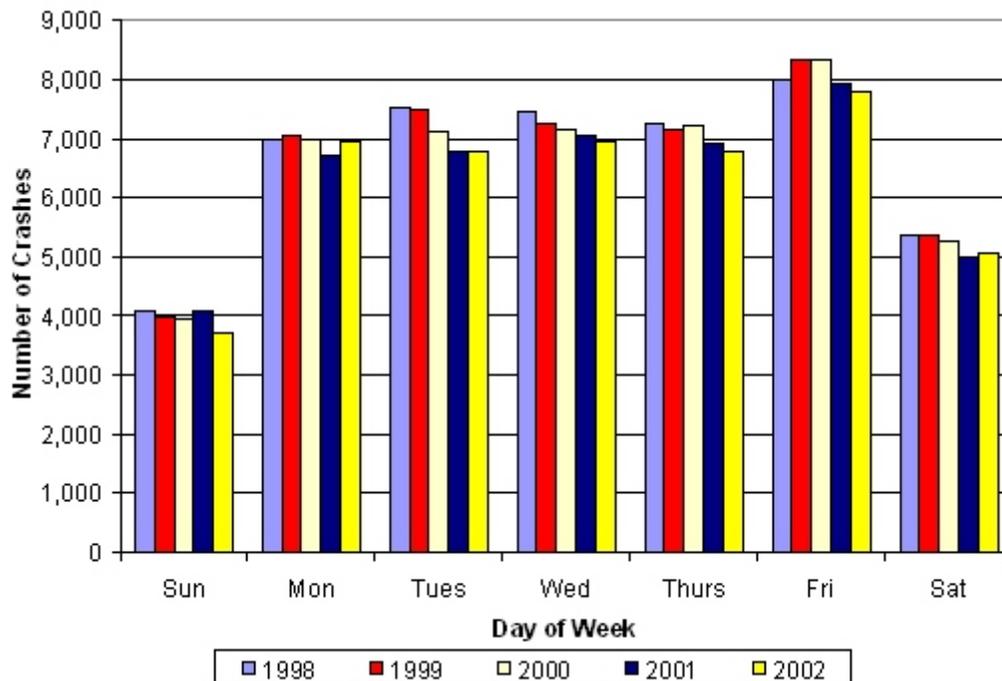


Figure 2. Older Driver Crashes by Day of Week and Year

The pattern of older driver crashes by time of day also did not change significantly over the 5-year period between 1998 and 2002 (Table 8 and Figure 3). The largest proportion of older driver crashes (about 29%) occur between noon and 3 p.m., most likely reflecting the time that older drivers are on the roadways the most. Indeed, 53 to 55% of the crashes are between 9 a.m. and 3 p.m. Only 5% of older driver crashes occur between 9 p.m. and 6 a.m.

Table 8. Older Driver Crashes by Time of Day and Year								
	12:01a.m. 3:00 a.m.	3:01a.m. 6:00a.m.	6:01a.m. 9:00a.m.	9:01a.m. 12 p.m.	12:01p.m. 3:00 p.m.	3:01p.m. 6:00 p.m.	6:01 p.m. 9:00 p.m.	9:01 p.m. 12:00a.m.
1998	537 (1.16)	710 (1.53)	5,280 (11.37)	11,594 (24.98)	13,459 (28.99)	10,115 (21.79)	3,728 (8.03)	997 (2.15)
1999	523 (1.13)	696 (1.50)	5,446 (11.76)	11,610 (25.06)	13,323 (28.76)	9,936 (21.45)	3,735 (8.06)	1,056 (2.28)
2000	520 (1.15)	812 (1.79)	5,521 (12.20)	11,239 (24.84)	13,104 (28.96)	9,480 (20.95)	3,629 (8.02)	944 (2.09)
2001	428 (1.04)	706 (1.71)	4,853 (11.77)	10,034 (24.34)	11,627 (28.21)	9,093 (22.06)	3,510 (8.52)	968 (2.35)
2002	469 (1.13)	711 (1.72)	4,810 (11.61)	10,118 (24.42)	11,773 (28.42)	9,042 (21.82)	3,487 (8.42)	1,021 (2.46)

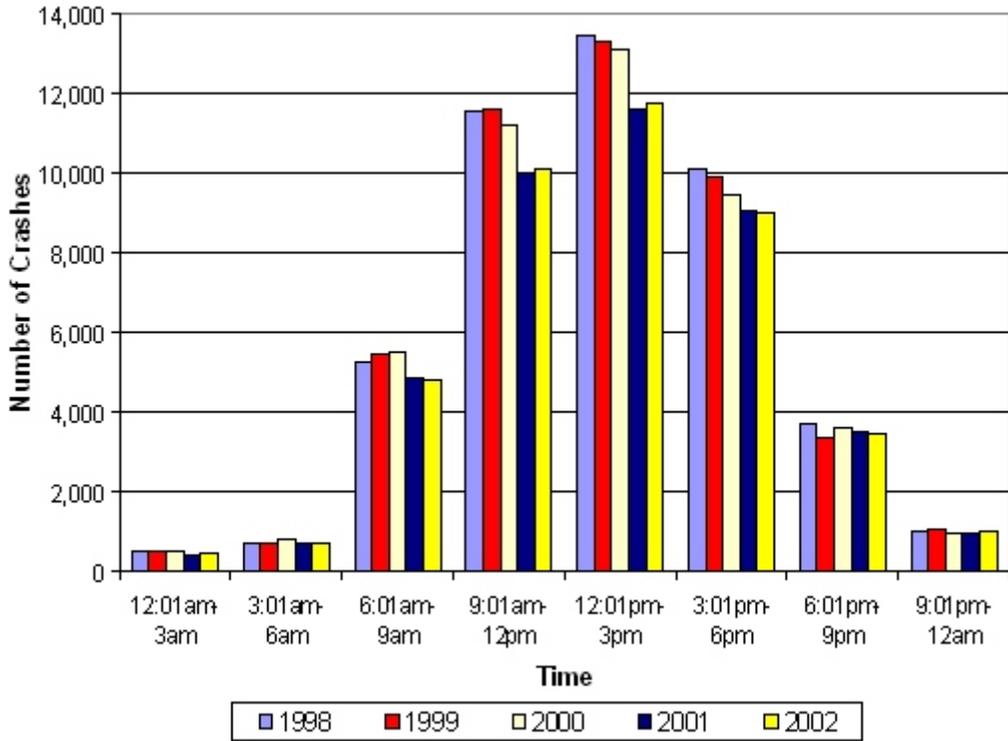


Figure 3. Older Driver Crashes by Time of Day and Year

Table 9 shows the speed limit at the location of older driver crashes. During the 5-year period

between 1998 and 2002, the largest proportion of these crashes occurred at locations with 25, 35, and 55 mph speed limits. This is not unusual because these are the most frequently encountered speed limits on non-freeway roadways. The proportion of crashes that occurred at freeway speeds (65 mph and above) increased from 1% in 1998 to 3.6% in 2002. Whether the increase in the proportion of higher speed crashes is just a fluctuation, or a beginning of a trend remains to be seen.

Table 9. Older Driver Crashes by Speed Limit and Year									
	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65+ mph
1998	8,448 (19.03)	3,852 (8.68)	8,697 (19.59)	5,223 (11.77)	7,925 (17.86)	1,539 (3.47)	7,901 (17.80)	38 (0.09)	463 (1.04)
1999	8,497 (19.19)	3,692 (8.34)	8,775 (19.81)	4,924 (11.12)	7,949 (17.95)	1,496 (3.38)	8,089 (18.27)	38 (0.09)	538 (1.21)
2000	8,342 (19.19)	3,657 (8.41)	8,465 (19.47)	4,879 (11.22)	7,640 (17.57)	1,545 (3.55)	8,214 (18.89)	35 (0.08)	403 (0.93)
2001	7,543 (18.06)	3,302 (7.91)	8,024 (19.21)	4,626 (11.08)	7,254 (17.37)	1,392 (3.33)	7,777 (18.62)	17 (0.04)	1,516 (3.63)
2002	7,209 (17.57)	3,197 (7.79)	7,717 (18.81)	4,398 (10.72)	7,388 (18.01)	1,506 (3.67)	7,857 (19.15)	27 (0.07)	1,473 (3.59)

Table 10 shows older driver crashes by roadway condition and year. Approximately 75% of older driver crashes occur on dry pavement and between 16% and 20% occur on wet pavement. This pattern did not changed over the 5-year period.

Table10. Older Driver Crashes by Roadway Condition and Year								
	Dry	Wet	Icy	Snowy	Muddy	Slushy	Debris	Other Unknown

Year	Clear	Cloudy	Fog, Smoke	Rain	Snow, Blowing Snow	Severe wind	Sleet, Hail	Other Unknown
1998	35,909 (77.56)	8,117 (17.53)	853 (1.84)	951 (2.05)	18 (0.04)	265 (0.57)	21 (0.05)	162 (0.35)
1999	35,313 (76.45)	6,811 (14.74)	1,202 (2.60)	2,201 (4.76)	17 (0.04)	457 (0.99)	14 (0.03)	177 (0.38)
2000	32,199 (70.55)	8,274 (18.13)	1,467 (3.21)	2,866 (6.28)	23 (0.05)	584 (1.28)	17 (0.04)	212 (0.46)
2001	31,847 (74.01)	8,555 (19.88)	1,113 (2.59)	1,093 (2.54)	25 (0.06)	201 (0.47)	16 (0.04)	183 (0.43)
2002	32,770 (76.82)	6,979 (16.36)	1,053 (2.47)	1,309 (3.07)	22 (0.05)	306 (0.72)	13 (0.03)	206 (0.48)

Table 11 shows the patterns of older driver crashes by weather condition. There was some variation by weather condition but it is most likely due to the variation of weather from year to year. Overall, each year about 85% of crashes occurred in clear or cloudy weather and about 9% occurred in rain.

Year	Clear	Cloudy	Fog, Smoke	Rain	Snow, Blowing Snow	Severe wind	Sleet, Hail	Other Unknown
1998	26,142 (56.32)	13,599 (29.30)	173 (0.37)	4,695 (10.11)	1,534 (3.30)	49 (0.11)	71 (0.15)	156 (0.34)
1999	27,827 (59.99)	11,970 (25.80)	131 (0.28)	3,370 (8.04)	2,476 (5.34)	20 (0.04)	49 (0.11)	185 (0.40)
2000	24,394 (53.44)	13,479 (29.53)	204 (0.45)	3,949 (8.65)	3,345 (7.33)	10 (0.02)	39 (0.09)	231 (0.51)
2001	23,800 (54.55)	12,749 (29.22)	181 (0.41)	4,808 (11.02)	1,759 (4.03)	34 (0.08)	79 (0.18)	217 (0.50)
2002	24,684 (57.10)	12,533 (28.99)	113 (0.26)	3,487 (8.07)	2,140 (4.95)	27 (0.06)	40 (0.09)	208 (0.48)

Table 12 shows the pattern of older driver crash occurrence by light condition. The pattern

was relatively stable over the 5-years between 1998 and 2002. About 82- 83% of the crashes occurred during daylight and 13-14% occurred during night time.

Table 12. Older Driver Crashes by Lighting Condition and Year						
	Daylight	Dawn	Dusk	Dark but lighted	Dark and unlighted	Other Unknown
1998	38,226 (82.52)	522 (1.13)	1,337 (2.89)	3,106 (6.70)	3,075 (6.64)	58 (0.13)
1999	38,233 (82.73)	565 (1.22)	1,232 (2.67)	2,946 (6.37)	3,167 (6.85)	71 (0.15)
2000	37,485 (82.64)	616 (1.36)	1,166 (2.57)	2,940 (6.48)	3,069 (6.77)	83 (0.18)
2001	35,418 (81.41)	520 (1.20)	1,245 (2.86)	2,899 (6.66)	3,348 (7.70)	77 (0.18)
2002	35,277 (81.82)	549 (1.27)	1,094 (2.54)	2,887 (6.70)	3,244 (7.52)	66 (0.15)

### **Hazardous Actions**

The proportion of single-vehicle crashes among all the older driver crashes was about 11% for each year during the 5-year period between 1998 and 2002. Table 13 shows the number and distribution of hazardous actions that were recorded for older drivers in single-vehicle crashes. In approximately two-thirds of the single-vehicle crashes involving older drivers no hazardous action was recorded. When all drivers in single-vehicle crashes were considered, no hazardous action was recorded for only 59-63% (See Appendix B for tabulation of hazardous actions for all drivers). Each year excessive speed was recorded for 10% to 12% of older single-vehicle crash-involved drivers and for 18% to 20% of all single-vehicle crash-involved drivers.

Table 13. Hazardous Actions for Single-Vehicle Crash-Involved Older Drivers by Year					
Hazardous Action	1998	1999	2000	2001	2002
None	3,273 (67.89)	3,479 (69.28)	3,382 (66.94)	3,561 (69.00)	3,381 (66.00)
Speed too Fast	473 (9.81)	468 (9.32)	638 (12.63)	495 (9.59)	608 (11.87)
Speed too Slow	6 (0.12)	2 (0.04)	4 (0.08)	3 (0.06)	5 (0.10)
Fail to Yield	61 (1.27)	51 (1.02)	61 (1.21)	59 (1.14)	54 (1.05)
Traffic Control	29 (0.60)	30 (0.60)	21 (0.42)	37 (0.72)	28 (0.55)
Wrong Way	6 (0.12)	5 (0.10)	6 (0.12)	4 (0.08)	6 (0.12)
Left of Center	31 (0.64)	34 (0.68)	31 (0.61)	28 (0.54)	24 (0.47)
Improper Passing	3 (0.06)	7 (0.14)	9 (0.18)	6 (0.12)	2 (0.04)
Improper Lane Use	38 (0.79)	48 (0.96)	37 (0.73)	32 (0.62)	39 (0.76)
Improper Turn	29 (0.60)	19 (0.38)	19 (0.38)	25 (0.48)	28 (0.55)
Improper Signal	2 (0.04)	1 (0.02)	2 (0.04)	3 (0.06)	1 (0.02)
Improper Backing	25 (0.52)	39 (0.78)	29 (0.57)	30 (0.58)	21 (0.41)
Clear Distance	115 (2.39)	140 (2.79)	115 (2.28)	94 (1.82)	99 (1.93)
Other	615 (12.76)	577 (11.49)	557 (11.03)	653 (12.65)	687 (13.41)
Unknown	115 (2.39)	122 (2.43)	141 (2.79)	131 (2.54)	140 (2.73)

The patterns of hazardous actions for older drivers in multi-vehicle crashes from 1998 through 2002 are shown in Table 14. In approximately 44% of multi-vehicle crashes in which older drivers were involved, no hazardous action was recorded for the older driver. When drivers of all

ages were considered, this proportion was 51%. Failure to yield (the right of way), the most frequently recorded hazardous action for older drivers in multi-vehicle crashes, was recorded for 22-23% of the involved older drivers. In contrast, failure to yield was recorded for 12% of all drivers involved in multi-vehicle crashes. Failure to obey traffic control was recorded for 4% of older drivers and for 3% of all drivers in multi-vehicle crashes. However, only 12-13% of older drivers were recorded as failing to maintain clear distance prior to a multi-vehicle crash in contrast to 18% of all drivers in multi-vehicle crashes.

The indication from the comparison of hazardous actions of older drivers and all drivers is that older drivers have a higher likelihood of being in a single-vehicle crash without any overt hazardous action than younger drivers. They are also less likely than younger drivers to be speeding prior to a single-vehicle crash. In multi-vehicle crashes, however, hazardous actions are more likely to be recorded for older drivers than younger drivers. Failure to yield, and to some extent failure to obey traffic control are more likely among older drivers than among younger drivers. On the other hand, older drivers are less likely than younger drivers to fail to maintain clear distances.

Table 14. Hazardous Actions for Multi-Vehicle Crash-Involved Older Drivers by Year					
Hazardous Action	1998	1999	2000	2001	2002
None	14,375 (43.48)	14,280 (43.53)	14,629 (45.10)	12,962 (43.19)	13,031 (43.57)
Speed too Fast	267 (0.81)	334 (1.02)	368 (1.13)	268 (0.89)	264 (0.88)
Speed too Slow	68 (0.21)	66 (0.20)	44 (0.14)	33 (0.11)	43 (0.14)
Fail to Yield	7,532 (22.78)	7,350 (22.41)	7,199 (22.19)	6,642 (22.13)	6,545 (21.89)
Traffic Control	1,516 (4.59)	1,401 (4.27)	1,301 (4.01)	1,280 (4.26)	1,216 (4.07)
Wrong Way	39 (0.12)	37 (0.11)	39 (0.12)	44 (0.15)	39 (0.13)
Left of Center	248 (0.75)	257 (0.78)	236 (0.73)	221 (0.74)	206 (0.69)
Improper Passing	241 (0.73)	230 (0.70)	227 (0.70)	234 (0.78)	199 (0.67)
Improper Lane Use	1,209 (3.66)	1,248 (3.80)	1,133 (3.49)	1,139 (3.80)	1,171 (3.92)
Improper Turn	838 (2.53)	731 (2.23)	759 (2.34)	698 (2.33)	629 (2.10)
Improper Signal	58 (0.18)	64 (0.20)	48 (0.15)	48 (0.16)	41 (0.14)
Improper Backing	644 (1.95)	659 (2.01)	679 (2.09)	600 (2.00)	627 (2.10)
Clear Distance	4,146 (12.54)	4,215 (12.85)	3,969 (12.23)	3,955 (13.18)	3,992 (13.35)
Other	1,147 (3.47)	1,210 (3.69)	1,096 (3.38)	1,187 (3.95)	1,202 (4.02)
Unknown	735 (2.22)	721 (2.20)	713 (2.20)	701 (2.34)	700 (2.34)

## Summary

Salient trends in older driver crashes in Michigan from 1998 through 2002 are:

- The number of vehicle crashes involving older drivers decreased by 6%. The proportion of all crashes that involved older drivers remained at 11%.
- Among crashes that involved older drivers, 0.5% involved a fatality and 24% involved an injury.
- Each year from 14-16% of persons killed in motor vehicle crashes were age 65 or older.
- Each year 7% of persons injured in motor vehicle crashes were age 65 or older.
- In about 56% of crashes involving older drivers, the older driver were male.
- Crashes involving drivers age 65-69 decreased by 13% over the 5-year period.
- Crashes involving drivers age 80 and older increased by 5% during the 5-year period but the crash rate per licensed driver decreased. This is an indication that many of licensed drivers in this age group may have reduced or stopped driving.
- The peak months of crashes involving older drivers were October, November, and December. The peak day was Friday. The peak hours were from noon to 3 p.m.
- Most crashes involving older drivers occurred in good weather, on dry pavements, and in daylight.
- The proportion of crashes involving older drivers that occur on high-speed roads (speed limit 65 mph and over) increased over the 5-year period.
- About 11% of crashes involving older drivers were single-vehicle crashes.
- In two-thirds of single-vehicle crashes, no hazardous action was recorded for older drivers.
- Failing to yield the right of way was the most frequent hazardous action for older drivers in multi-vehicle crashes. It was recorded for older drivers in 22-23% of multi-vehicle crashes compared to 12% of all drivers in multi-vehicle crashes.

## FATAL AND SERIOUS INJURY CRASHES

In this section, crashes involving older drivers in which the most serious injury was either a death or a serious injury (KA crashes) are examined. Table 15 shows the total number of KA

crashes from 1998 through 2002 and the number and proportion of these crashes that involved older drivers. Over the 5-year period from 1998 through 2002, there was a reduction of 23% in the number of KA crashes in Michigan. The proportion of these crashes involving older drivers remained at about 13% throughout the entire time period.

Table 15. KA Vehicle Crashes by Year			
Year	All Fatal and Serious Injury Crashes	Fatal and Serious Injury Crashes Involving Older Drivers	
		Number	Percent of All
1998	12,201	1,646	13.5%
1999	11,206	1,436	12.8%
2000	10,438	1,351	12.9%
2001	9,388	1,190	12.7%
2002	9,421	1,269	13.5%

Table 16 shows the number of people who were killed or sustained serious injuries in motor vehicle crashes in Michigan each year from 1998 through 2002, and the number and proportion who were age 65 or older. There was an overall decrease of 33% in the number of fatalities and serious injuries from motor vehicle crashes from 1992 to 2002. The number of older persons killed or severely injured decreased by 23% in that time period. The proportion of older persons among those killed or severely injured was 8% from 1998 to 2001 and increased to 9% in 2002. Whether this increase is merely a fluctuation or a beginning of a trend remains to be seen.

Year	All People Killed or Seriously Injured	Older People Killed or Seriously Injured	
		Number	Percent of All
1998	15,738	1,283	8.2%
1999	14,388	1,144	8.0%
2000	13,328	1,045	7.8%
2001	11,858	976	8.2%
2002	10,556	983	9.3%

The number and rates of fatal and serious injury crashes involving older drivers by the sex are shown in Table 17. Each year men were involved in approximately 52% of the fatal and serious injury crashes. The decrease in the number of fatal and injury crashes for women was greater than for men (29% for women and 23% for men). A downward trend in the population crash rate was also evident from the decreases between 1998 and 2000. There was also an overall decrease in the rate of the severe crashes per licensed driver of 25% with a decrease of 31% for women and a 23% decrease for men.

	Number of Crashes			Crashes per 1000 Population*			Crashes per 1000 Licensed Drivers		
	Men	Women	Total**	Men	Women	Total	Men	Women	Total
1998	839	607	1,646	0.93	0.49	0.77	1.94	1.19	1.74
1999	761	504	1,436	0.85	0.41	0.67	1.76	0.97	1.51
2000	709	468	1,351	0.79	0.38	0.64	1.63	0.89	1.40
2001	611	433	1,190	--	--	--	1.41	0.81	1.23
2002	659	445	1,269	--	--	--	1.50	0.82	1.30
% Change	-21.0%	-26.7%	-22.9%	-15.0%†	-22.4%†	-16.9%†	-22.7%	-31.1%	-25.3%

\* Population data for 2001 and 2002 are not available.

\*\* The sum of men and women may not add to total due to missing data on sex.

† % Change from 1998 to 2000

The changes in the number and rates of fatal and serious injury crashes for older drivers by age group are shown in Table 18. Between 1998 and 2000, drivers age 70-74 had the highest number of KA crashes among older drivers. In 2001 and 2002, drivers age 80 and older were involved in more KA crashes than each of the other older driver age groups. However, each age group experienced a reduction in the annual number of KA crashes. The decrease in the number of KA crashes was inversely proportional to age. The largest decrease in KA crashes was in the youngest group age 65-69, and the smallest decrease was in the oldest group age 80 and over.

On average, the youngest age group of older drivers had the lowest rate of KA crashes per person, and the 75-79 year age group had the highest. The KA crash rate per licensed driver was also lowest among the 65-69 age group. However, the KA crash rate per licensed driver was highest among the 80+ drivers. Reductions in this rate over the five year period were greatest for the group, age 75-79, and the smallest was for the group, age 70-74.

Table 18. Older Driver KA Crashes by Age and Year							
		1998	1999	2000	2001	2002	% change
Number of Crashes	65-69	283	227	214	196	197	-30.4%
	70-74	415	411	356	267	313	-24.6%
	75-79	381	296	326	258	293	-23.1%
	80+	390	340	288	336	317	-18.7%
Crashes per 1000 Population*	65-69	0.83	0.69	0.65	--	--	-21.7%†
	70-74	1.31	1.31	1.13	--	--	-13.7%†
	75-79	1.49	1.14	1.25	--	--	-16.1%†
	80+	1.26	1.07	0.91	--	--	-27.8%†
Crashes per 1000 Licensed Drivers	65-69	0.99	0.80	0.76	0.70	0.70	-29.3%
	70-74	1.53	1.53	1.33	1.02	1.22	-20.3%
	75-79	1.86	1.40	1.51	1.20	1.34	-34.4%
	80+	2.15	1.80	1.45	1.60	1.44	-33.0%

\* Population data for 2001 and 2002 are not available

† % Change from 1998 to 2000

The distribution of KA crashes involving older drivers by month is shown in Table 19 and Figure 4. In eight of the twelve months, the number of crashes was lower in 2002 than in 1998. There is no consistent pattern of peak months of older driver KA crashes, however, May was among the three months with the most crashes for 4 of the years between 1998 through 2002.

Table 19. Older Driver KA Crashes by Month and Year												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1998	104 (6.32)	75 (4.56)	114 (6.93)	114 (6.93)	165 (10.02)	157 (9.54)	161 (9.78)	148 (8.99)	129 (7.84)	169 (10.27)	121 (7.35)	189 (11.48)
1999	81 (5.64)	86 (5.99)	83 (5.78)	101 (7.03)	143 (9.96)	128 (8.91)	146 (10.2)	137 (9.54)	138 (9.61)	143 (9.96)	123 (8.57)	127 (8.84)
2000	108 (7.99)	87 (6.44)	75 (5.55)	85 (6.29)	137 (10.14)	129 (9.55)	131 (9.70)	134 (9.92)	119 (8.81)	140 (10.36)	102 (7.55)	104 (7.70)
2001	91 (7.65)	67 (5.63)	83 (6.97)	102 (8.57)	129 (10.84)	104 (8.74)	85 (7.14)	131 (11.0)	103 (8.66)	115 (9.66)	98 (8.24)	82 (6.89)
2002	84 (6.62)	86 (6.78)	74 (5.83)	84 (6.62)	93 (7.33)	127 (10.0)	140 (11.0)	130 (10.2)	131 (10.3)	109 (8.59)	96 (7.57)	115 (9.06)

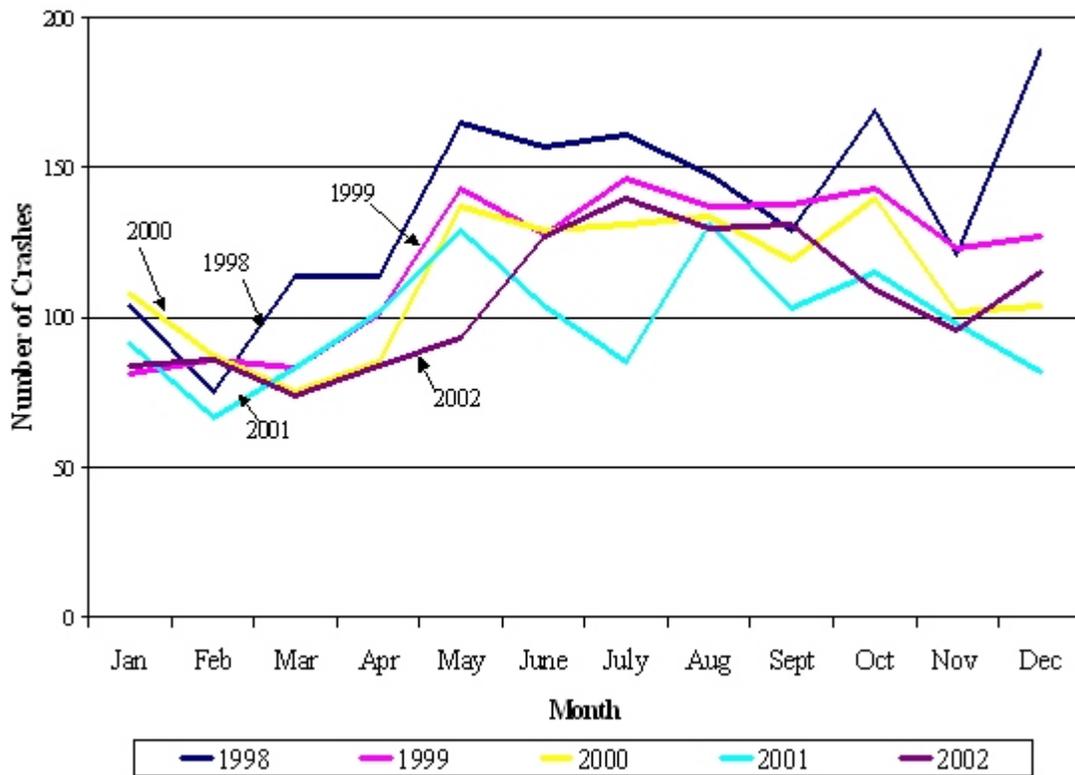


Figure 4. Older Driver KA Crashes by Month and Year

The distribution of older driver KA crashes by day of week over the 5-year period from 1998 through 2002 is shown in Table 20 and Figure 5. Again the pattern is not as clear as it was for all older driver crashes. However, Fridays are the peak days of older driver crashes in 3 of the 5 years.

Table 20. Older Driver KA Crashes by Day of Week and Year							
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1998	180 (10.94)	273 (16.59)	258 (15.67)	247 (15.01)	235 (14.28)	263 (15.98)	190 (11.54)
1999	164 (11.42)	224 (15.60)	212 (14.76)	193 (13.44)	190 (13.23)	260 (18.11)	193 (13.44)
2000	143 (10.58)	222 (16.43)	189 (13.99)	209 (15.47)	208 (15.40)	199 (14.73)	181 (13.40)
2001	131 (11.01)	170 (14.29)	179 (15.04)	189 (15.88)	156 (13.11)	205 (17.23)	160 (13.45)
2002	141 (11.11)	203 (16.00)	197 (15.52)	169 (13.32)	179 (14.11)	210 (16.55)	170 (13.40)

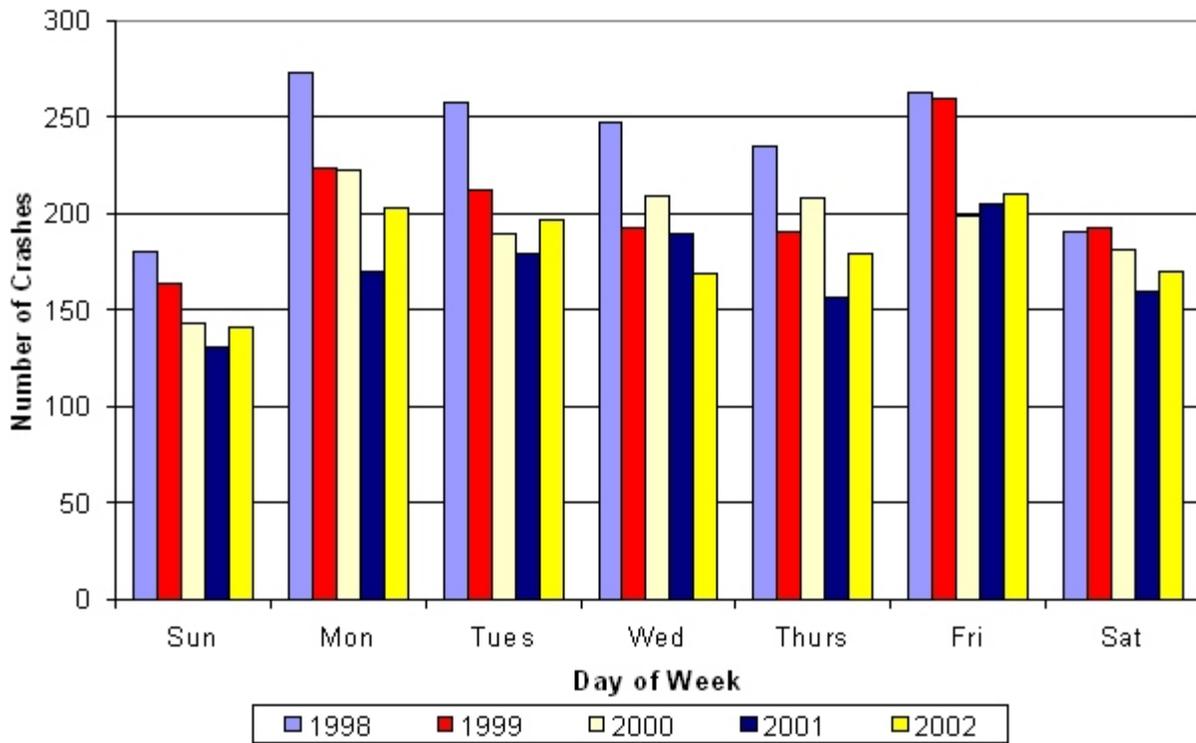


Figure 5. Older Driver KA Crashes by Day of Week and Year

The distribution of KA crashes involving older drivers by time of day is shown in Table 21 and Figure 6. For the years 1998 through 2002, the pattern of older driver KA crashes is similar to that of all older driver crashes. The peak 3 hour period of older driver KA crashes is from noon to 3 p.m. with about 29% of the crashes. About 54% of the older driver KA crashes occur between 9 a.m. and 3 p.m., and 6% of the KA crashes occur between 9 p.m. and 6 am.

Table 21. Older Driver KA Crashes by Time of Day								
	12:01a.m. 3:00 a.m.	3:01a.m. 6:00a.m.	6:01a.m. 9:00a.m.	9:01a.m. 12 P.m.	12:01p.m. 3:00 p.m.	3:01p.m. 6:00 p.m.	6:01 p.m. 9:00 p.m.	9:01 p.m. 12:00a.m.
1998	30 (1.83)	28 (1.71)	178 (10.85)	403 (24.57)	507 (30.91)	320 (19.51)	123 (7.50)	51 (3.11)
1999	20 (1.40)	18 (1.26)	173 (12.11)	326 (22.83)	410 (28.71)	331 (23.18)	118 (8.26)	32 (2.24)
2000	30 (2.31)	27 (2.08)	158 (12.17)	306 (23.57)	394 (30.35)	263 (20.26)	96 (7.40)	24 (1.85)
2001	14 (1.24)	16 (1.41)	117 (10.33)	277 (24.45)	336 (29.66)	240 (21.18)	104 (9.18)	29 (2.56)
2002	20 (1.63)	21 (1.71)	143 (11.67)	316 (25.80)	346 (28.24)	228 (18.61)	121 (9.88)	30 (2.45)

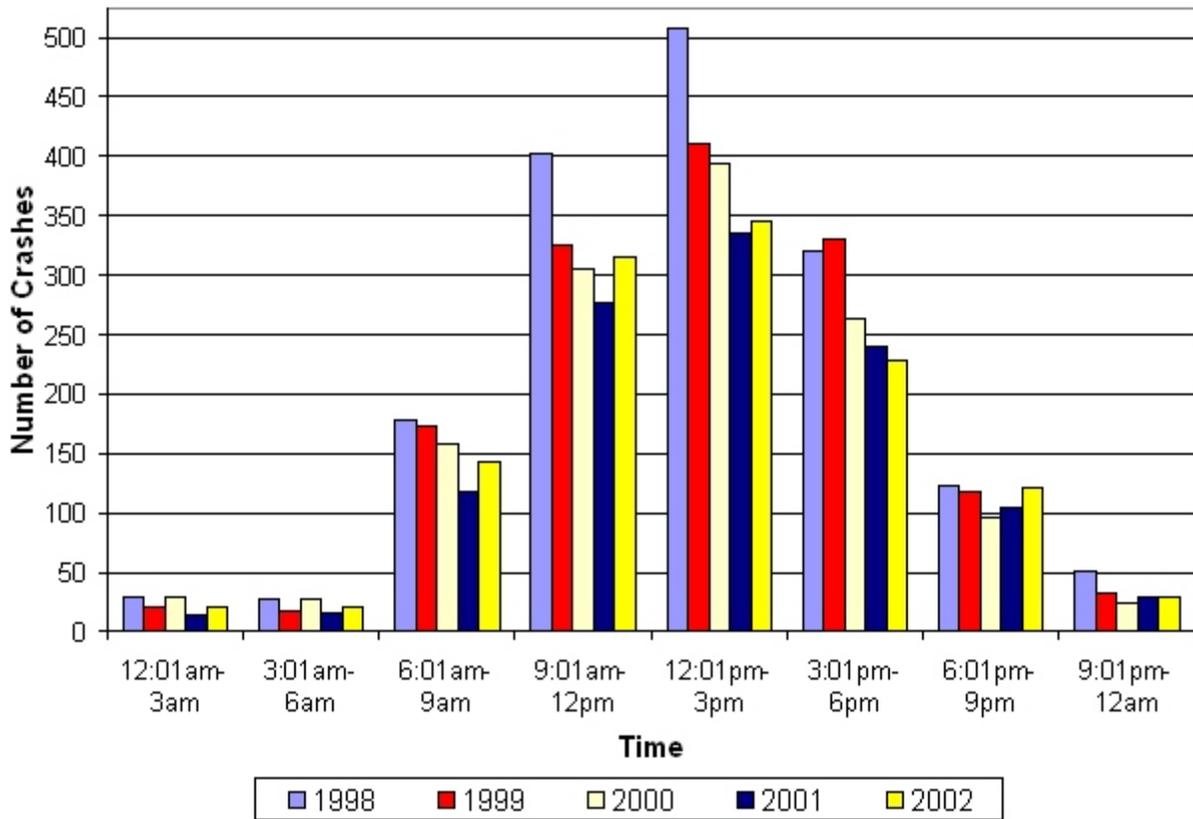


Figure 6. Older Driver KA Crashes by Time of Day

Table 22 shows the speed limit at the location of older driver KA crashes. During the 5-year period between 1998 and 2002, the largest proportion (about one-third) of these crashes occurred at locations with 55 mph speed limits. The proportion of KA crashes that occurred at locations with speed limits of 65 mph and above increased from 1% in 1998 to about 5% in 2001 and 2002. This parallels the increase in all crashes at high-speed-limit locations involving older drivers and may be a fluctuation in the data or it may be the beginning of a trend as a cohort of drivers who have used the freeway become older drivers.

Table 22. KA Crashes by Speed Limit and Year									
	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65+ mph
1998	162 (10.35)	108 (6.90)	254 (16.23)	179 (11.44)	260 (16.61)	74 (4.73)	503 (32.14)	3 (0.19)	16 (1.02)
1999	126 (9.28)	95 (7.00)	222 (16.35)	153 (11.27)	242 (17.82)	49 (3.61)	453 (33.36)	0 (0.00)	17 (1.25)
2000	133 (10.43)	79 (6.20)	205 (16.08)	93 (7.29)	225 (17.65)	82 (6.43)	439 (34.43)	0 (0.00)	16 (1.25)
2001	92 (8.09)	69 (6.07)	175 (15.39)	113 (9.94)	191 (16.80)	53 (4.66)	367 (32.28)	0 (0.00)	68 (5.98)
2002	119 (9.81)	62 (5.11)	174 (14.34)	130 (10.72)	204 (16.82)	62 (5.11)	393 (32.40)	1 (0.08)	55 (4.54)

As with all crashes involving older drivers, the vast majority of KA crashes continue to occur on dry pavements (Table 23), in good weather (i.e., clear or cloudy, Table 24), and in daylight conditions (Table 25).

Table 23. Older Driver KA Crashes by Roadway Condition and Year							
	Dry	Wet	Icy	Snowy	Muddy	Slushy	Other Unknown
1998	1,293 (78.99)	271 (16.55)	25 (1.53)	31 (1.89)	1 (0.06)	13 (0.79)	3 (0.18)
1999	1,155 (80.94)	196 (13.74)	25 (1.75)	35 (2.45)	0 (0.00)	15 (1.05)	1 (0.07)
2000	1,017 (75.67)	213 (15.85)	34 (2.53)	63 (4.69)	0 (0.00)	15 (1.12)	2 (0.15)
2001	882 (76.10)	214 (18.46)	29 (2.50)	21 (1.81)	1 (0.09)	11 (0.95)	1 (0.09)
2002	973 (78.34)	177 (14.25)	25 (2.01)	38 (3.06)	2 (0.16)	20 (1.61)	7 (0.56)

Table 24. Older Driver KA Crashes by Weather Condition and Year								
	Clear	Cloudy	Fog Smoke	Rain	Snow Blowing Snow	Severe wind	Sleet Hail	Other Unknown
1998	935 (57.12)	479 (29.26)	8 (0.49)	165 (10.08)	47 (2.87)	0 (0.00)	2 (0.12)	1 (0.06)
1999	887 (61.98)	373 (26.07)	8 (0.56)	97 (6.78)	65 (4.54)	0 (0.00)	1 (0.07)	0 (0.00)
2000	760 (56.72)	384 (28.66)	9 (0.67)	107 (7.99)	78 (5.82)	0 (0.00)	0 (0.00)	1 (0.07)
2001	655 (55.70)	346 (29.42)	4 (0.34)	122 (10.37)	43 (3.66)	1 (0.09)	3 (0.26)	2 (0.17)
2002	733 (58.45)	373 (29.74)	7 (0.56)	76 (6.06)	61 (4.86)	1 (0.08)	0 (0.00)	3 (0.24)

Table 25. Older Driver KA Crashes by Lighting Condition and Year						
	Daylight	Dawn	Dusk	Dark but lighted	Dark and unlighted	Other Unknown
1998	1,385 (84.50)	14 (0.85)	32 (1.95)	123 (7.50)	85 (5.19)	0 (0.00)
1999	1,200 (84.15)	9 (0.63)	24 (1.68)	122 (8.56)	70 (4.91)	1 (0.07)
2000	1,123 (83.87)	17 (1.27)	22 (1.64)	94 (7.02)	83 (6.20)	0 (0.00)
2001	971 (82.92)	9 (0.77)	25 (2.13)	93 (7.94)	72 (6.15)	1 (0.09)
2002	1,035 (82.54)	10 (0.80)	26 (2.07)	90 (7.18)	90 (7.18)	3 (0.24)

### Hazardous Actions

Of the KA crashes involving older drivers, approximately 13% each year were single-vehicle crashes. The hazardous actions that were recorded for the older driver are shown in Table 26. No hazardous action was recorded for the older driver in 23% of the KA crashes in 1998 and 30% in 2002. This is slightly higher than the 21% of all drivers in KA crashes with no hazardous action for

single-vehicle crashes (See Appendix B). Excessive speed was noted from 14-23% of older drivers in KA crashes between 1998 and 2002. This is much lower than the 32- 36% of all drivers who were traveling at excessive speeds prior to their single-vehicle crashes (See Appendix B).

Table 26. Older Driver Hazardous Actions in Single-Vehicle KA Crashes by Year					
Hazardous Action	1998	1999	2000	2001	2002
None	46 (22.77)	43 (28.10)	41 (22.53)	47 (26.11)	54 (30.00)
Speed too Fast	47 (23.27)	22 (14.38)	31 (17.03)	34 (18.89)	38 (21.11)
Speed too Slow	0 (0.00)	1 (0.65)	0 (0.00)	0 (0.00)	0 (0.00)
Fail to Yield	11 (5.45)	5 (3.27)	10 (5.49)	4 (2.22)	9 (5.00)
Traffic Control	3 (1.49)	2 (1.31)	3 (1.65)	5 (2.78)	1 (0.56)
Wrong Way	1 (0.50)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Left of Center	3 (1.49)	3 (1.96)	5 (2.75)	0 (0.00)	0 (0.00)
Improper Passing	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Improper Lane Use	3 (1.49)	1 (0.65)	1 (0.55)	3 (1.67)	1 (0.56)
Improper Turn	0 (0.00)	0 (0.00)	2 (1.10)	0 (0.00)	0 (0.00)
Improper Signal	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.56)	0 (0.00)
Improper Backing	0 (0.00)	3 (1.96)	3 (1.65)	1 (0.56)	2 (1.11)
Clear Distance	6 (2.97)	9 (5.88)	13 (7.14)	6 (3.33)	3 (1.67)
Other	61 (30.20)	45 (29.41)	50 (27.47)	56 (31.11)	54 (30.00)
Unknown	21 (10.40)	19 (12.42)	23 (12.64)	23 (12.78)	18 (10.00)

Table 27 shows the distribution of hazardous actions of older drivers for multi-vehicle crashes from 1998 through 2002. No hazardous action was recorded each year for about 38% of older drivers involved in multi-vehicle KA crashes. However, overall when all drivers involved in KA crashes are considered, no hazardous action is recorded for about 51%. Failure to yield the right of way was the most frequently recorded hazardous action for older drivers in multi-vehicle KA crashes between 1998 and 2002. It was recorded for 28% to 32% of the older drivers. In contrast, failure to yield the right of way was recorded for 16% of all drivers involved in KA crashes. There was little difference between the proportions of older drivers and all drivers involved in KA crashes who failed to obey traffic control, or who failed to maintain a clear distance. For both groups these proportions for both hazardous actions were approximately 7% to 8%.

Table 27. Older Driver Hazardous Actions in Multiple-Vehicle KA Crashes by Year					
Hazardous Action	1998	1999	2000	2001	2002
None	495 (37.93)	456 (38.91)	425 (40.02)	346 (38.15)	323 (37.69)
Speed too Fast	14 (1.07)	25 (2.13)	22 (2.07)	16 (1.76)	16 (1.87)
Speed too Slow	2 (0.15)	0 (0.00)	3 (0.28)	2 (0.22)	2 (0.23)
Fail to Yield	394 (30.19)	357 (30.46)	301 (28.34)	265 (29.22)	271 (31.62)
Traffic Control	121 (9.27)	99 (8.45)	89 (8.38)	75 (8.27)	65 (7.58)
Wrong Way	3 (0.23)	6 (0.51)	10 (0.94)	4 (0.44)	2 (0.23)
Left of Center	44 (3.37)	39 (3.33)	35 (3.30)	32 (3.53)	33 (3.85)
Improper Passing	3 (0.23)	4 (0.34)	1 (0.09)	2 (0.22)	2 (0.23)
Improper Lane Use	15 (1.15)	19 (1.62)	14 (1.32)	4 (0.44)	15 (1.75)
Improper Turn	29 (2.22)	20 (1.71)	19 (1.79)	18 (1.98)	11 (1.28)
Improper Signal	0 (0.00)	0 (0.00)	1 (0.09)	2 (0.22)	0 (0.00)
Improper Backing	0 (0.00)	1 (0.09)	1 (0.09)	0 (0.00)	0 (0.00)
Clear Distance	114 (8.74)	80 (6.83)	80 (7.53)	76 (8.38)	64 (7.47)
Other	45 (3.45)	46 (3.92)	42 (3.95)	41 (4.53)	40 (4.67)
Unknown	26 (1.99)	20 (1.71)	19 (1.79)	24 (2.65)	13 (1.52)

## Summary

Salient trends in KA crashes from 1998 through 2002 involving older drivers are:

- The number of KA crashes involving older drivers decreased by 23% over the 5-year period. The proportion of KA crashes involving older drivers remained at 13% during this time period.
- The number of older persons killed or severely injured decreased by 23%.
- The proportion of older persons among all persons killed or severely injured in motor vehicle crashes increased slightly from 8% to 9%.
- 52% of older drivers involved in KA crashes were male.
- Decreases in the number and rates of KA crashes were greater for women than for men.
- Each age group of older drivers experienced decreases in the number and rates of KA crashes. The greatest decrease in the number of KA crashes was among the youngest group, age 65-69. The smallest decrease in the number of KA crashes was among the oldest group, age 80 and older.
- The greatest decrease in the crash rate per licensed driver was among the oldest group, age 80 and older.
- The patterns of peak periods of older driver KA crashes are not as clear as those for all older driver crashes. However, the peak month for KA crashes appears to be May, the peak day is Friday, and the peak hours are between noon and 3 P.m..
- The majority of older driver KA crashes occur in good weather, on dry pavement, and in daylight.
- There is an increase in the proportion of older driver KA crashes on high-speed (65 mph and higher) roads.
- 13% of older driver KA crashes are single-vehicle crashes.
- In multi-vehicle KA crashes, hazardous actions are noted for 62% of older drivers as compared to 49% of all drivers.
- Failure to yield the right of way was the most frequent hazardous action for older drivers in KA crashes. Each year, it was recorded for approximately 30% of older drivers in multi-vehicle KA crashes, compared to 15% of all drivers involved in multi-vehicle KA crashes.

## HAD BEEN DRINKING CRASHES

Crashes in which the older driver had been drinking are examined in this section. Table 28 shows the overall number of crashes in which a driver had been drinking (HBD crashes) and the number and proportions of crashes in which an older driver had been drinking. Overall, the number of HBD crashes decreased by 19% over the 5-year period from 1998 through 2002. The number of crashes involving an older driver who had been drinking also decreased but the proportion remained at just over 2% throughout this time.

Year	Had Been Drinking Crashes	Crashes in which older driver had been drinking	
		Number	Percent
1998	19,537	494	2.5%
1999	18,523	419	2.3%
2000	17,300	399	2.3%
2001	15,805	377	2.4%
2002	15,824	362	2.3%

Table 29 shows the number and rates of crashes in which the older driver had been drinking by sex. Men were more likely than women to be involved in older driver HBD crashes. Each year, male drivers accounted for approximately 69% of the crashes in which an older driver had been drinking. Over the 5-year period, the number of HBD crashes decreased by 27% for men and 41% for women. There were also decreases in HBD population and licensed driver crash rates for both men and women, however, the decreases for women were greater than those for men.

Table 29. HBD Crashes in Which Older Driver Had Been Drinking by Sex and Year									
	Number of Crashes			Crashes per 1000 Population*			Crashes per 1000 Licensed Drivers		
	Men	Women	Total**	Men	Women	Total	Men	Women	Total
1998	340	61	494	0.38	0.05	0.23	0.79	0.12	0.52
1999	308	37	419	0.34	0.03	0.20	0.71	0.07	0.44
2000	278	42	399	0.31	0.03	0.19	0.64	0.08	0.41
2001	253	44	377	--	--	--	0.58	0.08	0.39
2002	248	36	362	--	--	--	0.57	0.07	0.37
% Change	-27.0%	-41.0%	-26.7%	-18.4%†	-40.0%†	-17.4%†	-27.8%	-41.7%	-28.8%

\* Population data are not available for 2001 and 2002

\*\* The sum of men and women may not add to total due to missing data on sex.

† % Change from 1998 to 2000

Table 30 shows the distribution of HBD crashes in which an older driver had been drinking by age. Although there was a reduction in the number of HBD crashes in each age group, drivers age 70-74 continue to be involved in more HBD crashes than other older drivers. The oldest age group had the fewest HBD crashes, the lowest crash rates per population and per licensed driver and also showed the largest percent decreases in all three measures.

		1998	1999	2000	2001	2002	% Change
Number of Crashes	65-69	119	121	103	106	75	-37.0%
	70-74	146	117	127	123	111	-24.0%
	75-79	88	69	60	44	69	-21.6%
	80+	57	42	34	32	36	-37.5%
Crashes per 1000 Population*	65-69	0.35	0.37	0.31	--	--	-11.4%†
	70-74	0.46	0.37	0.40	--	--	-13.0%†
	75-79	0.34	0.27	0.23	--	--	-32.4%†
	80+	0.18	0.13	0.11	--	--	-38.9%†
Crashes per 1000 Licensed Drivers	65-69	0.42	0.43	0.37	0.38	0.27	-35.7%
	70-74	0.54	0.44	0.48	0.47	0.43	-20.4%
	75-79	0.43	0.33	0.29	0.20	0.32	-25.6%
	80+	0.31	0.22	0.17	0.15	0.16	-48.4%

\* Population data are not available for 2001 and 2002

\*\* The sum of men and women may not add to total due to missing data on sex.

† % Change from 1998 to 2000

Table 31 and Figure 7 show the distribution of crashes involving an older driver who had been drinking by month. From 1998 to 2001, December were among the two months with the most older driver HBD crashes. In 2002, the peak month was September.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1998	45 (9.11)	37 (7.49)	37 (7.49)	35 (7.09)	37 (7.49)	28 (5.67)	51 (10.3)	46 (9.31)	42 (8.50)	44 (8.91)	34 (6.88)	58 (11.7)
1999	30 (7.16)	21 (5.01)	39 (9.31)	33 (7.88)	35 (8.35)	33 (7.88)	25 (5.97)	36 (8.59)	40 (9.55)	26 (6.21)	54 (12.9)	47 (11.2)
2000	33 (8.27)	29 (7.27)	28 (7.02)	26 (6.52)	35 (8.77)	41 (10.3)	34 (8.52)	35 (8.77)	37 (9.27)	25 (6.27)	34 (8.52)	42 (10.5)
2001	34 (9.02)	14 (3.71)	29 (7.69)	29 (7.69)	29 (7.69)	38 (10.1)	25 (6.63)	33 (8.75)	32 (8.49)	26 (6.90)	46 (12.2)	42 (11.1)
2002	31 (8.56)	35 (9.67)	22 (6.08)	22 (6.08)	34 (9.39)	29 (8.01)	27 (7.46)	26 (7.18)	43 (11.9)	37 (10.2)	31 (8.56)	25 (6.91)

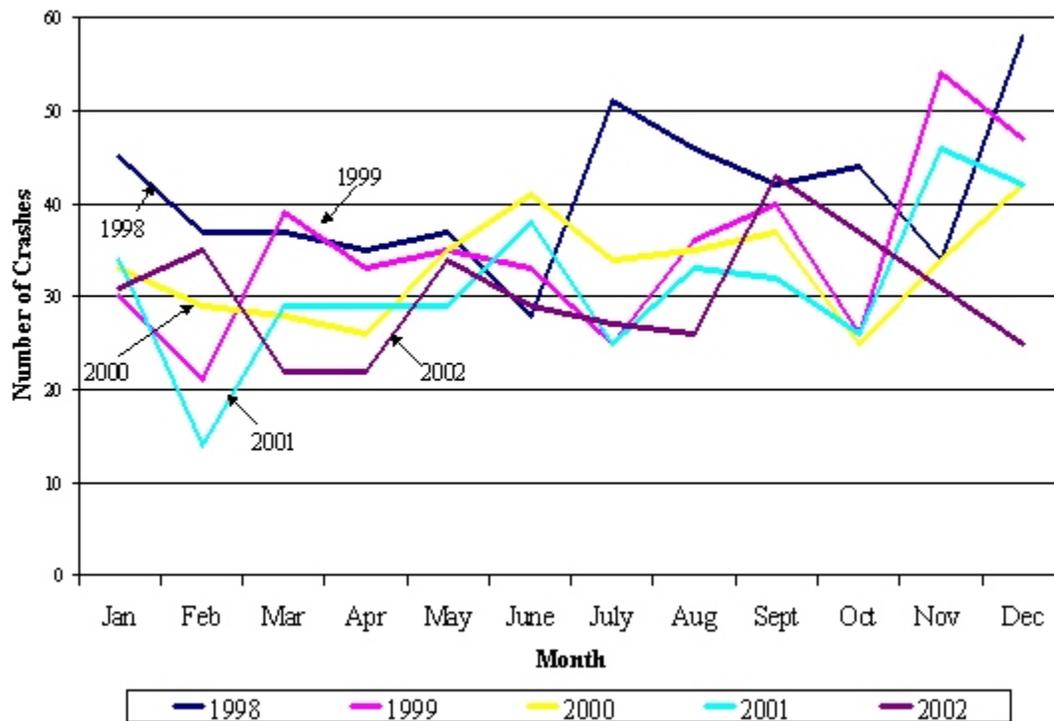


Figure 7. Older Driver HBD Crashes by Month and Year

Table 32 and Figure 8 show the distribution of older driver HBD crashes by day of week. Although the distribution varies somewhat over the 5-year period, in three of the five years, Friday and Saturday were the days of the highest number of HBD crashes.

Table 32. Older Driver HBD Crashes by Day of Week and Year							
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1998	56 (11.34)	69 (13.97)	58 (11.74)	88 (17.81)	90 (18.22)	66 (13.36)	67 (13.56)
1999	55 (13.13)	56 (13.37)	52 (12.41)	45 (10.74)	59 (14.08)	72 (17.18)	80 (19.09)
2000	52 (13.03)	58 (14.54)	56 (14.04)	56 (14.04)	49 (12.28)	69 (17.29)	59 (14.79)
2001	45 (11.94)	48 (12.73)	50 (13.26)	48 (12.73)	47 (12.47)	74 (19.63)	65 (17.24)
2002	47 (12.98)	48 (13.26)	45 (12.43)	61 (16.85)	47 (12.98)	50 (13.81)	64 (17.68)

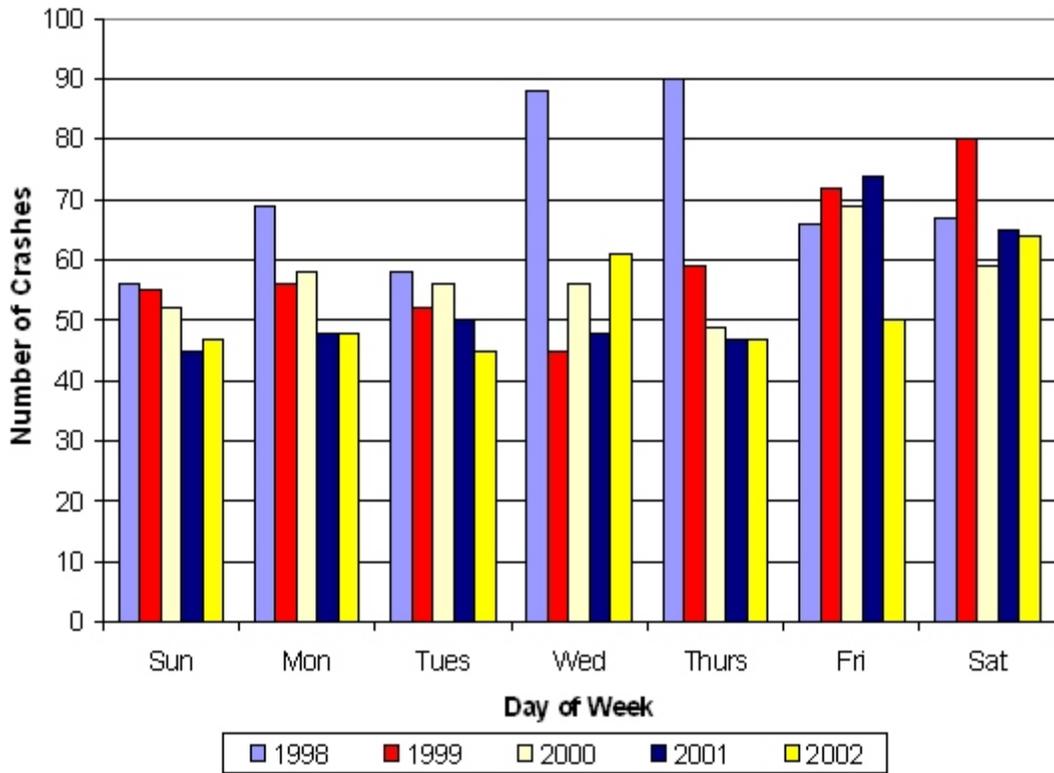


Figure 8. Older Driver HBD Crashes by Day of Week and Year

## **Summary**

The salient trends between 1998 and 2002 in crashes in which an older driver had been drinking are:

- The number of crashes in which an older driver had been drinking decreased by 27%. The proportion of HBD crashes in which an older driver was involved remained at just over 2% throughout the 5-year period.
- approximately 87% of the older driver HBD crashes involved male drivers.
- The number and rates of HBD crashes decreased for both men and women, however, the decreases were greater for women than for men.
- Drivers, age 70-74 continued to be involved in more HBD crashes than other older drivers.
- Drivers, age 80 and older were involved in the fewest HBD crashes, and also had the lowest HBD crash rates per population and licensed driver than other older drivers.
- Patterns in peak periods in older driver HBD crashes are not as clear as the patterns for all older driver crashes, but December appears to be the peak month and Friday and Saturday appear to be the peak days of the week for crashes in which the older driver had been drinking.

## **SAFETY-BELT USE**

Safety belts use from 1998 through 2002 among crash-involved older vehicle occupants is examined in this section. Because information about uninjured passengers is usually not included in the police crash reports, findings about passengers are based mostly on injured passengers and may be somewhat biased. However, despite the possible bias, the results do give an indication of the safety belt use of older vehicle occupants.

### **Use Rates**

Table 33 shows the number of crash-involved older drivers and passengers, and the number and proportion who were using safety belts at the time of the crash from 1998 to 2001. Safety belt use among crash-involved older vehicle occupants was very high in 1998 and increased slightly in 2000 and then decreased slightly for both drivers and passengers. This pattern of increase and decrease was similar to that found in safety belt use rates by direct observation before and after the implementation

of standard enforcement in Michigan (see Eby, Vivoda, and Fordyce, 2002). By 2002, the overall safety belt use for older vehicle occupants was 98%. The proportion of crash-involved passengers using safety belts was also high, and increase from 90% in 1998 to 93% in 2002. Safety belt use rates for passengers were consistently lower than that for drivers. However, it must be remembered that because the likelihood of injury is higher if a person is not using a safety belt, unbelted passengers are more likely to be injured, and therefore in the crash data than belted passengers. It is probable that the safety belt use of older crash-involved passengers is higher than the crash data indicate.

	1998	1999	2000	2001	2002
Drivers	44,639	44,465	44,137	42,518	42,206
Belted	43,591	43,662	43,613	42,081	41,536
(% Belted)	(97.7%)	(98.1%)	(98.8%)	(99.0%)	(98.4%)
Passengers	2,165	2,208	2,063	1,932	1,847
Belted	1,948	2,019	1,915	1,803	1,713
(% Belted)	(90.0%)	(91.4%)	(92.8%)	(93.3%)	(92.7%)
Total Vehicle Occupants	46,804	46,673	46,200	44,450	44,053
Belted	45,539	45,681	45,528	43,884	43,249
(% Belted)	(97.3%)	(97.9%)	(98.5%)	(98.7%)	(98.2%)

Table 34 shows the safety belt use of older drivers and passengers from 1998 through 2002 by sex. There were increases in the safety belt use of drivers and passengers of both sexes during the 5-year period between 1998 and 2002. The belt use of women was almost always higher than for men for both drivers and passengers. However, for both sexes, the safety belt use of passengers was consistently lower than for drivers. By 2002, the safety belt use rate for drivers of both sexes was approximately 99%. For passengers the use rate in 2002 was 92% for men and 95% for women.

Table 34. Safety Belt use of Crash-Involved Older Drivers and Passengers by Sex and Year					
	1998	1999	2000	2001	2002
Male Drivers	25,979	25,824	25,743	24,022	23,915
Belted	25,258	25,239	25,369	23,725	23,614
(% Belted)	(97.2%)	(97.7%)	(98.5%)	(98.8%)	(98.7%)
Female Drivers	18,044	18,100	17,920	17,366	17,214
Belted	17,731	17,850	17,773	17,235	17,104
(% Belted)	(98.3%)	(98.6%)	(99.2%)	(99.2%)	(99.4%)
Male Passengers	384	441	392	376	397
Belted	332	390	362	353	364
(% Belted)	(86.5%)	(88.4%)	(92.3%)	(93.9%)	(91.7%)
Female Passengers	1,690	1,690	1,622	1,477	1,389
Belted	1,535	1,559	1,510	1,376	1,323
(% Belted)	(90.8%)	(92.2%)	(93.1%)	(93.2%)	(95.2%)

Table 35 shows the safety belt use rate of crash-involved older drivers and passengers by age. There was little difference in the belt use of older crash-involved drivers by age, and the slight increase in safety-belt use by older drivers was uniform across the age groups. There was also an increase in the safety belt use in nearly every age group of passengers. The use rate of passengers age 80 and older was slightly, but consistently, lower than for passengers under 80 years of age. The use rate for passengers under 80 did not vary much by age.

Table 35. Safety-belt Use of Crash-Involved Older Drivers and Passengers by Age and Year					
	1998	1999	2000	2001	2002
Drivers, Age 65-69	8,671	8,205	8,110	7,799	7,678
Belted	8,490	8,054	7,997	7,731	7,610
(% Belted)	(97.9%)	(98.2%)	(98.6%)	(99.1%)	(99.1%)
Drivers, Age 70-74	12,553	12,473	12,339	11,550	11,257
Belted	12,269	12,243	12,208	11,448	11,150
(% Belted)	(97.7%)	(98.2%)	(99.0%)	(99.1%)	(99.1%)
Drivers, Age 75-79	9,536	9,816	9,616	9,347	9,329
Belted	9,320	9,630	9,524	9,260	9,244
(% Belted)	(97.7%)	(98.1%)	(99.0%)	(99.1%)	(99.1%)
Drivers, Age 80+	8,217	8,352	8,378	8,489	8,815
Belted	7,990	8,169	8,246	8,372	8,694
(% Belted)	(97.2%)	(97.8%)	(98.4%)	(98.6%)	(98.6%)
Passengers, Age 65-69	356	341	327	258	280
Belted	317	314	302	241	266
(% Belted)	(89.0%)	(92.1%)	(92.4%)	(93.4%)	(95.0%)
Passengers, Age 70-74	600	581	541	516	447
Belted	543	540	499	482	426
(% Belted)	(90.5%)	(92.9%)	(92.2%)	(93.4%)	(95.3%)
Passengers, Age 75-79	472	493	451	458	401
Belted	424	453	427	429	383
(% Belted)	(89.8%)	(91.9%)	(94.7%)	(93.7%)	(95.5%)
Passengers, Age 80+	514	550	531	503	525
Belted	453	493	487	463	483
(% Belted)	(88.1%)	(89.6%)	(91.7%)	(92.0%)	(92.0%)

## Nonusers

Because safety belt use among older motorists is very high, it is interesting to see who among them did not use safety-belts. Table 36 shows the distribution by age and sex of older drivers who were not using safety belts at the time of a crash. Although the number of safety belt nonusers was small, a pattern is discernable. About 70% of the nonuser drivers were men. Among male drivers, the largest proportion of nonusers were in the 70 to 74 year age group from 1998-2000. However, in 2001 and 2000 the largest proportion of male driver nonusers were age 80 and older. The pattern among the women drivers was less clear. However, in years 2001 and 2002, the highest proportion of female driver nonusers was also in the older age category.

Table 36. Unbelted Crash-Involved Older Drivers by Sex, Age, and Year										
	Men					Women				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
65-69	131 (21.2%)	110 (21.4%)	78 (23.2%)	46 (18.0%)	54 (19.9%)	47 (17.0%)	39 (17.1%)	35 (26.9%)	22 (19.8%)	13 (12.9%)
70-74	198 (32.0%)	163 (31.7%)	103 (30.7%)	73 (28.6%)	78 (28.7%)	83 (30.0%)	64 (28.1%)	28 (21.5%)	25 (22.5%)	26 (25.7%)
75-79	141 (22.8%)	120 (23.3%)	62 (18.5%)	58 (22.7%)	57 (21.0%)	69 (25.0%)	64 (28.1%)	30 (23.1%)	27 (24.3%)	26 (25.7%)
80+	149 (24.0%)	121 (23.5%)	93 (27.7%)	78 (30.6%)	83 (30.5%)	77 (28.0%)	61 (26.7%)	37 (28.5%)	37 (33.3%)	36 (35.6%)
Total	619 (100%)	514 (100%)	336 (100%)	255 (100%)	272 (100%)	276 (100%)	228 (100%)	130 (100%)	111 (100%)	101 (100%)
% Men	69.2%	69.3%	72.1%	69.7%	72.9%					
% Women						30.8%	30.7%	27.1%	30.3%	27.1%

The age and sex distributions of crash-involved older passengers are shown in Table 37. Unlike drivers, the majority of passengers who were not using safety belts at the time of the crash were women. The actual percentage varied over the 5 years between 1998 and 2002, but on average three-fourths of the passengers not using safety belts were women. The highest proportion of non users among women were over 80 years of age. The number of male passengers recorded as not using safety belts was very small and no pattern by age was discernable.

Table 37. Unbelted Crash-Involved Older Passengers by Sex, Age, and Year										
	Men					Women				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
65-69	14 (29.2%)	3 (7.1%)	4 (16.7%)	7 (36.8%)	7 (25.9%)	22 (15.0%)	22 (18.6%)	21 (19.8%)	10 (10.4%)	7 (11.1%)
70-74	7 (14.6%)	16 (38.1%)	8 (33.3%)	5 (26.3%)	6 (22.2%)	48 (32.7%)	24 (20.3%)	31 (29.2%)	28 (29.2%)	15 (23.8%)
75-79	10 (20.8%)	9 (21.4%)	3 (12.5%)	2 (10.5%)	7 (25.9%)	36 (24.5%)	30 (25.4%)	20 (18.9%)	23 (24.0%)	10 (15.9%)
80+	17 (35.4%)	14 (33.3%)	9 (37.5%)	5 (26.3%)	7 (25.9%)	41 (27.9%)	42 (35.6%)	34 (32.1%)	35 (36.5%)	31 (49.2%)
Total	48 (100%)	42 (100%)	24 (100%)	19 (100%)	27 (100%)	147 (100%)	118 (100%)	106 (100%)	96 (100%)	63 (100%)
% Men	24.6%	26.3%	18.5%	16.5%	30.0 %					
% Women						75.4%	73.7%	81.5%	83.5%	70.0%

### Safety-Belt Use and Injury Severity

The safety belt use rates for drivers and passengers killed and non-fatally injured are shown in Table 38 for the 5 years from 1998 through 2002. Safety-belt use rates for drivers in property-damage-only crashes are also shown. As noted earlier, information about uninjured passengers is usually not recorded in Michigan crash data. Safety belt use rate decreased with injury severity. The lowest safety belt rates was among older driver and passengers who were killed and the highest belt use rate was among not injured drivers. Of all older motorists killed between 1998 and 2002, 34% were not using safety belts. In 2000, an increase in safety-belt use rates was seen in every injury category. This is most likely a result of the standard enforcement law that went into effect on March 10, 2000.

Table 38. Safety Belt Use and Injury Severity					
Drivers	1998	1999	2000	2001	2002
Killed	128	146	135	131	117
Belted	81	95	94	96	85
(% Belted)	(63.3%)	(65.1%)	(69.6%)	(73.3%)	(72.6%)
Non-Fatal Injury	6,641	6,134	5,969	5,681	5,623
Belted	6,207	5,825	5,765	5,506	5,435
(% Belted)	(93.5%)	(95.0%)	(96.6%)	(96.9%)	(96.7%)
Not Injured	37,428	37,704	37,758	35,844	35,833
Belted	36,871	37,231	37,481	35,624	35,635
(% Belted)	(98.5%)	(98.7%)	(99.3%)	(99.4%)	(99.4%)
Passengers	1998	1999	2000	2001	2002
Killed	53	50	57	47	40
Belted	34	32	45	35	31
(% Belted)	(64.2%)	(64.0%)	(78.9%)	(74.5%)	(77.5%)
Non-Fatal Injury	2,093	2,137	1,999	1,859	1,788
Belted	1,897	1,966	1,863	1,744	1,691
(% Belted)	(90.6%)	(92.0%)	(93.2%)	(93.8%)	(94.6%)

## Summary

Salient trends from 1998 through 2002 in safety belt use among older crash-involved motorists are:

- Safety belt use among older motorists, already very high in 1998 at 97% increased to 98% by 2002.
- Safety belt use was consistently higher among older drivers than older passengers. Among drivers, safety belt use was 98% in 2002 and 93% for passengers.
- Safety belt use by women was higher than for men.
- The lowest safety-belt use was among passengers age 80 and older.
- Safety belt non users among drivers, were most likely to be male, age 70-74 years of age.
- Safety-belt non users among passengers, most likely to be women, age 80 and older.
- Of the older drivers and passengers killed over the five year period, 34% were not using safety belts.

## PEDESTRIANS

Between 1998 and 2002, the number of pedestrians involved in motor vehicle crashes in Michigan decreased by 8%, and the proportion of persons age 65 and older among them ranged between 2-3% during this time (Table 39).

Year	All Crash-Involved Pedestrians	Older Crash-Involved Pedestrians	
		Number	Percent
1998	7,928	232	2.9%
1999	7,456	227	3.0%
2000	5,829	121	2.1%
2001	7,237	179	2.5%
2002	7,288	170	2.3%

The proportion of older persons among the pedestrians killed in motor vehicle crashes varied from 22% in 1998 to 16% in 2002, although no clear trend was obvious (Table 40). The proportion of older persons among all pedestrians injured also varied but averaged around 5% over the 5-year period. (Table 40). Table 41 shows the distribution of older crash-involved pedestrians by sex and year and Table 42 shows their distribution by age and year.

		1998	1999	2000	2001	2002
Number of Pedestrians Killed	All Ages	177	181	171	169	179
	Age 65+ (% of all)	39 (22.0%)	20 (11.0%)	25 (14.6%)	32 (18.9%)	29 (16.2%)
Number of Pedestrians Injured	All Ages	3,483	3,259	2,543	2,965	2,899
	Age 65+ (% of all)	175 (5.0%)	193 (5.9%)	144 (5.7%)	80 (2.7%)	123 (4.2%)

Year	Men	Women	Total
1998	105 (46.5%)	121 (53.5%)	226 (100%)
1999	133 (59.9%)	89 (40.1%)	222 (100%)
2000	105 (60.3%)	69 (39.7%)	174 (100%)
2001	70 (59.8%)	47 (40.2%)	117 (100%)
2002	81 (48.8%)	85 (51.2%)	166 (100%)

Year	65-69	70-74	75-79	80+
1998	33 (15.6%)	51 (24.2%)	67 (31.8%)	60 (28.4%)
1999	37 (18.4%)	69 (34.3%)	36 (17.9%)	59 (29.4%)
2000	33 (20.6%)	40 (25.0%)	39 (24.4%)	48 (30.0%)
2001	13 (12.5%)	30 (28.8%)	21 (20.2%)	40 (38.5%)
2002	29 (18.6%)	38 (24.4%)	41 (26.3%)	48 (30.8%)

The proportions of men and women varied over the 5-year period. However, over the 5-years, men accounted for 55% of the older pedestrians involved in vehicle crashes, and women accounted for 45%. The proportions of crash-involved pedestrians by age also varied somewhat over the 5-year period, however, the oldest age group appears to have the most pedestrian crash involvements when the entire 5-year period is considered. Over the 5 years, 31% of the older pedestrian crashes involved persons age 80 or older, while 17% involved persons age 65-69.

## Summary

The salient trends between 1998 and 2002 in older pedestrian crashes are:

- The number of older pedestrians involved in vehicle crashes decreased by 8% over the 5-year period. The proportion of older persons among pedestrians involved in motor-vehicle crashes remained at 2% to 3% each year.
- The proportion of older persons among pedestrians killed in motor-vehicle crashes varied between 16% to 22% over the 5 years.
- The proportion of older persons among pedestrians injured in motor-vehicle crashes varied between 3% and 6% over the 5 years.
- Over the five years, 55% of the older pedestrians involved in vehicle crashes were male.
- Over the five years, 31% of the older pedestrians involved in vehicle crashes were age 80 or older.

## NOTABLE TRENDS

In 2002 there were 44,011 vehicle crashes involving older drivers, of which 1,175 resulted in a death or serious injury. These numbers reflect an overall decrease of 6% in older driver crashes and a decrease of 23% of older driver crashes involving a fatality or serious injury. The number of crashes in which an older driver had been drinking was 362, a 27% decrease from 1998. Throughout the 5-year period from 1998 through 2002, the proportion of crashes involving older drivers remained relatively constant at 11% of all crashes, 13% of all fatal and serious injury crashes and at about 2% of all crashes in which a driver had been drinking. The number of older persons killed or seriously injured in motor vehicle crashes decreased by 23% in the five years between 1998 and 2002. However, the proportion of older persons killed or injured each year remained approximately at 15% of all killed and 7% of all injured. The number of older pedestrians involved in vehicle crashes decreased by 8% over the 5-year period. The proportion of older persons among pedestrians involved in motor-vehicle crashes remained at 2% to 3% each year. This lack of change in the proportions indicates that the decreases in older driver crashes in Michigan are following the overall trends of crashes in Michigan and that the patterns of older driver crashes have been relatively stable over the last five years.

There was, however, a difference in the crash experience between the youngest and oldest groups of older drivers. Between 1998 and 2002, the number of crashes decreased involving drivers age 65-69 decreased by 13% and crashes involving drivers age 80 and older increased by 5%. Although each age group of older drivers experienced decrease in the number of fatal and serious injury crashes, the greatest decrease in the number of KA crashes was among the youngest group, age 65-69 and the smallest was among the drivers age 80 and older. Crash rates per licensed driver decreased for each age group including that of the oldest drivers. This decrease in the crash rate per licensed driver together with the increase in the number of crashes indicates that a portion of the licensed drivers in the oldest age group have reduced or stopped driving.

Older drivers had and continue to have a very low crash involvement as had been drinking drivers. However, drivers, age 75-79 were involved in more HBD crashes than other older drivers during the entire 5-year period from 1998 through 2002. Drivers, age 80 and older were involved in the fewest HBD crashes, and also had the lowest HBD crash rates per population and licensed driver of all older drivers.

The patterns of crash involvement by sex were also stable over the 5-year period. Male drivers were involved in approximately 56% of all crashes, 59% of KA crashes and 87% of the crashes in which the older driver had been drinking.

There was also stability in the time of occurrence of older driver crashes. The peak months of crashes involving older drivers are October, November, and December. The largest proportion of crashes involving older drivers occurred on Fridays. The largest proportion of older driver crashes occurred between noon to 3 P.m.. Only 5% of crashes involving older drivers occurred from 9 P.m. to 6 AM. The patterns of peak periods of fatal and serious injury and had been drinking crashes involving older drivers are not as clear as those for all older driver crashes. However, the peak month for the serious crashes appears to be May and the peak month for had been drinking crashes appears to be December. Friday is the peak day for fatal and serious injury crashes and Friday and Saturday is the peak days for had been drinking crashes. The largest proportion of fatal and serious injury crashes occur between noon and 3 p.m.

As for crashes involving other drivers, most crashes including the fatal and serious injury crashes

involving older drivers occurred in good weather, on dry pavements, and in daylight. The proportion of all crashes and fatal and serious injury crashes involving older drivers that occur on roads with high speed limits (65 mph and over) increased over the 5-year period. This may be a fluctuation in the data or it may be the beginning of increasing trend as a cohort of drivers who have used freeways all their lives enter the ranks of older drivers.

The crash records show that older drivers have more problems than younger drivers in negotiating intersections. Failing to yield the right of way, a hazardous action usually associated with intersections, was the most frequent hazardous action for older drivers in multi-vehicle crashes. It was recorded for older drivers in 22% to 23% of all multi-vehicle crashes and in 30% of fatal or serious injury multi-vehicle crashes. By contrast, failing to yield the right of way was recorded for 12% of all drivers in multi-vehicle crashes and for 15% of all drivers in fatal or serious-injury crashes.

Safety belt use among older motorists, already very high in 1998 increased to 98% by 2002, again following the general pattern of statewide safety belt use increase. Safety belt use was consistently higher among older drivers than older passengers. Among drivers, safety belt use was 98% in 2002 and 93% for passengers. Safety belt non users among drivers were most likely to be male, age 70-74 years. Safety-belt non users among passengers, most likely to be women, age 80 and older. Of the older drivers and passengers killed over the five year period, 34% were not using safety belts.

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**APPENDIX A**

**Michigan Population and  
Licensed Population**

## Michigan Older Male Population by Age and Year

<b>Men</b>					
	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001*</b>	<b>2002*</b>
<b>65</b>	31,480	30,971	32,873		
<b>66</b>	30,398	29,733	29,128		
<b>67</b>	31,867	29,661	29,744		
<b>68</b>	30,493	29,295	29,380		
<b>69</b>	30,722	30,645	30,011		
<b>65-69</b>	<i>154,960</i>	<i>150,305</i>	<i>151,136</i>		
<b>70</b>	29,973	28,807	29,436		
<b>71</b>	29,111	29,881	28,493		
<b>72</b>	28,034	28,347	28,573		
<b>73</b>	26,736	26,388	27,216		
<b>74</b>	25,208	25,536	25,753		
<b>70-74</b>	<i>139,062</i>	<i>138,959</i>	<i>139,471</i>		
<b>75</b>	23,890	24,278	24,680		
<b>76</b>	23,278	22,681	22,615		
<b>77</b>	21,650	21,907	21,069		
<b>78</b>	19,092	20,460	20,154		
<b>79</b>	17,191	17,831	17,868		
<b>75-79</b>	<i>105,101</i>	<i>107,157</i>	<i>106,386</i>		
<b>80</b>	15,151	15,775	15,644		
<b>81</b>	13,823	14,112	14,141		
<b>82</b>	12,521	12,795	12,646		
<b>83</b>	11,163	11,397	11,090		
<b>84</b>	9,832	10,296	9,695		
<b>85+</b>	40,641	42,674	40,750		
<b>80 and older</b>	<i>103,131</i>	<i>107,049</i>	<i>103,966</i>		
<b>Total Men 65+</b>	901,377	899,891	897,952		

\*Data for 2001 and 2002 are not available

Sources:  
1998-1999

US Census Bureau, Population Division, Estimates Program  
Female Population of Michigan by single Year of age, 1990-1999  
Male Population of Michigan by single Year of age, 1990-1999

2000

US Census Bureau, Census 2000 Population and Housing Summary File 1

## Michigan Older Female Population by Age, and Year

<b>Women</b>					
	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001*</b>	<b>2002*</b>
<b>65</b>	36,657	35,671	36,984		
<b>66</b>	36,089	34,923	33,920		
<b>67</b>	38,157	36,188	35,079		
<b>68</b>	37,075	36,648	35,321		
<b>69</b>	36,932	36,510	36,395		
<b>65-69</b>	<i>184,910</i>	<i>179,940</i>	<i>177,699</i>		
<b>70</b>	36,883	35,415	36,060		
<b>71</b>	36,473	36,896	34,519		
<b>72</b>	35,508	35,675	35,562		
<b>73</b>	34,520	33,849	34,454		
<b>74</b>	33,577	33,842	33,979		
<b>70-74</b>	<i>176,961</i>	<i>175,677</i>	<i>174,574</i>		
<b>75</b>	33,215	33,463	33,754		
<b>76</b>	32,282	31,355	31,973		
<b>77</b>	30,756	31,001	30,261		
<b>78</b>	28,475	29,925	29,931		
<b>79</b>	26,352	26,869	28,019		
<b>75-79</b>	<i>151,080</i>	<i>152,613</i>	<i>153,938</i>		
<b>80</b>	24,622	25,395	25,689		
<b>81</b>	22,846	23,444	23,569		
<b>82</b>	21,421	21,754	22,430		
<b>83</b>	20,506	20,719	20,100		
<b>84</b>	18,387	19,003	18,530		
<b>85+</b>	98,757	101,545	101,710		
<b>80 and over</b>	<i>206,539</i>	<i>211,860</i>	<i>212,028</i>		
<b>Total Women 65+</b>	1,232,441	1,228,320	1,224,450		

\*Data for 2001 and 2002 are not available

Sources:  
1998-1999

US Census Bureau, Population Division, Estimates Program  
Female Population of Michigan by single Year of age, 1990-1999  
Male Population of Michigan by single Year of age, 1990-1999

2000

US Census Bureau, Census 2000 Population and Housing Summary File 1

### Michigan Licensed Older Drivers by Age Group, Sex, and Year

<b>Men Age 65+</b>					
	1998	1999	2000	2001	2002
<b>65-69</b>	131,523	129,676	127,576	126,729	127,463
<b>70-74</b>	125,129	123,549	122,326	118,855	115,788
<b>75-79</b>	92,955	95,654	96,697	97,003	98,576
<b>80+</b>	82,176	84,637	87,600	91,690	96,287
<b>Total Men 65+</b>	431,783	433,516	434,199	434,277	438,114
<b>Women Age 65+</b>					
<b>65-69</b>	155,183	154,176	153,138	153,411	155,094
<b>70-74</b>	145,500	144,927	144,576	143,063	140,451
<b>75-79</b>	112,256	116,465	118,511	118,770	120,354
<b>80+</b>	98,868	104,610	111,451	118,381	123,606
<b>Total Women 65+</b>	511,807	520,178	527,676	533,625	539,505
<b>Total Licensed Drivers 65+</b>	943,590	953,694	961,875	967,902	977,619

### Total Michigan Licensed Drivers by Sex, and Year

	1998	1999	2000	2001	2002
<b>All Men</b>	2,934,566	2,946,076	2,961,272	2,967,098	2,974,878
<b>All Women</b>	3,408,344	3,435,689	3,462,257	3,486,697	3,511,124
<b>All Licensed Drivers</b>	6,342,910	6,381,765	6,423,529	6,453,795	6,486,002

Source: Michigan Department of State

## **APPENDIX B**

### **Single and Multi-Vehicle Crashes by Hazardous Actions - All Drivers**

Table B1. Number and Percent of Hazardous Actions Recorded for Single-Vehicle Crashes by Year - All Drivers					
Hazardous Action	1998	1999	2000	2001	2002
None	76,499 (63.37)	78,811 (62.70)	79,100 (60.69)	77,480 (62.18)	73,267 (58.81)
Speed too Fast	21,688 (17.97)	23,784 (18.92)	27,113 (20.80)	22,374 (17.96)	25,721 (20.65)
Speed too Slow	158 (0.13)	181 (0.14)	165 (0.13)	145 (0.12)	179 (0.14)
Fail to Yield	768 (0.64)	741 (0.59)	842 (0.65)	802 (0.64)	717 (0.58)
Traffic Control	454 (0.38)	433 (0.34)	382 (0.29)	426 (0.34)	390 (0.31)
Wrong Way	50 (0.04)	70 (0.06)	52 (0.04)	55 (0.04)	51 (0.04)
Left of Center	498 (0.41)	553 (0.44)	447 (0.34)	368 (0.30)	357 (0.29)
Improper Passing	165 (0.14)	154 (0.12)	153 (0.12)	117 (0.09)	119 (0.10)
Improper Lane Use	549 (0.45)	629 (0.50)	514 (0.39)	419 (0.34)	442 (0.35)
Improper Turn	394 (0.33)	355 (0.28)	354 (0.27)	333 (0.27)	328 (0.26)
Improper Signal	38 (0.03)	39 (0.03)	55 (0.04)	42 (0.03)	38 (0.03)
Improper Backing	516 (0.43)	521 (0.41)	461 (0.35)	394 (0.32)	405 (0.33)
Clear Distance	2,854 (2.36)	2,931 (2.33)	2,941 (2.26)	2,406 (1.93)	2,611 (2.10)
Other	13,240 (10.97)	13,627 (10.84)	14,430 (11.06)	16,084 (12.90)	16,813 (13.50)
Unknown	2,849 (2.36)	2,874 (2.29)	3,320 (2.55)	3,163 (2.54)	3,139 (2.52)

Table B2. Number and Percent of Hazardous Actions Recorded for Multiple-Vehicle Crashes by Year- All Drivers					
Hazardous Action	1998	1999	2000	2001	2002
None	2583,79 (50.82)	263,026 (50.74)	274,276 (51.47)	237,798 (50.08)	237,671 (50.68)
Speed too Fast	10,557 (2.08)	12,777 (2.46)	13,378 (2.51)	9,929 (2.09)	97,04 (2.07)
Speed too Slow	1,136 (0.22)	988 (0.19)	830 (0.16)	597 (0.13)	562 (0.12)
Fail to Yield	60,811 (11.96)	61,615 (11.89)	61,817 (11.60)	56,916 (11.99)	54,419 (11.60)
Traffic Control	15,431 (3.04)	15,440 (2.98)	15,249 (2.86)	13,727 (2.89)	13,394 (2.86)
Wrong Way	464 (0.09)	453 (0.09)	428 (0.08)	414 (0.09)	382 (0.08)
Left of Center	3,658 (0.72)	3,766 (0.73)	3,492 (0.66)	3,134 (0.66)	2,958 (0.63)
Improper Passing	4,587 (0.90)	4,700 (0.91)	4,392 (0.82)	4,167 (0.88)	3,827 (0.82)
Improper Lane Use	14,449 (2.84)	14,681 (2.83)	14,333 (2.69)	1,3260 (2.79)	13,101 (2.79)
Improper Turn	8,123 (1.60)	7,851 (1.51)	7,717 (1.45)	7,014 (1.48)	6,469 (1.38)
Improper Signal	861 (0.17)	873 (0.17)	840 (0.16)	739 (0.16)	717 (0.15)
Improper Backing	8,248 (1.62)	8,638 (1.67)	8,732 (1.64)	8,066 (1.70)	7,594 (1.62)
Clear Distance	89,262 (17.56)	90,354 (17.43)	94,002 (17.64)	84,790 (17.86)	84,667 (18.05)
Other	19,800 (3.89)	20,436 (3.94)	20,099 (3.77)	21,682 (4.56)	21,179 (4.23)
Unknown	12,640 (2.49)	12,769 (2.46)	13,285 (2.49)	12,642 (2.66)	12,276 (2.62)

Table B3. Numbers of Hazardous Actions Recorded for Single-Vehicle KA Crashes by Year - All Drivers					
Hazardous Action	1998	1999	2000	2001	2002
None	1,015 (20.68)	938 (20.19)	1,052 (24.43)	855 (20.64)	848 (20.46)
Speed too Fast	1,564 (31.87)	1,443 (31.06)	1,167 (27.10)	1,064 (25.68)	1082 (26.08)
Speed too Slow	6 (0.12)	11 (0.24)	8 (0.19)	5 (0.12)	7 (0.17)
Fail to Yield	229 (4.67)	184 (3.96)	198 (4.60)	159 (3.84)	158 (3.81)
Traffic Control	76 (1.55)	61 (1.31)	58 (1.35)	65 (1.57)	63 (1.52)
Wrong Way	7 (0.14)	5 (0.11)	7 (0.16)	6 (0.14)	7 (0.17)
Left of Center	54 (1.10)	69 (1.49)	52 (1.21)	38 (0.92)	21 (0.51)
Improper Passing	17 (0.35)	11 (0.24)	8 (0.19)	7 (0.17)	7 (0.17)
Improper Lane Use	53 (1.08)	56 (1.21)	33 (0.77)	29 (0.70)	30 (0.72)
Improper Turn	15 (0.31)	8 (0.17)	10 (0.23)	5 (0.12)	8 (0.19)
Improper Signal	3 (0.06)	1 (0.02)	1 (0.02)	1 (0.02)	1 (0.02)
Improper Backing	19 (0.39)	15 (0.32)	6 (0.14)	10 (0.24)	7 (0.17)
Clear Distance	160 (3.26)	160 (3.44)	124 (2.88)	88 (2.12)	80 (1.93)
Other	1,334 (27.19)	1,367 (29.42)	1,271 (29.51)	1,497 (36.13)	1,496 (36.06)
Unknown	355 (7.23)	317 (6.82)	312 (7.24)	312 (7.53)	333 (8.03)

Table B4. Numbers of Hazardous Actions Recorded for Multiple-Vehicle KA Crashes by Year- All Drivers					
Hazardous Action	1998	1999	2000	2001	2002
None	7,781 (51.31)	6,916 (50.94)	6,695 (52.98)	5,326 (50.16)	5,531 (51.01)
Speed too Fast	590 (3.89)	549 (4.04)	523 (4.14)	432 (4.07)	452 (4.17)
Speed too Slow	27 (0.18)	17 (0.13)	20 (0.16)	19 (0.18)	10 (0.09)
Fail to Yield	2,397 (15.81)	2,123 (15.64)	1,818 (14.39)	1,660 (15.64)	1,651 (15.23)
Traffic Control	1,092 (7.20)	941 (6.93)	911 (7.21)	723 (6.81)	723 (6.67)
Wrong Way	40 (0.26)	59 (0.43)	46 (0.36)	33 (0.31)	26 (0.24)
Left of Center	439 (2.89)	366 (2.70)	321 (2.54)	287 (2.70)	298 (2.75)
Improper Passing	96 (0.63)	90 (0.66)	80 (0.63)	57 (0.54)	63 (0.58)
Improper Lane Use	202 (1.33)	172 (1.27)	122 (0.97)	102 (0.96)	113 (1.04)
Improper Turn	202 (1.33)	182 (1.34)	133 (1.05)	112 (1.05)	99 (0.91)
Improper Signal	24 (0.16)	15 (0.11)	7 (0.06)	15 (0.14)	7 (0.06)
Improper Backing	20 (0.13)	20 (0.15)	20 (0.16)	11 (0.10)	10 (0.09)
Clear Distance	1,197 (7.89)	1,155 (8.51)	980 (7.76)	797 (7.51)	775 (7.15)
Other	749 (4.94)	696 (5.13)	711 (5.63)	809 (7.62)	849 (7.82)
Unknown	310 (2.04)	275 (2.03)	249 (1.97)	234 (2.20)	237 (2.19)