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Recent Trends in Fatal Motorcycle Crashes: An Update

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[1]Team Leader, Data Reporting Branch, Mathematical Analysis Division, Office of Traffic Records and Analysis, National Center for Statistics and Analysis
[2] Programmer Analyst (contractor) for the Mathematical Analysis Division of the National Center for Statistics and Analysis.

16. Abstract

Motorcycle rider fatalities decreased each year from 1995 to 1997, reaching a historic low of 2,116 in 1997. Beginning in 1998 motorcycle rider fatalities started to increase each year. Since 1997 motorcycle rider fatalities have increased by 89 percent. NHTSA released a comprehensive report in 2001 based on increases in motorcycle rider fatalities for two consecutive years (1998 and 1999). The latest 2004 data show that motorcycle rider fatalities increased for the seventh year in a row since 1997. This report is an update to the 2001 report and was written to provide insight and update into the continued increasing trend in motorcycle rider fatalities in the recent years.

The analysis was based on 1995-2004 data from the Fatality Analysis Reporting System (FARS) along with data from Motorcycle Industry Council (MIC), Federal Highway Administration (FHWA), and the United States Census Bureau.

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1. EXECUTIVE SUMMARY

This report was written to provide insight and update into the recent continued increasing trend in motorcycle rider fatalities. The analysis was based on 1995-2004 data from: the Fatality Analysis Reporting System (FARS), a census of all fatal motor vehicle crashes; Motorcycle Industry Council (MIC) motorcycle sales and market distribution data; Federal Highway Administration (FHWA) motorcycle registration and vehicle miles traveled (VMT) data; and the United States Census Bureau general population data.

Motorcycle rider fatalities decreased each year from 1995 to 1997, reaching a historic low of 2,116 in 1997. Beginning in 1998 this trend was reversed and motorcycle rider fatalities have increased each year. Since 1997 motorcycle rider fatalities have increased by 89 percent from 2,116 to 4,008 in 2004. NHTSA previously released a comprehensive report in 2001 based on increases in motorcycle rider fatalities for two consecutive years (1998 and 1999). The latest 2004 data show that motorcycle rider fatalities increased for the seventh year in a row since 1997. This report is an update to the previously released report in 2001 along with more recent data from 1995 to 2004.

The recently released 2005 projections show motorcycle rider fatalities are expected to increase for the eighth year in a row. The increase in motorcycle rider fatalities from 2004 to 2005 as per the projections is 7.7 percent – from 4,008 to 4,315.

1.1. Purpose

The purpose of this report is to:

- Combine NHTSA's motor vehicle crash data from FARS with data from the Motorcycle Industry Council (MIC), the Federal Highway Administration (FHWA) and the U.S. Census Bureau;

- Analyze combined data within specific problem areas by looking for trends and calculating rates; and

- Identify areas that may explain the possible causes for the recent continued increases in motorcycle rider fatalities.

The analytical approach involved several steps. First, a review of the data sources was conducted to determine the appropriate data elements to be examined within FARS, and to determine whether exposure data by age groups were available. Motorcycle registration data and VMT data by age groups were not available from FHWA. Ownership data by age groups for four different years were available from MIC and were used to complement the fatal crash data with new rider data. Resident population data from the U.S. Census Bureau were also used for analysis based on age groups. Motorcycle registration and VMT data from FHWA were used to calculate rates over the ten-year period from 1995 to 2004 to identify trends.

1.2. Findings

The findings from the analysis described in this report identify a variety of trends from FARS data, available exposure data, and calculated rates. Analyses from all data sources support FARS data which found greater involvement of riders in the 40 and above age group and larger (1,001-1,500 cc) engine motorcycles in fatal crashes. If the patterns seen in the analyses continue as seen from the combination of data sources, there is the likelihood that the increase in motorcycle rider fatalities will continue in the future years also. These findings could aid in the design of crash prevention programs:

- Motorcycle Industry Council (MIC) data show an increase in the number of on-highway motorcycles and motorcycle registration data from the Federal Highway Administration (FHWA) also show an increase in the number of registered motorcycles;

- MIC data show an increase in motorcycle ownership in the 40 and above age group and FARS data show an increase in motorcycle rider fatalities in the age group of 40 and above in the last 10 years;

- According to MIC, sales of motorcycles with larger engine sizes have increased over the past years, corresponding to FARS data where an increased number of motorcycle rider fatalities involve a motorcycle with a larger engine size;

- An increased number of motorcycle rider fatalities in the 40 and above age group were seen on rural roadways;

- Among roadway types, undivided roadways accounted for a majority of motorcycle rider fatalities;

- Speeding is one of the major contributing factors in motorcycle crashes especially among motorcycle riders under the age of 30;

- Motorcycle operators with a blood alcohol concentration (BAC) of .08 g/dL or higher continue to be a major problem;

- Helmet use among fatally injured motorcycle riders has remained constant, at just above 50 percent in the last ten years;

- About two-thirds (66%) of the fatally injured motorcycles riders in States without universal helmet laws in 2004 were not wearing helmets compared to 15 percent in States with universal helmet laws, and

- Among all riders, motorcycle operator fatalities under the age of 20 had larger percentages of improperly licensed.

2. INTRODUCTION

More than 125,000 motorcycle riders have died in traffic crashes since the enactment of the Highway Safety Act of 1966 and The National Traffic and Motor Vehicle Safety Act of 1966.

The recently released 2005 projections show motorcycle rider fatalities are expected to increase for the eighth year in a row. The increase in motorcycle rider fatalities from 2004 to 2005 as per the projections is 7.7 percent – from 4,008 to 4,315. According to these projections, motorcycle rider fatalities will account for 10 percent of the 43,200 total fatalities from motor vehicle crashes. All data in this report are based on motorcycle rider fatalities from 1995-2004.

In 2004, motorcycles made up nearly 2.4 percent of all registered vehicles in the United States and accounted for only 0.3 percent of all vehicle miles traveled. In comparison, motorcycle riders accounted for 5.3 percent of total traffic fatalities in 1995 and have increased to 9.4 percent of the total traffic fatalities in 2004. Per 100,000 registered vehicles, the fatality rate for motorcycle riders (69.33) in 2004 was 4.6 times the fatality rate for passenger car occupants (15.05). Per vehicle mile traveled in 2004, motorcycle riders (39.89) were about 34 times more likely than passenger car occupants (1.18) to die in a motor vehicle traffic crash.

The purpose of this report is to identify areas that may explain the possible causes for the recent continued increases in motorcycle rider fatalities.

In order to better understand the reasons for the increase in fatalities, FARS data can be analyzed in various cross tabulations of many data elements. These analyses among the different variables provide better insight into the specific problem areas relating to the increase in fatalities. This analysis and report is based on FARS data elements in various cross tabulations either individual or combined.

The following sections detail data used in the analysis, describe the methodology to analyze crash and exposure data, highlight the findings, and summarize the implications for crash prevention programs.

3. ANALYTICAL APPROACH AND DATA SOURCES

3.1. Analytical Approach

The analytical approach for the report involved the following steps:

- Review of the data sources, FARS, MIC, FHWA and the U.S. Census Bureau, to determine the data elements of interest in FARS and how these data sources could be combined with data from the other three sources;
- Calculation of proportions and rates to analyze 10 years of trend data and within specific data elements; and
- Summarization of data that focus on increases in motorcycle rider fatalities.

3.2. Data Sources

Four data sources were used in this analysis:

- Fatality Analysis Reporting System (FARS) data relating to fatal traffic crashes;
- 2004 Motorcycle Industry Council (MIC) Statistical Annual data relating to ownership, retail sales, and motorcycle population;
- Federal Highway Administration (FHWA) data relating to motorcycle registration and vehicle miles traveled (VMT); and
- U.S. Census Bureau data relating to resident population.

The following sections provide some comparisons from the four data sources that have been used in this analysis.

4. DATA ANALYSIS

4.1. Summary Data

4.1.1. Fatality Analysis Reporting System (FARS) Data

Motorcycle rider fatalities increased from 2,227 in 1995 to 4,008 in 2004. Motorcycle rider fatalities in 1997 had reached an all time low of 2,116 and from then, have increased every year. A review of FARS data from 1995 through 2004 shows that in 1997 motorcycle rider fatalities (2,116) were only 5.3 percent of the overall motor vehicle fatalities (42,013) and in 2004 motorcycle rider fatalities (4,008) have increased to 9.4 percent of the total motor vehicle fatalities (42,636). Table 1 shows the distribution of motor vehicle crash fatalities by year and person type from 1995 to 2004.

Table 1: Fatalities from Motor Vehicle Crashes by Year and Person Type										
Year	Person Type								Total Fatalities	
	Occupants by Vehicle Type						Non Motorists[3]			
	Passenger[1] Vehicles		Motorcycles		Others/ Unknown[2]					
	No.	%	No.	%	No.	%	No.	%	No.	%
1995	31,991	77	2,227	5	1,073	3	6,526	16	41,817	100
1996	32,437	77	2,161	5	1,099	3	6,368	15	42,065	100
1997	32,448	77	2,116	5	1,161	3	6,288	15	42,013	100
1998	31,899	77	2,294	6	1,189	3	6,119	15	41,501	100
1999	32,127	77	2,483	6	1,265	3	5,842	14	41,717	100
2000	32,225	77	2,897	7	1,226	3	5,597	13	41,945	100
2001	32,043	76	3,197	8	1,200	3	5,756	14	42,196	100
2002	32,843	76	3,270	8	1,262	3	5,630	13	43,005	100
2003	32,271	75	3,714	9	1,356	3	5,543	13	42,884	100
2004	31,693	74	4,008	9	1,441	3	5,494	13	42,636	100
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)										

(1) Passenger cars, pickups, vans, sport utility vehicles (SUVs), and other light trucks.
(2) Others/Unknown vehicle type includes large trucks, buses, other types of vehicles, and unknown type of vehicle.
(3) Non-motorists include pedestrians and pedalcyclists.

4.1.2. Motorcycle Industry Council (MIC) Data

According to the most recent *Motorcycle Industry Council Statistics Annual (2004)*, motorcycle registrations accounted for 2.3 percent of all motor vehicles registered for use on public roads in 2003.

There were 3.0 motorcycles in use for every 100 persons living in United States in 2003. California, Florida, Texas, New York, and Pennsylvania represented one-third (33 percent) of the motorcycles in use in 2003. By region, the South had the highest motorcycle population in 2003 with 30 percent of the total motorcycles in use. The West showed the highest motorcycle penetration, at 3.4 vehicles per 100 persons. The Midwest had 3.3 motorcycles per 100 persons; the East had 2.8 motorcycles per 100 persons; and the South had 2.8 motorcycles per 100 persons.

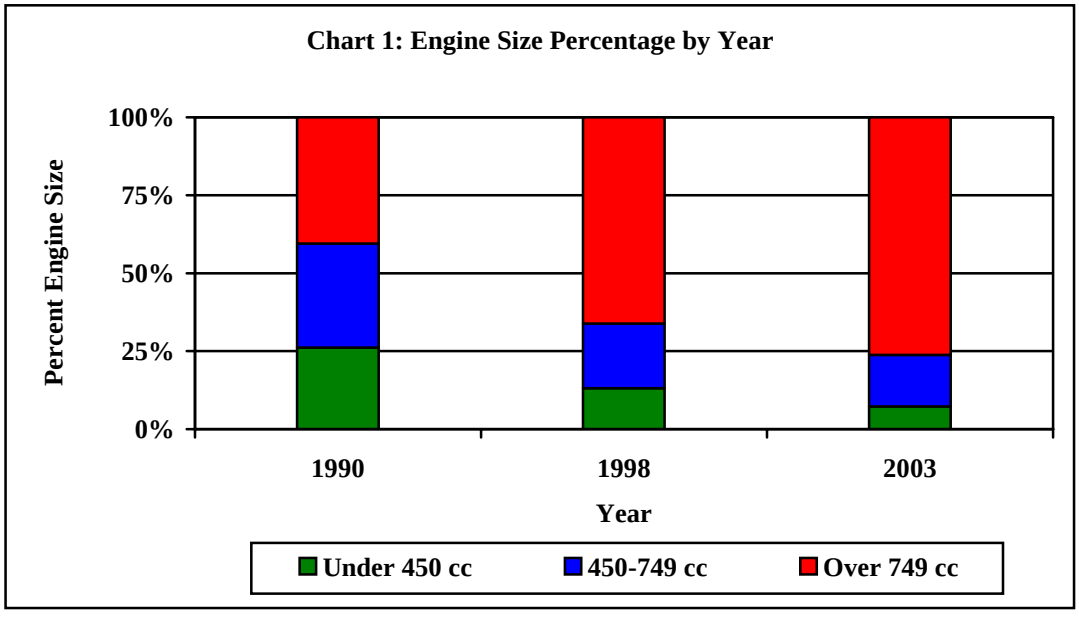
An estimated 6,390,000 on-highway motorcycles were in use in 2003 compared to 3,650,000 motorcycles in 1990, an increase of 75 percent between 1990 and 2003. Table 2 shows the distribution of motorcycles by engine size in cubic centimeters (cc) for the years 1990, 1998, and 2003. More than three-fourths (76 percent) of the motorcycles in 2003 had an engine displacement of over 749 cc, compared to 40

percent in 1990. The percentage of motorcycles for all other engine sizes has decreased from 1990 to 2003. These data indicate that motorcycles with engines over 749 cc are becoming more prevalent. Chart 1 shows the percentages of motorcycles of different engine size groups for the years 1990, 1998, and 2003.

Table 2: On-Highway Motorcycles by Engine Displacement in cc

Engine Displacement	Calendar Year					
	1990		1998		2003	
	No.	%	No.	%	No.	%
Under 125 cc	430,700	11.8	202,000	4.2	234,500	3.7
125-349 cc	328,500	9.0	240,400	5.0	223,800	3.5
350-449 cc	197,100	5.4	187,600	3.9	5,900	0.1
450-749 cc	1,215,500	33.3	995,500	20.7	1,052,600	16.5
Over 749 cc	1,478,200	40.5	3,183,500	66.2	4,873,200	76.2
Total	3,650,000	100.0	4,809,000	100.0	6,390,000	100.0

Source: Motorcycle Industry Council Statistics, 2004



Source: Motorcycle Industry Council Statistics, 2004

Table 3 shows the number of new on-highway motorcycle units sold from 1995-2004. There has been an increase each year in the number of units sold, from 1995. The cumulative increase in the number of units sold is almost 128 percent between 1995 and 2003 with most of the increases occurring in 1998, 1999, and 2000. An estimated 379,000 new on-highway motorcycle units were sold in 1999, about 27 percent over the previous year and an increase of over 50 percent from the 247,000 units sold in 1997. The average number of units sold between 1995 and 2003 was 408,100 units per year.

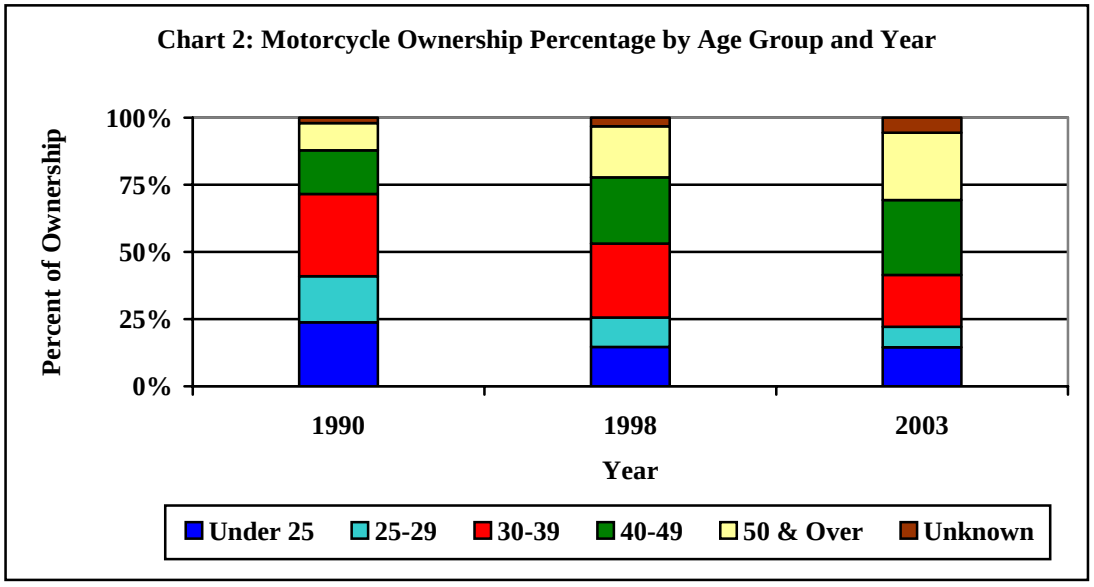
Table 3: New On-Highway Motorcycle Units Sold by Year and Percent and Cumulative Increases

Year	Units Sold	Percent Increase from Previous Year	Cumulative Increase
1995	214,000	+1.9	+3.7
1996	228,000	+6.5	+10.2
1997	247,000	+9.2	+19.4
1998	298,000	+20.6	+40.0
1999	379,000	+27.2	+67.2
2000	471,000	+24.3	+91.5
2001	556,000	+18.0	+109.5
2002	618,000	+11.2	+120.7
2003	662,000	+7.1	+127.8
2004	*	*	*

Source: Motorcycle Industry Council statistics, 2004
* Data not available yet

The mean age of a motorcycle owner in 2003 was 40.2 years, compared to 38.1 years in 1998, and 33.1 years in 1990. Table 4 and Chart 2 show the percent of ownership of motorcycles by age groups for three individual years. The percent of ownership for those age 50 years and over in 2003 was 25.1 percent compared to 19.1 percent in 1998 and 10.1 percent in 1990. Similar increases are also seen in the 40-49 age group. Motorcycle ownership in the under 18, 25-29, and 30-34 age groups showed corresponding decreases. The largest percentage decrease was in the 25-29 age group, and the greatest increase was in the 50 and over age group.

Table 4: Ownership of Motorcycles by Age Group			
Age	Year		
	1990	1998	2003
Under 18	8.3%	4.1%	3.7%
18 – 24	15.5%	10.6%	10.8%
25 – 29	17.1%	10.9%	7.6%
30 – 34	16.4%	11.5%	8.9%
35 – 39	14.3%	16.0%	10.4%
40 – 49	16.3%	24.6%	27.9%
50 and Over	10.1%	19.1%	25.1%
Not Stated	2.0%	3.2%	5.6%
Median Age	32.0 Years	38.0 Years	41.0 Years
Mean Age	33.1 Years	38.1 Years	40.2 Years
Source: Motorcycle Industry Council statistics, 2004			

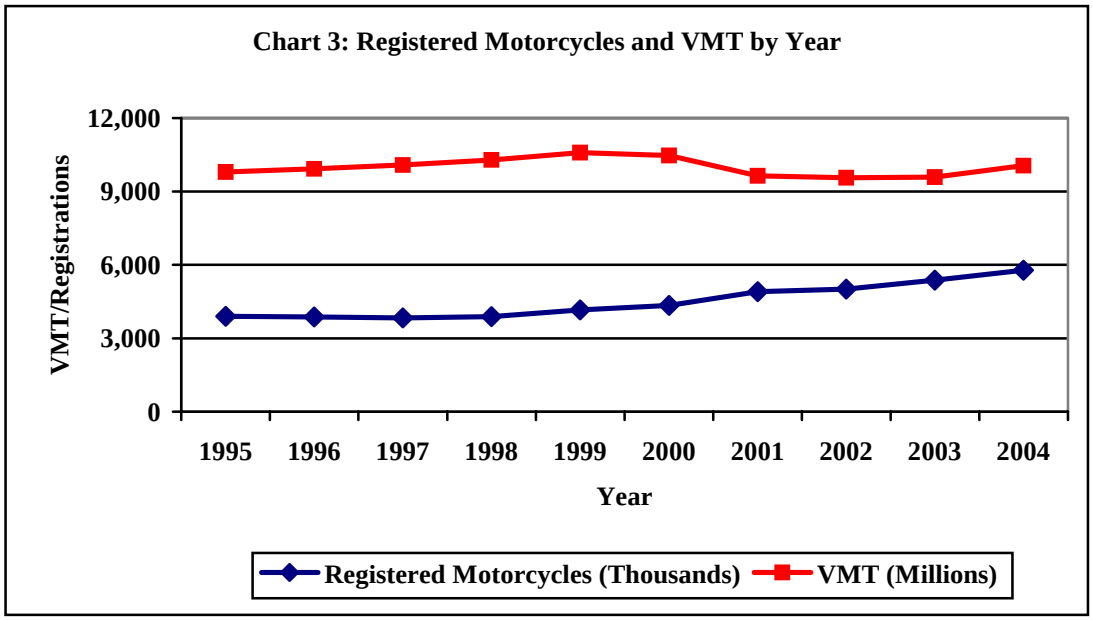


Source: Motorcycle Industry Council Statistics, 2004

4.1.3. Federal Highway Administration (FHWA) Data

Table 5 shows motorcycle registrations and vehicle miles traveled (VMT) data from 1995 to 2004. The data show that motorcycle registrations have increased from 1995 to 2004 by nearly 48 percent while the VMT for motorcycles shows an increase of about 3 percent from 1995 to 2004. Chart 3 shows trend lines for motorcycle registrations and VMT from 1995-2004.

Table 5: Motorcycle Registrations and Vehicle Miles Traveled (VMT) by Year		
Year	**Motorcycle Registrations**	**Motorcycle VMT (Millions)**
1995	3,897,191	9,797
1996	3,871,599	9,920
1997	3,826,373	10,081
1998	3,879,450	10,283
1999	4,152,433	10,584
2000	4,346,068	10,469
2001	4,903,056	9,639
2002	5,004,156	9,552
2003	5,370,035	9,577
2004	5,780,870	10,048
Source: FHWA		



Source: FHWA

4.1.4. U.S. Census Bureau Data

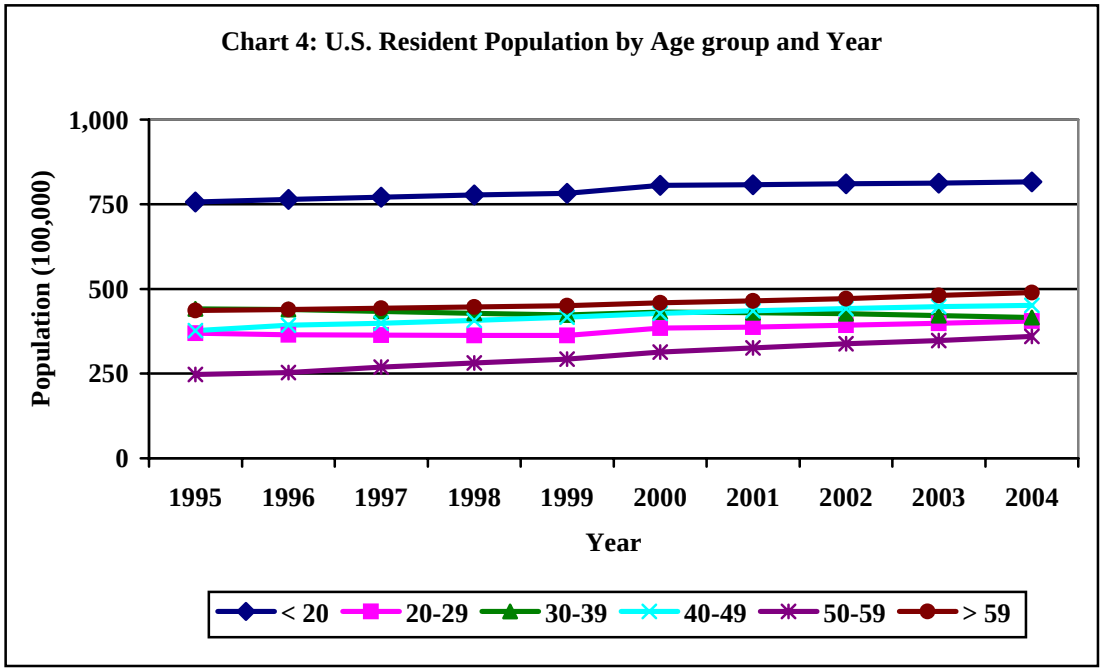
The U.S. population increased from 262,803,000 in 1995 to 293,655,000 in 2004, or by nearly 12 percent according to the estimates released by the Census Bureau on December 22, 2004. Table 6 and Chart 4 show population estimates from 1995 to 2004 by age group.

The population in the under 20, 40-49, 50-59, and over 59 age groups has steadily increased each year from 1995 to 2004; and population in the 30-39 age group has decreased each year since 1995 except in 2000. Population in the 20-29 age group decreased each year from 1995 to 1999, after which it has increased every year. The greatest increase in population has been in the 50-59 age group, followed by 40-49 age group. From 1995-2004, the population in the 50-59 age group increased by more than 45 percent, and by nearly 20 percent in the 40-49 age group. In 2004, the proportion of 50-59 population was 12 percent of the overall population compared to 9 percent in 1995. The increases in under 20 and 20-29 age groups for the same years were 8 percent and 10 percent respectively. The decrease in population in the 30-39 age group was nearly 6 percent.

Table 6: Estimate of U.S. Resident Population (100,000) by Year and Age Group

Year	Resident Population Age Group						Total
	< 20	20-29	30-39	40-49	50-59	> 59	
1995	756.8	368.9	441.2	377.2	247.3	436.7	2,628.0
1996	764.4	364.4	438.7	392.4	252.8	439.5	2,652.3
1997	771.0	363.1	433.7	398.5	269.1	442.5	2,677.8
1998	777.0	362.5	427.8	407.4	281.2	446.5	2,702.5
1999	781.9	362.3	422.7	416.2	293.2	450.5	2,726.9
2000	805.5	384.3	432.0	427.5	313.3	459.3	2,821.9
2001	807.8	387.4	430.1	435.5	326.0	464.3	2,851.0
2002	809.8	392.4	426.5	442.2	337.8	470.9	2,879.4
2003	812.2	398.8	421.3	447.5	347.6	480.5	2,907.9
2004	815.5	405.3	415.2	451.8	359.9	488.8	2,936.6

Source: Census Bureau



Source: Census Bureau

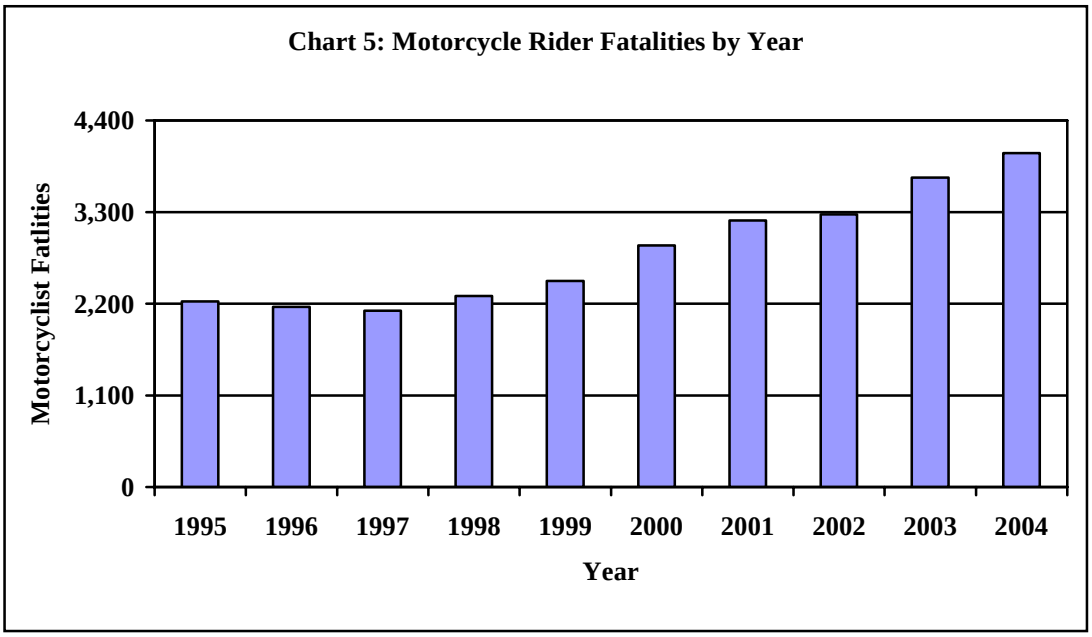
The analyses of all data are categorized into two broad categories: motorcycle rider fatality trends covering a ten year span and common crash characteristics relating to motorcycles covering only the latest 2004 data. Additional data used in the analysis, but not shown in this section, are shown at the end of the report in Appendix A.

4.2. Trends

4.2.1. Motorcycle Rider Fatalities by Person Type

In 2004, the fatality rate for motorcycle riders per 100,000 registered motorcycles was 69.33, an increase of 21 percent from 57.14 in 1995. The fatality rate for motorcycle riders per 100 million VMT in 2004 was 39.89 compared to 22.73 in 1995. Motorcycle rider fatalities and fatality rates from 1995 to 2004 are shown in Table 7. Chart 5 depicts motorcycle rider fatalities by year.

Table 7: Motorcycle Rider Fatalities and Fatality Rates by Year and Per Registered Vehicle and Vehicle Miles of Travel					
Year	**Registered Motorcycles**	**Vehicle Miles Traveled (Millions)**	**Motorcycle Rider Fatalities**	**Fatality Rate per 100,000 Registered Motorcycles**	**Fatality Rate per 100 Million VMT**
1995	3,897,191	9,797	2,227	57.14	22.73
1996	3,871,599	9,920	2,161	55.82	21.78
1997	3,826,373	10,081	2,116	55.30	20.99
1998	3,879,450	10,283	2,294	59.13	22.31
1999	4,152,433	10,584	2,472	59.53	23.46
2000	4,346,068	10,469	2,897	66.66	27.67
2001	4,903,056	9,639	3,197	65.20	33.17
2002	5,004,156	9,552	3,270	65.35	34.23
2003	5,370,035	9,577	3,714	69.16	38.78
2004	5,780,870	10,048	4,008	69.33	39.89
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF), VMT, Registered Motorcycles – FHWA					



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

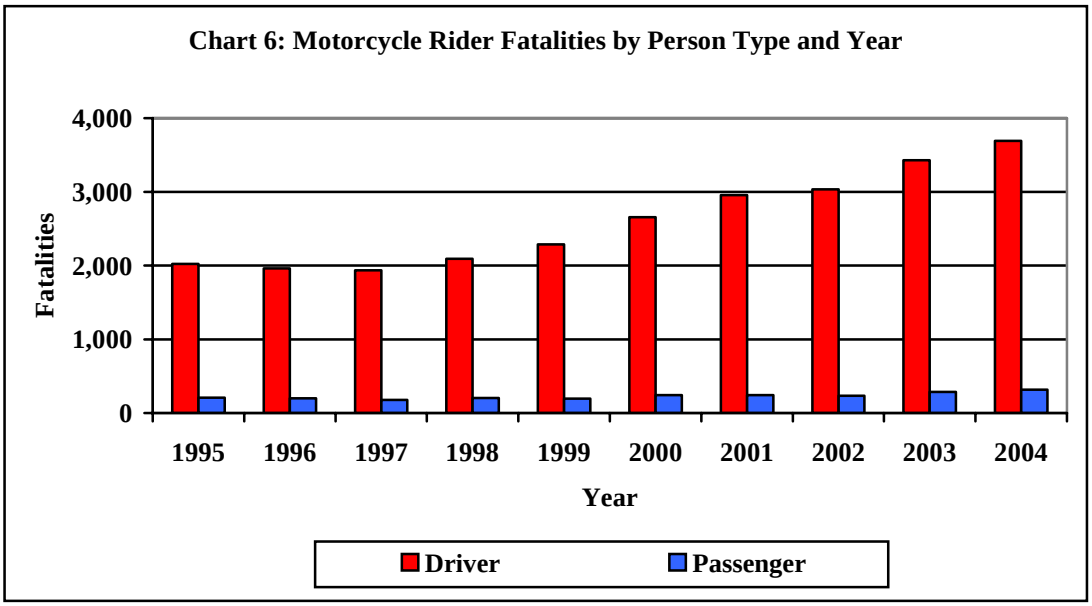
4.2.2. Motorcycle Rider Fatalities by Person Type

Motorcycle rider fatalities reached a historic low of 2,116 in 1997, and have increased each year since reaching the low. Table 8 and Chart 6 show motorcycle rider fatalities from 1995 to 2004 by person type. In all the years motorcycle operators accounted for more than 90 percent of the fatalities while motorcycle passengers accounted for less than 10 percent. Even though motorcycle operator fatalities have increased by nearly 83 percent from 1995 to 2004 and motorcycle passenger fatalities have increased by 52 percent, the proportion of motorcycle operator to passenger fatalities has remained the same in the last 10 years.

Table 8: Motorcycle Rider Fatalities by Year and Person Type

Year	Operator (Driver)		Passenger		Total
	No.	%	No.	%	
1995	2,020	91	207	9	2,227
1996	1,962	91	199	9	2,161
1997	1,937	92	179	8	2,116
1998	2,089	91	205	9	2,294
1999	2,286	92	197	8	2,483
2000	2,653	92	244	8	2,897
2001	2,955	92	242	8	3,197
2002	3,034	93	236	7	3,270
2003	3,427	92	287	8	3,714
2004	3,693	92	315	8	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

Table 9 shows motorcycle rider fatalities by sex from 1995 to 2004. The data show that for the past ten years about 90 percent of the motorcycle riders killed were males. The number of female riders killed has more than doubled in the past ten years, but the proportion has remained at about 10 percent.

Table 9: Motorcycle Rider Fatalities by Year and Sex

Year	Motorcycle Rider Sex						Total
	Male		Female		Unknown		
	No.	%	No.	%	No.	%	
1995	2,024	91	203	9	0	0	2,227
1996	1,966	91	195	9	0	0	2,161
1997	1,926	91	190	9	0	0	2,116
1998	2,088	91	206	9	0	0	2,294
1999	2,257	91	225	9	1	0	2,472
2000	2,620	90	277	10	0	0	2,897
2001	2,904	91	293	9	0	0	3,197
2002	2,961	91	309	9	0	0	3,270
2003	3,342	90	372	10	0	0	3,714
2004	3,575	89	431	11	2	0	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

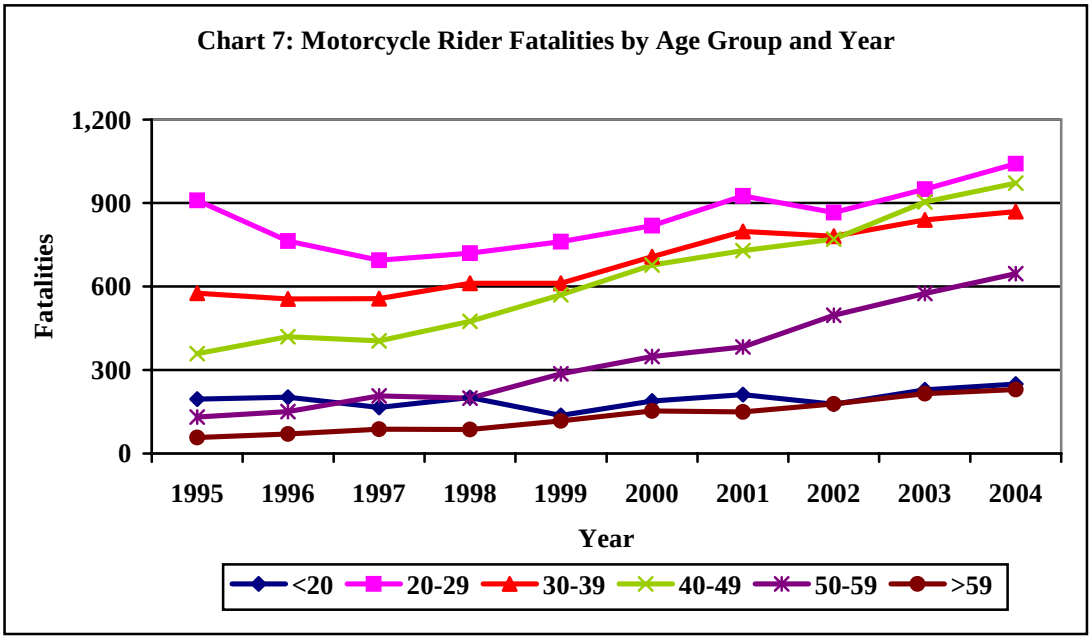
4.2.3. Motorcycle Rider Fatalities by Age Groups (Percent)

Table 10 and Chart 7 show the number of motorcycle rider fatalities from 1995 to 2004 by age group. Motorcycle rider fatalities, from 1995 to 2004, have increased in all the age groups. The number of motorcycle rider fatalities in the age group of 40-49 has steadily increased, each year from 405 in 1997 to 971 in 2004, an increase of 140 percent. The largest percentage increase during this time period was in the over 59 age group. In all the years (1995-2004) the largest number of motorcycle rider fatalities was in the 20-29 age group.

Table 10: Motorcycle Rider Fatalities by Year and Age Group

Year	Motorcycle Rider Age Group							Total
	< 20	20-29	30-39	40-49	50-59	>59	Unknown	
1995	195	909	576	359	131	57	0	2,227
1996	202	763	555	420	151	70	0	2,161
1997	166	694	556	405	207	87	1	2,116
1998	201	720	612	475	199	86	1	2,294
1999	137	761	612	570	286	117	0	2,483
2000	189	818	707	677	348	153	5	2,897
2001	211	925	798	729	383	149	2	3,197
2002	177	866	781	770	496	178	2	3,270
2003	229	950	839	904	575	215	2	3,714
2004	250	1,041	869	971	646	230	1	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)



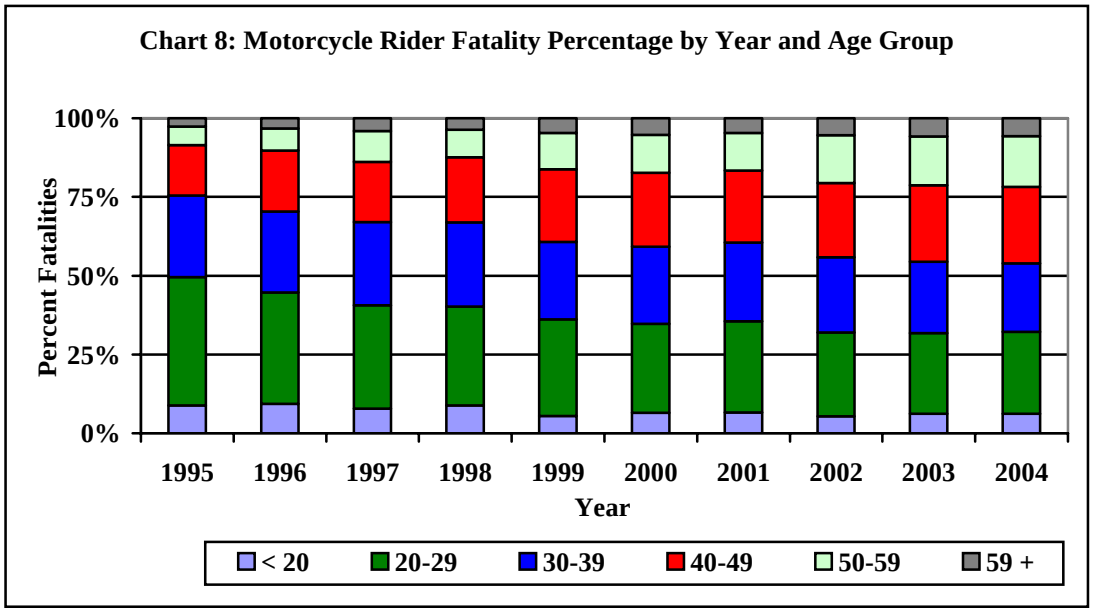
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

Even though motorcycle rider fatalities increased in every age group between 1995 and 2004, the proportion of motorcycle rider fatalities increased for the 40-49, 50-59, and over 59 age groups and declined for the under 20, 20-29, and 30-39 age groups. Table 11 shows the percent of motorcycle rider fatalities by age groups for the last 10 years. The percent of motorcycle rider fatalities in the 40-49 age group has increased by a factor of 1.5 from 16.1 percent in 1995 to 24.2 percent in 2004, in the 50-59 age group by a factor of 2.7 from 5.9 percent in 1995 to 16.1 percent in 2004 and in the over 59 age group by a factor of 2.1 from 2.6 percent to 5.7 percent over the same period of time.

These increases have been observed for the most part, in the over 40 age group. The percent of fatalities in the 20-29 age group has declined considerably between 1995 and 2004 and declines were also seen in the percent of fatalities in the under 20 and the 30-39 age groups during the same period.

However, there are still proportionally more fatalities in the 20-29 year age group than in the other age groups from 1995 to 2004. This indicates that the 20-29 age group is still the leading age group in terms of the number of motorcycle rider fatalities among all age groups. Chart 8 shows motorcycle rider fatality percentage by year and age group.

Table 11: Motorcycle Rider Fatalities as Percent by Year and Age Group						
Year	Motorcycle Rider Age Group by Percent					
	< 20	20-29	30-39	40-49	50-59	> 59
1995	8.8	40.8	25.9	16.1	5.9	2.6
1996	9.3	35.3	25.7	19.4	7.0	3.2
1997	7.8	32.8	26.3	19.1	9.8	4.1
1998	8.8	31.4	26.7	20.7	8.7	3.7
1999	5.5	30.6	24.6	23.0	11.5	4.7
2000	6.5	28.2	24.4	23.4	12.0	5.3
2001	6.6	28.9	25.0	22.8	12.0	4.7
2002	5.4	26.5	23.9	23.5	15.2	5.4
2003	6.2	25.6	22.6	24.3	15.5	5.8
2004	6.2	26.0	21.7	24.2	16.1	5.7
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)						



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

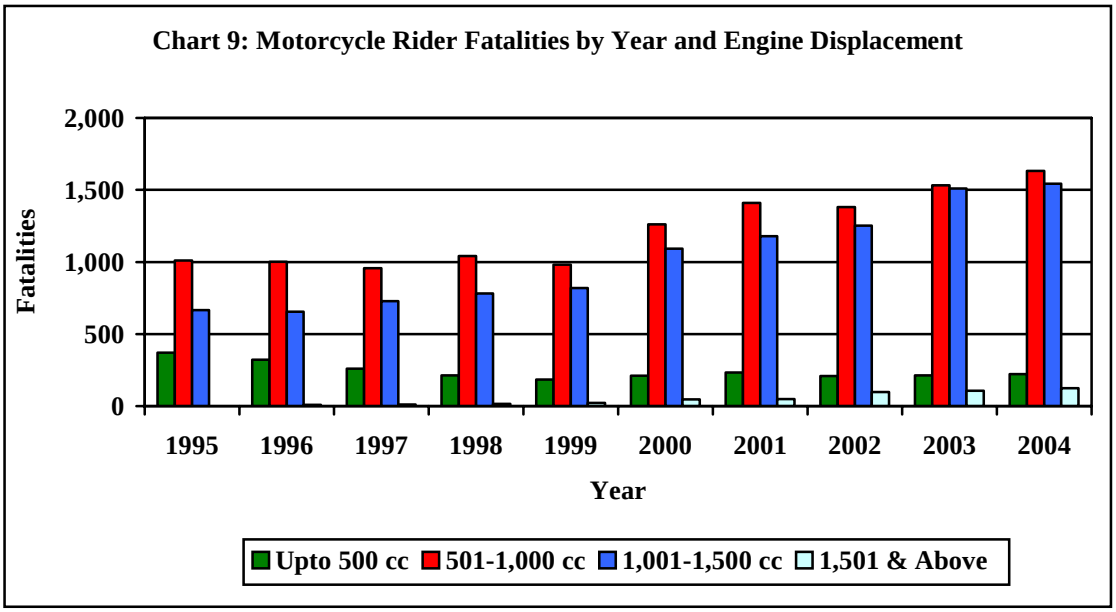
4.2.4. Motorcycle Rider Fatalities by Engine Displacement in Cubic Centimeters (cc)

The overall increase in motorcycle rider fatalities in recent years has been due to a considerable increase in motorcycle rider fatalities within the 1,001-1,500 cc engine size group. The number of motorcycle rider fatalities in the 1,001-1,500 cc engine group increased from 666 in 1995 to 1,542 in 2004, an increase of 132 percent. Increases in motorcycle rider fatalities were also seen in the 501-1,000 cc and over 1,500 cc engine groups. The largest number of motorcycle rider fatalities is still in the 501-1,000 cc engine group. However, the fatality count among motorcycle riders in the 1,001-1,500 cc group is quickly approaching the 501-1,000 cc level. Motorcycle rider fatalities declined in the 500 cc and below engine group by 40 percent from 1995 to 2004. Fatalities in the 501-1,000 cc group have increased by 62 percent during the same time period. Starting in 1996, a small number of all motorcycle rider fatalities are reported involving motorcycles with engine displacements greater than 1,500 cc. Table 12 and Chart 9 show motorcycle rider fatalities from 1995 to 2004 by engine displacement.

Table 12: Motorcycle Rider Fatalities by Year and Engine Displacement

Year	Engine Displacement in Cubic Centimeters										Total
	Up to 500		501-1,000		1,001-1,500		> 1,500		Unknown		
	No.	%	No.	%	No.	%	No.	%	No.	%	
1995	370	17	1,009	45	666	30	0	0	182	8	2,227
1996	321	15	1,001	46	654	30	8	0	177	8	2,161
1997	260	12	957	45	729	34	11	1	159	8	2,116
1998	214	9	1,040	45	781	34	16	1	243	11	2,294
1999	185	7	982	40	818	33	23	1	475	19	2,483
2000	210	7	1,261	44	1,092	38	46	2	288	10	2,897
2001	233	7	1,410	44	1,178	37	48	2	328	10	3,197
2002	209	6	1,381	42	1,252	38	98	3	330	10	3,270
2003	213	6	1,531	41	1,510	41	106	3	354	10	3,714
2004	221	6	1,631	41	1,542	38	124	3	490	12	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

4.2.5. Motorcycle Rider Fatalities in 1,001-1,500 cc Engine Size by Year and Age Group

Data from Table 12 showed that, between 1995 and 2004 the major increase in motorcycle rider fatalities was in the 1,001-1,500 cc engine size group. Analysis of data from Table 13 shows the number of motorcycle rider fatalities in the 1,001-1,500 cc engine size category has increased in the 30-39, 40-49, 50-59, and over 59 age groups between 1995 and 2004. Motorcycle rider fatalities have been steadily increasing in the 40-49 age group each year since 1995; fatalities in the 50-59 age group have been increasing each year since 1998.

Between 1995 and 2004, motorcycle rider fatalities for the 1,001-1,500 cc engine size have increased by 3.1 times in the 40-49 age group and by 5.3 times in 50-59 age group. This increase in motorcycle rider fatality numbers indicates the involvement of more large motorcycles (1,001-1,500 cc engine size) with riders over 40 years of age, in fatal crashes.

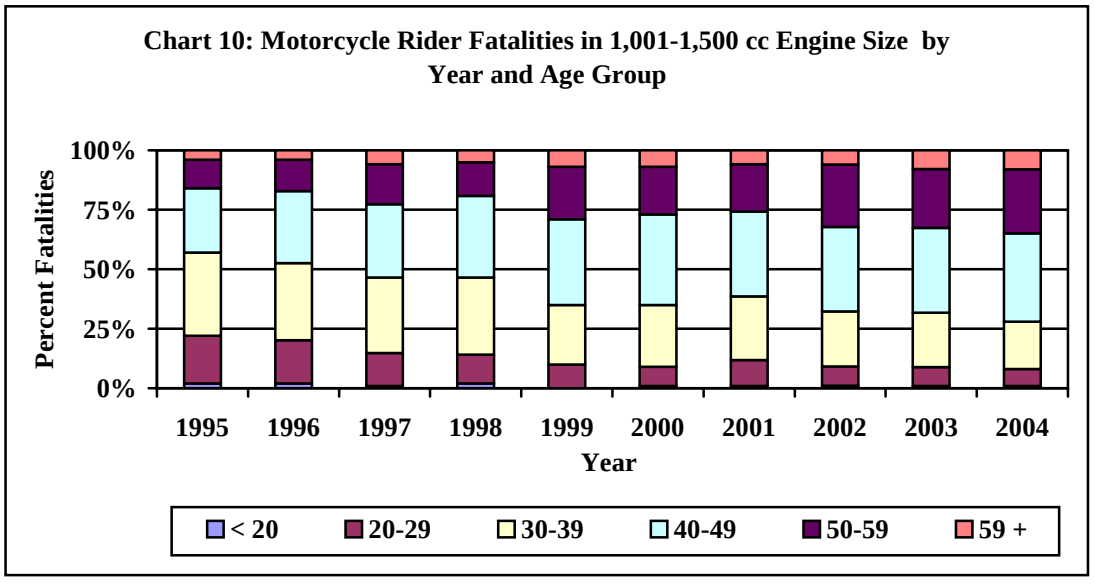
The percentage of motorcycle rider fatalities in the 40-49 age group has increased from 27 percent in 1995 to 37 percent in 2004 in the 1,001-1,500 cc engine size. About 72 percent of the motorcycle rider fatalities in 2004 were in the 40 and over age group and the remaining 28 percent in the under 40 age group, compared to 43

percent in over 40 age group, and 57 percent in under 40 age group in 1995. Chart 10 shows motorcycle rider fatalities in 1,001-1,500 cc engine size motorcycles by age group and year.

Table 13: Motorcycle Rider Fatalities in 1,001-1,500 cc Engine Size by Year and Age Group

Year	Motorcycle Rider Age Group												Total*
	< 20		20-29		30-39		40-49		50- 59		59+		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
1995	12	2	135	20	233	35	182	27	77	12	27	4	666
1996	15	2	119	18	211	32	198	30	85	13	26	4	654
1997	8	1	99	14	232	32	225	31	124	17	41	6	729
1998	17	2	91	12	252	32	267	34	111	14	42	5	781
1999	3	0	79	10	205	25	294	36	177	22	60	7	818
2000	9	1	92	8	282	26	416	38	215	20	75	7	1,092
2001	12	1	125	11	313	27	420	36	236	20	71	6	1,178
2002	9	1	105	8	290	23	443	35	324	26	81	6	1,252
2003	18	1	122	8	342	23	541	36	371	25	116	8	1,510
2004	13	1	105	7	310	20	575	37	413	27	126	8	1,542

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF) * Includes unknown age.



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

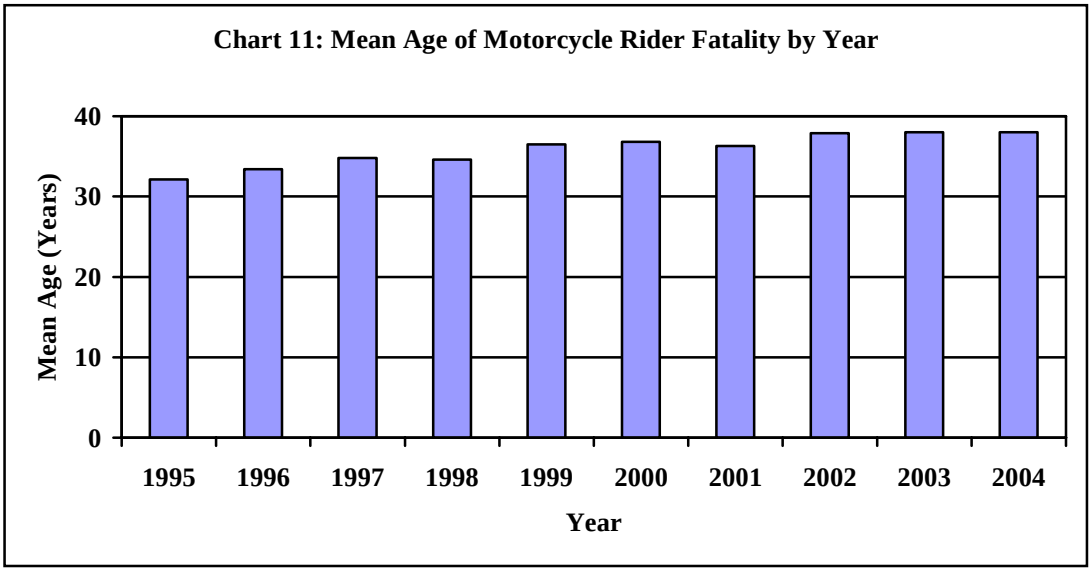
4.2.6. Mean Age of Motorcycle Riders Killed and Mean Engine Displacement in Fatal Crashes

The average age of motorcycle riders killed in crashes has increased each year from 1995 to 2004. The mean age of the motorcycle rider killed in 2004 was 38.0 years compared to 32.1 years in 1995, an increase of nearly 6 years. Similarly the mean engine displacement of the motorcycles involved in fatal crashes has increased from 841 cc in 1995 to 1,015 cc in 2004. The data indicate an increase in the average age of motorcycle riders killed and greater involvement of motorcycles with larger engines in fatal crashes. Table 14 shows the mean age of motorcycle riders killed and mean engine displacement in fatal crash from 1995 to 2004. Charts 11 and 12 show the trend in the last ten years in, motorcycle rider mean age and mean engine size of motorcycles involved in fatal crashes.

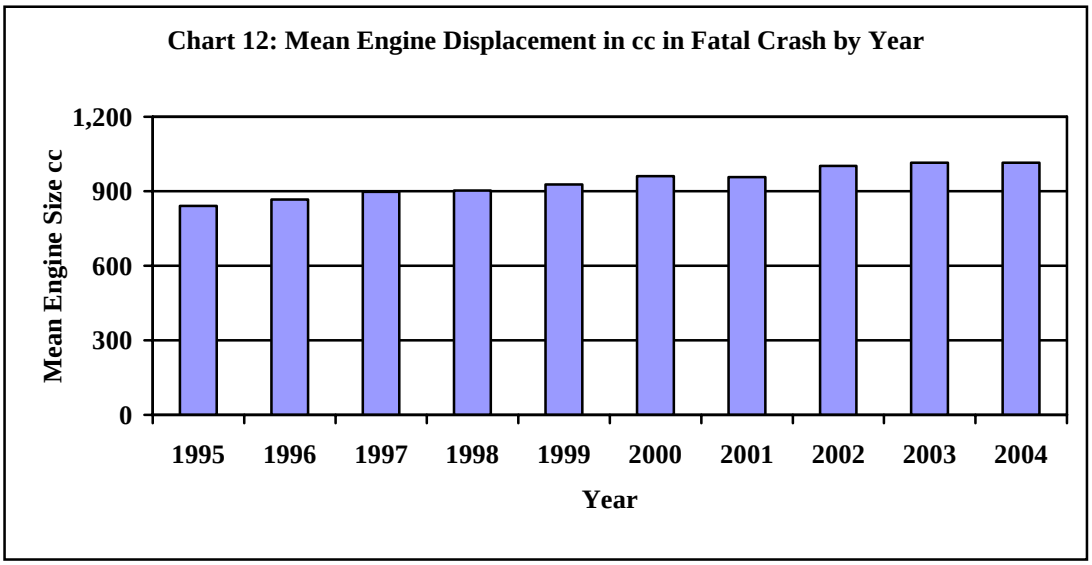
Table 14: Mean Age of Motorcycle Rider Fatalities and Mean Engine Displacement in cc Involved in Fatal Crash by Year

Year	Mean Age of Motorcycle Rider Killed (Years) [(1)]	Mean Engine Displacement Involved in Fatal Crash (cc) [(2)]
1995	32.1	841
1996	33.4	866
1997	34.8	897
1998	34.6	902
1999	36.5	927
2000	36.8	961
2001	36.3	957
2002	37.9	1,002
2003	38.0	1,014
2004	38.0	1,015
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)		

Note: [(1)] Excludes unknown occupant age, [(2)] Excludes unknown engine size



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

4.2.7. Motorcycle Rider Fatalities by Day of Week

In the last ten years, the proportion of motorcycle rider fatalities during weekdays and weekends has changed slightly with a slight increase in fatalities during weekends. A greater number of motorcycle rider fatalities are seen during weekends. NHTSA uses the following definition for weekdays and weekends:

Weekday: 6 a.m. Monday through 5:59 p.m. Friday.
Weekend: 6 p.m. Friday through 5:59 a.m. Monday.

Based on the definition mentioned above, the number of hours during a weekend is 60 (2½ days) and during weekdays is 108 (4½ days). The total number of weekend days during a year is 130 (52 weeks x 2½ days) and the total number of weekdays during a year is 234 (52 weeks x 4½ days). In 2004, there were 1,891 motorcycle rider fatalities during weekdays, which translates to an average of 8 fatalities every day and there were 2,107 weekend fatalities, which translates to an average of 16 fatalities every day. Hence, there were twice as many motorcycle rider fatalities during weekends than during weekdays. This might suggest more recreational motorcycle riding during weekends. Table 15 shows motorcycle rider fatalities by year and day of week.

Table 15: Motorcycle Rider Fatalities by Year and Day of Week

Year	Day of Week						Total
	Weekday		Weekend		Unknown		
	No.	%	No.	%	No.	%	
1995	1,113	50	1,100	49	14	1	2,227
1996	1,068	49	1,086	50	7	0	2,161
1997	988	47	1,120	53	8	0	2,116
1998	1,081	47	1,204	52	9	0	2,294
1999	1,162	47	1,314	53	7	0	2,483
2000	1,323	46	1,563	54	11	0	2,897
2001	1,525	48	1,660	52	12	0	3,197
2002	1,568	48	1,695	52	7	0	3,270
2003	1,736	47	1,959	53	19	1	3,714
2004	1,891	47	2,107	53	10	0	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

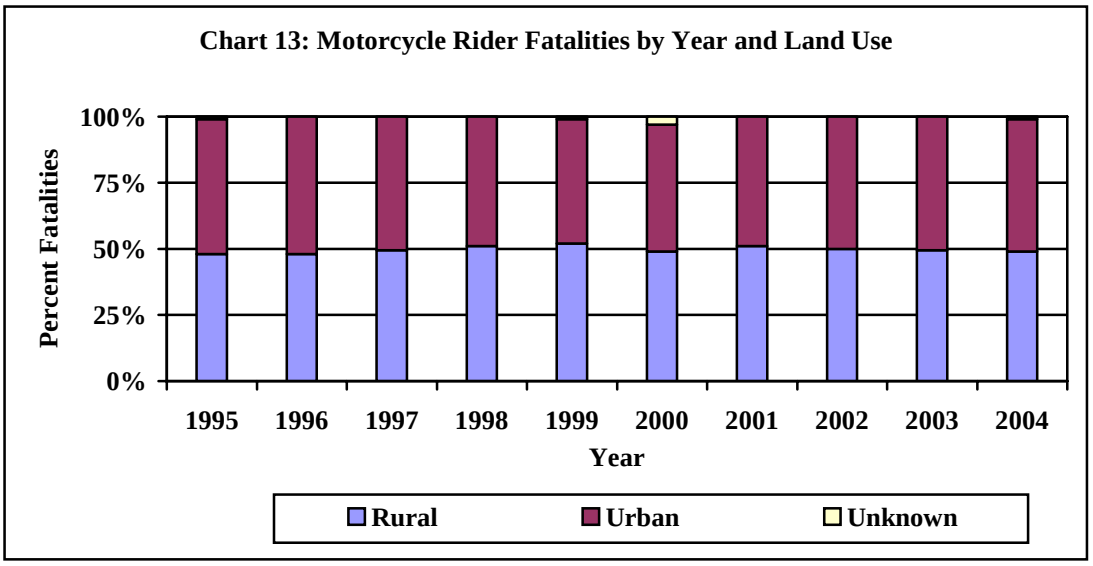
4.2.8. Motorcycle Rider Fatalities by Land Use

The increase in motorcycle rider fatalities has been very steady in rural and urban areas in the past ten years but the proportion of motorcycle rider fatalities has remained almost the same. Table 16 shows the breakdown of motorcycle rider fatalities by land use for the years 1995 through 2004. Rural motorcycle rider fatalities increased by 89 percent from 1,047 in 1997 to 1,982 in 2004; and urban motorcycle rider fatalities increased by 88 percent from 1,064 in 1997 to 2,004 in 2004. Chart 13 shows the proportions of motorcycle rider fatalities by land use from 1995-2004.

Table 16: Motorcycle Rider Fatalities by Year and Land Use

Year	Land Use						Total
	Rural		Urban		Unknown		
	No.	%	No.	%	No.	%	
1995	1,070	48	1,144	51	13	1	2,227
1996	1,027	48	1,126	52	8	0	2,161
1997	1,047	49	1,064	50	5	0	2,116
1998	1,166	51	1,119	49	9	0	2,294
1999	1,290	52	1,175	47	18	1	2,483
2000	1,428	49	1,385	48	84	3	2,897
2001	1,631	51	1,562	49	4	0	3,197
2002	1,641	50	1,625	50	4	0	3,270
2003	1,824	49	1,874	50	16	0	3,714
2004	1,982	49	2,004	50	22	1	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

4.2.9. Motorcycle Rider Fatalities by Crash Type

Motorcycle rider fatalities in single-vehicle and multivehicle crashes each year is shown in Table 17. Motorcycle rider fatalities in single-vehicle crashes increased by 88 percent from 960 in 1995 to 1,808 in 2004 and in multivehicle crashes increased by 74 percent from 1,267 in 1995 to 2,200 in 2004. The proportions of motorcycle rider fatalities in single-vehicle to multivehicle crashes do not indicate any significant variation over the ten-year period.

Table 17: Motorcycle Rider Fatalities by Year and Crash Type

Year	Single-vehicle Crash		Multivehicle Crash		Total
	Number	Percent	Number	Percent	
1995	960	43	1,267	57	2,227
1996	937	43	1,224	57	2,161
1997	937	44	1,179	56	2,116
1998	1,042	45	1,252	55	2,294
1999	1,140	46	1,343	54	2,483
2000	1,307	45	1,590	55	2,897
2001	1,469	46	1,728	54	3,197
2002	1,540	47	1,730	53	3,270
2003	1,629	44	2,085	56	3,714
2004	1,808	45	2,200	55	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

4.2.10. Fatally Injured Motorcycle Riders by Helmet Use

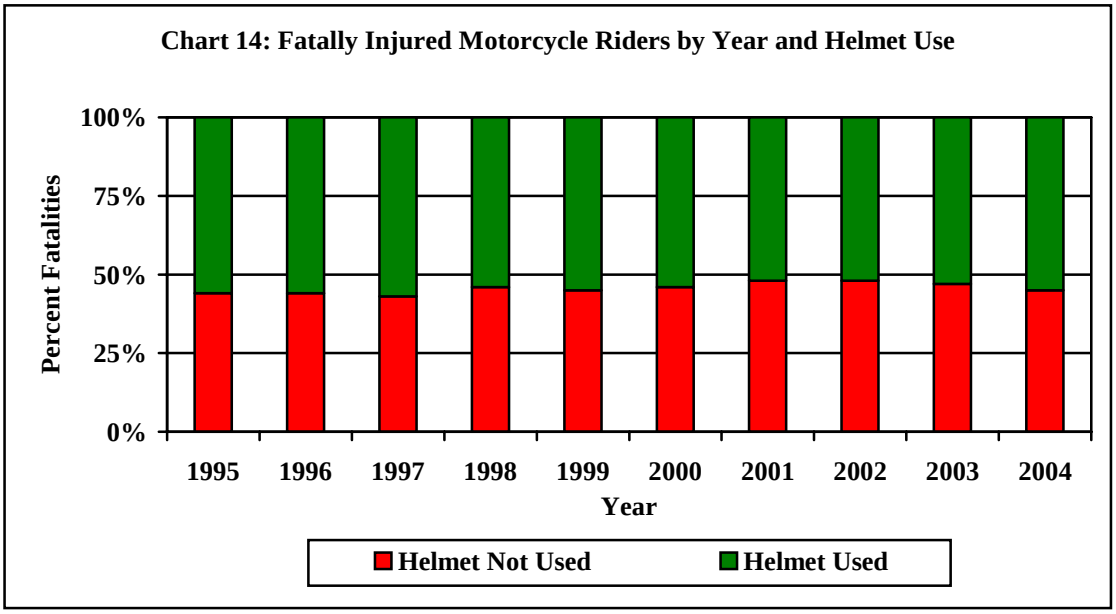
Helmet use rate in crashes among fatally injured motorcycle riders has remained almost the same from 1995 to 2004. Table 18 shows the number and percent of fatally injured motorcycle riders by helmet use from 1995 to 2004. Chart 14 depicts the percent of fatally injured motorcycle riders who used and did not use helmets.

In 2004, 20 States, the District of Columbia, and Puerto Rico required helmet use by all motorcycle operators and passengers. In another 27 States, only persons under a specific age, usually 18, were required to wear helmets. Three States had no laws requiring helmet use. Table 19 shows fatally injured motorcycle riders by their helmet usage in States with and without universal helmet laws in 2003 and 2004. Two-thirds (66%) of the fatally injured motorcycles riders in States without universal helmet laws in 2004 were not wearing helmets compared to 15 percent in States with universal helmet laws.

Table 18: Fatally Injured Motorcycle Riders by Year and Helmet Use

Year	Helmet Use				Total
	Helmet Not Used		Helmet Used		
	Number	Percent	Number	Percent	
1995	980	44	1,247	56	2,227
1996	958	44	1,203	56	2,161
1997	919	43	1,197	57	2,116
1998	1,063	46	1,231	54	2,294
1999	1,121	45	1,362	55	2,483
2000	1,339	46	1,558	54	2,897
2001	1,537	48	1,660	52	3,197
2002	1,565	48	1,705	52	3,270
2003	1,743	47	1,971	53	3,714
2004	1,794	45	2,214	55	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)
Unknown helmet use was distributed proportionally to the known use categories.



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

Table 19: Fatally Injured Motorcycle Riders in States With/Without Universal Helmet Laws				
Motorcycle Rider Fatalities	Year			
	2003		2004	
Total in States With Universal Helmet Laws	1,610	100%	1,677	100%
Helmeted	1,365	85%	1,428	85%
Not Helmeted	245	15%	249	15%
Total in States Without Universal Helmet Laws	2,104	100%	2,331	100%
Helmeted	615	29%	792	34%
Not Helmeted	1,489	71%	1,539	66%
Source: NCSA, FARS 2003 (Final), 2004 (ARF)				

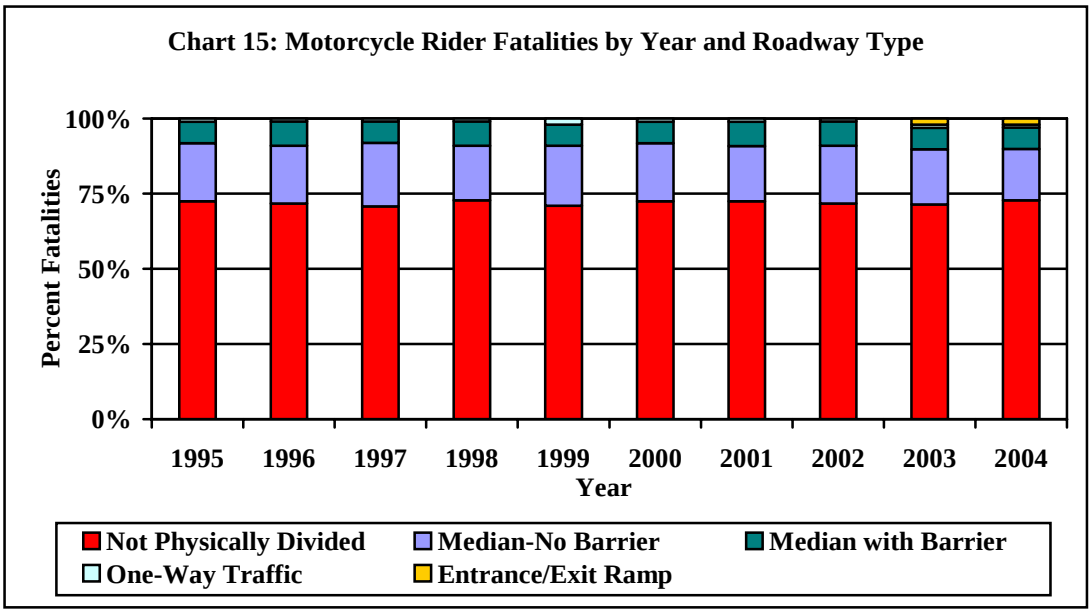
4.2.11. Motorcycle Rider Fatalities by Roadway Type

In 2004, 72 percent of the motorcycle rider fatalities occurred on undivided roadways, another 17 percent were on roadways that had a median but with no median barrier. Data from 1995 to 2004 indicate that there are not many changes in the percentage of the fatalities occurring on different types of roadways. Starting in 2003, a new attribute (*Entrance/Exit Ramp*) was added to the variable Roadway Type. Table 20 and Chart 15 show motorcycle rider fatalities on different roadways from 1995-2004.

Table 20: Motorcycle Rider Fatalities by Year and Roadway Type

Year	Roadway Type										* Total
	Not Divided		Median-No Barrier		Median w/Barrier		One Way Traffic		Entrance /Exit Ramp		
	No.	%	No.	%	No.	%	No.	%	No.	%	
1995	1,586	71	431	19	145	7	31	1	-	-	2,227
1996	1,531	71	411	19	168	8	21	1	-	-	2,161
1997	1,484	70	437	21	146	7	16	1	-	-	2,116
1998	1,662	72	405	18	176	8	23	1	-	-	2,294
1999	1,762	71	491	20	163	7	42	2	-	-	2,483
2000	2,043	71	558	19	215	7	35	1	-	-	2,897
2001	2,281	71	588	18	265	8	43	1	-	-	3,197
2002	2,334	71	617	19	263	8	30	1	-	-	3,270
2003	2,609	70	679	18	275	7	45	1	67	2	3,714
2004	2,876	72	700	17	291	7	30	1	95	2	4,008

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)
***** Includes unknown roadway types.



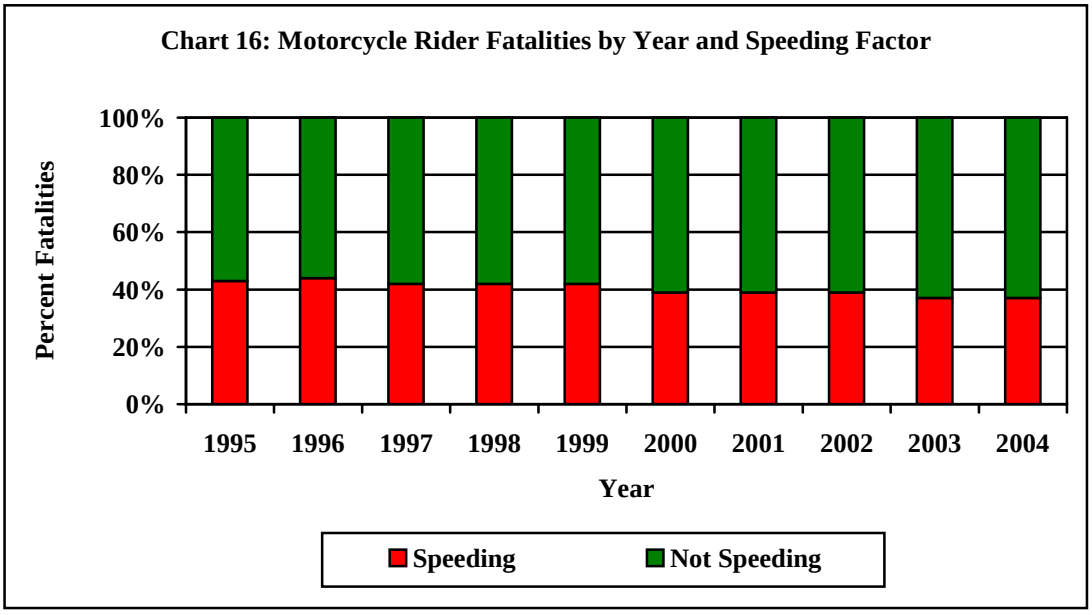
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

4.2.12. Motorcycle Rider Fatalities by Speeding

The percent of motorcycle rider fatalities, in crashes where speeding was recorded as a driver contributing factor – decreased by 6 percentage points from 43 percent in 1995 to 37 percent in 2004. Table 21 shows the numbers and percentage of fatalities listed for each of the past ten years. Chart 16 shows the percentage of motorcycle rider fatalities by year and speeding factor.

***Definition*: Speeding Related** - A crash is considered to be speeding-related if the driver was charged with a speeding-related offense or if an officer indicated that racing, driving too fast for conditions, or exceeding the posted speed limit was a contributing factor in the crash.

Table 21: Motorcycle Rider Fatalities by Year and Speeding Factor					
Year	Speeding Factor				Total
	Speeding		Not Speeding		
	Number	Percent	Number	Percent	
1995	963	43	1,264	57	2,227
1996	942	44	1,219	56	2,161
1997	885	42	1,231	58	2,116
1998	956	42	1,338	58	2,294
1999	1,033	42	1,450	58	2,483
2000	1,123	39	1,774	61	2,897
2001	1,260	39	1,937	61	3,197
2002	1,272	39	1,998	61	3,270
2003	1,373	37	2,341	63	3,714
2004	1,497	37	2,511	63	4,008
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)					



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

4.2.13. Motorcycle Operator Fatalities by Driver Blood Alcohol Concentration (BAC)

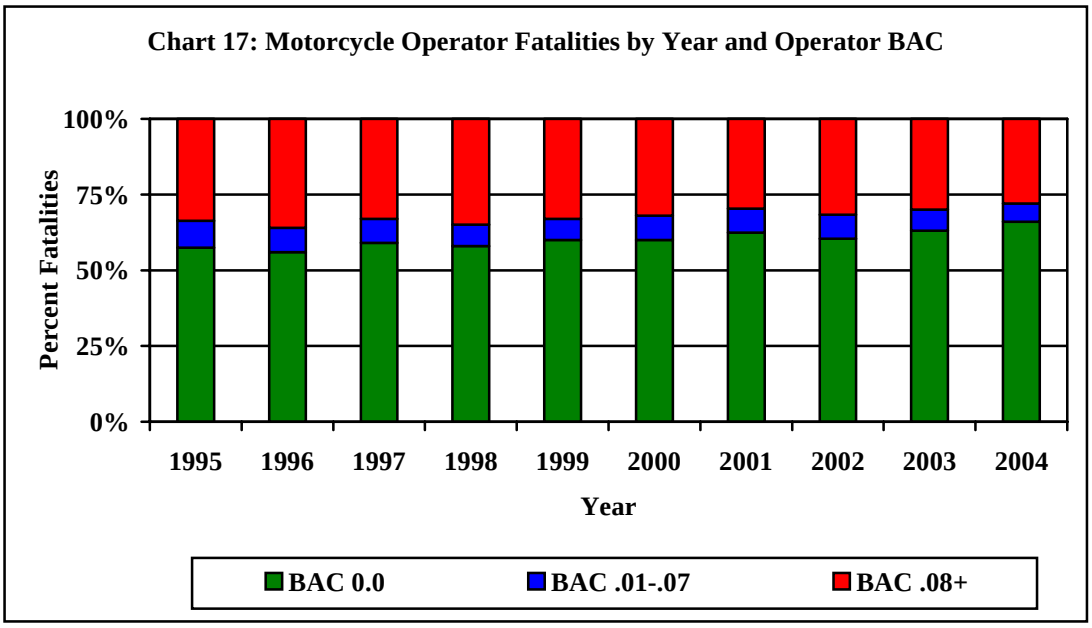
NHTSA defines a fatal traffic crash as being alcohol-related if either a driver or a nonoccupant (e.g., pedestrian) had a blood alcohol concentration (BAC) of .01 grams per deciliter (g/dL) or greater in a police reported traffic crash. The alcohol estimates in this report are based on multiple imputation method. For more information on the alcohol methodology refer to NHSTA document titled '*Transitioning to Multiple Imputation – A New Method to Impute Missing Blood Alcohol Concentration (BAC) values in FARS'* - (DOT HS 809 403).

Persons with BACs of .08 g/dL or greater involved in fatal crashes are considered to be intoxicated. This is the legal limit of intoxication in many states. Alcohol involvement among motorcycle operators has been declining over the last ten years. The percent of fatally injured motorcycle operators, who had been drinking, declined by 8 percentage points from 42 percent in 1995 to 34 percent in 2004. But a majority of motorcycle operators killed who had been drinking were intoxicated with a BAC of .08+. In 2004, there were 1,264 operators killed who had been drinking (BAC .01+) of which 1,025 (81 percent) operators killed were intoxicated (BAC .08+). These numbers indicate that even though the alcohol involvement among motorcycle operators is declining, there is still an underlying problem because of the high proportion of motorcycle operators with BACs over .08+. Table 22 shows the numbers and percent of motorcycle operators killed by their BAC from 1995 to 2004. Chart 17 shows the percent of motorcycle operators killed by their BAC and year.

Table 22: Motorcycle Operator Fatalities by Year and Operator BAC

Year	BAC .00		BAC .01-.07		BAC .08+		BAC .01+		Total
	No.	%	No.	%	No.	%	No.	%	
1995	1,165	58	174	9	681	34	855	42	2,020
1996	1,101	56	160	8	700	36	861	44	1,962
1997	1,134	59	163	8	640	33	803	41	1,937
1998	1,214	58	139	7	736	35	875	42	2,089
1999	1,370	60	163	7	753	33	916	40	2,286
2000	1,581	60	213	8	859	32	1,072	40	2,653
2001	1,860	63	223	8	872	30	1,095	37	2,955
2002	1,840	61	236	8	958	32	1,194	39	3,034
2003	2,156	63	245	7	1,026	30	1,271	37	3,427
2004	2,429	66	239	6	1,025	28	1,264	34	3,693

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

4.2.14. Motorcycle Operator Fatalities by License Status and License Compliance

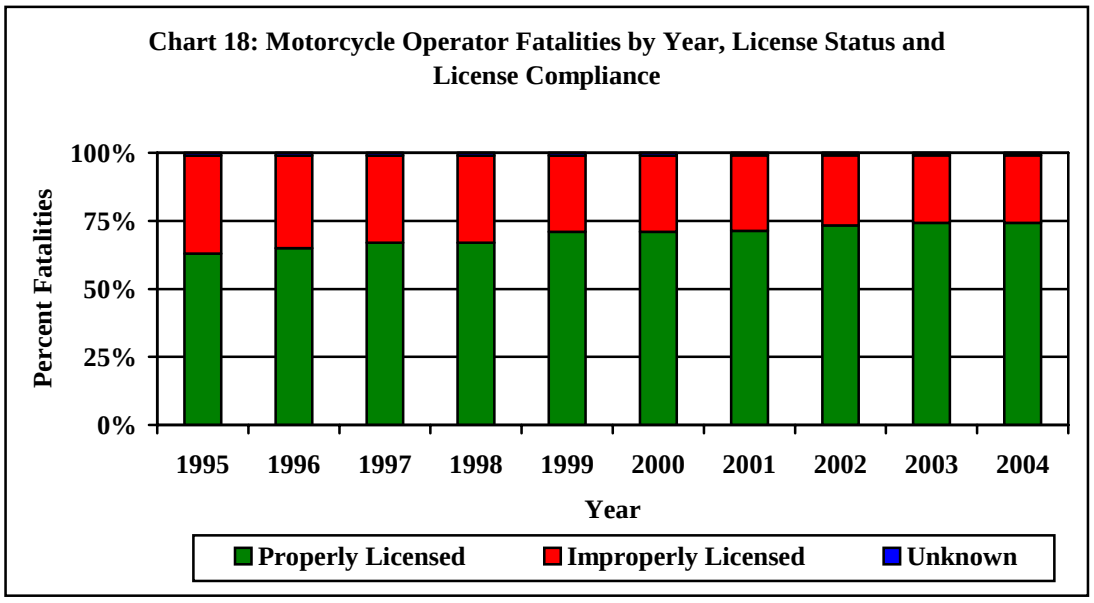
The definitions for the terms properly and improperly licensed, used in this report are based on the following:

Properly Licensed – a valid driver license (*Non-CDL License Status*) with a motorcycle endorsement, a motorcycle only license, learner's permit; and a temporary license; or no license required for operating a motorcycle type vehicle like mopeds.

Improperly Licensed – not licensed, not licensed to operate a motorcycle, or a license that is suspended, revoked, expired, or canceled or denied.

From 1995 to 2004 the percentage of fatally injured motorcycle operators who were properly licensed has increased steadily. In 2004, the percentage of properly licensed motorcycle operators killed in fatal crashes reached an all time high of 75 percent, an increase of 12 percentage points compared to 63 percent in 1995. Still 25 percent of the operators killed in 2004 were riding a motorcycle with an improper license. Table 23 shows the number and percentage of operators killed by their license status for the past ten years. Chart 18 shows the proportion of properly licensed and improperly licensed motorcycle operators killed by year.

Table 23: Motorcycle Operators Killed by Year, License Status, and License Compliance							
Year	License Status with License Compliance						Total
	Properly Licensed		Improperly Licensed		Unknown		
	No.	%	No.	%	No.	%	
1995	1,263	63	737	36	20	1	2,020
1996	1,274	65	666	34	22	1	1,962
1997	1,300	67	623	32	14	1	1,937
1998	1,405	67	665	32	19	1	2,089
1999	1,628	71	636	28	22	1	2,286
2000	1,894	71	738	28	21	1	2,653
2001	2,114	72	815	28	26	1	2,955
2002	2,233	74	779	26	22	1	3,034
2003	2,562	75	847	25	18	1	3,427
2004	2,753	75	909	25	31	1	3,693
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)							



Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)

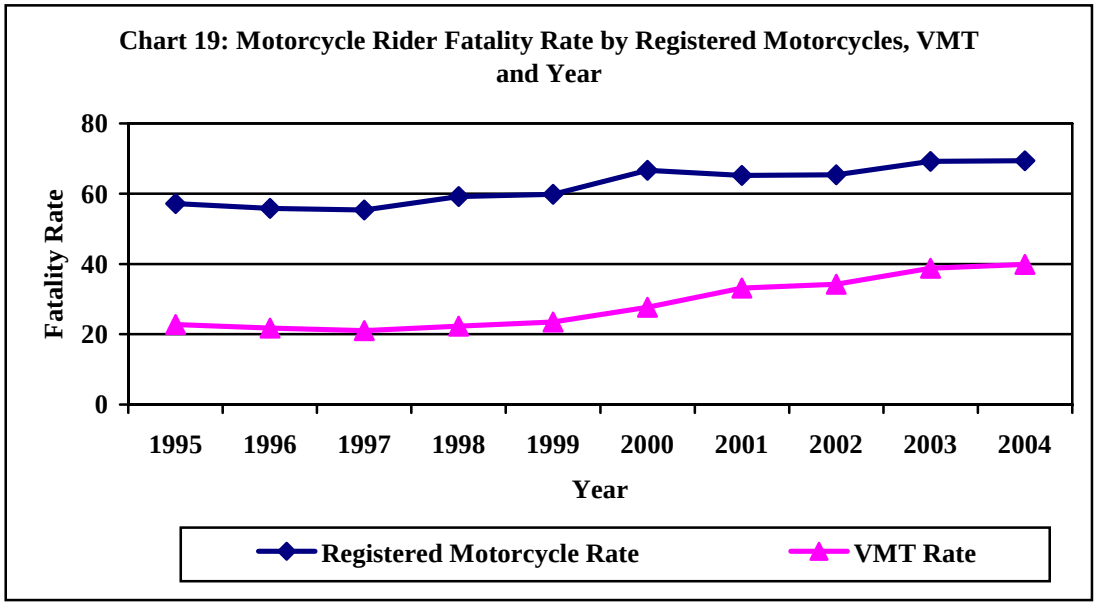
4.2.15. Motorcycle Rider Fatality Rate by Registered Motorcycles and VMT

Fatality rates for motorcycle riders declined between 1995 and 1997 when measured per 100,000 registered motorcycles and when measured per 100 million motorcycle VMT. However, starting from 1998 fatality rates started to increase steadily. The fatality rate per 100,000 registered motorcycles has increased by 25 percent from 55.30 in 1997 to 69.33 in 2004 and the fatality rate per 100 million motorcycle vehicle miles traveled has increased by 90 percent from 20.99 in 1997 to 39.89 in 2004. The number of fatalities has increased more sharply for these years than the increase in the VMT. Table 24 and Chart 19 show the fatality rates for registered motorcycles and motorcycle VMT from 1995 to 2004.

Table 24: Motorcycle Rider Fatality Rates by Registered Motorcycles, Vehicle Miles of Travel, and Year

Year	Rate per 100,000 Registered Motorcycles	Rate per 100 million VMT
1995	57.14	22.73
1996	55.82	21.78
1997	55.30	20.99
1998	59.13	22.31
1999	59.80	23.46
2000	66.66	27.67
2001	65.20	33.17
2002	65.35	34.23
2003	69.16	38.78
2004	69.33	39.89

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF)
Motorcycle Registrations, VMT – FHWA

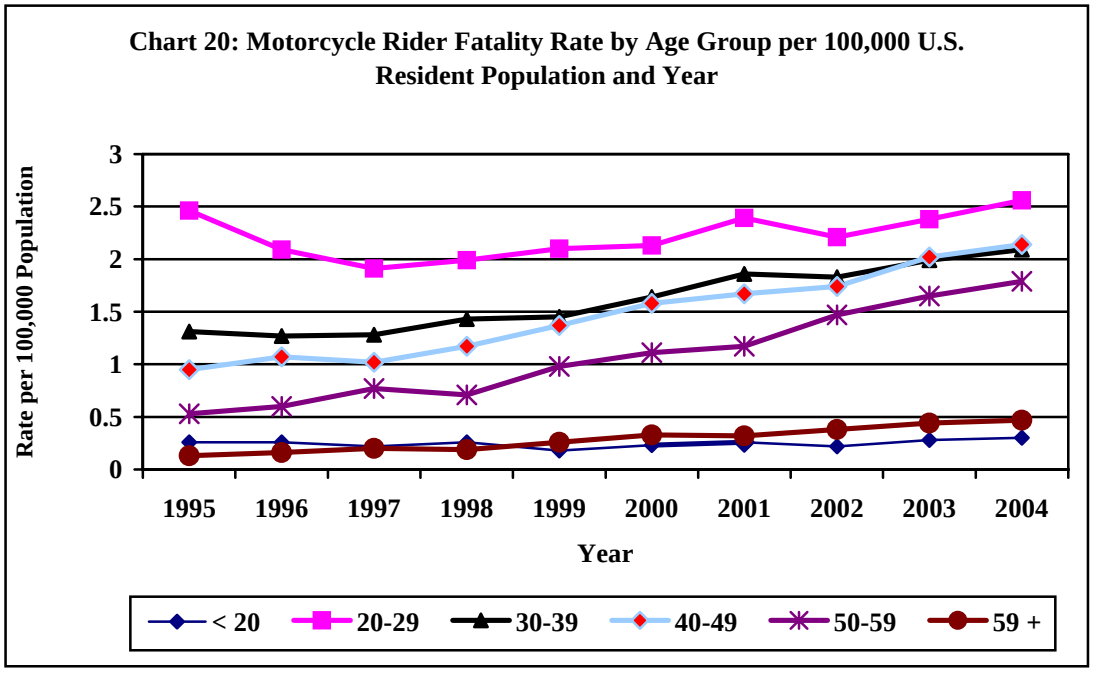


Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF) Motorcycle Registrations, VMT – FHWA

4.2.16. Motorcycle Rider Fatality Rate per 100,000 U.S. Resident Population

Even though the population of 40-49, 50-59 and over 59 age groups grew between 1995 and 2004, the increase in motorcycle rider fatalities for these groups has outpaced the increase in population as evident from the increase in the fatality rates. Table 25 gives the motorcycle rider fatality rates by age group per 100,000 US resident populations. The greatest rate increase is seen for the over 59-age group with the rate jumping from 0.13 in 1995 to 0.47 in 2004. Similarly the fatality rate for the 50-59 age group has risen from 0.53 in 1995 to 1.79 in 2004 and the fatality rate for the 40-49 age group has risen from 0.95 in 1995 to 2.14 in 2004. The rates for other age groups have also increased over the same period of time but not to the same level as seen in riders aged 40 and over. These rates underscore the increase in motorcycle rider fatalities in the over 40 age groups seen in previous sections. Chart 20 shows 10 year trends of motorcycle rider fatality rates by age group per 100,000 U.S. resident population.

Table 25: Motorcycle Rider Fatality Rate by Age Group Per 100,000 U.S. Resident Population and Year							
Year	Rider Age Group						Total
	< 20	20-29	30-39	40-49	50-59	59+	
1995	0.26	2.46	1.31	0.95	0.53	0.13	0.85
1996	0.26	2.09	1.27	1.07	0.60	0.16	0.81
1997	0.22	1.91	1.28	1.02	0.77	0.20	0.79
1998	0.26	1.99	1.43	1.17	0.71	0.19	0.85
1999	0.18	2.10	1.45	1.37	0.98	0.26	0.91
2000	0.23	2.13	1.64	1.58	1.11	0.33	1.03
2001	0.26	2.39	1.86	1.67	1.17	0.32	1.12
2002	0.22	2.21	1.83	1.74	1.47	0.38	1.14
2003	0.28	2.38	1.99	2.02	1.65	0.44	1.27
2004	0.30	2.56	2.09	2.14	1.79	0.47	1.36
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF) Population Data – Census Bureau							



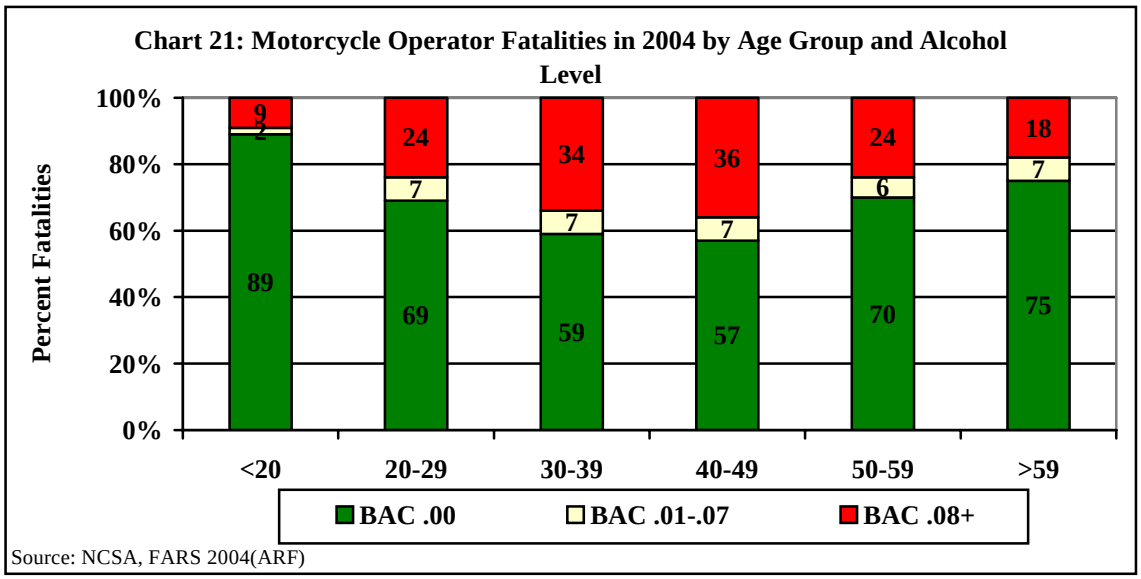
Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF), Population Data – Census Bureau

4.3. Common Crash Characteristics

After looking at motorcycle rider fatality trend data in the past 10 years by different variables, the two variables that standout in terms of change in trend are motorcycle rider age and motorcycle engine size. Our analysis, in this section is based on 2004 data and focuses on the two variables mentioned above and on some of the common characteristics relating to motorcycle crashes. The data tables for the analysis in this section are provided in Appendix A.

4.3.1. Motorcycle Operator Fatalities by Age Group and Alcohol Involvement

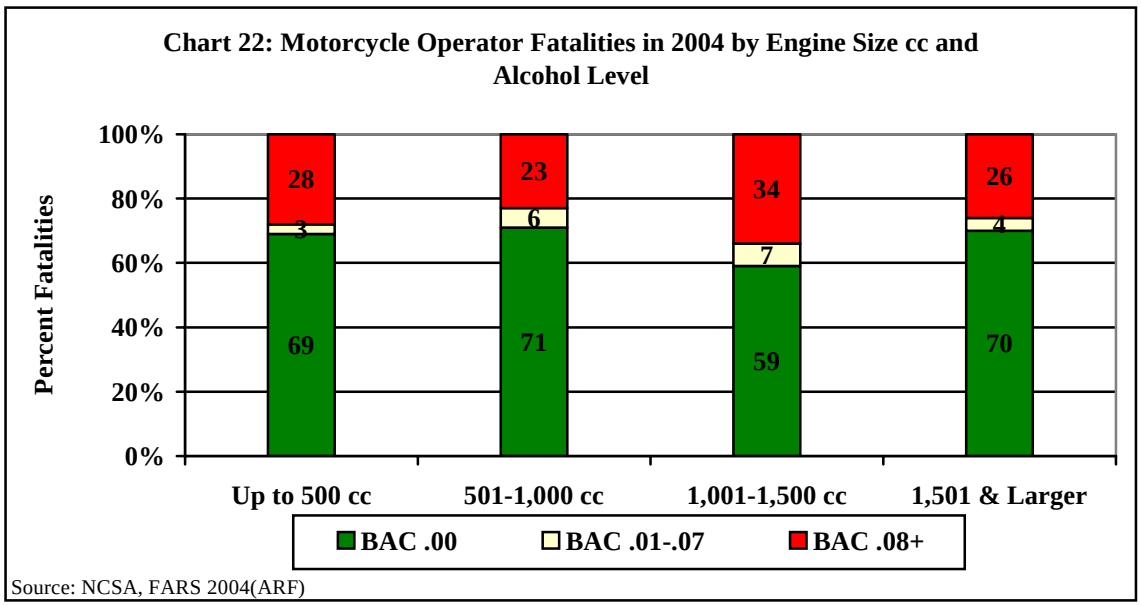
Among the motorcycle operators killed in 2004, a high percentage of alcohol involvement was noticed in the age groups of 40-49 and 30-39. Of all the operators killed with a BAC level of .08 or higher, nearly 60 percent were in the 30-39 and 40-49 age groups. Chart 21 shows motorcycle operator fatalities in 2004 by age group and their alcohol level.



Source: NCSA, FARS 2004(ARF)

4.3.2. Motorcycle Operator Fatalities by Engine Size cc and Alcohol Involvement

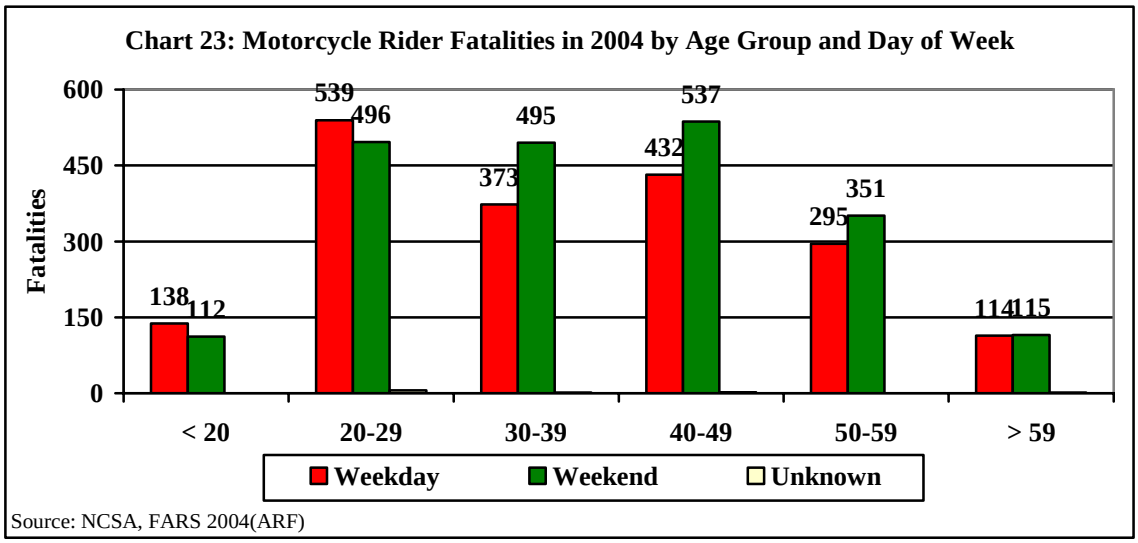
Chart 22 shows motorcycle operator fatalities in 2004 by motorcycle engine size and alcohol level. Highest alcohol involvement among fatal motorcycle operators was seen in the 1,001-1,500 cc engine sizes. Alcohol involvement was least for motorcycle operators killed in the 501-1,000 cc engine size.



Source: NCSA, FARS 2004(ARF)

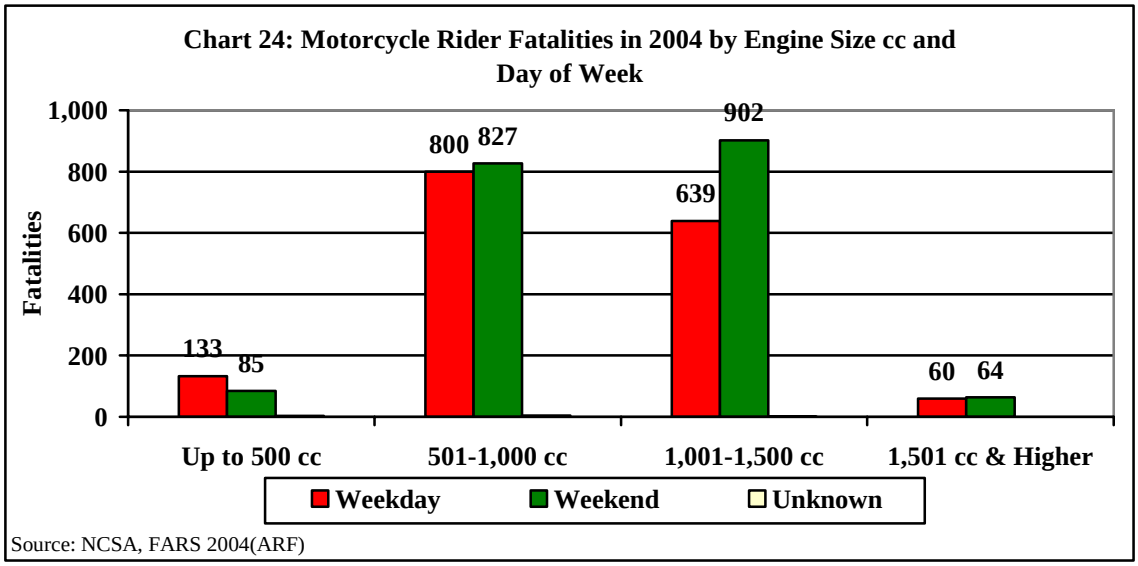
4.3.3. Motorcycle Rider Fatalities by Age Group and Day of Week

Motorcycle rider fatalities in 2004 during weekdays were higher for the under 30 age groups. However, for the 30 and above age groups there were more fatalities during weekends than weekdays. Based on the time definition of weekday/weekend in the trends section, in the 30 and above age groups there were 2.5 times as many fatalities during weekends than during weekdays. Chart 23 shows motorcycle rider fatalities in 2004 by age groups and day of week.



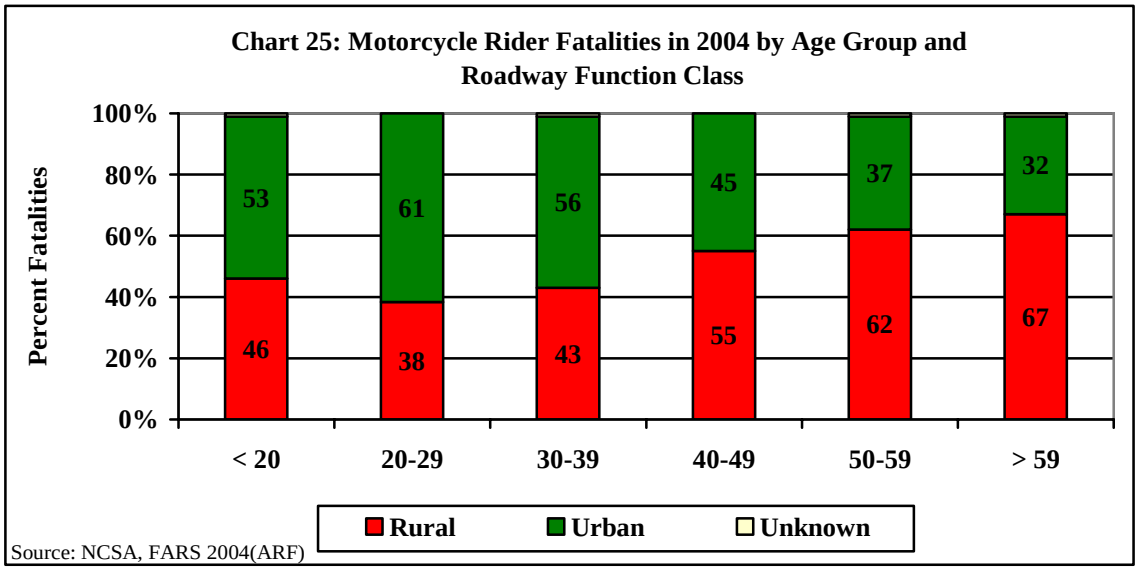
4.3.4. Motorcycle Rider Fatalities by Engine Size cc and Day of Week

Among motorcycle rider fatalities in 2004, weekday fatalities were higher for riders in the below 500 cc engine sizes and weekend fatalities were higher for riders in the 1,001-1,500 cc engine sizes. Based on the definition of weekday/weekend, there were nearly 3 times as many fatalities during weekends involving 1,001-1,500 cc engine motorcycles than during weekdays. Chart 24 shows motorcycle rider fatalities in 2004 by engine size and day of week.



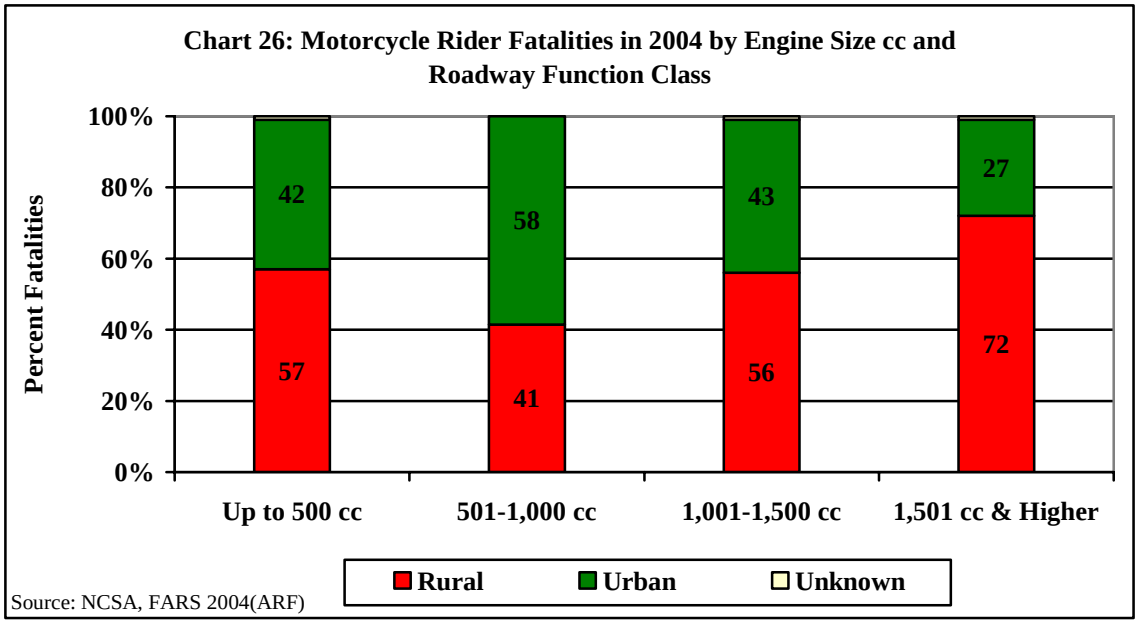
4.3.5. Motorcycle Rider Fatalities by Age Group and Roadway Function Class

Motorcycle rider fatalities in 2004 in the under 40 age group was seen more on urban roadways and in the 40 and above age group was more on rural roadways. Majority of the fatally injured motorcycle riders on rural roadways are age 40 and older which could indicate leisure riding among 40-year-old and older riders. Chart 25 shows motorcycle rider fatalities by age group and roadway function class.



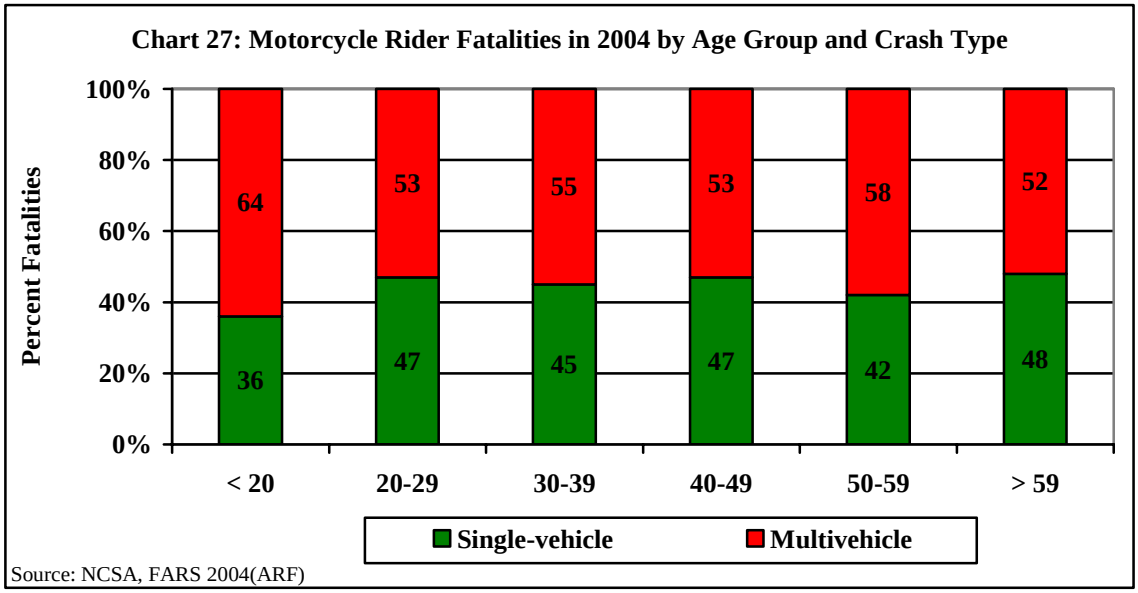
4.3.6. Motorcycle Rider Fatalities by Engine Size cc and Roadway Function Class

A majority of the motorcycle rider fatalities on urban roadways were seen mostly involving motorcycles with engine sizes between 501-1,000 cc. A majority of the motorcycle rider fatalities for other engine sizes were on rural roadways. Chart 26 shows motorcycle rider fatalities in 2004 by engine size and roadway function class.



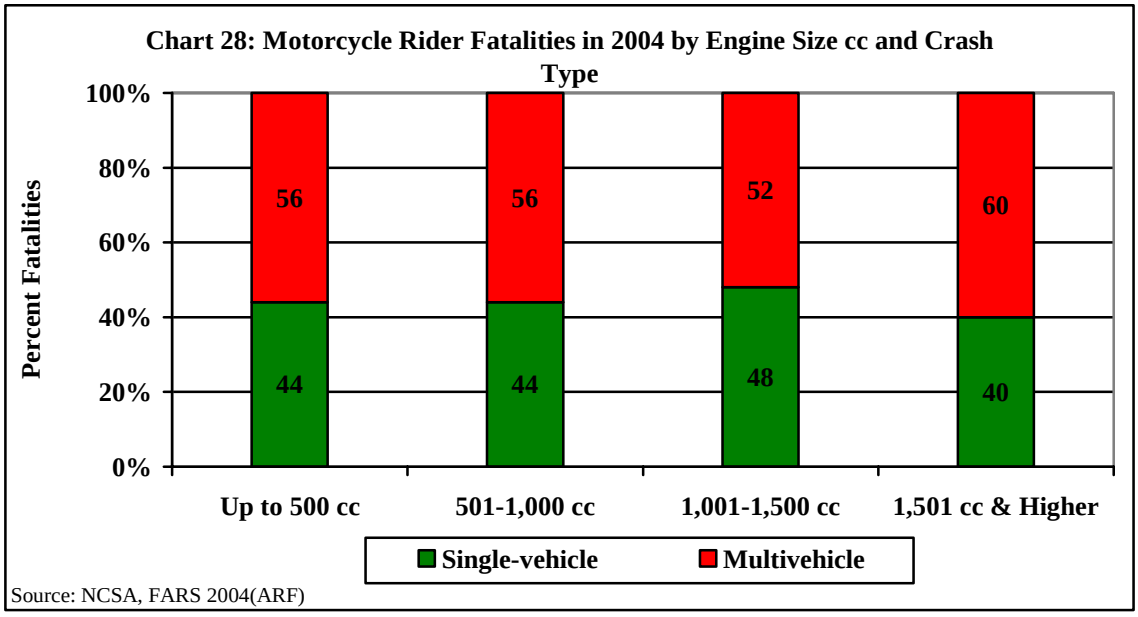
4.3.7. Motorcycle Rider Fatalities by Age Group and Crash Type

In 2004, nearly two-thirds of the motorcycle rider fatalities in the under 20 age group were in multivehicle crashes. Among the motorcycle rider fatalities in single vehicle crashes a higher percentage were in the over 59 age group. Chart 27 shows motorcycle rider fatalities in 2004 by age group and crash type.



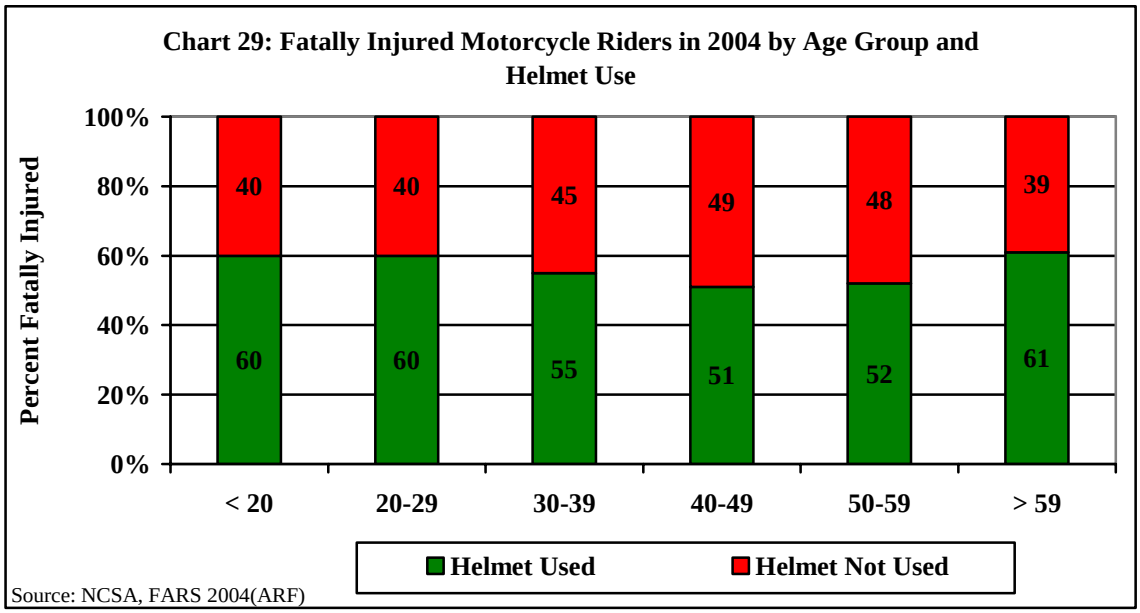
4.3.8. Motorcycle Rider Fatalities by Engine Size cc and Crash Type

Among all the engine size groups in 2004, motorcycle rider fatalities involving 1,501 cc and higher engine sizes were higher in multivehicle crashes. The proportion of multivehicle to single-vehicle fatalities for all engine sizes is similar to the overall trend. Chart 28 shows motorcycle rider fatalities by engine size and crash type.



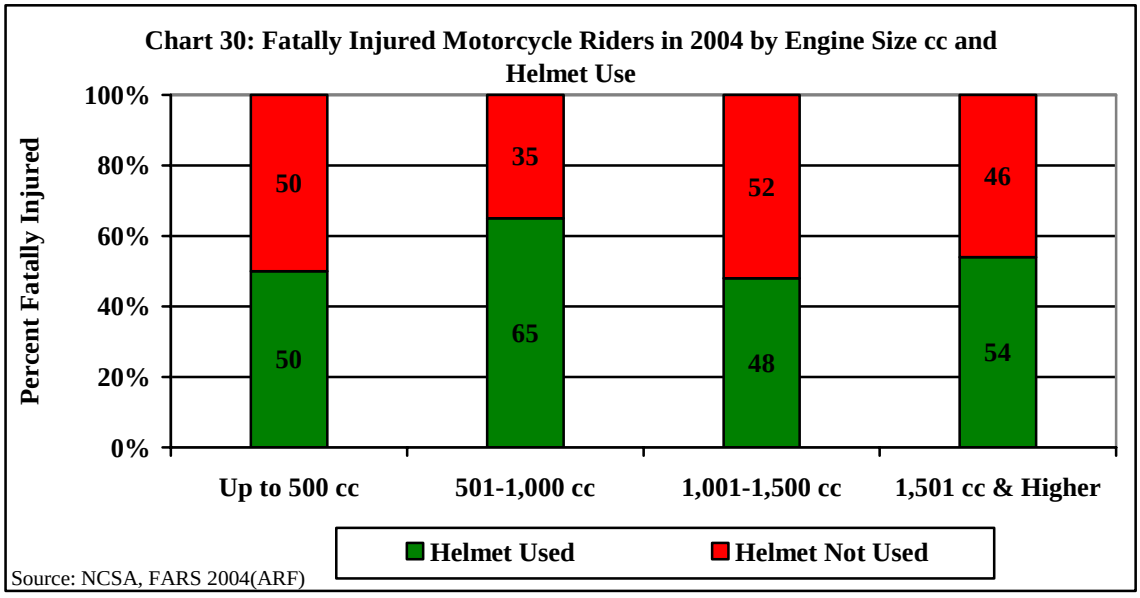
4.3.9. Fatally Injured Motorcycle Riders by Age Group and Helmet Use

Among all age groups, helmet use among fatally injured motorcycle riders in 2004 was higher in the under 30 and over 59 age groups and lower for 30-59 age group. Chart 29 shows fatally injured motorcycle riders by age group and helmet use.



4.3.10. Fatally Injured Motorcycle Riders by Engine Size cc and Helmet Use

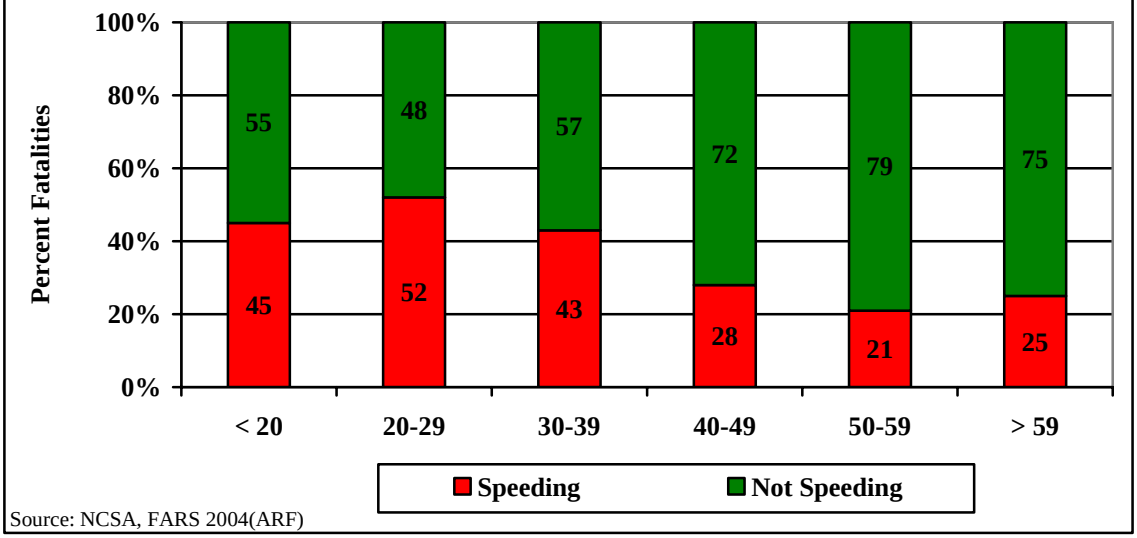
Among fatally injured motorcycle riders in 2004, helmet use was highest for the 501-1,000 cc engine size group. Helmet use was about two-thirds among the 501-1,000 cc engine size motorcycle riders compared to nearly 50 percent among riders in the other engine sizes. Chart 30 shows fatally injured motorcycle riders in 2004 by engine size and helmet use.



4.3.11. Motorcycle Rider Fatalities by Age Group and Speeding

Among the motorcycle riders who were fatally injured in 2004 in crashes when speeding was a contributing factor, higher percentages were in the under 40 age group. The highest percentage of speeding-related motorcycle rider fatalities was in the age group of 20-29 followed by the under 20 age group. Chart 31 shows motorcycle rider fatalities by age group and speeding.

Chart 31: Motorcycle Rider Fatalities in 2004 by Age Group and Speeding

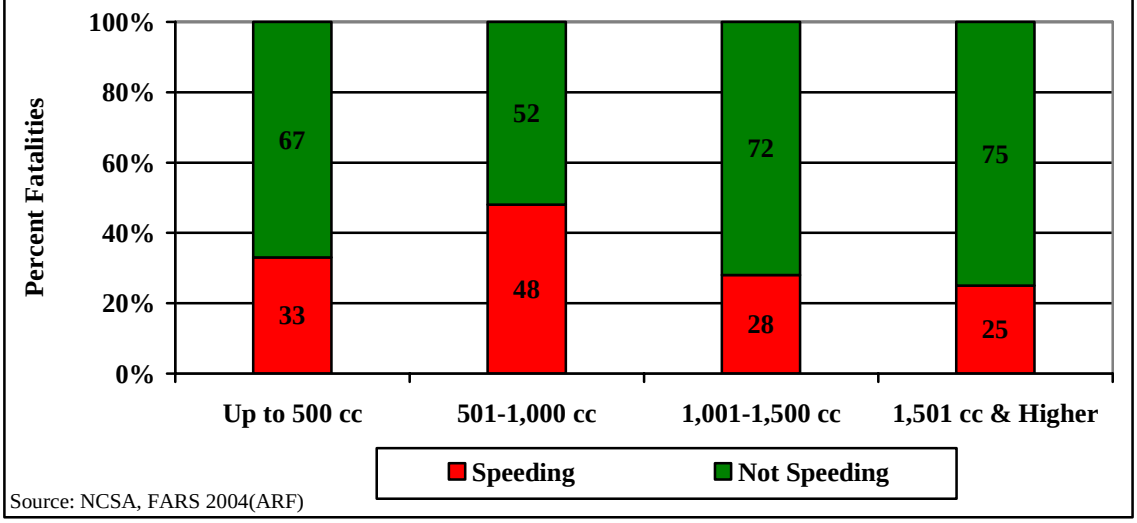


Source: NCSA, FARS 2004(ARF)

4.3.12. Motorcycle Rider Fatalities by Engine Size cc and Speeding

In 2004, a higher percentage of speeding-related motorcycle rider fatalities were seen involving 501-1,000 cc engine size motorcycles. Speeding was less among motorcycle rider fatalities involving 1,001-1,500 cc engine sizes. Chart 32 shows motorcycle rider fatalities by engine size and speeding.

Chart 32: Motorcycle Rider Fatalities in 2004 by Engine Size cc and Speeding

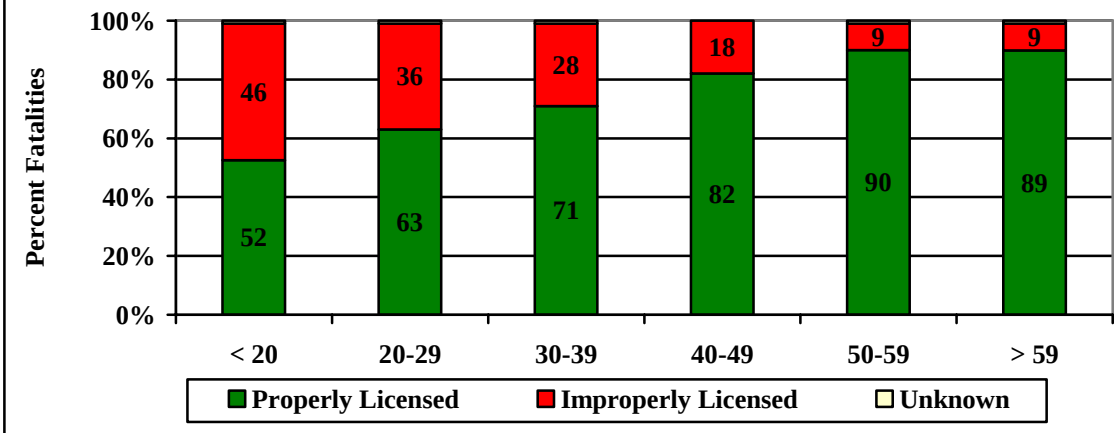


Source: NCSA, FARS 2004(ARF)

4.3.13. Motorcycle Operator Fatalities by Age Group and License Status

Among motorcycle operators fatally injured in crashes in 2004 a higher percentage of improperly licensed operators were in the under 20 age group. The percentage of properly licensed drivers was higher in all other age groups with the highest being in the above 50 age group category. The proportion of properly licensed operators increases with the increase in age group of the operator. Chart 33 shows motorcycle operator fatalities by age group and license status.

Chart 33: Motorcycle Operator Fatalities in 2004 by Age Group and License Status

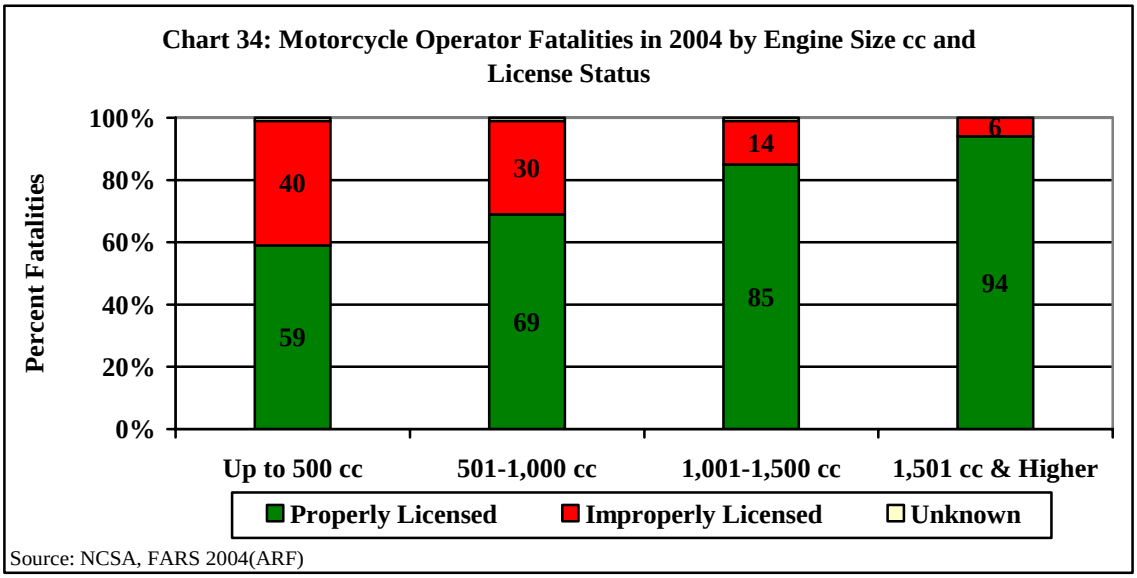


Source: NCSA, FARS 2004(ARF)

4.3.14. Motorcycle Operator Fatalities by Engine Size cc and License Status

Among motorcycle operators fatally injured in crashes in 2004 a higher proportion of improperly licensed operators were in the 500 cc and below engine category. Increases in properly licensed motorcycle operators were seen with the increase in motorcycle engine size. Chart 34 shows motorcycle operator fatalities in 2004 by engine size cc and motorcycle operator license status.

Chart 34: Motorcycle Operator Fatalities in 2004 by Engine Size cc and License Status



Source: NCSA, FARS 2004(ARF)

5. FINDINGS

The findings in this report are divided in two categories: 1) findings based on trends in the past ten years in motorcycle rider fatalities from FARS, motorcycle sales data from MIC, population data from the U.S. Census Bureau, and VMT and registration data from FHWA, and 2) findings based on common crash characteristics in motorcycle rider fatalities from FARS 2004 data. If the patterns seen in the analyses continue as seen from the combination of data sources, there is the likelihood that the increase in motorcycle rider fatalities will continue in the future years also.

5.1 Exposure

Motorcycle registration data from the Federal Highway Administration (FHWA) show a greater number of registered motorcycles. Data from the Motorcycle Industry Council (MIC) show increasing sales in the number of new On-highway motorcycles. According to MIC, the majority of new motorcycles sold are with large engine sizes. MIC data also show an increase in motorcycle ownership in the 40 and above age group. Data from the U.S. Census Bureau show, among all ages, greater increases in the U.S. resident population in the 40 and above age group.

5.2 Trends

- FARS data show increases in motorcycle rider fatalities in the age group of 40 and above in the last 10 years. Among all the age groups, the 20-29 age group had the largest number of motorcycle rider fatalities. Motorcycle rider fatalities in the 40-49 age group are fast approaching the number of fatalities in the 20-29 age group.

- The mean age of motorcycle riders killed and the mean engine size of motorcycles involved in fatal crashes are increasing. The mean age of motorcycle riders killed has increased to 38, an increase of nearly 6 years, indicating more involvement of older riders (in the 40 and above age group). The mean engine size of motorcycles involved in crashes has increased indicating a greater number of motorcycles with larger engine sizes being driven.

- FARS data show a greater number of motorcycle rider fatalities involving a motorcycle with a larger engine size. Most of the increases in motorcycle rider fatalities were seen in the 1,001-1,500 cc engine size, once again indicating more motorcycles with larger engine sizes being driven.

- Although the number of motorcycle rider fatalities in single and multivehicle crashes has increased over the ten-year period, the proportion of motorcycle rider fatalities in single-vehicle to multivehicle crashes does not indicate any significant variation.

- The percentage of properly licensed motorcycle operator fatalities in fatal crashes has increased during the past ten years, yet about one-fourth of fatally injured motorcycle operators, are still improperly licensed.

- Helmet use among fatally injured motorcycle riders in crashes has remained the same, at just above 50 percent. In 2004, about two-thirds (66%) of the fatally injured motorcycle riders in States without universal helmet laws were not wearing helmets compared to 15 percent in States with universal helmet laws.

- The percentage of motorcycle rider fatalities during weekdays and weekends has remained almost the same in the past ten years. However, motorcycle rider fatalities during weekends are twice the fatalities during weekdays which might indicate more recreational use of motorcycles during weekends.

- Though motorcycle rider fatalities have increased steadily in both rural and urban areas during the last ten years, the proportion of motorcycle rider fatalities in both areas has remained almost the same.

- Analysis of data show that 70 percent of all fatalities occur on undivided roadways. The percentage of motorcycle rider fatalities occurring on different roadway types has remained the same in the past ten years.

- The percentage of speeding related motorcycle rider fatalities has declined in the past ten years but speeding still continues to be a contributing factor in about a third of the motorcycle rider fatalities.

- As a trend alcohol involvement among motorcycle operators has been declining over the last ten years, but still a majority of the motorcycle operators killed are intoxicated with a blood alcohol concentration (BAC) of .08 g/dL or higher. Motorcycle operators with high BAC continue to be a major problem.

5.3 Common Crash Characteristics

Two significant findings from the analysis were the increases in motorcycle rider fatalities among older (40 and over) age groups and larger (1,001-1,500 cc) engine sizes. The findings below based on crash characteristics are based on these two variables.

5.3.1. Age Group

- Nearly three-fourths (72 percent) of the motorcycle rider fatalities in the 40 and over age group were on larger engine size motorcycles.

- Alcohol involvement among motorcycle operators was highest among operators in the age group of 40-49 compared to all age groups.

- Speeding is one of the major contributing factors in motorcycle crashes, especially among motorcycle riders under the age of 30.

- A greater number of motorcycle rider fatalities in the 40 and above ages were seen on rural roadways.

- Among motorcycle operators of all ages, the percentage of properly licensed operators increased with increase in operator age.

- Helmet use among fatally injured motorcycle riders was just above 50 percent among those aged 30-59, compared to 60 percent in the other age groups.

- Motorcycle rider fatalities in the above 30 age groups during weekends were more than twice as high as during weekdays.

5.3.2. Engine Size

- Alcohol involvement among motorcycle operators was highest among operators riding 1,001-1,500 cc engine size motorcycles.

- Speeding related motorcycle rider fatalities was higher in 501-1,000 cc engine size motorcycles.

- A greater number of motorcycle rider fatalities involving 1,001-1,500 cc engine size motorcycles were seen on rural roadways.

- An increase in the percentage of properly licensed motorcycle operators was seen with the increase in motorcycle engine size.

- Helmet use among fatally injured motorcycle riders was higher for motorcycle riders on the 501-1,000 cc engine size compared to other engine sizes.

- Motorcycle rider fatalities were higher during weekends in the 1,001-1,500 cc engine size motorcycles.

6. APPENDIX A: Additional Data

The following sections provide additional data that were used in the analysis but not shown in the previous sections.

Table 26: Motorcycle Operator Fatalities in 2004 by Age Group and Alcohol Level

Age Group	BAC .00		BAC .01-.07		BAC .08+		BAC .01+		Total
	No.	%	No.	%	No.	%	No.	%	
< 20	194	89	5	2	19	9	24	11	218
20-29	675	69	68	7	232	24	299	31	974
30-39	475	58	58	7	278	34	337	42	812
40-49	502	57	59	7	314	36	373	43	875
50-59	423	70	36	6	142	24	178	30	601
59 +	159	75	14	7	38	18	53	25	212
Unknown	1	50	0	0	1	50	1	50	1
Total	2,429	66	239	6	1,025	28	1,264	34	3,693
Source: NCSA, FARS 2004 (ARF)									

Table 27: Motorcycle Operator Fatalities in 2004 by Engine Size and Alcohol Level

Engine Size	BAC .00		BAC .01-.07		BAC .08+		BAC .01+		Total
	No.	%	No.	%	No.	%	No.	%	
Up to 500 cc	146	69	7	3	59	28	66	31	212
501-1,000 cc	1,095	71	97	6	348	23	445	29	1,540
1,001-1,500 cc	816	59	93	7	468	34	561	41	1,377
1,501 cc & Higher	76	70	4	4	28	26	32	30	108
Unknown	297	65	37	8	122	27	159	35	456
Total	2,429	66	239	6	1,025	28	1,264	34	3,693
Source: NCSA, FARS 2004 (ARF)									

Table 28: Motorcycle Rider Fatalities in 2004 by Age Group and Day of Week							
Age Group	Day of Week						Total
	Weekday		Weekend		Unknown		
	No.	%	No.	%	No.	%	
< 20	138	55	112	45	0	0	250
20-29	539	52	496	48	6	1	1,041
30-39	373	43	495	57	1	0	869
40-49	432	44	537	55	2	0	971
50-59	295	46	351	54	0	0	646
> 59	114	50	115	50	1	0	230
Unknown	0	0	1	100	0	0	1
Total	1,891	47	2,107	53	10	0	4,008
Source: NCSA, FARS 2004 (ARF)							

Table 29: Motorcycle Rider Fatalities in 2004 by Engine Size and Day of Week							
Engine Size	Day of Week						Total
	Weekday		Weekend		Unknown		
	#	%	#	%	#	%	
Up to 500 cc	133	60	85	38	3	1	221
501-1,000 cc	800	49	827	51	4	0	1,631
1,001-1,500 cc	639	41	902	58	1	0	1,542
1,501 cc & Higher	60	48	64	52	0	0	124
Unknown	259	53	229	47	2	0	490
Total	1,891	47	2,107	53	10	0	4,008
Source: NCSA, FARS 2004 (ARF)							

Table 30: Motorcycle Rider Fatalities by Age Group and Land Use in 2004							
Age Group	Land Use						Total
	Rural		Urban		Unknown		
	No.	%	No.	%	No.	%	
< 20	116	46	132	53	2	1	250
20-29	398	38	640	61	3	0	1,041
30-39	376	43	485	56	8	1	869
40-49	535	55	433	45	3	0	971
50-59	403	62	239	37	4	1	646
59 +	154	67	74	32	2	1	230
Unknown	0	0	1	100	0	0	1
Total	1,982	49	2,004	50	22	1	4,008
Source: NCSA, FARS 2004 (ARF)							

Table 31: Motorcycle Rider Fatalities by Engine Size and Land Use in 2004							
Engine Size	Land Use						Total
	Rural		Urban		Unknown		
	No.	%	No.	%	No.	%	
Up to 500 cc	126	57	93	42	2	1	221
501-1,000 cc	671	41	952	58	8	0	1,631
1,001-1,500 cc	867	56	665	43	10	1	1,542
1,501 cc & Higher	89	72	34	27	1	1	124
Unknown	229	47	260	53	1	0	490
Total	1,982	49	2,004	50	22	1	4,008
Source: NCSA, FARS 2004 (ARF)							

Table 32: Motorcycle Rider Fatalities in 2004 by Age Group and Crash Type						
Age Group	Crash Type				Total	
	Single-vehicle		Multivehicle			
	No.	%	No.	%	No.	%
< 20	89	36	161	64	250	100
20-29	486	47	555	53	1,041	100
30-39	395	45	474	55	869	100
40-49	459	47	512	53	971	100
50-59	269	42	377	58	646	100
59 +	110	48	120	52	230	100
Unknown	0	0	1	100	1	100
Total	1,808	45	2,200	55	4,008	100
Source: NCSA, FARS 2004 (ARF)						

Table 33: Motorcycle Rider Fatalities in 2004 by Engine Size and Crash Type						
Engine Size	Crash Type				Total	
	Single-vehicle		Multivehicle			
	No.	%	No.	%	No.	%
Up to 500 cc	97	44	124	56	221	100
501-1,000 cc	711	44	920	56	1,631	100
1,001-1,500 cc	739	48	803	52	1,542	100
1,501 cc & Higher	49	40	75	60	124	100
Unknown	212	43	278	57	490	100
Total	1,808	45	2,200	55	4,008	100
Source: NCSA, FARS 2004 (ARF)						

Table 34: Fatally Injured Motorcycle Riders in 2004 by Age Group and Helmet Use						
Age Group	Helmet Use				Total	
	Not Used		Used			
	No.	%	No.	%	No.	%
< 20	100	40	150	60	250	100
20-29	419	40	622	60	1,041	100
30-39	393	45	476	55	869	100
40-49	479	49	492	51	971	100
50-59	313	48	333	52	646	100
> 59	89	39	141	61	230	100
Unknown	1	100	0	0	1	100
Total	1,794	45	2,214	55	4,008	100
Source: NCSA, FARS 2004 (ARF)						

Table 35: Fatally Injured Motorcycle Riders in 2004 by Engine Size and Helmet Use						
Engine Size	Helmet Use				Total	
	Not Used		Used			
	No.	%	No.	%	No.	%
Up to 500 cc	109	50	112	50	221	100
501-1,000 cc	567	35	1,064	65	1,631	100
1,001-1,500 cc	806	52	736	48	1,542	100
1,501 cc & Higher	57	46	67	54	124	100
Unknown	254	52	236	48	490	100
Total	1,794	45	2,214	55	4,008	100
Source: NCSA, FARS 2004 (ARF)						

Table 36: Motorcycle Rider Fatalities in 2004 by Age Group and Roadway Function Class							
Age Group	Roadway Function Class						Total
	Rural		Urban		Unknown		
	No.	%	No.	%	No.	%	
< 20	116	46	132	53	2	1	250
20-29	398	38	640	61	3	0	1,041
30-39	376	43	485	56	8	1	869
40-49	535	55	433	45	3	0	971
50-59	403	62	239	37	4	1	646
59+	154	67	74	32	2	1	230
Unknown	0	0	1	100	0	0	1
Total	1,982	49	2,004	50	22	1	4,008
Source: NCSA, FARS 2004 (ARF)							

Table 37: Motorcycle Rider Fatalities in 2004 by Engine Size and Roadway Function Class							
Engine Size	Roadway Function Class						Total
	Rural		Urban		Unknown		
	No.	%	No.	%	No.	%	
Up to 500 cc	126	57	93	42	2	1	221
501-1,000 cc	671	41	952	58	8	0	1,631
1,001-1,500 cc	867	56	665	43	10	1	1,542
1,501 cc & Higher	89	72	34	27	1	1	124
Unknown	229	47	260	53	1	0	490
Total	1,982	49	2,004	50	22	1	4,008
Source: NCSA, FARS 2004 (ARF)							

Table 38: Motorcycle Rider Fatalities in 2004 by Age Group and Speeding						
Age Group	Speeding Related				Total	
	Speeding		Not Speeding			
	No.	%	No.	%	No.	%
< 20	113	45	137	55	250	100
20-29	541	52	500	48	1,041	100
30-39	374	43	495	57	869	100
40-49	274	28	697	72	971	100
50-59	137	21	509	79	646	100
> 59	57	25	173	75	230	100
Unknown	1	100	0	0	1	100
Total	1,497	37	2,511	63	4,008	100
Source: NCSA, FARS 2004 (ARF)						

Table 39: Motorcycle Rider Fatalities in 2004 by Engine Size and Speeding						
Engine Size	Speeding Related				Total	
	Speeding		Not Speeding			
	No.	%	No.	%	No.	%
Up to 500 cc	73	33	148	67	221	100
501-1,000 cc	789	48	842	52	1,631	100
1,001-1,500 cc	432	28	1,110	72	1,542	100
1,501 cc & Higher	31	25	93	75	124	100
Unknown	172	35	318	65	490	100
Total	1,497	37	2,511	63	4,008	100
Source: NCSA, FARS 2004 (ARF)						

Table 40: Motorcycle Operator Fatalities in 2004 by Age Group, License Status, and License Compliance								
Age Group	License Status						Total	
	Properly Licensed		Improperly Licensed		Unknown			
	#	%	#	%	#	%	#	%
< 20	114	52	101	46	3	1	218	100
20-29	616	63	353	36	5	1	974	100
30-39	575	71	228	28	9	1	812	100
40-49	717	82	154	18	4	0	875	100
50-59	542	90	53	9	6	1	601	100
> 59	189	89	20	9	3	1	212	100
Unknown	0	0	0	0	1	100	1	100
Total	2,753	75	909	25	31	1	3,693	100
Source: NCSA, FARS 2004 (ARF)								

Table 41: Motorcycle Operator Fatalities in 2004 by Engine Size, License Status, and License Compliance							
Engine Size	License Status						Total
	Properly Licensed		Improperly Licensed		Unknown		
	#	%	#	%	#	%	
Up to 500 cc	126	59	84	40	2	1	212
501-1,000 cc	1,069	69	463	30	8	1	1,540
1,001-1,500 cc	1,174	85	187	14	16	1	1,377
1,501 cc & Higher	101	94	7	6	0	0	108
Unknown	283	62	168	37	5	1	456
Total	2,753	75	909	25	31	1	3,693
Source: NCSA, FARS 2004 (ARF)							

Table 42: Motorcycle Rider Fatalities by State from 1975-1989															
State	Calendar Year														
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Alabama	42	59	65	67	55	54	56	53	58	52	61	72	39	39	34
Alaska	10	9	13	16	10	6	8	6	14	10	5	8	1	6	8
Arizona	63	53	77	87	135	121	119	84	103	116	112	104	89	99	76
Arkansas	26	29	31	28	38	43	41	26	47	31	37	31	40	30	23
California	493	598	684	785	865	821	783	695	666	860	804	877	754	609	639
Colorado	46	33	61	64	78	69	86	76	69	73	71	50	62	50	38
Connecticut	39	55	55	76	89	116	86	100	84	91	89	65	69	63	53
Delaware	8	9	4	8	13	14	8	18	10	7	18	6	14	11	4
Dist of Columbia	7	4	4	5	4	3	8	4	7	7	5	5	3	6	4
Florida	155	144	180	227	249	265	243	240	238	314	277	272	242	223	212
Georgia	66	64	86	88	105	118	109	116	90	91	89	87	67	63	65
Hawaii	9	6	12	24	22	11	18	18	21	20	11	16	14	17	17
Idaho	22	19	21	25	35	34	25	21	24	27	30	27	27	29	25
Illinois	174	175	207	228	205	226	204	188	181	173	181	182	161	178	128
Indiana	85	81	96	121	157	136	121	108	104	85	106	131	129	89	69
Iowa	62	67	69	72	84	77	79	69	60	45	57	58	63	61	44
Kansas	38	44	51	52	55	60	72	50	42	47	33	38	40	43	25
Kentucky	53	45	45	50	63	45	53	50	49	49	48	49	44	43	23
Louisiana	49	65	90	102	82	120	130	91	91	67	74	63	42	50	37
Maine	18	19	25	25	30	34	32	30	30	33	22	22	22	19	17
Maryland	53	47	49	67	64	100	89	76	66	76	66	82	60	57	39
Massachusetts	71	68	89	93	97	110	77	65	75	83	86	65	58	59	64
Michigan	161	133	156	168	124	148	145	114	113	150	137	118	118	82	73
Minnesota	61	59	92	107	99	121	97	72	74	66	81	71	52	61	39
Mississippi	10	27	31	37	21	27	42	50	44	50	29	29	33	18	24
Missouri	63	80	80	68	72	84	66	68	63	73	58	55	54	64	46
Montana	12	20	9	22	21	24	24	18	24	27	34	15	25	18	16
Nebraska	21	27	30	30	32	35	34	27	26	25	26	24	33	19	13
Nevada	10	25	17	30	36	39	17	22	19	14	20	19	23	26	21
New Hampshire	16	17	27	27	35	33	25	21	19	16	33	29	27	20	23
New Jersey	41	52	85	81	89	85	101	90	76	72	61	71	51	54	31
New Mexico	24	27	29	52	51	65	46	47	56	49	47	49	35	40	31
New York	126	145	215	182	198	229	208	188	207	173	202	195	189	175	140
North Carolina	71	72	79	87	105	93	98	91	66	109	110	110	97	81	57
North Dakota	9	6	14	10	12	15	14	18	15	7	8	7	7	8	1
Ohio	144	149	187	219	255	237	202	206	187	214	203	217	199	155	162
Oklahoma	56	53	71	73	80	88	93	80	64	67	79	60	44	51	44
Oregon	37	42	71	67	67	80	68	62	56	63	69	79	72	48	45
Pennsylvania	150	112	162	172	178	194	165	151	148	171	165	160	148	132	113
Rhode Island	10	18	21	13	12	16	14	19	20	7	15	20	18	14	15
South Carolina	54	46	53	38	46	58	54	71	86	97	83	65	59	61	54
South Dakota	13	10	18	13	22	18	15	13	12	9	15	10	14	13	14
Tennessee	79	61	86	77	63	84	95	80	85	98	89	95	86	68	60
Texas	202	182	264	318	347	375	437	401	350	362	369	404	290	299	243
Utah	21	16	24	23	30	44	42	31	28	38	33	29	33	28	23
Vermont	10	7	9	13	11	18	10	11	5	10	11	5	12	5	7
Virginia	53	62	65	74	62	84	92	58	68	70	107	91	66	67	36
Washington	53	60	74	113	119	117	101	107	77	72	80	80	90	75	68
West Virginia	21	24	33	33	34	31	29	30	29	27	18	26	27	23	19
Wisconsin	63	81	67	109	123	108	108	113	103	101	90	110	89	100	70
Wyoming	9	6	21	11	15	11	17	10	16	14	10	13	5	13	9
NATIONAL	**3,189**	**3,312**	**4,104**	**4,577**	**4,894**	**5,144**	**4,906**	**4,453**	**4,265**	**4,608**	**4,564**	**4,566**	**4,036**	**3,662**	**3,141**
Puerto Rico	N/A	N/A	N/A	28	N/A	36	32	21	28	29	18	31	31	32	35
Source: NCSA, FARS 1975-1989 (Final)															

Table 43: Motorcycle Rider Fatalities by State from 1990-2004															
State	Calendar Year														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Alabama	30	38	34	32	31	33	31	29	34	32	43	43	43	52	74
Alaska	10	11	7	3	2	3	6	6	5	9	6	7	12	12	8
Arizona	78	60	64	66	66	65	69	57	60	73	90	73	94	109	119
Arkansas	32	23	22	21	25	17	25	19	28	22	27	38	38	56	57
California	583	515	325	310	295	260	232	235	204	236	276	299	324	383	432
Colorado	68	45	41	48	47	45	50	38	56	60	73	84	73	70	80
Connecticut	50	29	38	44	32	33	32	38	41	38	50	46	47	29	57
Delaware	10	7	14	8	6	6	10	8	6	7	5	10	7	11	8
Dist of Columbia	5	6	1	2	2	6	4	4	5	4	7	5	7	7	8
Florida	224	175	175	197	172	181	160	184	183	178	259	287	319	365	432
Georgia	63	60	56	52	55	44	47	56	66	59	61	95	85	103	111
Hawaii	20	18	16	26	29	21	20	14	21	17	18	18	24	19	21
Idaho	22	12	17	24	6	18	12	18	6	13	18	19	12	19	24
Illinois	152	111	104	115	148	101	109	83	99	103	126	140	100	143	157
Indiana	82	82	71	51	64	65	62	48	69	67	73	75	88	81	108
Iowa	37	40	29	38	30	43	17	28	28	30	32	39	41	51	37
Kansas	35	49	28	20	20	14	19	17	19	15	21	25	33	31	30
Kentucky	38	34	37	36	33	23	28	26	32	42	38	59	45	58	68
Louisiana	43	29	36	29	28	28	29	20	35	40	57	65	68	83	72
Maine	19	30	20	10	17	13	15	10	15	16	18	14	13	20	22
Maryland	45	49	56	45	29	26	25	26	35	44	50	53	51	56	69
Massachusetts	54	42	33	44	30	28	34	30	34	35	33	53	58	35	58
Michigan	87	85	57	58	72	83	61	63	56	83	86	97	87	81	81
Minnesota	51	42	28	34	47	36	42	25	41	30	37	42	47	64	52
Mississippi	25	15	15	12	16	15	10	13	18	18	22	30	26	42	40
Missouri	50	41	44	30	41	40	35	37	28	37	44	53	60	90	56
Montana	16	10	13	20	13	16	9	20	14	15	13	13	24	12	21
Nebraska	6	14	9	6	9	6	6	5	6	8	3	12	15	13	21
Nevada	22	18	19	15	20	23	19	24	13	17	21	21	35	26	52
New Hampshire	18	14	10	16	12	16	22	14	17	32	27	22	12	9	28
New Jersey	59	40	45	40	34	40	52	43	37	42	56	73	50	57	73
New Mexico	47	38	32	29	21	33	26	26	21	23	26	31	32	36	39
New York	143	124	119	115	88	92	96	114	111	113	119	147	141	154	150
North Carolina	79	71	68	86	68	76	72	62	83	106	98	109	123	108	134
North Dakota	8	9	5	7	2	6	5	3	3	3	4	4	1	4	9
Ohio	163	164	112	134	107	108	116	106	118	121	127	125	133	136	134
Oklahoma	43	37	30	34	31	40	25	33	25	33	24	39	39	43	78
Oregon	27	35	25	28	22	22	28	24	25	18	37	32	26	44	37
Pennsylvania	108	107	90	112	112	84	98	92	111	111	149	132	134	156	158
Rhode Island	14	16	11	9	7	6	3	5	5	12	12	6	9	13	10
South Carolina	59	44	57	57	50	50	54	60	73	65	82	82	90	89	88
South Dakota	23	9	11	12	19	14	9	8	9	10	20	17	19	19	26
Tennessee	62	50	69	61	59	48	50	56	42	59	69	78	75	90	93
Texas	197	131	130	151	124	128	115	117	152	182	229	243	256	342	285
Utah	18	23	17	15	21	11	21	22	14	23	24	28	18	22	31
Vermont	8	6	6	13	3	8	3	7	4	7	6	11	5	3	11
Virginia	59	42	38	32	33	35	36	39	42	38	43	45	54	56	57
Washington	61	43	47	37	35	37	41	28	51	38	37	55	54	59	72
West Virginia	15	24	19	19	21	26	10	8	21	24	17	21	29	30	27
Wisconsin	69	77	40	40	58	48	52	63	65	66	78	72	82	103	80
Wyoming	7	12	5	6	8	7	9	5	8	9	6	10	12	20	13
NATIONAL	**3,244**	**2,806**	**2,395**	**2,449**	**2,320**	**2,227**	**2,161**	**2,116**	**2,294**	**2,483**	**2,897**	**3,197**	**3,270**	**3,714**	**4,008**
Puerto Rico	32	25	27	30	32	32	26	27	27	35	51	47	60	56	63
Source: NCSA, FARS 1990-2003 (Final), 2004 (ARF)															

Table 44: Registered Motorcycles by State from 1995 to 2004										
State	Calendar Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Alabama	37,926	36,706	39,025	44,540	49,205	54,849	54,998	62,010	70,859	81,086
Alaska	12,917	13,122	13,467	13,695	14,924	16,107	16,788	18,173	19,615	21,134
Arizona	69,170	72,235	74,680	54,373	145,190	165,094	191,364	219,105	209,215	209,048
Arkansas	17,217	16,490	14,331	21,070	21,786	25,020	29,290	34,101	38,500	43,668
California	532,053	526,048	454,360	403,971	419,572	448,501	488,042	535,424	562,176	626,529
Colorado	88,120	94,217	95,162	97,236	95,027	98,297	194,856	1,201	8,013	8,411
Connecticut	48,965	48,328	48,537	50,594	53,521	54,046	51,883	62,061	63,071	64,754
Delaware	9,168	9,985	9,941	10,174	10,704	10,980	12,656	13,820	15,008	17,485
Dist of Columbia	1,623	1,600	1,627	1,562	1,489	1,476	1,472	1,465	1,516	1,601
Florida	190,112	203,334	209,473	221,966	235,716	255,210	305,461	345,490	392,420	461,935
Georgia	72,318	73,492	75,625	86,273	87,009	88,071	91,946	109,024	118,671	129,439
Hawaii	13,209	25,114	21,487	20,445	19,302	20,061	21,749	20,584	22,394	23,106
Idaho	33,489	34,034	35,069	34,530	40,779	42,151	39,272	42,703	43,951	49,578
Illinois	184,216	171,091	181,789	204,225	216,641	195,511	256,834	232,187	261,038	276,122
Indiana	96,394	96,518	98,476	102,848	109,472	117,837	127,374	135,552	144,310	153,566
Iowa	111,503	131,851	132,000	128,540	125,201	126,671	137,973	140,544	140,000	140,000
Kansas	43,120	48,835	48,054	47,634	49,682	49,867	51,811	53,687	56,356	61,678
Kentucky	32,996	36,603	38,658	39,901	41,905	44,003	46,206	48,508	50,932	53,478
Louisiana	36,776	37,072	38,049	39,638	42,908	48,244	50,507	53,935	57,275	55,846
Maine	25,972	26,768	28,166	28,117	30,953	28,899	32,808	31,021	34,923	38,712
Maryland	38,833	37,936	38,701	42,636	45,973	49,403	54,711	56,823	63,994	72,844
Massachusetts	74,243	90,844	88,800	99,583	103,110	106,718	114,965	129,663	130,355	136,887
Michigan	127,902	149,971	155,673	154,358	167,882	183,592	199,168	204,805	215,698	228,856
Minnesota	117,891	116,189	123,858	128,097	126,786	143,055	152,040	158,516	174,706	188,903
Mississippi	29,636	30,162	30,857	31,138	32,212	31,859	26,840	27,037	26,998	27,162
Missouri	54,939	54,118	55,527	53,653	57,329	60,940	64,513	64,179	73,828	77,519
Montana	20,930	20,868	21,406	21,582	22,216	26,511	26,481	29,748	66,017	47,967
Nebraska	18,951	18,596	18,063	18,662	19,631	21,159	23,076	25,349	27,233	28,671
Nevada	21,672	22,471	23,781	24,709	23,499	24,912	32,521	35,898	37,206	44,823
New Hampshire	49,445	51,890	47,312	46,040	47,656	48,651	53,321	57,389	59,692	66,319
New Jersey	88,634	91,995	94,243	100,564	105,547	111,853	125,747	134,034	140,383	149,911
New Mexico	31,180	31,578	31,392	32,364	30,669	28,554	28,269	34,467	32,544	36,294
New York	169,679	136,246	135,814	138,846	143,547	107,486	118,864	142,790	150,756	170,148
North Carolina	67,207	67,855	70,216	75,002	78,733	82,647	86,761	91,063	95,598	100,366
North Dakota	16,894	16,394	16,051	16,167	16,387	17,035	18,214	17,865	19,154	20,953
Ohio	218,502	219,719	220,092	229,306	240,590	254,666	269,082	271,112	286,378	298,652
Oklahoma	55,480	59,210	52,318	53,326	53,277	57,646	77,566	66,838	72,705	84,651
Oregon	61,236	60,841	62,836	64,506	66,609	69,468	72,522	74,453	75,149	75,453
Pennsylvania	171,335	178,527	183,116	191,073	200,829	215,737	238,433	249,916	268,990	292,196
Rhode Island	16,979	17,048	17,741	17,673	19,210	19,484	21,374	23,009	24,589	26,506
South Carolina	34,570	39,219	39,853	41,116	46,844	51,679	56,660	62,726	57,177	60,029
South Dakota	25,184	24,734	24,584	25,210	25,761	29,205	31,525	33,935	37,549	41,602
Tennessee	70,058	78,869	56,229	59,620	62,985	71,084	83,880	84,334	93,814	108,659
Texas	130,117	148,815	133,423	149,175	168,896	187,174	213,299	234,922	261,553	286,992
Utah	22,171	23,171	23,175	24,470	24,674	28,291	38,787	41,421	38,131	44,386
Vermont	18,113	18,256	18,856	16,684	17,663	21,740	24,194	26,527	26,332	28,304
Virginia	58,199	57,561	56,338	57,582	57,464	60,857	65,056	70,139	73,692	75,457
Washington	95,795	104,450	104,553	106,352	107,290	118,697	123,492	134,212	141,945	160,227
West Virginia	18,494	16,075	17,655	22,496	19,447	26,307	27,855	30,868	19,291	19,534
Wisconsin	168,937	169,594	190,673	170,329	192,806	179,576	209,486	204,732	240,519	232,808
Wyoming	16,559	14,954	15,261	15,799	15,925	19,187	21,064	24,791	27,816	30,615
NATIONAL	**3,767,029**	**3,871,599**	**3,826,373**	**3,879,450**	**4,152,433**	**4,346,068**	**4,903,056**	**5,004,156**	**5,370,035**	**5,780,870**
Puerto Rico	N/A	N/A	N/A	33,502	21,436	21,436	21,833	21,833	21,833	31,770
Source: FHWA										

Table 45: Motorcycle Rider Fatality Rate per 10,000 Registered Motorcycles by State from 1995 to 2004										
State	Calendar Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Alabama	8.7	8.4	7.4	7.6	6.5	7.8	7.8	6.9	7.3	9.1
Alaska	2.3	4.6	4.5	3.7	6.0	3.7	4.2	6.6	6.1	3.8
Arizona	9.4	9.6	7.6	11.0	5.0	5.5	3.8	4.3	5.2	5.7
Arkansas	9.9	15.2	13.3	13.3	10.1	10.8	13.0	11.1	14.5	13.1
California	4.9	4.4	5.2	5.0	5.6	6.2	6.1	6.1	6.8	6.9
Colorado	5.1	5.3	4.0	5.8	6.3	7.4	4.3	607.8	87.4	95.1
Connecticut	6.7	6.6	7.8	8.1	7.1	9.3	8.9	7.6	4.6	8.8
Delaware	6.5	10.0	8.0	5.9	6.5	4.6	7.9	5.1	7.3	4.6
Dist of Columbia	37.0	25.0	24.6	32.0	26.9	47.4	34.0	47.8	46.2	50.0
Florida	9.5	7.9	8.8	8.2	7.6	10.1	9.4	9.2	9.3	9.4
Georgia	6.1	6.4	7.4	7.7	6.8	6.9	10.3	7.8	8.7	8.6
Hawaii	15.9	8.0	6.5	10.3	8.8	9.0	8.3	11.7	8.5	9.1
Idaho	5.4	3.5	5.1	1.7	3.2	4.3	4.8	2.8	4.3	4.8
Illinois	5.5	6.4	4.6	4.8	4.8	6.4	5.5	4.3	5.5	5.7
Indiana	6.7	6.4	4.9	6.7	6.1	6.2	5.9	6.5	5.6	7.0
Iowa	3.9	1.3	2.1	2.2	2.4	2.5	2.8	2.9	3.6	2.6
Kansas	3.2	3.9	3.5	4.0	3.0	4.2	4.8	6.1	5.5	4.9
Kentucky	7.0	7.6	6.7	8.0	10.0	8.6	12.8	9.3	11.4	12.7
Louisiana	7.6	7.8	5.3	8.8	9.3	11.8	12.9	12.6	14.5	12.9
Maine	5.0	5.6	3.6	5.3	5.2	6.2	4.3	4.2	5.7	5.7
Maryland	6.7	6.6	6.7	8.2	9.6	10.1	9.7	9.0	8.8	9.5
Massachusetts	3.8	3.7	3.4	3.4	3.4	3.1	4.6	4.5	2.7	4.2
Michigan	6.5	4.1	4.0	3.6	4.9	4.7	4.9	4.2	3.8	3.5
Minnesota	3.1	3.6	2.0	3.2	2.4	2.6	2.8	3.0	3.7	2.8
Mississippi	5.1	3.3	4.2	5.8	5.6	6.9	11.2	9.6	15.6	14.7
Missouri	7.3	6.5	6.7	5.2	6.5	7.2	8.2	9.3	12.2	7.2
Montana	7.6	4.3	9.3	6.5	6.8	4.9	4.9	8.1	1.8	4.4
Nebraska	3.2	3.2	2.8	3.2	4.1	1.4	5.2	5.9	4.8	7.3
Nevada	10.6	8.5	10.1	5.3	7.2	8.4	6.5	9.7	7.0	11.6
New Hampshire	3.2	4.2	3.0	3.7	6.7	5.5	4.1	2.1	1.5	4.2
New Jersey	4.5	5.7	4.6	3.7	4.0	5.0	5.8	3.7	4.1	4.9
New Mexico	10.6	8.2	8.3	6.5	7.5	9.1	11.0	9.3	11.1	10.7
New York	5.4	7.0	8.4	8.0	7.9	11.1	12.4	9.9	10.2	8.8
North Carolina	11.3	10.6	8.8	11.1	13.5	11.9	12.6	13.5	11.3	13.4
North Dakota	3.6	3.0	1.9	1.9	1.8	2.3	2.2	0.6	2.1	4.3
Ohio	4.9	5.3	4.8	5.1	5.0	5.0	4.6	4.9	4.7	4.5
Oklahoma	7.2	4.2	6.3	4.7	6.2	4.2	5.0	5.8	5.9	9.2
Oregon	3.6	4.6	3.8	3.9	2.7	5.3	4.4	3.5	5.9	4.9
Pennsylvania	4.9	5.5	5.0	5.8	5.5	6.9	5.5	5.4	5.8	5.4
Rhode Island	3.5	1.8	2.8	2.8	6.2	6.2	2.8	3.9	5.3	3.8
South Carolina	14.5	13.8	15.1	17.8	13.9	15.9	14.5	14.3	15.6	14.7
South Dakota	5.6	3.6	3.3	3.6	3.9	6.8	5.4	5.6	5.1	6.2
Tennessee	6.9	6.3	10.0	7.0	9.4	9.7	9.3	8.9	9.6	8.6
Texas	9.8	7.7	8.8	10.2	10.8	12.2	11.4	10.9	13.1	9.9
Utah	5.0	9.1	9.5	5.7	9.3	8.5	7.2	4.3	5.8	7.0
Vermont	4.4	1.6	3.7	2.4	4.0	2.8	4.5	1.9	1.1	3.9
Virginia	6.0	6.3	6.9	7.3	6.6	7.1	6.9	7.7	7.6	7.6
Washington	3.9	3.9	2.7	4.8	3.5	3.1	4.5	4.0	4.2	4.5
West Virginia	14.1	6.2	4.5	9.3	12.3	6.5	7.5	9.4	15.6	13.8
Wisconsin	2.8	3.1	3.3	3.8	3.4	4.3	3.4	4.0	4.3	3.4
Wyoming	4.2	6.0	3.3	5.1	5.7	3.1	4.7	4.8	7.2	4.2
NATIONAL	**5.9**	**5.6**	**5.5**	**5.9**	**6.0**	**6.7**	**6.5**	**6.5**	**6.9**	**6.9**
Puerto Rico	N/A	N/A	N/A	8.1	16.3	23.8	21.5	27.5	25.6	19.8

Source: NCSA, FARS 1995-2003 (Final), 2004 (ARF), Motorcycle Registration -FHWA

7. APPENDIX B: Data Sources

The following sections give information relating to the four data sources used in the analysis.

7.1 Fatality Analysis Reporting System (FARS)

The National Center for Statistics and Analysis (NCSA) collects and analyzes data, conducts research, and disseminates statistical information to support efforts by NHTSA and the highway safety community aimed at reducing deaths, injuries, and economic losses resulting from motor vehicle crashes.

NCSA designed and developed the Fatality Analysis Reporting System (FARS) database, a national census of police-reported motor vehicle crashes resulting in fatal injuries. FARS compiles data from various sources on the location and circumstances of the crash, types of vehicles, and people involved. This system generates overall measures of highway safety, helps identify traffic safety problems, and provides a basis to evaluate the effectiveness of motor vehicle safety standards and highway safety programs.

FARS system became operational in 1975. It contains a census of fatal motor vehicle traffic crashes within the 50 states and the District of Columbia and Puerto Rico.

A motor vehicle crash is a transport incident that involves a motor vehicle in transport, is not an aircraft incident or water craft incident, and does not include any harmful event involving a railway train in transport prior to involvement of a motor vehicle in transport.

To be included in FARS, a crash must involve a motor vehicle traveling on a traffic way customarily open to the public, and result in the death of a person (either an occupant of a vehicle or a non-motorist) within 30 days of the crash. Data elements contain specific information including the age of the person, license status of the driver, roadway type, motorcycle engine size, and land use (urban/rural). These data elements can be used in determining trends relating to fatal crashes. Thus, the FARS system provides a basis to evaluate the effectiveness of motor vehicle safety standards and highway safety programs.

Additional information on FARS can be obtained from NHTSA's website at:
www-fars.nhtsa.dot.gov

7.2 Motorcycle Industry Council (MIC)

The Motorcycle Industry Council (MIC) is a nonprofit national trade association representing the motorcycle industry. MIC's purpose is to preserve and promote motorcycling and the motorcycle industry. This is accomplished through activities in government relations, statistics, communications, and technical and aftermarket programs. MIC has two offices, an Executive Office in Irvine, California, and a Government Relations Office in the Washington, DC, area.

More than 300 members represent manufacturers and distributors of motorcycles, scooters, parts and accessories, and members of allied trades, such as publishing companies, advertising agencies, insurance companies, and consultants. While dealers, clubs and individuals are not eligible for membership, MIC works with these groups on issues of mutual interest. Additional information can be obtained at: www.mic.org

7.3 Federal Highway Administration (FHWA)

FHWA is part of the U.S. Department of Transportation and is headquartered in Washington, DC, with field offices across the United States. FHWA performs its mission through these main programs:

The Federal Highway Program provides federal financial assistance to States to construct and improve the National Highway System, urban and rural roads, and bridges. The program provides funds for general improvements and development of safe highways and roads.

The Federal Lands Highway Program provides access to and within national forests, national parks, Indian reservations and other public lands by preparing plans, letting contracts, supervising construction facilities, and conducting bridge inspections and surveys.

To support these program areas, FHWA conducts and manages a comprehensive research, development, and technology program.

Each year FHWA brings together annual series of selected statistical tabulations relating to highway transportation in three major areas:

- Highway Use – the ownership and operation of motor vehicles;
- Highway Finance – the receipts and expenditures for highways by public agencies; and
- The Highway Plant – the extent, characteristics, and performance of the public roadways, roads, and streets in the United States.

Additional information can be obtained at: www.fhwa.dot.gov

7.4 U.S. Census Bureau

The U.S. Census Bureau is part of the Department of Commerce and located in Washington, DC. One of the missions of the Census Bureau is to collect census data every ten years and update the data each year. The sole purpose of the census is to secure general statistical information and compile the population by state, race, age groups, and several other categories. Additional information can be obtained at: www.census.gov

8. REFERENCES

Department of Transportation, National Highway Traffic Safety Administration, "*Traffic Safety Facts 2004: Motorcycle*", November 2005.

Department of Transportation, National Highway Traffic Safety Administration, "*Recent Trends in Fatal Motorcycle Crashes (DOT HS 809 271)*", June 2001.

Motorcycle Industry Council, "*Statistical Annual 2004*".

U.S. Bureau of the Census, *Historical National Population Estimates Internet Release Date, April 11, 2000* (revised June 28, 2000) 2000-2004 Population data are the July 1 estimates from the 2000 Census; *Release Date:* December 22, 2004

Department of Transportation, Federal Highway Administration, "*Motorcycle Vehicle Miles Traveled"*.

Department of Transportation, Federal Highway Administration, "*Registered Motorcycles*".

Department of Transportation, National Highway Traffic Safety Administration, "*Transitioning to Multiple Imputation – A New Method to Impute Missing Blood Alcohol Concentration (BAC) values in FARS (DOT HS 809 403)*", January 2003.

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