

An Analysis of Motorcycle Crashes 1996 to 2002

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Introduction

U.S. motorcyclist deaths dropped consistently from 1980 to 1997 but are now increasing considerably each year. In 1997, 2,116 motorcyclists were killed; in 2001, the number was up to 3,181, according to the National Highway Traffic Safety Administration (NHTSA). The rising number of motorcycles on the road is one contributing factor to the rising death toll; but, even with this increase taken into account, the number of crashes is up.

The rate of fatal U.S. crashes per 100 million miles traveled increased by 59 percent from 1997 to 2001, i.e., from 21.43 crashes per 100 million miles to 34.4 crashes per 100 million miles traveled. In 1997, one in 20 U.S. road fatalities was a motorcycle rider; in 2001, it was one in 13. NHTSA cites many possible causes for the increased motorcycle death rate, such as the fact that riders tend to be older. The average age of motorcyclists killed in crashes increased from 29.3 in 1990 to 36.3 in 2001. Another contributing factor is the increase in motorcycle engine sizes—an average of 769 cubic centimeters in 1990 to 959 cubic centimeters in 2001. According to the NHTSA, a weakening in mandatory motorcycle helmet laws plays a major contributing factor in the motorcycle death rates. Since 1997, five states—Arkansas, Texas, Kentucky, Louisiana, and Florida—removed mandatory helmet laws. NHTSA studies show a dramatic increase in fatalities in each of these states except Florida.

Motorcycle fatalities in Louisiana increased by 170% from 1997 to 2002. Injuries increased by 58% in the same time period. This report presents a detailed analysis of the Louisiana crash data to determine factors contributing to the increase in motorcycle fatalities. The crash data for 1996 to 2002 serve as the basis for this analysis. Some of the data for years prior to 1999 are not readily available because of archiving of the data.

In summary, Louisiana crash data show that a combination of factors contributed to the rise in motorcycle fatalities and injuries on Louisiana highways. There is convincing evidence that a decline in helmet use is the most important factor contributing to death and severe injury in motorcycle crashes. Other factors are an increase in alcohol use specifically on weekends and an increase in “pleasure” riders on weekends specifically in the evening hours in the last couple of years. These riders often do not have motorcycle endorsements and, thus, may have less experience in driving a motorcycle than riders who use their motorcycle regularly to drive to work.

Risk of Driving Motorcycles

In 1997 motorcycles represented 0.31% of all vehicles in crashes, while motorcycle fatalities represented 2.3% of all the fatalities in crashes. Thus, in 1997, the motorcycle riders were overrepresented by a factor of about seven. This factor doubled in the past five years. Today, motorcycles are overrepresented by a factor of about 15. Figure 1 depicts these statistics for the years 1996 to 2002. This graph shows that the motorcycle fatalities now represent 7.2% of all fatalities, while motorcycles only represent 0.52% of all vehicles in crashes. Although it is statistically evident that driving a motorcycle is a high risk adventure, this risk seems to have increased over the past five years.

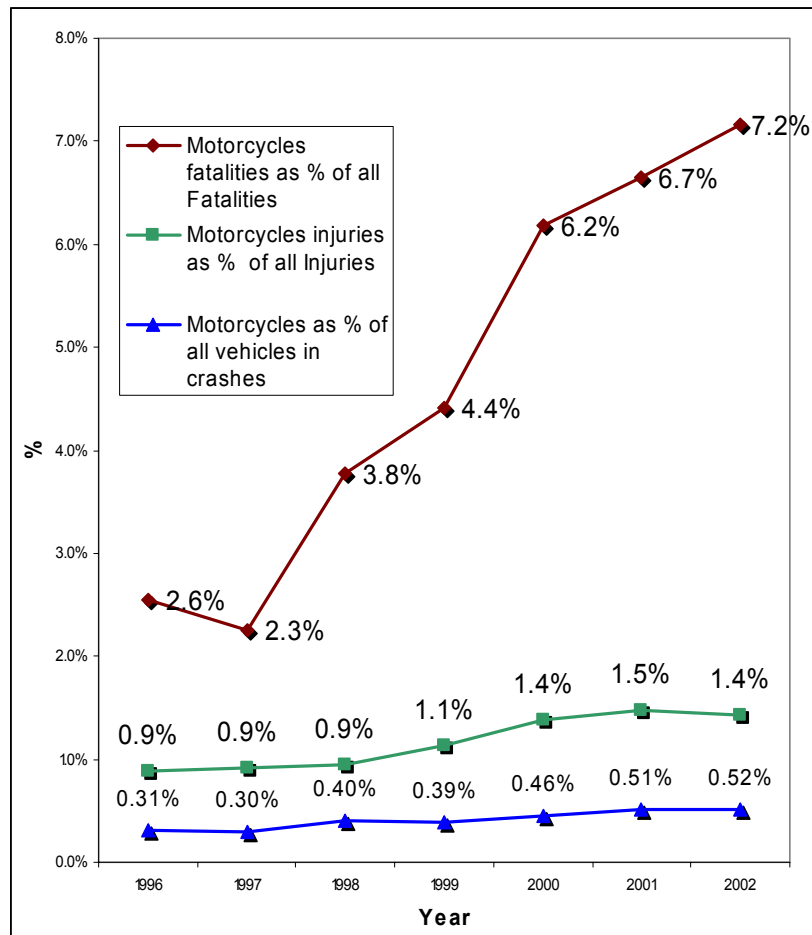


Figure 1: Percentage of Motorcycle Fatalities vs. Percentage of Motorcycles Among All Vehicle Crashes

Table 1 presents another view of the trend in motorcycle fatalities. While fatalities increased by 170% in the last 5 years (from 1997 to 2002), the number of motorcycles involved in crashes increased by 66% and the injuries increased by 58%. The fatality rate (fatalities per 100 crashes) has nearly doubled from 1997 to 2002-- 2.2% in 1997 to 3.9% in 2002.

Table 1: Motorcycle Crashes from 1996 to 2002

Year	# killed	# Injured	# of Motorcycles in Crashes	Fatal. per 100 Crash.
1996	23	768	955	2.4%
1997	21	793	954	2.2%
1998	35	737	889	3.9%
1999	42	835	1,138	3.7%
2000	58	1,071	1,388	4.2%
2001	63	1,159	1,528	4.1%
2002	62	1,214	1,585	3.9%
1 Year	-2%	5%	4%	-0.2%
5 Years	170%	58%	66%	1.5%

Effect of Helmet Use

While there are several factors possibly contributing to the increase in fatality rates, helmet use is of particular interest because of the change in the law in Louisiana. In many cases the helmet use is unknown; therefore, Table 2 (below) shows the helmet-usage rate in motorcycle crashes from 1999 to 2002 including only the documented cases. For instance, in 1999, the percentage of drivers in motorcycle crashes wearing a helmet

was 74% based on documented cases of helmet usage; but, helmet usage declines considerably after 1999 to about 50%. There is no information readily available for the unknown helmet-use cases for 1996 to 1998.

Table 2: Fatality Rate vs. Percentage Helmet Use 1999 to 2002

Year	# killed	# Injured	# of Motor-cycles in Crashes	Helmet Used	Helmet Not Used	Helmet Use Unknown	% Helmet Use based on Known Cases	Fatal. per 100 Crashes
1999	42	835	1,138	572	206	360	74%	3.7%
2000	58	1,071	1,388	490	501	397	49%	4.2%
2001	63	1,159	1,528	497	636	395	44%	4.1%
2002	62	1,214	1,585	598	589	398	50%	3.9%
1 Year Change	-2%	5%	4%	20%	-7%	1%	7%	-0.2%
3 Years Change	48%	45%	39%	5%	186%	11%	-23%	0.2%

Table 3 (below) shows the fatalities and injuries of **drivers only** for the crashes with known helmet use; this excludes all unknown cases in the calculations. It is evident from Table 3 that, for 1999 to 2002, on the average, the fatality rate tends to be 2.4 percentage points higher for motorcycle drivers not wearing a helmet and the severe injuries tend to be on the average 3.80 percentage points higher. When these percentages are applied to all motorcycle drivers, these percentages amount to 46 more fatalities and 73 more severe injuries than expected for motorcycle riders wearing helmets over the past four years. This means that, had all motorcycle drivers worn helmets when they crashed, we would have likely seen only 72 fatalities instead of 118 and 149 severe injuries instead of 222 over the past four years. It is important to recognize that crashes documented for helmet usage form the basis for these estimates. There are about 25% of crashes with unknown helmet use. For instance, if all

of the drivers in crashes with unknown helmet use were actually wearing helmets, the average fatality rate for helmet use would have been as low as 2.5% instead of the 3.7%. However, if all of the unknown cases were to be added to the “without helmet” column, the average fatality rate for crashes without helmet use could be as low as 3.7% instead of 6.1% over the past four years. In any case, it is evident that the fatality rate of motorcycle drivers without helmets is considerably higher than the fatality rate of motorcycle drivers with helmets. For 1996 to 1998 the fatality rate of motorcycle drivers without a helmet (2.0%) was somewhat lower than the fatality rate of motorcycle drivers with a helmet (3.2%). However, this difference (-1.2%) is small when compared to the 2.4% difference for 1999 to 2002. Note that severe injury data are only presented for 1999 to 2002 because the injury categories changed from five categories to three with the new crash report revision in 1999.

Table 3: Fatalities and Injuries by Helmet Usage

	Fatal		All		Percentage	
Year	With Helmet	Without Helmet	With Helmet	Without Helmet	With Helmet	Without Helmet
1996	15	4	489	355	3.1%	1.1%
1997	11	6	477	437	2.3%	1.6%
1998	22	11	519	309	4.2%	3.6%
1996-1998	48	21	1485	1089	3.2%	2.0%
1999	25	15	572	206	4.4%	7.3%
2000	21	29	490	501	4.3%	5.8%
2001	17	36	497	636	3.4%	5.7%
2002	17	38	598	589	2.8%	6.5%
1999-2002	80	118	2157	1932	3.7%	6.1%
	Severe Injury		All		Percentage	
Year	With Helmet	Without Helmet	With Helmet	Without Helmet	With Helmet	Without Helmet
1999	53	30	572	206	9.3%	14.6%
2000	37	56	490	501	7.6%	11.2%
2001	26	59	497	636	5.2%	9.3%
2002	50	77	598	589	8.4%	13.1%
Total	166	222	2157	1932	7.7%	11.5%

Cost of Motorcycle Crashes

Injuries and fatalities caused by motor vehicle crashes affect not only the drivers and occupants in crashes, but all citizens. Everyone bears the cost of crashes in the form of higher taxes, higher insurance premiums, and delays on highways. Table 4 (below) gives the inflation-adjusted unit cost of fatalities and injuries published by NHTSA for the year 2000. NHTSA uses these costs to estimate the total cost of traffic crashes.

Table 4: Unit Cost for Vehicle Crashes

(Source: NHTSA Technical Report, DOT HS 809 446)

	Average Cost per Person	Including Loss of Quality of Life
Fatal	\$ 1,020,889	\$ 3,516,866
Severe	\$ 754,427	\$ 1,637,346
Moderate	\$ 132,111	\$ 246,634
Complaint	\$ 6,542	\$ 79,386

Based on these figures, the 46 driver fatalities and 73 severe driver injuries incur an additional cost of \$47 million and \$55 million, respectively, for the citizens of the State of Louisiana. When the loss of quality of life through pain and suffering is included, this amount rises to \$163 and \$120 million, respectively. Hence, the total cost over the past four years due to motorcycle drivers not wearing helmets is about \$102 million. Adding the reduction of quality of life through pain and suffering, this cost increases to \$283 million. These costs will be even higher if motorcycle passengers are included. It should also be noted that the total cost of motorcycle crashes (including passengers) over the past four years in Louisiana was \$745 million in direct costs and \$1.9 billion including pain and suffering into the calculation.

Other Factors

There are other possible contributing factors to the increase in fatality rates. These include:

- The motorcycle endorsement among motorcycle fatalities was on the average 38%, i.e., most motorcycle drivers do not have a motorcycle endorsement.
- The average age of motorcycle fatalities was 36 years over the past four years.

- The average age of motorcycle fatalities not wearing a helmet was 34, while the average age of motorcycle fatalities wearing a helmet was 40.

Alcohol plays a more dominant role in motorcycle crashes now than it has in the past. Reports indicate a much higher percentage of alcohol-related crashes from 1999 to 2001 than from 1996 to 1998. Table 5 (below) depicts the trend in alcohol-related crashes from 1996 to 2001 (The data for 2002 are not available at this point in time).

Table 5: Trend of Alcohol-Related Motorcycle Crashes

Year	# killed	% Alcohol
1996	23	9%
1997	21	5%
1998	35	26%
1999	42	44%
2000	58	47%
2001	63	40%
2002	62	35%

Motorcycle crashes occur more frequently on weekends. Figures 2 and 3 (below) show the number of motorcycle crashes by day of week. The figures indicate that motorcycle crashes and fatal motorcycle crashes are about twice as high on weekends than any other day of the week. These charts report all crashes from 1999 to 2002.

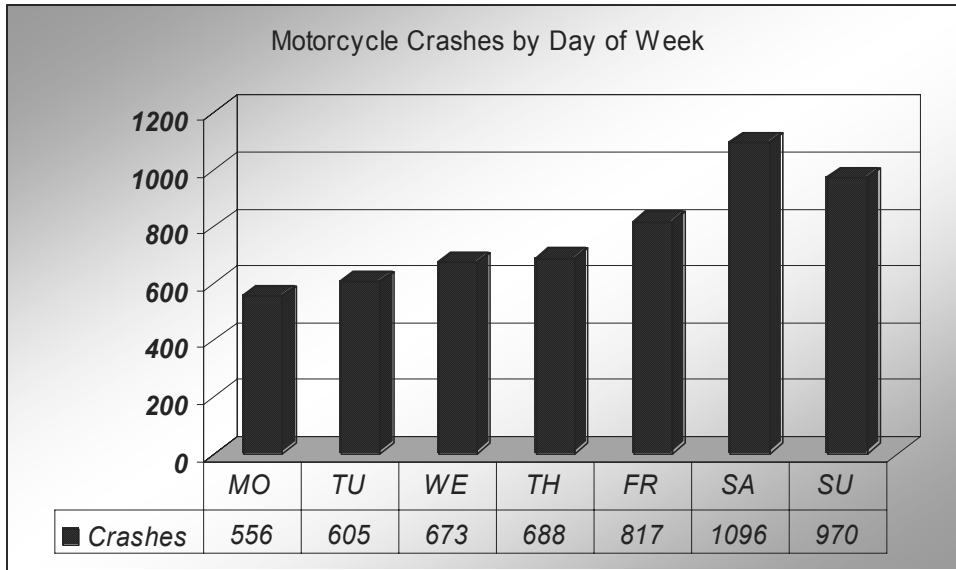


Figure 2: Motorcycle Crashes by Day of the Week

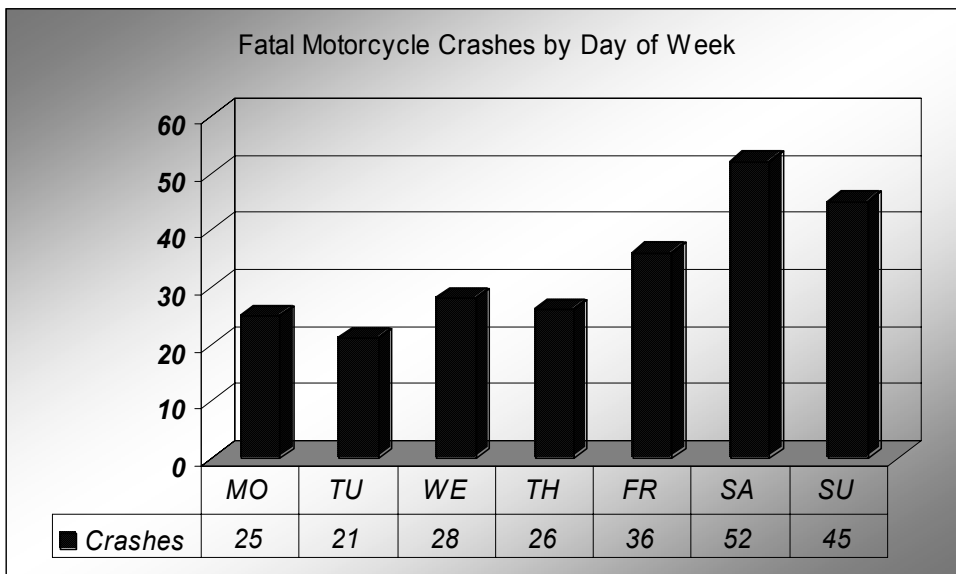


Figure 3: Fatal Motorcycle Crashes by the Day of the Week

The majority of motorcycle crashes occur in the late afternoon and evening hours (See Figure 4). This pattern is quite different from the pattern observed for all vehicle crashes. The number of all vehicle crashes is highest between 3pm and 6pm and declines very rapidly thereafter.

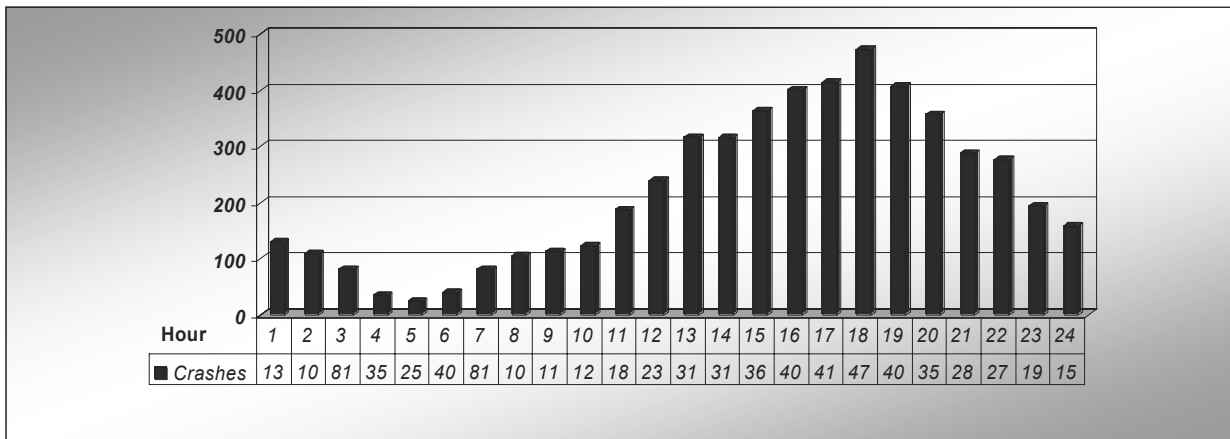


Figure 4: Motorcycle Crashes by Hour of Day

The fatal motorcycle crashes follow in general the pattern of all motorcycle crashes with the exception of a higher frequency of fatal crashes between 11pm and 2am than observed for all motorcycle crashes.

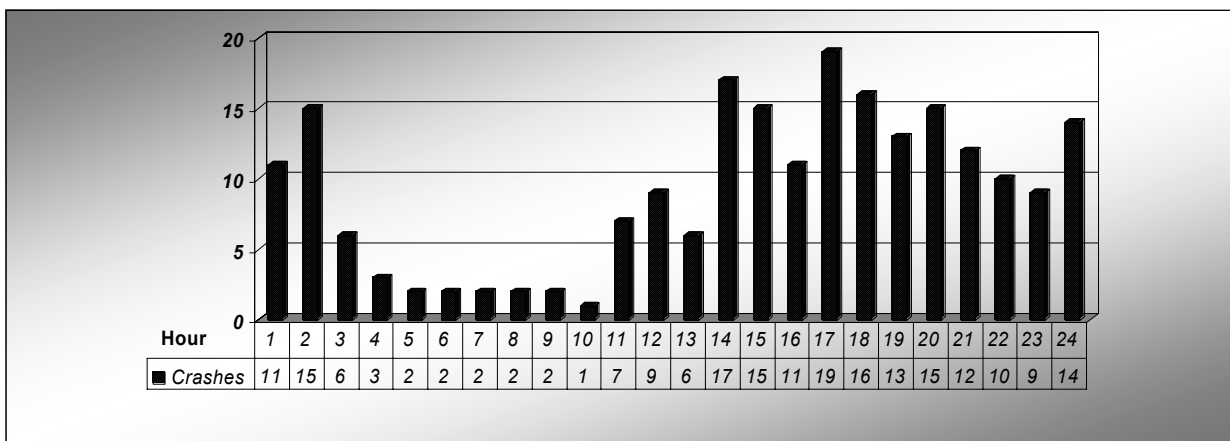


Figure 5: Fatal Motorcycle Crashes by Hour of Day

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