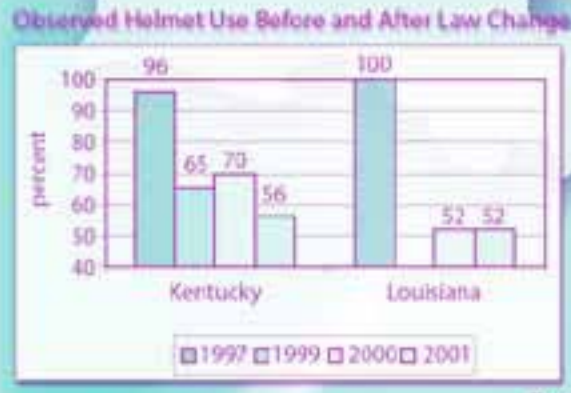
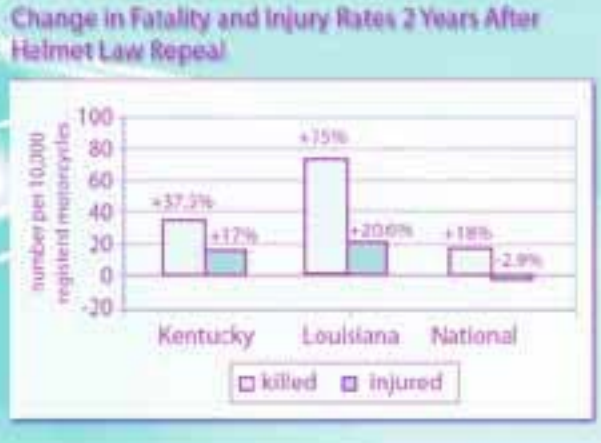
Evaluation of the Repeal of Motorcycle Helmet Laws in Kentucky and Louisiana





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16. Abstract

The 1998 universal motorcycle helmet law repeal in Kentucky and the 1999 repeal in Louisiana produced similar effects. Observed helmet use dropped from nearly full compliance under the laws to the 50 percent range without the laws. Motorcyclist fatalities increased in the near term by sizeable amounts - by over 50 percent in Kentucky and by 100 percent in Louisiana. Injuries also increased substantially in both states. At the same time, the number of registered motorcycles increased (by 20%), and vehicle miles traveled increased by approximately 6% (based on national numbers). Thus, some of the increase in fatalities in Kentucky and Louisiana were probably due to increased exposure.

In Kentucky, motorcyclists killed per 10,000 registered motorcycles averaged 6.4 in the two years just before the helmet law repeal and averaged 8.8 in the two years following its repeal, an increase of +37.5 percent. Persons injured per 10,000 registered motorcycles averaged 187 in the preceding two years and averaged 219 in the two years following its repeal, an increase of +17 percent. In Louisiana, the fatality rate averaged 4.5 in the two years prior to helmet law repeal and rose to 7.9 in the year following, an increase of +75 percent. The injury rate averaged 126 persons in the two years before the helmet law repeal and increased to 152 persons in the year following repeal of the universal motorcycle helmet law, an increase of +20.6 percent. For comparison purposes, the national fatality rate per 10,000 registered motorcycles increased 18% and injuries declined by 2.9%.

The experience in Kentucky and Louisiana is similar to the experience in Arkansas and Texas, two other states that repealed universal laws recently (1997). This leaves little doubt that such repeals have demonstrable negative safety consequences.

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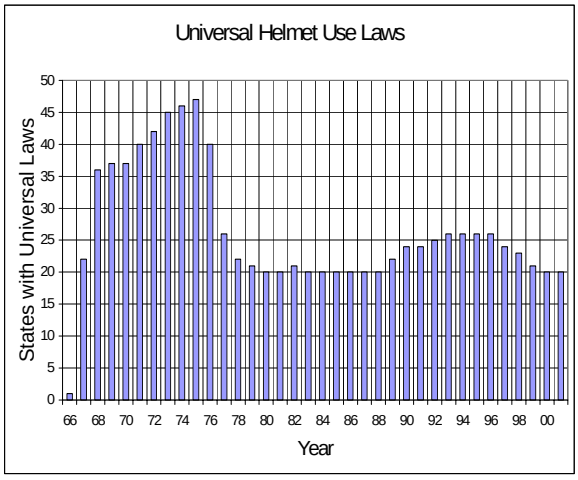
At the end of 2001, 20 states and the District of Columbia had laws requiring all motorcycle riders to wear helmets; 27 states had laws requiring helmet use only by riders under a certain age (usually 18); 3 states had no laws regarding motorcycle helmet use. Mandatory helmet use laws first came into being following the issuance of highway safety program standards in 1967. From the outset, the enactment of helmet laws has been a contentious issue in many states as public policy makers have debated the balance between personal freedoms and the societal costs of crashes. Those opposed to mandatory helmet laws generally argue that their individual rights are or will be infringed upon and that helmet use should be left to the choice of individual riders. Those who advocate for helmet laws note that helmets are effective in reducing injury severity and that society bears a significant portion of motorcycle crash costs, thereby establishing a public interest in requiring the use of reasonable safety equipment. Over the years, states have variously enacted, repealed, and reenacted universal, or all-rider, motorcycle helmet laws.



In 1998, Kentucky repealed its universal motorcycle helmet law and, in 1999, Louisiana repealed its law. These actions follow similar steps taken by Arkansas and Texas in 1997. More recently, Florida repealed its universal helmet law. This report examines data from Kentucky and Louisiana to assess the effects of their helmet law changes on helmet use and motorcyclist fatalities and injuries.

Kentucky first enacted a motorcycle helmet law applicable to all riders in 1968. It was this law that was amended effective July 1998 to require helmet use only by:

- Motorcycle operators and passengers under the age of 21;
- Motorcycle operators who possess a motorcycle instruction permit; and
- Motorcycle operators who have had a motorcycle operator's license for less than one year.

(Continue on additional pages)

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The originally amended law also required helmet use by those who did not have at least $10,000 of medical insurance coverage. Owners of registered motorcycles were to provide proof of insurance to their county clerks who would issue a helmet use exemption sticker to be displayed on the insured's motorcycle. The medical provision was repealed effective July 2000.

Louisiana first adopted a motorcycle helmet law applicable to all riders in 1968. That law was amended in 1976 to require helmet use only by riders under the age of 18. Then, in 1982 the state reenacted a universal helmet law. It was this latter law that was amended effective August 1999 to require helmet use only by:

- Motorcycle operators and passengers under the age of 18; and
- Riders 18 and older who do not have medical insurance coverage of at least $10,000.

Observed Helmet Use

Based on statewide observational surveys, motorcycle helmet use decreased substantially following repeal of the universal helmet laws. In Kentucky, in the last full year under the law (1997), observed helmet use was 96 percent. In the first year following repeal (1999), helmet use was measured at 65 percent. It stood at 70 percent in 2000 and at 56 percent in 2001. In Louisiana, full compliance was recorded in the last full year under the universal helmet law (1998). In 2000 and 2001, helmet use was measured at 52 percent.

Survey Date	Kentucky	Louisiana
Under Universal Helmet Law	96%	100%
1999	65	-
2000	70	52
2001	56	52

These results are similar to what occurred in Arkansas and Texas. Both of these states recorded 97 percent helmet use in the last full year of their laws. Use dropped to 52 percent in Arkansas and to 66 percent in Texas following their universal law repeals.

Fatal Crashes and Fatalities

The number of crashes in which a motorcyclist was killed and the numbers of riders killed increased in both Kentucky and Louisiana following repeal of their universal helmet laws. In Kentucky, in the two years prior to repeal, an average of 23 fatal crashes claimed 24 motorcyclists. In the two full years following repeal, there were an average of 36 fatal crashes and 38 motorcyclists killed.

In Louisiana, in the two years prior to repeal, an average of 26 fatal crashes and fatalities took place. In the two full years following repeal, there were an average of 54 fatal crashes and 55 motorcyclists killed.

Year	Kentucky		Louisiana	
	Fatal Crashes	Motorcyclists Killed	Fatal Crashes	Motorcyclists Killed
1996	22	24		
1997	24	24	19	19
1998	26	27	33	34
1999	38	40	40	40
2000	35	36	54	57
2001	n/a	n/a	54	54

As shown in the following table, motorcycle fatal crashes and motorcyclist fatalities also increased in Arkansas and Texas following repeals of their universal helmet laws, although the effect was smaller in Arkansas than has been seen elsewhere.

Year	Arkansas		Texas	
	Fatal Crashes	Motorcyclists Killed	Fatal Crashes	Motorcyclists Killed
1995	14	14	117	124
1996	20	24	107	110
1997	18	18	109	112
1998	26	28	144	147
1999	20	21	170	174

Comparing the two-year averages of motorcyclist fatalities after the law changes with the two year averages before the law changes shows:

Kentucky	+ 58%	Arkansas	+29%
Louisiana	+108%	Texas	+37%

It should be noted that during this same time frame motorcycle fatalities in the U.S. also increased by 50.3%. Motorcycle registrations increased from 1996 to 2000 by 12% and motorcycle miles traveled increased by 5.6% (million VMT). Thus, it is likely that some of the increase in fatalities seen in these States was due to these national trends (increased exposure).

Injuries

Kentucky motor vehicle injury crash data for motorcycle involvements in injury crashes and injuries show that in the two full years prior to the helmet law repeal (1996-1997), there was an average of 573 injury crashes involving motorcycles while in the two post repeal years(1999-2000) there was an average of 785 injury crashes; a 37 percent increase. The average number of injuries involving motorcycles increased by 34 percent, from 703 in 1996-1997 to 942 in 1999-2000.

Louisiana motorcycle injury crashes and motorcyclist injuries show that in the last two full years of the universal helmet law (1997-1998), an average of 687 injury crashes took place resulting in 741 motorcyclist injuries. In 2000, injury crashes and injuries increased by more than 40 percent, to 977 and 1,011 respectively.

Year	Kentucky		Louisiana	
	Injury Crashes	Injuries	Injury Crashes	Injuries
1996	581	711	-	-
1997	565	695	737	790
1998	647	796	637	692
1999	774	934	759	871
2000	797	951	977	1101

Data from Arkansas and Texas regarding motorcyclist injuries show that in Arkansas, the number of riders injured increased from 444 in the year before the state's helmet law repeal to 551 in the year after, a 24 percent increase. In Texas, injuries rose from 3,279 to 3,356, a marginal increase of 2 percent.

Year	Arkansas Motorcyclists Injured	Texas Motorcyclists Injured
1996	444	3279
1997	488	3034
1998	551	3356

Arkansas data are EMS cases and exclude Little Rock.

Fatality and Injury Rates

In Kentucky, motorcyclists killed per 10,000 registered motorcycles averaged 6.4 in the two years just before the helmet law repeal and averaged 8.8 in the two years following its repeal, an increase of +37.5 percent. Persons injured per 10,000 registered motorcycles averaged 187 in the preceding two years and averaged 219 in the two years following its repeal, an increase of +17 percent.

Kentucky Motorcycle Registrations and Crash Rates

Year	Registered Motorcycles	Motorcyclists Killed per 10,000 Registered	Persons Injured in Motorcycle Crashes per 10,000 Registered
1996	36,603	6.6	194.2
1997	38,658	6.2	179.8
1998	39,901	6.8	199.5
1999	41,905	9.5	222.9
2000	44,003	8.2	216.1

In Louisiana, the fatality rate averaged 4.5 in the two years prior to helmet law repeal and rose to 7.9 in the year following, an increase of +75 percent. The injury rate averaged 126 persons in the two years before the helmet law repeal and increased to 152 persons in the year following repeal of the universal motorcycle helmet law, an increase of +20.6 percent.

Louisiana Motorcycle Registrations and Crash Rates

Year	Registered Motorcycles	Motorcyclists Killed per 10,000 Registered	Persons Injured in Motorcycle Crashes per 10,000 Registered
1997	60,042	3.2	131.6
1998	57,189	5.9	121.0
1999	64,075	6.2	135.9
2000	72,445	7.9	152.0

Nationally, motorcyclists killed per 10,000 registered motorcycles increased 18% and injuries declined by 2.9% from 1997 to 2001. Thus, the increases in fatalities in Kentucky and Louisiana were more than twice the national average increase and the increase in injuries even greater.

The next table shows that the fatality rate in Arkansas did not change appreciably from before to after the repeal of the state's universal motorcycle helmet laws. In the two years before the law's repeal, the rate averaged 11.3 and it averaged 11.4 in the two years after repeal. In Texas, motorcyclists killed per

10,000 registered motorcycles averaged 8.4 in the two years before helmet law repeal and 10.0 in the two years after repeal.

Year	Fatalities per 10,000 Registered Motorcycles	
	Arkansas	Texas
1995	8.1	9.5
1996	14.6	7.4
1997	12.6	8.4
1998	13.3	9.8
1999	9.6	10.3

Limitations of Study

Data collected at the national level show that both vehicle miles traveled (VMT) and registrations have been increasing for motorcycles in recent years. Motorcycle fatalities have also been increasing since 1997. National fatality rates per 10,000 registered motorcycles and per VMT have increased by 18% and 59% over this time period. The increase in motorcycle fatalities and injuries in recent years, may be due to the fact that there are more motorcycles on the road, traveling more miles, thus increasing their exposure to harmful events. The VMT measure, provided by the Federal Highway Administration, is a good indicator of trends from year to year, but cannot be broken down reliably to the individual state level for motorcycles. This study reports motorcycle fatalities by VMT, for the nation as a whole, but not for either Kentucky or Louisiana.

To calculate the effect of fatalities by the number of riders, annual motorcycle registration data from Kentucky and Louisiana were used to calculate fatality and injury rates. Registrations increased by 20% in both States. The fatality rate by vehicle registrations increased after the repeal of each state's universal motorcycle helmet law by much more than the number of registrations or the national rate. The injury rate by vehicle registrations increased at approximately the same rate as did the registrations.

Conclusions

The 1998 universal helmet law repeal in Kentucky and the 1999 repeal in Louisiana produced effects similar to each other. Observed helmet use dropped from nearly full compliance under the law to the 50 percent range without the law. Motorcyclist fatalities increased in the near term by sizeable amounts - by over 50 percent in Kentucky and over 100 percent in Louisiana. Injuries also increased substantially in both states. The rates of fatalities per registered motorcycle increased in both states following the helmet law repeals, +37 percent and +75 percent.

The experience in Kentucky and Louisiana is also similar to what occurred in Arkansas and Texas, two other states that have repealed universal laws in recent years (1997), leaving little doubt that such repeals have demonstrable negative safety consequences. The weight of the evidence is that helmets reduce injury severity, that repeal of helmet laws decreases helmet use, and that states that repeal universal helmet laws experience increased motorcyclist fatalities and injuries.

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I. INTRODUCTION

Kentucky in 1998 and Louisiana in 1999 repealed their laws requiring motorcycle helmet use by all riders. These actions follow recent helmet law repeals in Arkansas and Texas that took place in 1997.

This report examines data from Kentucky and Louisiana to assess the effects of the helmet law repeals on helmet use and motorcyclist fatalities and injuries. Following this introduction, the report is organized as follows:

- Chapter II, Background, describes the legislative history of motorcycle helmet laws in the U.S. and reviews the literature on the effects of helmet use and helmet use laws.

- Chapter III, National Trend, provides national data on trends in motorcycle registrations, travel and casualties.

- Chapter IV, Effects of the Law Change in Kentucky, describes the effect of Kentucky's law change on helmet use, fatalities, injuries and casualty rates per motorcycle registrations.

- Chapter V, Effects of the Law Change in Louisiana, provides similar descriptions for Louisiana.

- Chapter VI, Crash Descriptions, presents narrative descriptions of the fatal motorcycle crashes that took place in Kentucky and Louisiana immediately following the helmet law changes in these two states.

- Chapter VII, Discussion, briefly discusses the finding of the study.

- Chapter VIII, References.

- Appendix, State Helmet Law History, summarizes the history of motorcycle helmet laws in each state.

II. BACKGROUND

In recent years, several states have eliminated the legal requirement that all motorcyclists wear protective helmets when riding. Effective August 1, 1997, Arkansas changed its motorcycle helmet law to require helmet use only for riders under age 21, and effective September 1, 1997, Texas required helmet use only for riders under age 21 and for older riders who have not completed a rider education course or who do not have at least $10,000 medical insurance coverage. Kentucky also repealed its universal helmet law. Effective July 15, 1998, that state required helmet use only for riders under age 21, riders operating with a learner's permit or licensed but with less than one year of riding experience. Effective August 15, 1999, Louisiana repealed its universal helmet law, thereafter only requiring riders under the age of 18 and those without at least $10,000 of medical insurance coverage to wear helmets. Florida is the most recent state to eliminate its universal helmet law, effective July 1, 2000.

The present work evaluates the effects of the helmet law changes in Kentucky and Louisiana. It follows a recently completed examination of the law changes in Arkansas and Texas (Preusser et al., 2000). To provide the appropriate context for the results, this chapter reviews the history of motorcycle helmet use laws in the United States and summarizes the effects of enacting, amending, and repealing these laws. The material is an update of that originally reported by Preusser et al. (2000).

LEGISLATIVE HISTORY

1966-1975: Most States Enact Universal Helmet Use Laws in Response to a Federal Requirement

Prior to 1966, no state had enacted a motorcycle helmet use law. The Highway Safety Act of 1966 (P.L. 89-564) changed this situation abruptly. The Act required the Secretary of Transportation to set uniform standards for state highway safety programs. One of these standards, issued in 1967, dealt with motorcycle safety. It included the requirement that states adopt universal helmet use laws -- laws that mandate helmet use by all motorcycle riders. States that failed to comply would lose a portion of their federal-aid highway construction funds.

States immediately began to enact and implement universal helmet laws. Twenty-two states had universal helmet use laws in effect by the end of 1967 and 14 more states added laws in 1968. By 1975, 47 states and the District of Columbia had adopted universal helmet use laws.

From the first, helmet use laws generated controversy. The Illinois law, effective in 1967, was repealed in 1969 after being declared unconstitutional by the Illinois Supreme Court.

Michigan enacted a universal helmet law in 1967, repealed it in 1968, and enacted it again in 1969. Kansas enacted a universal helmet law in 1967, amended it to cover only riders under 21 in 1970, and reinstated universal coverage in 1972. Oklahoma did likewise, enacting a universal helmet law in 1967, amending it to cover only riders under 21 in 1969, and reinstating universal coverage in 1975 (finally amending it again in 1976 to cover only riders under 18).

1976-1980: Half the States Repeal or Amend their Universal Helmet Use Laws after Congress Eliminates Sanctions

In 1975, under the authority of the Highway Safety Act of 1966, the Secretary of Transportation was prepared to penalize the three states (California, Illinois, and Utah) still lacking universal helmet laws by withholding the specified portion of their federal-aid highway construction funds. This action prompted Congress to revisit the Highway Safety Act. Congress eliminated the motorcycle helmet law requirement and withdrew the potential withholding of funds from states without such laws. As a result, many states reconsidered their laws. By 1978, 25 states had repealed their universal helmet laws or amended them to cover only riders below a specified age (typically 18). Two more states did the same in 1979 and 1980, reducing the total number of states with universal helmet laws to 19 and the District of Columbia.

1981-1988: Period of Stability

In contrast to the preceding 15 years, the 1980s saw little legislative activity on the issue. In 1983, Wyoming became the twenty-eighth state to repeal its universal law and require use only by riders under 18. In 1982, Louisiana re-enacted the universal use law it had repealed in 1976.

1989-1994: Gradual Re-enactment and Congressional Encouragement

Oregon and Texas re-enacted universal helmet use laws in 1989. Nebraska and Washington followed suit in 1990, as did Maryland in 1992. California, a state with more than 10 percent of the nation's registered motorcycles and one of only two states that had never had a helmet use law applicable to adults, implemented a universal law in 1992, following extensive debate and publicity. From 1992 to 1996, 25 states and the District of Columbia had universal helmet use laws in effect. Another 22 states had laws applicable only to young riders (usually those under the age of 18), while three states (Colorado, Illinois, and Iowa) had no use helmet law at all.

During this time, Congress once again took an interest in motorcycle helmets. In April 1990, Senators Moynihan and Chafee requested the United States General Accounting Office (GAO) to review and evaluate the available information on helmet effectiveness in preventing deaths and serious injuries, the effect of helmet laws on helmet use and motorcycle rider

fatalities, and the costs to society of injuries to unhelmeted motorcyclists. GAO conducted the requested review and reported to Congress in July 1991. The report concluded that "helmet use reduces fatality rates and reduces injury severity among survivors of motorcycle accidents" and that "universal helmet laws have been very effective in increasing helmet use, virtually doubling use compared with experience without a law or with a limited law applying only to young riders. Under universal helmet laws, most states experienced 20 to 40 percent lower fatality rates than during periods without laws or under limited laws." The report recommended that "because there is convincing evidence that helmets save lives and reduce society's burden of caring for injured riders, the Congress may wish to consider encouraging states to enact and retain universal helmet laws. The Congress could return to the use of penalties [as in the 1966 Act], use incentives (e.g., making additional funds available to states that have universal laws), or use a combination of penalties and incentives" (GAO, 1991, p. 31).

With the GAO report findings as support, Congress used both *a carrot and a stick* to promote universal helmet laws as part of the Intermodal Surface Transportation Efficiency Act of 1991, commonly known as ISTEA. The *carrot* was additional federal funding for states. ISTEA provided special "incentive" grants to states with both universal motorcycle helmet laws and passenger vehicle safety belt use laws. A state qualified for a first-year grant by having these two laws in effect. In subsequent years, the state also was required to exceed minimum motorcycle helmet and safety belt use levels (helmet use of 75 percent in the second year and 85 percent in the third year). Twenty-three states and the District of Columbia received grants for one or more of the fiscal years 1992, 1993, and 1994 for which the grants were authorized.

As the *stick*, ISTEA provided that states without both a universal motorcycle helmet law and a safety belt use law by October 1, 1993, would have a portion of their fiscal year 1995 Federal-aid highway funds transferred to their highway safety programs. As most states had safety belt use laws in place, the provision's main goal was to encourage states to enact universal helmet laws.

The *carrot and stick* had little effect on state motorcycle helmet laws. Maryland has been the only state to enact a universal helmet law since 1992. At the end of fiscal year 1995, twenty-three states had safety belt use laws but did not have universal helmet laws by October 1993 and consequently saw the specified portion of their Federal-aid highway funds transferred in that fiscal year. Three additional states had a universal helmet law but lacked a safety belt use law, and two states lacked both laws.

1995-2001: Congress Acts Again; Five States Drop Universal Helmet Laws

In November 1995, as part of the National Highway System Designation Act, Congress repealed the ISTEA transfer provision for states lacking universal helmet laws, effective with

fiscal year 1996. Efforts to amend or repeal universal helmet laws grew in many states and, as noted, Arkansas, Florida, Kentucky, Louisiana and Texas repealed their laws. At the end of 2001, 20 states and the District of Columbia had universal helmet laws in effect. Another 27 states had laws applicable only to some riders (typically riders under a specified age), while three states had no helmet law at all.[1] Figure 1 shows the number of states with a universal helmet law in effect at the end of each year, beginning in 1966. The shaded states in Figure 2 are those with a universal helmet law in effect at the end of 2001.

Figure 1. Universal Helmet Law States

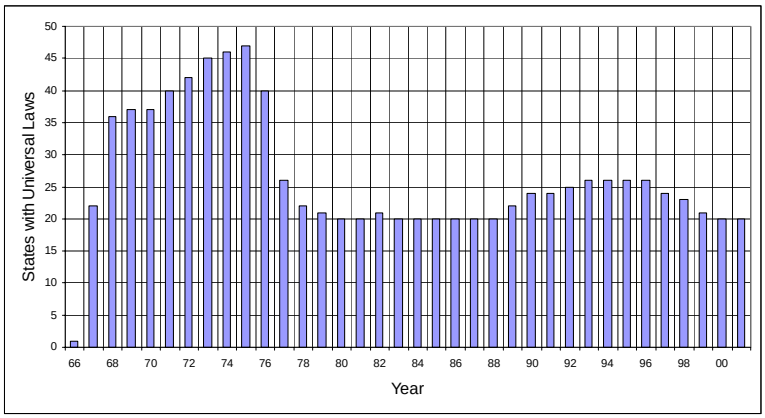
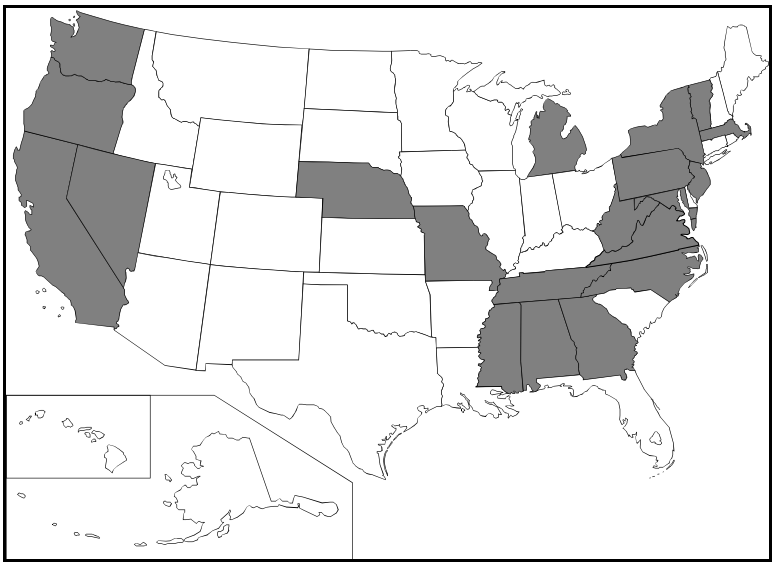


Figure 2. Helmet Law Status in 2001



Highlighted states have universal helmet laws.

[1] The states with universal helmet laws at the end of 2001 were AL, CA, GA, MD, MA, MI, MS, MO, NB, NV, NJ, NY, NC, OR, PA, TN, VT, VA, WA and WV. States with no helmet laws were CO, IL and IA. See the Appendix for State Helmet Law History.

STUDIES OF HELMET USE LAW EFFECTS

The effects of state helmet law enactment and repeal have been studied in great detail. GAO's 1991 review summarizes all studies available in 1990. The GAO study and studies that have appeared since the GAO review are discussed below.

1991 GAO Review of Helmet Use Law Studies

GAO conducted a broad search for studies as of 1990 and discovered 46 that were published between 1975 and 1990, used data from the United States, and "contained original data or original analyses and met minimum criteria for methodological soundness" (GAO, 1991, p. 2).

GAO found nine studies that included data on helmet use in states with and without universal laws. These studies:

> *"reported that helmet use under universal laws ranged from 92 to 100 percent, while without a law or under a limited law [requiring only some riders to wear helmets], helmet use generally ranged from 42 to 59 percent. These data also indicated low helmet use among young riders in states with limited helmet laws"* (GAO, 1991, p. 4).

GAO found twenty studies that compared motorcycle rider fatality rates under universal helmet laws with rates during periods before enactment or after repeal of these laws.

> *" These studies consistently showed that fatality rates were lower when universal helmet laws were in effect; most rates ranged from 20 to 40 percent lower. Several of these studies compared periods before a helmet law was enacted, while it was in effect, and after it was repealed. They showed that the decreases in fatality rates when laws were enacted were matched by comparable increases when the laws were repealed"* (GAO, 1991, p. 4)].

GAO found thirteen studies with data on some aspect of the societal costs of motorcycle accidents.

> *" These studies indicated that nonhelmeted riders were more likely to (1) need ambulance service, (2) be admitted to a hospital as an inpatient, (3) have higher hospital charges, (4) need neurosurgery and intensive care, (5) need rehabilitation, and (6) be permanently impaired and need long-term care"* (GAO, 1991, p. 4).

Studies Since 1990

Several studies have appeared since GAO's review. Some investigate the effects of enacted helmet laws in several states. Others provide new data on the effectiveness of helmets in preventing injury.

Arkansas was among the first group of states that adopted a universal helmet law in 1967. That law was repealed as of August 1, 1997. Preusser et al. (2000) found that following the law repeal, helmet use declined from 97 percent to 52 percent while fatalities and injuries increased**.** The percentage of cases involving head injury also increased.

Arkansas has relatively few motorcyclists fatalities per year. In the three years before the repeal (1994-1996) the state experienced an average of 21 motorcyclists killed per year. This increased to 25 killed per year in the three years after the law change (1998-2000).

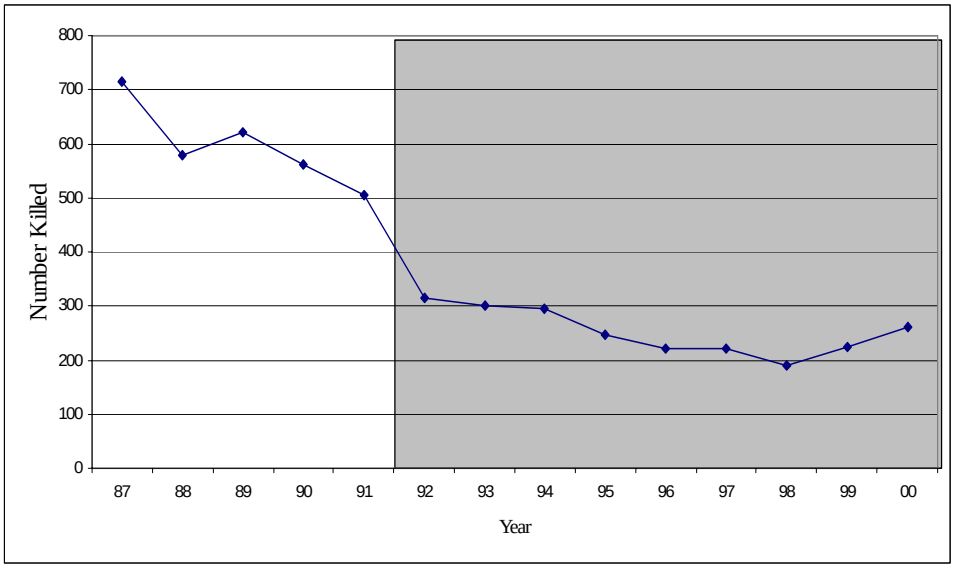
California's universal helmet law became effective in January 1992. Kraus et al. (1995) observed helmet use at 60 locations in seven California counties, twice before and four times after California's law became effective. They concluded that helmet use increased from about 50 percent in 1991 to more than 99 percent in 1992.

Kraus et al. (1994) compared California's motorcycle crash experience in 1991, before the law, with 1992, after the universal law. Motorcycle fatalities statewide decreased 37 percent in 1992 compared with a year earlier. The fatality rate per registered motorcycle decreased 26 percent.

There is now considerably more data regarding motorcycle fatalities in California since its adoption of a universal helmet law. In the five years immediately before the universal law (1987-1991), the annual average of motorcyclists killed was 596. In the five years following adoption (1992-1996), the average was 274, a 54 percent decrease. Figure 3 shows the trend in the state's motorcyclist fatalities over the 1987-2000 period. Prior to the adoption of the universal helmet law, fatalities had declined from 716 in 1987 to 505 in 1991. A sharp decline was then experienced following enactment of the law. This was followed by gradual declines through 1998, then increases in 1999 and 2000, mirroring national trends.

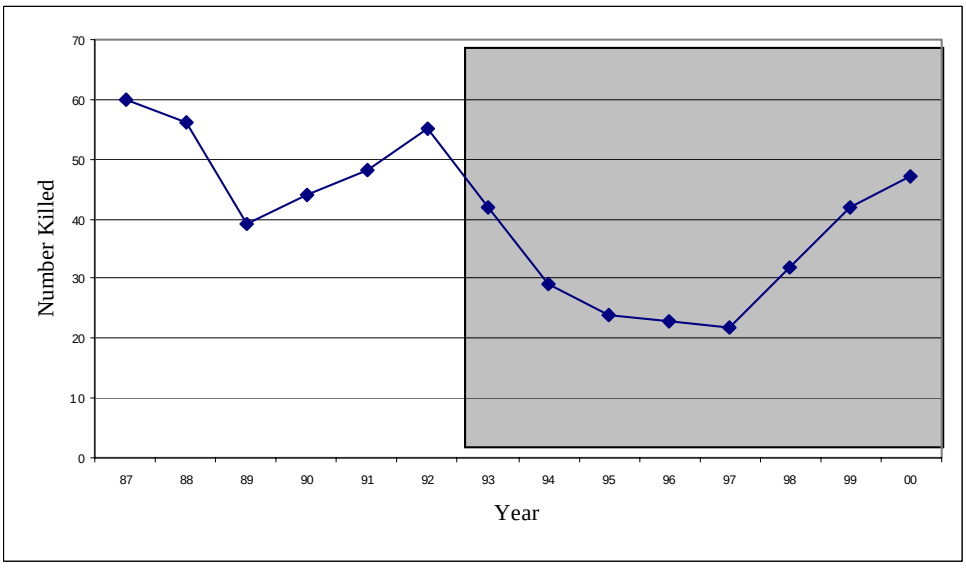
Kraus and Peek (1995) studied injured motorcyclists treated at 18 hospitals in 10 California counties between January 1, 1991 and December 31, 1993 (2,037 patients in 1991, before the law, and 2,753 in 1992 and 1993, after the law). Helmet use among these injured motorcyclists rose from 30 percent in 1991 to 86 percent in 1992 and 88 percent in 1993. Both the severity and number of head injuries per rider decreased after the law.

Figure 3. California Motorcyclists Killed, 1987-2000 (Source: FARS)



Maryland's universal helmet law was adopted in 1992. Mitchell et al. (2001) used autopsy records to study the effects of the law. They reported that there was a 36 percent decline in the number of motorcyclist fatalities in the 33-month period immediately following the law compared to the 33 months just prior to the law. Helmeted motorcyclists were significantly less likely to have died from traumatic brain injury as compared to non-helmeted motorcyclists. In the five years prior to the law's adoption (1987-1991) the state averaged 49 motorcyclist fatalities per year. In the five years after the law's passage (1993-1997) the state averaged 28 motorcyclist fatalities. However, as shown in Figure 4, fatalities have been on the increase in recent years.

Figure 4. Maryland Motorcyclists Killed, 1987-2000 (Source: FARS)



Nebraska's universal helmet law became effective in January 1989; a previous universal law had been declared unconstitutional by the Nebraska Supreme Court and was repealed in 1977. Mulleman, Mlinek, and Collicott (1991) observed a 26 percent reduction in crashes per registered motorcycle in 1990, compared to the five previous years and to five adjoining states without universal helmet laws. They also studied all motorcyclists with reported crash injuries in two urban counties during 1988 and 1989 (421 in 1988 and 250 in 1989). They found that the universal law produced sharp declines in the numbers and rates of injuries, hospital transports, hospital admissions, severe injuries to the head, and deaths.

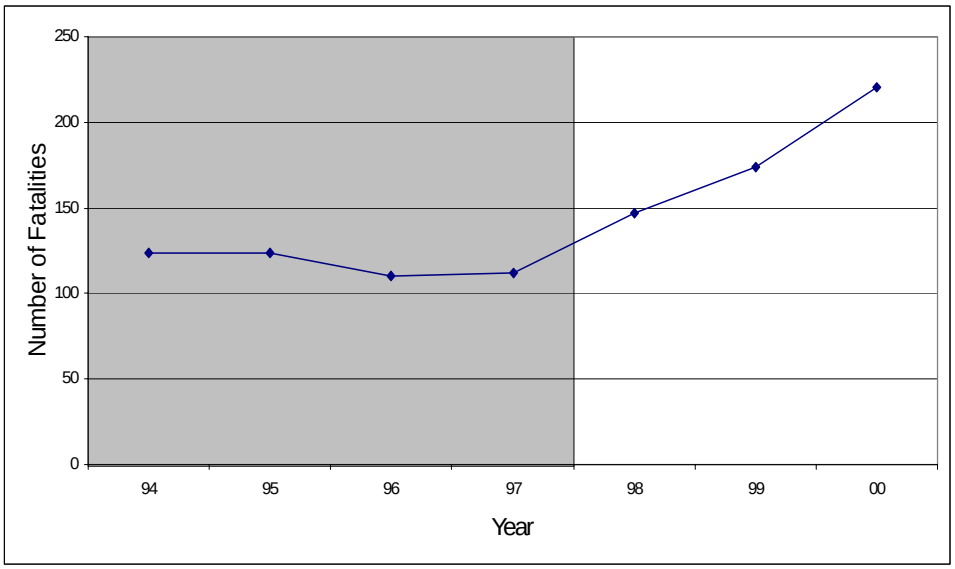
Nebraska is another state with relatively few motorcyclist fatalities. Nevertheless, in the five years just prior to adopting a universal helmet law, the state averaged 24 fatalities per year. In the five years just after the universal law, fatalities declined to an average of 10 per year. In 2000 the state experienced just three motorcyclist fatalities.

Texas enacted a universal helmet use law in 1968, repealed it in 1977 and required helmet use only for riders under 18, and re-enacted a universal helmet law in 1989. Lund, Williams, and Womack (1991) present data showing that helmet use increased from less than 50 percent just before the 1989 universal law to 90 percent immediately after the law became effective and to 95 percent two months later.

Mounce et al. (1992) found an 11 percent reduction in serious injury crashes per registered motorcycle after the law, using police-reported data. Hospital data from the first nine months after the law showed that motorcyclists injured after the law suffered less serious injuries and were less likely to have head or face injuries than motorcyclists injured before the law. Fleming and Becker (1992) found a 13 percent reduction in fatalities and in severe injuries in the first 12 months after the universal law was reinstated, after using time series methods to control for long-term declines in motorcycle fatalities. They found a 57 percent decrease in head-related fatalities and a 55 percent reduction in severe head-related injuries among hospital-admitted motorcyclists.

Effective September 1, 1997 Texas again repealed its universal helmet law and thereafter required helmet use only by riders under age 21 or who had not completed a rider education course or who did not have at least $10,000 medical insurance coverage. Preusser et al. (2000) found that the 1997 repeal was accompanied by a decline in helmet use, an increase in fatalities, while non-fatal injuries did not change appreciably. However, there was a marked increase in traumatic brain injury cases and in the costs of treating these cases. Also, in the three years immediately following the law change (1998-2000), an average of 180 motorcyclists were killed each year compared to an average of 119 in the three years (1994-1996) before the law change; a 51 percent increase. See Figure 5.

Figure 5. Texas Motorcyclists Killed, 1994-2000 (Source: FARS)



Washington's universal helmet law became effective in June 1990. Mock et al. (1995) analyzed 992 motorcycle crash victims admitted to the Seattle region's only level 1 trauma center from 1986 through 1993. They found that severe head injuries decreased from 20 percent of all admitted patients before the law to 9 percent after the law. Mortality among admitted patients decreased following the law.

In the five full years (1984-1988) before the universal law was adopted, Washington averaged 77 motorcyclist fatalities per year. In the five full years after the law (1991-1995), the average declined to 39 fatalities per year.

Helmet Effects. As part of the 1991 ISTEA legislation, Congress required NHTSA to study the effects of safety belt and motorcycle helmet use in crashes. NHTSA conducted the analysis using its Crash Outcome Data Evaluation System (CODES) data system, in which seven states linked data from their police crash reports, emergency medical services, hospital emergency departments, hospital discharge files, claims and other sources. NHTSA's 1996 Report to Congress found that "motorcycle helmet effectiveness ranged from 9 percent in preventing any kind of injury to 35 percent in preventing a fatality." "The average inpatient charge for motorcycle crash victims receiving inpatient care was $14,377 for those who used helmets, and $15,578 for those who did not" (NHTSA, 1996).

Additional analyses of the CODES data showed that helmet use for motorcycle riders involved in crashes ranged from 80 to 98 percent in three CODES states with universal helmet

laws and from 30 to 49 percent in three CODES states without universal laws. Helmets were found to be 65 percent effective in preventing brain injuries in a crash (NHTSA, 1998a).

Sosin, Sacks, and Wilson (1990) used National Center for Health Statistics Multiple Cause of Death data to study motorcycle fatalities from 1979 through 1986. They found that 53 percent of the 28,749 motorcycle fatalities were associated with head injuries. Rates per population for motorcycle fatalities associated with head injury (adjusted by age, sex, and race) were almost twice as high in states without universal helmet laws as in states with universal helmet laws. Fatalities per registered motorcycle also were greater in states without universal helmet laws. In the two states that dropped universal coverage during the study period, motorcyclist fatalities per population rose substantially: by 184 percent in South Carolina and by 73 percent in Wyoming.

Kelley et al. (1991) studied 398 motorcycle crash victims in eight Illinois medical centers from April through October 1988. Illinois had no helmet law at that time. They concluded that unhelmeted patients had higher overall injuries (measured by the Injury Severity Score) and more frequent head and neck injuries than helmeted motorcyclists.

Kraus et al. (1995) studied 174 fatally injured and 379 nonfatally injured crash-involved motorcyclists in Los Angeles County, California, in 1988-1989, before California's universal helmet law. They concluded that "those not using helmets where helmet use is voluntary are a higher risk population than helmet users. They are more likely to be involved in crashes but, because they are unhelmeted, less likely to be protected against serious head injury."

Sakar, Peek, and Kraus (1995) studied 173 fatally injured motorcyclists in Los Angeles County, California between July 1, 1988, and October 31, 1989. They concluded that head and cervical spine injuries were more frequent in unhelmeted than in helmeted fatally injured motorcyclists.

Rowland et al. (1996) studied 86 fatally injured and 386 hospitalized motorcyclists in the state of Washington in 1989 (when Washington's helmet law covered only riders under age 18). They concluded that "motorcycle helmet use is strongly and independently associated with reduced likelihood and severity of head injury, reduced overall injury severity, and reduced probability of motorcycle-related hospitalization and death attributable to head injury."

Bigelow (2001) examined CODES data from 18,394 motorcyclists involved in crashes in the State of Wisconsin. Helmeted riders were less likely to have sustained traumatic brain injury across a variety of crash related factors including crash type, speed limit, highway type, and alcohol involvement. The average hospital charges for the brain injury cases was almost $28,806 and the average length of stay was 10.6 days.

Finison (2001) examined CODES data from 806 motorcyclists involved in crashes in the State of Maine during 1995 and 1996. Riders not wearing helmets were found to be three times more likely to have head injuries requiring EMS transport, hospitalization, or resulting in death than motorcyclists who were helmeted.

Summary

The studies since the 1991 GAO report confirm GAO's conclusions with more recent data. All studies concluded that universal motorcycle helmet laws raise helmet use to 90 percent or higher from pre-law levels of 50 percent or lower. Universal laws reduce motorcycle fatalities, fatality rates, and severe head injuries. The studies also confirm that helmets reduce the probability of injury, of head injury, and of fatality for crash-involved motorcyclists.

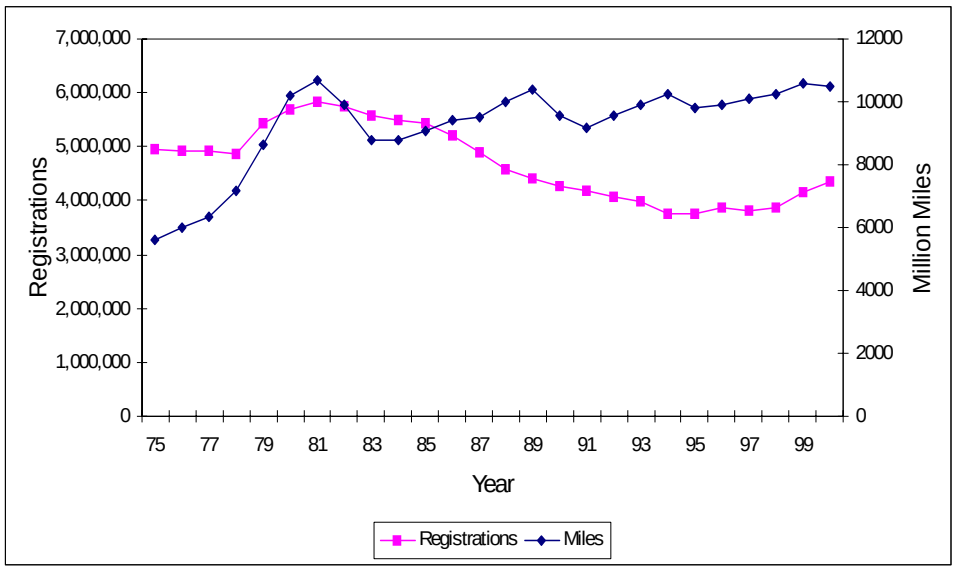
III. NATIONAL TRENDS

Motorcycle registration, travel, and casualty trends in the United States differ considerably from passenger vehicle trends. This chapter examines these trends briefly to provide context for the Kentucky and Louisiana experience.

REGISTRATIONS, TRAVEL AND FATALITIES

Table 1 lists the number of registered motorcycles reported for the United States in the years 1975 through 2000 and the estimated national annual miles of travel for motorcycles. Figure 6 shows the national trend data graphically.

Figure 6. U.S. Motorcycle Registrations and Miles of Travel, 1975-2000 (Source: FHWA)



Motorcycle registrations peaked in 1981 at 5.8 million then declined gradually but steadily until about 1994. Registrations have been increasing in more recent years. The year 2000 motorcycle registration level of approximately 4.3 million is 25 percent below the 1981 peak. Motorcycle travel has been increasing gradually during the past two decades. The average annual miles driven per registered motorcycle increased from 1,134 in 1975 to 1,833 in 1981 and to 2,411 in 2000. The smaller number of registered motorcycles and the larger annual mileage per motorcycle suggests that the typical motorcyclist in the year 2000 rides more miles than the typical motorcyclist 20 years ago.

FATALITIES AND INJURIES

Table 1 also gives the number of motorcyclists killed in the United States each year from 1975 to 2000 and the fatality rates per 10,000 registered motorcycles and per mile traveled. Figures 7 and 8 display the information graphically. Fatality data are from FARS using the body type code 80. This excludes mopeds and similar vehicles from the tabulations.

Figure 7. U.S. Motorcyclists Killed, 1975-2000 (Source: FARS)

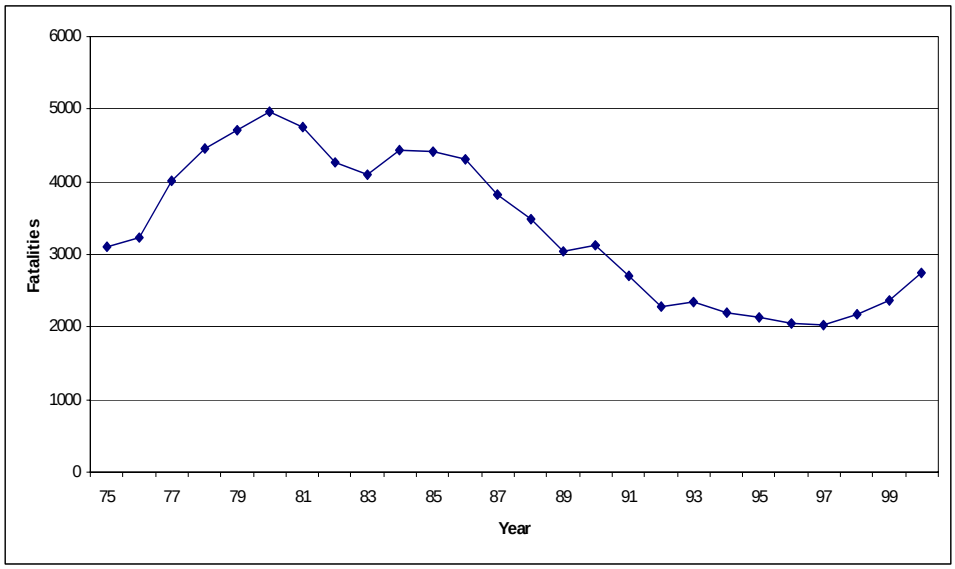


Figure 8. Motorcyclist's Fatality Rates, 1975-2000 (Source: FARS, FHWA)

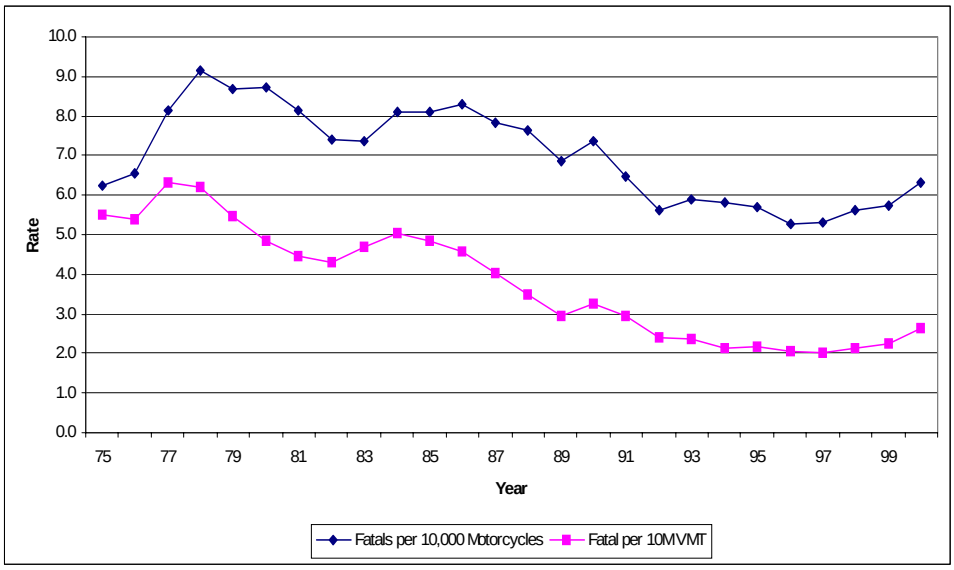


Table 1. U.S. Motorcycle Registrations and Travel, 1975-2000

Year	Registrations - US	Travel - US (million miles)	Fatalities	Fatalities per 10,000 Registered	Fatalities per 10M VMT
1975	4,964,070	5,629	3,103	6.3	5.5
1976	4,933,332	6,003	3,233	6.6	5.4
1977	4,933,256	6,349	4,008	8.1	6.3
1978	4,867,855	7,158	4,451	9.1	6.2
1979	5,422,132	8,637	4,713	8.7	5.5
1980	5,693,940	10,214	4,961	8.7	4.9
1981	5,831,132	10,690	4,746	8.1	4.4
1982	5,753,858	9,910	4,270	7.4	4.3
1983	5,585,112	8,760	4,104	7.3	4.7
1984	5,479,822	8,784	4,431	8.1	5.0
1985	5,444,404	9,086	4,417	8.1	4.9
1986	5,198,993	9,397	4,309	8.3	4.6
1987	4,885,772	9,506	3,834	7.8	4.0
1988	4,584,284	10,024	3,492	7.6	3.5
1989	4,420,420	10,371	3,036	6.9	2.9
1990	4,259,462	9,557	3,129	7.3	3.3
1991	4,177,365	9,178	2,703	6.5	2.9
1992	4,065,118	9,557	2,291	5.6	2.4
1993	3,977,856	9,906	2,336	5.9	2.4
1994	3,756,555	10,240	2,190	5.8	2.1
1995	3,767,029	9,797	2,144	5.7	2.2
1996	3,871,599	9,920	2,046	5.3	2.1
1997	3,826,373	10,076	2,028	5.3	2.0
1998	3,879,450	10,260	2,186	5.6	2.1
1999	4,152,433	10,584	2,374	5.7	2.2
2000	4,346,068	10,479	2,747	6.3	2.6

Source: FHWA, FARS

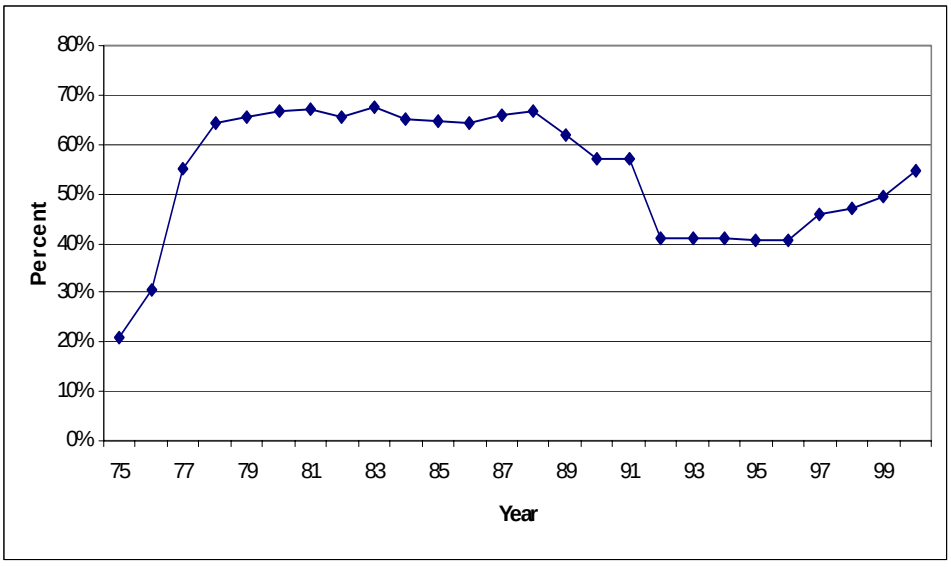
Table 1 and Figure 7 show that motorcyclist fatalities peaked in 1980, at about the same time that motorcycle registrations were highest, then generally declined over the next 15 years. However, fatalities have increased since the low of 2,028 recorded in 1997. Table 1 and Figure 8 show that fatality rates also peaked at about the same time (1977 for fatalities per miles of travel and 1978 for fatalities per registered motorcycles). Both rates generally declined into the 1990's but have also turned upward in more recent years.

NHTSA estimates the societal cost of a motor vehicle fatality to be in excess of $977000. The 2,747 motorcyclist killed in 2000 represent a cost to society in excess of 2.6 billion dollars.

Figure 6 showed that motorcycle registrations and miles of travel have been on the increase since 1997. The accompanying increase in fatality rates (Figure 8) suggests that the long term trend toward safer riding may be reversing.

Figure 9 charts the percentage of all US motorcycles that were registered in states that did *not* have a universal motorcycle helmet law in effect at year end over the 1975-2000 period. With the repeals of universal laws that were underway at the time, the percentage rose rapidly from approximately 20 percent in 1975 to 65 percent in 1978 and then remained at about this level until 1988. California's adoption of a universal helmet law in 1992 dropped the percentage of motorcycles registered in states without such a law to approximately 40 percent. Recent helmet law repeals have again raised the figure to more than 50 percent. Comparing Figures 7 and 9 suggests a substantial relationship between the national trends of motorcyclist fatalities and the percentage of motorcycles registered in states without a universal helmet law.

Figure 9. Percent of Registered Motorcycles Not Covered by a Universal Helmet Law (Source: NHTSA, FHWA)

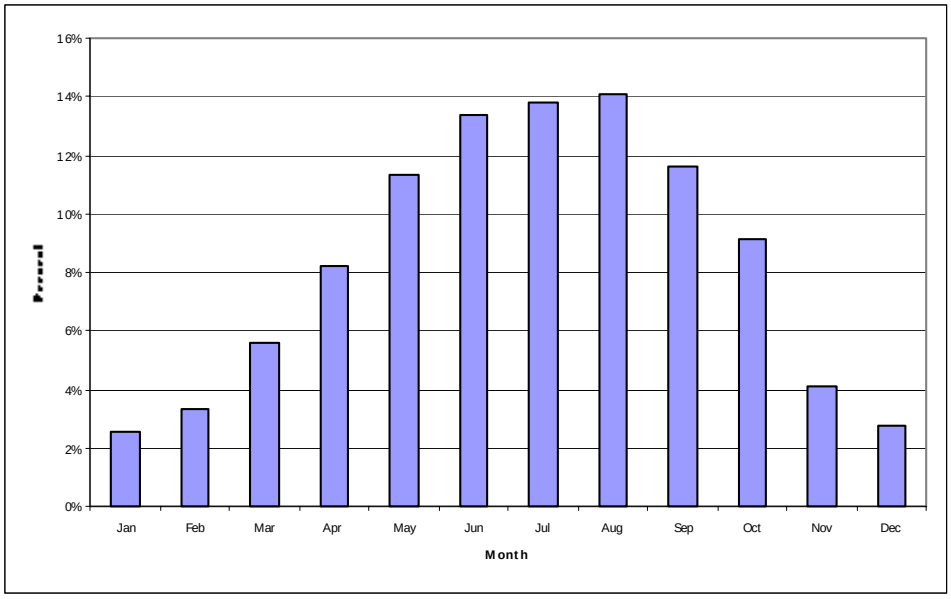


The National Occupant Protection Use Survey (Glassbrenner, 2002) estimates that in 2000, motorcycle helmet use was 81 percent in states with universal helmet laws and 59 percent in states without such laws. The 2002 survey found that helmet use declined considerably in both groups of states. However, this result might have been influenced by the 2002 survey having been taken in the summer whereas earlier surveys were taken in the fall months. That is, helmet use likely is lower in warmer weather.

In 2000, there were 719 more motorcyclists killed nationally than were killed in 1997. All states except Alaska, Delaware, Montana, Nebraska, Nevada, Oklahoma, South Carolina and Vermont recorded increases. The five states that repealed universal helmet laws during this period experienced 230 of the increased fatalities - Texas (108), Florida (63), Louisiana (38), Kentucky (12), Arkansas (9). Other states with substantial increases were Pennsylvania (59), California (41), Illinois (37), Colorado (35) and Maryland (25). A recent NHTSA examination of trends in motorcycle fatalities (Shankar, 2001) suggests that much of the increase has involved older motorcyclists (age 40 and older), motorcycles with large displacement engines, and more motorcyclist fatalities on rural roadways.

Motorcycling is a highly seasonal activity with most riding taking place in the warmer months. This is illustrated in Figure 10 which shows the percentage of motorcyclist fatalities that took place by month in the five years 1996-2000. Less than 10 percent of fatalities happened in the winter months of December, January and February while over 40 percent of fatalities took place in June, July and August.

Figure 10. Percent of Motorcyclists Killed by Month (Source: FARS)



The riding season is longer in states with more temperate climates. The "southern tier" states CA, AZ, NM, TX, LA, MS, AL, FL and GA recorded about 17 percent of motorcyclist deaths in December, January and February while the "northern tier" states WA, MT, ND, MN, WI, MI OH, PA, NY, VT, NH and ME recorded just over two percent of their fatalities during these months.

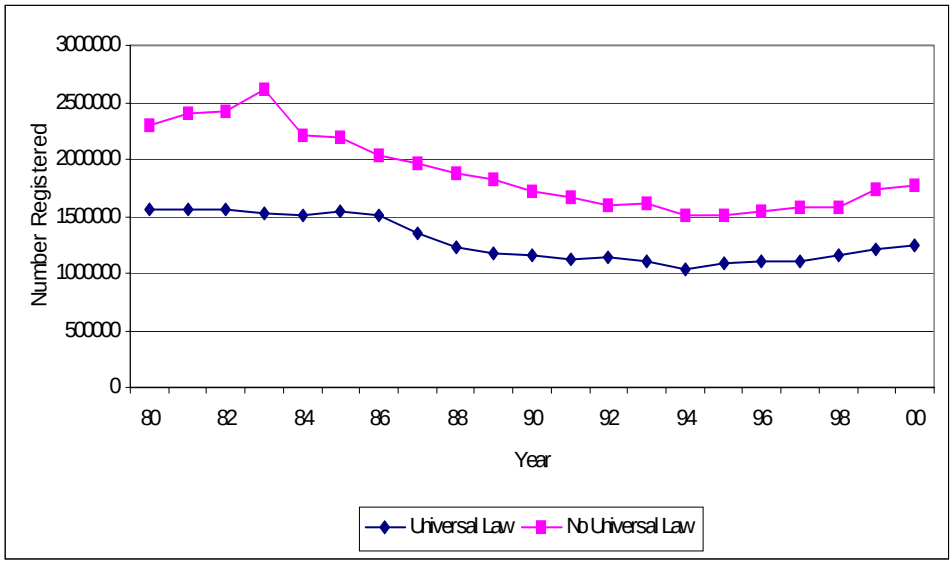
Motorcycle registrations per population follow a different pattern. In the southern tier states in 2000, there were 13.5 registered motorcycles per 1,000 residents while the northern tier states had 18.3 registered motorcycles per 1,000 population. That is, the registration rate tends to be lower where the riding season tends to be longer.

In 2000, there were 979 motorcyclists killed in the southern tier states while 683 were killed in the northern tier. The fatality rate per 10,000 registered motorcycles was 7.7 in the southern tier and 5.1 in the northern states. The southern states, therefore, tend to have longer riding seasons, more fatalities per registered motorcycle but a lower per capita registration rate.

There is considerable state-by-state variation in motorcycle registrations per population. The five states with the highest rates of registrations per 1,000 population in 2000 are Iowa (43.3), New Hampshire (39.4), Wyoming (38.8), South Dakota (38.7), and Vermont (35.7). The five states with the lowest registration rates are New York (5.7), Virginia (8.6), Texas (9.0), Maryland (9.3) and Arkansas (9.4).

Population based motorcycle registration rates also tend to be higher in states without universal helmet laws (18.7 registrations per 1,000 population in 2000) than in states with universal helmet laws (12.8 registrations per 1,000 population). There are 15 states that have had a universal helmet law in place consistently since the late 1970s (AL, GA, MA, MI, MS, MO, NV, NJ, NY, NC, PA, TN, VT, VA and WV) and 16 states that consistently have had a helmet law applicable only to young riders since the 1970s (AK, AZ, DE, HI, ID, KS, MN, MT, NH, NM, ND, OH, OK, SD, UT and WI). Figure 11 shows the trends in numbers of registered motorcycles in these two groups of states. The figure shows that registrations in states with and without universal helmet laws have generally paralleled one another over the past two decades.

Figure 11. Motorcycle Registrations in States With and Without Universal Helmet Laws



Source: FHWA. Wisconsin data for 1983 were extrapolated.

IV. EFFECTS OF THE LAW CHANGE IN KENTUCKY

THE LAW

Kentucky first enacted a motorcycle helmet law applicable to all riders in 1968. It was this law which was amended effective July 1998 to require helmet use only by:

- Motorcycle operators and passengers under the age of 21;
- Motorcycle operators who possess a motorcycle instruction permit;
- Motorcycle operators who have had a motorcycle operator's license for less than one year.

The originally amended law also required helmet use by those who did not have at least $10,000 of medical insurance coverage. Owners of registered motorcycles were to provide proof of insurance to their county clerks who would issue a helmet use exemption sticker to be displayed on the insured's motorcycle. Anecdotal information suggests that there may have been questions about the insurance provision; for example, whether helmets were required by passengers and by out-of state motorcyclists who had insurance. The medical provision was repealed effective July 2000.

HELMET USE

Observational Surveys

Motorcycle helmet use is observed annually as a part of the state's safety belt usage survey. Agent (2000) reports that,

> "surveys taken during the mandatory [motorcycle helmet] usage period had found a usage rate of over 95 percent. Data were taken in 1998 both before and after the effective date of the repeal. Prior to July 15, 1998 only 10 of 240 observed motorcyclists were not wearing a helmet, giving a usage rate of 96 percent. After this date, 29 of 148 motorcyclists were observed not wearing a helmet giving a usage rate of 76 percent. In 1999, 164 of 452 motorcyclists were observed not wearing a helmet with a weighted usage rate of 65 percent. The weighted rate for 2000 was 70 percent with a sample size of 427".

The 2001 survey recorded a 56 percent helmet use rate. (Agent, 2002). Table 2 summarizes these figures.

Table 2. Observed Helmet Use in Kentucky

Year	Percent Helmeted
1997	96
1998 Pre-Change	96
1998 Post-Change	76
1999	65
2000	70
2001	56

FATALITIES

Table 3 lists Kentucky's motorcyclist fatality experience around the time of the helmet law change. The table shows that in the two years immediately prior to the law change (1996 and 1997), there were 22 and 24 fatal crashes, respectively, involving motorcyclist victims and there were 24 fatalities each year. In the two years immediately after the law change (1999 and 2000), there were 38 and 35 fatal crashes involving 40 and 36 motorcyclist fatalities. That is, annual motorcyclist fatal crashes and fatalities increased by more than 50 percent following the law change.

Table 3. Motorcyclist Fatal Crashes and Fatalities in Kentucky 1996-2000 (Source: FARS)

Year	Fatal Crashes	Motorcyclists Killed
1996	22	24
1997	24	24
1998	26	27
1999	38	40
2000	35	36

INJURIES

Motor vehicle injury crash data published by the state (Kentucky Transportation Center, 1996-2000) for motorcycle involvements in injury crashes and injuries are show in Table 4. In

1996-1997, there was an average of 573 injury crashes involving motorcycles, while in 1999-2000, there was an average of 785 injury crashes; a 37 percent increase. The average number of injuries involving motorcycles increased by 34 percent, from 703 in 1996-1997 to 942 in 1999-2000.

Table 4. Kentucky Injuries Involving Motorcycles1996-2000

Year	Injury Crashes Involving Motorcycles	Persons Injured
1996	581	711
1997	565	695
1998	647	796
1999	774	934
2000	797	951

In crashes where motorcyclist injury severity and helmet use were known, helmet use declined from 75% of those injured in 1996 to 52 percent in 2000, while the number of injured riders increased (see Table 5).

Table 5. Kentucky Helmet Use and Injuries 1996-2000[2]

	Year				
	1996	1997	1998	1999	2000
Helmet Use by Injured Riders	75% (427/573)	77% (414/538)	70% (394/565)	60% (404/668)	52% (442/849)
Helmet Use by those with Serious (A) Injury	71% (131/184)	79% (138/175)	67% (120/178)	51% (120/234)	50% (132/264)
Helmet Use by those with Head/Face Injury	48% (22/46)	60% (33/55)	45% (38/88)	33% (27/83)	26% (31/117)

[2] Data for 1996-1999 were extracted from a file containing injuries by persons in crashes involving motorcycles. Other vehicle occupants were distinguished from motorcyclists in the present analysis based on safety equipment used (e/g. Air bags) and seating position (e.g., right front seat). Instances that could not be resolved in this manner are excluded. Data for 2000 explicitly identified motorcyclists. They account for 89 percent of the injuries occurring in motorcycle involved crashes.

Similarly, helmet use among riders sustaining serious (A) injuries declined from 71 percent to 50 percent while the number of these injuries also increased. Table 5 also shows that the number of riders sustaining head and/or face injuries increased substantially following the repeal of the universal helmet law. The number of helmeted riders sustaining head/face injuries changed little over the years 1996-2000, while the number of unhelmeted cases of head injury more than doubled.

MOTORCYCLE REGISTRATIONS

Table 6 shows the number of motorcycles registered in Kentucky during the 1996-2000 period, along with motorcyclist fatality and injury rates per registered vehicle. Registration data are from the FHWA.

Table 6. Kentucky Motorcycle Registrations and Crash Rates

Year	Registered Motorcycles	Motorcyclists Killed per 10,000 Registered	Persons Injured in Motorcycle Crashes per 10,000 Registered
1996	36,603	6.6	194.2
1997	38,658	6.2	179.8
1998	39,901	6.8	199.5
1999	41,905	9.5	222.9
2000	44,003	8.2	216.1

Motorcycle registrations increased more or less steadily each year during the period. Motorcyclists killed per 10,000 registered motorcycles increased from less than 7 under the universal helmet law to more than 8 following repeal. The rate of persons injured in motorcycle crashes also increased following the law's repeal.

The increase in number of motorcyclists killed and injured per 10,000 registered motorcycles appears to be due, in part, to the motorcycle helmet law repeal. National data suggest that registrations are higher in States without mandatory helmet laws. Repealing mandatory helmet use laws may result in more registrations. Other national data suggest a trend towards larger bikes and older riders. Thus, the increase in registrations experienced by Kentucky and Louisiana after repeal of their helmet use laws may have also resulted in an increase in older/less experienced riders on larger bikes who are at greater risk of crash involvement. Unfortunately, insufficient data were available to determine the extent to which the

increased fatality and injury rates were due to reduced helmet use, to increased exposure, or more riding by riders at higher risk of crash involvement.

V. EFFECTS OF THE LAW CHANGE IN LOUISIANA

THE LAW

Louisiana first adopted a motorcycle helmet law applicable to all riders in 1968. That law was amended in 1976 to require helmet use only by riders under the age of 18. Then, in 1982, the state reenacted a universal helmet law. It was this latter law that was amended effective August 1999 to require helmet use only by:

- Motorcycle operators and passengers under the age of 18;
- Riders 18 and older who do not have medical insurance coverage of at least $10,000.

HELMET USE

Observational Surveys

Motorcycle helmet use is observed annually as a part of the state's safety belt usage survey. Results from recent surveys are shown in Table 7. The figures indicate that under the universal helmet law virtually all riders were wearing helmets. Following repeal of the law, helmet use declined to just over 50 percent.

Table 7. Observed Helmet Use in Louisiana

Year	Number Observed	Percent Helmeted
1997	127	100
1998	188	100
1999	21	97
2000	247	52
2001	321	52

FATALITIES

Annual Louisiana crashes in which motorcyclists were killed and the numbers killed are shown in Table 8. In the two years just prior to the universal helmet law's repeal (1997-1998), an average of 27 motorcyclists were killed in 26 crashes. In the two years after the law's repeal

(2000-2001), an average of 56 motorcyclists were killed in 54 crashes. That is, fatal crashes and fatalities have doubled, on average, since the law's repeal.

Table 8. Motorcyclist Fatal Crashes and Fatalities in Louisiana 1997-2001

Year	Fatal Crashes	Motorcyclists Killed
1997	19	19
1998	33	34
1999	40	40
2000	54	57
2001	54	54

1997-2000 data are from FARS, 2001 data are from the Louisiana Highway Safety Commission.

INJURIES

Motorcycle injury crashes and injuries are shown in Table 9 for the years 1997-2000. In 1997-1998, an average of 687 injury crashes took place resulting in 741 motorcyclist injuries. In 2000, injury crashes and injuries increased by more than 40 percent, to 977 and 1,011 respectively.

Table 9. Motorcycle Injury Crashes and Injuries in Louisiana 1997-2000

Year	Injury Crashes	Motorcyclists Injured
1997	737	790
1998	637	692
1999	759	871
2000	977	1,101

MOTORCYCLE REGISTRATIONS

Table 10 shows the number of motorcycles registered in Louisiana for the years 1997 to 2000 and motorcyclist fatality and injury rates per registered motorcycle. Registration data are from the Louisiana Department of Public Safety.

Table 10. Louisiana Motorcycle Registrations and Crash Rates

Year	Registered Motorcycles	Motorcyclists Killed per 10,000 Registered	Persons Injured in Motorcycle Crashes per 10,000 Registered
1997	60,042	3.2	131.6
1998	57,189	5.9	121.0
1999	64,075	6.2	135.9
2000	72,445	7.9	152.0

The figures in the table show that Louisiana has experienced a large increase in motorcycle registrations over the 1997 to 2000 period. At the same time, the rates of fatalities per registered motorcycles and injuries per registered motorcycles have also increased, indicating that the increases in motorcyclists killed and injured are not explainable solely by changes in vehicle registrations.

VI. CRASH DESCRIPTIONS

The material presented thus far has been based largely on the statistics of crashes and helmet use. In the present section, we attempt to provide a more qualitative "feel" for what is happening in motorcycle crashes and to the persons involved. We do this by translating crash report data into narrative descriptions of selected crashes.

This technique was originally used by Preusser, Williams and Ulmer (1995) as a means of crash typing motorcycle crashes. Five crash types were found to classify 86 percent of fatal motorcycle crashes: *ran off-road* crashes (41%) involve situations where the motorcyclist runs off the roadway and overturns or strikes an off-road object; *ran traffic control* crashes (18%) occur when one vehicle with an obligation to stop, remain stopped, or yield, fails to do so and collides with another vehicle; *oncoming or head-on* crashes (11%) involve a collision between two vehicles traveling in opposite directions; *left-turn oncoming* crashes (8%) involve a vehicle making a left turn in front of oncoming traffic resulting in collision; *motorcyclist down* crashes (7%) involve a motorcyclist losing control and going down in the roadway or deliberately going down to avoid some perceived threat ahead. Other crash types, identified in small percentages of crashes, were: *run down* crashes (3%) in which one vehicle runs down from behind another vehicle traveling in the same direction at an unimpeded speed; *stopped/stopping* crashes (3%) in which a vehicle stopped, stopping or just starting up in a travel lane is hit from the rear; *road obstacle* crashes (2%) in which a motorcyclist strikes an object in or on the roadway; and *lane change* crashes (1%) in which a vehicle moves into another same direction travel lane that is already occupied.

LOUISIANA FATAL CRASHES

After Louisiana's repeal of its universal helmet law effective August 15, 1999, there was an increase in motorcyclist fatalities compared to the same period in 1998. From August 15, 1999, to the end of the year, there were 16 motorcyclists killed in 16 separate crashes, compared to 12 victims killed in 11 crashes a year earlier. The following narratives describe the 16 crashes that took place just after the law change

The first crash following the helmet law change took place about a week later, late on a Sunday afternoon . In the crash, a 40 year-old motorcycle operator was killed when he *ran off the road* while attempting to negotiate a curve and struck a culvert. The crash site was a rural collector roadway with undivided two-way traffic, two travel lanes and a 45 mph posted speed limit. It was daylight, the weather was clear, the road surface was dry. The victim was alone at the time of the crash. The operator held a valid license and had no recorded crashes or violations on his driving record. Based on alcohol testing, this was an alcohol related crash. The victim was not wearing a helmet. According to state data, death was due to head injury.

The second crash, and the first involving multiple vehicles, occurred early in the evening on a Monday in mid-September. The crash site was also on a rural collector roadway, with undivided two-way traffic and two travel lanes. The roadway was straight and level with a 55 mph speed limit. The crash was at an intersection controlled by a stop sign. There was still daylight and the weather was clear. The crash victim was the motorcycle operator, a 31 year-old male. The victim was stopped at the stop sign when he was hit from the rear by a 16 year-old male driving a sport utility at an estimated speed of 50 mph. A third vehicle was also struck in the crash. The victim was not helmeted; state data indicate that death was due to head injuries. The *stopped/stopping* crash type represented here is found in about 3 percent of motorcycle fatal crashes.

The third post-law change crash took place on a September Saturday at about 5:30 pm. A motorcycle operator was killed in a single vehicle crash in another ran-off roadway type crash. The crash site was a rural collector, with a 45 mph speed limit. It was daylight, the weather was clear, the road surface was dry. The victim, a 45 year-old male, failed to negotiate a curve, *ran off the road,* and struck an unspecified object off the roadway. Estimated speed was 40 mph. A 36 year-old female passenger was injured but survived the crash. Neither the operator nor passenger were helmeted. Death was ascribed to internal hemorrhaging. Police reported this was an alcohol related crash.

The following week, on a Sunday night, a 25 year-old male motorcycle operator was killed in a two vehicle crash. The site was an urban arterial, a divided roadway with 2 travel lanes in each direction with a 35 mph speed limit. The crash was mid-block. It was dark and the weather was clear. The motorcyclist was killed when he ran into the rear of a pickup truck that was traveling in front of him at about 30 mph. The motorcyclist was described as operating in a reckless manner prior to the crash. No helmet was worn and death was ascribed primarily to head injuries. This crash is an example of the *run down* crash type where one vehicle runs down another traveling in the same direction and strikes it in the rear. In this type of crash, the struck vehicle is traveling at an unimpeded speed prior to the crash. In most cases, as here, it is the motorcycle that comes from behind and runs down the lead vehicle.

Two days later, on Tuesday at about 5:00 pm, another motorcyclist was killed in a two vehicle crash. It occurred on a rural collector, with undivided two-way traffic and 2 travel lanes. The roadway at the crash site was curved and level with a 55 mph speed limit. It was daylight, and the weather was clear. The 35 year-old operator was killed when he crossed into the oncoming lane and collided *head-on* with an automobile coming from the other direction. Both vehicles were traveling at or above the speed limit. The victim was not wearing a helmet; death was attributed to multiple injuries.

The sixth post-helmet law change crash took place in early October on a Friday around 2:00 am. The crash occurred on an urban arterial with a 70 mph speed limit. It was dark, the

weather was clear, the road surface was dry. A 51 year-old male operator of a motorcycle was reported to have been driving on the wrong side of the road and was killed when he collided *head-on* with several vehicles traveling in the opposite direction. No helmet was worn; death was caused by multiple injuries. A 23 year-old male passenger, also unhelmeted, received serious injuries in the crash, but survived. Only one minor injury was reported in the other vehicles. Alcohol testing showed the motorcycle operator had been drinking.

The seventh crash took place two days later on Sunday just before 8:00 pm. A motorcyclist was killed in a two vehicle crash on an urban arterial road way with a 40 mph speed limit. It was dark but lighted; the weather was clear The crash occurred when a 51 year-old male driver of an automobile, who was described as operating erratically, changed lanes and ran into a 38 year-old male motorcyclist who was traveling in the same direction (*run down* crash type). The motorcyclist was helmeted but died of internal injuries. The other driver sustained moderate injuries. Alcohol testing revealed indicated that the automobile driver had been drinking.

Nearly two weeks passed before the next motorcyclist fatality in Louisiana. It took place during mid-afternoon on a Saturday when a motorcycle operator was killed in another *head-on* crash. The site was a rural major collector, with undivided two-way traffic and 2 travel lanes. The roadway was curved and level with a 50 mph speed limit. It was daylight, the weather was clear, the road surface was dry. The 41 year-old male victim was operating a 1994 motorcycle when he crossed into the on-coming lane and collided head-on with a pickup truck. The motorcycle was Louisiana registered, the operator had a valid license and no prior recorded crashes or violations. The operator was helmeted, but nevertheless, died from head injuries. A passenger of the pickup sustained minor injury.

The following day, the 22 year-old male operator of a 1995 motorcycle was killed in a *left-turn oncoming* type crash. It took place in the afternoon at an intersection on an urban local street. The road was straight and level with a 25 mph speed limit. There were no traffic controls. It was daylight, the weather was clear, the road surface was dry. The crash occurred when a compact utility driven by a 49 year-old female made a left turn in front of the motorcycle which collided with the turning vehicle. The victim was not helmeted but died from aortic laceration. The driver of the other vehicle was not injured. This crash is typical of the *left-turn oncoming* type in that it is usually the other vehicle that turns left in front of, or into the motorcyclist.

The tenth post-law change crash, another *left-turn oncoming* type, occurred on a Friday about 7:00 pm. The crash site was a rural principal arterial, with undivided two-way traffic and 2 travel lanes. The roadway was straight and level with a 45 mph speed limit. It was dark but lighted, the weather was clear, the road surface was dry. A 23 year-old male motorcycle operator was killed when a 25 year-old female driving a pickup truck made a left turn to a driveway and struck the motorcycle. The driver and a passenger in the pickup were uninjured. Alcohol testing showed the pickup driver had been drinking. The motorcycle was registered in Louisiana, the

operator's license was valid and there was no prior history of crashes or violations. The victim was not helmeted; state data did not indicate the nature of the injuries received. Alcohol testing showed the pickup truck driver had been drinking.

The next day, still another *left-turn oncoming* type crash took the life of a 44 year-old male motorcyclist. The crash took place at about 1:00 am on an urban local street. The road was straight and level with a 35 mph speed limit. The crash was at an intersection with no traffic controls. It was dark but lighted, the weather was clear, the road surface was dry. A large utility station wagon driven by a 24 year-old female made a left turn in front of the oncoming motorcycle. The utility's driver, who was operating on a suspended license, and several passengers sustained minor injuries. The 1983 motorcycle was registered in Louisiana. The operator had a valid license with one prior speeding infraction on his driving record. Alcohol testing showed the victim had been drinking. No helmet was worn and death was attributed to multiple blunt trauma.

At mid-afternoon on a Tuesday in early November, a 53 year-old motorcyclist was killed in a *ran traffic control* type crash when he entered an intersection in front of a vehicle coming from the left. The crash site was a rural principal arterial, with undivided two-way traffic and 4 travel lanes. The roadway was straight and level with a 25 mph speed limit. The intersection was controlled by a stop sign facing the motorcyclist. It was daylight, the weather was clear, the road surface was dry. The victim's 1985 motorcycle was registered in Louisiana, his license was valid and there were no prior crashes or violations on his driving record. Investigators reported that he failed to obey the stop sign before beginning a left turn. No helmet was worn and death was ascribed to multiple injuries. The striking vehicle was a large utility station wagon. Neither the driver nor any passengers were injured.

The following Saturday, in the early evening, a motorcyclist was killed in a *stopped/stopping* type crash. It took place on a rural minor arterial, with undivided two-way traffic and two travel lanes. The roadway was straight and level with a 55 mph speed limit. It was dark, the weather was clear, the road surface was dry. The 45 year-old male motorcyclist, stopped in traffic, was killed when he was struck from behind by a small sedan driven by a 23 year-old male. The victim's 1994 motorcycle was registered in Louisiana; he held a valid license with no recorded crashes or violations. No helmet was worn and death was due to a fractured skull. An unhelmeted 44 year-old passenger was injured in the crash, but survived.

Another *ran traffic control* type crash claimed the life of a 44 year-old motorcyclist when he struck a passenger vehicle that had run a stop sign. The crash took place on a weekday in mid- November at about noontime. The site was an urban divided minor arterial. The roadway was straight and level with a 40 mph speed limit The crash was at an intersection. It was daylight, the weather was clear, the road surface was dry. The motorcyclist struck the right side of a passenger car, driven by a 52 year-old male who failed to yield the right-of-way at the

intersection. The motorcyclist had a valid license with no record of crashes or violations. His 1993 motorcycle was registered in Louisiana. The motorcyclist wore a helmet; death was attributed to spinal trauma. The passenger car driver held a valid license but had a prior crash and two speeding infractions on his driving record. The driver and several passengers sustained minor or moderate injuries.

A mid-morning crash in early December took the life of a 26 year-old male motorcyclist who was killed in a *left turn oncoming* type crash. The site was an urban local street. The roadway was straight and level with a 35 mph speed limit. It was daylight, the weather was clear, the road surface was dry. A pickup truck driven by a 29 year-old male made a left turn toward a driveway. The motorcyclist, coming from the other direction, could not stop and struck the right side of the pickup. The motorcyclist wore a helmet but died of head injuries. The pickup driver was not injured.

The final motorcyclist fatality in Louisiana in 1999 involved a 29 year-old male who *ran off the road*, struck an embankment and was killed. A female passenger was injured in the crash. Helmet use was not recorded and the nature of the victim's injuries were not specified. The crash occurred on a weekday in the early afternoon. The site was a rural major collector, with undivided two-way traffic and 2 travel lanes. The roadway was curved and level with a 55 mph speed limit. It was daylight, the weather was clear, the road surface was dry. The motorcyclist failed to negotiate the curve and left the roadway. The 2000 motorcycle was registered in Louisiana. The operator's license was valid with no recorded crashes or violations.

KENTUCKY FATAL CRASHES

Unlike Louisiana, Kentucky did not experience an immediate increase in fatalities following the modification of its motorcycle helmet law. In the period just after the law change, July15 - December 31, 1998, there were 14 motorcyclist fatalities in 14 crashes. In the comparable period a year earlier, 15 motorcyclists were killed in 15 crashes. As noted earlier, there was an initial requirement to obtain and display an exemption sticker and there were questions about helmet requirements for passengers and out of state riders. These issues may have ameliorated the potential effects of the law change. For instance, observed helmet use dropped in the immediate post law survey but not nearly as dramatically as in other states that have repealed universal helmet laws or in Kentucky in subsequent helmet use observations. In 1999, helmet use declined further and during the July 15 - December 31, 1999, period 25 motorcyclists were killed in 24 crashes.

Kentucky's first motorcyclist fatality after the helmet law change took place on a Sunday evening in early August. A 46 year-old male motorcyclist, operating on a suspended license, was killed in a *ran traffic control* type crash when he failed to yield the right-of-way at a stop sign

and was struck by an automobile entering the intersection from the left. The victim was helmeted. Police reported the motorcyclist had been drinking.

A week later, just after noon, a 44 year-old male motorcyclist was killed in a *head-on* crash on a rural roadway with a 55 mph speed limit. The motorcyclist was negotiating a curve when he crossed the center line and collided with an automobile coming from the opposite direction. The motorcyclist was helmeted but sustained multiple injuries. The automobile driver, a 17 year-old female sustained minor injuries in the crash.

Two weeks later, at about 3:00 am on a Saturday, a 28 year-old male motorcyclist was killed on an urban Interstate roadway. The motorcyclist, who was traveling in excess of 90 mph, *ran off the roadway* and struck a concrete barrier in the median. The impact forced the motorcyclist back onto the roadway where he was struck by a large van type vehicle traveling in the same direction. A fire ensued. The motorcyclist was not helmeted and sustained head and face injuries. BAC testing showed the motorcyclist had been drinking. The van driver, a 34 year-old male sustained incapacitating injuries. A 36 year-old female passenger and two young child passengers sustained moderate injuries in the crash.

A week later, just after midnight on a Saturday, a 31 year-old male motorcyclist was killed when he *ran off the road* and struck an embankment. The crash site was a rural collector type roadway with a 55 mph speed limit. It was dark and foggy. The victim was not helmeted and sustained head and face injuries. BAC testing showed this was an alcohol-related crash.

The following week, on a Friday around 10:00 pm, a 40 year-old male was killed when he *ran off the road* and struck a tree. The crash site was a rural local road. The weather was clear and the road was dry. The motorcyclist was helmeted but sustained head and face injuries. BAC testing showed this was an alcohol-related crash.

The next morning, a 23 year-old motorcyclist was killed in a *head-on* crash that occurred on a rural local road with a 55 mph speed limit and two travel lanes. The motorcyclist was attempting to pass another vehicle while negotiating a curve and collided with a pickup truck coming from the opposite direction. The motorcyclist was helmeted but sustained multiple injuries. The operator of the pickup, a 44 year-old male, sustained moderate injuries in the crash.

Four days later, just after noon on a Wednesday, a 23 year-old male motorcyclist was killed when he ran a stop sign (*ran traffic control)* and struck a pickup truck that was making a left turn from the intersecting roadway. The crash site was an urban arterial roadway. The weather was clear and the road was dry. Investigators indicated the motorcyclist was speeding prior to the crash. The motorcyclist was not helmeted and sustained multiple injuries. The pickup truck driver, a 25 year-old male was uninjured.

Two weeks later, on a Monday afternoon, a 31 year-old male motorcyclist was killed when he failed to negotiate a curve, *ran off the road* and struck a roadside object. The site was an urban collector type roadway with a 55 mph speed limit. The weather was clear and the roadway was dry. The motorcyclist was not helmeted and sustained head and face injuries. BAC testing showed this was an alcohol-related crash.

The next day at mid-morning, a 66 year-old male motorcyclist was killed when an 86 year-old driver of an automobile failed to negotiate a curve, crossed into the on-coming lane, rolled over and struck the motorcyclist *head-on.* The site was a rural roadway with two travel lanes and a 55 mph speed limit. The weather was clear and the roadway was dry. The motorcyclist was helmeted but sustained unspecified injuries. The automobile driver sustained moderate injuries in the crash.

The final five Kentucky motorcyclist fatal crashes of 1998 took place during the month of October.

Late on a Saturday morning, a 29 year-old male motorcyclist failed to negotiate a curve, *ran of the road,* struck a fence and was killed. Estimated travel speed was in excess of 90 mph. No helmet was worn; death was attributed to neck injuries. According to BAC testing, this was an alcohol related crash.

The following day just after noon, a 43 year-old male motorcyclist was killed on a two lane rural roadway when a pickup truck coming from the opposite direction turned left toward a driveway (*left-turn oncoming).* The motorcyclist struck the oncoming turning vehicle. A helmet was worn but multiple injuries were sustained. The 55 year-old male operator of the pickup was uninjured in the crash.

Mid-morning the next Friday, a 43 year-old male motorcyclist was killed in a *ran traffic control* type crash. An automobile on a crossing city street driven by a 67 year-old male failed to stop at a stop sign and entered the intersection in front of the motorcyclist. No helmet was worn; the motorcyclist's injuries were unspecified. The automobile driver sustained minor injuries. According to BAC testing, the motorcyclist had been drinking.

On a Thursday evening about 10:00 pm a 50 year-old motorcyclist was killed on a rural local road when he and two other motorcyclists traveling together collided in a *lane change* type crash. The victim sideswiped another motorcyclist and then was struck by the third rider. A helmet was worn but multiple injuries were sustained. BAC testing showed that the victim and one of the other motorcyclists had been drinking..

The last Kentucky motorcyclist fatality of 1998 was another *ran off road* type crash. A 17 year-old male motorcyclist was killed about 1:00 am on a Friday when he failed to negotiate a curve on an urban local street and struck a utility pole. No helmet was worn.

VII. DISCUSSION

At the present time, 20 states and the District of Columbia have laws requiring helmet use by all motorcycle riders, 27 states have laws requiring helmets only of riders under a certain age (usually 18) and 3 states have no laws regarding helmet use. In recent years, several states have repealed their all-rider helmet laws and so far unsuccessful efforts to repeal have occurred in others.

Motorcycle helmet laws have been a contentious issue in many states as public policy makers have debated the balance between personal freedoms and the societal costs of crashes. Those opposed to mandatory helmet laws generally argue that their individual rights are or will be infringed upon and that helmet use should be left to the choice of individual riders. Those who advocate helmet laws note that helmets are effective in reducing injury severity and that society bears a significant portion of motorcycle crash costs thereby establishing a public interest in requiring the use of reasonable safety equipment.

The 1998 universal helmet law repeal in Kentucky and the 1999 repeal in Louisiana produced similar effects. Observed helmet use dropped from nearly full compliance under the law to the 50 percent range without the law. Motorcyclist fatalities increased in the near term by sizeable amounts - by over 50 percent in Kentucky and over 100 percent in Louisiana. Injuries also increased substantially in both states. The rates of fatalities and injuries per registered motorcycle increased in both states following the helmet law repeals.

The experience in Kentucky and Louisiana is similar to the experience in Arkansas and Texas, two other states that have repealed universal laws in recent years, leaving little doubt that such repeals have demonstrable negative safety consequences. The weight of the evidence is that helmets reduce injury severity, that repeal of helmet laws decreases helmet use, and that states that repeal universal helmet laws experience increased fatalities and injuries. There is also evidence that serious head injuries increase and that treatment costs rise. Conversely, states that have adopted or reenacted universal laws have experienced declines in motorcyclist fatalities and injuries.

There are a number of factors that may influence the volume of motorcycle crashes. For instance, there has been a recent increase nationally in motorcyclist fatalities that has been attributed, in part, to an aging ridership and a trend toward more powerful motorcycles. Motorcycle registrations have also been increasing recently following many years of decline, suggesting that there may be more novice riders on the roads for the near-term. Within these global factors, helmet use plays a demonstrable role in reducing injury severity, and mandatory helmet use laws play a significant role in determining the extent of helmet use.

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APPENDIX. STATE HELMET LAW HISTORY

State	Original Law Effective Date	Original Law Coverage; Subsequent Action; Current Law
Alabama	11-06-67	All riders.
Alaska	1-01-71	All riders. Repealed effective 7-01-76; helmet use required for riders under 18 and all passengers.
Arizona	1-01-69	All riders. Repealed effective 5-27-76; helmet use required for riders under 18.
Arkansas	7-10-67	All riders. Repealed effective 8-01-97; helmet use required for riders under 21.
California	1-01-85	Helmet use required for riders under 15 1/2. Effective 1-01-92 helmet use required for all riders.
Colorado	7-01-69	All riders. Repealed effective 5-20-77.
Connecticut	10-01-67	All riders. Not enforced until 2-01-74. Repealed effective 6-01-76. Effective 1-01-90 helmet use required for riders under 18.
Delaware	10-01-68	All riders. Repealed effective 6-10-78; helmet use required for riders under 19. Also required that a helmet be carried on the motorcycle for riders 19 and older.
District of Columbia	10-12-70	All riders.
Florida	9-05-67	All riders. Repealed effective 7-01-00; helmet use required for riders under 21.
Georgia	8-31-66	All riders.

State	Original Law Effective Date	Original Law Coverage; Subsequent Action; Current Law
Hawaii	5-01-68	All riders. Repealed effective 6-07-77; helmet use required for riders under 18.
Idaho	1-01-68	All riders. Repealed effective 3-29-78; helmet use required for riders under 18.
Illinois	1-01-68	All riders. Repealed effective 6-17-69 after being declared unconstitutional by the State Supreme Court on 5-28-69
Indiana	7-01-67	All riders. Repealed effective 9-01-77. Effective 6-01-85 helmet use required for riders under 18.
Iowa	9-01-75	All riders. Repealed effective 7-01-76.
Kansas	7-01-67	All riders. Repealed effective 3-17-70; helmet use required for riders under 21. Effective 7-01-72 helmet use required for all riders. Repealed effective 7-01-76; helmet use required for riders under 16. Effective 7-01-82 helmet use required for riders under 18.
Kentucky	7-01-68	All riders. Repealed effective 7-15-98; helmet use required for riders under 21.
Louisiana	7-31-68	All riders. Repealed effective 10-01-76; helmet use required for riders under 18. Effective 1-01-82 helmet use required for all riders. Repealed effective 8-15-99; helmet use required for riders under 18.

State	Original Law Effective Date	Original Law Coverage; Subsequent Action; Current Law
Maine	10-07-67	All riders. Repealed effective 10-24-77. Effective 7-03-80 helmet use required for riders under 15.
Maryland	9-01-68	All riders. Repealed effective 5-29-79; helmet use required for riders under 18. Effective 10-01-92 helmet use required for all riders.
Massachusetts	2-27-67	All riders.
Michigan	3-10-67	All riders. Repealed effective 6-12-68. Effective 9-01-69 helmet use required for all riders.
Minnesota	5-01-68	All riders. Repealed effective 4-06-77; helmet use required for riders under 18.
Mississippi	3-28-74	All riders.
Missouri	10-13-67	All riders.
Montana	7-01-73	All riders. Repealed effective 7-01-77; helmet use required for riders under 18.
Nebraska	5-29-67	Never enforced. Declared unconstitutional by State Supreme Court and repealed effective 9-01-77. Effective 1-01-89 helmet use required for all riders.
Nevada	1-01-72	All riders.
New Hampshire	9-03-67	All riders. Repealed effective 8-07-77; helmet use required for riders under 18.

State	Original Law Effective Date	Original Law Coverage; Subsequent Action; Current Law
New Jersey	1-01-68	All riders.
New Mexico	5-01-67	Helmet use required for riders under 18 and all passengers. Effective 7-01-73 helmet use required for all riders. Repealed effective 6-17-77; helmet use required for riders under 18.
New York	1-01-67	All riders.
North Carolina	1-01-68	All riders.
North Dakota	7-01-67	All riders. Repealed effective 7-01-77; helmet use required for riders under 18.
Ohio	4-02-68	All riders. Repealed effective 7-01-78; helmet use required for riders under 18.
Oklahoma	4-27-67	All riders. Repealed effective 4-07-69; helmet use required for riders under 21. Effective 7-01-75 helmet use required for all riders. Repealed effective 5-03-76; helmet use required for riders under 18.
Oregon	1-01-68	All riders. Repealed effective 10-04-77; helmet use required for riders under 18. Effective 6-16-89 helmet use required for all riders.
Pennsylvania	9-13-68	All riders.
Puerto Rico	7-20-60	All riders.
Rhode Island	6-30-67	All riders. Repealed effective 5-21-76; helmet use required only for passengers. Effective 7-1-92 helmet use required for riders under 21.

State	Original Law Effective Date	Original Law Coverage; Subsequent Action; Current Law
South Carolina	7-01-67	All riders. Repealed effective 6-16-80; helmet use required for riders under 21.
South Dakota	7-01-67	All riders. Repealed effective 7-01-77; helmet use required for riders under 18.
Tennessee	6-05-67	All riders.
Texas	1-01-68	All riders. Repealed effective 9-01-77; helmet use required for riders under 18. Effective 9-01-89 helmet use required for all riders. Repealed effective 9-01-97; helmet use required for riders under 21.
Utah	5-13-69	Helmets required only on roads with speed limits of 35 mph or higher. Effective 5-08-77 helmet use required for riders under 18 on all roads.
Vermont	7-01-68	All riders.
Virginia	1-01-71	All riders.
Washington	7-01-67	All riders. Repealed effective 7-01-77. Effective 7-01-87 helmet use required for riders under 18. Effective 6-8-90 helmet use required for all riders.
West Virginia	5-21-71	All riders.
Wisconsin	7-01- 68	All riders. Repealed effective 3-19-78; helmet use required for riders under 18.

State	Original Law Effective Date	Original Law Coverage; Subsequent Action; Current Law
Wyoming	5-25-73	All riders. Repealed effective 5-27-83; helmet use required for riders under 19.

Source: NHTSA, as of 12/31/2001. Some states with laws applicable only to younger riders may also require helmet use by older learners and those who do not have a specified amount of medical insurance coverage.

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