

Spotlight on
Highway Safety



Motorcyclist Traffic Fatalities by State

Prepared for
Governors Highway Safety Association
by **Dr. Allan Williams**

2014 PRELIMINARY DATA



◀ Motorcyclist Traffic Fatalities by State

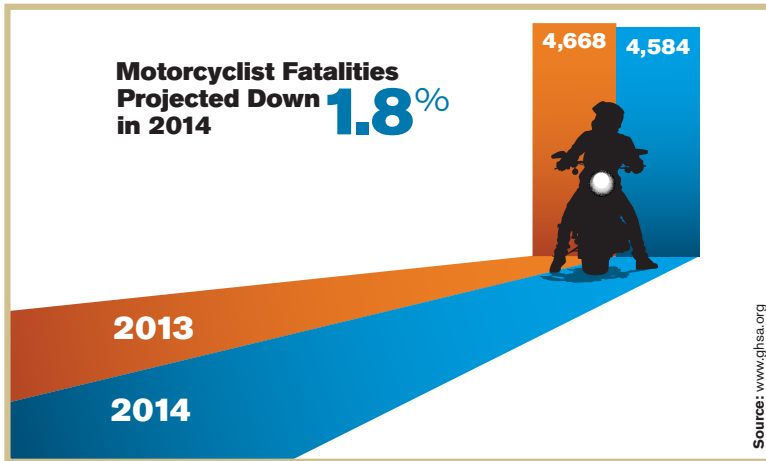
2014 PRELIMINARY DATA

CONTENTS

- 3 SUMMARY
- 4 INTRODUCTION
- 6 THE PRESENT STUDY
- 7 MOTORCYCLIST DEATHS 2013 AND 2014
- 10 CHANGES IN MOTORCYCLE CRASH PATTERNS AND FATALITIES
- 12 THREE-YEAR STATE TRENDS
- 14 EFFORTS TO REDUCE MOTORCYCLIST CRASHES AND FATALITIES
- 19 DISCUSSION
- 20 REFERENCES
- 22 ACKNOWLEDGEMENTS

Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA



SUMMARY

Motorcyclist fatalities in the United States are expected to have decreased by about 2 percent in 2014 compared with 2013, based on preliminary data supplied to the Governors Highway Safety Association (GHSA) by the 50 states and the District of Columbia. This will be only the third year since 1997 that motorcyclist fatalities have decreased, and the first time there have been decreases in consecutive years.

In the preliminary data supplied for the first nine months of 2014, motorcyclist fatalities decreased by 6 percent. The decrease will be less in the final data because some fatalities that occurred during these months are not yet recorded. Based on five previous studies of motorcyclist fatalities in 2009-2013, GHSA expects the underreporting to be about 4.6 percent, and counts were adjusted accordingly. GHSA estimates that the total fatalities for 2014 will be 4,584, compared with 4,668 for 2013 – a 1.8 percent drop.

Despite these recent decreases, fatalities remain high in an era of great progress in reducing other motor vehicle fatalities. In 2013, other motor vehicle fatalities were 28 percent lower than in 2003. In contrast, although down

from their peak in 2008, motorcyclist fatalities were still 26 percent higher in 2013 than 2003. The annual number of motorcyclists killed has doubled since the late 1990's.

Motorcycling is a high-risk activity, especially when combined with factors such as lack of helmet use, speeding, alcohol, and invalid licensure. Motorcycles are less stable than four-wheeled vehicles, and provide no protection when riders are in crashes. Motorcyclists are susceptible to serious injury in collisions with larger motor vehicles, which are prone to violate motorcyclists' right of way because of the smaller visual target they present.

There is little evidence that the risk factors for motorcyclists have been reduced in recent years, and the effect of *Share the Road* programs is unknown. Fluctuations in motorcyclist fatalities are likely to have more to do with economic factors and weather patterns affecting exposure. Helmet use laws covering all motorcyclists in the 31 states that lack them would save many lives. Although bills are introduced each year in state legislatures to require universal helmet use, there are more bills introduced to repeal or weaken existing laws. One favorable trend is the increasing availability of antilock brakes, which have been shown to decrease fatal motorcycle crashes.

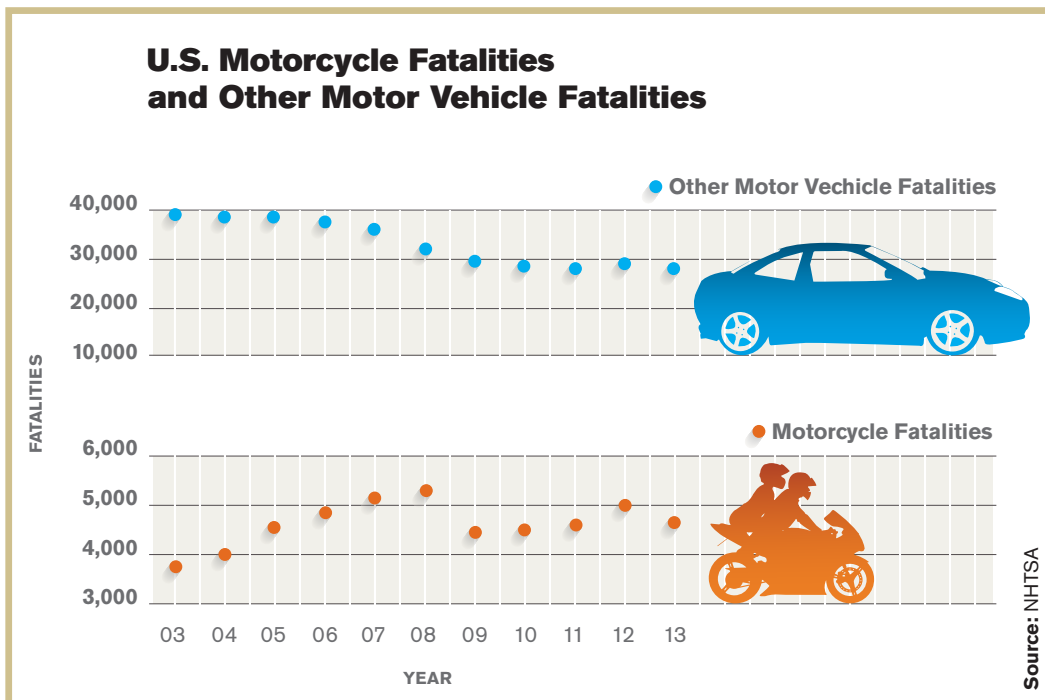
Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

INTRODUCTION

Motorcycles have some advantages over passenger vehicles in avoiding crashes, in terms of field of vision and quick maneuverability. However, they are less stable than four-wheeled vehicles, and there is no protective vehicle structure to minimize injuries when crashes occur. The result is substantially higher fatality rates for motorcyclists, whether based on registered vehicles or miles driven. Per mile driven, fatality rates for motorcyclists were 26 times that of passenger vehicle occupants in 2013 (NHTSA, 2015).

Motorcycles comprise only 3 percent of vehicles on the roads. Despite their limited presence, motorcyclists currently account for 14 percent of all motor vehicle-related fatalities. This percentage has grown in recent years. Motorcyclist fatalities rose between 1975 and 1980, and then declined steadily to a low of 2,116 in 1997. As shown in Table 1, fatalities began to rise in 1998 and increased by 151 percent (2,116 to 5,312) through 2008. Since then fatality trends have been variable. Motorcyclist fatalities declined by 16 percent in 2009, increased slightly in both 2010 and 2011, rose 8 percent in 2012, and dropped by 6 percent in 2013. The number of motorcyclist fatalities was 12 percent lower in 2013 than the all-time high of 5,312 in 2008, but substantially higher than in earlier years.



During this same time period (1997 through 2013), motor vehicle fatalities other than motorcyclists declined in all but four years. The combination of a 122 percent increase in motorcyclist fatalities and a 30 percent drop in other motor vehicle fatalities resulted in the motorcyclists' share of total motor vehicle deaths rising from 5 percent to 14 percent.

Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

Table 1 Trends in Motorcyclist and All Other Motor Vehicle Deaths, 1997-2013

| Year | Motorcyclist Fatalities | % change from previous year | Other Motor Vehicle Fatalities | % change from previous year | Motorcyclist Fatalities as a % of all Fatalities |
|------|-------------------------|-----------------------------|--------------------------------|-----------------------------|--|
| 1997 | 2,116 | -- | 39,897 | -- | 5 |
| 1998 | 2,294 | +8 | 39,207 | -2 | 6 |
| 1999 | 2,483 | +8 | 39,234 | +<1 | 6 |
| 2000 | 2,897 | +17 | 39,048 | <-1 | 7 |
| 2001 | 3,197 | +10 | 38,999 | <-1 | 8 |
| 2002 | 3,270 | +2 | 39,735 | +2 | 8 |
| 2003 | 3,714 | +14 | 39,170 | -1 | 9 |
| 2004 | 4,028 | +8 | 38,808 | <-1 | 9 |
| 2005 | 4,576 | +14 | 38,934 | +<1 | 11 |
| 2006 | 4,837 | +6 | 37,871 | -3 | 11 |
| 2007 | 5,174 | +7 | 36,085 | -5 | 13 |
| 2008 | 5,312 | +3 | 32,111 | -11 | 14 |
| 2009 | 4,469 | -16 | 29,414 | -8 | 13 |
| 2010 | 4,518 | +1 | 28,481 | -3 | 14 |
| 2011 | 4,630 | +2 | 27,849 | -2 | 14 |
| 2012 | 4,986 | +8 | 28,796 | +3 | 15 |
| 2013 | 4,668 | -6 | 28,051 | -3 | 14 |

Source: Fatality Analysis Reporting System

In light of these statistics, since 2010 the Governors Highway Safety Association (GHSA) has produced an annual series of motorcyclist fatality studies (GHSA, 2010-2014). These studies provide an early look at current trends and developing issues, months before more definitive numbers are released by the National Highway Traffic Safety Administration (NHTSA) through its annual census of motor vehicle deaths, the Fatality Analysis Reporting System (FARS).

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

THE PRESENT STUDY

The present report represents a continuation of these earlier studies. State Highway Safety Offices were asked in early 2015 to provide their preliminary motorcyclist fatality counts for 2014, duplicating procedures followed in the five prior studies. All 50 states and the District of Columbia provided data. In this report, a motorcyclist is classified as a person operating or riding as a passenger on a public road on a motorcycle, moped, or other two-wheeled motorized vehicle. Some jurisdictions also provided views on why they thought their motorcyclist fatalities were increasing or decreasing, and commented on motorcycle safety issues.

GHSA emphasizes that the counts provided are preliminary, drawn from state traffic records systems. As in prior reports, data are presented for the first nine months of the year, January through September, because these counts are thought to be reasonably complete at the time of the survey. The data are adjusted for expected underreporting, based on past experience.

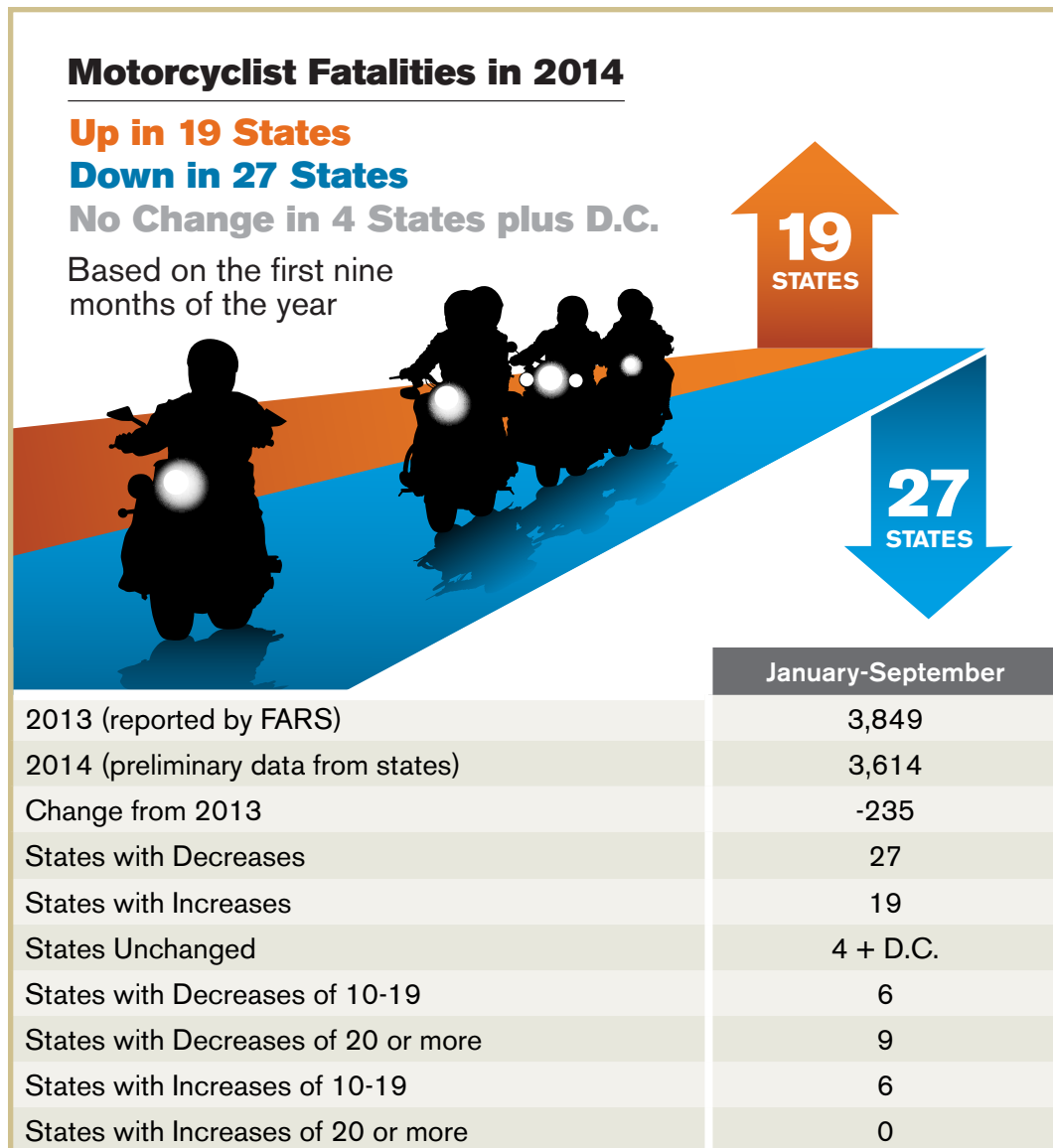
Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

MOTORCYCLIST DEATHS 2013 AND 2014

Motorcyclist deaths based on preliminary state numbers for the first nine months of 2014 are presented in Table 2, compared with the first nine months of 2013 as reported in FARS.

Table 2 Motorcyclist Fatalities, January–September, 2013 vs. 2014



Sources: 2013 data - FARS; 2014 data - reported by states

Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

Based on these preliminary state data, motorcyclist fatalities decreased in 27 states, increased in 19, and stayed the same in four states plus the District of Columbia. Nine states reported decreases of 20 fatalities or more, but no states increased by this much. As noted, the state numbers are preliminary, and fatality counts can be expected to increase. In the five prior studies, the final motorcyclist fatality counts in FARS for the first nine months of the year were 3.2 to 5.8 percent higher than the preliminary counts.

Table 3 adjusts for anticipated underreporting in 2014 by increasing the nine-month state counts by 4.6 percent, the average of the undercounts for the previous five years. Based on unadjusted numbers (from Table 2), the decrease from 2013 to 2014 was 6.1 percent. The more likely decrease, adjusted for undercounting, is 1.8 percent. This compares with a statistical projection by NHTSA (2015a) estimating a 2.2 percent decrease for all motor vehicle fatalities for the first six months of 2014.

If undercounting is at the low end of the range during the past five years (3.2 percent), the expected decrease in motorcycle fatalities for 2014 would be 3.1 percent. If undercounting is at the high end (5.8 percent) there would be 25 fewer fatalities in 2014, a 0.6 percent reduction – virtually no change.

Table 3 Number of Motorcyclist Fatalities for the First Nine Months of 2013 and 2014 Based on Preliminary Data for 2014, Unadjusted and Adjusted for Expected Underreporting

| | # Fatalities, January-September |
|------------------------------|---------------------------------|
| 2013 FARS | 3,849 |
| 2014 Unadjusted State Counts | 3,614 |
| Difference from 2013 FARS | -235 |
| Percent Change | -6.1 |
| 2014 Adjusted State Counts | 3,780 |
| Difference from 2013 FARS | -69 |
| Percent Change | -1.8 |

Sources: 2013 data - FARS; 2014 data - reported by states

Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

Table 4

Motorcyclist Fatalities by State for First Nine Months of 2013 and 2014

Sources: 2013 data - FARS
2014 data - reported by states

The substantial variation in individual state changes based on preliminary data is displayed in Table 4. The largest decreases were in Texas (-39), New York (-35), Arizona (-33), Oklahoma (-32), and Michigan (-31).

| State | Jan-Sept 2013 | Jan-Sept 2014 | Change from 2013 |
|----------------------|---------------|---------------|------------------|
| Alabama | 64 | 58 | -6 |
| Alaska | 9 | 8 | -1 |
| Arizona | 121 | 88 | -33 |
| Arkansas | 47 | 55 | +8 |
| California | 338 | 338 | -- |
| Colorado | 74 | 80 | +6 |
| Connecticut | 46 | 45 | -1 |
| Delaware | 16 | 15 | -1 |
| District of Columbia | 3 | 3 | -- |
| Florida | 349 | 321 | -28 |
| Georgia | 102 | 101 | -1 |
| Hawaii | 22 | 21 | -1 |
| Idaho | 21 | 24 | +3 |
| Illinois | 140 | 113 | -27 |
| Indiana | 97 | 105 | +8 |
| Iowa | 38 | 47 | +9 |
| Kansas | 29 | 40 | +11 |
| Kentucky | 80 | 68 | -12 |
| Louisiana | 70 | 59 | -11 |
| Maine | 14 | 11 | -3 |
| Maryland | 55 | 57 | +2 |
| Massachusetts | 32 | 28 | -4 |
| Michigan | 129 | 98 | -31 |
| Minnesota | 61 | 39 | -22 |
| Mississippi | 28 | 28 | -- |
| Missouri | 62 | 75 | +13 |
| Montana | 34 | 21 | -13 |
| Nebraska | 13 | 20 | +7 |
| Nevada | 41 | 52 | +11 |
| New Hampshire | 20 | 17 | -3 |
| New Jersey | 48 | 54 | +6 |
| New Mexico | 31 | 35 | +4 |
| New York | 153 | 118 | -35 |
| North Carolina | 147 | 128 | -19 |
| North Dakota | 9 | 9 | -- |
| Ohio | 114 | 125 | +11 |
| Oklahoma | 78 | 46 | -32 |
| Oregon | 28 | 41 | +13 |
| Pennsylvania | 158 | 167 | +9 |
| Rhode Island | 9 | 7 | -2 |
| South Carolina | 122 | 94 | -28 |
| South Dakota | 21 | 16 | -5 |
| Tennessee | 116 | 102 | -14 |
| Texas | 393 | 354 | -39 |
| Utah | 27 | 38 | +11 |
| Vermont | 7 | 7 | -- |
| Virginia | 64 | 73 | +9 |
| Washington | 64 | 60 | -4 |
| West Virginia | 20 | 26 | +6 |
| Wisconsin | 76 | 65 | -11 |
| Wyoming | 9 | 14 | +5 |
| TOTAL | 3,849 | 3,614 | -235 |

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

CHANGES IN MOTORCYCLE CRASH PATTERNS AND FATALITIES

The major motorcycle crash and fatality risk factors have long been established: lack of helmet use, alcohol involvement, and speeding. Invalid licensure also has been found to elevate crash likelihood (Kraus et al., 1991). While lack of helmet use will not prevent a crash, it clearly elevates the likelihood of a fatality in the event of a crash. There is little evidence that these risk factors have been reduced over the years.

For example, NHTSA's national observational surveys of helmet use have been conducted since 1994. DOT-compliant helmet use was 63 percent in 1994 and 64 percent in 2014. Helmet use has ranged from 48 percent to 71 percent over this 20-year period, but the range in the most recent years has been between 60 percent and 66 percent (NHTSA, 2015b). Helmet use among fatally injured motorcyclists also has remained steady over recent years, at 60 percent or slightly less for motorcycle operators, and slightly less than 50 percent for passengers (NHTSA, 2015; Insurance Institute for Highway Safety (IIHS) (2015).

The percentage of fatally-injured motorcyclists with BACs of 0.08 grams per deciliter or greater has ranged narrowly from 27 to 30 percent in the past decade. The proportion of motorcyclists involved in fatal crashes who were speeding has been slightly more than one-third over the same time frame. The percentage of motorcyclists with invalid licenses in fatal crashes was 25 percent in 2013, and has ranged from the low to mid-20s in recent years (NHTSA, 2015; IIHS, 2015).

Motorcyclist fatality rates per registered vehicle have fluctuated over the years, but in 2013, the rate was about the same as in 1997: 5.55 fatalities per 10,000 registered vehicles, compared with 5.53 in 1997. In contrast, passenger vehicle fatalities per registered vehicle have declined by 66 percent over this time period (IIHS, 2015a). In part, this is due to such factors as structural improvements in passenger vehicle design making them more protective to occupants, increases in seat belt use, electronic stability control for four-wheeled vehicles, and effective policies such as graduated driver licensing for the youngest drivers. These factors do not affect motorcyclists. Frontal airbags are feasible for some types of motorcycles, but are available as an option on only one model, Honda's Gold Wing Touring motorcycle.

One important vehicle factor that can reduce motorcyclist deaths is the antilock brake system (ABS). ABS prevents wheels from locking up, reducing the likelihood of ejection from the motorcycle. In one study, the rate of fatal crashes was 31 percent lower for motorcycles equipped with ABS compared with same-vehicle models without ABS (Teoh, 2013). ABS is becoming increasingly available as standard or as an option on recent model year motorcycles. In a national telephone survey of motorcyclists, 58 percent said they thought ABS enhanced motorcyclist safety, and 54 percent indicated that they would get ABS on their next motorcycle (McCartt et al., 2011). Thus the percentage of motorcycles on the roads with ABS is likely to rise.

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

The European Union has mandated ABS as standard equipment for motorcycles as of 2016, but NHTSA has not responded to a 2013 petition to do so in the United States.

Other crash avoidance features for motorcycles are possible, such as traction control, which is being introduced in some motorcycle models. Traction control helps mitigate the loss of traction by correcting rear wheel slip as it starts to occur during acceleration. Bosch markets a system called motorcycle stability control, which optimizes ABS to improve stability in curves.

In the absence of curtailment of motorcyclist risk factors, yearly fluctuations in motorcyclist deaths are thought to be determined largely by changes in exposure. Exposure is defined as the number of motorcycles on the roads and their amount and type of use, which can be influenced by economic factors and weather patterns. For example, high gas prices can encourage the use of more fuel-efficient motorcycles. Rain, snow and cold temperatures discourage biking. Rising costs of motorcycles also can be an influencing factor.

The large increase in fatalities between 1997 and 2008 is clearly linked to the doubling of the number of registered motorcycles, from 3,826,373 to 7,752,926. The 2009 break in the pattern of yearly increases in motorcyclist deaths is likely attributable to the severe economic recession of the time, resulting in less travel for recreational purposes (GHSA, 2010). A case can be made that the increase in motorcyclist fatalities in 2012 was strongly influenced by unusually warm and dry periods in much of the country for many of the months. (GHSA, 2013).

Influences on exposure in 2014 compared with recent years are not entirely clear and may have been negligible. One factor may be that the growth in motorcycle registrations has slowed in recent years, and actually decreased slightly between 2012 and 2013 (the last year available)(Federal Highway Administration, 2015). Motorcycle sales reportedly increased by 3.8 percent between 2013 and 2014 (webBikeworld, 2015). The economy continued its slow growth, the Gross Domestic Product (GDP) increasing by 2.4 percent between 2013 and 2014 (Bureau of Economic Analysis, 2015). Gas prices remained relatively high, not decreasing until late 2014, and more dramatically in 2015 (US Energy Information Administration, 2015).

In this most current survey, no states mentioned any of these factors. Nor was there any indication that weather played an important role in contributing to 2013-2014 exposure changes. Some states noted weather changes, but there was no consistent pattern. A few states reported 2013-2014 differences that may have contributed to increases in fatalities (increase in dry days; early onset of warm weather; milder weather). An equal number of states noted differences that could lead to decreases (colder temperatures; more rain).

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

THREE-YEAR STATE TRENDS

As indicated in Table 4, state patterns do not necessarily conform to the overall national pattern, and this holds true over a longer span of time as well. Table 5 presents numbers of motorcyclist deaths reported in FARS for the three most recent years available: 2011, 2012, and 2013. States are ranked from highest to lowest in terms of the numbers of deaths in 2013, and the percentage of all motor vehicle deaths that were motorcyclists is provided.

Table 5 illustrates the wide range in numbers of deaths, from 3 to 491 in 2013 and similar ranges in 2011 and 2012. Three states – Texas, Florida, and California accounted for almost one-third (31 percent) of the deaths in 2013. Although accurate up-to-date information on amount of exposure by state (or nationally) is not available, the rankings largely reflect differences in exposure relating to total population, number of registered motorcycles, and seasonal factors, that is, number of days conducive to riding.

The percentage of all motor vehicle deaths that are motorcyclists is of considerable interest in indicating the prominence of the problem by state. In 2013, the range was from 6 percent in Mississippi and North Dakota to 28 percent in Hawaii. In three other states, 20 percent or more of the deaths were motorcyclists: Nevada (22), Florida (20) and Delaware (20). In addition to Mississippi and North Dakota, three states had fewer than 10 percent of all deaths that were motorcyclists: West Virginia (7), Nebraska (7) and Alabama (9).

Also notable is the recent three-year pattern of motorcyclist deaths, which, combined with 2014 data presented in Table 4, provides information useful for assessment and planning. Nationwide, motorcyclist fatalities increased 8 percent in 2012 and decreased 6 percent in 2013. Not unexpectedly, numerous states followed this pattern, although some did not. For example, states that exhibited the 2012 increase and the 2013 dip included, among others, Pennsylvania, Washington, Indiana, Kentucky, Missouri and Massachusetts. There were various other patterns. Some states had little change over this three-year period, notably New York, which had the same number of deaths (170) each year. Some states increased each year, for example, Arizona, Connecticut, Minnesota and Montana. A few states decreased each year, most notably Georgia and New Jersey.

Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

Table 5

Motorcyclist Fatalities by State, 2011-2013, and Percentage of 2013 Fatalities that were Motorcyclists

Source: FARS

| State | Number of Fatalities 2011 | Number of Fatalities 2012 | Number of Fatalities 2013 | % of 2013 Fatalities that were Motorcyclists |
|----------------------|---------------------------|---------------------------|---------------------------|--|
| Texas | 478 | 454 | 491 | 15 |
| Florida | 464 | 492 | 485 | 20 |
| California | 415 | 447 | 453 | 15 |
| North Carolina | 170 | 198 | 189 | 15 |
| Pennsylvania | 199 | 210 | 182 | 15 |
| New York | 170 | 170 | 170 | 14 |
| Illinois | 145 | 148 | 152 | 15 |
| Arizona | 136 | 141 | 151 | 18 |
| South Carolina | 129 | 146 | 149 | 19 |
| Michigan | 118 | 138 | 138 | 15 |
| Tennessee | 115 | 139 | 137 | 14 |
| Ohio | 165 | 162 | 132 | 13 |
| Georgia | 150 | 134 | 116 | 10 |
| Indiana | 118 | 152 | 114 | 15 |
| Oklahoma | 98 | 84 | 92 | 14 |
| Colorado | 78 | 79 | 87 | 18 |
| Kentucky | 71 | 106 | 87 | 14 |
| Louisiana | 80 | 78 | 86 | 12 |
| Wisconsin | 88 | 117 | 85 | 16 |
| Alabama | 98 | 97 | 80 | 9 |
| Virginia | 96 | 85 | 79 | 11 |
| Missouri | 82 | 104 | 74 | 10 |
| Washington | 72 | 83 | 73 | 17 |
| Maryland | 76 | 78 | 62 | 13 |
| Arkansas | 64 | 72 | 61 | 13 |
| Minnesota | 42 | 55 | 61 | 16 |
| Nevada | 41 | 43 | 57 | 22 |
| New Jersey | 93 | 77 | 56 | 10 |
| Connecticut | 37 | 48 | 53 | 19 |
| Iowa | 36 | 59 | 41 | 13 |
| New Mexico | 47 | 64 | 41 | 13 |
| Massachusetts | 40 | 56 | 40 | 12 |
| Mississippi | 58 | 39 | 39 | 6 |
| Kansas | 45 | 48 | 35 | 10 |
| Montana | 20 | 30 | 35 | 15 |
| Oregon | 40 | 51 | 34 | 11 |
| Utah | 28 | 32 | 31 | 14 |
| Hawaii | 32 | 40 | 29 | 28 |
| Idaho | 17 | 22 | 25 | 12 |
| New Hampshire | 14 | 29 | 24 | 18 |
| West Virginia | 27 | 31 | 24 | 7 |
| South Dakota | 14 | 25 | 22 | 16 |
| Delaware | 19 | 17 | 20 | 20 |
| Maine | 15 | 24 | 14 | 10 |
| Nebraska | 23 | 22 | 14 | 7 |
| Rhode Island | 15 | 8 | 11 | 17 |
| Alaska | 10 | 9 | 9 | 18 |
| Wyoming | 16 | 12 | 9 | 10 |
| North Dakota | 14 | 16 | 9 | 6 |
| Vermont | 8 | 11 | 7 | 10 |
| District of Columbia | 4 | 4 | 3 | 15 |
| TOTAL | 4,630 | 4,986 | 4,668 | 14 |

Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

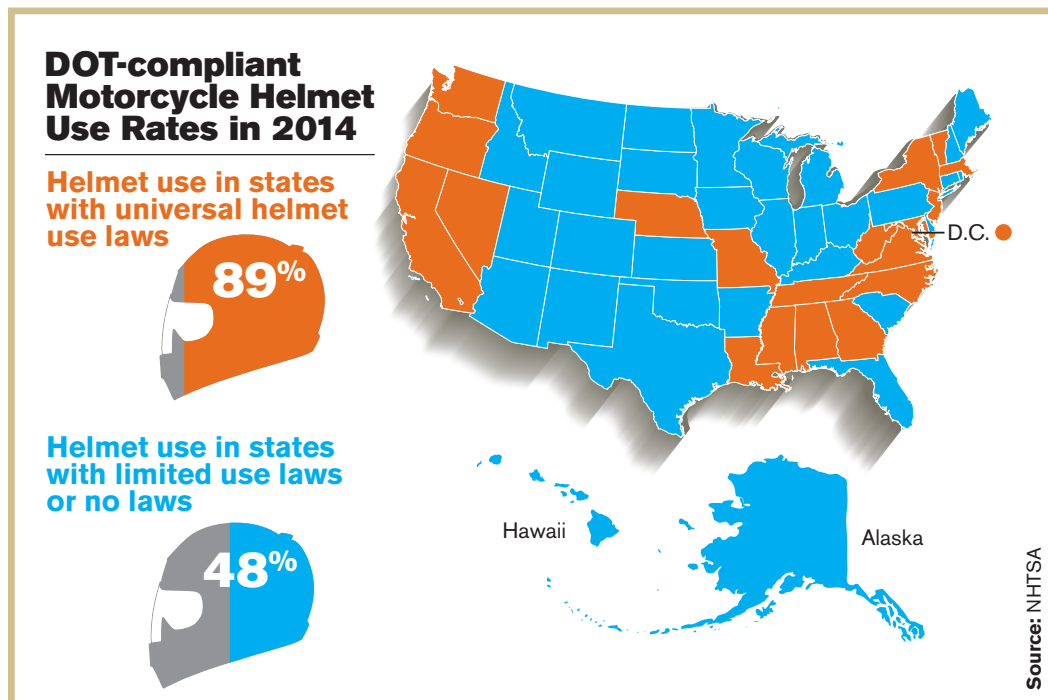
EFFORTS TO REDUCE MOTORCYCLIST CRASHES AND FATALITIES

The objectives in protecting motorcyclists are to reduce the major risk factors for crashes and injuries. This is a challenging task.

Increasing Helmet Use

When crashes occur, passenger vehicle occupants are protected to a degree by surrounding vehicle structure and restraint systems: seat belts and air bags. Motorcyclists can wear protective clothing, but they lack any external structure or restraint to prevent their propulsion off of the motorcycle. However, the most important injury protection mechanism for motorcyclists is to wear a DOT-compliant helmet. Helmets reduce head and brain injuries and decrease the risk of dying in a crash by 37 percent (NHTSA, 2008). There is no evidence that motorcyclists can be persuaded to wear helmets through educational techniques, but it is well established that helmet use can be increased to more than 90 percent, and in some cases close to 100 percent (Kraus, Peek, & Williams, 1992) through a law that requires all motorcyclists to wear helmets (referred to as a universal helmet use law).

In 1967, states were required to have a universal helmet use law in order to qualify



◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

for certain highway safety and highway construction funds, and by 1975, all but three states mandated helmets for all motorcyclists. In 1976, Congress ruled that the Department of Transportation could no longer penalize states financially for not having a helmet use law. Between 1976 and 1978, eight states repealed all helmet use requirements and 20 states weakened their laws to apply only to young riders. In the early 1990s, Congress again established penalties as well as incentives for states to enact helmet use laws, only to rescind these rules in 1995. These actions led to several states reinstating helmet laws, and subsequently to more repeals. Presently, 19 states plus the District of Columbia have universal helmet use laws, 28 require only those younger than a certain age (generally 18 or 21) to use helmets, and three states (Illinois, Iowa, New Hampshire) have no requirements.

These fluctuations have provided many opportunities to study the effects of helmet laws on use rates and injury outcomes, and the results are clear-cut. In brief, the introduction (or reinstatement) of a universal helmet law increases use and reduces injuries and fatalities; repealing or weakening a universal law reduces use and increases injuries and deaths (IIHS, 2014). Not wearing a helmet when required is a very visible offense, and use rates typically increase from around 50 percent to close to 90 percent or higher with a universal law. Laws that apply only to young motorcyclists are not easily enforceable and minimally affect motorcyclist injuries. A synthesis of studies undertaken during a period when many law changes had gone into effect indicated that helmet use was low when partial laws were in place. In addition, motorcycle deaths, or deaths per registration or per crash, were substantially lower in states with universal laws than in those with no laws or laws applying only to young motorcyclists (US General Accounting Office, 1991). NHTSA's national observational survey in 2014 indicated that use rates of DOT-compliant helmets in universal law states were 89 percent, compared with 48 percent in all other states. These figures exclude helmets not meeting DOT standards, with use rates of 7 percent in states with universal laws and 3 percent in other states. (NHTSA, 2015b).

Some motorcycling organizations and many motorcyclists oppose helmet use laws, arguing that motorcyclists should be able to make their own decisions and that priority should be given to increasing awareness of other motorists to the presence of motorcyclists, and penalizing motorists who cause motorcycle crashes (Shinkle, 2015). Numerous bills are introduced every year in state legislatures to repeal or weaken universal helmet use laws or to require universal helmet use. No such bills passed in 2013 or 2014, but many are active in 2015. The last state to weaken a universal helmet use law was Michigan in 2012, with predictable negative results (Chapman et al, 2014). In Florida, which weakened its law in 2000, the motorcyclist death rate increased significantly (Kyrychenko & McCartt, 2006). The last state to adopt a universal helmet use law was Louisiana in 2004 (reinstating an earlier law), with predictable positive results (Gilbert et al., 2008).

A national survey of motorcyclists found that 76 percent thought that helmets protected against injuries, including many of those who said they never or rarely wore a helmet (McCartt et al., 2011). Convincing this group to wear helmets because of their safety benefits is thus likely to be a difficult task. Universal helmet use laws are the key to increasing motorcyclist protection, but the trend has been in the opposite direction.

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

Several states commented on the absence of an effective helmet use law. One noted that having a helmet use law applying only to those under age 21 made it difficult to implement programs that can have a meaningful impact on motorcyclist safety.

Reducing Alcohol-impaired Riding

Motorcyclists are the most likely of all motor vehicle operators to have BACs of 0.08 percent or greater. Many states cited alcohol as a safety problem for motorcyclists. Clearly, state impairment prevention programs need to address motorcyclists as well as passenger vehicle drivers, and police need to be aware of the cues indicating when motorcyclists may be impaired (Stuster, 1993).

Reducing Speeding

Speeding is another important risk factor found more often among motorcyclists than among passenger vehicle drivers. In 2013, 34 percent of motorcyclists in fatal crashes were speeding, compared with 21 percent for passenger vehicle drivers (NHTSA, 2015). Speeding is particularly problematic among riders of sport and supersport motorcycles. These lightweight, high horsepower bikes have tremendous speed and acceleration capabilities that are likely to encourage speeding and be attractive to those inclined to do so. Washington commented that “overwhelmingly, younger riders choose a ‘sport-bike,’ a lightweight high-performance race-replica type motorcycle.” Supersport motorcycles have four times the fatal crash rate of other motorcycle types (cruisers or standards), and sport bikes, which are not quite so lightweight or powerful, have twice the fatal crash rate (Teoh & Campbell, 2010).

Reducing Invalid Licensure

Invalid licensure is also more common among fatally injured motorcyclists than among fatally injured passenger vehicle drivers. In 2013, 25 percent of fatally injured motorcyclists did not have a valid license, compared with 13 percent of fatally injured passenger vehicle drivers (NHTSA, 2015).

States are well aware of this issue and some are trying to address it. Michigan, noting that 42 percent of its fatally injured motorcyclists did not have a valid license, has implemented a strong campaign to encourage riders to seek out formal training as a way to get their motorcycle endorsement. Another strategy has been to compare motorcycle registration and vehicle licensing files and to contact those who have a registered motorcycle but not a motorcycle license. It is possible that institution of a universal helmet law may reduce the population on the roads of those without proper license, but this has not been verified.

Motorcycle licensing practices vary widely, and it is not clear what the best balance is between policies that are intended to ensure that motorcyclists are well prepared to operate a motorcycle and to interact with other vehicles on the roads, and the problem that some motorcyclists will avoid the licensing process.

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

Graduated driver licensing (GDL) policies similar to those for young passenger vehicle drivers have been discussed – and in some cases employed – in the United States, but more so in other countries. These policies are intended to control access to higher risk situations during the learning process (Mayhew & Simpson, 2001; Christie, 2011; Haworth & Mulvihill, 2005). There is logic to easing beginning motorcyclists into full privileges on the roads, but insufficient research evidence to support this idea. NHTSA (2006) has recommended a 90-day learner period for beginning motorcyclists, consonant with GDL policy.

Education and training courses are part of the licensing process in many states and should be available to all who wish to take such courses, regardless of requirements. Operating a motorcycle is more difficult than driving a car, and training courses make sense, although the effects of such courses are unclear (Kardamanidis et al., 2010).

Share the Road Programs

Motorcycles, unlike bicycles, have the speed capabilities to travel on the roads at the same pace as other motor vehicles, and they generally travel in the same lanes as other motor vehicles and are subject to the same rules. However, like bicyclists they are susceptible to injury in crashes with other motor vehicles, because of the larger size of passenger vehicles, and because motorcyclists are not in an enclosed structure and are likely to be ejected from the bike in crashes. The majority of motorcyclist deaths occur in multiple vehicle collisions, although each year more than 40 percent of the deaths occur in single vehicle crashes, often from contact with fixed objects.

Drivers of other motor vehicles that collide with motorcycles are often at fault in these crashes, violating the motorcyclist's right of way. The most common collision type is when the other motor vehicle is turning left while the motorcyclist is going straight, passing, or overtaking other vehicles. The reason most often offered for these collisions is that motorcycles present a smaller visual target and are not seen by the striking motorists. Motorcyclists are rightfully concerned about incursions into their path.

This is the basis for *Share the Road* programs, which rely on education and publicity of various types to urge motorists to watch out for motorcycles. The programs are primarily aimed at other motorists. Clearly motorcyclists also need to be vigilant, and many motorcyclists learn with experience to anticipate potentially dangerous situations. Motorcyclists can also make themselves or their bikes more conspicuous through clothing and striping, and some motorcyclists modify their bikes to make them noisier, intending to increase awareness of their presence.

It is certain that motorists should be alert and vigilant when on the roads, but what *Share the Road* programs can accomplish in that regard is questionable. Education/publicity programs used alone, in the absence of an enforcement component, or folded into a broad-based community program, have had little success in changing behavior (NCHRP, 2007). Some states do have active enforcement programs. For example, in California increased motorist awareness

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

has been developed through highly publicized motorcycle safety enforcement operations which target violations made by all roadway users that contribute to motorcycle crashes.

Motorcyclists are sometimes found to be at fault in multi-vehicle crashes. Several states suggested there should be more focus on motorcyclist behavior, providing examples of crashes in which the motorcyclist crossed the center line and collided with an oncoming vehicle, and other motorcyclist errors that led to collisions with other vehicles. Some posited that federally-funded state programs should be permitted to address both passenger vehicle driver and motorcyclist risk factors.

Arkansas: *“The biggest problem is the motorcyclist, not the motorist being aware of the motorcyclist. Over 75 percent of the motorcyclist fatalities were the fault of the motorcyclist.”*

Colorado: *“Sixty-six percent of motorcycle operators involved in fatal crashes were determined to be at fault.”*

Virginia: *“Sixty-six percent of the time the fatal crash was the result of the rider’s action, not the other vehicle.”*

Washington: *“Of all motorcyclist fatalities, about 67 percent were caused by the rider.”*

Delaware suggested an opposite trend: *“In 2014, there was an increase in the number of fatal crashes where the driver of the motor vehicle appeared at fault. In past years, the fault has been largely on the motorcycle rider.”*

Some states noted an imbalance in countermeasure approaches, with federal funding concentrated on *Share the Road* programs. As suggested by one state, “The programs funded by NHTSA are important but only part of the solution. They cannot be used to address riders who are impaired, speeding, or running off the road which continue to be major contributing factors in serious injury and fatal motorcyclist crashes... across the nation.”



Passenger vehicle drivers are not the only ones “sharing the road” with motorcyclists. Motorcyclists also need to be vigilant when traveling at times and places when deer and other animals are likely to be crossing the roads. In a study of animal/motor vehicle collisions in which motorists were killed, motorcyclists comprised 39 percent of the fatally injured people, and 65 percent of those were not wearing helmets (Williams & Wells, 2005).

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

DISCUSSION

The results of this latest survey suggest that the number of motorcyclist fatalities will decrease slightly in 2014. If so, this will be the second year in a row that fatalities have dropped, which is a welcome development. When motorcyclist fatalities declined in 2009, after 11 consecutive years of increases, this was followed by three years of increases, until the 6 percent decrease in 2013.

Yet, motorcycling remains a dangerous pursuit, and there is no evidence that the known risk factors for injury – lack of helmet use, alcohol, speeding, invalid licensure – have been affected by countermeasure efforts or that motorists have become more cognizant of motorcycles in their driving environment.

The one policy that would produce a major decrease in motorcyclist fatalities is universal helmet use laws in every state. NHTSA estimates that if all motorcyclists were helmeted, almost 800 lives could be saved annually. However, the proponents and opponents of universal helmet laws have been locked in a political stalemate in recent years, with few changes to existing laws. A more realistic hope is that there will be an increase in the presence of motorcycles with ABS, which would have lifesaving benefits. There is also the prospect that other effective crash avoidance features becoming increasingly available on both passenger vehicles and motorcycles and making frontal airbags available on more motorcycle models would be expected to have beneficial effects.

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

REFERENCES

- Bureau of Economic Analysis (2015). U.S. GDP by Year, Washington DC: U.S. Department of Commerce.
- Chapman, A.J., Titus, R., Ferenchik, H., Davis, A., Rodriguez, C. (2014). Repeal of the Michigan helmet law: early clinical impacts. *American Journal of Surgery*, 207, 352-356.
- Christie, R. (2011). A discussion paper on elements of graduated licensing systems for motorcycle riders. Austroads, Sydney, Australia.
- Federal Highway Administration (2015). Highway Statistics Series, State Motor Vehicle Registrations—2013, Washington D.C.
- Gilbert, H., Chaudhary, N., Solomon, M., Preusser, D., Cosgrove, L. (2008). Evaluation of the reinstatement of the helmet law in Louisiana. DOT HS 810 956, Washington D.C: National Highway Traffic Safety Administration.
- GHSA (2010-2014). Motorcyclist traffic fatalities by state; 2009, 2010, 2011, 2012, 2013 preliminary data. Washington D.C.
- Haworth, N., Mulvihill, C. (2005). Review of motorcycle licensing and training, Monash University Accident Research Centre, Report no. 240, Victoria, Australia.
- IIHS (2014). Q & A, Motorcycle helmets, Arlington VA.
- IIHS (2015). Fatality Facts 2013: Motorcycles, Arlington VA.
- IIHS (2015a). Fatality Facts 2013: Passenger vehicle occupants, Arlington VA.
- Kardamanidis, K., Martiniuk, A., Ivers, R.Q., Stvenson, M.R., Thistlethwaite, K. (2010). Motorcycle rider training for the prevention of road traffic crashes (Review). *Cochrane Database of Systematic Reviews*. Issue 10, Art. No. CD 005249, Oxfordshire, England: the Cochrane Collaboration.
- Kraus, J.F., Anderson, C., Zador, P., Williams, A. (1991). Motorcycle licensure, ownership, and injury crash involvement. *American Journal of Public Health*, 81, 172-176.
- Kraus, J.F., Peek, C., Williams, A. (1992). Compliance with the 1992 California helmet use law. *American Journal of Public Health*, 85, 96-99.
- Kyrychenko, S.Y., McCartt, A.T. (2006). Florida's weakened motorcycle helmet law: effects on death rates in motorcycle crashes. *Traffic Injury Prevention*, 7, 55-60.
- Mayhew, D.R., Simpson, H.M. (2001). Graduated licensing for motorcyclists. Ottawa, Ontario: Traffic Injury Research Foundation.

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

- McCartt, A.T., Blaner, L., Teoh, E., Strouse, L. (2011). Overview of motorcycling in the United States: a national survey. *Journal of Safety Research*, 42, 177-84.
- NCHRP (2007). Public information and education in the promotion of highway safety. *Research Results Digest* 322, Washington D.C: Transportation Research Board.
- NHTSA (2006). Uniform guidelines for state highway safety programs; motorcycle safety. Washington, D.C.
- NHTSA (2008). Traffic safety facts, laws: motorcycle helmet use laws. DOT HS 810 887. Washington D.C.
- NHTSA (2015). Traffic Safety Facts: Motorcycles, 2013 Data. DOT HS 812 148, Washington D.C.
- NHTSA (2015a). Early estimate of motor vehicle traffic fatalities for the first half (Jan-Jun) of 2014. DOT HS 812 093, Washington D.C.
- NHTSA (2015b). Motorcycle helmet use in 2014 – overall results. DOT HS 812 110, Washington, D.C.
- Shinkle, D. (2015). The debate over requiring motorcyclists to wear helmets revs up once again. *State Legislatures Magazine*, February 2015.
- Stuster, J. (1993). The detection of DWI Motorcyclists. DOT HS 807 839. Washington D.C: National Highway Traffic Safety Administration
- Teoh, E., Campbell, M. (2010) Role of motorcycle type in fatal motorcycle crashes. *Journal of Safety Research*, 41, 507-512.
- Teoh, E. (2013). Effects of antilock braking systems on motorcycle fatal crash rates – an update. Arlington VA: Insurance institute for Highway Safety.
- U.S. General Accounting Office (1991). Highway safety: motorcycle helmet laws save lives and reduce costs to society, Washington D.C.
- U.S. Energy Information Administration (2015). Petroleum and other liquids, Weekly retail gasoline and diesel prices, Washington D.C: US Department of Energy.
- webBikeWorld (2015). Motorcycle sales statistics. www.webbike.com/motorcycles.
- Williams, A.F., Wells, J.K. (2005). Characteristics of vehicle-animal crashes in which vehicle occupants are killed. *Traffic Injury Prevention*, 6, 56-59.

◀ Motorcyclist Traffic Fatalities by State

2014 PRELIMINARY DATA

ACKNOWLEDGEMENTS

Dr. Allan Williams conducted the analysis, researched and wrote the report.

Jonathan Adkins, Executive Director, GHSA, and Kara Macek, Communications Director, GHSA, oversaw the report.

Creative by Tony Frye Design.