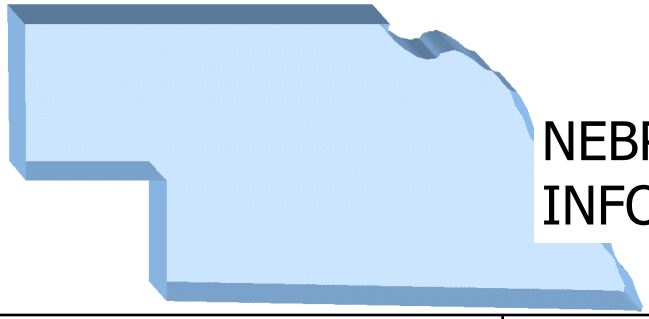


NEBRASKA MOTORCYCLE INFORMATION PACKET

As of August 2016

Contents

MOTORCYCLE HELMETS

➔ *NHTSA estimates helmets are estimated to be 37 percent effective in preventing fatal injuries to motorcycle riders.

➔ Unhelmeted motorcyclists are three times more likely to suffer brain injuries than helmeted riders in a crash.*

➔ In 1991, a Nebraska study on hospital costs for injured motorcyclists showed a decline in total acute medical charges of 38 percent after the helmet law was implemented.^

➔ Studies show that unhelmeted riders involved in crashes are less likely to have insurance and more likely to have higher hospital costs than helmeted riders in similar crashes.*

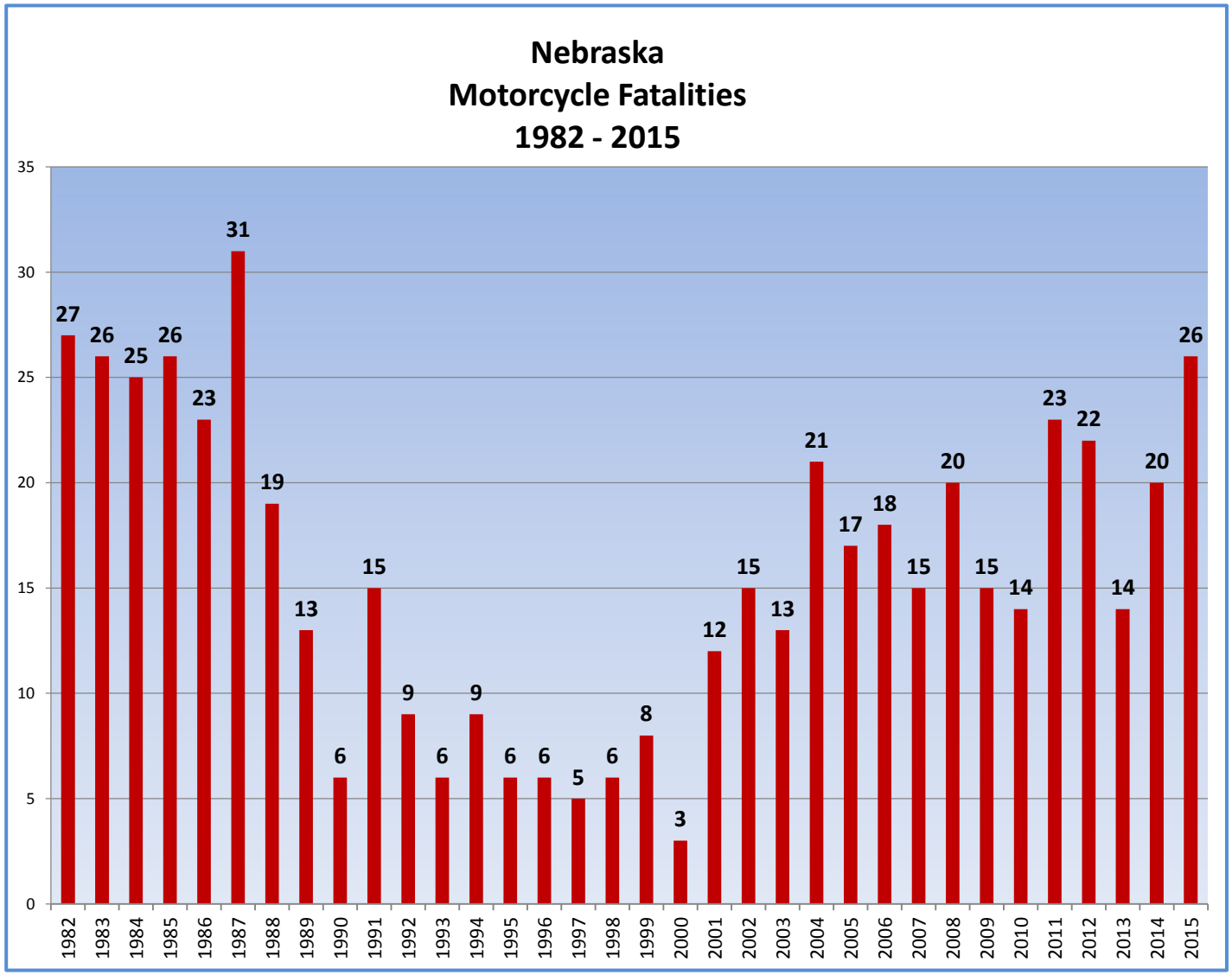
➔ All states that have weakened or repealed helmet laws have experienced an increase in motorcycle fatality rates.*

➔ According to an May 2016 survey of 900 Nebraskans conducted by Research Associates, "73% indicated the Nebraska law requiring motorcycle helmets should be continued; 23% indicated it should be repealed; 4% had no opinion."

➔ Only 1% of licensed Nebraska motorcyclists are under the age of 21.#

*National Highway Traffic Safety Administration—NHTSA– 2013 Traffic Safety Facts
#Nebraska Department of Motor Vehicles
^Motorcycle Crash Injuries and Costs

Nebraska Office of Highway Safety
P.O. Box 94612
Lincoln, Nebraska 68509
402/471-2515 FAX: 402/471-3865
www.transportation.nebraska.gov/nohs/



In 1974, the Motorcycle Safety Education Courses began.

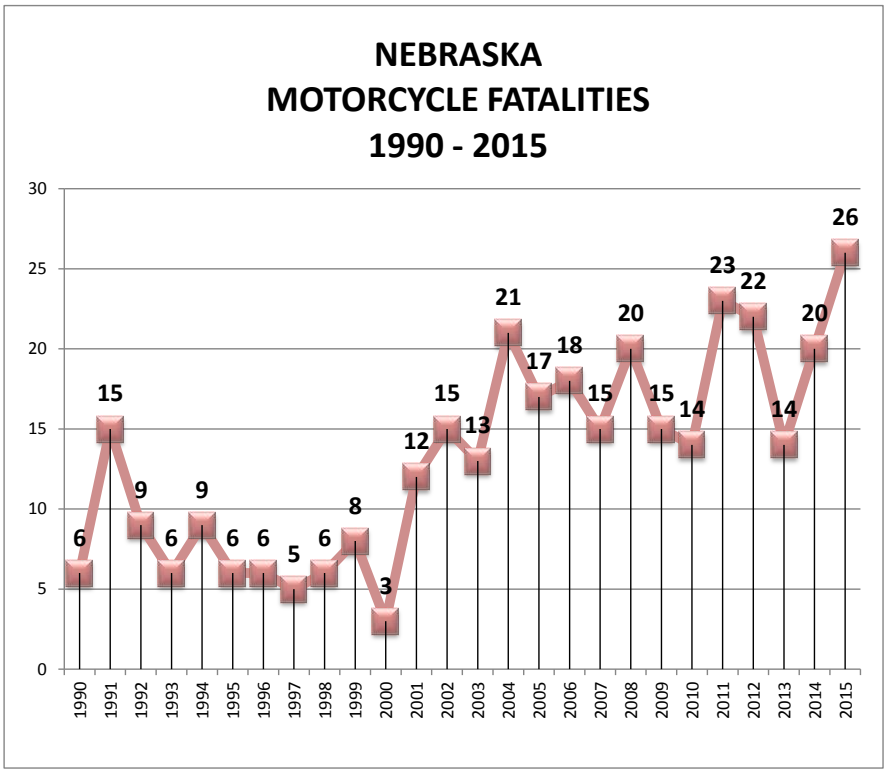
On January 1, 1986, the Financial Responsibility (Proof of Insurance) Law became effective.

On January 1, 1989, the Nebraska Motorcycle Helmet Law became effective.

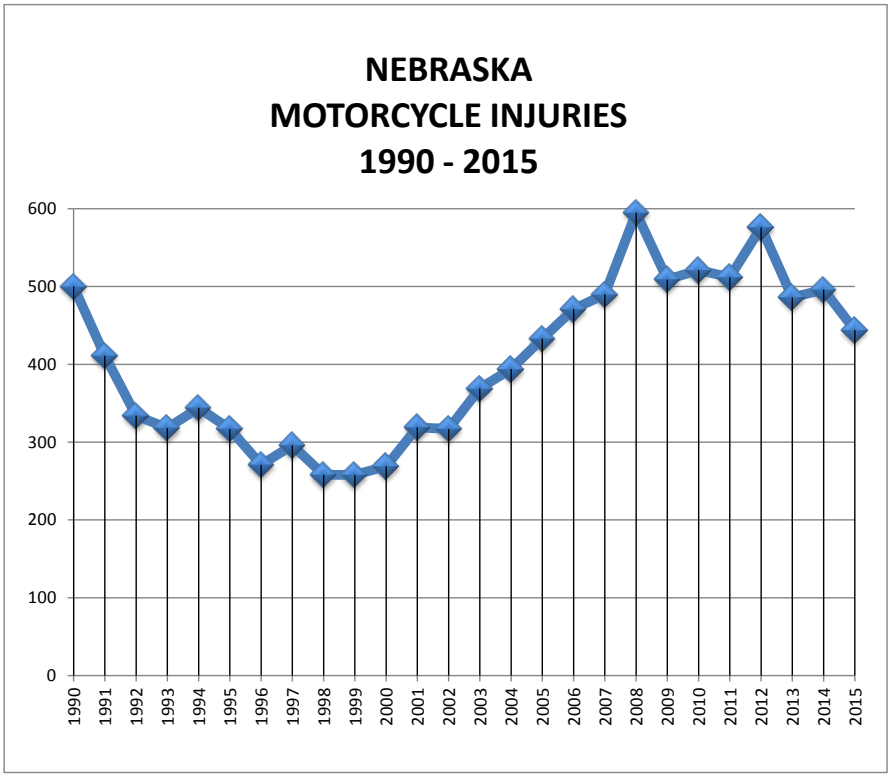
Provided by: Nebraska Office of Highway Safety, 1500 South 14th, PO Box 94612, Lincoln, NE 68509

As of January 7, 2016

Year	Motorcycle Fatalities
1990	6
1991	15
1992	9
1993	6
1994	9
1995	6
1996	6
1997	5
1998	6
1999	8
2000	3
2001	12
2002	15
2003	13
2004	21
2005	17
2006	18
2007	15
2008	20
2009	15
2010	14
2011	23
2012	22
2013	14
2014	20
2015	26



Year	Motorcycle Injuries
1990	500
1991	411
1992	334
1993	318
1994	344
1995	317
1996	271
1997	296
1998	258
1999	258
2000	269
2001	319
2002	317
2003	369
2004	394
2005	433
2006	471
2007	490
2008	595
2009	509
2010	521
2011	512
2012	576
2013	486
2014	496
2015	444



* 1974 Motorcycle Safety Education Courses Started

* January 1, 1986 Financial Responsibility (Proof of Insurance) Law

*January 1, 1989 Mandatory Motorcycle Helmet Law

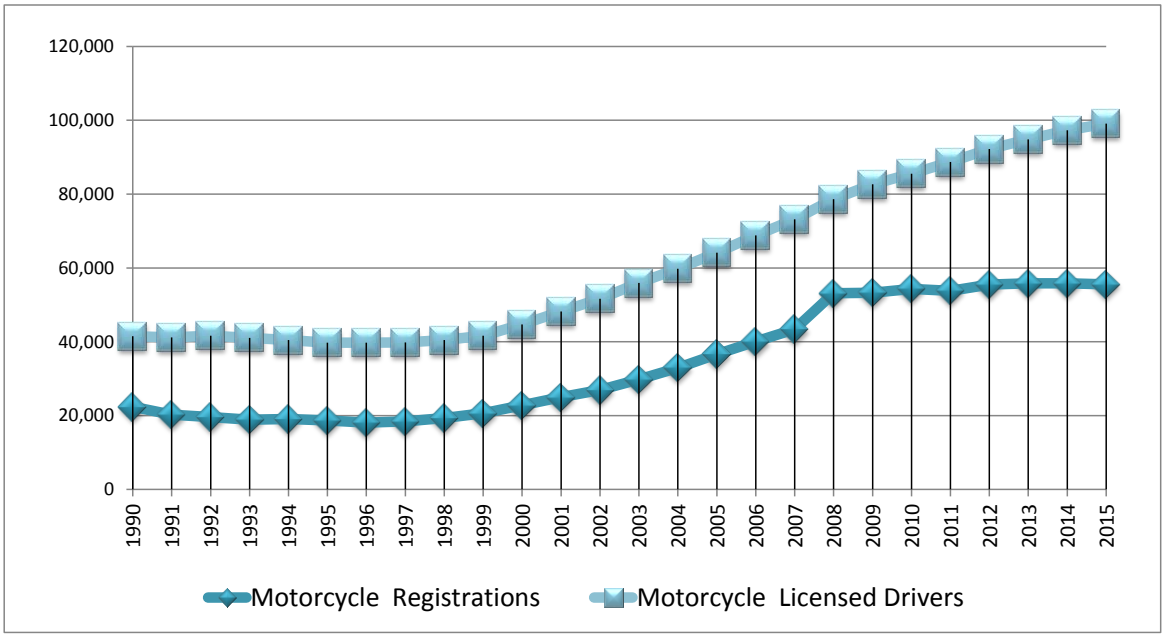
Prepared by: Nebraska Office of Highway Safety, PO Box 94612, Lincoln, NE 68509

Last Date Modified: August 3, 2016

NEBRASKA MOTORCYCLE

Registrations vs. Licensed Drivers

Year	Motorcycle Registrations	Motorcycle Licensed Drivers
1990	22,375	41,485
1991	20,264	41,193
1992	19,582	41,616
1993	18,882	41,060
1994	19,084	40,491
1995	18,696	39,782
1996	18,094	39,758
1997	18,441	39,832
1998	19,344	40,483
1999	20,612	41,628
2000	22,758	44,715
2001	25,010	48,196
2002	26,931	51,623
2003	29,794	55,913
2004	32,916	59,786
2005	36,622	64,123
2006	40,065	68,838
2007	43,387	73,192
2008	53,171	78,625
2009	53,259	82,638
2010	54,349	85,515
2011	53,773	88,728
2012	55,461	92,244
2013	55,833	94,817
2014	55,833	97,332
2015	55,585	99,106



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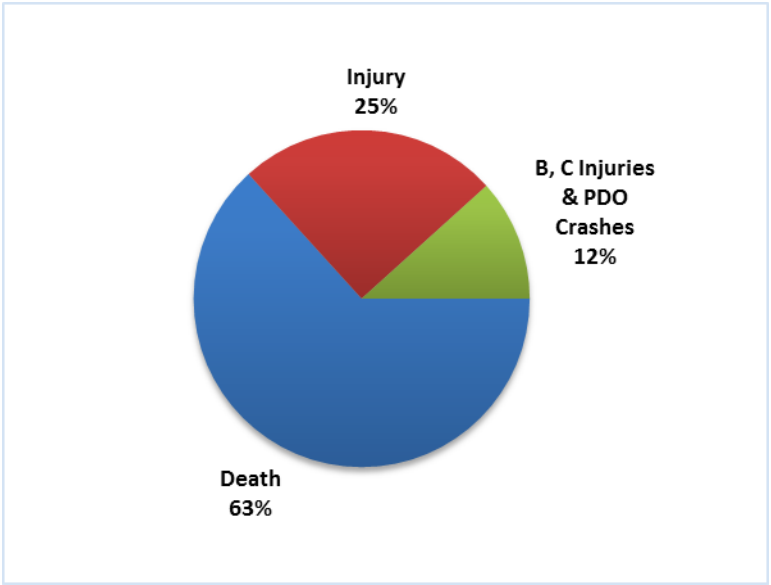
402/471-2515 Fax: 402/471-3865
www.transportation.nebraska.gov/nohs/
Last Date Modified: August 3, 2016

NEBRASKA
COST ESTIMATE
FOR
MOTORCYCLE CRASHES IN 2015

The cost of each type of motor-vehicle crash includes wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, and uninsured employer costs for crashes involving workers. The information below indicates the average economic costs in 2014 per death (not each fatal crash), per nonfatal disabling injury (A) (not each injury crash), visible, but not disabling injury (B), visible, but not disabling injury (C), and per property damage crash.

Type of Injury/Crash	Number of each type of Injury/Crash	Cost Per each type of Injury/Crash	Total Cost of all types of Injuries/Crashes
Death	25	$1,500,000	$37,500,000
Disabling Injury	168	$88,500	$14,868,000
Visible, but not Disabling Injury	193	$25,600	$4,940,800
Possible Injury	83	$21,000	$1,743,000
Property-damage crashes	57	$4,200	$239,400

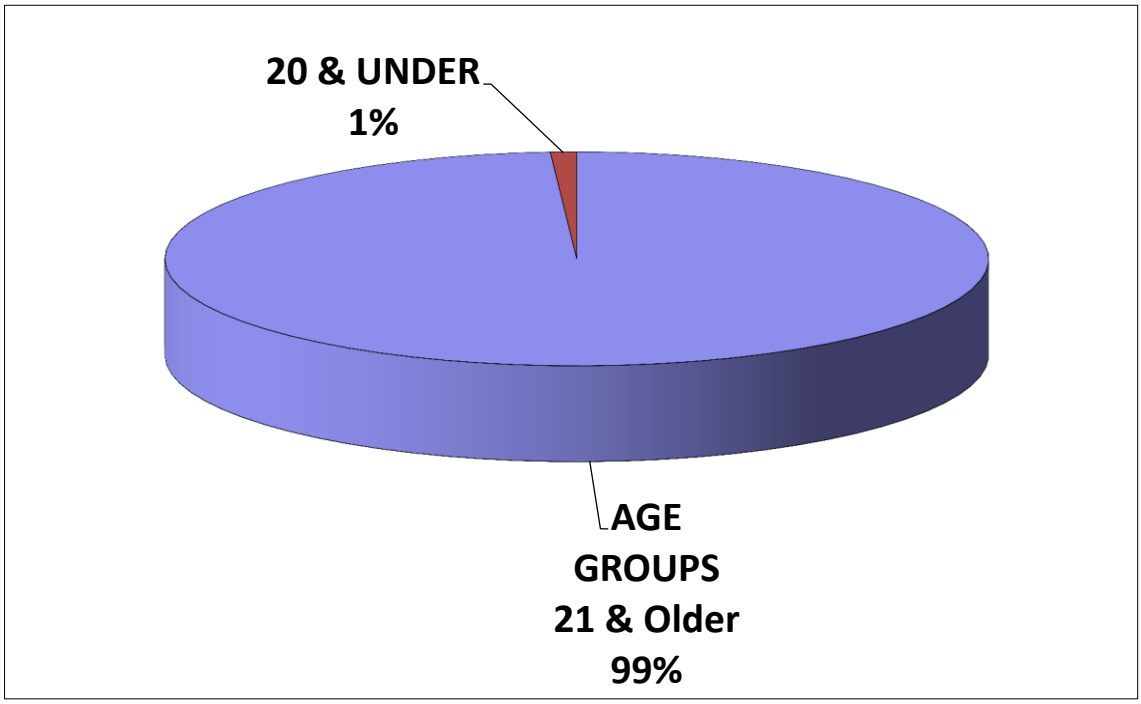
Total Projected Costs in 2015	**$59,291,200**



PDO – Property Damage Only
Source: National Safety Council, Injury Facts 2014 Edition
Prepared by: Nebraska Office of Highway Safety,
PO Box 94612, Lincoln, NE 68509
Revised 7/28/2016

2015 NEBRASKA MOTORCYCLE LICENSED OPERATORS (AGE GROUPS 21 & Older vs. 20 & UNDER)

	AGE GROUPS 21 & Older	20 & UNDER
2015	98,090	1,016



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Last Date Modified: January 7, 2016

NEBRASKA MOTORCYCLE STATISTICS

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Fatalities	15	13	21	17	18	15	20	15	14	23	22	14	20	26
Injuries (A, B & C)	317	369	394	433	471	490	595	509	521	512	576	486	496	470
Fatality Helmet Usage	9	11	14	11	11	9	18	10	11	20	20	14	19	22
Fatality Illegal/No Helmet Usage	4/2	2/0	0/7	4/2	1/6	1/5	0/2	1/4	1/1	1/2	1/1	0/0	0/1	1/3
Unknown Head Injuries	NA	NA	6	8	8	0	3	7	5	2	4	3	5	10
Passengers Killed	0	2	4	3	1	2	0	1	2	2	3	0	2	0
Females Killed	0	3	4	3	2	2	1	2	2	3	5	2	1	0
Average Age of Fatality	40	38	35	47	42	35	48	41	37	44	44	36	36	39
Motorcycle Fatality with "M" Endorsement on Drivers License	NA	NA	NA	10	9	6	15	11	8	18	18	12	17	15
Total Crashes	383	401	413	459	482	503	624	539	548	562	588	550	535	490
Fatal Crashes	15	12	18	16	17	13	20	15	12	22	22	14	20	25
Injury Crashes	289	320	352	393	420	429	535	464	472	472	502	469	454	408
Property Damage Only	79	68	41	50	43	61	69	59	64	68	64	67	61	57
Interstate Crashes	17	27	24	30	24	23	35	26	33	41	41	31	28	25
Alcohol-Related Fatal Crashes	5	2	7	7	8	7	6	11	3	6	9	3	9	9
Alcohol-Related Fatalities	5	3	10	8	9	9	6	11	4	7	9	3	9	9
Unknown BAC, No Test, etc.	7	3	1	4	5	3	6	1	2	3	5	2	3	2
Alcohol-Related Fatal Crashes as a % of all Fatal Crashes	33%	17%	39%	44%	47%	54%	30%	73%	25%	27%	41%	21%	45%	36%
Alcohol-Related Fatalities as a % of all Fatalities	33%	23%	48%	47%	50%	60%	30%	73%	29%	30%	41%	21%	45%	35%
Average Blood Alcohol Content	0.183	0.027	0.106	0.120	0.141	0.142	0.164	0.081	0.153	0.141	0.096	0.153	0.101	0.141
Licensed Drivers	51,623	55,913	59,786	64,123	68,838	73,192	78,625	82,638	85,515	88,728	92,244	94,817	97,332	99,106
20 & Under Licensed Drivers	825	894	976	1,126	1,167	1,294	1,467	1,424	1,320	1,288	1,259	1,202	1,172	1,016
% 20 & Under	1.6%	1.6%	1.6%	1.8%	1.7%	1.8%	1.9%	1.7%	1.5%	1.5%	1.4%	1.3%	1.2%	1.0%
Motorcycle Registrations	26,931	29,794	32,916	36,622	40,065	43,387	53,171	53,259	54,349	53,773	55,461	55,833	55,475	55,585

~Note: Registration information is under reported due to a delay in entering data into the system.

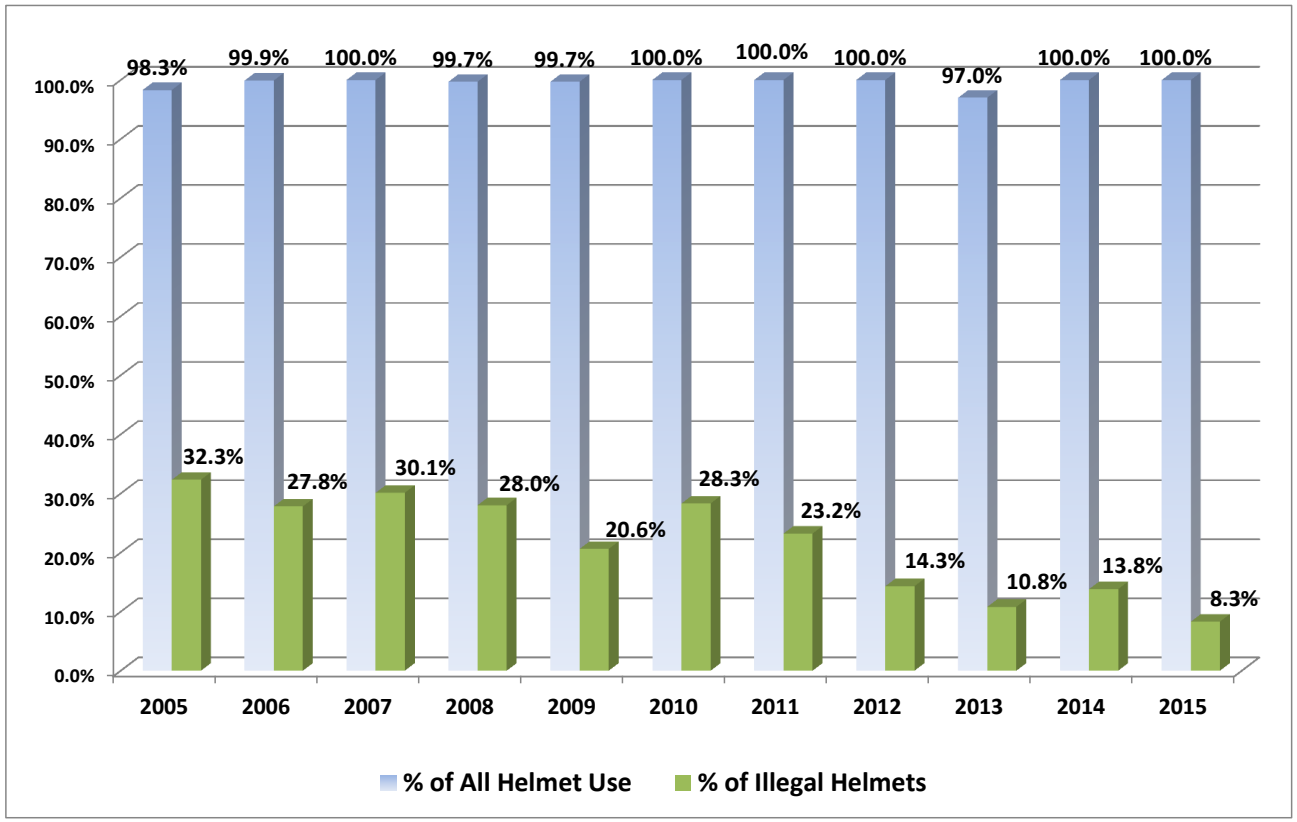
- *** 1974 Motorcycle Safety Education Courses Started**
- *** January 1, 1986 Proof of Insurance at time of Registration**
- *** January 9, 1989 Mandatory Motorcycle Helmet Law**

Source: Nebraska Office of Highway Safety, P O Box 94612, Lincoln, NE 68509 Phone: 402/471-2515 Fax: 402/471-3865

Last Date Modified: August 3, 2016

Nebraska

Motorcycle Helmet Use Rates



In 1974, the Motorcycle Safety Education Courses began.
On January 1, 1986, the Financial Responsibility (Proof of Insurance) Law became effective.
On January 1, 1989, the Nebraska Motorcycle Helmet Law became effective.

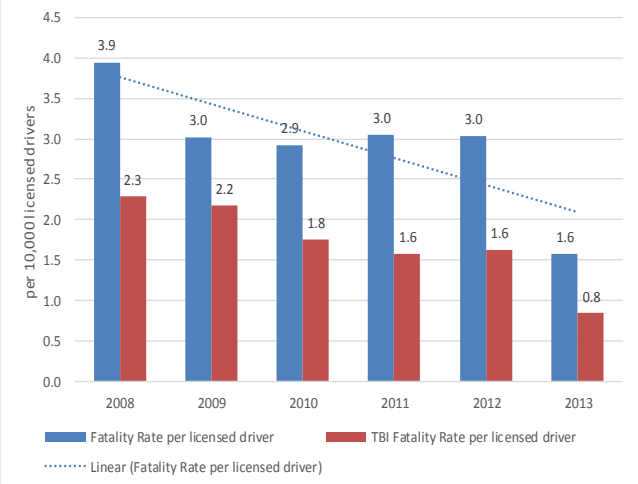
Note: The percent (%) of Helmet Use includes the % of Illegal Helmet Use.
Source: Nebraska Helmet Use Observation Reports - Health Education, Inc.
Prepared by: Nebraska Office of Highway Safety, 5001 South 14th, PO Box 94612, Lincoln, NE 68509
402/471-2515 Fax: 402/471-3865 As of September 17, 2015

Motorcycle Injuries and Fatalities, Nebraska 2008-2013

Department of Health & Human Services DHHS NEBRASKA

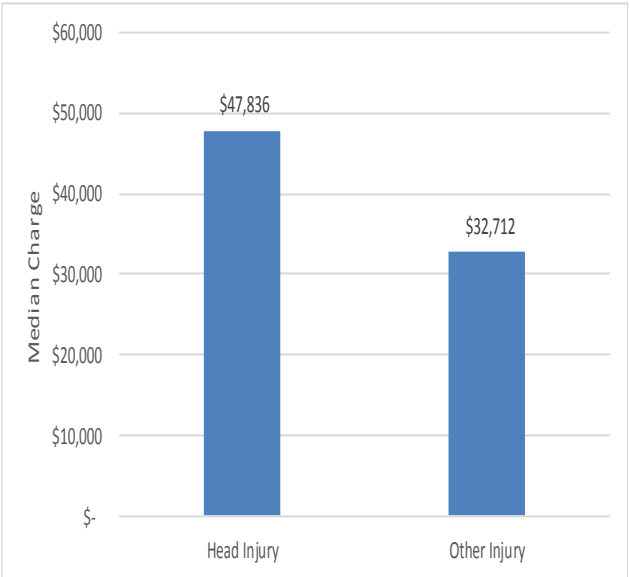
In Nebraska, family and community is our priority. Keeping all citizens safe on our states highways is a vital part of maintaining a healthy family and community. From 2008-2013 there were 151 deaths resulting from a motorcycle crash, of those 88 (58%) were the result of a head injury[3].

Figure 1: Motorcycle Fatality Rate per Licensed Driver, NE, 2008-2013 (N=151)[3]



- During 2008-2013, Nebraskans 45-54 years old had the highest motorcycle fatality rate[3].
- In Nebraska, for hospitalizations due to a motorcycle injury the primary injury for 1 in 3 riders (30%) was a head injury[3].
- Per vehicle mile traveled, motorcyclists were more than 26 times more likely than passenger car occupants to die in a traffic crash.[1]
- In 2013, the total charges for all riders hospitalized as a result of a motorcycle injury was over $11 million, 9% was paid for by Medicare or Medicaid[3].

Figure 2: Median Charges for Motorcycle Hospitalization, Head Injury vs. Other Injuries, NE, 2008-2013[3] (N=892)



Motorcycle Safety Tips[2]

- Always wear a DOT-approved helmet
- Never ride your motorcycle after drinking alcohol
- Wear protective clothing that provides some level of injury protection, with bright colors or reflective materials
- Avoid tailgating
- Maintain a safe speed and exercise caution when traveling over slippery surfaces or gravel.

Impact of Helmets

- Helmets are estimated to prevent 37% of crash deaths among motorcycle riders and 41% of crash deaths for motorcycle passengers.[2]

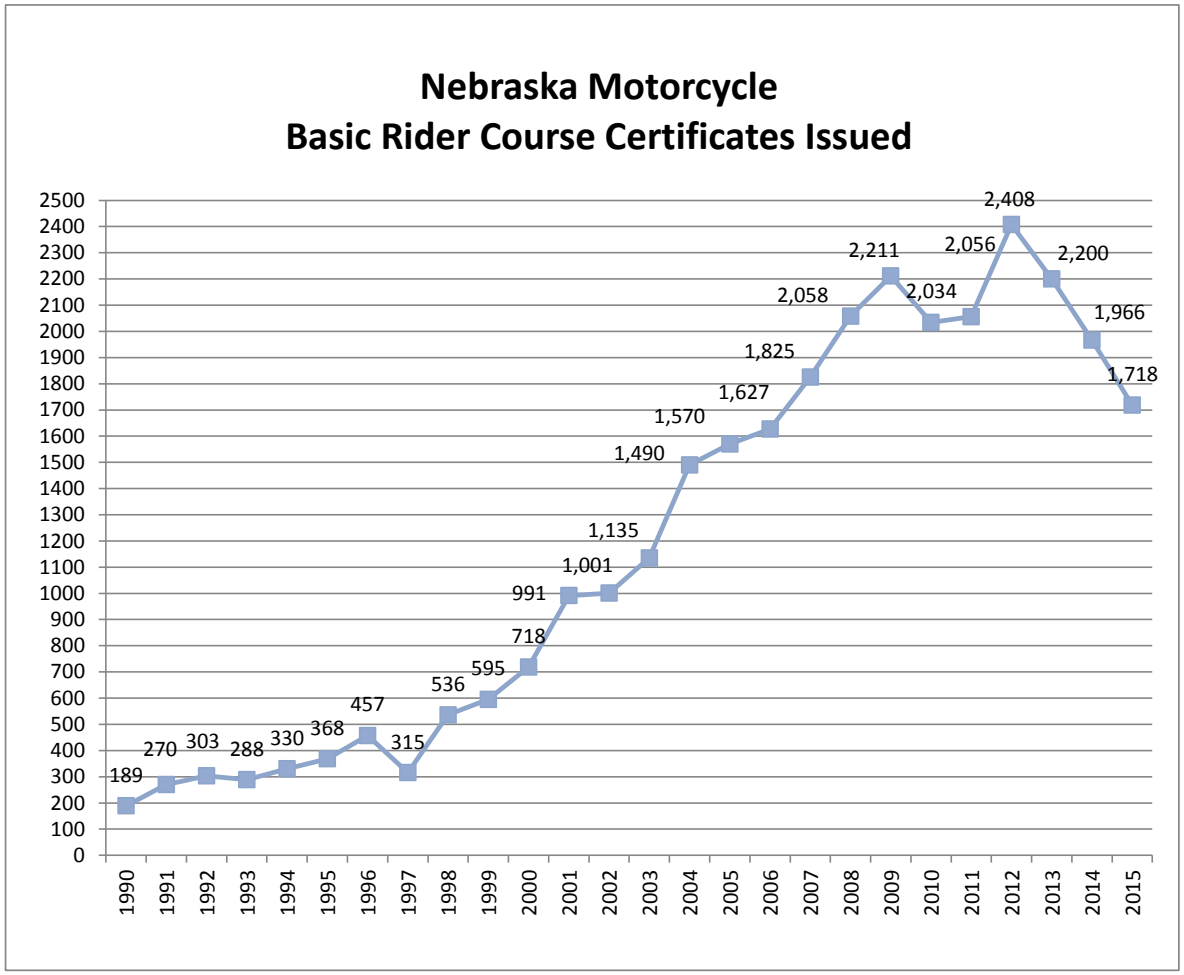
Source: Centers for Disease Control and Prevention

References

1. National Highway Traffic Safety Administration: Traffic Safety Facts Motorcycles, 2012 Data
2. Centers for Disease Control—Motorcycle Safety: http://www.cdc.gov/features/motorcyclesafety/
3. Data Source: Nebraska Vital Statistics and Nebraska Hospital Discharge Data

Injury Prevention Program
Phone: (402) 471-2101
Fax: (402) 471-6446
Website: http://dhhs.ne.gov/InjuryPrevention

NEBRASKA MOTORCYCLE TRAINING
1990 - 2015



Year	Applicants Registered	Applicants Trained
1990	210	189
1991	286	270
1992	342	303
1993	317	288
1994	365	330
1995	411	368
1996	500	457
1997	353	315
1998	580	536
1999	662	595
2000	762	718
2001	1,060	991
2002	1,107	1,001
2003	1,262	1,135
2004	1,632	1,490
2005	1,752	1,570
2006	1,804	1,627
2007	2,065	1,825
2008	2,284	2,058
2009	2,475	2,211
2010	2,224	2,034
2011	2,276	2,056
2012	2,599	2,408
2013	2,277	2,200
2014	2,127	1,966
2015	1,821	1,718

Prepared by: Nebraska Office of Highway Safety, PO Box 94612, Lincoln, NE 68516 Date Modified: February 7, 2016

Insurance Institute for Highway Safety
Highway Loss Data Institute

Motorcycles

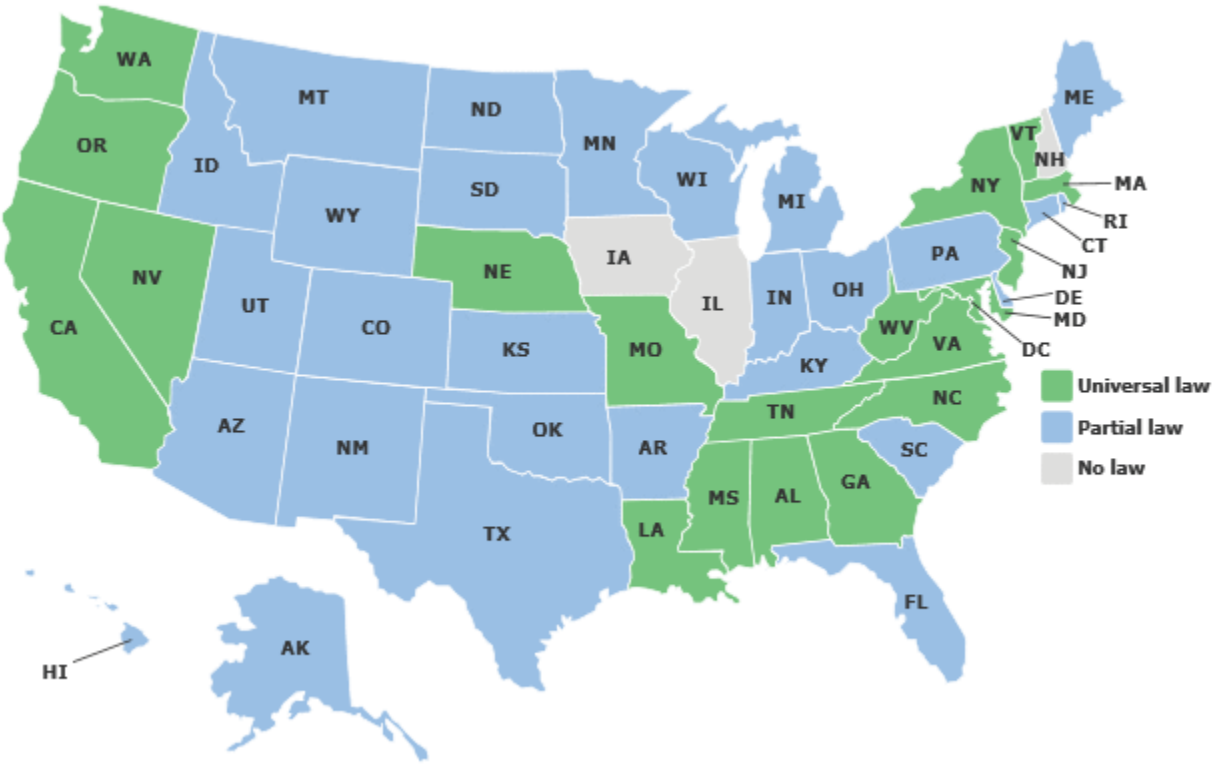
Motorcycle helmet use

August 2016

Motorcycle helmet laws vary widely among the states and have changed a lot in the past half a century. Currently, 19 states and the District of Columbia have laws requiring all motorcyclists to wear a helmet, known as universal helmet laws. Laws requiring only some motorcyclists to wear a helmet are in place in 28 states. There is no motorcycle helmet use law in three states (Illinois, Iowa and New Hampshire).

In the past, many more states had universal helmet laws, thanks to pressure from the federal government. In 1967, states were required to enact helmet use laws in order to qualify for certain federal safety programs and highway construction funds. The federal incentive worked. By the early 1970s, almost all the states had universal motorcycle helmet laws. However, in 1976, states successfully lobbied Congress to stop the Department of Transportation from assessing financial penalties on states without helmet laws.

Low-power cycle is a generic term used by IIHS to cover motor-driven cycles, mopeds, scooters, and various other 2-wheeled cycles excluded from the motorcycle definition. While state laws vary, a cycle with an engine displacement of 50 cubic centimeters or less, brake horsepower of 2 or less, and top speeds of 30 mph or less typically is considered an low-power cycle. Twenty-three states have motorcycle helmet laws that cover all low-power cycles. Twenty-four states and the District of Columbia have laws that cover some low-power cycles.



Helmet Laws

August 2016

Motorcycle Helmets

In 1967, the federal government required states to enact universal motorcycle helmet laws to qualify for certain highway safety funds. By 1975, all but three had complied. In 1976, Congress revoked federal authority to assess penalties for noncompliance, and states began to weaken helmet laws to apply only to young or novice riders.

Motorcyclist Fatality Reports

Currently, about half the states require helmets for all motorcyclists. Most other states require helmets for certain riders, and a few have no helmet law. *GHSA urges all states to adopt a universal motorcycle helmet law and vigorously enforce existing laws.*

- **47 states, the District of Columbia, Guam, the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands** have a helmet law for motorcyclists.
    - **19 states, the District of Columbia, the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands** have a universal helmet law, requiring helmets for all riders.
    - **The remaining 28 states and Guam** require helmets for specific riders.
- **3 states (Illinois, Iowa and New Hampshire)** do not have a motorcycle helmet law.

NOTE: GHSA does not compile any additional data on helmet laws other than what is presented here. For more information, consult the appropriate State Highway Safety Office.

State	Motorcyclists		
	Universal Helmet Law (Year Enacted)	Partial Law	Universal Helmet Law Repealed
Alabama	1967		
Alaska		<18 or instructional permit; all passengers	1976
Arizona		<18	1976
Arkansas		<21	1997
California	1992		
Colorado		<18; all passengers <18	1977
Connecticut		<18	1976
Delaware		<19	1978
D.C.	1970		
Florida		<21 or those with <$10,000 in medical coverage for motorcycle-related injuries	2000

Georgia	1969		
Guam		<18; all passengers <18; drivers licensed < 3 years	
Hawaii		<18	1977
Idaho		<18	1978
Illinois			1970
Indiana		<18	1977
Iowa			1976
Kansas		<18	1976
Kentucky		<21 or licensed <1 yr.; no medical insurance	1998
Louisiana	2004		
Maine		Licensed <1 yr.; all passengers <18	1977
Maryland	1992		
Massachusetts	1967		
Michigan		<21 or no additional insurance (riders and passengers)	2012
Minnesota		<18 or instructional permit	1977
Mississippi	1974		
Missouri	1967		
Montana		<18	1977
Nebraska	1989		
Nevada	1972		
New Hampshire			
New Jersey	1968		
New Mexico		<18	1977
New York	1967		
North Carolina	1968		
North Dakota		<18; all passengers if operator is <18	1977
Northern Mariana Islands	Yes		
Ohio		<18 or licensed <1 yr.; all passengers if operator required to wear helmet	1978
Oklahoma		<18	1976
Oregon	1988		
Pennsylvania		<21 or licensed <2 yrs. except those who complete a PnnDOT- or Motorcycle Safety Foundation-approved safety course	2003
Puerto Rico	Yes		
Rhode Island		<21 or licensed <1 yr.; all passengers	1976
South Carolina		<21	1980
South Dakota		<18	1977
Tennessee	1967		
Texas		<21; those who have not completed safety course or have no medical insurance (secondarily enforced)	1997
Utah		<18	1977
Vermont	1968		

Virgin Islands	Yes		
Virginia	1970		
Washington	1990		
West Virginia	1971		
Wisconsin		<18 or instructional permit	1978
Wyoming		<18	1983
Totals States	**47 + D.C., Guam, Northern Mariana Islands, Puerto Rico, U.S. Virgin Islands**		**31 states** have had a universal helmet law repealed
	19 + D.C., Northern Mariana Islands, Puerto Rico, U.S. Virgin Islands	**28 + Guam** **Age (# of States)** <21 (8) <19 (1) <18 (18 + Guam) Passengers <18 (1)	

Sources: Insurance Institute for Highway Safety (IIHS) and State Highway Safety Offices.

phone 202.789.0942 , **fax** 202.789.0946, **headquarters@ghsa.org**

Motorcycles

Helmets and antilock brakes make riding less dangerous.

SELECT ANOTHER TOPIC

Overview
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State laws
News releases and articles
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Regulatory and legislative policy
HLDI research
Selected IIHS bibliography

General Helmets

July 2016

- close all answers

1. Why is it important for motorcyclists to wear helmets?

   Compared with cars, motorcycles are an especially dangerous form of travel. The National Highway Traffic Safety Administration (NHTSA) estimates that per mile traveled, the number of deaths on motorcycles in 2014 was more than 27 times the number in cars.[1] Motorcycles often have excessive performance capabilities, including especially rapid acceleration and high top speeds. They are less stable than cars in emergency braking and less visible to other motorists. Motorcyclists are more prone to crash injuries than car occupants because motorcycles are unenclosed, leaving riders vulnerable to contact with hard road surfaces, other vehicles and fixed objects such as trees. This is why wearing a helmet, as well as other protective clothing, is so important.

2. How effective are helmets?

   Helmets decrease the severity of head injuries, the likelihood of death and the cost of medical care. Helmets are highly effective in preventing brain injuries, which often require extensive treatment and may result in lifelong disability. NHTSA estimates that in the event of a crash, unhelmeted motorcyclists are 3 times more likely than helmeted riders to suffer traumatic brain injuries, and that motorcycle helmets reduce the likelihood of a crash fatality by 37 percent.[2] Norvell and Cummings found a 39 percent reduction in the risk of death after adjusting for the effects of rider age, gender and seat position.[3] A recent literature review estimated that helmets reduce the risk of death in a crash by 42 percent and the risk of head injuries by 69 percent.[4]

3. Are some helmets more effective than others?

   No real-world crash studies have evaluated the effectiveness of helmets that do not meet federal performance standards for preventing injury or death, often referred to as novelty helmets. NHTSA laboratory tests suggest that head injuries are much more likely with these helmets than with ones certified to the NHTSA standard.[5]

   Helmets are available in different styles, including half-coverage (covering the upper half of the head, generally above the ears), open-face and full-face. A recent study evaluated the effectiveness of these different styles and found that crash-involved riders wearing half-coverage helmets were twice as likely to suffer traumatic brain injuries than riders wearing open-face or full-face helmets.[6]

4. Are there drawbacks to helmet use?

   Claims have been made that helmets increase the risk of neck injury and reduce peripheral vision and hearing, but there is no credible evidence to support these arguments. A study by J.P. Goldstein often is cited by helmet opponents as evidence that helmets cause neck injuries, allegedly by adding to head mass in a crash.[7] More than a dozen studies have refuted Goldstein's findings. A 1994 study analyzed 1,153 motorcycle crashes in four Midwestern states and determined that "helmets reduce head injuries without an increased occurrence of spinal injuries in motorcycle trauma."[8] More recently, a review of cases from a national database found that, among motorcyclists treated for trauma, helmeted riders were less likely than unhelmeted ones to have cervical spine fractures.[9]

   Regarding claims that helmets obstruct vision, studies show full-coverage helmets provide only minor restrictions in horizontal peripheral vision. A 1994 study found that wearing helmets does not restrict the ability to hear horn signals or to see a vehicle in an adjacent lane prior to initiating a lane change.[10] To compensate for any restrictions in lateral vision, riders increased their head rotation prior to a lane change. There were no differences in hearing thresholds under three helmet

conditions: no helmet, partial coverage and full coverage. The noise typically generated by a motorcycle is so loud that any reduction in hearing capability that may result from wearing a helmet is inconsequential. Sounds loud enough to be heard above the engine can be heard when wearing a helmet.

5. What is the history of helmet laws in the United States?

   In 1967, the federal government began requiring states to enact motorcycle helmet use laws to qualify for certain federal safety and highway construction funds. By the end of 1969, 39 states had universal helmet laws. By 1975, all but three states mandated helmets for all motorcyclists.

   As the U.S. Department of Transportation moved in 1976 to assess financial penalties on states without helmet laws, Congress responded to state pressure by revoking federal authority to assess penalties for noncompliance. Between 1976 and 1978, 20 states weakened their helmet use laws to apply only to young riders, usually those younger than 18. Eight states repealed helmet use requirements for all motorcyclists.

   In the 1980s and early 1990s, several states reinstated helmet laws applying to all riders. In 1991, Congress created incentives for states to enact helmet use and safety belt use laws. States with both laws were eligible for special safety grants, while states that had not enacted them by October 1993 had up to 3 percent of their federal highway allotment redirected to highway safety programs.

   Four years after establishing the incentives, Congress again reversed itself. In the fall of 1995, Congress lifted federal sanctions against states without helmet use laws, paving the way for state legislatures to repeal helmet laws. Now only 19 states and the District of Columbia have helmet laws covering all riders, and 28 states have laws covering some riders, usually people younger than 18. Three states (Illinois, Iowa and New Hampshire) do not have any helmet requirements.

6. How do helmet laws affect helmet use?

   Helmet use approaches 100 percent when all motorcyclists are required to wear helmets, compared with about 50 percent when there is no helmet law or a law applying only to some riders.[11,12] In 2015, 94 percent of motorcyclists observed in states with universal helmet laws were wearing helmets. In states without such laws, helmet use was 50 percent.[13] Use of helmets judged to be compliant with federal safety regulations was 80 percent among motorcyclists in states with universal helmet laws and 43 percent in states without such laws.

   In a national telephone survey of motorcyclists, 22 percent of those who said they believe helmets keep riders safer reported not always wearing helmets while riding.[14] However, only 6 percent of motorcyclists in states with universal laws reported not always wearing helmets, suggesting that education alone would not be as beneficial in increasing helmet use as a universal helmet law.

7. How do helmet laws affect deaths and injuries?

   In states that either reinstated or enacted universal motorcycle helmet laws, deaths and injuries of motorcyclists decreased. In states that repealed or weakened their universal helmet laws, deaths and injuries rose.

   Some examples of the effect of helmet laws on helmet use and death and injury rates:

   - When California's helmet use law covering all riders took effect on January 1, 1992, helmet use jumped to 99 percent from about 50 percent before the law,[15] and the number of motorcyclist fatalities decreased 37 percent.[16]
   - Nebraska reinstated a helmet law on January 1, 1989, after repealing an earlier law in 1977. The state then saw a 22 percent reduction in serious head injuries among motorcyclists.[17]
   - From 1968 to 1977, Texas had a universal helmet use law estimated to have saved 650 lives, but the law was amended in 1977 to apply only to riders younger than 18. The weakened law coincided with a 35 percent increase in motorcyclist fatalities. Texas reinstated its helmet law for all motorcyclists in September 1989. The month before the law took effect, the helmet use rate was 41 percent. The rate jumped to 90 percent during the first month of the law and rose to 98 percent by June 1990.[18] Serious injury crashes per registered motorcycle decreased 11 percent.[19] But in September 1997, Texas again weakened its helmet law, requiring helmets only for riders younger than 21. Helmet use in Texas dropped to 66 percent by May 1998, and operator fatalities increased 31 percent in the first full year following the repeal.[20]
   - Kentucky repealed its universal helmet law in 1998, followed by Louisiana in 1999. These actions resulted in lower helmet use, and motorcyclist deaths quickly increased in these states by 50 percent and 100 percent, respectively.[21]
   - In 2000, Florida's universal helmet law was weakened to exempt riders 21 and older who have at least $10,000 of medical insurance coverage. An Institute study found that the motorcyclist death rate in Florida increased by about 25 percent after the state weakened its helmet law.[22] The death rate rose from 31 fatalities per 1,000 crash involvements before the law change (1998-99) to 39 fatalities per 1,000 crash involvements after (2001-2002). An estimated 117 deaths could have been prevented during 2001-02 if the law had not been changed. Another study of the Florida law found a similar effect. Motorcyclist deaths per 10,000 motorcycle registrations increased 21 percent during the two years after the law was changed compared with the two years before.[12]

- Michigan weakened its universal helmet law in 2012 to exempt riders 21 and older who have at least $20,000 of medical insurance coverage and have either passed a motorcycle safety course or held a motorcycle license endorsement for at least two years. After controlling for policy limits to account for the new medical insurance requirement, this law change was associated with a 22 percent increase in the average insurance payment for injuries to motorcyclists.[23]

In two studies, researchers modeled state motorcyclist fatality rates by helmet law type, after controlling for factors such as per capita income, population density and annual precipitation amounts.[24,25] Death rates were lowest in states with helmet laws that cover all riders. Rates in states with helmet laws that cover only some riders were lower than those in states with no helmet law, but not as low as rates in states with helmet laws that cover all riders. These results held for all three types of rates considered: deaths per 10,000 registered motorcycles, deaths per 100,000 population and deaths per 10 billion vehicle miles traveled.

8. How do helmet laws impact health care costs?

Unhelmeted riders have higher health care costs as a result of their crash injuries, and many lack health insurance. A 2002 review of 25 studies of the costs of injuries from motorcycle crashes reported that helmet use reduced the cost of medical treatment, length of hospital stay and probability of long-term disability for riders injured in a crash.[26] Studies that looked at who pays for injured riders' medical care found that just over half of injured riders have private health insurance coverage. For those without private insurance, most of the medical costs are paid by the government. A more recent study confirmed the earlier findings that unhelmeted riders had much higher hospital charges than helmeted ones.[27]

Here are a few examples of how states' helmet law changes affected health care costs:

- After California introduced a universal helmet use law in 1992, health care costs associated with head-injured motorcyclists declined.[28] The rate of motorcyclists hospitalized for head injuries decreased by 48 percent in 1993 compared with 1991, and total costs for patients with head injuries decreased by $20.5 million during this period.
- When Nebraska reinstated its universal helmet use law, acute medical hospital charges for injured motorcyclists declined 38 percent.[17]
- When Florida weakened its universal helmet law in 2000 to exclude riders 21 and older who have at least $10,000 of medical insurance coverage, hospital admissions of motorcyclists with head injuries increased 82 percent during the 30 months following the law change.[12] The average inflation-adjusted cost of treating these injuries went up from about $34,500 before the helmet law was weakened to nearly $40,000 after — 4 times as high as the $10,000 minimum medical insurance requirement.
- Studies conducted in Nebraska, Washington, California and Massachusetts illustrate the burden that injured motorcyclists place on taxpayers. Forty-one percent of motorcyclists injured in Nebraska from January 1988 to January 1990 lacked health insurance or received Medicaid or Medicare.[17] In Seattle, 63 percent of trauma care for injured motorcyclists in 1985 was paid by public funds.[29] In Sacramento, public funds paid 82 percent of the costs to treat orthopedic injuries sustained by motorcyclists during 1980-83.[30] Forty-six percent of motorcyclists treated at Massachusetts General Hospital during 1982-83 were uninsured.[30]

9. Are helmet laws that apply only to young motorcyclists effective?

No. Helmet use laws that apply only to young riders are virtually impossible to enforce. Helmet use for all riders is low in states where partial laws are in effect, and death rates are 20 to 40 percent lower in states with universal laws than in those with weak laws or no laws.[31]

In 2000, Florida weakened its helmet law to exclude riders 21 and older with at least $10,000 of medical insurance coverage. Even though riders younger than 21 still were required to wear helmets, an Institute study found that they were 97 percent more likely to die in crashes after the law change than before.[22] Helmet use among fatally injured motorcyclists younger than 21 declined from 72 percent before the law change to 55 percent after.

10. How have courts resolved challenges to helmet laws?

Courts have repeatedly upheld motorcycle helmet use laws under the U.S. Constitution. In 1972, a federal court in Massachusetts told a motorcyclist who objected to the law: "The public has an interest in minimizing the resources directly involved. From the moment of injury, society picks the person up off the highway; delivers him to a municipal hospital and municipal doctors; provides him with unemployment compensation if, after recovery, he cannot replace his lost job; and, if the injury causes permanent disability, may assume responsibility for his and his family's subsistence. We do not understand a state of mind that permits plaintiff to think that only he himself is concerned." The U.S. Supreme Court affirmed this decision without hearing arguments in the case.[32]

11. Do people support mandatory helmet use laws?

According to a 2000 national telephone survey, 81 percent of respondents reported that they favored mandatory helmet use laws for motorcyclists. Support was more prevalent among females (88 percent) than males (72 percent) and among non-motorcyclists (83 percent) than those who drove motorcycles (51 percent). Support was higher in states requiring all riders to wear helmets (84 percent) compared with states with lesser requirements (75 percent) or no requirements (79 percent).[33]

In an Institute survey of motorcyclists conducted in 2009, 45 percent said they favor universal helmet laws.[14] Those who favor universal laws were more likely to report that they believe helmets keep riders safer than those who do not favor universal helmet laws (87 percent vs. 65 percent). Among motorcyclists who reported not always wearing helmets while riding, 57 percent said that a helmet law would encourage full-time helmet use.

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NTSB News

FOR IMMEDIATE RELEASE: September 11 , 2007 SB-07-44

NTSB RECOMMENDS LEGISLATION TO MANDATE ALL MOTORCYCLISTS USE DEPARTMENT OF TRANSPORTATION FMVSS 218-COMPLIANT HELMETS

Washington, DC-The National Transportation Safety Board today issued recommendations to states to require all motorcyclists and their passengers to wear Department of Transportation Federal Motor Vehicle Safety Standard (FMVSS) 218-compliant helmets.

Currently, only 20 states, the District of Columbia, and 4 territories have universal helmet laws requiring all riders to wear a helmet. Twenty-seven states and 1 territory have partial laws that require minors and/or passengers to wear such helmets. Three states have no helmet laws.

"The facts are very clear- head injuries are a leading cause of deaths in motorcycle crashes," said NTSB Chairman Mark V. Rosenker. "The most important step riders can take in terms of protecting themselves and staying alive is to wear a DOT- compliant helmet every time they ride."

FMVSS 218-compliant helmets are designed with a hard outer shell, an impact-attenuating liner, and a retention system to protect the head, especially the brain, in a variety of impact scenarios.

"Universal helmet laws have proven effective in the mitigation of injuries and the prevention of fatalities. Implementing these recommendations will take strong leadership in the States," Rosenker said. "I hope that the Governors and legislative leaders in the States will act promptly and decisively to implement the universal helmet laws recommended today by the Board."

Since 1997, motorcycle fatalities have increased 127 percent. Last year, 4,810 motorcyclists died in crashes, and accounted for more than 10 percent of all motor vehicle crash fatalities.

Last September, the Safety Board held a public forum and gathered information on ongoing motorcycle research and initiatives, as well as countermeasures that may reduce the likelihood of motorcycle accidents and fatalities. The meeting included participants

representing government, motorcycle manufacturers, motorcyclist associations, state motorcycle rights organizations, researchers, trauma physicians, law enforcement, and insurance companies.

As a result of today's meeting, the National Transportation Safety Board issued the following recommendations:

To the National Highway Traffic Safety Administration:

Reprioritize the National Agenda for Motorcycle Safety recommendations based on objective criteria, including known safety outcomes.

Following completion of the reprioritization of the National Agenda for Motorcycle Safety, implement an action plan for states and others, such as federal agencies, manufacturers, insurance organizations, and advocacy groups, to carry out those recommendations that are determined to be of high priority.

To the Federal Highway Administration:

Following the 2007 Motorcycle Travel Symposium, develop guidelines for the states to use to gather accurate motorcycle registrations and motorcycle vehicle miles traveled data. The guidelines should include information on the various methods to collect registrations and vehicle miles traveled data and how these methods can be put into practice.

To the three states with no motorcycle helmet laws:

Require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle.

To the 27 states and 1 territory with partial motorcycle helmet laws:

Amend current laws to require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle.

To the 8 states, the District of Columbia, and the 4 territories with universal motorcycle helmet laws/regulations not specifically requiring FMVSS 218-compliant helmets:

Amend current laws to specify that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle.

To all states:

Provide information to the National Highway Traffic Safety Administration (NHTSA) on the effectiveness of your motorcycle safety efforts to assist NHTSA with its effort to reprioritize the National Agenda for Motorcycle Safety recommendations.

Full copies of the recommendation letters will be available in a few days on the NTSB website, www.ntsb.gov.

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Traffic Safety Facts

2014 Data

July 2016

DOT HS 812 292

NHTSA

Key Findings

- In 2014 there were 4,586 motorcyclists killed—a 2-percent decrease from the 4,692 motorcyclists killed in 2013.
- There were an estimated 92,000 motorcyclists injured during 2014, a 5-percent increase from 88,000 motorcyclist injured in 2013.
- Per vehicle mile traveled, motorcyclist fatalities occurred 27 times more frequently than passenger car occupant fatalities in traffic crashes.
- Twenty-eight percent of motorcycle riders involved in fatal crashes in 2014 were riding their vehicles without valid motorcycle licenses.
- In 2014 motorcycle riders involved in fatal crashes were found to have the highest percentage of alcohol-impaired drivers than any other vehicle type (29% for motorcycles, 22% for passenger cars and light trucks, and 2% for large trucks).
- Forty-three percent of motorcycle riders who died in single-vehicle crashes in 2014 were alcohol-impaired.
- Motorcycle riders killed in traffic crashes at night were almost three times more frequently alcohol-impaired than those killed during the day.
- NHTSA estimates that helmets saved 1,669 motorcyclists' lives in 2014, and that 660 more could have been saved if all motorcyclists had worn helmets.
- In States without universal helmet laws, 58 percent of motorcyclists killed in 2014 were not wearing helmets, as compared to 8 percent in States with universal helmet laws.

U.S. Department of Transportation

National Highway Traffic Safety Administration

1200 New Jersey Avenue SE.
Washington, DC 20590

Motorcycles

The following definitions apply to terms used throughout this fact sheet: Motorcycles are defined as two- or three-wheeled motorcycles, off-road motorcycles, mopeds, scooters, mini bikes, and pocket bikes. The motorcycle rider is the person operating the motorcycle; the passenger is a person seated on, but not operating, the motorcycle; the motorcyclist is a general term referring to either the rider or passenger. NHTSA publications prior to 2007 may not reflect this terminology. For the purpose of this fact sheet, the term alcohol-impaired defines motorcycle riders with blood alcohol concentrations (BACs) of .08 grams per deciliter (g/dL) or higher.

In this fact sheet, the 2014 motorcycle information is presented as follows:

- Overview
- Registration
- Crash Involvement
- Speeding
- Age
- Motorcycle Engine Size
- Licensing and Previous Driving Records
- Alcohol
- Helmet Use and Effectiveness

Overview

In 2014 there were 4,586 motorcyclists killed in motor vehicle traffic crashes—a decrease of 2 percent from the 4,692 motorcyclists killed in 2013. There were an estimated 92,000 motorcyclists injured during 2014, a 5-percent increase from 88,000 motorcyclists injured in 2013. In 2014 two-wheeled motorcycles accounted for 93 percent of all motorcycles in fatal crashes.

In 2014 motorcyclists accounted for 14 percent of all traffic fatalities, 4 percent of all people injured, 17 percent of all occupants (driver and passenger) fatalities, and 4 percent of all occupants injured. Of the 4,586 motorcyclists killed in traffic crashes, 94 percent (4,311) were riders and 6 percent (275) were passengers.

Table 1 presents information about motorcyclists killed and injured over the decade from 2005 to 2014. During this time both the number of injured people and people killed peaked around 2007 and 2008 but have fallen slightly since that time. The number of registered motorcycles and motorcycle vehicle miles traveled (VMT) are also presented in Table 1, along with the respective fatality and injury rates. When reviewing the registered vehicles and VMT data and rates over the 10-year period, note the change in methodology in collection of the data starting in 2007.

Table 1
Motorcyclists Killed and Injured, and Fatality and Injury Rates, 2005–2014

Year	Killed	Registered Vehicles	Fatality Rate*	Vehicle Miles Traveled (millions)	Fatality Rate**
2005	4,576	6,227,146	73.48	10,454	43.77
2006	4,837	6,678,958	72.42	12,049	40.14
2007	5,174	7,138,476	72.48	21,396	24.18
2008	5,312	7,752,926	68.52	20,811	25.52
2009	4,469	7,929,724	56.36	20,822	21.46
2010	4,518	8,009,503	56.41	18,513	24.40
2011	4,630	8,437,502	54.87	18,542	24.97
2012	4,986	8,454,939	58.97	21,385	23.32
2013	4,692	8,404,687	55.83	20,366	23.04
2014	4,586	8,417,718	54.48	19,970	22.96
Year	**Injured**	**Registered Vehicles**	**Injury Rate***	**Vehicle Miles Traveled (millions)**	**Injury Rate****
2005	87,000	6,227,146	1,402	10,454	835
2006	88,000	6,678,958	1,312	12,049	727
2007	103,000	7,138,476	1,443	21,396	481
2008	96,000	7,752,926	1,238	20,811	461
2009	90,000	7,929,724	1,130	20,822	430
2010	82,000	8,009,503	1,024	18,513	443
2011	81,000	8,437,502	965	18,542	439
2012	93,000	8,454,939	1,099	21,385	434
2013	88,000	8,404,687	1,052	20,366	434
2014	92,000	8,417,718	1,088	19,970	459

*Rate per 100,000 registered vehicles **Rate per 100 million vehicle miles traveled

Source: Fatalities— Fatality Analysis Reporting System (FARS) 2005 to 2013 Final and 2014 Annual Report Final (ARF). Vehicle miles traveled and registered vehicles—Federal Highway Administration (FHWA), Injured—National Automotive Sampling System (NASS) General Estimates System (GES) 2005 to 2014.

Note: In 2011, the FHWA implemented an enhanced methodology for estimating registered vehicles and vehicle miles traveled by vehicle type. These revisions were applied to data after 2006. In some cases the changes were significant and should be taken into account when comparing registered vehicle counts and/or vehicle miles traveled for 2006 and earlier years with the numbers for 2007 and later years.

Registration

Motorcycles made up 3 percent of all registered vehicles in the United States in 2014 and accounted for only 0.7 percent of all vehicle miles traveled. Per registered vehicle, the fatality rate for motorcyclists in 2014 was 6 times the fatality rate for passenger car occupants, as shown in Table 2. The injury rate for motorcyclists (1,052) was slightly higher than the injury rate for passenger car occupants (1,005). Per vehicle mile traveled in 2014, motorcyclist fatalities occurred 27 times more frequently than passenger car occupant fatalities in motor vehicle traffic crashes, and motorcyclists were nearly 5 times more likely to be injured as shown in Table 2.

Table 2
Occupant Fatality Rates, by Vehicle Type, 2013 and 2014

Fatality Rate		Vehicle Type					
		Motorcycles		Passenger Cars		Light Trucks	
		Fatality Rate	Injury Rate	Fatality Rate	Injury Rate	Fatality Rate	Injury Rate
2013	Per 100,000 Registered Vehicles	55.83	1,052	9.34	1,005	7.62	622
	Per 100 Million Vehicle Miles Traveled	23.04	434	0.87	94	0.71	58
2014	Per 100,000 Registered Vehicles	54.48	1,088	9.09	985	7.37	633
	Per 100 Million Vehicle Miles Traveled	22.96	459	0.85	93	0.69	60

Source: Fatalities—FARS 2013 Final and 2014 ARF; Injury - GES 2013 and 2014
Vehicle miles traveled and registered vehicles—Federal Highway Administration.

Crash Involvement

Data shows in 2014 that the most harmful event for 2,469 (53%) of the 4,694 motorcycles involved in fatal crashes were collisions with motor vehicles in transport.

In two-vehicle crashes 73 percent of the motorcycles involved in motor vehicle traffic crashes were frontal collisions. Only 7 percent were struck in the rear.

Motorcycles are more frequently involved in fatal collisions with fixed objects than other vehicles. In 2014 about 25 percent of the motorcycles involved in fatal crashes collided with fixed objects, compared to 19 percent for passenger cars, 14 percent for light trucks, and 4 percent for large trucks.

In 2014 there were 2,172 two-vehicle fatal crashes involving a motorcycle and another type of vehicle. In 40 percent (872) of these crashes, the other vehicles were turning left while the motorcycles were going straight, passing, or overtaking other vehicles. Both vehicles were going straight in 481 crashes (22%).

Speeding

NHTSA considers a crash to be speeding-related if the driver was charged with a speeding-related offense or if an investigating police officer indicated that racing, driving too fast for conditions, or exceeding the posted speed limit was a contributing factor in the crash. In 2014 some 33 percent of all motorcycle riders involved in fatal crashes were speeding, compared to 20 percent for passenger car drivers, 17 percent for light-truck drivers, and 7 percent for large-truck drivers.

Age

From 2005 to 2014, motorcyclist fatalities increased by less than 1 percent. The 40-and-older age group made up 47 percent of motorcyclists killed in 2005 as compared to 54 percent of the motorcyclists killed in 2014. Over the 10-year period from 2005 to 2014, fatalities among the 40-and-older age group increased by 14 percent (from 2,159 to 2,472). In 2005 the average age of motorcycle riders killed in motor vehicle traffic crashes was 39, whereas in 2014 the average age was 42.

For the purpose of this fact sheet weekday is defined as 6 a.m. Monday to 5:59 p.m. Friday and weekend is defined as 6 p.m. Friday to 5:59 a.m. Monday. Data shows that in 2005 and 2014 about half the motorcyclists were killed in traffic crashes during the weekend versus weekday, as shown in Table 3. Based on the difference in the number of hours between weekday versus weekend, there were nearly twice as many motorcyclist fatalities in traffic crashes in 2014 during the weekend — 17.7 versus weekday 9.7, which is very similar to 2005 (17.9 versus 9.5). Among the different age groups, the 30 and younger motorcyclist were found to have the highest rate of motorcyclist killed in traffic crashes during the weekend (5.3) and weekday (3.2) in 2005. In 2014 the 50-and-older age group had the highest rate during the weekend at 6.3 versus weekday at 3.6.

Table 3

Motorcyclist Fatalities, by Age, Year, and Day of the Week, 2005 and 2014

Age	Weekday (6 a.m. Monday to 5:59 p.m. Friday)	Weekend (6 p.m. Friday to 5:59 a.m. Monday)	Total
2005			
<30	755	685	1,442
30-39	448	524	975
40-49	460	566	1,027
50+	573	556	1,132
Total	2,236	2,331	4,576
2014			
<30	702	639	1,343
30-39	375	395	770
40-49	342	453	795
50+	851	822	1,677
Total	2,271	2,309	4,586

Source: FARS 2005 Final and 2014 ARF; Total includes unknown age and unknown time of day.

Motorcycle Engine Size

Table 4 presents motorcycle rider fatalities by the engine size of the motorcycle. Twenty-seven percent of motorcycle riders killed in motor vehicle traffic crashes in 2014 were riding motorcycles with engine sizes from 1,001 to 1,500 cubic centimeters (cc), down from 39 percent in 2005. In 2014 about 19 percent of fatally injured riders were killed while riding motorcycles with engine sizes of 1,501cc or higher, up from just 3 percent in 2005.

Overall, the total number of rider fatalities increased less than 1 percent over the past decade from 4,254 in 2005 to 4,311 in 2014.

The number of rider fatalities on motorcycles with engine sizes of 1,000cc or less showed a decrease of 6 percent during this time period. Rider fatalities on motorcycles with engine sizes between 1,001 and 1,500cc decreased by 30 percent (from 1,668 to 1,172), while the number of riders killed on motorcycles 1,501cc or higher increased by over 500 percent (from 129 to 811).

Table 4
Motorcycle Rider (Operator) Fatalities, by Engine Size (cc), 2005 and 2014

	Engine Displacement (cc)										Total	
	Up to 500		501-1,000		1,001-1,500		1,501 & Higher		Unknown			
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
2005	255	6%	1,837	43%	1,668	39%	129	3%	365	9%	4,254	100%
2014	305	7%	1,669	39%	1,172	27%	811	19%	354	8%	4,311	100%

Source: FARS 2005 Final and 2014 ARF

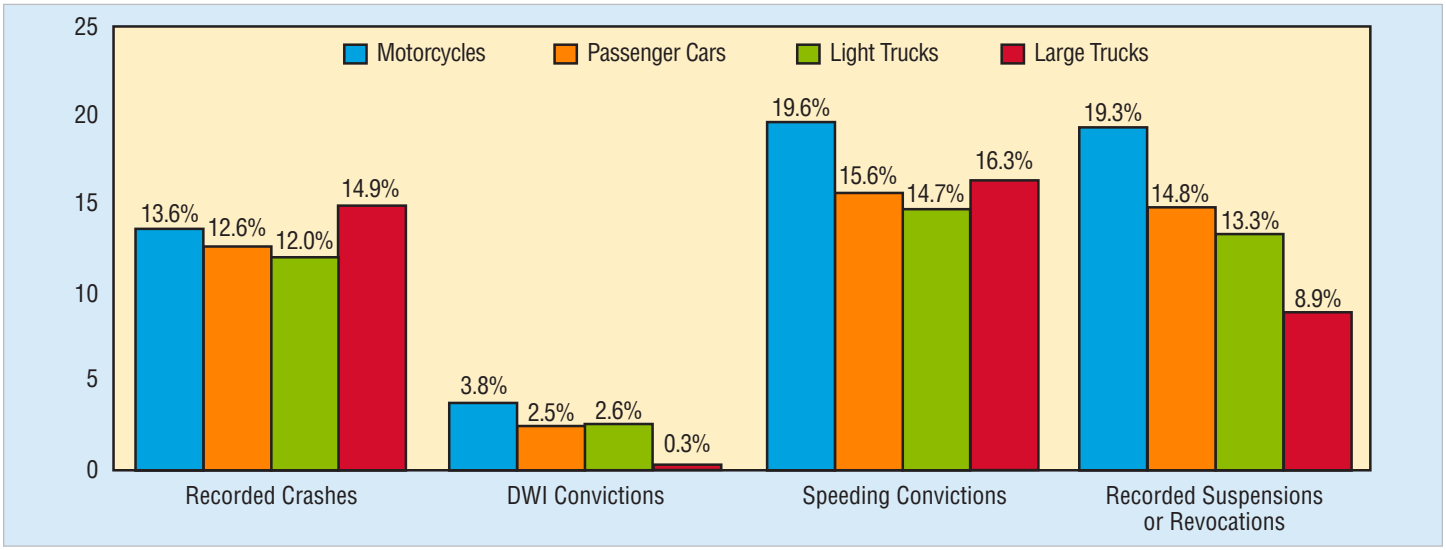
Licensing and Previous Driving Records

Twenty-eight percent of motorcycle riders involved in fatal crashes in 2014 were riding without valid motorcycle licenses at the time of the collisions, while only 13 percent of passenger vehicle drivers in fatal crashes did not have valid licenses. A valid motorcycle license includes a rider having a valid driver license (non-CDL license status) with a motorcycle endorsement or motorcycle-only license.

Motorcycle riders involved in fatal crashes were 1.3 times more likely than passenger vehicle drivers to have previous license suspensions or revocations (19.3% and 14.8%, respectively).

As shown in Figure 1, motorcycle riders involved in fatal crashes had the highest percentages of drivers with previous driving convictions (driving while impaired [DWI], speeding, and revocation) as compared to other vehicle drivers. However for the recorded crashes category, motorcycle riders had the highest proportion after drivers of large trucks.

Figure 1
Previous Driving Records of Drivers Involved in Fatal Traffic Crashes, by Vehicle Type, 2014



Source: 2014 FARS ARF
Note: Excludes all drivers with previous records that were unknown.

Alcohol

In 2014, there were 4,311 motorcycle riders killed in motor vehicle traffic crashes. Of those, 1,287 (30%) were alcohol-impaired (BAC of .08 or higher). In addition, there were 299 (7%) fatally injured motorcycle riders who had lower alcohol levels (BACs of .01 to .07 g/dL).

In fatal crashes in 2014, motorcycle riders (killed and survived) involved in fatal crashes had higher percentages of alcohol impairment than any other type of motor vehicle driver (29% for motorcycle riders, 22% for passenger car and light-truck drivers, and 2% for drivers of large trucks).

The highest percentages of fatally injured, alcohol-impaired motorcycle riders were in the 35-to-39 age group (42%), followed by the 40-to-45 age group (41%) and the 45-to-49 age group (35%).

As shown in Table 5, about 43 percent of the 1,803 motorcycle riders who died in single-vehicle crashes in 2014 were alcohol-impaired as compared to 41 percent in 2005. Sixty-two percent of those killed in single-vehicle crashes on weekend nights were alcohol-impaired.

Table 5

Motorcycle Riders Killed With BACs of .08 or Higher, by Crash Type and Day of the Week, 2005 and 2014

Crash Type and Day of the Week		2005			2014		
		Total Motorcycle Riders Killed	With BAC=.08+		Total Motorcycle Riders Killed	With BAC=.08+	
			Number	Percent		Number	Percent
Total	Total*	4,254	1,172	28%	4,311	1,287	30%
	Weekday	2,089	447	21%	2,149	507	24%
	Weekend	2,156	720	33%	2,156	778	36%
Single-Vehicle	Total*	1,885	776	41%	1,803	782	43%
	Weekday	810	280	35%	783	296	38%
	Weekend	1,066	492	46%	1,014	483	48%
Multiple-Vehicle	Total*	2,369	396	17%	2,508	505	19%
	Weekday	1,279	167	13%	1,366	210	15%
	Weekend	1,090	229	21%	1,142	295	26%

Source: FARS 2005 Final and 2014 ARF
*Includes riders involved in fatal crashes when time of day was unknown.

Motorcycle riders killed in traffic crashes at night were almost three times more frequently found to be alcohol-impaired than those killed during the day (46% and 15%, respectively).

The reported helmet use rate for alcohol-impaired motorcycle riders killed in traffic crashes was 51 percent as compared to 67 percent for those with no alcohol (BAC=.00 g/dL).

Table 6 presents the percentage of motorcycle riders killed who were alcohol-impaired, by States where the crashes occurred. The percentages ranged from a high of 58 percent (North Dakota) to a low of zero percent (District of Columbia).

Table 6

Motorcycle Rider Fatalities, by State and Rider's BAC, 2014

State	Total Motorcycle Riders Killed	Percentage of Motorcycle Riders Killed, by Their BAC	
		BAC=.08+	BAC=.01+
Alabama	61	20%	27%
Alaska	8	13%	38%
Arizona	125	28%	36%
Arkansas	53	21%	34%
California	501	28%	33%
Colorado	94	32%	37%
Connecticut	53	45%	52%
Delaware	13	42%	43%
District of Columbia	3	0%	0%
Florida	456	29%	35%
Georgia	133	29%	34%
Hawaii	25	41%	46%
Idaho	24	18%	28%
Illinois	107	34%	41%
Indiana	110	33%	38%
Iowa	50	26%	28%
Kansas	42	29%	35%
Kentucky	82	21%	23%
Louisiana	81	32%	39%
Maine	11	26%	27%
Maryland	67	34%	40%
Massachusetts	39	37%	48%
Michigan	105	24%	31%
Minnesota	41	22%	30%
Mississippi	36	33%	43%
Missouri	86	25%	35%
Montana	20	28%	44%
Nebraska	19	25%	36%
Nevada	59	24%	27%
New Hampshire	15	35%	36%
New Jersey	60	35%	46%
New Mexico	43	43%	49%
New York	137	26%	34%
North Carolina	175	26%	32%
North Dakota	9	58%	69%
Ohio	121	42%	46%
Oklahoma	52	27%	33%
Oregon	42	21%	36%
Pennsylvania	172	29%	36%
Rhode Island	10	55%	57%
South Carolina	111	37%	45%
South Dakota	14	18%	26%
Tennessee	116	31%	37%
Texas	421	34%	43%
Utah	42	22%	29%
Vermont	7	17%	46%
Virginia	88	28%	37%
Washington	65	29%	35%
West Virginia	25	20%	26%
Wisconsin	66	30%	47%
Wyoming	16	24%	25%
U.S. Total	4,311	30%	37%
Puerto Rico	46	33%	50%

Source: FARS 2014 ARF

Helmet Use and Effectiveness

NHTSA estimates that helmets saved the lives of 1,669 motorcyclists in 2014. If all motorcyclists had worn helmets an additional 660 lives could have been saved.

Helmets are estimated to be 37-percent effective in preventing fatal injuries to motorcycle riders and 41 percent for motorcycle passengers. In other words, for every 100 motorcycle riders killed in crashes while not wearing helmets, 37 of them could have been saved had all 100 worn helmets.

According to results from the National Occupant Protection Use Survey (NOPUS), the overall rate of DOT-compliant motorcycle helmet use in the United States was 64 percent in 2014. Helmet use continued to be significantly higher in States that required all motorcyclists to be helmeted than in other States (see Figure 3 in Motorcycle Helmet Use in 2014—Overall Results, Report No. DOT HS 812 110, available at (www-nrd.nhtsa.dot.gov/Pubs/812110.pdf).

Reported helmet use rates for fatally injured motorcyclists in 2014 were 62 percent for riders and 53 percent for passengers, compared with 60 percent and 49 percent, respectively, in 2013. Conversely, 39 percent of the 4,586 motorcyclists killed in motor vehicle traffic crashes were not helmeted. Table 7 shows that these percentages ranged from a high of 90 percent (North Dakota) to a low of 0 percent (Washington).

All motorcycle helmets sold in the United States are required to meet Federal Motor Vehicle Safety Standard 218, the performance standard that establishes the minimum level of protection for helmets designed for use by motorcyclists.

In 2014 only 19 States, the District of Columbia, and Puerto Rico required helmet use for all motorcyclists.

In 28 States helmet use was required for only a subset of motorcyclists (typically, motorcyclists under age 18), and 3 States (Illinois, Iowa, and New Hampshire) did not require helmet use for motorcyclists of any age. The most current information on helmet use laws is available on the GHSA website at www.ghsa.org/html/stateinfo/laws/helmet_laws.html.

In States without universal helmet laws, 58 percent of motorcyclists killed in 2014 were not wearing helmets, as compared to 8 percent in States with universal helmet laws.

This fact sheet contains information on motor vehicle fatalities and fatal crashes, based on data from the Fatality Analysis Reporting System (FARS). FARS is a census of fatal crashes within the 50 States, the District of Columbia, and Puerto Rico (although Puerto Rico is not included in U.S. totals). Crash and injury statistics are based on data from the National Automotive Sampling System (NASS) General Estimates System (GES). The NASS GES is a probability-based sample of police-reported crashes, from 60 locations across the country, from which estimates of national totals for injury and property-damage-only crashes are derived.

The suggested APA format citation for this document is:

National Center for Statistics and Analysis. (2016, July). *Motorcycles: 2014 data.* (Traffic Safety Facts. Report No. DOT HS 812 292). Washington, DC: National Highway Traffic Safety Administration.

For more information:

Information on traffic fatalities is available from the National Center for Statistics and Analysis, NSA-230, 1200 New Jersey Avenue SE., Washington, DC 20590. NCSA can be contacted at 800-934-8517 or by e-mail at ncsaweb@dot.gov. General information on highway traffic safety can be found at www.nhtsa.gov/NCSA. To report a safety-related problem or to inquire about motor vehicle safety information, contact the Vehicle Safety Hotline at 888-327-4236.

Other fact sheets available from the National Center for Statistics and Analysis are *Alcohol- Impaired Driving, Bicyclists and Other Cyclists, Children, Large Trucks, Occupant Protection, Older Population, Passenger Vehicles, Pedestrians, Rural/Urban Comparisons, School Transportation-Related Crashes, Speeding, State Alcohol Estimates, State Traffic Data, Summary of Motor Vehicle Crashes,* and *Young Drivers*. Detailed data on motor vehicle traffic crashes are published annually in Traffic Safety Facts: A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System. The fact sheets and annual Traffic Safety Facts report can be found at www-nrd.nhtsa.dot.gov/CATS/index.aspx.

U.S. Department of Transportation

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Table 7

Motorcyclist Fatalities, by State and Helmet Use, 2014

State	Helmet Use						Total		Percent "Known" Helmeted	Percent "Known" Unhelmeted
	Helmeted		Unhelmeted		Unknown					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Percent	Percent
Alabama	53	82%	10	15%	2	3%	65	100%	84%	16%
Alaska	5	63%	3	38%	0	0%	8	100%	63%	38%
Arizona	56	43%	69	53%	5	4%	130	100%	45%	55%
Arkansas	24	39%	36	59%	1	2%	61	100%	40%	60%
California	488	94%	24	5%	7	1%	519	100%	95%	5%
Colorado	33	35%	61	65%	0	0%	94	100%	35%	65%
Connecticut	20	36%	32	58%	3	5%	55	100%	38%	62%
Delaware	7	47%	7	47%	1	7%	15	100%	50%	50%
District of Columbia	2	67%	1	33%	0	0%	3	100%	67%	33%
Florida	240	50%	223	47%	15	3%	478	100%	52%	48%
Georgia	124	91%	8	6%	5	4%	137	100%	94%	6%
Hawaii	12	48%	12	48%	1	4%	25	100%	50%	50%
Idaho	9	36%	15	60%	1	4%	25	100%	38%	63%
Illinois	34	29%	81	69%	3	3%	118	100%	30%	70%
Indiana	26	21%	89	72%	9	7%	124	100%	23%	77%
Iowa	15	29%	37	71%	0	0%	52	100%	29%	71%
Kansas	18	38%	28	58%	2	4%	48	100%	39%	61%
Kentucky	38	44%	48	56%	0	0%	86	100%	44%	56%
Louisiana	67	81%	10	12%	6	7%	83	100%	87%	13%
Maine	7	64%	4	36%	0	0%	11	100%	64%	36%
Maryland	58	84%	8	12%	3	4%	69	100%	88%	12%
Massachusetts	36	84%	4	9%	3	7%	43	100%	90%	10%
Michigan	50	45%	52	46%	10	9%	112	100%	49%	51%
Minnesota	9	20%	29	63%	8	17%	46	100%	24%	76%
Mississippi	34	83%	6	15%	1	2%	41	100%	85%	15%
Missouri	79	87%	7	8%	5	5%	91	100%	92%	8%
Montana	10	43%	12	52%	1	4%	23	100%	45%	55%
Nebraska	18	90%	1	5%	1	5%	20	100%	95%	5%
Nevada	52	83%	8	13%	3	5%	63	100%	87%	13%
New Hampshire	3	18%	14	82%	0	0%	17	100%	18%	82%
New Jersey	52	84%	5	8%	5	8%	62	100%	91%	9%
New Mexico	9	20%	35	76%	2	4%	46	100%	20%	80%
New York	124	84%	21	14%	3	2%	148	100%	86%	14%
North Carolina	175	92%	15	8%	0	0%	190	100%	92%	8%
North Dakota	1	10%	9	90%	0	0%	10	100%	10%	90%
Ohio	42	31%	91	67%	3	2%	136	100%	32%	68%
Oklahoma	13	23%	44	77%	0	0%	57	100%	23%	77%
Oregon	41	89%	4	9%	1	2%	46	100%	91%	9%
Pennsylvania	75	41%	100	54%	10	5%	185	100%	43%	57%
Rhode Island	3	30%	7	70%	0	0%	10	100%	30%	70%
South Carolina	25	21%	95	79%	1	1%	121	100%	21%	79%
South Dakota	5	29%	11	65%	1	6%	17	100%	31%	69%
Tennessee	109	91%	10	8%	1	1%	120	100%	92%	8%
Texas	201	45%	234	52%	15	3%	450	100%	46%	54%
Utah	19	42%	26	58%	0	0%	45	100%	42%	58%
Vermont	6	86%	1	14%	0	0%	7	100%	86%	14%
Virginia	89	99%	1	1%	0	0%	90	100%	99%	1%
Washington	69	100%	0	0%	0	0%	69	100%	100%	0%
West Virginia	17	65%	7	27%	2	8%	26	100%	71%	29%
Wisconsin	20	27%	51	70%	2	3%	73	100%	28%	72%
Wyoming	6	38%	10	63%	0	0%	16	100%	38%	63%
U.S. Total	2,728	59%	1,716	37%	142	3%	4,586	100%	61%	39%
Puerto Rico	14	30%	33	70%	0	0%	47	100%	30%	70%

Shading indicates States requiring helmet use for all motorcyclists. Source: FARS 2014 ARF

U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS
Research Note

NHTSA

DOT HS 812 275

May 2016

Motorcycle Helmet Use in 2015—Overall Results

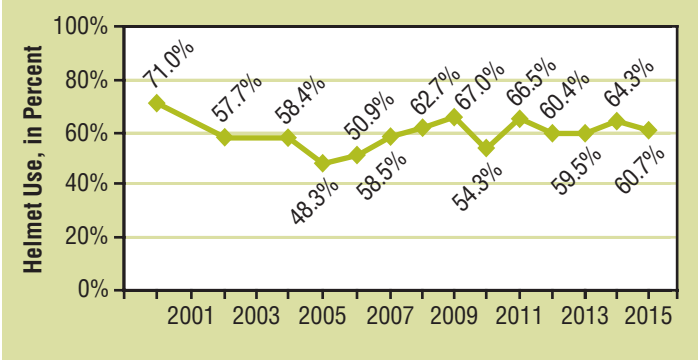
Use of DOT-compliant motorcycle helmets[1] was 60.7* percent in 2015, statistically unchanged from 64.3 percent in 2014. This result is from the National Occupant Protection Use Survey (NOPUS), the only survey that provides nationwide probability-based observed data on motorcycle helmet use in the United States. The NOPUS is conducted by the National Center for Statistics and Analysis of the National Highway Traffic Safety Administration.

Figure 1 shows the motorcycle helmet use trend since 2000. Figure 2 shows the percentages of motorcyclists using DOT-compliant helmets, non-compliant helmets, and no helmet in 2014 and 2015.

The 2015 survey also found the following:

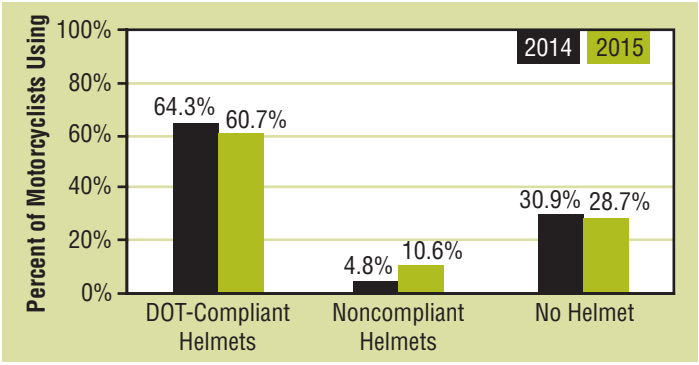
- Helmet use among motorcyclists in the northeastern States increased significantly to 77.2 percent, up from 56.1 percent in 2014. (Table 1)
- Use of non-compliant motorcycle helmets increased significantly to 10.6 percent, up from 4.8 percent in 2014. (Table 2)
- Helmet use continued to be significantly higher in States that require all motorcyclists to be helmeted than in other States (Figure 3).
- Helmet use among motorcyclists traveling in moderately dense traffic decreased significantly to 53.6 percent, from 72.8 percent in 2014 (Table 1).

Figure 1
Motorcycle Helmet Use, 2000–2015



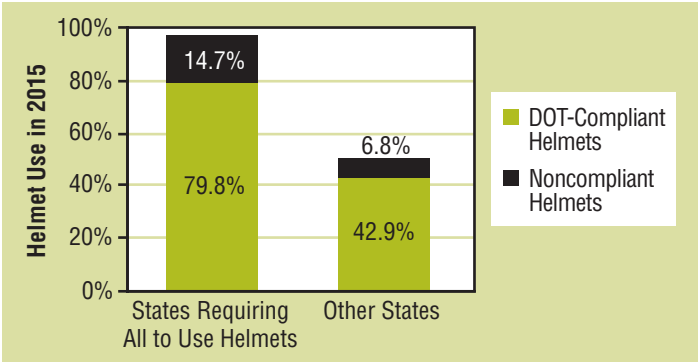
Data Source: NOPUS (In 2004 and prior, motorcycle helmet use data were collected every other year since the NOPUS began in 1994. Data on motorcycle helmet use were not collected in 2001 and 2003.)

Figure 2
Motorcyclists, by Helmet Type



Data Source: NOPUS

Figure 3
Motorcycle Helmet Use in 2015, by State Law and Helmet Type



Data Source: NOPUS

[1] DOT-compliant motorcycle helmets are those helmets meeting the safety requirements of Federal Motor Vehicle Safety Standard 218. Throughout this Research Note the term helmet use refers to the use of DOT-compliant motorcycle helmets unless otherwise stated.

* Please see "The 2015 NOPUS Redesign" section of this Research Note for more information about the change in NOPUS reporting precision.

Table 1
Use of Helmets Compliant With Federal Safety Regulations by Major Motorcyclist Characteristics

Motorcyclist Group	2014		2015		2014–2015 Change		
	Helmet Use[1]	95% Confidence Interval[2]	Helmet Use[1]	95% Confidence Interval[2]	Change in Percentage Points	95% Confidence Interval[3]	P-Value[4]
All Motorcyclists	64.3%	(53.6, 73.8)	60.7%	(51.1, 69.6)	-3.6	(-15.4, 8.2)	0.54
Riders	66.8%	(56.6, 75.7)	63.9%	(54.1, 72.6)	-2.9	(-14.5, 8.6)	0.61
Passengers	51.3%	(36.0, 66.4)	46.3%	(34.7, 58.4)	-5.0	(-22.2, 12.3)	0.56
Motorcyclists in States Where[5]							
Use Is Required for All Motorcyclists	88.7%	(81.2, 93.5)	79.8%	(71.8, 85.9)	-8.9	(-19.6, 1.7)	0.10
Other States	47.9%	(37.1, 58.9)	42.9%	(34.7, 51.4)	-5.0	(-18.7, 8.7)	0.46
Motorcyclists on							
Expressways	80.7%	(65.7, 90.1)	71.3%	(62.7, 78.6)	-9.4	(-19.9, 1.0)	0.07
Surface Streets	58.5%	(47.5, 68.7)	57.0%	(45.8, 67.6)	-1.5	(-16.1, 13.1)	0.84
Motorcyclists Traveling in							
Fast Traffic	71.9%	(62.9, 79.5)	68.1%	(60.9, 74.7)	-3.8	(-11.6, 3.9)	0.32
Medium-Speed Traffic	56.8%	(38.9, 73.1)	52.3%	(38.5, 65.9)	-4.5	(-24.2, 15.3)	0.65
Slow Traffic	62.2%	(39.4, 80.7)	62.2%	(43.3, 78.0)	-0.0	(-29.1, 29.0)	1.00
Motorcyclists Traveling in							
Heavy Traffic	63.3%	(48.5, 76.0)	68.9%	(59.8, 76.8)	5.6	(-6.1, 17.3)	0.34
Moderately Dense Traffic	**72.8%**	**(58.8, 83.4)**	**53.6%**	**(39.3, 67.2)**	**-19.2**	**(-35.8, -2.7)**	**0.02**
Light Traffic	49.1%	(34.4, 63.9)	54.7%	(37.1, 71.1)	5.6	(-20.3, 31.5)	0.67
Motorcyclists in							
Light Precipitation	55.5%	(35.4, 73.9)	71.8%	(49.5, 86.9)	16.3	(-12.8, 45.5)	0.26
Light Fog	NA	NA	NA	NA	NA	NA	NA
Clear Weather Conditions	64.7%	(53.3, 74.6)	60.6%	(50.5, 69.9)	-4.1	(-16.7, 8.5)	0.52
Motorcycle Riders When							
They Are the Sole Rider	69.8%	(60.4, 77.8)	65.7%	(56.8, 73.6)	-4.1	(-14.6, 6.3)	0.43
They Have a Passenger	54.4%	(36.3, 71.4)	57.4%	(40.8, 72.4)	3.0	(-19.1, 25.1)	0.79
Motorcyclists in the							
Northeast	**56.1%**	**(36.7, 73.9)**	**77.2%**	**(53.5, 90.9)**	**21.1**	**(1.3, 40.8)**	**0.04**
Midwest	47.4%	(32.8, 62.4)	44.3%	(31.9, 57.5)	-3.1	(-22.2, 16.1)	0.75
South	78.2%	(61.4, 89.0)	60.0%	(47.4, 71.3)	-18.2	(-37.0, 0.6)	0.06
West	84.9%	(66.4, 94.2)	74.8%	(60.4, 85.3)	-10.1	(-27.0, 6.8)	0.24
Motorcyclists in							
Urban Areas	62.3%	(38.9, 81.1)	60.6%	(52.8, 68.0)	-1.7	(-22.6, 19.3)	0.87
Rural Areas	51.9%	(21.7, 80.8)	60.8%	(44.6, 75.0)	8.9	(-26.6, 44.5)	0.61
Motorcyclists Traveling During							
Weekdays	64.9%	(55.0, 73.6)	62.1%	(53.5, 70.0)	-2.8	(-14.9, 9.3)	0.64
Weekday Rush Hours	58.9%	(47.6, 69.3)	63.6%	(54.0, 72.3)	4.7	(-10.7, 20.2)	0.54
Weekday Non-Rush Hours	70.5%	(59.1, 79.8)	60.4%	(48.6, 71.2)	-10.1	(-24.7, 4.6)	0.17
Weekends	63.7%	(45.5, 78.7)	59.4%	(45.1, 72.2)	-4.3	(-24.2, 15.6)	0.66
Motorcycle Riders Who							
Are Riding Alone	69.8%	(60.4, 77.8)	65.7%	(56.8, 73.6)	-4.1	(-14.6, 6.3)	0.43
Have a Passenger Using a DOT-Compliant Helmet	85.0%	(65.7, 94.4)	86.9%	(73.5, 94.1)	1.9	(-13.6, 17.3)	0.81
Have a Passenger Using a Noncompliant Helmet	NA	NA	NA	NA	NA	NA	NA
Have an Unhelmeted Passenger	10.2%	(3.7, 25.3)	24.3%	(9.4, 50.0)	14.1	(-6.5, 34.7)	0.17
Passengers on Motorcycles on Which							
The Rider Is Using a DOT-Compliant Helmet	80.2%	(65.5, 89.7)	70.2%	(53.1, 83.1)	-10.0	(-28.9, 8.8)	0.29
The Rider Is Using a Noncompliant Helmet	NA	NA	NA	NA	NA	NA	NA
The Rider Is Unhelmeted	13.9%	(5.0, 33.2)	12.8%	(7.1, 21.8)	-1.1	(-16.2, 13.9)	0.88

[1] Use of helmets meeting the safety requirements of Federal Motor Vehicle Safety Standard 218, observed between 7 a.m. and 6 p.m. among motorcycle riders and passengers.
[2] The Wilson Confidence Interval is used in the estimated percentages in the motorcyclist group (e.g., motorcyclists in urban areas), which is in the form: $\{(2n_{EFF}p + t^2) \pm t\sqrt{(t^2 + 4n_{EFF}pq)}\}/2(n_{EFF} + t^2)$, where p is the estimated percentage of Helmet Use, $n_{EFF} = n/DEFF$ is the effective sample size (where n is the sample size and $DEFF$ is the design effect), $t = t_{1-\alpha/2}(df)$, is a multiplier from the t-distribution with df degrees of freedom, and $q = 1 - p$. For percentages these endpoints are multiplied by 100.
[3] The regular symmetric interval was used for the estimated change in percentage point, which is in the form: $p \pm t_{1-\alpha/2}(df)\sqrt{v(p)}$, where p is the estimated change in percentage point, $v(p)$ is its estimated variance, and $t_{1-\alpha/2}(df)$ is a multiplier from the t-distribution with df degrees of freedom. The degrees of freedom used in 2015 is different from that used in 2014.
[4] The P-value that use in percentage points change in the motorcyclist group (e.g., motorcyclists in urban areas) is a probability, which is the result of a statistical test, a big or small value, shows the null hypothesis of no changes is true along with the 95% confidence interval results. The motorcyclist group with p-values that less than 0.05 are formatted in boldface type.
[5] Use rates reflect the laws in effect at the time data was collected.
NA: Data not sufficient to produce a reliable estimate.
Source: National Occupant Protection Use Survey, NCSA

Table 2
Use of Noncompliant Helmets by Major Motorcyclist Characteristics

Motorcyclist Group	2014		2015		2014–2015 Change		
	Helmet Use[1]	95% Confidence Interval[2]	Helmet Use[1]	95% Confidence Interval[2]	Change in Percentage Points	95% Confidence Interval[3]	P-Value[4]
All Motorcyclists	**4.8%**	**(3.1, 7.3)**	**10.6%**	**(7.6, 14.7)**	**5.8**	**(2.1, 9.7)**	**< 0.01**
Riders	**4.1%**	**(2.6, 6.5)**	**10.7%**	**(7.4, 15.3)**	**6.6**	**(2.4, 10.7)**	**< 0.01**
Passengers	8.1%	(3.6, 17.3)	10.4%	(6.3, 16.8)	2.3	(-6.4, 11.1)	0.59
Motorcyclists in States Where[5]							
Use Is Required for All Motorcyclists	**6.8%**	**(4.0, 11.5)**	**14.7%**	**(9.1, 23.0)**	**7.9**	**(0.4, 15.4)**	**0.04**
Other States	3.4%	(1.7, 6.5)	6.8%	(3.7, 12.0)	3.4	(-0.7, 7.6)	0.10
Motorcyclists on							
Expressways	NA	NA	10.8%	(6.3, 17.8)	NA	NA	NA
Surface Streets	**5.7%**	**(3.5, 9.3)**	**10.6%**	**(7.3, 15.2)**	**4.9**	**(0.3, 9.4)**	**0.04**
Motorcyclists Traveling in							
Heavy Traffic	**4.8%**	**(2.3, 9.5)**	**10.0%**	**(6.7, 14.6)**	**5.2**	**(1.0, 9.5)**	**0.02**
Moderately-Dense Traffic	6.0%	(3.5, 10.3)	11.3%	(6.5, 19.0)	5.3	(-1.5, 12.1)	0.12
Slow Traffic	2.4%	(0.9, 6.6)	10.6%	(4.8, 21.5)	8.2	(-0.4, 16.7)	0.06
Motorcyclists Traveling in							
Heavy Traffic	**4.4%**	**(2.4, 7.9)**	**11.6%**	**(7.0, 18.6)**	**7.2**	**(1.3, 13.1)**	**0.02**
Moderately Dense Traffic	6.4%	(3.0, 13.1)	8.7%	(4.6, 15.7)	2.3	(-4.0, 8.6)	0.46
Light Traffic	NA	NA	13.5%	(6.9, 24.7)	NA	NA	NA
Motorcyclists in							
Light Precipitation	16.5%	(5.8, 38.6)	NA	NA	NA	NA	NA
Light Fog	NA	NA	NA	NA	NA	NA	NA
Clear Weather Conditions	**4.2%**	**(2.7, 6.7)**	**10.3%**	**(7.0, 14.8)**	**6.1**	**(2.0, 10.1)**	**< 0.01**
Motorcycle Riders When							
They Are the Sole Motorcyclist	**4.4%**	**(2.8, 6.8)**	**11.8%**	**(8.2, 16.6)**	**7.4**	**(3.0, 11.7)**	**< 0.01**
They Have a Passenger	2.9%	(1.0, 8.0)	6.7%	(3.4, 13.0)	3.8	(-1.7, 9.4)	0.17
Motorcyclists in the							
Northeast	7.0%	(4.7, 10.3)	9.5%	(3.5, 23.3)	2.5	(-6.9, 11.9)	0.59
Midwest	2.8%	(1.0, 7.6)	4.0%	(2.5, 6.1)	1.2	(-1.9, 4.3)	0.44
South	6.0%	(2.2, 15.1)	15.3%	(8.5, 26.2)	9.3	(-0.5, 19.2)	0.06
West	**4.1%**	**(1.4, 11.7)**	**16.1%**	**(10.7, 23.6)**	**12.0**	**(4.7, 19.4)**	**< 0.01**
Motorcyclists in							
Urban Areas	8.5%	(5.6, 12.7)	11.0%	(7.7, 15.5)	2.5	(-1.8, 6.8)	0.24
Rural Areas	NA	NA	10.3%	(6.3, 16.4)	NA	NA	NA
Motorcyclists Traveling During							
Weekdays	**5.5%**	**(3.4, 9.0)**	**10.5%**	**(7.6, 14.4)**	**5.0**	**(1.3, 8.7)**	**0.01**
Weekday Rush Hours	6.4%	(3.0, 13.1)	10.3%	(5.8, 17.5)	3.9	(-2.8, 10.6)	0.25
Weekday Non-Rush Hours	**4.8%**	**(2.3, 9.4)**	**10.8%**	**(7.8, 14.6)**	**6.0**	**(1.6, 10.5)**	**0.01**
Weekends	**3.9%**	**(2.1, 7.0)**	**10.8%**	**(6.1, 18.4)**	**6.9**	**(0.5, 13.3)**	**0.03**
Motorcycle Riders Who							
Are Riding Alone	**4.4%**	**(2.8, 6.8)**	**11.8%**	**(8.2, 16.6)**	**7.4**	**(3.0, 11.7)**	**< 0.01**
Have a Passenger Using a DOT-Compliant Helmet	NA	NA	3.2%	(0.9, 10.6)	NA	NA	NA
Have a Passenger Using a Noncompliant Helmet	NA	NA	NA	NA	NA	NA	NA
Have an Unhelmeted Passenger	NA	NA	NA	NA	NA	NA	NA
Passengers on Motorcycles on Which							
The Rider Is Using a DOT-Compliant Helmet	12.1%	(4.9, 27.0)	11.5%	(5.3, 22.9)	-0.6	(-14.3, 13.0)	0.92
The Rider Is Using a Noncompliant Helmet	NA	NA	NA	NA	NA	NA	NA
The Rider Is Unhelmeted	NA	NA	NA	NA	NA	NA	NA

[1] Use of helmets meeting the safety requirements of Federal Motor Vehicle Safety Standard 218, observed between 7 a.m. and 6 p.m. among motorcycle riders and passengers.
[2] The Wilson Confidence Interval is used in the estimated percentages in the motorcyclist group (e.g., motorcyclists in urban areas), which is in the form: $\{(2n_{EFF}p + t^2) \pm t\sqrt{(t^2 + 4n_{EFF}pq)}\}/2(n_{EFF} + t^2)$, where p is the estimated percentage of Helmet Use, $n_{EFF} = n/DEFF$ is the effective sample size (where n is the sample size and $DEFF$ is the design effect), $t \equiv t_{1-\alpha/2}(df)$, is a multiplier from the t-distribution with df degrees of freedom, and $q = 1 - p$. For percentages these endpoints are multiplied by 100.
[3] The regular symmetric interval was used for the estimated change in percentage point, which is in the form: $p \pm t_{1-\alpha/2}(df)\sqrt{v(p)}$, where p is the estimated change in percentage point, $v(p)$ is its estimated variance, and $t_{1-\alpha/2}(df)$ is a multiplier from the t-distribution with df degrees of freedom. The degrees of freedom used in 2015 is different from that used in 2014.
[4] The P-value that use in percentage points change in the motorcyclist group (e.g., motorcyclists in urban areas) is a probability, which is the result of a statistical test, a big or small value, shows the null hypothesis of no changes is true along with the 95% confidence interval results. The motorcyclist group with p-values that less than 0.05 are formatted in boldface type.
[5] Use rates reflect the laws in effect at the time data was collected.
NA: Data not sufficient to produce a reliable estimate.
Source: National Occupant Protection Use Survey, NCSA

Survey Methodology

The NOPUS is the only survey that provides nationwide probability-based observed data on motorcycle helmet use in the United States. The survey observes helmet use as it actually occurs at randomly selected roadway sites, and thus provides the best tracking of helmet use in this country.

The survey data is collected by sending observers to probabilistically sampled roadways, who observe motorcyclists between 7 a.m. and 6 p.m. Observations are made either while standing at the roadside or, in the case of expressways, while riding in a vehicle in traffic. In order to capture the true behavior of motorcyclists, NOPUS observers do not stop motorcycles or interview motorcyclists. The 2015 NOPUS data was collected between June 1 and June 27, 2015, while the 2014 data was collected between June 2 and June 27, 2014.

The NOPUS uses a complex multistage probability sample, statistical data editing, imputation of unknown values, and complex estimation procedures. The sample sites for the 2015 NOPUS were entirely from the 2015 NOPUS sample redesign. Table 3 shows the observed sample sizes of the 2015 NOPUS Moving Traffic Survey. A total of 1,019 motorcyclists were observed on the 851 motorcycles at the 1,901 data collection sites.

Table 3
Sites, Motorcycles, and Motorcyclists Observed

Numbers of	2014	2015	Percentage Change
Sites Observed*	1,581	1,901	20.2%
Motorcycles Observed	684	851	24.4%
Motorcyclists Observed	806	1,019	26.4%

*The number of sites observed reflects the number of sites in the sample frame minus those sites unavailable due to restricted access, traffic problems, or safety issues.

Because the NOPUS sites are selected probabilistically, we can analyze the statistical significance of its results. Statistically significant changes in helmet use between 2014 and 2015 are identified in Table 1 and Table 2 by having a P-Value that is 0.05 or less in column 8 of these tables. The statistical confidence intervals that use in a given motorcyclist group, e.g., motorcyclists in the Midwest are provided in columns 3, 5, and 7 of Table 1 and Table 2.

Data collection, estimation, and variance estimation for the NOPUS are conducted by Westat, Inc., under the direction of the National Center for Statistics and Analysis in NHTSA under Federal contract number DTNH22-13-D-00284.

Definitions

NHTSA established standards for motorcycle helmets to ensure a certain degree of protection in a crash in Federal Motor Vehicle Safety Standard 218 (Code of Federal Register, Title 49, Volume 5, Part 571, Section 218, October 2003). *DOT-compliant helmets* are helmets that meet this safety standard, while *noncompliant helmets* are helmets that do not.

DOT-compliant helmets are marked with an identifying sticker on the back of the helmets. However, because of the prevalence of counterfeit stickers, NOPUS data collectors categorize DOT-compliant helmets as helmets that cover the motorcyclists' ears or are at least 1 inch thick.

NHTSA defines helmet use as the use of DOT-compliant helmets.

At the time the 2015 survey was conducted, 19 States and the District of Columbia required all motorcyclists to be helmeted. Table 4 provides a list of States with laws requiring helmet use for all motorcyclists. Twenty-eight States required only a subset of riders or motorcycle passengers to use helmets (such as those under age 17, 18, or 20). Three States, Illinois, Iowa, and New Hampshire, had no motorcycle helmet requirement.

Table 4
States With Laws* Requiring Helmet Use for All Motorcyclists

Alabama	Mississippi	Oregon
California	Missouri	Tennessee
District of Columbia	Nebraska	Vermont
Georgia	Nevada	Virginia
Louisiana	New Jersey	Washington
Maryland	New York	West Virginia
Massachusetts	North Carolina	

*States and the District of Columbia with laws in effect as of May 31, 2015

"Expressways" are defined to be roadways with limited access, while "surface streets" comprise all other roadways. "Rush hour" is defined as 7 to 9:30 a.m. and 3:30 to 6 p.m.

A roadway is defined to have "fast traffic" if during the observation period the average speed of passenger vehicles that pass the observer exceeds 50 mph, with "medium-speed traffic" defined as 31 to 50 mph, and "slow traffic" defined as 30 mph or slower.

A roadway is defined to have "heavy traffic" if the average number of vehicles on the roadway during the observation period is greater than 5 per lane per mile, with "moderately dense traffic" defined as greater than 1 but less than or equal to 5 vehicles per lane per mile, and "light traffic" as less than or equal to 1 vehicle per lane per mile.

The survey uses the following definitions of geographic regions, which are defined in terms of the States contained in the region below:

Northeast:	CT, MA, ME, NH, NJ, NY, PA, RI, VT
Midwest:	IA, KS, IL, IN, MI, MN, MO, ND, NE, OH, SD, WI
South:	AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV
West:	AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY

Please note that NHTSA employs the following data reporting guidelines for the NOPUS publications:

Estimates whose numerator is based on fewer than five observations in the sample, and/or whose denominator is based on fewer than 30 observations in the sample, or that are not statistically different from zero percent are reported as "NA" in publications, including any related estimates.

The 2015 NOPUS Redesign

The NOPUS sample was redesigned in 2015 and implemented to conduct the 2015 survey. NHTSA initiated the redesign to make NOPUS more efficient, accurate and representative. Also, beginning with the 2015 NOPUS, the reporting precision has been increased to be consistent with generally recommended Federal practices for reporting survey estimates. In addition, the new design incorporates scalability and flexibility in its design to accommodate changing resources. A sample of 57 primary sampling units (PSUs) was selected from a frame of 1,588 PSUs.

The redesigned NOPUS sample was selected using a stratified two-stage design. The first stage of selection was the county, referred to as the PSU within the design framework. The PSUs were targeted for selection based on their measure of size (MOS). The second stage of selection or secondary sampling unit (SSU), within the selected PSUs, is the road segment. At the road segment level, the NOPUS data collectors are then positioned so that they can efficiently observe seat belt use, motorcycle helmet use, and driver electronic device use.

Frame Formation: The NOPUS sample frame of PSUs excluded Puerto Rico and other U.S. Territories due to data collection cost constraints. All other counties in the U.S. were included in the sampling frame with the exception of 37 counties and three areas in Alaska; these locations were excluded on the basis of low traffic volume measured in terms of vehicle miles traveled (VMT) or because they were geographically isolated. The sample frame of SSUs excluded segments along unnamed roads, culs-de-sac, private roads, and a variety of other road types that have traditionally had very low traffic volume measured by VMT.

The PSUs consist of individual counties or groups of counties that were formed to minimize the distance that data collectors might have to travel within a particular PSU, while maintaining road segments that reflected a minimum number of annual vehicle miles traveled for each PSU. All PSUs for the sample frame are contained within their states; a PSU cannot be in more than one state if it is comprised of multiple counties. The measure of size is the 2012 VMT obtained from the Federal Highway Administration.

Stratification: One PSU was sampled with certainty because of its large VMT, and the remaining PSUs were first grouped into eight major strata based on the four U.S. Census designated regions (Northeast, Mideast, South, and West) and the two urbanicity classes (Urban and Rural). Within each major stratum, the PSUs were ordered by their predicted seat belt use rates, from lowest to highest. Then the PSUs were further stratified through cut points of the predicted seat belt use rate, resulting in strata with approximately equal total MOS. The restraint use rates were predicted by a linear regression model that used primary seat belt law enforcement, the county-level ratio of fatal crashes to VMT, and other county-level demographic data.

Sample Selection: A sample of 57 PSUs was selected using a Sequential Poisson method (Ohlsson, 1998) with probability approximately proportional to the MOS (VMT). The new NOPUS sample was selected to maximize PSU overlap with the old sample, thus maintaining comparability of the estimates from the current and previous samples. A SSU sample of road segments within each PSU is selected based upon the types of roads and urban/rural status with specified sampling rates.

The sample size of the PSUs and SSUs were determined to minimize the overall variance (increasing the efficiency) of restraint use and the costs necessary to con-

duct the NOPUS. As described before, the stratification employed in the redesign clusters the sampling units so that the PSUs within each stratum are very similar in terms of their predicted seat belt use rates, resulting in increased efficiency (smaller variance) at the PSU-level than that generated from previous NOPUS sample. To minimize variance within the PSUs, NHTSA used updated cost and road segment information to revise the road segment stratum sampling rates in order to achieve more efficiency from the survey.

Changes and Improvements: Using estimated seat belt use rates to form PSU strata provides a stratification that allows flexibility if resources for the survey change. It is straightforward to collapse strata (reducing the number of PSUs in the sample) with this method by combining adjacent strata or to increase PSU sample sizes by sampling additional PSUs per stratum.

Data collection protocols remain largely the same in the redesigned NOPUS; however NHTSA has made some minor adjustments to streamline data collection. In order to provide an estimate based on all vehicles affected by seat belt laws in relevant jurisdictions, data collectors observe and record seat belt use for all passenger vehicles observed at the data collection sites. In previous NOPUS surveys, government, emergency, and commercially-marked vehicles were excluded from observation.

NOPUS is based on a probability sample, and this survey continues to use standard survey sampling methods for constructing sampling weights for estimating national seat belt use rates, and to use replication methods to calculate standard errors of these estimates.

Prior to 2015, NHTSA's NOPUS publications reported integer percentage values for seat belt use point estimates. Along with updating the survey design, NHTSA has revised its NOPUS reporting format to be consistent with statistical best practices across the Federal Government. The new reporting format presents percentage point estimates with one decimal place. Along with this change, 95 percent confidence intervals and p-values accompany the point estimates.

References

Ohlsson, E. (1998). Sequential Poisson sampling. *Journal of Official Statistics,* 14, 149–162.

For More Information

This Research Note was written by Timothy M. Pickrell and Hongying (Ruby) Li, mathematical statisticians in the Mathematical Analysis Division, National Center for Statistics and Analysis, NHTSA. For questions regarding the information presented in this document, please contact timothy.pickrell@dot.gov.

Additional data and information on the survey design and analysis procedures will be available in upcoming publications to be posted at the website www-nrd.nhtsa.dot.gov/cats/index.aspx in 2016.

Helmets are estimated to be 37-percent effective in preventing fatal injuries to motorcycle riders and 41-percent effective for motorcycle passengers (Deutermann, W. [2004] *Motorcycle Helmet Effectiveness Revisited* [Report No. DOT HS 809 715] Washington, DC: National Highway Traffic Safety Administration). NHTSA estimates that helmets saved the lives of 1,669 motorcyclists in 2014 (Traffic Safety Facts: 2014 Data, Report No. DOT HS 812 218). For more information on the campaign by NHTSA and the States to raise helmet use, see www.nhtsa.gov.

NOPUS also observes other types of restraints, such as seat belts and child restraints, and observes driver electronic device use. This publication is part of a series that presents overall results from the survey on these topics. Please see publications in the series, such as "Seat Belt Use in 2015 – Overall Results," for the latest data on these topics.

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U.S. Department of Transportation

National Highway Traffic Safety Administration

This research note and other general information on highway traffic safety may be accessed by Internet users at: www-nrd.nhtsa.dot.gov/CATS/index.aspx

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National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS
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DOT HS 812 206

October 2015

Estimating Lives and Costs Saved by Motorcycle Helmets With Updated Economic Cost Information

Summary

In 2013, an estimated 1,630 lives were saved in the United States by motorcycle helmets; an estimated 715 additional fatalities could have been prevented if all motorcyclists[1] had worn helmets. The lives saved resulted in an estimated $2.8 billion saved in economic costs, and $17.3 billion in comprehensive costs,[2] by helmet-wearing motorcyclists. An additional $1.1 billion could have been saved in economic costs, and $7.2 billion in comprehensive costs, if all motorcyclists had worn helmets.

The National Highway Traffic Safety Administration annually provides information on the number of lives saved by the use of DOT-compliant motorcycle helmets, as well as the potential number of lives that could have been saved at 100-percent helmet use. In addition, the economic costs saved by those wearing helmets, and how much could have been saved had all riders worn helmets, are also estimated. This information is provided for each State as well as the nation as a whole. A recently published report, *The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised)* (Blincoe, Miller, Zaloshnja, & Lawrence, 2015), updated the cost information used with these estimates.

This Research Note provides information on how NHTSA determines estimates of lives and costs saved by the use of motorcycle helmets, principally presenting updated economic cost estimate data. The Appendix details the process for calculating these estimates.

Background

The process NHTSA uses to calculate these estimates is detailed in *Determining Estimates of Lives and Costs Saved by Motorcycle Helmets* (NHTSA, 2011). The cost information in that document came from a number of reports published more than a decade ago (Blincoe, 1994; NHTSA, 1988; and Blincoe, Seay, Zaloshnja, Miller, Romano, Luchter, & Spicer, 2002). The information in these documents has recently been combined and updated in Blincoe, Miller, Zaloshnja, and Lawrence (2015), which provides not only updated economic cost estimates, but also cost estimates relating to lost quality of life. The combined economic and quality of life costs are referred to as "Total Costs" or "Comprehensive Costs." This new economic data enables an update of the procedure used to estimate the lives and costs saved by wearing motorcycle helmets, and the lives and costs that could be saved at 100-percent helmet use. The report of Blincoe and colleagues (2015) provides costs associated with various types of crashes (e.g., police reported/unreported, crashes that involve speeding, crashes involving bicyclists, costs that occurred as a result of crashes and costs saved due to safety equipment use).

Methodology

NHTSA's National Center for Statistics and Analysis (NCSA) published *Calculating Lives Saved by Motorcycle Helmets* (Deutermann, 2005) that presented the formulas and calculations for estimating the number of lives saved by motorcycle helmets. While this document was published in 2005, the effectiveness estimates (37% for riders [operators] and 41% for passengers) and method remains current.

NHTSA's methodology to estimate the number of motorcyclists saved by helmets, and the associated costs, is based on the number of motorcyclist fatalities. Using the effectiveness estimates of motorcycle helmets and the number of motorcyclist fatalities, the number that would have died but were saved because they wore a helmet can be calculated. The number of fatalities is obtained from the Fatality Analysis Reporting System (FARS) database, a census of all traffic fatalities in the United States. Motorcyclists whose injuries were prevented by helmets, as well as those that could have been prevented, are calculated in a similar manner.

[1] Motorcyclist is the term used to reference both the motorcycle rider (operator) and the motorcycle passenger.

[2] The economic or human capital costs represent the tangible losses resulting from motor vehicle crashes, the value of resources that are used or that would be required to restore crash victims, to the extent possible, to their pre-crash physical and financial status. These are resources have been diverted from other more productive uses to merely maintain the status quo. These costs include medical care, lost productivity, legal and court costs, insurance administrative costs, workplace costs, travel delay, and property damage. Comprehensive costs are made up of these economic costs plus the estimated costs associated with lost quality of life. In cases of serious injury or death, medical care cannot fully restore victims to their pre-crash status, and the human capital costs fail to capture the relatively intangible value of lost quality-of-life that results from these injuries. In the case of death, victims are deprived of their entire remaining lifespan. In the case of serious injury, the impact on the lives of crash victims can involve extended or even lifelong impairment or physical pain, which can interfere with or prevent even the most basic living functions.

For every motorcyclist traffic fatality, a number of other motorcyclists receive injuries of various levels. Helmets are effective at preventing injuries as well as fatalities, and these must also be accounted for when calculating the economic costs prevented by helmets. Because NHTSA does not have data on the number and severity of motorcyclists injured in each State, the number of motorcyclists receiving serious and minor injuries are estimated, based on the number of fatalities in each State.

Previously, NHTSA economic estimates (Blincoe et al., 2002) used the year 2000 as the base year for economic estimates, and adjusted for inflation. Blincoe, Miller, Zaloshnja, and Lawrence (2015) updated this using 2010 as the cost base year. A change in the relative frequency of the levels of injury severity was also introduced. In the 2011 NCSA report, the estimated injuries were categorized into two groups based on their Maximum Abbreviated Injury Score (MAIS): minor (MAIS 1), which made up 63 percent of motorcyclist injuries, and serious (MAIS 2 through 5), which made up the remaining 37 percent. Blincoe, Miller, Zaloshnja, and Lawrence's report (2015) provides frequency estimates for each individual MAIS injury level, rather than grouping those who were seriously injured. This enables the estimation of the number of injured people at each individual MAIS level, rather than grouping MAIS levels 2 through 5. Note that because there are not effectiveness estimates for each MAIS level, the total estimate of the number of motorcyclists prevented from being injured does not change. The benefit is that the costs saved and savable can now be estimated more precisely. Finer detail on the distribution of injuries enables more accurate estimates of costs saved by the wearing of motorcycle helmets.

Note that:

- Costs that were prevented by the use of motorcycle helmets *would* have occurred had the motorcyclists not worn helmets.
- Preventable costs were those that *did* occur, but could have been prevented by the use of helmets. Since they are costs that were experienced, these preventable costs are a portion of the estimated reported cost of motorcyclist crashes.

Table 1 shows the estimated relative incidence of each injury level for reported motorcyclist crashes, separately by helmet use.

Table 1
Relative Injury Incidence in Reported Crashes, by Helmet Use

MAIS Level	Helmeted	Unhelmeted
1	0.64	0.62
2	0.22	0.23
3	0.12	0.14
4	0.01	0.01
5	0.01	0.01

Source: The economic and societal impact of motor vehicle crashes, 2010 (Revised) [Note: Shown are rounded values, obtained from the incidence of motorcyclists at each injury level in Tables 10-4 and 10-5.]

NHTSA has estimated that the effectiveness of helmets in preventing fatalities is 0.37 for riders and 0.41 for passengers (Deutermann, 2005). While there are not different effectiveness estimates for riders and passengers that are injured, there are two separate estimates based on the level of injury. NHTSA estimates helmets are 8 percent effective in preventing minor/MAIS 1 injuries, and 13 percent effective in preventing serious/MAIS 2 – 5 injuries (NHTSA, 1988). This latter estimate was developed using data from combined AIS 2 through 5 injured motorcyclists. Separate estimates of the effectiveness of motorcycle helmets in preventing each individual level of MAIS 2 through 5 injured motorcyclists have not been developed.

Another feature of the new method is that estimates of costs due to lost quality of life were added (Blincoe, Miller, Zaloshnja, & Lawrence, 2015). Previous cost estimates had included economic costs only. Using this new information, both economic and comprehensive (economic plus quality of life) costs are able to be provided.

Finally, cost estimates are available for non-fatally injured motorcyclists by helmet use. Even within an MAIS level, those injured who were unhelmeted have higher estimated costs than those who were helmeted, both economic and comprehensive. The differences are greater at higher injury levels. For fatalities, however, the economic and comprehensive costs are the same regardless of helmet use. The economic and comprehensive costs per injury level/fatality, by helmet use, are in Table 2. These values are those that appear in Blincoe, Miller, Zaloshnja, and Lawrence (2015) in 2010 dollars. For subsequent data years, these values are adjusted for inflation (see Appendix, Economic Impact).

Table 2
Economic and Comprehensive Unit Costs per Injured Motorcyclist, by Injury Level and Helmet Use, 2010

Helmet Use	Injury Level	2010 Costs	
		Unit Economic Cost	Unit Comprehensive Cost*
Helmeted	MAIS 1	$18,079	$30,915
	MAIS 2	$48,186	$220,580
	MAIS 3	$184,941	$759,107
	MAIS 4	$328,872	$1,701,424
	MAIS 5	$1,190,011	$4,909,241
	Fatal	**$1,381,645**	**$9,090,622**
Unhelmeted	MAIS 1	$18,941	$32,926
	MAIS 2	$49,258	$227,273
	MAIS 3	$184,639	$763,673
	MAIS 4	$352,587	$1,852,270
	MAIS 5	$1,617,283	$7,564,608
	Fatal	**$1,381,645**	**$9,090,622**

Source: *The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised)*, Tables 10-6 and 10-7.
*Comprehensive costs consist of Economic and Lost Quality-of-Life Costs.

It is important to note the differences between the Blincoe, Miller, Zaloshnja, and Lawrence (2015) cost report and the costs presented in this research note. Most importantly, costs covered in this research note relate specifically to those costs prevented and preventable due to helmet use. The Blincoe report, on the other hand, presents costs realized due to various types of motor vehicle crashes *in addition* to costs prevented and preventable by motorcycle helmets.

An additional difference involves the crashes that are included in the cost estimation. Costs in this present research note are estimates of *reported* crashes only. FARS data, on which these estimates are based, is a census of fatal crashes which are required to be reported through law enforcement. This research note also uses the General Estimates System GES data to estimate the number of people injured at each MAIS level and is also reported data. This differs from the Blincoe report which bases estimates on *reported* data, but then adjusts them to account for unreported crashes. There are larger percentages of unreported injured at lower injury levels, so differences between all crashes and reported crashes are greater at lower injury levels.

The economic report presents estimates of all costs generated by crashes involving motorcycles, in addition to those specifically prevented and preventable by motorcycle helmets (Blincoe, Miller, Zaloshnja, & Lawrence, 2015, p. 187, Table 10-8). Finally, the costs reported in Blincoe (2015) are costs for the calendar year 2010. While those are the base costs used in this present research note, they have then been indexed for inflation to represent 2013 costs (to agree with the 2013 data used).

Results

In 2013, after adjusting for inflation, the *economic* cost to society for each motorcyclist fatality was $1.48 million, and the *comprehensive* cost of each fatality was $9.71 million. Nearly 85 percent of this *comprehensive* amount is attributable to lost quality of life. The loss of a life clearly has a tragic emotional impact on the family and friends of the deceased. The substantial economic loss, some immediate but much of it realized over upcoming years, is an additional burden they must bear. Helmets worn by motorcyclists saved an estimated 1,630 lives in 2013; an additional 715 lives could have been saved had all motorcyclists worn helmets. Forty-one percent of fatally injured motorcyclists in 2013 were unhelmeted. According to the National Occupant Protection Use Survey (NOPUS), the use of DOT-compliant helmets remained at 60 percent in 2013, unchanged from the previous year.

The overall *economic* cost savings in the United States due to helmet use was approximately $2.8 billion in 2013, and an additional $1.1 billion could have been saved if all motorcyclists had worn helmets. The overall *comprehensive cost* savings, including both economic costs and lost quality of life, was $17.3 billion, and an additional $7.2 billion in comprehensive costs could have been saved at 100-percent helmet use.

Table 3 presents the number of fatally injured motorcyclists as well as the percentage of them that wore helmets, by State, for the 2013 crash year. It is this number, fatally injured helmeted motorcyclists, on which the estimates of costs saved and numbers of motorcyclists prevented from being killed and injured are based. Also presented in the table are the estimated number of lives saved by helmets, and those that could have been saved at 100-percent helmet use; the economic costs saved and savable at 100-percent helmet use; and comprehensive costs (economic plus quality of life costs) saved and savable at 100-percent helmet use.

Texas had the highest number (491) of motorcyclist fatalities in 2013, while the District of Columba had the fewest, 3. Motorcycle helmet use rates in fatal crashes ranged from a high of 100 percent in the District of Columbia to a low of 7 percent in Maine. The number of lives saved by motorcycle helmets is a combination of both the number of riders, and the percentage of those wearing helmets. The largest number of motorcyclists' lives saved was in California (248), a State with 92-percent helmet use. Only 1 life was saved by helmets in Maine, with its low helmet use rate as well as having a relatively small number of motorcyclist fatalities.

Currently 19 States and the District of Columbia have universal helmet laws. Helmet use in fatal crashes in States with universal helmet laws averaged 91 percent in 2013, while in the remaining States helmet use averaged 38 percent. There were about 11 times as many unhelmeted motorcyclist fatalities in States without universal helmet laws (1,704 unhelmeted fatalities) as in States with universal helmet laws (150 unhelmeted fatalities) in 2013. States with universal helmet laws saved an average of 48 lives because more motorcyclists wore helmets, and could have saved an average of 3 more per State if all motorcyclists wore helmets. The States without universal helmet laws saved an average of 21 lives per State, and at 100-percent use could have saved, on average, an additional 21 per State. This highlights the effect of the higher use rates in States with universal helmet laws. Without such a law, only about half of those that could be saved, were saved, because of lack of helmet use. Looking at economic costs that were saved, and those that could have been saved, in States with universal helmet laws, 94 percent of the costs that *could* have been saved *were* saved by motorcyclists wearing helmets. In States without universal helmet laws, only 48 percent of possible costs that could have been saved actually were.

For further information on how the costs discussed in this Research Note were estimated, see Blincoe, Miller, Zaloshnja, and Lawrence (2015).

Table 3

Motorcyclist Fatalities, Helmet Use, Lives Saved, and Additional Savable at 100% Helmet Use, Costs Saved by, and Savable at 100% Helmet Use, 2013

State	Motorcyclists Helmets Used	Helmet Not Used	Unknown	Helmet Use Rate in Fatal Crashes (Known)	Total Fatals	Number of Fatals Prevented	Additional Fatals Preventable at 100% Use	*Economic Costs Saved	*Additional Econ Costs Savable at 100% Use	**Comprehensive (Econ + QoL) Costs Saved	**Add'l Comp Costs Savable at 100% Use
Alabama	78	1	1	99%	80	47	0	$68,906318	$526,439	$425,735,600	$3,387,347
Alaska	7	2	0	78%	9	4	1	$8,066,420	$1,350,093	$49,592,233	$8,678,427
Arizona	62	83	6	43%	151	38	32	$58,904,081	$46,220,396	$362,784,791	$297,273,448
Arkansas	19	39	3	33%	61	12	15	$16,990,268	$20,799,759	$104,966,844	$133,920,305
California	409	34	10	92%	453	248	13	$497,743,329	$22,734,044	$3,018,976,515	$146,232,159
Colorado	31	55	1	36%	87	19	21	$33,044,995	$35,946,901	$206,548,215	$231,675,693
Connecticut	22	21	10	51%	53	16	10	$36,603,224	$21,424,612	$229,299,479	$138,212,740
Delaware	13	7	0	65%	20	8	3	$12,941,090	$4,338,027	$80,743,785	$27,943,468
Dist. of Col.	3	0	0	100%	3	2	0	$5,107,923	$0	$31,971,215	$0
Florida	238	237	10	50%	485	144	90	$242,338,532	$143,538,390	$1,499,154,993	$924,689,050
Georgia	107	5	4	96%	116	66	2	$101,024,654	$2,778,741	$624,045,386	$17,889,073
Hawaii	10	19	0	34%	29	6	7	$10,899,551	$11,983,247	$66,551,785	$76,843,672
Idaho	12	12	1	50%	25	7	5	$10,582,766	$6,186,178	$65,187,135	$39,785,979
Illinois	35	113	4	24%	152	22	43	$41,882,998	$75,462,606	$256,318,102	$486,642,769
Indiana	18	82	14	18%	114	12	35	$17,847,712	$49,982,061	$111,203,434	$321,865,241
Iowa	10	31	0	24%	41	6	12	$9,936,524	$18,073,121	$62,286,778	$116,488,868
Kansas	15	18	2	45%	35	9	7	$15,334,545	$11,315,840	$95,901,536	$72,947,902
Kentucky	28	59	0	32%	87	17	22	$23,178,082	$29,953,854	$144,441,583	$192,850,149
Louisiana	66	18	2	79%	86	40	7	$63,554,709	$10,611,647	$396,843,574	$68,363,930
Maine	1	13	0	7%	14	1	5	$935,045	$7,454,288	$5,805,147	$47,929,912
Maryland	56	5	1	92%	62	34	2	$68,557,722	$3,707,736	$429,043,701	$23,899,006
Massachusetts	31	5	4	86%	40	20	2	$42,957,929	$4,257,668	$268,943,948	$27,468,615
Michigan	64	67	7	49%	138	40	26	$59,543,227	$38,066,351	$371,520,551	$245,165,569
Minnesota	16	34	11	32%	61	12	15	$20,912,890	$26,800,746	$130,840,613	$172,746,694
Mississippi	36	3	0	92%	39	22	1	$28,668,029	$1,424,736	$178,391,695	$9,162,155
Missouri	66	7	1	90%	74	40	3	$61,088,669	$3,946,713	$381,396,735	$25,422,018
Montana	12	22	1	35%	35	7	8	$11,028,170	$12,357,302	$68,644,353	479,526,426
Nebraska	12	1	1	92%	14	8	0	$12,380,000	$634,776	$77,454,608	$4,092,713
Nevada	48	7	2	87%	57	30	3	$45,923,563	$4,071,699	$285,995,111	$26,202,356
New Hampshire	7	17	0	29%	24	4	6	$7,571,303	$11,265,125	$47,227,598	$72,549,645
New Jersey	51	2	3	96%	56	32	1	$66,510,301	$1,599,197	$415,710,906	$10,306,311
New Mexico	13	20	8	39%	41	9	9	$13,450,994	$13,050,944	$83,603,448	$83,959,761
New York	147	16	7	90%	170	91	6	$186,784,286	$12,370,232	$1,162,145,805	$79,584,511
North Carolina	170	17	2	91%	189	102	6	$152,407,814	$9,326,474	$948,913,345	$60,024,622
North Dakota	5	3	1	63%	9	3	1	$5,563,042	$2,049,788	$34,758,099	$13,209,304
Ohio	43	87	2	33%	132	26	33	$39,093,462	$48,752,662	$243,480,189	$314,022,202
Oklahoma	15	77	0	16%	92	9	29	$13,666,107	$42,468,769	$85,413,945	$273,624,854
Oregon	32	2	0	94%	34	19	1	$29,930,651	$1,132,983	$185,899,850	$7,283,806
Pennsylvania	84	94	4	47%	182	52	35	$87,707,463	$58,978,022	$548,106,529	$379,978,099
Rhode Island	5	6	0	45%	11	3	2	$5,266,367	$3,858,641	$32,772,603	$24,828,132
South Carolina	43	106	0	29%	149	26	39	$36,172,401	$53,837,751	$224,923,619	$346,229,030
South Dakota	7	15	0	32%	22	4	6	$6,822,603	$8,820,479	$42,621,452	$56,816,345
Tennessee	126	11	0	92%	137	75	4	$109,657,800	$5,890,134	$684,264,243	$37,942,003
Texas	187	279	25	40%	491	118	109	$190,947,887	$174,623,436	$1,194,883,265	$1,125,864,593
Utah	12	19	0	39%	31	7	7	$9,860,720	$9,449,263	$61,365,411	$60,788,930
Vermont	5	2	0	71%	7	3	1	$5,153,366	$1,280,583	$32,107,614	$8,246,427
Virginia	76	3	0	96%	79	45	1	$83,044,487	$1,995,066	$520,508,635	$12,868,415
Washington	69	3	1	96%	73	42	1	$75,334,849	$1,992,955	$470,594,313	$12,839,304
West Virginia	16	8	0	67%	24	9	3	$12,999,083	$3,963,071	$80,816,479	$25,490,840
Wisconsin	21	62	2	25%	85	13	23	$20,499,487	$36,969,830	$127,891,452	$238,091,588
Wyoming	4	5	0	44%	8	2	2	$4,579,076	$3,606,525	$28,720,307	$23,284,142
Nation	**2,663**	**1,854**	**151**	**59%**	**4,668**	**1,630**	**715**	**$2,789,852,511**	**$1,123,228,901**	**$17,287,318,553**	**$7,235,138,549**
Puerto Rico	17	25	0	40%	42	10	9	$18,511,970	$16,844,793	$115,620,013	$108,555,188

*Economic Costs include lost produtivity, medical costs, legal and court costs, emergency service costs (EMS), insurance administration costs, congestion costs, property damage, and workplace losses.

**Comprehensive Costs include Economic Costs plus valuation for lost quality-of-life (QoL).

Cost data from Blincoe, Miller, Zaloshnja, & Lawrence, 2015.

Source: Fatality Analysis Reporting System 2013 Annual Report File (ARF); Bureau of Labor Statistics; Blincoe et al., 2015.

Motorcyclist Fatalities (Riders and Passengers) Helmet Use, FARS 2013, Lives and Costs Saved and Savable (Based on 2013 Cost)

Shaded States are those with laws requiring helmet use for all motorcyclists, at the time of publication.

State costs are adjusted for relative per-capita income; dollar amounts for the nation will not equal the sum of the States.

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U.S. Department of Transportation

National Highway Traffic Safety Administration

This research note and other general information on highway traffic safety may be accessed by Internet users at: www-nrd.nhtsa.dot.gov/CATS/index.aspx

Appendix:
Calculating Lives and Costs Saved by Motorcycle Helmets

The process, formulae, and calculations used to estimate the number of lives saved and savable by motorcycle helmets, and the associated costs, were detailed in NCSA, 2011 (Appendix). This appendix uses the same process and formulas, with the following adjustments.

- Updated (2013) motorcycle fatal crash data
- Updated economic cost numbers with data from Blincoe, Miller, T. R., Zaloshnja, E., and Lawrence, 2015 (Revised)
- Updated inflation factor with information from the Bureau of Labor Statistics website
- Incidence of MAIS injury level now ascertained separately by helmet use
- Revised cost breakdown to use each MAIS level, rather than combining MAIS 2-5 into "serious" injury, as well as helmet use
- Added calculations and information on comprehensive cost numbers

The information needed to calculate these estimates is:

- For a given year, the number of motorcyclist fatalities, subdivided by helmet use and role (rider or passenger). This data would come from FARS. If you wish to look at States individually, you would also need this information subdivided by State.
- The number of motorcyclist fatalities for each of the past 5 years, subdivided by helmet use. This data is also from FARS.
- The estimated number of motorcyclists injured for each of the past 5 years, subdivided by helmet use. This data comes from NASS GES.
- The appropriate cost inflation factor, obtained from information on the Department of Labor's Bureau of Labor Statistics website (see below).

Motorcyclist Fatalities and Estimating the Number of Lives Saved

Data is obtained from FARS for the year of interest (Table A1) by helmet use and role.

Table A1
Motorcyclist Fatalities by Person Type and Helmet Use (Unknown Helmet Use Distributed, 2013)

	Operator	Passenger	All Motorcyclists
Helmeted	2,620	131	2,752
Unhelmeted	1,779	138	1,916
Total	**4,399**	**269**	**4,668**

Source: FARS 2013 ARF
Unknown helmet use has been distributed proportionally by role (operator or passenger).

The number of lives that were saved by motorcycle helmets is estimated using the number of helmeted fatally injured motorcyclists and the effectiveness estimate. For motorcycle operators, helmets have an estimated effectiveness of 0.37. First, the potential operator fatalities are calculated:

$$OperatorFatalities_{Potential} = \frac{OperatorFatalities_{Helmeted}}{(1 - 0.37)}$$

Using the number of helmeted operator fatalities above (2,620), this is:

$$OperatorFatalities_{Potential} = \frac{2{,}620}{(1 - 0.37)} = 4{,}159$$

The number of potential fatalities less the number actual fatalities gives the number of lives saved by helmets. In this case, 4,159 – 2,620 = 1,539

For motorcycle passengers, helmets have an effectiveness of 41 percent. So, in 2013, the calculations for the number of motorcycle passenger lives saved are estimated by:

$$PassengerFatalities_{Potential} = \frac{131}{(1 - 0.41)} 222$$

The number of motorcycle passenger fatalities prevented is 222 – 131 = 91

So the total number of lives saved by motorcycle helmets nationwide in 2013 is 1,539 + 91 = 1,630

For ease of presentation, values are rounded at each step calculated in examples in this Appendix. Therefore small differences may occur between values calculated here and those presented elsewhere, or when adding individual States compared to the national total.

Estimating additional preventable fatalities at 100-percent helmet use

The additional lives that could be saved if all motorcyclists had worn helmets are calculated using the number of unhelmeted fatally injured motorcyclists and the effectiveness estimate.

$$MotorcyclistFatalities_{Unhelmeted} \times Effectiveness_{role}$$

For operator fatalities, using the number of unhelmeted operator fatalities from Table A1, this is 1,779 × 0.37 = 658

Had all of these 1,779 riders that died in crashes been wearing helmets, 658 (37 percent) of them would have survived.

The number of additional lives that could have been saved if all passengers had worn helmets is:

$$138 \times 0.41 = 57$$

Therefore, a total of 715 additional lives (658 operators and 57 passengers) could have been saved had all motorcyclists worn helmets.

Estimating the total number of Motorcyclists Injured

The method used to estimate costs saved by motorcycle helmets requires information on injury severity. NCSA maintains a number of crash data files. The Fatality Analysis Reporting System (FARS) is a census of fatal crashes in the United States. The General Estimates System (GES), part of the National Automotive Sampling System (NASS), is a sample of reported traffic crashes to which weights are applied in order to obtain national estimates. Data from both of these systems are used together to estimate the number of motorcyclists by role (passenger or operator), helmet use, and injury severity for Maximum Abbreviated Injury Scale (MAIS) levels 1 through 5. MAIS 6 is a fatal injury, and FARS data is used in that case. Since the GES data is not collected in every state, these calculations allows for lives and cost saved estimates for each State, rather than only on a nationwide basis.

The initial step is to determine the total number of motorcyclist fatalities (from FARS) and the estimated number injured (from GES), separately by helmet use, using the most recent five years of data. Fatality counts in Table A2 exclude those with unknown helmet use, since it is the proportion required here, not a numerical count.

The ratio of injured motorcyclists to fatalities, by helmet use, is calculated for each year, and then the average of the five injury-to-fatality ratios is calculated. Using 5 years, rather than only the most recent, gives a better estimate as it controls for the year-to-year variability inherent in any sampling system. The numbers presented in Table A3 are rounded, while the actual calculations are based on unrounded numbers.

For helmeted motorcyclists, this is:

$$\frac{23.04 + 20.93 + 19.98 + 20.75 + 20.25}{5} = 20.99$$

For unhelmeted motorcycles, this is:

$$\frac{16.23 + 14.57 + 14.12 + 14.38 + 14.82}{5} = 14.82$$

These ratios give us the number of injured motorcyclists for every motorcyclist fatality. So, there are about 21 injured, helmeted motorcyclists for each helmeted motorcyclist that dies in a traffic crash. The appropriate ratio is then used to estimate the number of injured motorcyclists, by helmet use as well as role

Table A2
Total Motorcyclist Fatalities and Injured, 2009–2013

Year	Fatalities		Injured		Injury to Fatality Ratio	
	Helmeted	Unhelmeted	Helmeted	Unhelmeted	Helmeted	Unhelmeted
2009	2,506	1,963	57,748	31,860	23.04	16.23
2010	2,614	1,904	54,708	27,740	20.93	14.57
2011	2,737	1,893	54,669	26,730	19.98	14.12
2012	2,813	2,039	58,365	29,324	20.75	14.38
2013	2,663	1,854	53,934	27,482	20.25	14.82
Total	—	—	—	—	**20.99**	**14.82**

Source: FARS 2009–2012 Final File, 2013 ARF and GES 2009–2013

(rider or passenger). Multiplying each of the helmeted values in Table A1 by 20.99, and each unhelmeted value by 14.82 results in:

Table A3
Estimates of Motorcyclists Injured, by Person Type and Helmet Use, 2013

	Operator	Passenger	All Motorcyclists
Helmeted	55,001	2,757	57,758
Unhelmeted	26,368	2,040	28,408
Total	**81,369**	**4,798**	**86,166**

Estimating the number of injured motorcyclists at each injury level

Previously, the process used to estimate the number of injured motorcyclists allowed estimates separating injured into two groups, minor (MAIS 1) and seriously (MAIS 2-5) injured motorcyclists. Using relative incidence of injury level in reported crashes, provided in Blincoe, Miller, Zaloshnja, and Lawrence (2015), estimation of the number of injured motorcyclists at each individual MAIS level is now possible. The relative incidence of injury at each MAIS level is shown in Table A4 (which is the same as Table 1, and repeated here for convenience).

Table A4
Relative Injury Incidence in Reported Crashes, by Helmet Use

MAIS Level	Helmeted	Unhelmeted
1	0.64	0.62
2	0.22	0.23
3	0.12	0.14
4	0.01	0.01
5	0.01	0.01

Source: The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised) [Note: Shown are rounded values, obtained from the incidence of motorcyclists at each injury level in Tables 10-4 and 10-5.]

Using this incidence of motorcyclists by injury level and helmet use status, 64 percent of injured helmeted motorcyclists are estimated to be injured at MAIS level 1, 22 percent at MAIS level 2, twelve percent at MAIS 3, and one percent at each MAIS levels 4 and 5. For example, if there were 100 injured helmeted motorcyclists in a given state in one year, the estimated number of those with MAIS 1 injuries would be 64, with 22 MAIS 2, 12 MAIS 3, and 1 each at MAIS 4 and MAIS 5. For injured motorcyclists that were unhelmeted, similar calculations would be made using the second column in Table A4.

So, given 55,001 helmeted operators injured (from Table A3):

Number of MAIS 1 helmeted motorcycle operators:

$$0.64 \times 55{,}001 = 35{,}201$$

Number of MAIS 2 helmeted motorcycle operators:

$$0.22 \times 55{,}001 = 12{,}100$$

Number of MAIS 3 helmeted motorcycle operators:

$$0.12 \times 55{,}001 = 6{,}600$$

Number of MAIS 4 helmeted motorcycle operators:

$$0.01 \times 55{,}001 = 550$$

Number of MAIS 5 helmeted motorcycle operators:

$$0.01 \times 55{,}001 = 550$$

Calculations would be similar for unhelmeted motorcycle operators, and helmeted and unhelmeted motorcycle passengers. (Note that for the results in these calculations, the rounded incidence values presented above in Table A4 were used. In calculations for estimates of annual lives and costs saved in motorcycle crashes, the unrounded ratios using incidence values from Table 10-2 of Blincoe et al. [2015] are used.) Table A5 presents the estimates for motorcyclist by MAIS level, role, and helmet status.

Table A5
Estimates of Motorcyclists Injured, by Person Type, Helmet Use, and MAIS level, 2013

	Operator		Passenger	
	Helmeted	Unhelmeted	Helmeted	Unhelmeted
MAIS 1	35,201	16,348	1,764	1,265
MAIS 2	12,100	6,065	607	469
MAIS 3	6,600	3,692	331	286
MAIS 4	550	264	28	20
MAIS 5	550	264	28	20

Estimating the number of motorcyclists prevented from being injured because of motorcycle helmets, at each injury level

The number of motorcyclists whose injuries were prevented by helmets is estimated using the same process that was used for estimating the number of lives saved (above), but at each MAIS level. Recall that the effectiveness estimates for saving lives were 37 percent for operators and 41 percent for passengers. The effectiveness estimate for preventing a motorcyclist from receiving a minor injury is 8 percent and for preventing a seriously injured motorcyclist (MAIS 2–5), 13 percent. The estimate for the effectiveness of motorcycle helmets in preventing *injuries* is the same for both operators and passengers. Note that distributing injured motorcyclists by each MAIS level will not affect the estimated *total number* of motorcyclists prevented from being injured, since the effectiveness estimate is the same for all MAIS levels 2 through 5. However, the *cost* estimates differ by MAIS level, so the amount of money saved (and savable at 100% helmet use) is better estimated by separating those injured by MAIS level.

To estimate the number of motorcyclists whose helmets prevented them from receiving a serious (MAIS level 2 through 5)

injury, the number of helmeted motorcyclists is used. First the number of potentially seriously injured is estimated:

$$Seriously\ Injured_{Potential} = \frac{Seriously\ Injured_{\ Helmeted}}{(1 - 0.13)}$$

Using the estimate of helmeted, seriously injured motorcyclists above, the sum of both operators and passengers at MAIS levels 2 through 5 (20,793[3]), this is:

$$Seriously\ Injured_{Potential} = \frac{20{,}793}{(1 - 0.13)} = 23{,}900$$

The number of potential seriously injured, less the number actual seriously injured, gives the number of seriously injured prevented by helmets. In this case, 23,900 – 20,793 = 3,107. Again, these calculations are being shown using rounded numbers, whereas during the actual calculations rounding would not occur until presenting the final value.

The number of potential minor injured (MAIS 1) motorcyclists is:

$$Minor\ Injured_{Potential} = \frac{Minor\ Injured_{\ Helmeted}}{(1 - 0.08)}$$

Using the estimate of helmeted minor injured motorcyclists above (35,201 + 1,764 = 36,965), this is:

$$Minor\ Injured_{Potential} = \frac{36{,}965}{(1 - 0.08)} = 40{,}179$$

The number of potential minor injured, less the number actual minor injured, gives the number of minor injured prevented by helmets. In this case, 40,179 – 36,965 = 3,214.

Estimating the number of additional motorcyclists prevented from being injured at 100-percent Helmet Use, at each injury level

The number of motorcyclists whose injuries could have been prevented if all had worn helmets is estimated using the same method as previously shown for motorcyclist fatalities. Again, there are not different injury effectiveness estimates for riders and passengers. There are, however, different effectiveness estimates for the two levels of injury. The number of injured motorcyclists that could have been prevented is calculated as:

$$MotorcyclistsInjured(Injurylevel)_{Unhelmeted} \times Effectiveness_{InjuryLevel}$$

From Table A5, there were 11,080 unhelmeted motorcyclists who were seriously injured. The estimate of the number of additional motorcyclists whose serious injuries could have been prevented is:

$$11{,}080 \times 0.13 = 1{,}440$$

[3] This is obtained by adding together all seriously injured helmeted motorcyclists. From Table A5, these values are 12,100 + 6,600 + 550 + 550 + 607 + 331+ 28 + 28 = 20,793.

And for those with minor injuries, this is:

$$17{,}613 \times 0.08 = 1{,}409$$

Economic Impact

Cost savings are calculated by multiplying the number of motorcyclists who were prevented from being injured or killed by the associated economic cost. The cost bases, as well as detailed information on how they were estimated, come from *The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised).* Costs associated with motorcycle injuries are different from those for general (all vehicle) crashes, because the injuries motorcyclists suffer differ from the general injuries at each MAIS level. See chapter 10 of Blincoe, Miller, Zaloshnja, and Lawrence (2015) for the reasoning on costs associated with motorcyclist MAIS level injuries.

The costs in Blincoe, Miller, Zaloshnja, and Lawrence (2015) use 2010 crash data, and are expressed in 2010 dollars. Costs in the present research note use 2013 crash data, and adjust for inflation, from 2010 dollars to 2013 dollars, in order to agree with the 2013 FARS data.

The required inflation factor is obtained using data from the Department of Labor's Bureau of Labor Statistics, at its website at http://data.bls.gov/cgi-bin/surveymost?cu.

To obtain the needed values, place a check in the first item's box ("U.S. All items, 1982–84=100 – CUUR0000SA0") then scroll to the bottom and click "Retrieve data." If necessary, you can modify the range of years in the "Change Output Options" section at the top of the screen. If the table presented does not have a column labeled "Annual," check the box for "include annual averages," and click "Go."

For the inflation factor, divide the value for "Annual" for the relevant data year (2013) by that of the base year index (2010 for our calculations, since the known value is the cost per fatality and injured in year 2010 dollars). For example, to convert 2010 dollars to 2013, the values are 232.957/218.056 = 1.068. The cost at each MAIS level or fatality is multiplied by the inflation factor to get the current-year cost per fatality or injury. The 2013 economic cost per fatality, then, is inflated from year 2010 dollars to year 2013 dollars by:

$$\$1{,}381{,}645 \times 1.068 = \$1{,}475{,}597$$

Table A6 presents the dollar values associated with each fatality and MAIS level, for both economic costs and comprehensive costs, used in the present research note. Note that, for simplicity and clarity, the values in Table A6 use the rounded value of 1.068 as the inflation multiplier. When calculating estimates, the unrounded 218.056/232.957 would be used.

State and/or national cost savings are then estimated by multiplying the number of motorcyclists who were prevented from being killed or injured separately by each MAIS level (including those fatally injured) by the corresponding economic and comprehensive costs, and summing all injury levels. For example,

Table A6
Economic and Comprehensive Unit Costs per Injured Motorcyclist, by Injury Level and Helmet Use, 2010 and 2013

Helmet Use	Injury Level	2010 Costs		2013 Costs	
		Unit Economic Cost	Unit Comprehensive Cost*	Unit Economic Cost	Unit Comprehensive Cost*
Helmeted	MAIS 1	$18,079	$30,915	$19,308	$33,017
	MAIS 2	$48,186	$220,580	$51,463	$235,579
	MAIS 3	$184,941	$759,107	$197,517	$810,726
	MAIS 4	$328,872	$1,701,424	$351,235	$1,817,121
	MAIS 5	$1,190,011	$4,909,241	$1,270,932	$5,243,069
	Fatal	**$1,381,645**	**$9,090,622**	**$1,475,597**	**$9,708,784**
Unhelmeted	MAIS 1	$18,941	$32,926	$20,229	$35,165
	MAIS 2	$49,258	$227,273	$52,608	$242,728
	MAIS 3	$184,639	$763,673	$197,194	$815,603
	MAIS 4	$352,587	$1,852,270	$376,563	$1,978,224
	MAIS 5	$1,617,283	$7,564,608	$1,727,258	$8,079,001
	Fatal	**$1,381,645**	**$9,090,622**	**$1,475,597**	**$9,708,784**

Source: *The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised)*, Tables 10-6 and 10-7, adjusted for inflation using data from Department of Labor's Bureau of Labor Statistics to estimate 2013 costs (see text).
*Comprehensive costs consist of Economic and Lost Quality-of-Life Costs.

earlier it was estimated that nationwide, 1,630 lives were saved by motorcycle helmets in 2013. This resulted in an economic cost savings (in 2013 dollars) of:

$$\$1,475,597 \times 1,630 = \$2,405,223,110$$

and a comprehensive cost savings of:

$$\$9,708,784 \times 1,630 = \$15,825,317,920$$

that can be attributed to helmets having prevented fatalities. The economic and comprehensive cost savings at each MAIS level for injured motorcyclists would be calculated in the same way, using the number of motorcyclists prevented from being injured and the corresponding dollar amounts for helmeted injured motorcyclists. Finally, all injury level and fatality costs are summed to estimate a total cost savings from the use of motorcycle helmets.

To calculate the economic and comprehensive costs that could have been saved had all motorcyclists been wearing helmets, the cost savings for each fatality and injury level is multiplied by the number of lives that could have been saved, or the number of motorcyclist who received injured that could have been prevented.

The economic cost savings for fatalities that could have been prevented by 100-percent helmet use is:

$$\$1,475,597 \times 715 = \$1,055,051,855$$

The comprehensive cost saving for fatalities that could have been prevented by 100-percent helmet use is:

$$\$9,708,784 \times 715 = \$6,941,780,560$$

The complete additional cost savings for fatalities and injured motorcyclists preventable at 100-percent helmet use (for the nation, a State, or other grouping) would be calculated by summing the dollar amounts for fatalities and each injury level.

Again, because of rounding used for ease of presentation, the additional dollar amount that could have been saved had all motorcyclists worn helmets differs from the amount presented in Table 3 as well as other published values.

Numbers in the above examples are national totals. For the data in Table 3 for individual States, the number of fatalities by helmet use for each State is used. The dollar amount is adjusted for each state using a ratio of the per-capita personal income in the specific state to the national average per-capita personal income. The rationale for this method is explained in *A Model for Estimating the Economic Savings from Increased Motorcycle Helmet Use.* Depending on the number of motorcyclist fatalities in each State, summing the State costs may differ from the cost estimate based on the national total. The national totals presented in Table 3 are calculated directly from the national counts and cost estimates, and are calculated without intermediate rounding.

Florida's Motorcycle Helmet Law Repeal

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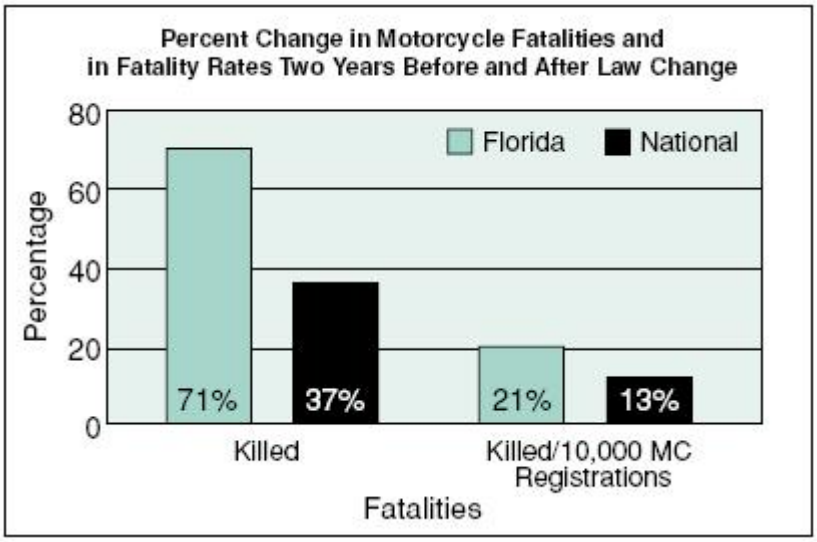
Traffic Safety Facts
Traffic Tech – Technology Transfer Series

Number 299 August 2005

On July 1, 2000, Florida repealed the legal requirement that all motorcyclists wear protective helmets. State law now requires helmet use only by riders under the age of 21, and by older riders who do not have a minimum of $10,000 medical insurance coverage.

The National Highway Traffic Safety Administration (NHTSA) contracted with Preusser Research Group to evaluate the effects of the motorcycle helmet law repeal in Florida.



Helmet Use - Observational Surveys

Virtually all observed riders were wearing helmets in a 1998 Florida helmet use observation survey. Only 65 percent of the observed sample, however, wore compliant helmets (helmets that meet the requirements for Federal Motor Vehicle Safety Standard No. 218) while 35 percent were wearing noncompliant helmets (headgear that does not meet Federal Motor Vehicle Safety Standard No. 218). These weighted figures compare to 84 percent approved helmets and 15 percent noncompliant helmets observed in a 1993 survey that noncompliant helmet use was increasing over time.

A 2002 post-law change survey found 47 percent compliant helmet use, 6 percent noncompliant helmet use and 47 percent no helmet use. These results indicate that use of compliant helmets has declined significantly following the law change while wearing noncompliant helmets has largely been abandoned.

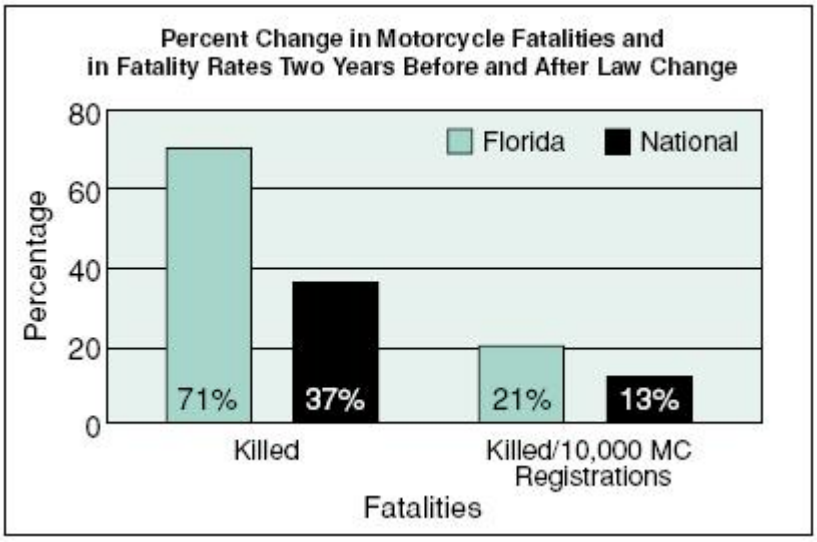
Helmet Use - Crash Reports

Among the 515 motorcyclists killed in traffic crashes in the 3 years before the helmet law change (1997-1999), 9 percent were recorded in the Fatality Analysis Reporting System (FARS) as not wearing a helmet. In the 3 years following the law change (2001-2003), 61 percent of the 933 fatally injured motorcyclists were reported as not wearing a helmet. In 1997-1999, there were 35 motorcyclists under the age of 21 killed in Florida. Of these, 26 percent were not helmeted. In 2001-2003, 101 motorcyclists under age 21 were killed (+ 188 percent) with 45 percent of them not wearing a helmet.

Motorcyclist Fatalities (note 1)

There has been a substantial increase in motorcyclists killed in Florida beginning in the first 6 months of 2000 (the repeal of the all-rider helmet law went into effect on July 1, 2000). Fatalities in the two years following the law change (2001-2002, N=575) were 71 percent greater than the two years before the law change. This is almost double the increase in fatalities for the nation as a whole. Fatalities in Florida per 10,000 registered motorcycles increased 21 percent compared to 13 percent nationally for the 2 years before and after the law change - 75 percent higher than the national rate.

There was an average of 181 motorcyclists killed annually in the 30 months before the law change, and an average of 280 in the 30 months after the law change. Registrations increased an average 33.7 percent in this time period in Florida (219,486 to 293,393). The expected average annual number of motorcycle fatalities as a result of the increase in registrations was 242. The actual number who died in 2002 was 301, 24 percent (59) more motorcycle fatalities than expected as a result of increased registrations alone. The actual number who died in 2003 was 358.



When the increase in motorcycle registrations after the law change is taken into account, the unhelmeted fatality rate per 10,000 registered motocycles increased from 0.7 fatalities in 1998 to 6.1 fatalities in 2002. The rate for helmeted motorcyclist fatalities, on the other hand, fell from 7.6 in 1998 to 3.2 in 2002.

Note 1 - All fatality numbers used in this study are based on FARS vehicle body type code 80 only in order to maintain consistency with the other data sources used such as the Florida motor vehicle crash database. In contrast, NHTSA typically uses FARS body type codes 80-89 when discussing motorcycle crashes. Thus, in its publications about motorcycles (for example, Traffic Safety Facts) NHTSA fatality numbers will differ slightly from the numbers and rates reported in this study. These small differences in no way alter the findings or implications of the results.

Motorcyclist Injuries

The Florida Department of Highway Safety and Motor Vehicles produces an annual database of information taken from police motor vehicle crash reports. In the first full year following the law change (2001), there were 1,890 motorcyclists who sustained incapacitating injury and 3,886 who sustained lesser injury. These figures are 32 percent and 28 percent higher, respectively, than the comparable figures in 1999. Injuries per 10,000 registered motorcycles increased in 2000, but decreased in 2001. Although the injury rate per registered motorcycle in 2001 is less than the rate in 1999, the previous downward trend of non-fatal injuries per registered motorcycle appears to have slowed following the law change.

Hospital Discharge Data

The Hospital Discharge database maintained by the Florida Agency for Health Care Administration shows that in the 30 months immediately following the helmet law change, there were 4,986 motorcyclists admitted to hospitals for acute care treatment. This figure is 40 percent greater than the 3,567 admissions during the 30 months just before the law change. Head injury admissions increased by more than 80 percent.

Total gross costs charged to hospital admitted motorcyclists with head, brain or skull injury more than doubled from $21 million to $44 million, adjusted for inflation, and the average cost per case rose from $34,518 to $39,877 in the 30 months after the law change. In 1998 and 1999, the acute care hospital charges for head-brain-skull principal injury cases per 10,000 registered motorcycles were $311,549 and $428,347 respectively. The comparable figures for 2001 and 2002 were $605,854 and $610,386, adjusted for inflation.

In the post law change period, 75 percent of the head, brain, skull injured admitted motorcyclists were charged approximately $12,000 or more while the remaining 25 percent of patients were charged less than this amount. That is, less than one-quarter of the injured would be covered by the $10,000 medical insurance requirement for those who chose not to use helmets. The hospital discharge data indicate that in the post law change period, approximately 63 percent of admitted motorcyclists were covered by commercial insurance ($31 million), 16 percent were classified as "self pay" because they were under insured or uninsured ($8 million), while the remaining 21 percent had their costs ($10.5 million) billed to charitable and public sources (e.g., Medicaid).

Limitations of the Study

National data suggest that as motorcycle registrations increase, motorcyclists' deaths and injuries increase. In Florida, motorcycle registrations increased substantially beginning in the year of the repeal of the all-rider helmet law, an outcome seen in other states that repealed helmet laws in recent years. The increases in motorcycle registrations alone do not account for the size of the increases in fatalities or the hospital admissions for head injuries. The decline in helmet use contributed significantly to the increase in deaths and head injuries. Other factors that may have contributed to the fatality increase are alcohol use, speed, increased exposure, and the likely contribution of a change in motorcycle ridership.

Nationally, motorcycle vehicle miles of travel (VMT) increased gradually throughout the 1990s, but decreased in 2001 and 2002. The VMT measure, provided by the Federal Highway Administration, is regarded as a good indicator of trends year to year, but cannot be broken down reliably to the individual state level for motorcycles.

Head-Brain-Skull Injury Treatment Costs

Period	Number of Cases	Costs*	Total Costs*	Average Case Cost*
1998	188	$6,460,620	Pre Law	Pre Law
1999	263	$9,463,172	(30 Months)	(30 Months)
2000 pre	151	$4,845,147	$20,779,939	$34,581
2000 post	178	$6,455,558	Post Law	Post Law
2001	445	$17,555,237	(30 Months)	(30 Months)
2002	474	$19,733,833	$43,744,629	$39,877

* Adjusted by Consumer Price Index (DOL) for medical care, 1999-2002, expressed in 1998 dollars.
Source: Florida Agency for Health Care Administration, Department of Labor

In 1998, the average motorcycle traveled 2,645 miles, while in 2002 this figure had declined to 1,909 miles.

Summary

The effects of Florida's repeal of its all-rider motorcycle helmet use law are similar to those seen in the other states that have repealed such laws (Arkansas, Kentucky, Louisiana, Texas).

- Deaths increased by 24 percent above what was expected from the increase in motorcycle registrations.
- Helmet use declined from near 100 percent to near 50 percent after the all-rider helmet law was repealed.
- The decline in helmet use likely contributed to the increase in fatalities.
- Deaths in riders <21 years, who were still required to wear helmets, increased by 188 percent.
- Motorcycle fatalities and fatality rates rose in Florida much more than nationally.
- Costs to treat injured motorcyclists with head injury as primary diagnosis more than doubled - to $44 million in 2002.
- Fewer than 25 percent of the hospitalized cases for head, brain or skull injuries cost less than $10,000, the required level of insurance to ride without a helmet.
- One out of five hospital-admitted motorcyclists had costs (total $10.5 million) billed to charitable and public sources (e.g. Medicaid).

How To Order

For a copy of *Evaluation of the Repeal of the All-Rider Motorcycle Helmet Law In Florida* (30 pages) write to the Office of Research and Technology, NHTSA, NTI-130, 400 Seventh Street, SW., Washington D.C. 20590 or send a fax to (202) 366-7096 or download www.nhtsa.dot.gov. Patty Ellison-Potter, Ph.D. was the contract manager.

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