

MOTORCYCLE SAFETY



HOW TO SAVE LIVES AND SAVE MONEY



National Center for Injury Prevention and Control
Division of Unintentional Injury Prevention



PUBLIC HEALTH LEADERSHIP TO KEEP
PEOPLE SAFE ON THE ROAD — EVERY DAY

“Our role is to identify ways to prevent injury and death and rigorously check what works and what does not work. For motorcycle safety, the research shows that universal helmet laws are the most effective way to reduce the number of deaths and traumatic brain injuries that result from crashes.”

Dr. Thomas Frieden, CDC Director



Motorcycle deaths and injuries are an important public health concern and economic liability in the United States.

In this Guide, you will learn:

- the public health significance of motorcycle crashes
- the best way to protect motorcycle riders
- how your state compares with other states in terms of motorcycle-related deaths and economic costs
- what you can do to increase motorcycle safety.

OVERVIEW

DEATHS ON THE RISE

Motorcycle-related deaths have increased by 55% since 2000.¹

Motorcycle crashes killed 4,502 people in 2010.²

Preventing debilitating injuries and deaths from motorcycle crashes is a growing public health concern.

THE COST

The cost of motorcycle crashes is not just measured in bodies, loss, and grief. Motorcycle crashes create a burden to society, consuming public funds for emergency response, emergency room costs, and insurance premiums.³ In terms of medical care costs and productivity losses...

The economic burden from crash-related injuries and deaths in one year alone totaled \$12 billion.⁴

PREVENTION THAT WORKS

With motorcycle ownership at an all-time high, motorcycle-related deaths and traumatic brain injuries are expected to remain at high levels unless more effective protective measures are enacted. Helmets are the only safety measure proven to save lives, and the universal helmet law (one that covers all motorcycle riders) is demonstrated to be the best way to ensure helmet use.⁵



Photo: Dennis Hook, Hooked on Photography

PEOPLE WHO RIDE, PEOPLE WHO DIE

REAL PEOPLE DYING EVERY DAY



The mother of a 13-year-old girl clinging to life wonders why her daughter wasn't wearing a helmet as she rode on the back of a motorcycle driven by her father... They were both listed in critical condition Sunday — a “touch-and-go” situation two weeks after the motorcycle accident which is under investigation by the Lake County Sheriff's Office.

*News Sun, August 2007*⁶



When Ryan died from a motorcycle crash in 2004, the whole family was devastated. First, his brother became addicted to drugs, and after years of struggling with his addiction, he just recently got out of rehab. Then, his best friend tried to commit suicide. My cousin Ryan was only 24 when he died. His parents are still struggling to deal with the death of one son, and the damage to the other from drugs — both as a result of the crash. We're from a small town and everyone felt it. We're all looking for ways to cope.

*Emily W., January 2010*⁷

Today, more people are riding motorcycles than ever before. Motorcycle riders represent almost every demographic group in the country. Riders now tend to be more affluent than 30 years ago. The average age of riders has increased, and more women are riding than ever before.⁸ The profile of who crashes and who dies has changed too:

Age: Young people are not the only ones dying in motorcycle crashes. In 2010, more than half the people killed in motorcycle crashes were 40 or older, up from 25% in 1995.^{1,2}

Sex: While only 10% of riders killed in motorcycle crashes in 2010 were women, almost all passengers (89%) killed in motorcycle crashes were women.²

Helmets: Forty-one percent of motorcycle operators and 50% of motorcycle passengers who died in 2010 were not wearing a helmet.²

Location: More people are killed in motorcycle crashes on rural roads now than 20 years ago. Roughly half of all crashes take place on rural roads.⁹

Alcohol: When people drink and ride, they are at much greater risk of crashing and dying. Twenty-eight percent of motorcycle riders who died in 2010 had a blood alcohol concentration that was at or above the legal limit of .08 g/dL.¹⁰

Motorcycle Type: The majority of people who die in crashes are riding sport motorcycles with mid-size engines designed to maximize speed and agility.⁹

Who Dies?

While studying for ministry, I spent a year as chaplain resident at a Chicago hospital. I was “on call” one evening when the emergency room paged me. An ambulance had just brought in a fellow who’d been riding his motorcycle without a helmet when an SUV had turned in front of him. Unable to turn or stop, he had hit the vehicle, ramming his head into a door. He was a classic “biker dude”: muscular arms, tattoos, and a couple day’s growth of beard. He was unconscious and his face was swollen and turning purple. Emergency room staff swarmed around him.

I spent most of the night with that family. I listened to their stories, I shared their tears. The couple had two teenagers, plus a younger girl, age nine. I think about his family every time I see a biker zoom by without a helmet. Helmets and cautious driving save lives. If, like this fellow, you have tough biker friends, I suppose they will tease you pretty hard if you do wear a helmet. It takes a thick skin and courage to handle teasing. Then again, I wonder how much courage it took for the nine-year-old girl to go in and say goodbye to her father?

*Reverend Dennis McCarty*¹¹



“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.”

Opinion of the Federal Court of Massachusetts, 1972
Affirmed by the United States Supreme Court¹²



Photo: Bill Lavallie, Fine Line International

“A group of state legislators from across the country heard a presentation from a University of New Mexico neurosurgeon. At the end of his talk, one legislator asked, ‘If there was one thing we could do in the legislature to make your job easier, what would it be?’ They expected to hear, ‘Give us more money’ or ‘Increase our budget!’ Instead the surgeon answered, ‘Pass a motorcycle helmet law.’”

PAYING THE BILL

Who Pays?

Everyone pays when a motorcycle rider is severely injured. You can talk about freedom of choice, but when other people have to pay for the consequences of that choice, then it's not freedom of choice at all.

Lt. Col. James Champagne

Executive Director, Louisiana Highway Safety Commission, Retired¹⁴

THE PUBLIC PAYS

It is estimated that the economic burden of injuries and deaths from motorcycle-related crashes in one year totaled \$12 billion.⁴ Studies have also shown that a substantial proportion of costs are paid by the U.S. public due to higher insurance premiums and taxes, as well as lost tax revenue.^{3, 15, 16}

A study of 105 motorcyclists hospitalized at a major trauma center determined that 63% of their care was paid for by public funds, with Medicaid accounting for over half of all charges.¹⁶

KEY FACTORS

Two key factors influence the public's financial burden from motorcycle crashes: helmet use and hospital and rehabilitation costs.

- Unhelmeted motorcycle riders injured in a crash and admitted to hospitals face substantially higher healthcare costs than do helmeted riders. Unhelmeted riders also use more of a hospital's critical resources.¹⁷
- Unhelmeted motorcycle riders are twice as likely to suffer traumatic brain injuries from crashes.^{17,18,19,20} The median hospital charges for motorcycle riders hospitalized with severe traumatic brain injuries were 13 times higher than the charges for those who did not have a traumatic brain injury.¹⁷
- Unhelmeted motorcycle riders are less likely to have health insurance and are therefore more likely to have their medical expenses paid by government-funded healthcare.¹⁵

“Despite the effectiveness of motorcycle helmet legislation, many states have repealed these laws during the last decade. Aspects often neglected by policymakers are who pays for the care of these victims and how much of this cost is subsidized by public funds.”

Journal of the American Medical Association.¹⁶

SUMMARY OF MOTORCYCLE SAFETY EFFORTS

Motorcycle safety measures include motorcycle operator licensing and training, traffic laws and enforcement, and educational programs and campaigns. Considerable emphasis is placed on educating both motorcycle riders and car drivers that share the road with motorcyclists about safe driving. Additionally, education and outreach efforts often focus on alcohol. However, there is no consistent evidence that any of these measures reduce the number of motorcycle crashes or deaths.

HOW EFFECTIVE ARE THE MEASURES?

	Unknown	Likely	Effective in Certain Situations	Scientifically Proven
State motorcycle helmet laws				✓
Motorcycle rider training	✓			
Motorcycle rider licensing	✓			
Helmet use promotion programs	✓			
Helmet law enforcement, noncompliant helmets	✓			
Alcohol impairment: detection, enforcement and sanction		✓		
Alcohol impairment communications	✓			
Conspicuity and protective clothing	✓			
Other driver awareness of motorcycles	✓			

Unknown:
Limited or no high-quality evidence.

Likely:
Likely to be effective based on balance of evidence from high-quality evaluations.

Effective in Certain Situations:
Demonstrated to be effective in certain situations.

Scientifically Proven:
Demonstrated to be effective in several scientific evaluations with consistent results.

Adapted from National Highway Traffic Safety Administration's Countermeasures That Work, 2011 ⁵

A few recent studies have shown that mechanical improvements such as antilock brakes can reduce the severity of crashes, and this may affect injuries and deaths.^{5, 21} Other motorcycle safety efforts include improving road conditions, reducing cultural support for rider-group alcohol use, and improving clothing and motorcycle visibility through bright or reflective colors. But again, no consistent evidence shows that any of these measures reduce the number of motorcycle crashes or deaths.⁵

Some traffic departments have reported successes in using cues to identify alcohol-impaired riders, however evaluation data is lacking, and while specific evaluation data on the effects of enforcement and sanctions on impaired motorcycle crashes is also lacking, enforcement strategies (e.g., sobriety checkpoints) exist, which have proven effective for reducing impaired driving and crashes generally.⁵

The only safety measure that costs little to initiate and reaches all riders is a state universal motorcycle helmet law. It is also the only measure proven to improve motorcycle safety.⁵

PREVENTION THAT WORKS

What Works?

I was commuting to work on my motorcycle and headed onto the freeway exchange at about 45 miles an hour. I lost control and laid down my bike, really hit my head, and slid my way to a stop. My motorcycle was scratched, my helmet was banged up, and the rest of my gear was pretty shredded. But I walked away.

The thing is, I never used my helmet where I lived before because I wasn't required to — there was no law. Moving to California meant I had to wear one, and I am so glad that I did. My helmet saved my life.

*Jonathan Hailstone*²²

WHAT HELMETS DO

Wearing helmets that meet the Department of Transportation (DOT) standard is the single most effective means of reducing the number of people who get injured or die from motorcycle crashes.⁵

Helmets are estimated to reduce the likelihood of death in a motorcycle crash by 37%.²³ The National Highway Traffic Safety Administration (NHTSA) estimates that helmets saved the lives of 1,544 motorcycle riders in 2010 alone.²⁴

Traumatic brain injury is a leading cause of motorcycle crash death.²⁵ Even when not fatal, these debilitating head injuries can mean a lifetime of costly rehabilitation and severe emotional trauma for family and friends. In fact, treating severe traumatic brain injuries costs 13 times more than non-brain injuries.¹⁷

Helmets reduce the risk of head injury by 69%.^{3, 26}

There are no negative health effects from helmet use. Helmets do not restrict a rider's ability to hear important sounds, or to see a vehicle in the next lane.²⁷

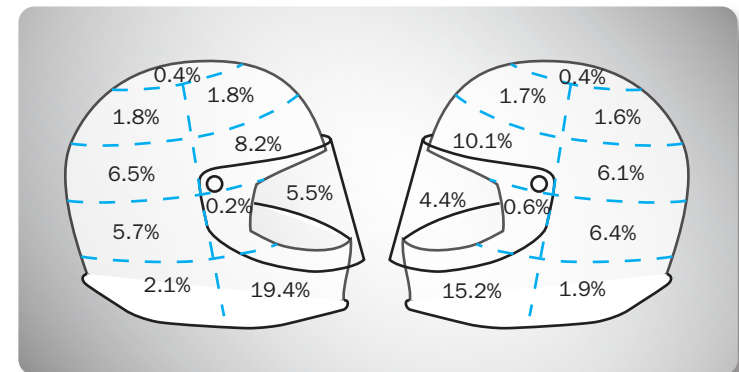
WHEN UNHELMETED RIDERS CRASH

Unhelmeted riders are 40% more likely to die from a head injury than someone wearing a helmet.²⁸

The only proven way to get people to wear helmets is the universal helmet law.⁵

ANATOMY OF A HELMET

Since 1974 all motorcycle helmets are required to meet the DOT standard that establishes the minimum level of protection a helmet must afford each helmet user.²³ Full-face helmets offer the most protection, protecting the eyes and face with a face shield and providing protection to the chin. To illustrate the importance of full coverage, research from crashes shows the distribution of impact locations absorbed by motorcycle helmets.²⁹



*Distribution of impact locations on motorcycle helmets, all collisions, based on a study by Dietmar Otte.*²⁹



UNIVERSAL HELMET LAWS INCREASE HELMET USE

THE POSITIVE IMPACT OF **STRENGTHENING** HELMET LAWS

Rate of helmet use before and after enacting a universal helmet law^{3,30,31,32,33}

	Under partial/no law	Under universal law
Nebraska (1989*)	15%	85%
Washington (1990*)	41%	80%
California (1992*)	50%	99%
Maryland (1992*)	25%	81%
Louisiana (2004*)	60%	99%
* Year of enactment		

All five states gained a substantial increase in helmet use in the year after the universal helmet law was enacted.

THE NEGATIVE IMPACT OF **WEAKENING** HELMET LAWS

Rate of helmet use before and after repealing a universal helmet law^{3,34,35,36}

	Under universal law	Under partial law
Arkansas (1997*)	97%	52%
Texas (1997*)	97%	66%
Kentucky (1998*)	96%	65%
Louisiana (1999*)	100%	52%
Florida (2000*)	99%	53%
Pennsylvania (2003*)	82%	58%
* Year of repeal		

All six states showed a substantial decrease in helmet use in the year after the universal helmet law was repealed.

There are two types of helmet laws used in the United States.

Universal Helmet Law: Requires all motorcycle riders and passengers of all ages to wear helmets whenever riding.

Partial Helmet Law: Only requires specific groups of people, such as those below a certain age, to wear helmets.

Each state decides its respective helmet law. As of May 2012, 19 states and the District of Columbia had universal helmet laws, 28 states had a partial helmet law, and 3 states had no helmet law. Many states have weakened their helmet law over the years, while a few states have strengthened their helmet law.³⁷

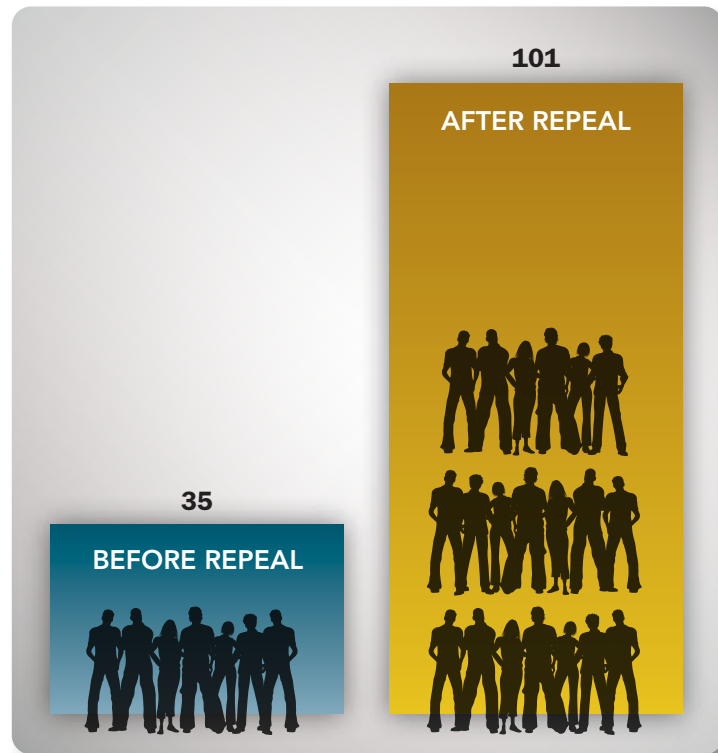
The research on states that change their helmet law is very clear:

- When a state enacts a universal helmet law, helmet use increases substantially.^{3,30,31,32,33}
- When a state repeals a universal helmet law, helmet use decreases substantially.^{3,34,35,36}
- When a state repeals a universal helmet law, motorcycle deaths and injuries increase.³

THE FLORIDA CASE STUDY

THE NEGATIVE IMPACT OF WEAKENING HELMET LAWS: FLORIDA

Number of deaths of riders under 21 in 30 months before vs. after repeal.



National Highway Traffic Safety Administration³⁵

DEATHS INCREASE FOR RIDERS COVERED BY PARTIAL HELMET LAWS

Florida is one example of the ineffectiveness of partial laws to save lives. In 2000, Florida repealed its universal helmet law, weakening it to mandate helmet use only for riders under the age of 21 and those with less than \$10,000 of medical insurance coverage.^{35,37}

Comparing the 30 months after the Florida state legislature repealed its universal helmet law with the 30 months before repeal:

- Deaths of all riders increased by 55%, substantially higher than what was expected from the increased registrations after repeal.^{28,35}
- Among riders under the age of 21, deaths of unhelmeted riders increased by 188%, even though the helmet law still applied to them.^{28,35}
- Motorcycle crash-related hospitalizations rose more than 40%. The costs of treating head injuries from motorcycle crashes more than doubled to \$44 million.^{28,35}

Only one in four motorcyclists who were hospitalized had medical costs less than \$10,000, which is the amount of medical insurance coverage that is required to ride without a helmet. Hospital discharge data showed that in the period after repeal, approximately \$10.5 million of hospitalization costs were billed to public sources (e.g., Medicaid) or charitable sources, and an additional \$8 million in costs were classified as “self pay” because patients were underinsured or uninsured.^{28, 35}



MOTORCYCLE DEATHS AND PARTIAL HELMET LAWS

A Casualty

One Florida high school senior was planning to attend college to study business and landscaping on a scholarship. He was involved in his high school drama club, played on the basketball team, ran track, and was a member of the Students Against Destructive Decisions Club.

Hours before his high school graduation, while riding his motorcycle without a helmet, this teenager crashed and died. Under Florida's partial helmet law he should have been wearing a helmet — he was, after all, under 21 years of age.

But like many other motorcyclists in states with partial helmet laws, he didn't wear a helmet.

He paid the price with his life.³⁸

PARTIAL LAWS — WHAT THEY LIMIT

Age: Riders under a specific age, which ranges between 17–20 years, are required to wear helmets. *Applies in all 28 states with partial laws.*³⁷

Passengers: Passengers are required to wear helmets if they are under a certain age or riding with drivers that are legally required to wear helmets. *Applies in Colorado, Maine, Michigan, North Dakota, Ohio, and Pennsylvania. Alaska and Rhode Island require all passengers to wear helmets.*³⁷

Insurance: Florida, Kentucky, and Michigan require anyone without health insurance to wear a helmet. Texas requires either proof of insurance or proof of successfully completing a motorcycle operator training course to ride without a helmet.³⁷

Licensing: Riders with an instructional or learner's permit or those who are recently licensed are required to wear helmets, regardless of age. *Applies in Alaska, Kentucky, Maine, Minnesota, Ohio, Rhode Island, and Wisconsin. Michigan and Pennsylvania require recently licensed riders to wear a helmet, unless they have passed a motorcycle safety course.*³⁷

PARTIAL LAWS — WHY THEY DON'T WORK

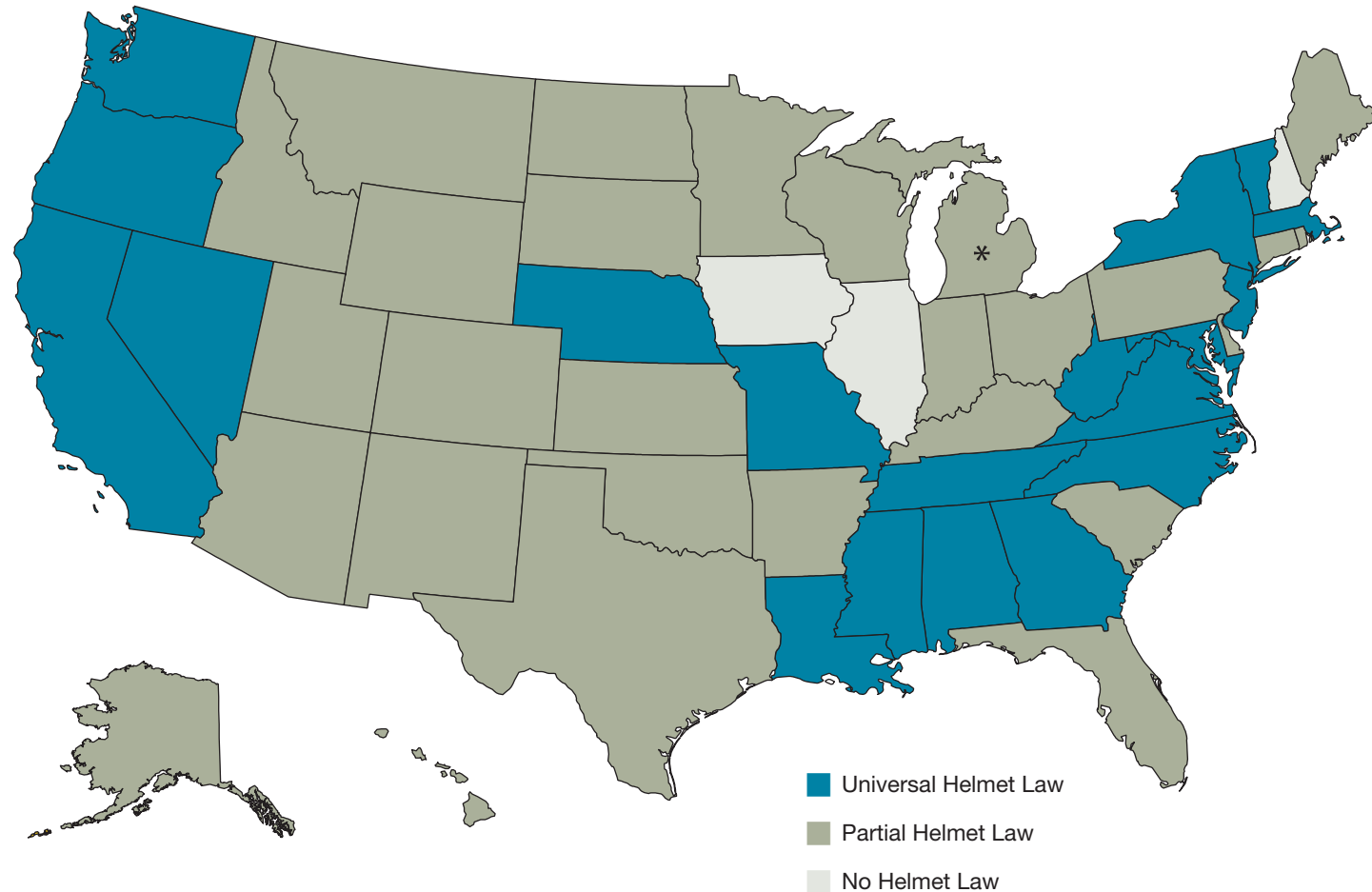
Research shows that partial helmet laws do not motivate riders to wear helmets.^{35,39} States with partial laws and states with no helmet law experience little difference in helmet use.⁴⁰ Even though all partial helmet laws apply to minors, 60% of fatally injured minors were unhelmeted in partial helmet law states, compared to 22% in universal helmet laws states from 2008–2010.¹ Among young riders who were hospitalized after a crash, the risk of suffering a serious traumatic brain injury was 37% higher in partial law states compared to universal law states.⁴¹ Only the universal helmet law is proven to increase helmet use.⁵

Compliance is low because partial helmet laws are difficult to enforce. Identifying partial law violations is problematic. As a result, partial helmet laws are typically only enforced when a police officer has pulled a rider over for another infraction, such as speeding.⁴²



HELMET LAWS SAVE LIVES AND MONEY

MOTORCYCLE HELMET LAWS IN THE UNITED STATES, AS OF MAY 2012



HOW DO STATES MEASURE UP?

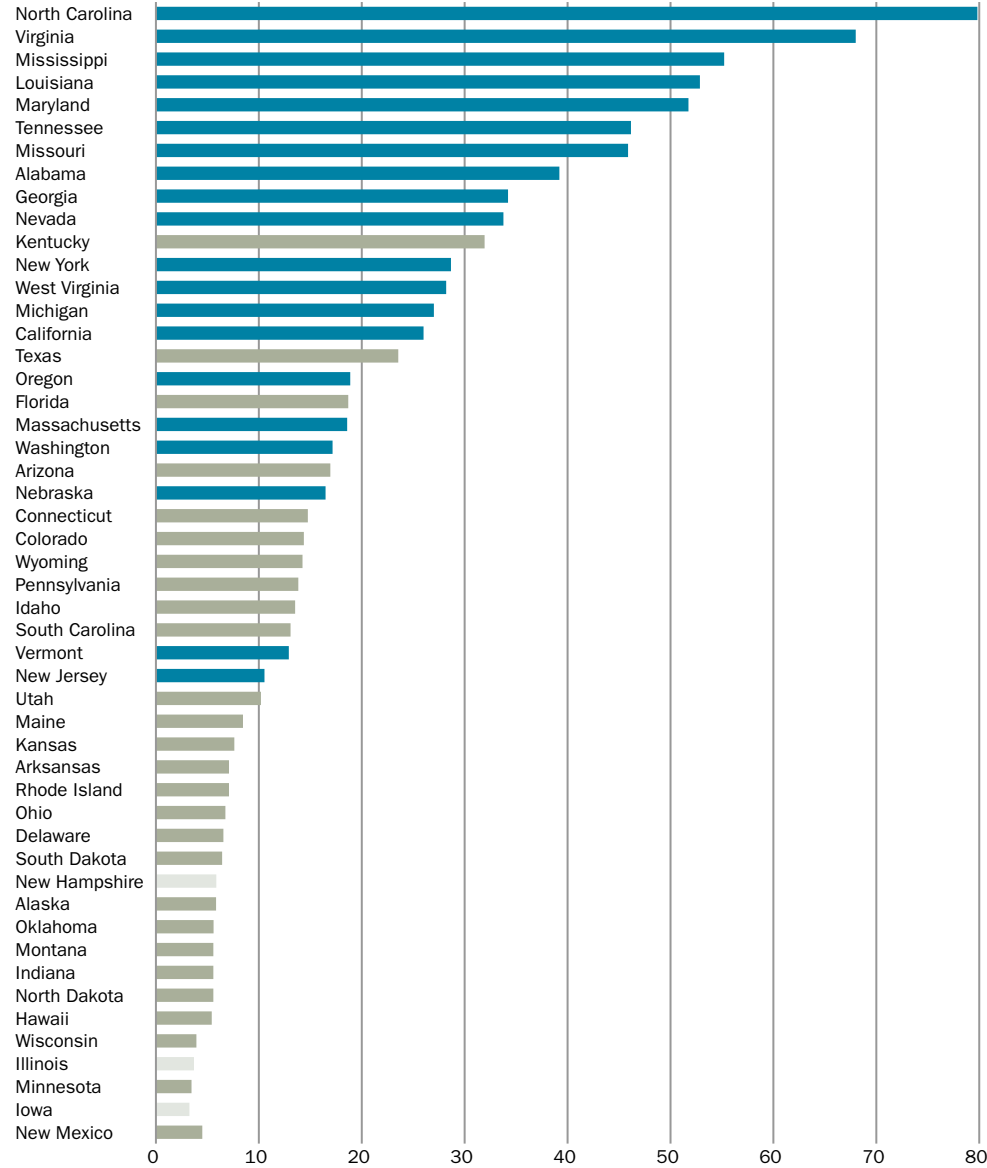
In 2010, 42% of motorcyclists who were fatally injured were unhelmeted. Helmets saved over 1,500 riders' lives, but about 700 more lives could have been saved if all riders had worn helmets in 2010.²⁴

On average, states with a universal helmet law save 8 times more riders' lives per 100,000 motorcycle registrations each year, compared to states without a helmet law, and save 3 times more riders' lives per 100,000 motorcycle registrations each year, compared to states with a partial helmet law.²⁴

Economic costs saved in states with universal helmet laws were, on average, **nearly four times greater** per registered motorcycle than in states without such a law.

*In April 2012, Michigan changed their helmet law from a universal to a partial helmet law. Please note that the lives saved and dollars saved analyses use 2010 data and reflect the status of the helmet laws at that time.

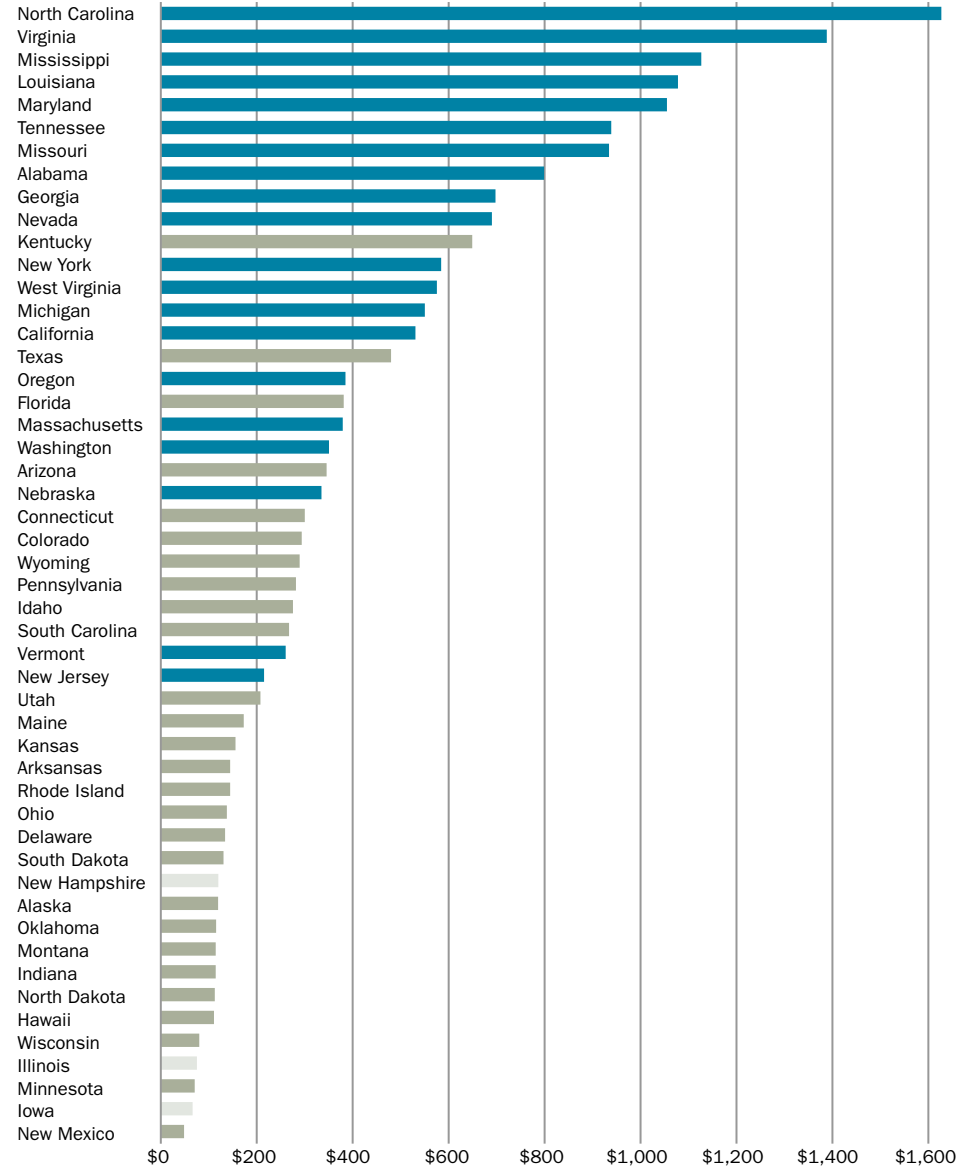
LIVES SAVED



Lives saved by helmet use per 100,000 registered motorcycles by state, 2010

Note: For comparison purposes, lives saved are standardized by motorcycle registrations (per 100,000 registrations) for each state.

ECONOMIC COSTS SAVED



Economic costs saved by helmet use per registered motorcycle by state, 2010

Note: For comparison purposes, money saved is standardized by motorcycle registrations for each state.

■ Universal Helmet Law ■ Partial Helmet Law ■ No Helmet Law

Note: In April 2012, Michigan changed their helmet law from a universal to a partial helmet law. Please note that the lives saved and dollars saved analyses use 2010 data and reflect the status of the helmet laws at that time.

SAVE MONEY



“...vast majorities of the American people accept and support the idea that on safety issues it is desirable and necessary for government to set standards and enforce laws designed to protect the public.”

Advocates for Highway and Auto Safety⁴⁵

STRONG SUPPORT

A Rider, a Nurse

As a rider and a trauma nurse, I would always recommend that riders wear a helmet. I see so much death, loss, grief, and trauma from riders and the loved ones they leave behind because of motorcycle crashes. If laws are what work to get people to wear a helmet, then we should have strong laws in place nationally.

Carlen Hudnet, RN⁴⁶

SUPPORTERS OF MOTORCYCLE SAFETY HELMET LAWS

These are just some of the organizations that support motorcycle helmet laws:

- AAA Foundation
- American Association of State Highway and Transportation Officials
- American Academy of Orthopedics
- American Academy of Pediatrics
- American College of Surgeons
- American Public Health Association
- Brain Injury Association
- Emergency Nurses Association
- Epilepsy Foundation of America
- National Safety Council
- Nationwide Insurance
- SADD (Students Against Destructive Decisions)
- ThinkFirst National Injury Prevention Foundation



FAQs

Do helmet laws interfere with a person's freedom to choose whether to wear a helmet?

Yes. Many laws restrict people's freedom to perform behaviors judged contrary to the public good. These include drunk driving laws, cellphone use laws, and infectious disease quarantine laws, to name a few. Courts usually uphold such laws as important to the nation's well-being.

Don't helmets make it harder for riders to see or hear?

No. Helmets that meet the DOT standard do not reduce visibility or impair hearing. By protecting people's heads in crashes, helmets only make riding safer.

If a motorcyclist chooses not to wear a helmet, does it only affect him?

No, not if the rider crashes. Unhelmeted riders injured in a crash have substantially higher healthcare costs than helmeted riders. When the rider is insured, these costs are passed on to others in the form of higher health insurance premiums. Unhelmeted riders are more likely to be uninsured than other riders. When the riders are uninsured, their medical expenses may be paid for using taxpayers' funds.

Can motorcycle safety education substitute for helmet laws?

No. The benefits of motorcycle safety education are unclear. A universal helmet law is the most effective way to reduce the number of people who are seriously injured or killed from motorcycle crashes.

Are universal helmet laws really that much better than partial helmet laws?

Yes. There is strong, substantial, and clear evidence that universal helmet laws save lives and save money. This is not true for partial laws. When a universal helmet law is enacted, helmet use dramatically increases, and states see an across-the-board decrease in deaths. If states repeal the law, they see an increase in deaths.

MOTORCYCLE SAFETY: A PUBLIC HEALTH PERSPECTIVE

QUICK FACTS

- The single most effective way for states to save lives and save money is a universal helmet law.
- Helmets reduce the risk of death by 37%.
- Helmets reduce the risk of head injury by 69%.
- The United States saved \$3 billion due to helmet use in 2010.
- The United States could have saved an additional \$1.4 billion in 2010 if all motorcyclists had worn helmets.
- Helmets do not reduce visibility or impair hearing.

MOTORCYCLE SAFETY RESOURCES

AAA Foundation

607 14th Street NW
Suite 201
Washington, D.C. 20005
(202) 638-5944
<http://www.aaafoundation.org>

Advocates for Highway and Auto Safety

750 First Street NE
Suite 901
Washington, D.C. 20002
(202) 408-1711
<http://www.saferoads.org>

American College of Emergency Physicians

1125 Executive Circle
Irving, TX 75038
(972) 550-0911
<http://www.acep.org>

American College of Surgeons

633 N. Saint Clair Street
Chicago, IL 60611
(312) 202-5000
<http://www.facs.org>

Brain Injury Association of America

1608 Spring Hill Road
Suite 110
Vienna, VA 22182
(703) 761-0750
<http://www.biausa.org>

Emergency Nurses Association

915 Lee Street
Des Plaines, IL 60016-6569
(800) 900-9659
<http://www.ena.org>

Governors Highway Safety Association

444 North Capitol Street NW
Suite 722
Washington, D.C. 20001
(202) 789-0942
<http://www.ghsa.org>

Head Protection Research Laboratory

6409 Alondra Boulevard
Paramount, CA 90723
(562) 529-3295
<http://www.hpri.org>

Insurance Institute for Highway Safety

1005 N. Glebe Road
Suite 800
Arlington, VA 22201
(703) 247-1500
<http://www.iihs.org>

Motorcycle Safety Foundation

2 Jenner Street
Suite 150
Irvine, CA 92618
(800) 446-9227
<http://www.msf-usa.org>

National Center for Injury Control and Prevention Centers for Disease Control and Prevention

1600 Clifton Road
Atlanta, GA 30333
(800) 232-4636
<http://www.cdc.gov>

National Conference of State Legislatures

7700 East First Place
Denver, CO 80230
(303) 364-7700
<http://www.ncsl.org>

National Highway Traffic Safety Administration

1200 New Jersey Avenue SE
West Building
Washington, D.C. 20590
(888) 327-4236
Hearing Impaired (TTY): (800) 424-9153
<http://www.nhtsa.dot.gov>

National Transportation Safety Board

490 L'Enfant Plaza SW
Washington, D.C. 20594
(202) 314-6000
<http://www.nts.gov>

SMARTER**(Skilled Motorcyclist Association-Responsible, Trained
and Educated Riders, Inc.)**

P.O. Box 121
Scottville, MI 49454-0121
<http://www.smarter-usa.org>

ThinkFirst National Injury Prevention Foundation

1801 N. Mill Street
Suite F
Naperville, IL 60563
(630) 961-1400
(800) THINK-56 (844-6556)
<http://www.thinkfirst.org>

Transportation Research Board**The National Academies**

500 Fifth Street NW
Washington, D.C. 20001
(202) 334-2934
<http://www.trb.org>

World Health Organization

Helmet Initiative
<http://www.whohelmets.org/mhrc.htm>
info@whohelmets.org
Helmets: a road safety manual for decision-makers and
practitioners. Available at: [http://www.who.int/roadsafety/
projects/manuals/helmet_manual/en/](http://www.who.int/roadsafety/projects/manuals/helmet_manual/en/)

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