ADVOCATES FOR HIGHWAY & AUTO SAFETY

Motorcycle Rider Safety

The Issue:

Motorcycles are the most hazardous form of motor vehicle transportation.[1] A lack of physical barriers around motorcyclists compared to the occupants of cars and trucks, combined with less stability and less visibility all contribute to the risk of crashes, injuries and fatalities.[2] When crashes occur, motorcyclists need adequate head protection to prevent one of the leading causes of death and disability in the U.S. – head injuries.[3]

The Impact:

- In 2022, 6,218 motorcycle riders were killed.[4] This is the highest fatality total in a single year since data collection began in 1975. An additional 82,687 motorcyclists were injured in 2022.[5]
- Early estimates for 2023 indicate a 2% increase in motorcyclist fatalities compared to 2022.[6]
- The number of motorcycle crash fatalities in 2022 is nearly three times the historic low of 2,116 motorcycle crash deaths in 1997.[7]
- Motorcycle riders represented 15% of the total traffic fatalities in 2022, even though motorcycle vehicle miles traveled (VMT) accounted for only 0.7% of all VMT.[8]
- Per VMT in 2022, motorcycle riders were nearly 22 times more frequently killed in a traffic crash than occupants of passenger cars in traffic crashes.[9]
- Motorcycle rider fatalities of older adults (aged 65 and older) increased by 59% over the 10-year period from 2013 to 2022.[10]
- In 2022, when helmet use was known, 37% of motorcyclists killed were not wearing a helmet.[11]

The Facts:

Motorcycle Helmets Save Lives, Prevent and Mitigate Injuries, and Reduce Costs

- Motorcycle helmets reduce the risk of head injury by 69% and reduce the risk of death by 42%.[12]
- The National Highway Traffic Safety Administration (NHTSA) estimates that helmets saved the lives of 1,872 motorcycle riders in 2017 (the latest year data is available) and that 749 more lives in all states could have been saved if all motorcycle riders had worn helmets.[13]

- In October 2024, the Insurance Institute for Highway Safety (IIHS) calculated that Between 1976 and 2022, over 22,000 additional lives could have been saved if all states had all-rider motorcycle helmet laws.[14]
- The NHTSA has estimated helmets to be 37% effective in preventing fatalities in drivers and 41% for motorcycle passengers.[15]
- A University of Wisconsin study of motorcycle crash victims in Wisconsin from 2010 to 2015 found that unhelmeted riders sustained cervical spine injuries twice as often as riders who wore helmets.[16]
- Annually, motorcycle crashes cost nearly $17 billion in economic impacts and $107 billion in societal harm as measured by comprehensive costs based on 2019 data.[17] Accounting for inflation alone, in 2024, this would equate to over $21 billion in economic impacts, and over $131 billion in societal harm.[18] Serious injuries and fatalities accounted for 83% of total comprehensive costs of motorcycle crashes, compared to 60% of the total comprehensive costs of all motor vehicle crashes.[19]
- In 2019, motorcycle helmets were preventing $21.2 billion in societal harm costs annually, but another $9.4 billion in harm costs could have been prevented if all motorcycle riders had worn helmets.[20] Accounting for inflation alone, in 2024 this would equate to $26 billion in societal harm prevented and over $11.5 billion if all riders had worn helmets.[21]
- In 2019, helmets were saving $3.2 billion in economic costs annually.[22] Accounting for inflation alone, in 2024, this would equate to $4 billion in costs.[23]

The Solutions: Laws, Technology and Roadway Safety Infrastructure

State All-Rider Helmet Laws (*See Advocates' Roadmap to Safety Report for more information about state laws.*)

- According to the American Academy of Pediatrics (AAP), in states with only youth-specific helmet laws, helmet use has decreased, and youth mortality has increased. Serious traumatic brain injury among young riders was 38% higher in states with only age-specific laws compared to states with all-rider helmet laws.[24]
    - All-rider motorcycle helmet law repeal efforts, which include motorcycle education and training requirements, fail to meet the safety benefit provided by a universal helmet law. There is no scientific evidence that motorcycle rider training reduces crash risk.
- According to a Government Accountability Office (GAO) report, "laws requiring all motorcyclists to wear helmets are the only strategy proved to be effective in reducing motorcyclist fatalities."[25]
- According to NHTSA, in 2022, there were 7.7 times as many unhelmeted fatalities (1,986) in states without a universal helmet law compared to states with a universal helmet law (258).[26]
- In states without all-rider helmet laws, 54% of motorcyclists killed in 2022 were not wearing helmets, compared to 11% in states with such laws.[27]
- The observed use rate of U.S. Department of Transportation (DOT)-compliant helmets among motorcycle riders was nearly 83% in states with all-rider helmet laws, compared to only 66% in other states in 2023.[28]

- In Michigan, which repealed its all-rider helmet law in 2012, there would have been 26 fewer motorcycle crash deaths (a 21% reduction) that year if the helmet mandate was still in place, according to the University of Michigan Transportation Research Institute.[29] Additionally, in the remainder of the year after the helmet repeal was enacted, only 74% of motorcycle riders involved in crashes were helmeted, compared to 98% in the same time period of the previous four years.[30]
- A study of motorcycle rider crash injuries before and after Michigan partially repealed its motorcycle helmet use law found that following the repeal, the percentage of hospitalized trauma patients with a head injury rose 14% and the percentage of skull fracture-related injuries rose 38%. The study also found trauma patients with head injuries were more likely to need costly hospital services, such as intensive care unit stays, ventilation and neurosurgical interventions than patients without head injuries.[31]
- In 2010 in states with an all-rider helmet law, use of a helmet resulted in economic costs saved to society of $725 per registered motorcycle, compared with $198 per registered motorcycle in states without such a law.[32]

Vehicle Safety Technology and Safety Standards Can Protect Vehicle Occupants and Other Road Users

The U.S. Department of Transportation (DOT) must expeditiously advance minimum performance standards for vehicle safety technologies which can prevent or mitigate crashes and protect vehicle occupants and road users. These safety technologies should be standard, not optional, equipment in new vehicles. This action will achieve safety equity by both ensuring that the technology responds to and benefits all road users and that consumers buying new vehicles are not charged extra fees for the technology. Moreover, requiring equipment as standard can reduce the base cost of technology due to economies of scale.

Advanced Driver Assistance Systems (ADAS):

- According to the AAA Foundation for Traffic Safety, equipping all cars, pickup trucks, vans, minivans and SUVs with forward collision warning (FCW)/automatic emergency braking (AEB) which respond to pedestrians and bicyclists as well as vehicles could prevent 1.9 million crashes, nearly 900,000 injuries, and more than 4,700 deaths annually.[33]
- The Insurance Institute for Highway Safety (IIHS) evaluated on-road data and found motorcycle anti-lock braking systems (ABS) were associated with a 22% reduction in the rate of fatal crash involvements.[34] Requiring ABS as standard equipment (i.e., via a Federal Motor Vehicle Safety Standard (FMVSS)) in new motorcycles will prevent and mitigate crashes.
- The Infrastructure Investment and Jobs Act (IIJA) directs the U.S. DOT to issue Final Rules on minimum performance standards and requirements for ADAS technologies including AEB, FCW, lane departure warning (LDW) and lane keeping assist (LKA).[35]
- In May 2024, U.S. DOT issued a Final Rule to require passenger vehicles be equipped with AEB that detect pedestrians.[36] NHTSA estimates that this action will

save 362 lives and mitigate over 24,000 injuries annually. It is estimated to result in yearly cost benefit of between $5.8-$7.2 billion.[37] In July 2023, DOT issued a NPRM to require heavy vehicles weighing over 10,000 pounds to be equipped with AEB.[38]

- The AEB rule is a significant upgrade for safety, and its protections should be extended to ensure all road users are detected including bicyclists and motorcyclists.

Road Safety Infrastructure Improvements and the Safe System Approach[39]

The Safe System Approach (SSA) assumes that humans will make mistakes and that we must anticipate this and make accommodations to account for limited human injury tolerances through five elements: Safe Vehicles, Safe Road Users, Safe Roads, Safe Speed and Post-Crash Care. By improving the design and operation of roadways to accommodate all road users safely, the SSA seeks to avoid conflicts between road users (drivers of vehicles, motorcycle riders, pedestrians, bicyclists, micromobility riders, wheelchair users and others) and minimize impact forces when they do occur to prevent fatalities and serious injuries.

Infrastructure improvements consistent with the SSA to limit conflicts include:

Curbing speed:

- This can be accomplished by reducing speed limits, employing automated enforcement to augment traditional enforcement, adding speed humps, using real-time speed feedback signs, performing road diets and installing roundabouts.

Prioritizing infrastructure to promote safety:

- This includes changes such as adding lighting and sight lines, leading intervals, pedestrian hybrid beacons, curb extensions, accessible sidewalks, rumble strips, protected intersections, separated bike lanes, and road separations that consider all users.

Localities can advance these and other infrastructure improvements systemically by requiring their adoption as appropriate in all road design and maintenance projects.

The IIJA includes multiple provisions that advance the SSA including expanded funding for safety infrastructure upgrades. It also provides support and guidance for localities planning to apply for such, permits use of certain federal funds for automated enforcement programs in school and work zones, directs requirements for vehicle safety improvements including crash avoidance technologies, and ensures funds are used to improve vulnerable road user safety.

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1 The Economic and Societal Impact of Motor Vehicle Crashes, 2019 (Revised), NHTSA, Feb. 2023, DOT HS 813 403, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813403.

2 Motorcycles, IIHS, last accessed Oct. 4, 2023, available at https://www.iihs.org/topics/motorcycles.

[3] Coronado VG, Xu L., Basavaraju SV, McGuire LC, Wald MM, Faul MD, Guzman BR, JD Hemphill, *Surveillance for Traumatic Brain Injury--Related Deaths --- United States, 1997—2007*, MMWR Morb Mortal Wkly Rep, 60(05), 1-32, 2011, available at http://www.cdc.gov/mmwr/pdf/ss/ss6005.pdf.

[4] Traffic Safety Facts: 2022 Data, Motorcycles, NHTSA, Jul. 2024, DOT HS 813 589, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813589.

[5] Traffic Safety Facts: 2022 Data, Motorcycles, NHTSA, Jul. 2024, DOT HS 813 589, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813589.

[6] Traffic Safety Facts, Crash Stats: Early Estimates of Motor Vehicle Traffic Fatalities And Fatality Rate by Sub-Categories in 2023, NHTSA, May 2024, DOT HS 813 581, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813581.

[7] Traffic Safety Facts 2021: A Compilation of Motor Vehicle Crash Data, NHTSA, Dec. 2024, DOT HS 813 527 available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813527 ; Traffic Safety Facts: 2022 Data, Motorcycles, NHTSA, Jul. 2024, DOT HS 813 589, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813589.

[8] Traffic Safety Facts: 2022 Data, Motorcycles, NHTSA, Jul. 2024, DOT HS 813 589, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813589; Overivew of Motor Vehicle Traffic Crashes in 2022, NHTSA, Jun. 2024 (Revised), available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813560.

[9] Traffic Safety Facts: 2022 Data, Motorcycles, NHTSA, Jul. 2024, DOT HS 813 589, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813589.

[10] Traffic Safety Facts: 2022 Data, Motorcycles, NHTSA, Jul. 2024, DOT HS 813 589, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813589; Fatality and Injury Reporting System Tool (FIRST), Queried for Motorcycle Occupants Killed, Ages 65+, in 2013 and 2022, available at https://cdan.dot.gov/query.

[11] Traffic Safety Facts: 2022 Data, Motorcycles, NHTSA, Jul. 2024, DOT HS 813 589, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813589.

[12] Liu BC, Ivers R, Norton R, Boufous S, Blows S, Lo SK, *Helmets for preventing injury in motorcycle riders (Review)*, The Cochrane Library, Issue 1, 2009. Available online at: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004333.pub3/abstract (Accessed Nov. 11, 2013).

[13] Traffic Safety Facts: 2021 Data, Motorcycles, NHTSA, Jun. 2023 (Revised), DOT HS 813 466, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813466.

[14] The human cost of allowing unhelmeted motorcycling in the United States, Oct. 2024, IIHS, available at: https://www.iihs.org/topics/bibliography/ref/2317.

[15] Lives and Cost Saved by Motorcycle Helmets, 2017, NHTSA, DOT HS 812 867, Dec. 2019, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812867

[16] Page PS, Wei Z, Brooks NP, *Motorcycle helmets and cervical spine injuries: a 5-year experience at a Level 1 trauma center*, Journal of Neurosurgery: Spine, Vol. 28, No. 6, June 2018. Available online at: http://thejns.org/doi/full/10.3171/2017.7.SPINE17540.

[17] The Economic and Societal Impact of Motor Vehicle Crashes, 2019 (Revised), NHTSA, Feb. 2023, DOT HS 813 403, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813403.

[18] CPI Inflation Calculator, BLS, January 2019 to January 2024 dollars, available at https://data.bls.gov/cgi-bin/cpicalc.pl.

[19] The Economic and Societal Impact of Motor Vehicle Crashes, 2019 (Revised), NHTSA, Feb. 2023, DOT HS 813 403, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813403.

[20] The Economic and Societal Impact of Motor Vehicle Crashes, 2019 (Revised), NHTSA, Feb. 2023, DOT HS 813 403, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813403.

[21] CPI Inflation Calculator, BLS, January 2019 to January 2024 dollars, available at https://data.bls.gov/cgi-bin/cpicalc.pl.

[22] The Economic and Societal Impact of Motor Vehicle Crashes, 2019 (Revised), NHTSA, Feb. 2023, DOT HS 813 403, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813403.

[23] CPI Inflation Calculator, BLS, January 2019 to January 2024 dollars, available at https://data.bls.gov/cgi-bin/cpicalc.pl.

[24] Weiss, H., Ph.D., MPH, MS, Agimi, Y.l., MPH, and Steiner, C., MD, MPH, "Youth Motorcycle-Related Brain Injury by State Helmet Law Type: United States 2005 2007," Pediatrics, November 2010, available at https://pubmed.ncbi.nlm.nih.gov/21078726/.

[25] Motorcycle Safety: Increasing Federal Flexibility and Identifying Research Priorities Would Help Support States' Safety Efforts, GAO, 2012, GAO-13-42, available at http://www.gao.gov/assets/660/650037.pdf.

[26] Traffic Safety Facts: 2021 Data, Motorcycles, NHTSA, Jun. 2023 (Revised), DOT HS 813 466, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813466.

[27] Traffic Safety Facts: 2021 Data, Motorcycles, NHTSA, Jun. 2023 (Revised), DOT HS 813 466, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813466.

[28] Traffic Safety Facts, Research Note: Motorcycle Helmet Use in 2023 – Overall Results, NHTSA, Sept. 2024, DOT HS 813 634, available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813634.

[29] Flannagan CA, Analysis of Motorcycle Crashes: Comparison of 2012 to Previous Years, 18th Michigan Traffic Safety Summit, 2013.

[30] Flannagan CA, Analysis of Motorcycle Crashes: Comparison of 2012 to Previous Years, 18th Michigan Traffic Safety Summit, 2013.

[31] Status Report, Vol. 51, No. 7, "Head injuries rise as riders ditch helmets in Michigan," IIHS, September 1, 2016; available at https://www.iihs.org/iihs/sr/statusreport/article/51/7/2.

[32] Centers for Disease Control and Prevention (CDC), Helmet use Among Motorcyclists Who Died in Crashes and Economic Cost Savings Associated With State Motorcycle Helmet Laws – United States, 2008-2010, MMWR Morb Mortal Wkly Rep, 61(23), 425-430, 2012, available at https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6123a1.htm.

[33] Benson, A., Tefft, B.C., Svancara, A.M. & Horrey, W.J., September 2018. Potential Reduction in Crashes, Injuries and Deaths from Large-Scale Deployment of Advanced Driver Assistance Systems (Research Brief). Washington, D.C.: AAA Foundation for Traffic Safety, available at: https://aaafoundation.org/potential-reduction-in-crashes-injuries-and-deaths-from-large-scale-deployment-of-advanced-driver-assistance-systems/.

[34] Motorcycle Antilock braking Systems and Fata Crash Rates: Updated Results, Aug. 2021, IIHS, available at https://www.iihs.org/topics/bibliography/ref/2236.

[35] Infrastructure Investment and Jobs Act (IIJA, Pub. L. 117-58), November 15, 2021, Sections 24208 and 23010, available at: https://www.govinfo.gov/content/pkg/PLAW-117publ58/pdf/PLAW-117publ58.pdf.

[36] 89 FR 39686 (May 9, 2024); available at https://www.govinfo.gov/content/pkg/FR-2024-05-09/pdf/2024-09054.pdf .

[37] 89 FR 39686 (May 9, 2024); available at https://www.regulations.gov/document/NHTSA-2023-0021-1065.

[38] 88 FR 43174 (Jul. 6, 2023); available at https://www.regulations.gov/document/NHTSA-2023-0023-0001.

[39] "Recommendations of the Safe System Consortium," Johns Hopkins University Center for Injury Research and Prevention, May 2021. Available here: https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-injury-research-and-policy/our-impact/documents/recommendations-of-the-safe-_system-consortium.pdf.