



DOT HS 812 512

August 2018

Motorcycle Helmet Use in 2017—Overall Results

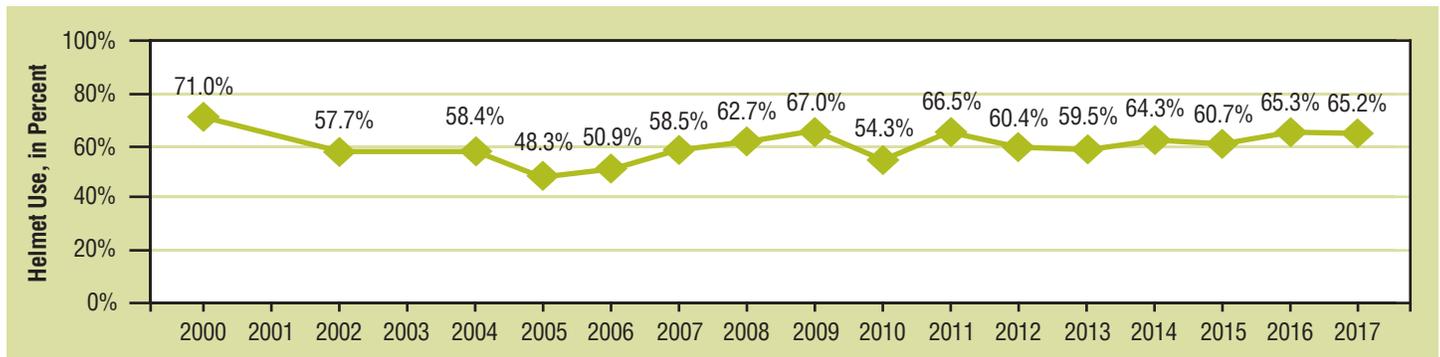
Use of DOT-compliant motorcycle helmets¹ was 65.2 percent in 2017, not statistically different at the 0.05 level from 65.3 percent in 2016. This result is from the National Occupant Protection Use Survey (NOPUS), the only survey that provides nationwide probability-based observed data on motorcycle helmet 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 2016 and 2017.

The 2017 survey also found the following:

- 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 on expressways increased significantly to 88.9 percent in 2017, up from 69.8 percent in 2016. (Table 1)
- Helmet use among motorcyclists traveling in fast traffic increased significantly to 80.1 percent in 2017, up from 66.7 percent in 2016 (Table 1)
- Helmet use among motorcyclists traveling in heavy traffic increased significantly to 78.5 percent in 2017, up from 64.0 percent in 2016. (Table 1)

Figure 1
Motorcycle Helmet Use, 2000 – 2017 (Data Source: NOPUS*)



*Prior to 2004, motorcycle helmet use data were collected every other year since the NOPUS began in 1994. Data on motorcycle helmet use was not collected in 2001 and 2003.

Figure 2
Motorcyclists, by Helmet Type (NOPUS)

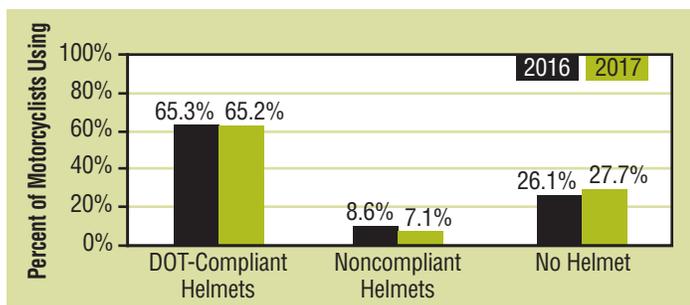
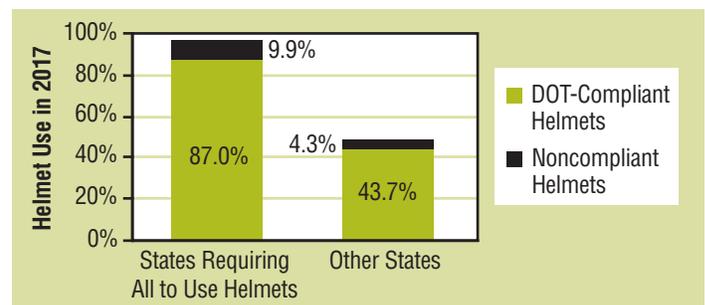


Figure 3
Motorcycle Helmet Use in 2017, by State Law and Helmet Type (NOPUS)



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.

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

Motorcyclist Group	2016		2017		2016–2017 Change		
	Helmet Use ¹	95% Confidence Interval ²	Helmet Use ¹	95% Confidence Interval ²	Change in Percentage Points ⁶	95% Confidence Interval ³	P-Value ⁴
All Motorcyclists	65.3%	(57.6, 72.2)	65.2%	(56.6, 72.9)	-0.1	(-11.0, 10.9)	0.99
Riders	67.8%	(59.2, 75.4)	68.0%	(60.1, 75.0)	0.2	(-10.7, 11.0)	0.98
Passengers	52.5%	(38.5, 66.1)	51.1%	(37.0, 65.1)	-1.4	(-23.3, 20.5)	0.90
Motorcyclists in States Where ⁵							
Use Is Required for All Motorcyclists	79.6%	(67.4, 88.0)	87.0%	(79.4, 92.0)	7.4	(-4.6, 19.4)	0.22
Other States	53.5%	(43.3, 63.4)	43.7%	(33.2, 54.9)	-9.8	(-20.0, 0.4)	0.06
Motorcyclists on							
Expressways	69.8%	(54.2, 81.9)	88.9%	(81.2, 93.7)	19.1	(3.9, 34.2)	0.02
Surface Streets	63.5%	(55.3, 70.9)	55.0%	(46.7, 63.0)	-8.4	(-19.5, 2.6)	0.13
Motorcyclists Traveling in							
Fast Traffic	66.7%	(54.3, 77.2)	80.1%	(72.6, 86.0)	13.4	(0.3, 26.5)	0.05
Medium-Speed Traffic	68.5%	(58.4, 77.1)	56.8%	(44.1, 68.7)	-11.7	(-24.4, 1.1)	0.07
Slow Traffic	58.6%	(46.6, 69.7)	44.2%	(35.8, 52.9)	-14.4	(-28.9, 0.0)	0.05
Motorcyclists Traveling in							
Heavy Traffic	64.0%	(53.9, 73.0)	78.5%	(69.3, 85.5)	14.5	(2.6, 26.3)	0.02
Moderately Dense Traffic	64.8%	(55.8, 72.9)	58.4%	(46.0, 69.8)	-6.4	(-21.4, 8.6)	0.39
Light Traffic	69.9%	(54.1, 82.1)	47.3%	(31.8, 63.3)	-22.7	(-46.4, 1.1)	0.06
Motorcyclists in							
Light Precipitation	74.2%	(21.3, 96.8)	59.8%	(41.9, 75.4)	-14.5	(-72.2, 43.2)	0.61
Light Fog	NA	NA	NA	NA	NA	NA	NA
Clear Weather Conditions	64.7%	(57.6, 71.3)	65.4%	(56.7, 73.3)	0.7	(-10.6, 12.0)	0.90
Motorcycle Riders When							
They Are the Sole Rider	70.1%	(61.1, 77.7)	72.1%	(64.4, 78.7)	2.0	(-7.6, 11.6)	0.67
They Have a Passenger	58.9%	(46.3, 70.5)	51.3%	(37.3, 65.1)	-7.7	(-29.8, 14.5)	0.48
Motorcyclists in the							
Northeast	70.7%	(46.8, 86.9)	70.6%	(53.7, 83.3)	-0.1	(-10.1, 9.9)	0.98
Midwest	53.8%	(44.8, 62.6)	41.0%	(27.9, 55.4)	-12.8	(-26.4, 0.7)	0.06
South	67.5%	(50.7, 80.7)	76.7%	(64.3, 85.8)	9.2	(-10.3, 28.8)	0.34
West	90.9%	(81.1, 95.8)	83.8%	(67.8, 92.7)	-7.1	(-25.0, 10.9)	0.43
Motorcyclists in							
Urban Areas	56.7%	(48.9, 64.1)	65.3%	(56.5, 73.1)	8.6	(-0.2, 17.3)	0.05
Rural Areas	72.4%	(61.2, 81.4)	65.2%	(52.1, 76.3)	-7.2	(-26.6, 12.1)	0.45
Motorcyclists Traveling During							
Weekdays	69.6%	(60.1, 77.7)	71.7%	(61.9, 79.8)	2.0	(-6.5, 10.5)	0.63
Weekday Rush Hours	71.1%	(62.6, 78.3)	71.6%	(60.2, 80.7)	0.5	(-10.5, 11.5)	0.93
Weekday Non-Rush Hours	68.6%	(55.4, 79.4)	71.7%	(60.1, 81.1)	3.1	(-11.0, 17.3)	0.65
Weekends	60.4%	(49.5, 70.3)	58.8%	(47.9, 68.9)	-1.6	(-17.1, 13.9)	0.84
Motorcycle Riders Who							
Are Riding Alone	70.1%	(61.1, 77.7)	72.1%	(64.4, 78.7)	2.0	(-7.6, 11.6)	0.67
Have a Passenger Using a DOT-Compliant Helmet	83.9%	(58.4, 95.1)	89.3%	(79.4, 94.8)	5.4	(-15.0, 25.8)	0.59
Have a Passenger Using a Noncompliant Helmet	NA	NA	NA	NA	NA	NA	NA
Have an Unhelmeted Passenger	29.2%	(10.5, 59.1)	5.3%	(1.9, 14.1)	-23.9	(-53.2, 5.4)	0.11
Passengers on Motorcycles on Which							
The Rider Is Using a DOT-Compliant Helmet	74.8%	(52.4, 88.9)	89.1%	(79.5, 94.5)	14.3	(-8.6, 37.2)	0.21
The Rider Is Using a Noncompliant Helmet	NA	NA	NA	NA	NA	NA	NA
The Rider Is Unhelmeted	22.5%	(6.5, 54.9)	9.1%	(4.0, 19.3)	-13.4	(-38.9, 12.0)	0.29

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 2017 is different from that used in 2016.

⁴ A p-value of 0.05 or less indicates that there is a statistically significant difference (at the alpha=0.05 level) between the 2016 and 2017 estimates for the group in question, indicated with bold type.

⁵ Use rates reflect the laws in effect at the time data was collected.

⁶ Belt use rates, 95% Confidence Interval, annual changes have been rounded to the nearest tenth. Annual changes have been computed based on unrounded estimates and may not equal those based on displayed values.

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	2016		2017		2016–2017 Change		
	Helmet Use ¹	95% Confidence Interval ²	Helmet Use ¹	95% Confidence Interval ²	Change in Percentage Points ⁵	95% Confidence Interval ³	P-Value
All Motorcyclists	8.6%	(4.8, 14.9)	7.1%	(4.7, 10.6)	-1.5	(-7.5, 4.4)	0.60
Riders	7.4%	(4.0, 13.4)	7.1%	(4.5, 11.0)	-0.4	(-6.3, 5.5)	0.90
Passengers	14.5%	(7.8, 25.3)	7.1%	(3.8, 13.0)	-7.4	(-17.9, 3.2)	0.16
Motorcyclists in States Where⁴							
Use Is Required for All Motorcyclists	14.9%	(7.0, 28.8)	9.9%	(5.7, 16.6)	-5.0	(-16.9, 6.8)	0.39
Other States	3.5%	(1.8, 6.4)	4.3%	(2.4, 7.8)	0.9	(-2.4, 4.1)	0.59
Motorcyclists on							
Expressways	8.5%	(4.5, 15.2)	5.3%	(1.9, 13.7)	-3.1	(-10.9, 4.7)	0.42
Surface Streets	8.7%	(4.3, 16.6)	7.8%	(4.9, 12.2)	-0.8	(-7.9, 6.2)	0.81
Motorcyclists Traveling in							
Heavy Traffic	9.0%	(5.2, 15.1)	5.6%	(3.0, 10.4)	-3.3	(-9.8, 3.1)	0.30
Moderately-Dense Traffic	6.6%	(2.6, 15.6)	7.9%	(4.5, 13.4)	1.3	(-6.3, 8.9)	0.73
Slow Traffic	10.5%	(4.3, 23.3)	9.1%	(4.0, 19.5)	-1.4	(-12.7, 10.0)	0.81
Motorcyclists Traveling in							
Heavy Traffic	12.3%	(5.9, 24.0)	7.6%	(4.2, 13.2)	-4.8	(-15.8, 6.2)	0.38
Moderately Dense Traffic	4.9%	(2.7, 8.8)	9.1%	(5.2, 15.6)	4.2	(-1.1, 9.6)	0.12
Light Traffic	7.2%	(2.9, 16.8)	3.0%	(1.2, 7.3)	-4.2	(-10.6, 2.2)	0.19
Motorcyclists in							
Light Precipitation	NA	NA	20.6%	(10.1, 37.5)	NA	NA	NA
Light Fog	NA	NA	NA	NA	NA	NA	NA
Clear Weather Conditions	9.1%	(5.1, 15.7)	6.4%	(4.2, 9.8)	-2.6	(-8.8, 3.6)	0.39
Motorcycle Riders When							
They Are the Sole Motorcyclist	7.7%	(4.5, 12.9)	7.9%	(5.0, 12.5)	0.2	(-5.7, 6.1)	0.94
They Have a Passenger	6.3%	(1.8, 19.7)	3.5%	(1.2, 9.7)	-2.8	(-12.2, 6.6)	0.54
Motorcyclists in the							
Northeast	12.7%	(5.0, 28.9)	17.4%	(7.6, 35.1)	4.7	(-11.1, 20.5)	0.55
Midwest	3.3%	(1.6, 7.0)	2.4%	(0.7, 7.3)	-1.0	(-4.7, 2.8)	0.60
South	14.3%	(5.2, 33.8)	7.6%	(4.9, 11.6)	-6.7	(-22.6, 9.2)	0.39
West	5.9%	(2.5, 13.3)	6.0%	(1.6, 19.8)	0.1	(-9.0, 9.3)	0.98
Motorcyclists in							
Urban Areas	11.4%	(6.7, 18.8)	9.2%	(5.0, 16.5)	-2.2	(-10.3, 5.9)	0.59
Rural Areas	6.3%	(2.9, 13.2)	5.6%	(3.1, 9.9)	-0.7	(-6.9, 5.5)	0.82
Motorcyclists Traveling During							
Weekdays	8.0%	(4.9, 13.0)	5.5%	(3.6, 8.3)	-2.6	(-7.5, 2.4)	0.29
Weekday Rush Hours	9.7%	(5.3, 17.1)	7.3%	(4.0, 13.1)	-2.4	(-9.8, 5.0)	0.51
Weekday Non-Rush Hours	6.9%	(3.8, 12.1)	4.2%	(2.4, 7.4)	-2.6	(-7.6, 2.3)	0.29
Weekends	9.3%	(4.3, 18.7)	8.7%	(5.1, 14.4)	-0.6	(-9.0, 7.8)	0.89
Motorcycle Riders Who							
Are Riding Alone	7.7%	(4.5, 12.9)	7.9%	(5.0, 12.5)	0.2	(-5.7, 6.1)	0.94
Have a Passenger Using a DOT-Compliant Helmet	NA	NA	NA	NA	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	8.9%	(4.5, 16.9)	6.6%	(3.0, 13.9)	-2.3	(-10.4, 5.9)	0.57
The Rider Is Using a Noncompliant Helmet	NA	NA	NA	NA	NA	NA	NA
The Rider Is Unhelmeted	NA	NA	3.4%	(0.9, 12.1)	NA	NA	NA

¹ Use of helmets that do NOT meet 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 2017 is different from that used in 2016.

⁴ Use rates reflect the laws in effect at the time data was collected.

⁵ Belt use rates, 95% Confidence Interval, annual changes have been rounded to the nearest tenth. Annual changes have been computed based on unrounded estimates and may not equal those based on displayed values.

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 to 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 2017 NOPUS data was collected from June 5 to July 1, 2017, while the 2016 data was collected from June 6 to June 25, 2016.

The NOPUS uses a complex multistage probability sample, statistical data editing, imputation of unknown values, and complex estimation procedures. Table 3 shows the observed sample sizes of the 2017 NOPUS Moving Traffic Survey. A total of 998 motorcyclists were observed on the 839 motorcycles at the 1,887 data collection sites.

Table 3
Sites, Motorcycles, and Motorcyclists Observed

Numbers of	2016	2017	Percentage Change
Sites Observed*	1,893	1,887	-0.32%
Motorcycles Observed	797	839	5.27%
Motorcyclists Observed	939	998	6.28%

*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 2016 and 2017 are identified in Table 1 by a p-value that is 0.05 or less in the table's far-right column.

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 2017 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, 2017

"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.



U.S. Department
of Transportation
**National Highway
Traffic Safety
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NHTSA's National Center for Statistics and Analysis

For More Information

This Research Note was written by Hongying (Ruby) Li and Timothy M. Pickrell, mathematical statisticians in the Mathematical Analysis Division, NCSA, 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 <https://crashstats.nhtsa.dot.gov/#/>

Helmets are estimated to be 37 percent effective in preventing fatal injuries to motorcycle riders and 41 percent for motorcycle passengers (Deutermann, W. [2004] *Motorcycle Helmet Effectiveness Revisited*, Report No. DOT HS 809 715, and Deutermann, W. [2005] *Calculating Lives Saved by Motorcycle Helmets*, Report No. DOT HS 809 861, Washington, DC: National Highway Traffic Safety Administration).

NHTSA estimates that helmets saved the lives of 1,859 motorcyclists in 2016 (Traffic Safety Facts: *Lives Saved in 2016 by Restraint Use and Minimum-Drinking-Age Laws*, Report No. DOT HS 812 454, Washington, DC: National Highway Traffic Safety Administration). For more information on the campaign by NHTSA and the States to raise helmet use, see www.nhtsa.gov/road-safety/motorcycles.

The 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 2017 – Overall Results,” for the latest data on these topics.

The suggested APA format citation for this document is:

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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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