



# Overview of the 2018 Crash Investigation Sampling System

## Summary

In 2018 there were an estimated 2,811,185 police-reported motor vehicle crashes where at least one passenger vehicle (i.e., passenger car or light truck<sup>1</sup>) was towed from the crash scene in the United States, which resulted in an estimated 1,489,413 known injured occupants of in-transport towed passenger vehicles. Among these crashes, 2.7 percent (74,604) were crashes with injury levels rated serious or above, 33.3 percent (935,120) were crashes with moderate or minor injury levels, and 50.9 percent (1,429,853) were crashes with no injury.

## Introduction

The National Highway Traffic Safety Administration is releasing the second year of data from the newly-modernized Crash Investigation Sampling System (CISS) – a replacement of the National Automotive Sampling System Crashworthiness Data System (NASS CDS). NHTSA designed CISS to select a more efficient and flexible sample using updated traffic and demographic information and optimizing the sample to better meet data users' needs. For more information see the Technical Report *Crash Investigation Sampling System: Sample Design and Weighting*. In 2018 motor vehicle traffic crashes that each involved at least one passenger vehicle towed from the scene of the crash were sampled, investigated, and coded at 32 selected sites across the Nation. Weighting procedures were applied to generate nationally representative estimates of such

crashes. This Research Note presents an overall summary of key estimates of crashes in 2018.<sup>2</sup> For a more detailed explanation of the sample design, estimation protocols, and guidance on how to analyze the new data, please refer to the *Crash Investigation Sampling Design: Design Overview, Analytic Guidance and FAQs*. In addition to sample design and weighting enhancements, several improvements were made to information technology infrastructure and operational protocols of CISS to gather more relevant, accurate, and nationally representative data.

## Results

### Crashes

As shown in Table 1 and Figure 1, there were an estimated 2,811,185 police-reported crashes where at least one passenger vehicle was towed from the scene in 2018. The Crash Abbreviated Injury Scale (CAIS) is the basis of Table 1 and Figure 1. CAIS is the most severe injury level among the occupants of towed in-transport CISS-applicable vehicles involved in a crash. There were an estimated 74,604 crashes (56,361+7,781+7,978+2,484) with injury levels of serious or above. Of the estimated 74,604 crashes, 2,484 resulted in the maximum (untreatable) injury level. An estimated 935,120 crashes (792,817+142,303) were minor or moderate injury levels and 1.43 million estimated crashes were no-injury crashes.

<sup>1</sup> Lights trucks include pickups, vans, and SUVs.

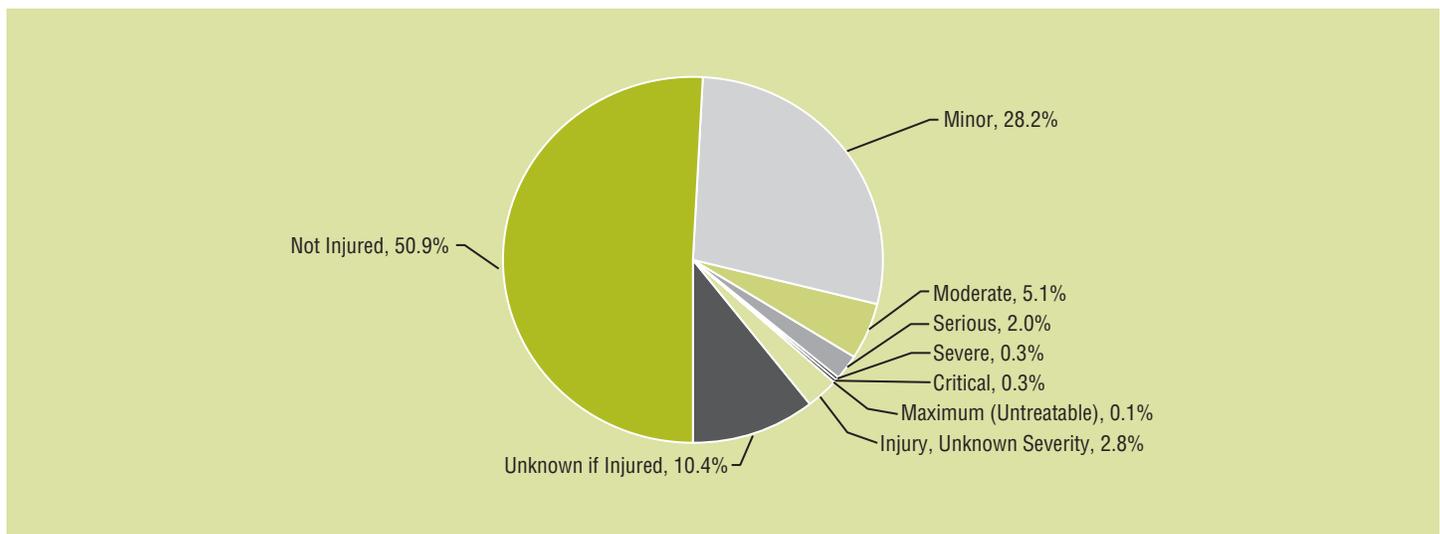
<sup>2</sup> This research note does not include comparisons to the 2017 CISS. For more information on CISS 2017 refer to the *Overview of the 2017 Crash Investigation Sampling System*. Additionally, 2017 CISS was updated in June 2020 which included marginal changes to the data. There were no changes to the summary statistics presented in the *Overview of the 2017 Crash Investigation Sampling System*. However, revisions were made to the previously published CISS *2017 Analytical User's Manual* and *Databook of 2017 CISS*.

Table 1  
**CISS-Applicable Police-Reported Motor Vehicle Crashes in 2018, by Crash AIS**

Crash AIS (CAIS)	Estimates [Standard Error]	Percentage of Total Crashes
0-Not Injured	1,429,853 (41,461)	50.9%
1-Minor	792,817 (87,125)	28.2%
2-Moderate	142,303 (22,387)	5.1%
<b>Subtotal (CAIS-1 to CAIS-2)</b>	<b>935,120</b>	<b>33.3%</b>
3-Serious	56,361 (11,170)	2.0%
4-Severe	7,781 (2,137)	0.3%
5-Critical	7,978 (1,368)	0.3%
6-Maximum (Untreatable)	2,484 (948)	0.1%
<b>Subtotal (CAIS-3 to CAIS-6)</b>	<b>74,604</b>	<b>2.7%</b>
9-Injury, Unknown Severity	78,002 (14,094)	2.8%
<b>Subtotal (CAIS-1 to CAIS-9)</b>	<b>1,087,726</b>	<b>38.7%</b>
99-Unknown If Injured	293,606 (36,959)	10.4%
<b>Total</b>	<b>2,811,185 (91,772)</b>	<b>100.0%</b>

Source: 2018 CISS. Some components may not add to subtotals or totals due to independent rounding.

Figure 1  
**CISS Applicable Police-Reported Motor Vehicle Crashes in 2018, by Crash AIS**



### Vehicles Involved

As shown in Table 2, there were an estimated 4.959 million vehicles involved in police-reported motor vehicle crashes where at least one passenger vehicle was towed

in 2018. Of the 4.959 million vehicles, 2.643 million vehicles were passenger cars (53.3%) and 2.092 million vehicles were light trucks (42.2%).

Table 2  
**Passenger Vehicles Involved in CISS-Applicable Crashes in 2018, by Vehicle Type**

Vehicle Type	Estimates (Standard Error)	Percentage of Total Vehicles
Passenger Cars	2,643,236 (170,700)	53.3%
Light Trucks	2,091,557 (111,742)	42.2%
<b>Subtotal</b>	<b>4,734,793</b>	<b>95.5%</b>
<b>Total*</b>	<b>4,959,460 (225,701)</b>	<b>100.0%</b>

Source: 2018 CISS. Some components may not add to subtotals or totals due to independent rounding.

\*Total includes non-passenger vehicles (i.e., large trucks, motorcycles buses, other, and unknown vehicle types). The results are not displayed because minimal information is collected in CISS on non-passenger vehicles.

## Occupants Involved

Table 3 shows the maximum AIS (MAIS) of occupants of towed in-transport passenger vehicles involved in crashes where at least one passenger vehicle was towed. In 2018 an estimated 4,987,372 occupants were involved in CISS crashes. Of the 4,987,372 occupants, 2,484 (less

than 0.1%) had a maximum (untreatable) injury, 8,443 (0.2%) had a critical injury, 8,215 (0.2%) had a severe injury, 67,233 (1.3%) had a serious injury, 167,118 (3.4%) had a moderate injury, 1,119,614 (22.4%) had a minor injury, and 2,989,517 (59.9%) had no injury.

Table 3

### Occupants of Towed In-Transport Passenger Vehicles Involved in CISS Crashes in 2018, by Maximum AIS

Maximum AIS (MAIS)	Estimates (Standard Error)	Percentage of Total Crashes
0-Not Injured	2,989,517 (103,701)	59.9%
1-Minor	1,119,614 (114,282)	22.4%
2-Moderate	167,118 (25,496)	3.4%
<b>Subtotal (MAIS-1 to MAIS-2)</b>	<b>1,286,732</b>	<b>25.8%</b>
3-Serious	67,233 (11,866)	1.3%
4-Severe	8,215 (2,184)	0.2%
5-Critical	8,443 (1,403)	0.2%
6-Maximum (Untreatable)	2,484 (948)	<0.1%
<b>Subtotal (MAIS-3 to MAIS-6)</b>	<b>86,375</b>	<b>1.7%</b>
9-Injury, Unknown Severity	116,306 (21,739)	2.3%
<b>Subtotal (MAIS-1 to MAIS-9)</b>	<b>1,489,413</b>	<b>29.9%</b>
99-Unknown If Injured	508,441 (59,619)	10.2%
<b>Total</b>	<b>4,987,372 (219,493)</b>	<b>100.0%</b>

Source: 2018 CISS. Some components may not add to subtotals or totals due to independent rounding.

## Improvements in CISS

Several modernization efforts were undertaken in the areas of sample design/estimation, IT infrastructure, and operational protocols/technology to better align sites and data with emerging data needs. This resulted in an up-to-date, relevant independent sample that is scalable and flexible. It was built upon a modern IT infrastructure and uses state-of-the-art data collection technology. Sample design, IT, and data collection improvements include replacement sample for domain vehicles unavailable for inspection, development of a set of data marts, delivery of data in multiple formats, more comprehensive crash scene documentation and diagrams, increased precision of crush measurements, and more detailed injury information.

## Comparisons of CISS with CDS, FARS, and CRSS

Comparisons of CISS estimates with CDS estimates should be performed with caution because they are two completely independent sample surveys designed more than 30 years apart. CISS and CDS have different target populations. CISS targets crashes where at least one passenger vehicle is towed from the scene (for any reason), whereas CDS targeted crashes where at least one pas-

senger vehicle is towed *due to damage*. Also, CISS case selection is based on newer vehicles with higher severity injuries, whereas, CDS case selection was first based on injury severity, then the model year of the vehicle. Since CDS is a subpopulation of CISS, it is possible to combine both data systems. For more information on combining CDS and CISS, refer to the *Crash Investigation Sampling Design: Design Overview, Analytic Guidance and FAQs*.

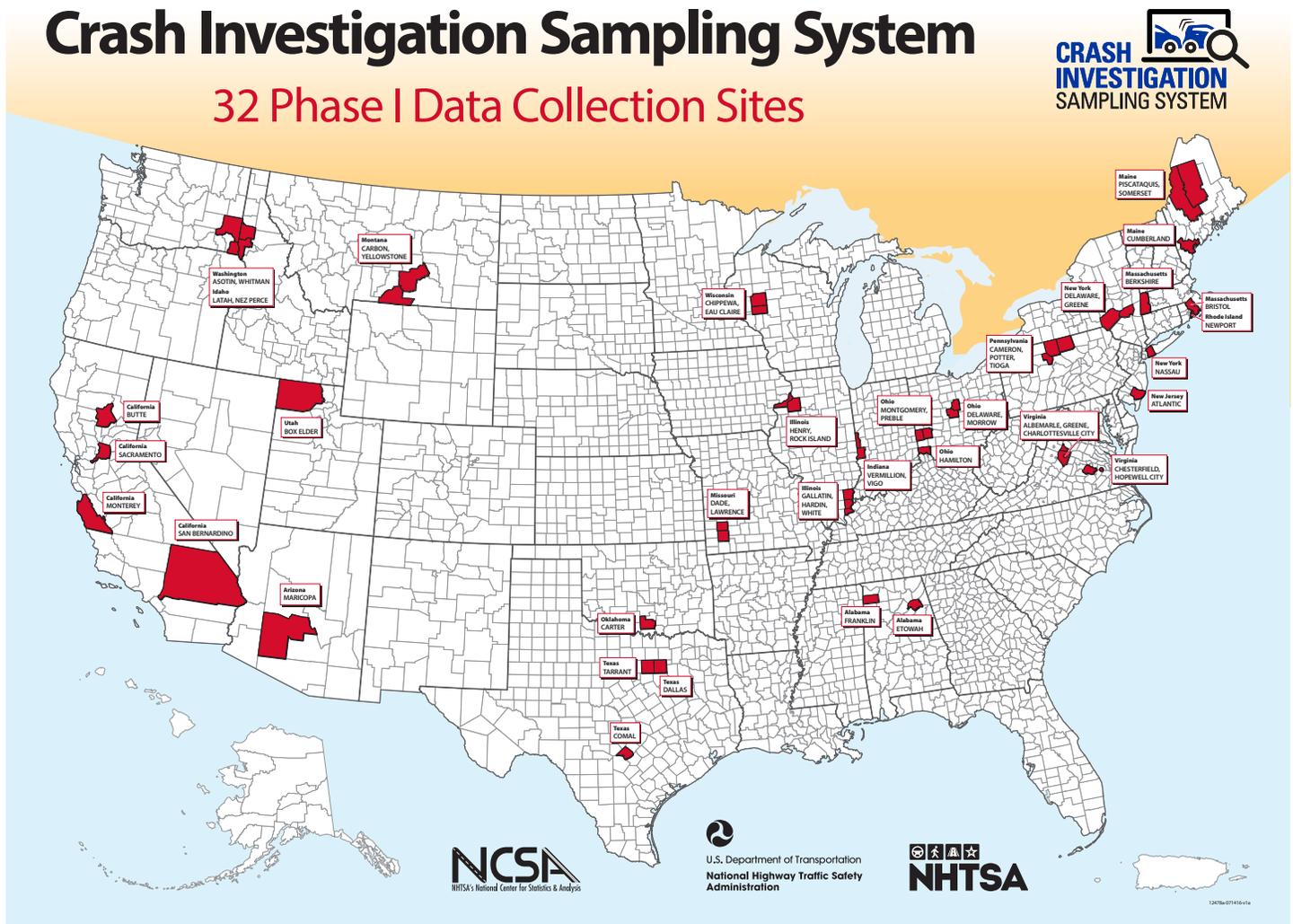
Additionally, the CISS target population is a subpopulation of the Crash Report Sampling System (CRSS) target population. CRSS targets police-reported crashes on a trafficway in the United States. Estimates of total crashes from CISS are similar to the estimates of total crashes from the corresponding CRSS sub-population.

Fatality Analysis Reporting System (FARS) is a national census of fatal crashes. CISS in-scope fatal crashes are also a sub-population of FARS. However, CISS data is normally collected within one or two weeks after the crash while FARS has much longer time to identify and collect fatal crash data. Due to the nature of serious crashes and injury outcomes, CISS fatal crash counts and FARS may not be comparable.

## The 2018 CISS Sample

The map below shows the 32 data collection sites<sup>3</sup> selected for CISS.

Figure 2  
CISS Data Collection Sites



In 2018 CISS selected 2,992 police-reported crashes from 225 police jurisdictions in 32 sites across the country. Each police-reported crash is categorized into 10 analysis domains created based on internal and external data needs. Table 4 shows the target sample allocation for each analysis domain compared to the actual sam-

pled cases for 2018 CISS. The distribution of the 2018 CISS sampled cases is consistent with target sample allocation distribution. Among the 2,992 crashes, 2,683 crashes<sup>4</sup> were eligible to be investigated and included in the final analytic files for estimation.

<sup>3</sup> There were 24 data collection sites in 2017.

<sup>4</sup> Out-of-scope cases and replacement sample cases are not investigated or included in the final analytic files.

Table 4  
**CISS Sample Allocation Versus 2018 CISS Sampled Cases**

CISS Analysis Domains	Description	Target Percentage of Sample Allocation	2018 Percentage of Sampled Cases
1	At least one occupant of towed passenger vehicle is killed	5%	5.5%
2	Crashes not in Stratum 1 involving: • A recent model year passenger vehicle in which at least one occupant is incapacitated.	10%	10.6%
3	Crashes not in Stratum 1 or 2 involving: • A recent model year passenger vehicle in which at least one occupant is non-incapacitated, possibly injured, or injured but severity is unknown	20%	18.9%
4	Crashes not in Stratum 1-3 involving: • A recent model year passenger vehicle in which all occupants are not injured.	15%	14.3%
5	Crashes not in Stratum 1-4 involving: • A mid-model year passenger vehicle in which at least one occupant is incapacitated.	6%	6.4%
6	Crashes not in Stratum 1-5 involving: • A mid-model year passenger vehicle in which at least one occupant is non-incapacitated, possibly injured or injured but severity is unknown.	12%	12.0%
7	Crashes not in Stratum 1-6 involving: • A mid-model year passenger vehicle in which all occupants are not injured.	10%	10.3%
8	Crashes not in Stratum 1-7 involving: • An older model year passenger vehicle in which at least one occupant is incapacitated.	6%	6.6%
9	Crashes not in Stratum 1-8 involving: • An older model year passenger vehicle in which at least one occupant is non-incapacitated, possibly injured or injured but severity is unknown.	10%	9.9%
10	Crashes not in Stratum 1-9 involving: • An older model year passenger vehicle in which all occupants are not injured.	6%	5.6%
<b>Total</b>		<b>100%</b>	<b>100%</b>

Source: 2018 CISS. Components may not add to 100 percent due to independent rounding.

Recent model year (or late model year): vehicles that are <= 4 years old (i.e., any model year of 2014-2019)

Mid-model year: 5-9 years old vehicles (i.e., any model year of 2009-2013)

Older model year: vehicles that are 10 years old or older (i.e., any model year up to 2008)

## Downloading and Analyzing 2017 and 2018 CISS Data

The 2017 CISS can be downloaded here:  
[www.nhtsa.gov/node/97996/176691](http://www.nhtsa.gov/node/97996/176691)

The 2018 CISS can be downloaded here:  
[www.nhtsa.gov/node/97996/280071](http://www.nhtsa.gov/node/97996/280071)

The analytic user's manual can be found here:  
<https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812958>

*Crash Investigation Sampling System: Design Overview, Analytic Guidance, and FAQs* can be found at:  
<https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812801>

*Crash Investigation Sampling System: Sample Design and Weighting* can be found at: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812804>

A databook providing weighted and unweighted univariate distributions of the variables in CISS can be found at: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812960>

## References

- Zhang, F., Subramanian, R., Chen, C.-L., & Noh, E. Y. (2019, September). *Crash Investigation Sampling System: Design overview, analytic guidance, and FAQs* (Report No. DOT HS 812 801). National Highway Traffic Safety Administration. Available at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812801>
- Zhang, F., Noh, E. Y., Subramanian, R., & Chen, C.-L. (2019, September). *Crash Investigation Sampling System: Sample design and weighting* (Report No. DOT HS 812 804). National Highway Traffic Safety Administration. Available at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812804>



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