

# 2019 Massachusetts Safety Belt Usage Observation Study

*Prepared for*

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## Introduction

This report presents the results of the 2019 Safety Belt Usage Observation Study conducted within the Commonwealth of Massachusetts. The observations and report were completed by the University of Massachusetts Traffic Safety Research Program (UMassSafe) located at the University of Massachusetts Amherst. This observational study was conducted as part of an effort to evaluate safety belt usage in the Commonwealth as directed by the Executive Office of Public Safety and Security’s Office of Grants and Research Highway Safety Division (EOPSS/OGR/HSD).

The reported safety belt usage rate in Massachusetts, a secondary law state, has been consistently lower than the national average. The results of the safety belt observation usage surveys in Massachusetts from 2010 – 2019 are presented in Table 1 below.

**Table 1 Massachusetts Safety Belt Usage Rates, 2010-2019**

<b>Observation Year</b>	<b>Observed Safety Belt Usage Rate (Weighted and Rounded)</b>
2010	74%
2011	73%
2012	73%
2013	75%
2014	77%
2015	74%
2016	78%
2017	74%
2018	82%
2019	82%

Source: Highway Safety Division, 2018 Massachusetts Safety Belt Usage Observation Survey

In 2019, the Safety Belt Usage Observation Study consisted of a single stage statewide survey assessing safety belt usage in the Commonwealth of Massachusetts, in compliance with the federal requirements of Uniform Criteria for State Observational Surveys of Seat Belt Use (23 CFR Part 1340).

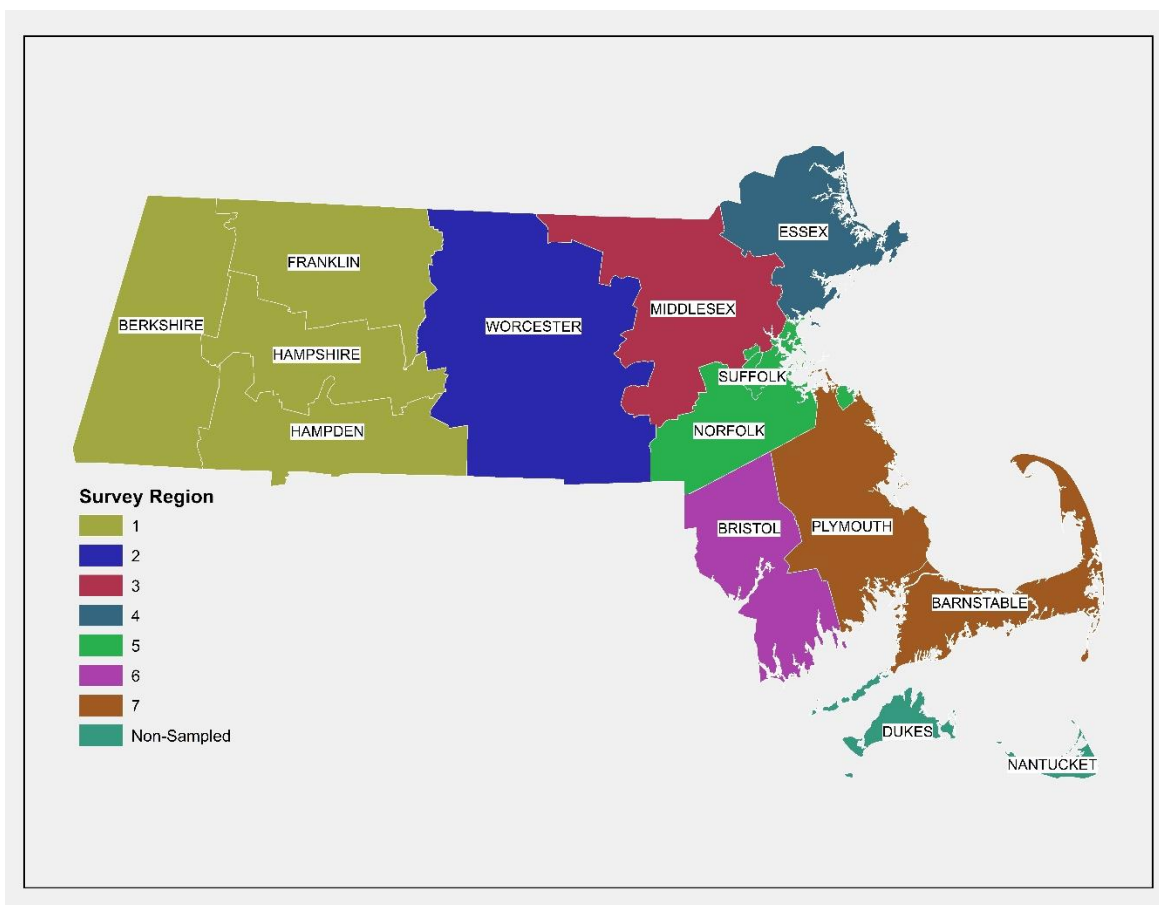
The sampling model used in this effort was developed and approved by the National Highway Traffic Safety Administration (NHTSA) prior to the 2018 study. The sampling plan adopted in 2018 was a departure from the previous protocol that had been employed since 2012. Similar to the previous protocol, current protocol included the sampling of segments for inclusion based upon roadway lengths proportional to the total length within the given stratum. Roadways were stratified based on roadway classification and geographic region, with the observation time period randomly selected to ensure adequate representation of daylight hours.

## Review of Sampling and Observation Approach

Massachusetts is composed of 14 counties, 12 of which account for over 99 percent of the passenger vehicle crash-related fatalities in the state, according to the Fatality Analysis Reporting System (FARS) data average for the period of 2010 to 2014. The regions for the safety belt observations were initially identified using both geographic proximity to one another and the annual traffic fatality count (a measure of importance within the revised sampling guidelines). As a result, the sampling plan included a selection of roadways from 7 regions that are comprised of 12 counties (all but Nantucket and Dukes) as presented in Table 2 and Figure 1. Within each region, 21 hour-long observations were made at randomly assigned time of day/day of week combinations. In total, the observation teams visited 147 locations across the Commonwealth.

**Table 2 Passenger Vehicle Fatality Counts by Developed Region (2010 to 2014)**

Region	County	County		Region	
		Number of Fatalities	Percent of Statewide Fatalities	Number of Fatalities	Percent of Statewide Fatalities
1	Berkshire	57	3%	286	16%
	Franklin	26	2%		
	Hampden	164	9%		
	Hampshire	39	2%		
2	Worcester	268	15%	268	15%
3	Middlesex	232	13%	232	13%
4	Essex	176	10%	176	10%
5	Norfolk	166	9%	293	16%
	Suffolk	127	7%		
6	Bristol	231	13%	231	13%
7	Barnstable	100	6%	291	16%
	Plymouth	191	11%		
Non-Sampled Counties	Dukes	7	0.4%	7	0.4%
	Nantucket	0	0%		



**Figure 1 Massachusetts Counties and Study Regions**

Using 2016 TIGER data developed by the U.S. Census Bureau, a listing of road segments was selected which have been classified by the U.S. Census Bureau using the MAF/TIGER Feature Class Code (MTFCC). There are primarily three roadway classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads (See Table 3 for detailed definitions). In addition, the listings include segment length as determined by TIGER. This descriptive information allowed for stratification of road segments, while a systematic probability proportional to size (PPS) sample was employed to select the road segments to be used as observation sites.

**Table 3 Massachusetts MTFCC Codes Included by Default in the Road Segment File**

Code	Name	Definition
S1100	Primary Road	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Secondary roads are main arteries, usually in the U.S. Highway, State Highway or County Highway System. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	These are generally paved non-arterial streets, roads, or byways that usually have a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.

Although not a variable used for sampling, the day of week/time of day observations were aggregated for analysis consistent with previous years for comparison purposes. The aggregation was as follows and corresponds to the observation periods:

- Weekday A.M. Peak Period (7 a.m. to 10 a.m.)
- Weekday Midday Peak Period (10 a.m. to 3 p.m.)
- Weekday P.M. Peak Period (3 p.m. to 7 p.m.)
- Weekend Period (7 a.m. to 7 p.m.)

Once they had arrived at their assigned location, the two-person teams observed and recorded the following attributes for occupants of passing vehicles:

- Vehicle information:
  - Vehicle type (passenger, pickup truck, SUV, van, small commercial passenger vehicle)
  - State of vehicle license plate (MA, NH, other)
- Shoulder belt usage:
  - Driver seat belt usage
  - Front seat outboard passenger seat belt usage
- Vehicle occupant information
  - Driver gender
  - Driver age category (teenager, adult, elderly adult)
  - Driver apparent race (White, Black, Hispanic, other)
  - Passenger gender
  - Passenger age category (child, teenager, adult, elderly adult)
  - Passenger apparent race (White, Black, Hispanic, other)

Please note that although it was not needed, the approved sampling plan allowed for the addition of sites should the calculated variance not achieve plus/minus 2.5 percent as required with NHTSA protocol.

## ***Results and Discussion***

Between June 4-28, 2019, a total of 22,727 drivers and front outboard passengers in a total of 20,160 vehicles were observed at 147 observation locations. The statistically weighted percentage of front seat occupants properly using seat belts during the observation study was **81.60 percent**. Based upon the variation in the sampling plan, the 95 percent confidence interval ranges between 80.28 and 82.91 percent, with a relative error well below the required 2.5 percent threshold. This number is 0.05 percentage points higher than the same rate observed in 2018 and is representative of the highest ever observed rate in Massachusetts. In an unweighted format, the percentage of belt usage was 84.15, a slight decrease from the value of 84.99 in 2018. Table 4 presents a breakdown of observed variables in a weighted format while providing a comparison to both 2017 and 2018. The change in percent (i.e., not percent change) of usage by variable from 2018 to 2019 is also presented in Table 4.

Given the 0.02 percentage point increase (81.58% to 81.60%) in the observed weighted seat belt usage rate, additional consideration across variables is warranted. Some of the interesting findings include, but are not limited to the following:

- Female drivers and occupants continue to have a higher observed belt usage rate than males at 86.95 percent and 76.81 percent, respectively. Within the observation sample of those with known belt status and gender, males accounted for 52.0 percent of the total occupants observed, with females accounting for 47.2 percent of the total occupants observed.
- Each age group observed minimal changes in observed seat belt usage from 2018. However, the largest change was among teens where the observed usage rate decreased by 2.8 percentage points to 84.09 percent. That said, similar to previous years, adults had the lowest weighted percent belted at 80.9 percent, albeit a slight increase from 2018.
- In the category of apparent race, Hispanic and ‘other’ occupants had the most significant decrease in observed belt usage, decreasing 2.66 and 2.72 percentage points, respectively. Hispanic occupants continue to have the lowest usage rate in comparison to Black, White, and other occupants.
- For State of Vehicle Registration, 91.6 percent of occupants were observed in Massachusetts registered vehicles, with a belt use of 81.5 percent, a slight increase of 0.1 percentage points from 2018. The observed seat belt usage for vehicles registered in New Hampshire or another state was 77.1 percent and 85.7 percent, respectively. The observed belt usage rate of vehicles registered in New Hampshire remains the lowest, including a decrease of 3.25 percentage points from 2018.
- Occupants from all vehicle types had relatively minor changes in belt use from 2018; however, the most significant being that of commercial vehicle occupants (54.1% in 2018 to 57.7% in 2019). In addition, occupant usage rates in pick-up trucks had a slight increase to 68.4%. Although commercial vehicles and pick-up trucks had a significantly lower occupancy rate as compared to passenger cars and SUVs, they continued to have drastically lower usage rates, similar to recent years.
- By time of day, the Weekday observations remained similar to the results from 2018; however, the AM Peak was the only time period with usage decrease (0.8%). The PM Peak and Midday peaks resulted in an increase of 2.1 and 3.2 percentage points, respectively. Although the Weekend observation total was significantly lower than the Weekday time periods, there was still a large decrease of 8.5 percentage points from 2018 (86.6% in 2018, 78.1% in 2019).
- Geographically, Region 1 (Western Mass) and Region 2 (Worcester County) had the largest decreases from 2018 to 2019, with 4.7 and 2.2 percent decreases respectively. Region 4 (Essex) and Region 7 (Cape) had the largest increase in belt usage, with 2.6 and 4.7 percent increases respectively. Of note, Region 4 (Essex) had the highest observed rate at 84.4 percent, while Region 2 (Worcester) at 76.0 percent had the lowest.
- Passenger presence was again significant. For drivers observed without a passenger, the observed usage rate was 81.0 percent. By comparison, drivers with a passenger had an observed usage rate of 82.8 percent. That said, front outboard passengers were observed to be wearing their belt 83.9 percent of the time.
- In the category of Roadway Classification, there was not a drastic change in belt usage across all three categories. Belt usage on Secondary (Arterial) roadways was the highest at 86.1 percent. Primary (Interstate) roads had a belt usage rate of 84.4 percent. Local roads had the lowest seat belt usage rate, at 78.9 percent.

**Table 4 Summary of Weighted Study Data by Observation Variable with Known Belt Status**

Observation Variable	2019 Data		2018 Data	2017 Data	Percentage Point Change (2019 vs. 2018)
	Total Observed Occ. with Known Belt Status	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	
<b>All Vehicle Occupants</b>	22,727	81.60%	81.58%	73.72%	0.02
<b>Gender</b>					
Male	11,828	76.81%	77.77%	67.44%	-0.96
Female	10,738	86.95%	86.69%	80.92%	0.25
Status Unknown	161	80.70%	73.66%	69.98%	7.04
<b>Apparent Age</b>					
Child (passenger <12)	181	93.25%	93.48%	89.29%	-0.24
Teen	954	84.09%	86.89%	82.26%	-2.80
Adult	18,882	80.88%	80.74%	72.36%	0.14
Elder Adult (>65)	2,621	85.34%	85.74%	80.54%	-0.40
Status Unknown	89	80.62%	69.12%	57.89%	11.50
<b>Apparent Race</b>					
Black	1,123	79.12%	78.75%	66.67%	0.37
Hispanic	1,079	71.56%	74.22%	56.14%	-2.66
White	18,982	82.18%	81.65%	75.28%	0.53
Other	1,384	84.17%	86.89%	81.85%	-2.72
Status Unknown	159	79.28%	80.78%	72.58%	-1.50
<b>State of Vehicle Registration</b>					
Massachusetts	20,826	81.48%	81.38%	73.39%	0.10
New Hampshire	526	77.08%	80.34%	71.13%	-3.25
Out of State (Other)	1,331	85.70%	86.05%	81.50%	-0.35
Unknown	44	83.77%	84.97%	83.21%	-1.19
<b>Vehicle Type</b>					
Passenger Car	9,298	83.04%	84.30%	75.57%	-1.26
Pick-Up Truck	2,306	68.44%	68.02%	57.29%	0.42
SUV	8,784	87.16%	85.71%	79.92%	1.45
Van	896	84.33%	86.94%	80.60%	-2.60
Commercial Vehicle	1,405	57.72%	54.10%	45.60%	3.62
Unknown (other)	38	76.58%	85.33%	n/a	-8.75
<b>Time of Day/Day of Week</b>					
A.M. Peak – Weekday	7,390	80.21%	81.01%	72.84%	-0.80
Midday Peak – Weekday	7,982	82.44%	79.21%	71.76%	3.23
P.M. Peak – Weekday	6,687	82.57%	80.46%	74.13%	2.10
Weekend	668	78.12%	86.58%	75.00%	-8.45
<b>Observation Region</b>					
Region 1	2,503	79.06%	83.76%	73.02%	-4.70
Region 2	2,210	76.02%	78.24%	76.20%	-2.22
Region 3	4,579	82.64%	83.60%	73.98%	-0.96
Region 4	4,006	84.38%	81.76%	73.24%	2.62
Region 5	3,502	83.98%	85.06%	75.46%	-1.07
Region 6	3,352	79.46%	79.97%	72.51%	-0.51
Region 7	2,575	82.46%	77.75%	70.99%	4.71
<b>Occupant Role</b>					
Driver Alone	16,778	80.99%	80.14%	72.34%	0.85
Driver with Passenger	3,076	82.78%	85.45%	75.98%	-2.67
Passenger	2,873	83.90%	84.42%	77.59%	-0.52
<b>Roadway Classification</b>					
Primary (Interstate)	2,159	84.42%	82.70%	80.61%	1.72
Secondary (Arterial)	6,883	86.09%	83.77%	73.84%	2.32
Local (All others)	13,685	78.94%	79.62%	72.82%	-0.68