

2018 Massachusetts Safety Belt Usage Observation Study

Prepared for

Highway Safety Division
Office of Grants & Research
Executive Office of Public Safety & Security
10 Park Plaza, Suite 3720
Boston, MA 02116
Phone: (617) 725-3301

Prepared by

University of Massachusetts Traffic Safety Research Program



University of Massachusetts Amherst
142 Marston Hall
Amherst, MA 01003
Phone: (413) 545-0228
UMassSafe@ecs.umass.edu

Date

July 20, 2018

Introduction

This report presents the results of the 2018 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 2007 – 2017 are presented in Table 1 below.

Table 1 Massachusetts Safety Belt Usage Rates, 2007-2017

Observation Year	Observed Safety Belt Usage Rate (Weighted and Rounded)
2007	69%
2008	67%
2009	74%
2010	74%
2011	73%
2012	73%
2013	75%
2014	77%
2015	74%
2016	78%
2017	74%

Source: Highway Safety Division, 2015 Massachusetts Safety Belt Usage Observation Survey

In 2018, 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%		

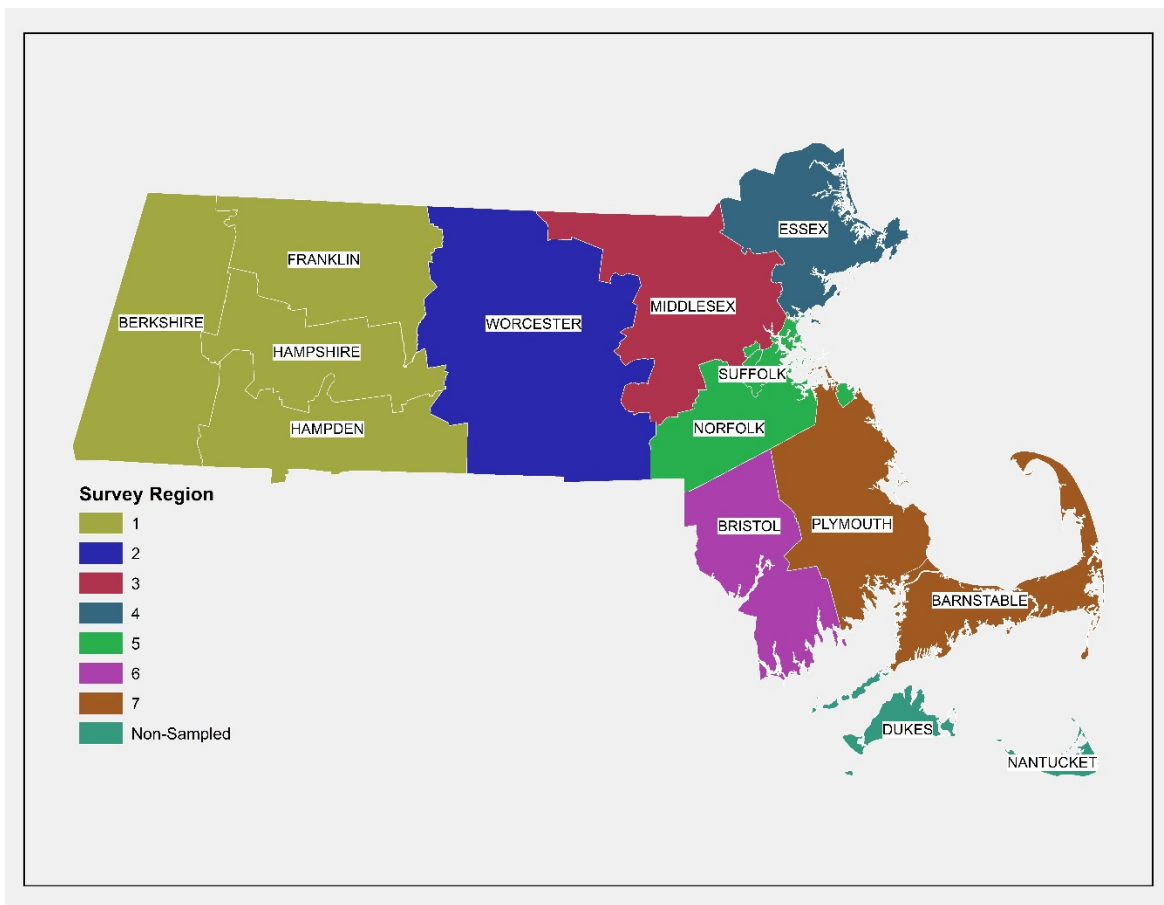


Figure 1 Massachusetts Counties and Study Regions

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 May 30 and June 23, 2018, a total of 28,265 drivers and front outboard passengers in a total of 24,145 vehicles were observed at 147 observation locations. The statistically weighted percentage of front seat occupants properly using seat belts during the observation study was **81.58 percent**. Based upon the variation in the sampling plan, the 95 percent confidence interval ranges between 80.06 and 83.10 percent, with a relative error well below the required 2.5 percent threshold. This number is 7.9 percentage points higher than the same rate observed in 2017 and is representative of the highest ever observed rate in Massachusetts. In an unweighted format, the percentage of belt usage was 84.99, an increase from the value of 77.53 in 2017. Table 4 presents a breakdown of observed variables in a weighted format while providing a comparison to both 2016 and 2017. The change in percent (i.e., not percent change) of usage by variable from 2017 to 2018 is also presented in Table 4.

Given the 7.9 percentage point increase (73.72% to 81.58%) 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:

- By gender, observed male occupants had an increase of 10.3 percentage points from 2017 to 2018. Similarly, female occupants also had an increase of 5.8 percentage points. Females continue to have a higher observed belt usage rate than males at 86.7 percent and 77.8 percent, respectively. Within the observation sample of those with known belt status and gender, males accounted for 56.6 percent of the total occupants observed, with females accounting for 43.0 percent of the total occupants observed.
- Each age group observed saw an increase in observed belt usage of some kind. The largest increase of known observed age was among adults where the observed usage rate increased by 8.4 percentage points to 80.7 percent. Again, similar to previous years, adults had the lowest weighted percent belted at 80.7 percent; despite the aforementioned increase from 2017. Of the 229 children (less than 12 years of age) observed as front outboard passengers the observed usage rate was 93.5 percent.
- In the category of apparent race, Hispanic occupants had a highly significant increase in observed belt usage, increasing from 56.1 percent to 74.2 percent. Despite the dramatic increase from 2017, Hispanic occupants continue to have the lowest usage rate in comparison to Black, White, and other occupants. Every category of apparent race increased in the observed usage rate as compared to 2017.
- For State of Vehicle Registration, 92.5 percent of occupants were observed in Massachusetts registered vehicles, with a belt use of 81.4 percent, an increase of 8.0 percentage points from 2017. The observed seat belt usage for vehicles registered in New Hampshire or another state were 80.3 percent and 86.1 percent, respectively.
- Occupants from all vehicle types had an observed increase in belt use, with the most significant being that of pick-up truck occupants (57.3% in 2017 to 68.0% in 2018). However, the rate of pick-up truck vehicles was much lower compared to occupancy rates of passenger cars and SUVs, which had a belt use of 84.3 percent and 85.7 percent, respectively. The observed belt rate for vans was 86.9 percent and 54.1 percent for commercial vehicles, though these vehicle types had significantly lower occupancy rates.
- By time of day, the observed rate was higher in all observation time periods in 2018 than in 2017. Of note, the highest observed rate was during the Weekends (86.6%), followed by AM Peak (81.0%), PM Peak (80.5%) and Midday Peaks (79.2%).
- Regionally, Region 1 (Western Mass) and Region 3 (Middlesex County) had the largest increases from 2017 to 2018, with 10.7 and 9.6 percent increases respectively. Region 2 (Worcester) was the only region which did not see a noticeable increase from the 2017 belted rate. Of note, Region 5 also had the highest observed rate at 85.1 percent, while Region 7 (Cape) at 77.8 percent had the lowest.
- Passenger presence was again significant. Of drivers observed alone, the observed usage rate was 80.1 percent. By comparison, drivers with a passenger had an observed usage rate of 85.5 percent. Front outboard passengers were observed to be wearing their belt 84.4 percent of the time.
- Unlike trends in previous years, belt usage increased across all three of the observed roadway types. Belt usage on Secondary (Arterial) roadways was the highest at 83.8 percent. Primary (Interstate) roads had a belt usage rate of 82.7 percent. Local roads had the lowest seat belt usage rate, at 79.6 percent.

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

Observation Variable	2018 Data		2017 Data		2016 Data	Change in Percentage (2018 vs. 2017)
	Total Observed Occ. with Known Belt Status	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	
All Vehicle Occupants	28,265	81.58%	73.72%	78.23%	78.23%	7.86%
Gender						
Male	15,989	77.77%	67.44%	72.63%	72.63%	10.33%
Female	12,160	86.69%	80.92%	84.55%	84.55%	5.78%
Status Unknown	116	73.66%	69.98%	80.68%	80.68%	3.68%
Apparent Age						
Child (passenger <12)	229	93.48%	89.29%	93.16%	93.16%	4.19%
Teen	822	86.89%	82.26%	82.88%	82.88%	4.63%
Adult	23,824	80.74%	72.36%	77.01%	77.01%	8.38%
Elder Adult (>65)	3,340	85.74%	80.54%	86.29%	86.29%	5.20%
Status Unknown	50	69.12%	57.89%	88.53%	88.53%	11.23%
Apparent Race						
Black	1,386	78.75%	66.67%	73.94%	73.94%	12.08%
Hispanic	714	74.22%	56.14%	68.63%	68.63%	18.08%
White	24,639	81.65%	75.28%	78.93%	78.93%	6.38%
Other	1,444	86.89%	81.85%	80.96%	80.96%	5.04%
Status Unknown	82	80.78%	72.58%	66.66%	66.66%	8.20%
State of Vehicle Registration						
Massachusetts	26,140	81.38%	73.39%	78.06%	78.06%	7.99%
New Hampshire	668	80.34%	71.13%	77.09%	77.09%	9.20%
Out of State (Other)	1,370	86.05%	81.50%	83.07%	83.07%	4.55%
Unknown	87	84.97%	83.21%	68.10%	68.10%	1.75%
Vehicle Type						
Passenger Car	12,074	84.30%	75.57%	78.07%	78.07%	8.73%
Pick-Up Truck	2,834	68.02%	57.29%	63.69%	63.69%	10.73%
SUV	10,523	85.71%	79.92%	84.24%	84.24%	5.79%
Van	1,165	86.94%	80.60%	83.75%	83.75%	6.34%
Commercial Vehicle	1,606	54.10%	45.60%	55.63%	55.63%	8.50%
Unknown (other)	63	85.33%				
Time of Day/Day of Week						
A.M. Peak – Weekday	10,632	81.01%	72.84%	78.18%	78.18%	8.17%
Midday Peak – Weekday	7,754	79.21%	71.76%	76.64%	76.64%	7.45%
P.M. Peak – Weekday	4,041	80.46%	74.13%	81.14%	81.14%	6.34%
Weekend	5,838	86.58%	75.00%	78.74%	78.74%	11.58%
Observation Region						
Region 1	3,020	83.76%	73.02%	79.12%	79.12%	10.74%
Region 2	3,048	78.24%	76.20%	79.67%	79.67%	2.03%
Region 3	4,381	83.60%	73.98%	83.41%	83.41%	9.62%
Region 4	5,562	81.76%	73.24%	78.59%	78.59%	8.52%
Region 5	4,307	85.06%	75.46%	78.56%	78.56%	9.60%
Region 6	4,271	79.97%	72.51%	72.39%	72.39%	7.46%
Region 7	3,676	77.75%	70.99%	75.99%	75.99%	6.76%
Occupant Role						
Driver Alone	20,064	80.14%	72.34%	76.31%	76.31%	7.80%
Driver with Passenger	4,093	85.45%	75.98%	82.09%	82.09%	9.47%
Passenger	4,127	84.42%	77.59%	83.85%	83.85%	6.82%
Roadway Classification						
Primary (Interstate)	3,437	82.70%	80.61%	84.44%	84.44%	2.09%
Secondary (Arterial)	10,858	83.77%	73.84%	78.94%	78.94%	9.94%
Local (All others)	13,970	79.62%	72.82%	77.40%	77.40%	6.80%