

# 2016 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  
Tel 413.545.0228  
UMassSafe@ecs.umass.edu

*Date*

July 14, 2016

## Introduction

This report presents the results of the 2016 safety belt 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 Highway Safety Division (EOPSS-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 2000 – 2015 are presented in Table 1 below.

**Table 1 Massachusetts Safety Belt Usage Rates, 2006-2015**

<b>Observation Year</b>	<b>Observed Safety Belt Usage Rate (Weighted and Rounded)</b>
2006	67%
2007	69%
2008	67%
2009	74%
2010	74%
2011	73%
2012	73%
2013	75%
2014	77%
2015	74%

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

In 2016, the safety belt study once again consisted of a single stage statewide survey that assessed 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).

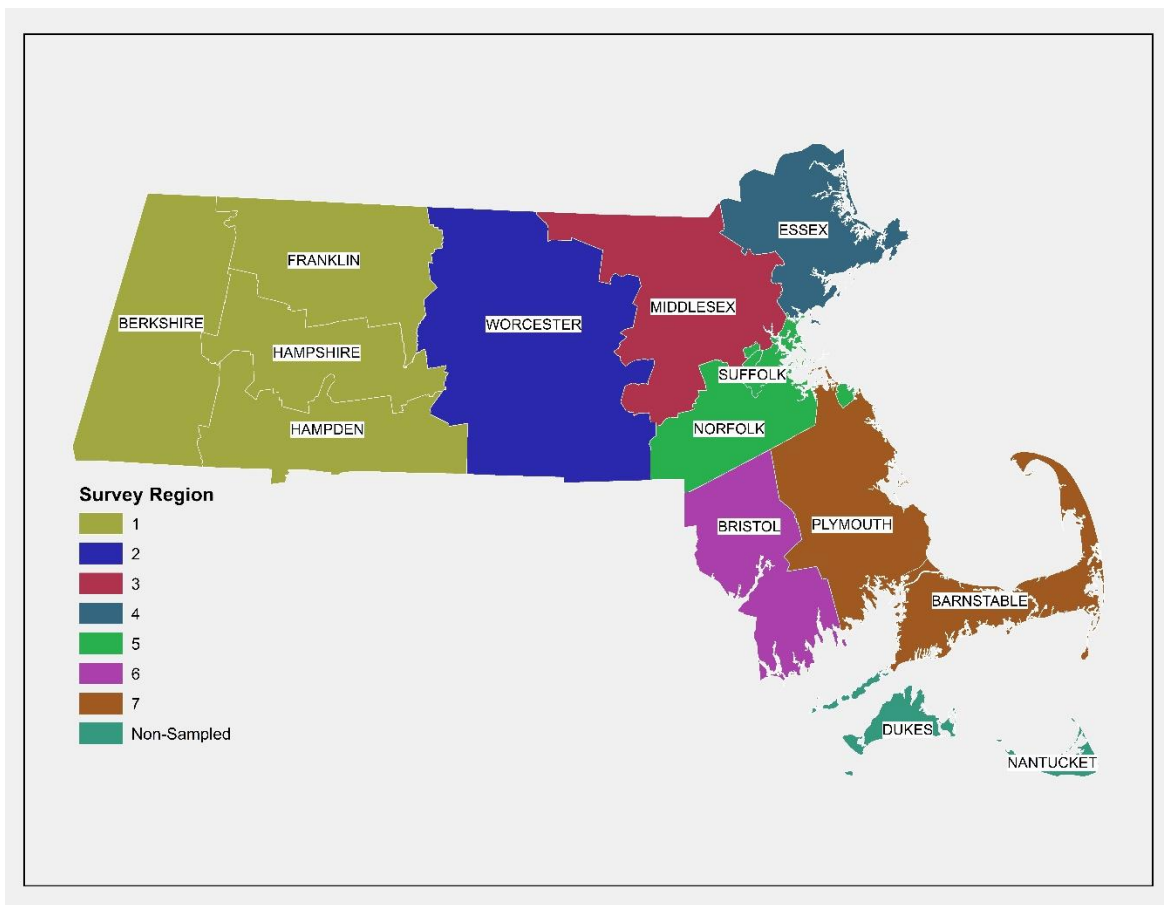
The sampling model used in this effort was developed and approved by the National Highway Traffic Safety Administration (NHTSA) prior to the 2012 study. The sampling plan adopted in 2012 was a departure from the previous protocol which had been employed since 2009. The most significant difference in the new protocol is the sampling of segments for inclusion based upon roadway lengths proportional to the total length within the given stratum. The previous model utilized the Massachusetts Statewide Travel Demand Model in order to stratify roadways with the probability of a segment being selected dependent on the proportion of road segment traffic volumes to the total volumes of all segments in the corresponding 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 approximately 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 2007 to 2011. 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, 20 or 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 (2007 to 2011)**

Region	County	County		Region	
		Number of Fatalities	Percent of Statewide Fatalities	Number of Fatalities	Percent of Statewide Fatalities
1	Berkshire	65	4%	291	16%
	Franklin	27	1%		
	Hampden	159	9%		
	Hampshire	40	2%		
2	Worcester	269	15%	269	15%
3	Middlesex	278	15%	278	15%
4	Essex	180	10%	180	10%
5	Norfolk	163	9%	298	16%
	Suffolk	135	7%		
6	Bristol	230	13%	230	13%
7	Barnstable	98	5%	271	15%
	Plymouth	173	9%		
Non-Sampled Counties	Dukes	4	0%	5	0%
	Nantucket	1	0%		



**Figure 1 Massachusetts Counties and Study Regions**

Using 2010 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 and a systematic probability proportional to size (PPS) sample was employed to select the road segments that would 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 am to 10 am)
- Weekday Midday Peak Period (10 am to 3 pm)
- Weekday P.M. Peak Period (3 pm to 7 pm)
- Weekend Period (7 am to 7 pm)

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

- Vehicle information:
  - Vehicle type (passenger, pickup truck, SUV, minivan, 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. The majority of sites observed in 2016 were consistent with those observed during previous years.

## *Results and Discussion*

Between May 24, and June 24, 2016 a total of 27,142 drivers and front outboard passengers in a total of 27,234 vehicles were observed at 147 observation locations. The statistically weighted percentage of front seat occupants properly using seat belts during the observation study was **78.23 percent**. Based upon the variation in the sampling plan, the 95% confidence interval ranges between 76.82 and 79.64 percent, with a relative error well below the required 2.5 percent threshold. This number is 4.2 percentage points higher than the same rate observed in 2015, and represented the highest ever reported usage rate in Massachusetts. In an unweighted format, the percentage of belt usage was 82.05, and increase from the value of 74.14 in 2015. Table 4 presents a breakdown of observed variables in a weighted format and provides a comparison to both 2014 and 2015. Also presented in Table 4 is the change in percent (i.e., not percent change) of usage by variable from 2015 to 2016.

Given the nearly 4 percentage point increase (74.05% to 78.235%) 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 6.0 percentage points from 2015 to 2016. Similarly, female occupants also had an increase of 2.1 percentage points. Females continue to have a higher observed belt usage rate than males at 84.6 percent and 72.6 percent, respectively. Within the observation sample of those with known belt status and gender, males accounted for 53.11 percent of the total occupants observed, with females accounting for 46.89 percent of the occupants observed.
- Each age groups observed saw an increase in observed belt usage of some kind. The largest increase was among elder adults where the observed usage rate climbed by 6.8 percentage points to 86.29 percent. Once again, adults had the lowest weighted percent belted at 77.01 percent; however this value is 4.1 percentage points higher than the same value in 2015. Of the 218 children (less than 12 years of age) observed as front outboard passengers the observed usage rate was 93.2 percent.
- In the category of apparent race, Hispanic occupants had a highly significant increase in the observed belt usage, increasing from 51.8 to 68.6 percent. Of note, the 2016 rate for Hispanic occupants is very similar to the observed rate in 2014 (68.5%). Hispanic occupants continue to have the lowest usage rate in comparison to Black, White, and other occupants. On a positive note, for each category in which the apparent race was known, the observed usage rate was higher than the rate in 2015.
- For State of Vehicle Registration, 94.41 percent of occupants were observed in Massachusetts registered vehicles, with a belt use of 78.1, which is an increase of 4.5 percentage points from 2015. The observed seat belt usage for vehicles registered in New Hampshire or another state were 77.1 percent and 83.1 percent, respectively.
- Occupants from all vehicle types had an observed increase in belt use, with the most significant being that off pick-up truck occupants (54.3% in 2015 to 63.7% in 2016) and commercial vehicles (46.3% in 2015 to 55.6 percent in 2016). The rates of these vehicle occupants are still significantly lower than other vehicle types. By comparison the observed rate of SUV (84.27%), Vans (83.86%), and passenger car (78.1%) occupants were notably higher.
- By time of day, the observed rate was higher in all four observation time periods in 2016 than in 2015. Of note, the highest observed rate was during the PM Peak (81.1%), followed by Weekends (78.7%), AM Peak (78.2%) and Middays (76.6%).
- Regionally, only Region 2 (Worcester County) had a slight decrease from 2015 to 2016 (80.5% in 2015 to 79.7% in 2016). Sizable increases of 10.7 and 8.6 percentage points were observed in Region 3 (Middlesex County) and Region 4 (Essex County), respectively. Of note, Region 3 also had the highest observed rate at 83.4 percent, while Region 6 (Bristol County) at 72.4 had the lowest.
- Passenger presences was again significant. Of drivers observed alone, the observed usage rate was 76.3 percent. By comparison, drivers with a passenger had an observed usage rate of 82.1 percent. Front outboard passengers were observed to be wearing their belt 83.9 percent of the time. All three categories of passenger status are reflective of a higher rate in 2016 than 2015.
- Belt use increase across all three of the observed roadway types. Similarly to previous years, belt use on Primary (Interstate) roadways was the highest at 84.4 percent. Secondary roads had increase of 4.9 percentage points (from 74.2% in 2015 to 78.9% in 2016), which was followed closely by the 4.3 percentage point increase in the usage rate along Local roads (73.2% in 2015 to 77.4% in 2016)

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

Observation Variable	2016 Data		2015 Data	2014 Data	Change in Percentage (2016 vs. 2015)
	Total Observed Occ. with Known Belt Status	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	
All Vehicle Occupants	27,142	78.23	74.05	76.57	4.18%
<b>Gender</b>					
Male	14,372	72.63	66.68	71.23	6.03%
Female	12,689	84.55	82.59	82.91	2.06%
Status Unknown	78	80.68	85.71	77.15	-4.93%
<b>Apparent Age</b>					
Child (passenger <12)	218	93.16	93.11	94.13	0.16%
Teen	566	82.88	79.35	80.25	3.63%
Adult	23,516	77.01	73.05	75.22	4.05%
Elder Adult (>65)	2,823	86.29	79.61	81.61	6.78%
Status Unknown	14	88.53	84.62	57.15	4.02%
<b>Apparent Race</b>					
Black	1,684	73.94	70.54	74.86	3.49%
Hispanic	1,003	68.63	51.81	68.54	16.89%
White	23,659	78.93	75.27	76.91	3.75%
Other	663	80.96	79.48	83.72	1.58%
Status Unknown	123	66.66	73.68	84.85	-6.93%
<b>State of Vehicle Registration</b>					
Massachusetts	25,619	78.06	73.63	76.35	4.52%
New Hampshire	491	77.09	70.93	68.96	6.25%
Out of State (Other)	1,025	83.07	84.29	84.81	-1.12%
Unknown	7	68.10	75.00	70.31	-6.81%
<b>Vehicle Type</b>					
Passenger Car	12,946	78.07	75.47	77.48	2.70%
Pick-Up Truck	2,741	63.69	54.32	60.04	9.44%
SUV	9,055	84.24	81.37	82.61	2.97%
Van	1,480	83.75	81.66	80.74	2.19%
Commercial Vehicle	917	55.63	46.26	55.49	9.42%
Unknown	0	N/A	N/A	54.68	N/A
<b>Time of Day/Day of Week</b>					
A.M. Peak – Weekday	7,436	78.18	75.30	73.49	2.97%
Midday Peak – Weekday	10,508	76.64	71.40	75.94	5.33%
P.M. Peak – Weekday	5,156	81.14	76.97	78.52	4.26%
Weekend	4,042	78.74	76.47	76.99	2.36%
<b>Observation Region</b>					
Region 1	4,266	79.12	77.67	76.63	1.54%
Region 2	3,091	79.67	80.51	80.68	-0.74%
Region 3	4,329	83.41	72.78	78.22	10.72%
Region 4	3,420	78.59	70.09	74.82	8.59%
Region 5	4,776	78.56	76.20	78.38	2.44%
Region 6	4,777	72.39	70.49	72.93	1.99%
Region 7	2,483	75.99	72.46	72.97	3.62%
<b>Occupant Role</b>					
Driver Alone	19,261	76.31	72.92	74.64	3.48%
Driver with Passenger	4,115	82.09	76.92	80.89	5.27%
Passenger	3,766	83.85	76.32	80.66	7.62%
<b>Roadway Classification</b>					
Primary (Interstate)	2,142	84.44	81.11	84.68	3.43%
Secondary (Arterial)	4,811	78.94	74.17	78.14	4.85%
Local (All others)	20,189	77.40	73.23	75.04	4.26%