2017 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, 2017

Introduction

This report presents the results of the 2017 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 2006 – 2016 are presented in Table 1 below.

Table 1 Massachusetts Safety Belt Usage Rates, 2006-2016

Observation Year	Observed Safety Belt Usage Rate (Weighted and Rounded)
2006	67%
2007	69%
2008	67%
2009	74%
2010	74%
2011	73%
2012	73%
2013	75%
2014	77%
2015	74%
2016	78%

Source: Highway Safety Division, 2016 Massachusetts Safety Belt Usage Observation Survey

In 2017, 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%		

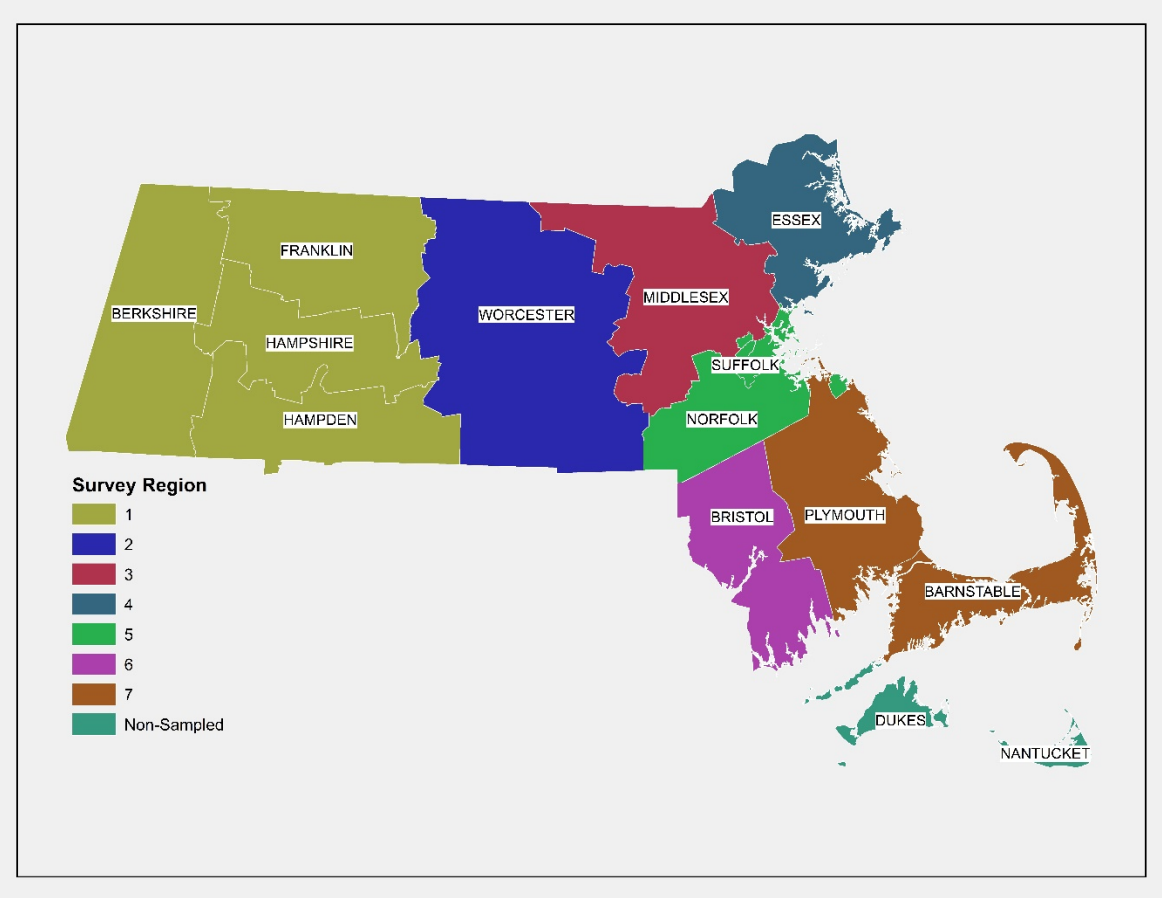

Figure 1 Massachusetts Counties and Study Regions

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 2017 were consistent with those observed during previous years.

Results and Discussion

Between May 31, and June 23, 2017 a total of 28,472 drivers and front outboard passengers in a total of 24,050 vehicles were observed at 147 observation locations. The statistically weighted percentage of front seat occupants properly using seat belts during the observation study was **73.72 percent.** Based upon the variation in the sampling plan, the 95% confidence interval ranges between 71.46 and 75.97 percent, with a relative error well below the required 2.5 percent threshold. This number is 4.5 percentage points lower than the same rate observed in 2016. In an unweighted format, the percentage of belt usage was 77.53, a decrease from the value of 82.05 in 2016. Table 4 presents a breakdown of observed variables in a weighted format and provides a comparison to both 2015 and 2016. 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 4.5 percentage point decrease (78.23% to 73.72%) 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 a decrease of 5.2 percentage points from 2016 to 2017. Similarly, female occupants also had a decrease of 3.6 percentage points. Females continue to have a higher observed belt usage rate than males at 80.9 percent and 67.4 percent, respectively. Within the observation sample of those with known belt status and gender, males accounted for 53.2 percent of the total occupants observed, with females accounting for 46.7 percent of the occupants observed.
- Each age group observed saw a decrease in observed belt usage of some kind. The largest decrease was among elder adults where the observed usage rate fell by 5.8 percentage points to 80.5 percent. Once again, adults had the lowest weighted percent belted at 72.4 percent; a value that is 4.6 percentage points lower than the same value in 2016. Of the 262 children (less than 12 years of age) observed as front outboard passengers the observed usage rate was 89.3 percent.
- In the category of apparent race, Hispanic occupants had a highly significant decrease in the observed belt usage, decreasing from 68.6 percent to 56.1 percent. Hispanic occupants continue to have the lowest usage rate in comparison to Black, White, and other occupants. With the exception of "Other" occupants, each category in which the apparent race was known saw a decrease in the observed usage rate as compared to 2016.
- For State of Vehicle Registration, 93.5 percent of occupants were observed in Massachusetts registered vehicles, with a belt use of 73.4 percent, which is a decrease of 4.7 percentage points from 2016. The observed seat belt usage for vehicles registered in New Hampshire or another state were 71.1 percent and 81.5 percent, respectively.
- Occupants from all vehicle types had an observed decrease in belt use, with the most significant being that of pick-up truck occupants (63.7% in 2016 to 57.3% in 2017) and commercial vehicles (55.6 percent in 2016 to 45.6 in 2017). The rates of these vehicle occupants are still significantly lower than other vehicle types. By comparison the observed rate of SUV (79.9%), Vans (80.6%), and passenger car (75.6%) occupants were notably higher.
- By time of day, the observed rate was lower in all observation time periods in 2017 than in 2016. Of note, the highest observed rate was during the Weekends (75.0%), followed by PM Peak (74.1%), AM Peak (72.8%) and Middays (71.8%).
- Regionally, Region 1 (Western Mass) and Region 3 (Middlesex County) had the largest decreases from 2016 to 2017, 6.1 and 9.4 percent drops respectively. Region 6 (Bristol County) was the only region which did not see a noticeable decrease from the 2016 belted rate. Of note, Region 2 also had the highest observed rate at 76.2 percent, while Region 7 (Cape) at 70.9 percent had the lowest.
- Passenger presence was again significant. Of drivers observed alone, the observed usage rate was 72.3 percent. By comparison, drivers with a passenger had an observed usage rate of 75.9 percent. Front outboard passengers were observed to be wearing their belt 77.6 percent of the time.
- Belt use decreased slightly across all three of the observed roadway types. Similar to previous years, belt use on Primary (Interstate) roadways was the highest at 80.6 percent. Secondary (Arterial) roads had belt usage rate of 73.8 percent. Local roads had the lowest seat belt usage rate, 72.8 percent.

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

Observation Variable	2017 Data		2016 Data	2015 Data	Change in Percentage (2017 vs. 2016)
	Total Observed Occ. with Known Belt Status	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	
All Vehicle Occupants	28,472	73.72	78.23	74.05	-4.51%
Gender					
Male	15,137	67.44	72.63	66.68	-5.19%
Female	13,282	80.92	84.55	82.59	-3.63%
Status Unknown	53	69.98	80.68	85.71	-10.70%
Apparent Age					
Child (passenger <12)	262	89.29	93.16	93.11	-3.87%
Teen	1,296	82.26	82.88	79.35	-0.62%
Adult	24,187	72.36	77.01	73.05	-4.65%
Elder Adult (>65)	2,704	80.54	86.29	79.61	-5.75%
Status Unknown	23	57.89	88.53	84.62	-30.64%
Apparent Race					
Black	1,900	66.67	73.94	70.54	-7.27%
Hispanic	1,782	56.14	68.63	51.81	-12.49%
White	23,702	75.28	78.93	75.27	-3.65%
Other	1,012	81.85	80.96	79.48	0.89%
Status Unknown	76	72.58	66.66	73.68	5.92%
State of Vehicle Registration					
Massachusetts	26,625	73.39	78.06	73.63	-4.67%
New Hampshire	500	71.13	77.09	70.93	-5.96%
Out of State (Other)	1,315	81.50	83.07	84.29	-1.57%
Unknown	32	83.21	68.10	75.00	15.11%
Vehicle Type					
Passenger Car	13,279	75.57	78.07	75.47	-2.50%
Pick-Up Truck	2,817	57.29	63.69	54.32	-6.40%
SUV	9,282	79.92	84.24	81.37	-4.32%
Van	1,469	80.60	83.75	81.66	-3.15%
Commercial Vehicle	1,606	45.60	55.63	46.26	-10.03%
Unknown	0	N/A	N/A	N/A	N/A
Time of Day/Day of Week					
A.M. Peak – Weekday	4,563	72.84	78.18	75.30	-5.34%
Midday Peak – Weekday	10,285	71.76	76.64	71.40	-4.88%
P.M. Peak – Weekday	5,119	74.13	81.14	76.97	-7.01%
Weekend	4,083	75.00	78.74	76.47	-3.74%
Observation Region					
Region 1	4,548	73.02	79.12	77.67	-6.10%
Region 2	2,612	76.20	79.67	80.51	-3.47%
Region 3	4,030	73.98	83.41	72.78	-9.43%
Region 4	3,272	73.24	78.59	70.09	-5.35%
Region 5	6,100	75.46	78.56	76.20	-3.10%
Region 6	5,599	72.51	72.39	70.49	0.12%
Region 7	2,311	70.99	75.99	72.46	-5.00%
Occupant Role					
Driver Alone	19,574	72.34	76.31	72.92	-3.97%
Driver with Passenger	4,476	75.98	82.09	76.92	-6.11%
Passenger	4,422	77.59	83.85	76.32	-6.26%
Roadway Classification					
Primary (Interstate)	2,737	80.61	84.44	81.11	-3.83%
Secondary (Arterial)	4,553	73.84	78.94	74.17	-5.10%
Local (All others)	21,182	72.82	77.40	73.23	-4.58%