# 2015 Massachusetts Safety Belt Usage Observation Study

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## *Introduction*

This report presents the results of the 2015 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 – 2014 are presented in Table 1 below.

**Table 1 Massachusetts Safety Belt Usage Rates, 2000-2014**

| Observation Year | Observed Safety Belt Usage Rate (Weighted and Rounded) |
|---|---|
| 2000 | 50% |
| 2001 | 56% |
| 2002 | 51% |
| 2003 | 62% |
| 2004 | 63% |
| 2005 | 65% |
| 2006 | 67% |
| 2007 | 69% |
| 2008 | 67% |
| 2009 | 74% |
| 2010 | 74% |
| 2011 | 73% |
| 2012 | 73% |
| 2013 | 75% |
| 2014 | 77% |

Source: Highway Safety Division, 2014 Massachusetts Safety Belt Usage Observation Survey

In 2015, 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 145 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% | | |

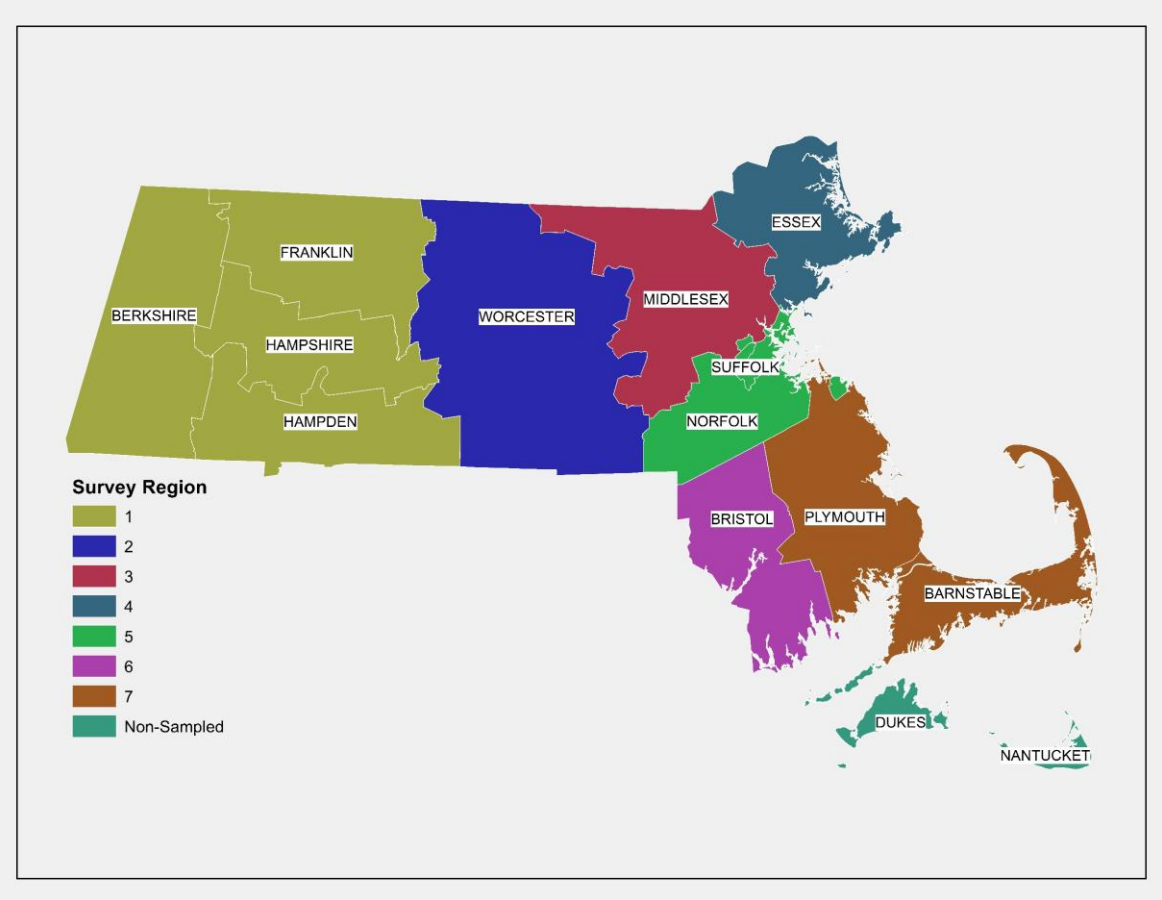


**Figure 1 Massachusetts Counties and Study Regions**

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 2015 were consistent with those observed during previous years.

## *Results and Discussion*

Between June 2 and June 26, 2015 a total of 32,678 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 **74.05 percent.** Based upon the variation in the sampling plan, the 95% confidence interval ranges between 72.77 and 75.33 percent, with a relative error well below the required 2.5 percent threshold. This number is 2.5 percentage points lower than the same rate observed in 2014, however, this difference is not statistically significant at the 95 percent confidence level. In an un-weighted format, the percentage of belt usage was 74.14, a decrease from the value of 77.79 in 2014. Table 4 presents a breakdown of observed variables in a weighted format and provides a comparison to both 2013 and 2014. Also presented in Table 4 is the change in percent (i.e., not percent change) of usage by variable from 2014 to 2015.

Given the nearly 2.5 percentage point decrease (76.57% to 74.05%) 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 4.6 percentage points from 2014 to 2015. By comparison, female occupants had a similar rate to that observed in 2015. Females continue to have a higher observed belt usage rate than males at 82.59 percent and 66.68 percent, respectively. Within the observation sample of those with known belt status and gender, males accounted for 53.13 percent of the total occupants observed, with females accounting for 46.87 percent of the occupants observed.
- Although all age groups saw a slight decrease in belt usage, the group with the lowest weighted percent belted (73.05%) were adults, while the group with the highest percent belted (93.11%) were children. The observed usage rate for teens was 79.35 percent, which is lower than the observed rate of 80.25 percent in 2014, but still much higher than the observed rate of 75.18 percent in 2013.
- In the category of apparent race, Hispanic occupants had a significant decrease of belt usage, decreasing from 68.54 percent in 2014 to 51.81 percent in 2015. Of note, the 2015 rate for Hispanic occupants is very similar to the observed rate in 2013 (52.86%). Hispanic occupants continue to have the lowest usage rate in comparison to Black, White, and other occupants. Additionally, all apparent race categories had an observed decrease in usage from 2014.
- For State of Vehicle Registration, 92.64 percent of occupants were observed in Massachusetts registered vehicles, with a belt use of 73.63 percent. Only 2.02 percent of occupants were observed in New Hampshire registered vehicles (with a lower belt use of 70.93%).
- Occupants from all vehicle types had an observed decrease in belt use, with the most significant being that off pick-up truck occupants (60.04% in 2014 to 54.32% in 2015) and commercial vehicles (55.49% in 2014 to 46.26% in 2015). The rates of these vehicle occupants are still significantly lower than other vehicle types. By comparison the observed rate of SUV (81.37%) and Van (81.66%) occupants were notably higher.
- By time of day, the observed rate was lower in all four observation time periods in 2015 than in 2014. Of note, the observed rate during the AM Peak (75.30%) and PM Peak (76.97%) periods was higher than that observed during the Midday (71.40%). Belt use on the weekend was very similar to the rate observed in 2015 (76.47% and 76.99%, respectively).
- Regionally, only Region 1 (Berkshire, Franklin, Hampden, and Hampshire Counties) had an increase from 2014 to 2015 (76.63 in 2015 to 77.67% in 2015). Decreases of 5.53 percentage points and 4.82 percentage points were observed in Region 3 (Middlesex County) and Region 4 (Essex County). Again this year, Region 2 (Worcester County) ranked the highest at 80.51 percent. Region 4 (Essex County) had the lowest observed rate at 70.09 percent, followed by Region 6 (Bristol County) at 70.49 percent.
- In regard to passenger presence, 80.01 percent of drivers were observed to be alone and 19.99 percent were accompanied by a passenger. Drivers with a passenger had a higher belt usage rate than drivers without a passenger, at 76.92 percent compared to 72.92 percent. By comparison, front outward passengers had a belt usage rate of 76.32 percent.
- Belt use decreased across all three of the observed roadway types. Similarly to previous years, belt use on Primary (Interstate) roadways was the highest at 81.11 percent. Although Local roads had a lower rate 73.23 percent the overall decrease in the rate for locals was lower than that of both other roadway types (-1.90 percentage points versus -3.67 percentage points for Primary and -4.06 for Secondary).

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

| Observation Variable | 2015 Data | | 2014 Data | 2013 Data | Change in Percentage (2015 vs. 2014) |
|---|---|---|---|---|---|
| | Total Observed Occ. with Known Belt Status | Weighted Percent Belted | Weighted Percent Belted | Weighted Percent Belted | |
| All Vehicle Occupants | 32,542 | 74.05 | 76.57 | 74.77 | -2.52% |
| Gender | | | | | |
| Male | 17,276 | 66.68 | 71.23 | 69.12 | -4.63% |
| Female | 15,238 | 82.59 | 82.91 | 81.19 | -0.42% |
| Status Unknown | 28 | 85.71 | 77.15 | 80.82 | 8.46% |
| Apparent Age | | | | | |
| Child (passenger <12) | 305 | 93.11 | 94.13 | 91.91 | -1.13% |
| Teen | 954 | 79.35 | 80.25 | 75.18 | -1.00% |
| Adult | 27,734 | 73.05 | 75.22 | 73.71 | -2.25% |
| Elder Adult (>65) | 3,536 | 79.61 | 81.61 | 81.85 | -2.10% |
| Status Unknown | 13 | 84.62 | 57.15 | 96.08 | 27.36% |
| Apparent Race | | | | | |
| Black | 1,901 | 70.54 | 74.86 | 70.57 | -4.40% |
| Hispanic | 1,357 | 51.81 | 68.54 | 52.86 | -16.80% |
| White | 28,237 | 75.27 | 76.91 | 75.88 | -1.73% |
| Other | 1,009 | 79.48 | 83.72 | 80.92 | -4.33% |
| Status Unknown | 38 | 73.68 | 84.85 | 73.91 | -11.26% |
| State of Vehicle Registration | | | | | |
| Massachusetts | 30,146 | 73.63 | 76.35 | 74.30 | -2.81% |
| New Hampshire | 657 | 70.93 | 68.96 | 65.89 | 1.88% |
| Out of State (Other) | 1,731 | 84.29 | 84.81 | 85.29 | -0.63% |
| Unknown | 8 | 75.00 | 70.31 | 94.92 | 4.60% |
| Vehicle Type | | | | | |
| Passenger Car | 15,841 | 75.47 | 77.48 | 76.19 | -2.10% |
| Pick-Up Truck | 2,929 | 54.32 | 60.04 | 57.30 | -5.79% |
| SUV | 10,230 | 81.37 | 82.61 | 80.34 | -1.34% |
| Van | 1,750 | 81.66 | 80.74 | 80.74 | 0.82% |
| Commercial Vehicle | 1,792 | 46.26 | 55.49 | 51.30 | -9.28% |
| Unknown | 0 | N/A | 54.68 | N/A | N/A |
| Time of Day/Day of Week | | | | | |
| A.M. Peak – Weekday | 5,960 | 75.30 | 73.49 | 73.94 | 1.72% |
| Midday Peak – Weekday | 14,237 | 71.40 | 75.94 | 73.12 | -4.63% |
| P.M. Peak – Weekday | 6,944 | 76.97 | 78.52 | 76.74 | -1.64% |
| Weekend | 5,401 | 76.47 | 76.99 | 77.79 | -0.62% |
| Observation Region | | | | | |
| Region 1 | 3,838 | 77.67 | 76.63 | 79.28 | 0.95% |
| Region 2 | 3,428 | 80.51 | 80.68 | 77.97 | -0.26% |
| Region 3 | 5,690 | 72.78 | 78.22 | 78.25 | -5.53% |
| Region 4 | 3,617 | 70.09 | 74.82 | 70.41 | -4.82% |
| Region 5 | 6,955 | 76.20 | 78.38 | 78.10 | -2.27% |
| Region 6 | 6,120 | 70.49 | 72.93 | 65.53 | -2.53% |
| Region 7 | 2,894 | 72.46 | 72.97 | 76.00 | -0.60% |
| Occupant Role | | | | | |
| Driver Alone | 21,767 | 72.92 | 74.64 | 73.52 | -1.81% |
| Driver with Passenger | 5,437 | 76.92 | 80.89 | 76.42 | -4.07% |
| Passenger | 5,338 | 76.32 | 80.66 | 76.82 | -4.43% |
| Roadway Classification | | | | | |
| Primary (Interstate) | 3,054 | 81.11 | 84.68 | 82.91 | -3.67% |
| Secondary (Arterial) | 6,121 | 74.17 | 78.14 | 76.93 | -4.06% |
| Local (All others) | 23,367 | 73.23 | 75.04 | 73.00 | -1.90% |