

2012 Massachusetts Seat Belt Usage Observation Study

Prepared for

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Introduction

This report presents the results of the 2012 seat 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 in Amherst. This observational study was conducted as a component of an effort to evaluate seat belt usage in the Commonwealth as directed by the Executive Office of Public Safety and Security's - Highway Safety Division (EOPSS-HSD).

The reported seat belt usage in Massachusetts, a secondary seat belt law state, has consistently had an observed usage rate lower than the national average. The results of the statewide seat belt observation studies in Massachusetts from 2000 – 2011 are presented in Table 1 below.

Table 1 Massachusetts Seat Belt Usage Rates, 2000-2011

Observation Year	Observed Seat 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%

Source: Highway Safety Division, 2011 Massachusetts Safety Belt Usage Observation Survey

In 2012, the seat belt study consisted of a single stage statewide survey to assess seat belt usage in the Commonwealth of Massachusetts in compliance with the newly released 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) as an initial component of this study. The new sampling plan is a departure from the previous protocol which had been employed since 2009. The most significant difference is how the sampling of roadway segments for inclusion was conducted. The previous study utilized the Massachusetts Statewide Travel Demand Model to stratify roadways in Massachusetts 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. However the new sampling method, developed for NHTSA, used a sampling of roadway segments for inclusion based upon roadway length proportional to the total length within the given stratum. For the 2012 study, roadways were stratified based upon roadway classification, and geographic region, while the observation time period was randomly selected to ensure adequate representation of daylight hours.

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 according to Fatality Analysis Reporting System (FARS) data average for the period of 2005 to 2009. The regions were initially identified using both the annual traffic fatality count (a measure of importance within the revising sampling guidelines) and geographic proximity to one another. As a result, the sampling plan included 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 (2005 to 2009)

Region	County	County		Region	
		Number of Fatalities	Percent of Statewide Fatalities	Number of Fatalities	Percent of Statewide Fatalities
1	Berkshire	73	4%	325	16%
	Franklin	35	2%		
	Hampden	169	8%		
	Hampshire	48	2%		
2	Worcester	287	14%	287	14%
3	Middlesex	315	16%	315	16%
4	Essex	186	9%	186	9%
5	Norfolk	179	9%	325	16%
	Suffolk	146	7%		
6	Bristol	243	12%	243	12%
7	Barnstable	106	5%	312	16%
	Plymouth	206	10%		
Non-Sampled Counties	Dukes	6	0%	8	0%
	Nantucket	2	0%		

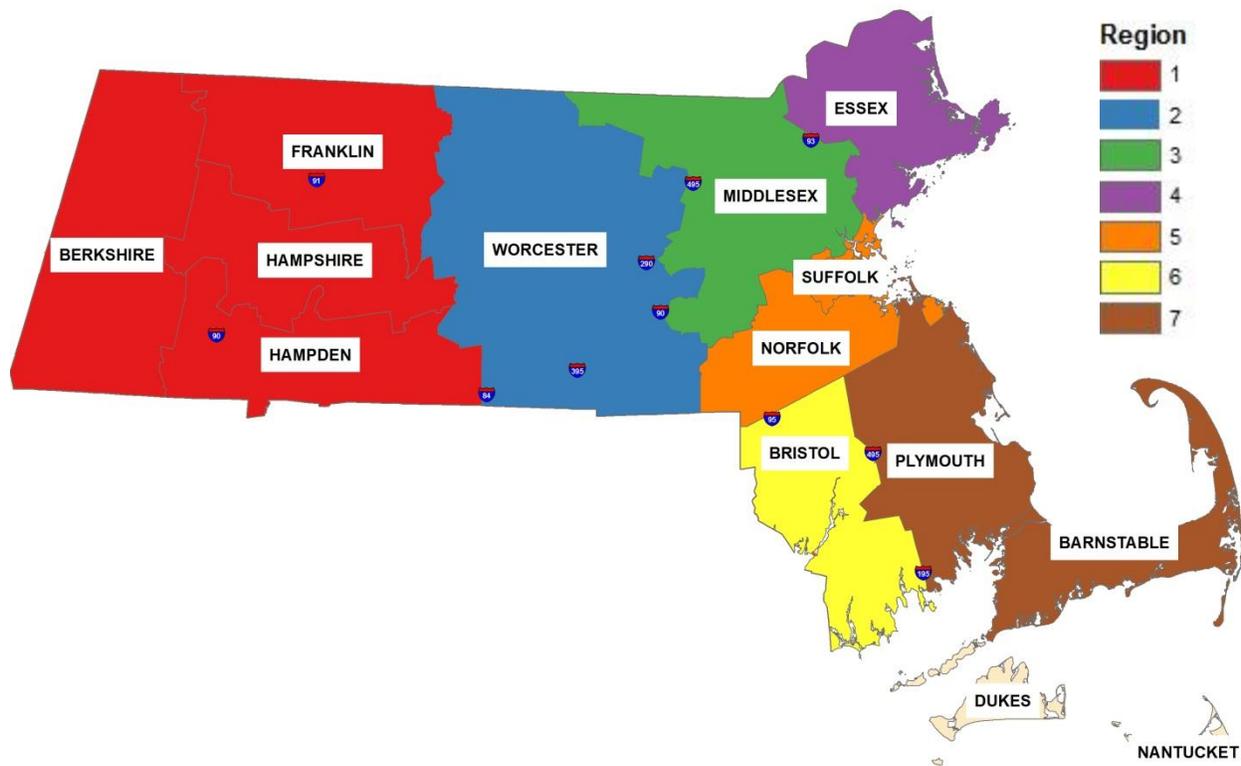


Figure 1 Massachusetts Counties and Seat Belt Study Regions

Using 2010 TIGER data developed by the U.S. Census Bureau, a listing of road segments was generated. These 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. 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 it was 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 start time of the observation period:

- Weekday A.M. Peak Period (6 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 (6 a.m. to 7 p.m.)

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

- Vehicle information:
 - Vehicle type (passenger car, pickup truck, SUV, van, small commercial passenger vehicles)
 - 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 the approved sampling plan called for the addition of sites as needed if the calculated variance did not achieve plus/minus 2.5 percent as required with NHTSA protocol. Given the directive to use the new sampling plan there were no carryover sites from previous years.

Results and Discussion

Between June 4 and June 30, 2012 a total of 21,755 drivers and front outboard passengers in a total of 17,687 vehicles were observed at the 145 observation locations. The statistically weighted percentage of front seat occupants properly using seat belts during the observation study was **72.74 percent**. Based upon the variation in the sampling plan the 95% confidence interval ranges between 70.98 and 74.50 percent with a relative error well below the required 2.5 percent threshold. This number is statistically equivalent to the weighted rate of 73.2 percent observed within Massachusetts in 2011. In an unweighted format the percentage of seat belt usage was 74.33, a slight increase from the value of 73.79 percent in 2011. Table 4 presents a breakdown of observed variables, in a weighted format and as compared to both 2010 and 2011. Also presented in Table 4 is the change in percent (i.e., not percent change) of usage by variable from 2011 to 2012. Please note that because of the redesigned sampling plan direct comparisons across some variables was not possible (e.g. geographic regions, roadway classification)

Although the results presented do not represent a significant change from 2011, an assessment of the new sampling approach and by variable analysis warrant further consideration. Some of the interesting findings include, but are not necessarily limited to the following:

- There is evidence to suggest that the revised sampling approach employed in 2012 resulted in an overall usage rate that would have been higher had the previous design been utilized. More specifically, the new design with segment selection proportional to length (as compared to VMT with functional classification as an equal sampling variable) resulted in an increase in the frequency of observations made at non-interstate and non-arterial locations where the usage rate is typically lower.
- There was an increase in the overall usage rate from 67.97% to 71.13%, on roadways categorized herein as local, which were comparable to functionally classified collectors and locals in previous years. The usage rate was also comparable or increased along primary roads (from 79.70% to 79.93%) and secondary roads (from 71.89% to 74.47%). The increase in seat belt usage rates along all road types, coupled with the slight overall decrease in the overall rate is indicative of the potential bias introduced by the increase in local roadways.
- The seat belt usage rate among males decreased slightly from 2011 (from 67.57% to 65.16%) and was once again significantly lower than females (65.16% vs. 81.08%).
- The belt usage for elder adults and teens both increased as compared to the 2011 rates and were comparable to the observed usage rate in 2010; however the overall usage rate among adults decreased (from 72.87% to 71.14%).
- Consistent with previous years the seat belt usage of occupants in out of state vehicles (other than New Hampshire) was again higher than that in those of Massachusetts vehicles. Vehicles registered in New Hampshire once again had a usage rate comparable to that of Massachusetts vehicles (72.60% and 72.21%, respectively).
- Observed seat belt usage for occupants in small commercial vehicles (43.69%) and pick-up trucks (57.18%) both decreased from 2011 and were significantly lower than occupants of all other vehicle types.
- Regionally, the observed seat belt usage was highest in Region 3 (Middlesex County), Region 2 (Worcester County) and Region 5 (Norfolk & Suffolk Counties). The lowest rates were observed in Region 6 (Bristol County) and Region 4 (Essex Country). Given the new sampling framework and regional stratification the 2012 data will provide a benchmark for comparison in future years.
- Consistent with previous observation data, the observed seat belt usage rate was highest along primary roads (79.93%), while local and collector roadways had the lowest observed usage rates (67.99 and 67.97%).
- Drivers with passengers were more likely to be belted than those without passengers (75.49% vs. 71.00%). The observed usage rate among front outboard passengers was 75.78% representing an increase of over 2 percentage points from 2011.

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

Observation Variable	2012 Data		2011 Data	2010 Data	Change in Percentage (2012 vs. 2011)
	Total Observed Occupants with Known Belt Status	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	
All Vehicle Occupants	21,542	72.74	73.22	73.70	-0.48
Gender					
Male	11,235	65.16	67.57	66.97	-2.42
Female	10,250	81.08	80.17	81.53	0.91
Status Unknown	57	68.71	68.00	84.58	0.71
Apparent Age					
Child (passenger <12)	238	88.81	87.64	90.15	1.17
Teen	1552	71.88	68.85	72.46	3.02
Adult	17,381	71.14	72.87	72.30	-1.74
Elder Adult (>65)	2,326	83.43	79.19	83.50	4.23
Status Unknown	45	73.94	50.55	78.74	23.40
Apparent Race					
Black	1,257	59.01	65.47	65.77	-6.46
Hispanic	1,039	53.41	54.39	57.71	-0.97
White	18,157	74.46	74.30	74.99	0.16
Other	1,022	78.43	78.97	70.75	-0.54
Status Unknown	67	70.11	70.58	73.23	-0.47
State of Vehicle Registration					
Massachusetts	19,839	72.21	72.37	73.02	-0.16
New Hampshire	434	72.60	72.60	72.51	0.00
Out of State (Other)	1,215	80.46	83.98	81.91	-3.52
Unknown	54	85.18	60.95	64.72	24.23
Vehicle Type					
Passenger Car	11,083	74.62	75.76	76.64	-1.14
Pick-up Truck	1,814	57.18	59.40	58.17	-2.22
SUV	5,981	77.95	77.72	78.50	0.23
Van	1,430	79.93	78.71	80.02	1.23
Commercial Vehicle	1,187	43.69	47.30	51.28	-3.61
Time of Day/Day of Week					
A.M. Peak – Weekday	2,093	73.45	72.14	73.65	1.32
Midday Peak – Weekday	9,074	70.37	69.90	72.24	0.48
P.M. Peak – Weekday	7,009	74.34	75.58	75.70	-1.24
Weekend	3,366	75.22	74.76	72.99	0.46
Observation Region					
Region 1	2,778	71.69	N/A	N/A	N/A
Region 2	2,016	76.11	N/A	N/A	N/A
Region 3	3,729	76.87	N/A	N/A	N/A
Region 4	2,326	69.39	N/A	N/A	N/A
Region 5	5,133	74.64	N/A	N/A	N/A
Region 6	3,746	68.18	N/A	N/A	N/A
Region 7	1,814	70.24	N/A	N/A	N/A
Occupant Role					
Driver Alone	13,529	71.00	72.55	73.24	-1.55
Driver with Passenger	4,051	75.49	75.24	75.12	0.25
Passenger	3,962	75.78	73.71	74.29	2.08
Roadway Classification					
Primary (Interstate)	2,167	79.93	79.70	78.95	0.23
Secondary (Arterial)	4,561	74.47	71.89	74.56	2.58
Local (All others)	14,814	71.13	67.97 ^a	N/A	3.15

^a Represents a combination of functionally classified local and collector roadways observed in 2011