

# 2023 Massachusetts Safety Belt Usage Observational Study

*Prepared for*

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## Introduction

This report presents the results of the 2023 Safety Belt Usage Observational 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 usage observational surveys in Massachusetts from 2012 – 2023 are presented in Table 1 below. It is important to note that safety belt usage data was not conducted in 2020 due to the COVID-19 pandemic.

**Table 1 Massachusetts Safety Belt Usage Rates, 2012-2023**

<b>Observation Year</b>	<b>Observed Safety Belt Usage Rate (Weighted and Rounded)</b>
2012	73%
2013	75%
2014	77%
2015	74%
2016	78%
2017	74%
2018	82%
2019	82%
2020	No Survey – COVID 19
2021	78%
2022	77%
2023*	80%

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

\* Note – sampling methodology revision, compare to previous years with caution

In 2023, similar to previous years, 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).

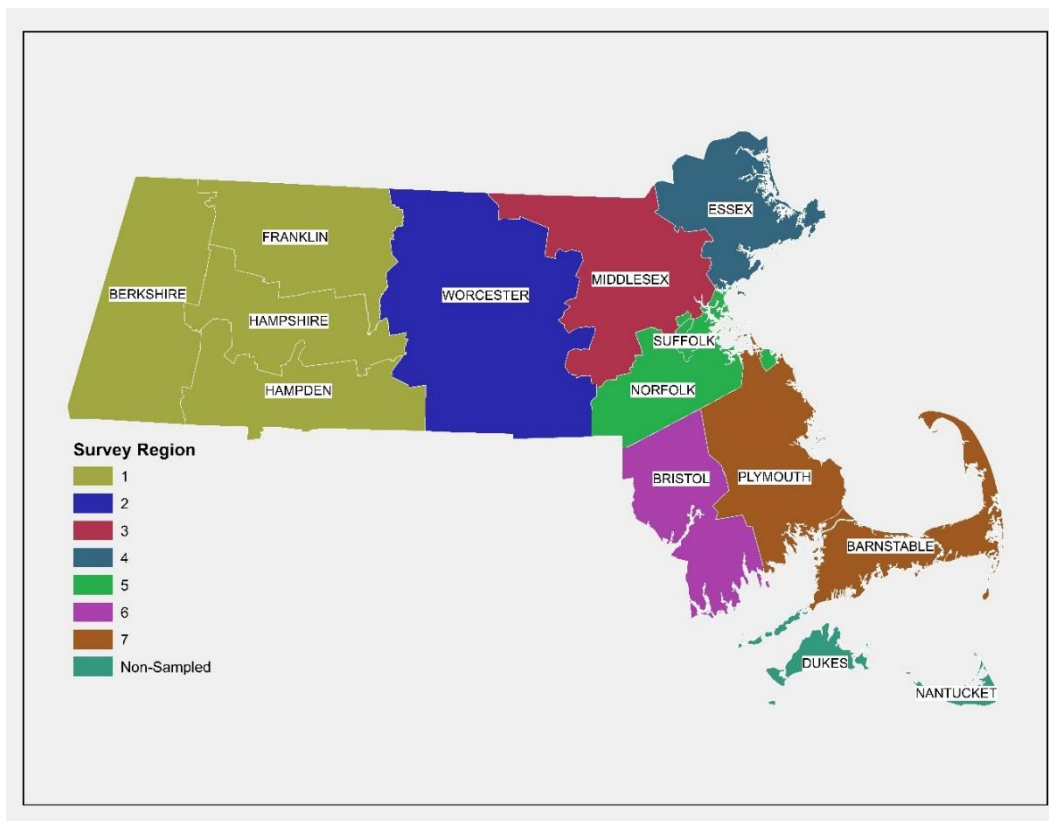
The revised 2023 sampling model used in this effort was developed and approved by the National Highway Traffic Safety Administration (NHTSA) prior to the study, replacing the previous protocol that had been employed since 2018. Similar to the previous protocol, the sampling of segments for inclusion was 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. New to this year's sampling plan is additional segment weighting based on an estimation of the coverage of vehicles observed and the weight for missing data on persons within sampled autos.

## Review of Sampling and Observation Approach

Massachusetts is composed of 14 counties, 12 of which account for over 99% of the passenger vehicle crash-related fatalities in the state, according to the Fatality Analysis Reporting System (FARS) data average for the period of 2016 to 2020. The regions where safety belt observations were conducted were initially identified using both geographic proximity to one another and the annual traffic fatality count (a measure of importance within the sampling guidelines). As a result, the sampling plan included a selection of roadways from seven regions 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 Average Counts by Developed Region (2016 to 2020)**

Region	County	County		Region	
		Average Number of Fatalities	Percent of All Statewide Traffic Fatalities	Average Number of Fatalities	Percent of All Statewide Traffic Fatalities
1	Berkshire	7.6	3.6%	41.2	19.4%
	Franklin	4.2	2%		
	Hampden	25.4	11.9%		
	Hampshire	4	1.9%		
2	Worcester	34	16%	34	16.0%
3	Middlesex	24.2	11.4%	24.2	11.4%
4	Essex	22.6	10.6%	22.6	10.6%
5	Norfolk	21	9.9%	29.6	13.9%
	Suffolk	8.6	4%		
6	Bristol	28.6	13.4%	28.6	13.4%
7	Barnstable	9	4.2%	32.2	15.1%
	Plymouth	23.2	10.9%		
Non-Sampled Counties	Dukes	0.4	0.2%	0.6	0.3%
	Nantucket	0.2	0.1%		



**Figure 1 Massachusetts Counties and Study Regions**

Using 2021 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 principally 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 are included in this feature class, as are (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 (Saturday/Sunday 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, SUV, pick-up, mini-van, small commercial vehicle)
  - State of vehicle registration (MA, NH, other)
- Shoulder belt usage:
  - Driver-seat belt usage
  - Front-seat outboard-passenger seat belt usage
- Vehicle occupant information:
  - Driver apparent sex (male, female, unknown)
  - Driver apparent age (teen, adult, elder adult, unknown)
  - Driver apparent race (White, Black, Hispanic, other, unknown)
  - Passenger apparent sex (male, female, unknown)
  - Passenger apparent age (child, teen, adult, elder adult, unknown)
  - Passenger apparent race (White, Black, Hispanic, other, unknown)

It should be noted that although it was not needed, the approved sampling plan allowed for the inclusion of additional sites if the calculated variance did not achieve plus/minus 2.5% as required by the NHTSA protocol.

### *Results and Discussion*

Between the 1<sup>st</sup> and 28<sup>th</sup> of June 2023, a total of 27,630 drivers and front outboard passengers in a total of 23,746 vehicles were observed at 147 observation locations statewide. The statistically weighted percentage of front seat occupants visibly using safety belts during the observational study was 80.44%. The 95<sup>th</sup> percent confidence interval ranges between 78.77% and 82.12%, with a relative error well below the required 2.5% threshold. In an unweighted format, the percentage of belt usage was 79.29%, representing a decrease from the 2022 unweighted value of 81.84%; whereas the weighted rate increased from 77.0% in 2022 to 80.4% in 2023. Table 4 presents a breakdown of observed variables in a weighted format while providing a comparison to both 2022 and 2021. The change in percent (i.e. not percent change) of usage by variable from 2022 to 2023 is also presented in Table 4.

Given the sizable increase of more than three percentage points (77.0% to 80.44%) in the weighted safety belt usage rate, additional consideration across variables is warranted. Some of the interesting findings include, but are not limited to, the following:

- Overall seat belt usage among front-seat vehicle occupants rose by 3.44 percentage points from 77.0% in 2022 to 80.44% in 2023. Occupants identified as *female* were found to be belted 11.26% more often, relative to *male*, at 86.48% and 75.22%, respectively.
- In terms of age, *elder adults* (>65) showed the highest increase in safety belt usage, from 82.13% in 2022 to 87.43% in 2023, a difference of 5.3 percentage points. *Adults* continued to represent the lowest usage at 78.89%, and *children* and *teens* the highest, at 92.15% and 83.45%, respectively.
- Based on race, *Hispanic* and *Other* groups showed the most improvement with seat belt usage increasing by a relative 10% from 65.11% and 78.67% in 2022 to 71.87% and 87.28%, respectively, in 2023.
- Vehicles registered in *Massachusetts* had seat belt usage rate of 80.93%, similar to those *out-of-state (other)* at 81.48%. However, vehicles registered in *New Hampshire* had a decrease in their belted occupants from 74.13% in 2022 to 69.93% in 2023, though a smaller sample size should be noted.
- In terms of vehicle type, *SUVs* had the highest seat belt usage rate at 86.25%, with *passenger cars* and *vans* closely behind at 82.21% and 82.47%, respectively, all consistent with overall trending improvements. While *pick-up trucks* experienced the greatest relative improvement to 63.58% in 2023, up from 60.42% in 2022. *Small commercial vehicles*, however, saw a decrease in usage from 53.65% in 2022 to 52.35% in 2023, and continue to have the lowest usage rate among all vehicle types.
- Seat belt usage during *weekends* showed a considerable increase from 78.7% in 2022 to 83.65% in 2023. The *P.M. peak* period on weekdays also saw an increase from 78.54% in 2022 to 82.49% in 2023. *A.M. peak* and *mid-day* remained consistent with overall trends at 78.06% and 79.68%, respectively.
- Regionally, *Region 2* (Worcester County) and *Region 1* (Western Massachusetts) experienced substantial increases in seat belt usage, of 9.05 and 8.44 percentage points, joining *Region 3* (Middlesex County) and *Region 5* (Suffolk/Norfolk Counties) in a cohort of communities with usage rates all exceeding 81%. On the other hand, *Region 4* (Essex County) and *Region 6* (Bristol County) both experienced decreases in usage, resulting to 75.44% and 72.89% in 2023. *Region 7* (Barnstable/Plymouth Counties) showed a moderate increase of 5 percentage points to 79.97%.
- Examining the effects of passenger-presence, *drivers with passengers* exhibited a higher rate of seat belt usage (84.8%) compared to drivers alone (78.91%) in 2023, consistent with prior years. Additionally, front-seat outboard passengers were recorded with a similar 84.56% usage.
- With respect to roadway classification of the observation sites, *local* roads saw the largest increase in seat belt usage, from 75.59% in 2022 to 79.58% in 2023. However, *primary* (interstate) roadways continue to have the highest usage rate at 81.57%, followed closely by *secondary* (arterial) roadways at 80.18%.

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

Observation Variable	2023 Data		2022 Data	2021 Data	Change in Percentage (2023 vs. 2022)
	Total Observed Occupants	Weighted % Belted	Weighted % Belted	Weighted % Belted	
All Vehicle Occupants	27194	80.44%	77.00%	77.53%	3.44%
<b>Apparent Sex</b>					
Male	14297	75.22%	71.49%	72.59%	3.73%
Female	12757	86.48%	83.60%	84.17%	2.88%
Status Unknown	140	73.18%	82.62%	84.29%	-9.44%
<b>Apparent Age</b>					
Child (passenger <12)	344	92.15%	89.27%	93.78%	2.88%
Teen	1394	83.45%	81.15%	86.83%	2.30%
Adult	21765	78.89%	76.05%	76.45%	2.84%
Elder Adult (>65)	3622	87.43%	82.13%	82.29%	5.30%
Status Unknown	69	70.66%	71.25%	84.73%	-0.59%
<b>Apparent Race</b>					
Black	1642	81.57%	75.88%	68.38%	5.69%
Hispanic	1507	71.87%	65.11%	62.10%	6.76%
White	22685	80.46%	77.41%	78.82%	3.05%
Other	1192	87.28%	78.67%	82.68%	8.61%
Status Unknown	168	79.10%	79.01%	76.77%	0.09%
<b>State of Vehicle Registration</b>					
Massachusetts	25250	80.93%	76.83%	77.63%	4.10%
New Hampshire	664	69.93%	74.13%	77.75%	-4.20%
Out of State (Other)	1229	81.48%	81.85%	81.02%	-0.37%
Unknown	51	82.26%	71.70%	75.87%	10.56%
<b>Vehicle Type</b>					
Passenger Car	8378	82.21%	79.11%	77.05%	3.10%
Pick-Up Truck	2891	63.58%	60.42%	67.75%	3.16%
SUV	13389	86.25%	82.57%	84.22%	3.68%
Van	907	82.47%	80.40%	86.39%	2.07%
Small Commercial Vehicle	1542	52.35%	53.65%	54.14%	-1.30%
Unknown (other)	87	70.96%	79.00%	81.91%	-8.04%
<b>Time of Day/Day of Week</b>					
A.M. Peak – Weekday	8287	78.06%	75.71%	75.36%	2.35%
Mid-day – Weekday	7528	79.68%	76.91%	78.07%	2.77%
P.M. Peak – Weekday	8063	82.49%	78.54%	75.87%	3.95%
Weekend	3316	83.65%	78.70%	81.74%	4.95%
<b>Observation Region</b>					
Region 1	1907	83.21%	74.77%	75.17%	8.44%
Region 2	2406	81.51%	72.46%	75.50%	9.05%
Region 3	4790	82.99%	81.49%	78.73%	1.50%
Region 4	4361	75.44%	77.79%	78.58%	-2.35%
Region 5	5459	81.35%	80.76%	81.88%	0.59%
Region 6	5179	72.89%	74.41%	75.39%	-1.52%
Region 7	3092	79.97%	74.78%	76.95%	5.19%
<b>Occupant Role</b>					
Driver Alone	20069	78.91%	75.70%	75.53%	3.21%
Driver with Passenger	3677	84.80%	80.87%	83.35%	3.93%
Passenger	3448	84.56%	81.13%	84.50%	3.43%
<b>Roadway Classification</b>					
Primary (Interstate)	1754	81.57%	80.81%	77.12%	0.76%
Secondary (Arterial)	7512	80.18%	78.90%	81.93%	1.28%
Local (All others)	17928	79.58%	75.59%	75.49%	3.99%