2023
Maryland Seat Belt Usage Report
NHTSA Jurisdictions

THIS REPORT WAS PREPARED IN COOPERATION WITH THE
Maryland Department of Transportation
Highway Safety Office
And
U.S. Department of Transportation
National Highway Traffic Safety Administration

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Executive Summary

The National Study Center for Trauma and EMS at the University of Maryland, Baltimore conducted a comprehensive study of seat belt usage in the State of Maryland in June 2023. Seat belt usage data were collected on drivers and front seat outboard passengers observed in a total of 28,805 vehicles at 140 randomly selected sites located within 14 jurisdictions of the State. Observed vehicles included passenger cars, vans, sport utility vehicles (SUV), pick-up trucks, and other vehicles below 10,000 pounds of gross vehicle weight. Data were collected on occupants of vehicles traveling on Primary (interstate roadways), Secondary (arterial roadways), and Local roads.

Overall usage rate and standard error (SE) results of the Statewide study, following weighted adjustment by probability of road segment selection and proportion of jurisdiction-level vehicle miles traveled (VMT) and exclusion of unknown observations, were as follows:

	All Vehicles				**Passenger Cars/SUVs**				**Pick-up Trucks**		
	Number (N) of Occupants	**Usage Rate (%)**	**SE (%)**		**N of Occupants**	**Usage Rate (%)**	**SE (%)**		**N of Occupants**	**Usage Rate (%)**	**SE (%)**
All Roadways	33,882	92.1	0.9		28,911	92.6	0.9		4,971	89.0	1.4
Primary Roads	14,562	93.6	0.8		12,562	94.0	0.9		2,000	91.3	1.2
Secondary Roads	18,258	92.6	1.1		15,406	93.0	1.1		2,852	89.2	1.8
Local Roads*	1,062	81.3	0.0		943	83.1	0.0		119	73.9	0.0

*Standard Error = 0% because no more than 1 Local Road was observed per jurisdiction, thus no variability was measured.

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Introduction

The National Highway Traffic Safety Administration (NHTSA) published new Uniform Criteria for State Observational Surveys of Seat Belt Use in Federal Register Vol. 76 No. 63, April 1, 2011, Rules and Regulations, pp. 18042 – 18059. This report represents the twelfth year of Maryland's response to the requirement to submit to NHTSA a data collection protocol and resulting observation findings of an annual State survey to estimate passenger vehicle occupant restraint use. This plan is fully compliant with the Uniform Criteria and has been used for the implementation of Maryland's 2023 seat belt survey. Using a consistent method to collect Statewide seat belt information will provide documentation for Maryland and the Nation on the success of occupant protection traffic safety programs.

Maryland is comprised of 24 jurisdictions, including 23 counties and Baltimore City; 14 of these jurisdictions account for about 86% of the passenger vehicle crash-related fatalities according to Fatality Analysis Reporting System (FARS) data averages for the period 2017 to 2019. These data contributed to the selection of roadway observation sites for use during the five-year period from 2022 to 2026 and were therefore employed to assess belt usage for this report. Road segments were mapped according to the latitude and longitude of their midpoints. A selected road segment was identified by an intersection or interchange that occurred within or just beyond the segment. If no intersection or interchange occurred within the segment, any point on that road could be used for observation. Data collection sites were selected such that traffic would be moving during the observation period. Data collection occurred as per the Site Assignment Sheets: at controlled intersections, ramps, overpasses, or on the side of the road. For interstate highways, data collection occurred on the next closest overpass. The observed direction of travel was randomly assigned for each road segment. The locations of the data collection sites were described on Site Assignment Sheets for each jurisdiction and maps were developed to aid the Data Observation Teams and Quality Control (QC) Monitors in traveling to the assigned locations.

Objective

This research initiative used the NHTSA Uniform Criteria for State Observational Surveys of Seat Belt Use to address the following objectives for 2023:

- Develop and implement a strategic process for observing seat belt use in the State of Maryland for drivers and right front seat passengers.
- Determine the seat belt usage rate for Maryland.
- Estimate differences in passenger seat belt use for belted and unbelted drivers.
- Develop and implement a strategic process for observing driver's hand-held cell phone use.
- Compare restraint usage in rural and urban jurisdictions and roadways.
- Develop and implement a means of Quality Control to ensure that data were collected properly following all survey protocols.

Sampling Methodology

Study Design

All of Maryland's 24 jurisdictions were ranked in descending order of the average number of motor vehicle crash-related fatalities for the period of 2017 to 2019 (Table 1). Data from the FARS were used to determine the average number of crash-related fatalities per jurisdiction. It was determined that 14 jurisdictions accounted for at least 85% of Maryland's total crash-related fatalities during that time period. The 85% threshold is a requirement of the NHTSA Uniform Criteria. These 14 jurisdictions comprise the sample frame (NHTSA Defined) and accounted for 86.2% of Maryland's motor vehicle crash-related fatalities as determined by FARS. The remaining 10 jurisdictions were classified as 'Non-NHTSA Defined' with limited data collection. The analyses provided in this report is limited to seat belt usage by drivers and right front seat passengers observed within the 14 NHTSA Defined jurisdictions.

Table 1 - Maryland Average Motor Vehicle Crash-Related Fatalities by Jurisdiction 2017-2019

Jurisdiction	Average Fatality Counts (2017-2019)	Fatality Percentage Within Maryland	Cumulative Fatality Percentage
NHTSA Defined			
Prince George's	57.0	18.7	18.7
Baltimore County	35.3	11.6	30.2
Anne Arundel	25.0	8.2	38.4
Charles	17.0	5.6	44.0
Baltimore City	17.0	5.6	49.6
Cecil	16.3	5.3	54.9
Howard	15.0	4.9	59.8
Montgomery	14.0	4.6	64.4
Frederick	13.7	4.5	68.9
St. Mary's	12.7	4.1	73.0
Carroll	12.0	3.9	77.0
Harford	11.0	3.6	80.6
Washington	10.0	3.3	83.8
Caroline	7.3	2.4	86.2

Table 1 Continued - Maryland Average Motor Vehicle Crash-Related Fatalities by Jurisdiction 2017-2019

Jurisdiction	Average Fatality Counts (2017-2019)	Fatality Percentage Within Maryland	Cumulative Fatality Percentage
Non-NHTSA Defined			
Wicomico	6.7	2.2	88.4
Queen Anne's	5.7	1.9	90.3
Talbot	5.0	1.6	91.9
Worcester	5.0	1.6	93.6
Calvert	4.3	1.4	95.0
Allegany	4.0	1.3	96.3
Garrett	4.0	1.3	97.6
Dorchester	3.0	1.0	98.6
Somerset	2.7	0.9	99.5
Kent	1.7	0.5	100.0

Road Segment Selection

After the 14 jurisdictions were identified, and to assure sufficient sample allocation and maintenance of errors below a threshold of 2.5% as mandated by the NHTSA Uniform Criteria, site sample sizes remained at 10 road segments per jurisdiction, for a total of 140 road segments. A probability proportional to size (PPS) sample was employed to select the road segments to be used as observation sites, using segment length as the measure of size (MOS). Maryland exercised the available exclusion option and removed non-public roads, unnamed roads, unpaved roads, vehicular trails, access ramps, cul-de-sacs, traffic circles and service drives from the dataset.

Maryland employed the Topologically Integrated Geographic Encoding and Referencing (TIGER) database from the Census Bureau, as provided by NHTSA, for the selection of road segments. The Maryland Department of Transportation – State Highway Administration estimates the jurisdiction level vehicle miles traveled (VMT) for each jurisdiction by functional class. Sample proportions within each jurisdiction were based on the jurisdictional VMT estimates applied in the creation of the 2022-2026 sample and partitioned relative to the three-way functional class grouping of Primary (interstate highways), Secondary (numbered arterial roadways), and Local/City roads using the TIGER Feature Class Code (MTFCC). A listing of the sample size allocation by jurisdiction and MTFCC classification, along with partitioned VMT estimates obtained as of January 1, 2023, for use as computation weights, is displayed in Table 2.

Table 2 - Roadway Functional Strata by Jurisdiction, Road Segments Population (N), 2023 VMT, and Number of Segments Selected (n)

Jurisdiction		MTFCC Strata			
		Primary	**Secondary**	**Local**	**Total**
Anne Arundel	Segment Frequency (N)	992	3,154	27,553	31,699
	VMT	2,979	2,460	460	5,899
	Sample (n)	5	4	1	10
Baltimore County	Segment Frequency (N)	1,152	4,305	36,898	42,355
	VMT	4,250	3,260	647	8,157
	Sample (n)	5	4	1	10
Caroline*	Segment Frequency (N)	0	1,549	4,124	5,673
	VMT	20	316	68	404
	Sample (n)	0	9	1	10
Carroll	Segment Frequency (N)	13	2,384	13,429	15,826
	VMT	40	1,093	131	1,264
	Sample (n)	1	8	1	10
Cecil	Segment Frequency (N)	131	2,061	8,815	11,007
	VMT	520	637	143	1,300
	Sample (n)	4	5	1	10
Charles	Segment Frequency (N)	0	2,983	13,093	16,076
	VMT	0	1,144	120	1,264
	Sample (n)	0	9	1	10
Frederick	Segment Frequency (N)	563	3,013	17,874	21,450
	VMT	1,775	1,060	323	3,158
	Sample (n)	6	3	1	10
Harford	Segment Frequency (N)	136	2,828	12,716	15,680
	VMT	895	1,394	228	2,517
	Sample (n)	4	5	1	10
Howard	Segment Frequency (N)	498	1,749	13,247	15,494
	VMT	2,436	1,292	356	4,084
	Sample (n)	6	3	1	10
Montgomery	Segment Frequency (N)	929	4,602	33,277	38,808
	VMT	2,903	3,763	540	7,206
	Sample (n)	4	5	1	10
Prince George's	Segment Frequency (N)	968	5,898	34,689	41,555
	VMT	4,506	3,794	652	8,952
	Sample (n)	5	4	1	10

*Although VMT data were reported for Primary roads in Caroline County, TIGER road segment data did not identify any road segment in the county as a Primary roadway. Thus, no Primary roads were sampled for observation in Caroline County.

Table 2 Continued - Roadway Functional Strata by Jurisdiction, Road Segments Population (N), 2023 VMT, and Number of Segments Selected (n)

Jurisdiction		MTFCC Strata			
		Primary	Secondary	Local	Total
St. Mary's	Segment Frequency (N)	0	1,953	9,304	11,257
	VMT	0	765	119	884
	Sample (n)	0	9	1	10
Washington	Segment Frequency (N)	502	2,576	11,132	14,210
	VMT	1,059	757	231	2,047
	Sample (n)	5	4	1	10
Baltimore City	Segment Frequency (N)	747	2,780	25,752	29,279
	VMT	1,147	1,865	230	3,242
	Sample (n)	3	6	1	10

The jurisdictional and functional class specific proportions were merged by MTFCC (Primary, Secondary and Local) with the TIGER data containing road segments within each jurisdiction and corresponding segment length. The list of eligible road segments in each jurisdiction was then sorted by segment length within MTFCC group to obtain an ordered list. Road segments were selected within each jurisdiction and MTFCC functional class with PPS using length as the MOS. Let $c = 1,2,\ldots C$ be the jurisdiction strata, h = 1,2, …H be the MTFCC strata, v_{chi} be the length for road segment i in stratum h in jurisdiction c, and $v_{ch} = \sum_{all\ i\ in\ ch} v_{chi}$ be the total length for all road segments in stratum h within jurisdiction c. Then the road segment inclusion probability is: $\pi_{chi} = n_{ch}v_{chi}/v_{ch}$, where $n_{ch}$is the sample size for the roadway stratum h that was allocated within jurisdiction c. In Maryland, there were no roadway segments whose MOS was equal to or exceeded v_{ch}/n_{ch}; therefore, no roads were selected with certainty. SAS procedure SURVEYSELECT, with MOS and probability vector as described above, was used to obtain the road segment samples with PPS by three-way functional class grouping within each jurisdiction.

Reserve Site Selection

Maryland also identified reserve data collection sites. These sites were used in the event that a pre-identified site was unavailable due to temporary or permanent circumstances. Reserve road segments consisted of up to five additional road segments per original road segment selected, resulting in a reserve sample of 210 road segments. The reserve segments were also selected with PPS, stratifying by MTFCC within jurisdiction and using segment length as MOS; this was the same approach that was used to select all other roadway segments. Thus, for the purposes of data weighting, the reserve road segment inherited all probabilities of selection and weighting components up to and including the road segment stage of selection from the original road segments actually selected. Probabilities and weights for any subsequent stages of selection (e.g., the sampling of vehicles) were determined by the reserve road segment itself.

Table 3 outlines the survey methodology details used in Maryland in 2022.

Table 3 - Methodology Summary Chart

Methodology	Multistage Stratified Cluster Design with Probability Proportional to Size Sampling	
Sources of Samples	2022 revised methodology, approved by Maryland Highway Safety Office (MHSO) and NHTSA; 2020 TIGER data developed by the U.S. Census Bureau based on the MAF/TIGER Feature Class Code (MTFCC)	
Geographic Coverage	State of Maryland	
Site Roadway Classification	Based on the VMT estimate for each jurisdictional roadway type: Primary, Secondary, Local	
Number of Sites	*Primary*	48
	Secondary	78
	Local/City	14
	TOTALS	140
	June 5, 2023 – June 26, 2023	
Survey Period	*Primary*: 20-minute survey *Secondary*: 40-minute survey *Local/City*: 60-minute survey	
Observation Duration Per Site	28,805 vehicles	
Sample Size		

Sampling Weights

The following is a summary of the notation used in this section:

c – Subscript for jurisdiction (PSU)
h – Subscript for road segment strata
i – Subscript for road segment
j – Subscript for time segment
k – Subscript for road direction
l – Subscript for lane
m – Subscript for vehicle
n – Subscript for front seat occupant

Under this stratified multistage sample design, the inclusion probability for each observed vehicle was the product of selection probabilities at all stages: π_c for jurisdiction, $\pi_{hi|c}$ for road segment, $\pi_{j|chi}$ for time segment, $\pi_{k|chij}$ for direction, $\pi_{l|chij}$ for lane, and $\pi_{m|chijl}$for vehicle. The overall vehicle inclusion probability was:

$$\pi_{chijklm} = \pi_c \pi_{hi|c} \pi_{j|chi} \pi_{k|chij} \pi_{l|chij} \pi_{m|chijl}.$$

The sampling weight (design weight) for vehicle *m* was:

$$w_{chijklm} = \frac{1}{\pi_{chijklm}}$$

Non-response Adjustment

Given the data collection protocol described in this plan, including the provision for the use of alternate observation sites, road segments with nonzero eligible volume and yet zero observations conducted should be a rare event. Nevertheless, if eligible vehicles passed an eligible site or an alternate eligible site during the observation time but no usable data were collected for some reason, then this site was considered as a "non-responding site." The weight for a non-responding site was distributed over other sites in the same road type in the same PSU.

Let:

$$\pi_{chi} = \pi_c \pi_{hi|c}$$

be the road segment selection probability, and

$$w_{chi} = \frac{1}{\pi_{chi}}$$

be the road segment weight. The non-responding site non-response adjustment factor

$$f_{ch} = \frac{\sum_{all\ i} w_{chi}}{\sum_{responding\ i} w_{chi}}$$

would be multiplied by all weights of non-missing road segments of the same road type in the same jurisdiction and the missing road segments would be dropped from the analysis file. However, if no vehicles passed the site during the selected observation time (either 20, 40 or 60 minutes), then this site was simply an empty block; the site would not be considered as a non-responding site and would not require non-response adjustment.

Estimators

Noting that all front seat occupants were observed, let the driver/passenger seat belt use status be:

$$y_{chijklmn} = \begin{cases} 1, & if\ belt\ used \\ 0, & otherwise \end{cases}.$$

VMT data were available for Maryland jurisdictions at the functional class level. Hence, the seat belt use rate estimator was a ratio estimator with VMT weights:

$$p_{VMT} = \frac{\sum_c \sum_h VMT_{ch} p_{chi}}{\sum_c \sum_h VMT_{ch}}.$$

Here VMT_{ch} is the VMT for functional class h in jurisdiction c. Assuming that all vehicles observed at the same road segment i have equal probability for being selected, then the road segment level seat belt use rate p_{chi} can be reduced to the following:

$$p_{chi} = \frac{\sum_{all\ i\ in\ ch} w_{chi} y_{chijklmn}}{\sum_{all\ i\ in\ chi} w_{chi}}.$$

where w_{chi} is the road segment selection weight.

Sample Size

A standard error of less than 2.5% for the seat belt use estimates is required by NHTSA Uniform Criteria. From 1999-2011, Maryland conducted the Annual Seat Belt Use Study and historically obtained standard errors well below this threshold (e.g., 0.4%, 0.4% and 0.5% in the most recent three years) via observed sample sizes of approximately 58,000-73,000 motor vehicle front seat occupants. These observed sample sizes were obtained from previous sample designs using 12 jurisdictions and 1-16 road segments per jurisdiction. The roadway set was revised in 2012, five years later in 2017, and again in 2022, as required by the Uniform Criteria. From 2017 to 2021, the average annual number of observed occupants with known seat belt use hovered just below 47,000, with an average standard error of 0.7%. In 2022, 40,645 front seat occupants with known belt use were observed with a standard error of 0.6%. Thus, the sample size with known belt use for the 2023 seat belt use survey sample was projected to be approximately 40,000 to 45,000 occupants.

Data Collection

Data Collection Team Training and Quality Control

In FFY2023, the NSC provided updated slides for the training power point presentation and attended the in-person training sessions of the Data Collection Teams that were conducted by the MHSO, offering input when appropriate. The quality control site visits were conducted by MHSO staff and the QC forms were sent to the NSC for review upon completion of the site visit.

Data Collection Agent

The MHSO hired WBA Research to conduct the data collection in an accurate, timely, and efficient manner. That contractor, known as the Data Collection Agent (DCA), was responsible for:

- hiring and retaining observers for the duration of the survey period;
- observing and recording seat belt use data at 140 designated seat belt observation sites;
- collecting the resulting data and submitting the data to the MHSO or its designated data analysis partner (the NSC); and
- responding to any questions from the MHSO or NHTSA concerning the hiring, observation, and reporting processes.

Data Collection Teams

Each Data Collection Team (DCT) was comprised of a Data Observer and a Data Recorder. The Data Observer was responsible for observing the flow of traffic and spotting, or calling out, vehicle seat belt observation information. The Data Recorder was responsible for documenting and recording the data as observed on the Maryland Seat Belt Observation Form. Observation at each site was conducted by a complete DCT consisting of both members.

Data Collection Lanes

Before starting the actual data collection at a particular site or Observation Post, the DCT determined, through observation, the traffic flow and number of lanes that could be observed without error. The Data Observer observed, at a minimum, the right-most lane on the roadway. If traffic was light enough to survey an additional lane(s), the team may have done so, provided that 100% of the traffic in the observed lanes was recorded for the duration of the survey at that site. Each DCT was requested to observe more than one lane when possible.

Only one direction of traffic was observed at any given site unless otherwise noted on the Site Assignment Sheet (pre-determined roads may have required observation in both directions of travel). The direction of travel was pre-determined and identified on the Site Assignment Sheet. If an intersection contained a turning lane, the DCT was instructed to strategically move its location so that the traffic in the turning lane could be included in the count. Should the site not allow for the collection team to move due to safety concerns, the DCT observed both the turn lane and the next right-most lane.

Vehicles and Occupants

Directions given to the DCT to observe belt usage included:

- Stand on the right-hand curb or roadside of the selected roadway as directed on the Site Assignment Sheet
- Face the assigned direction of traffic
- Never stand in any traffic lane
- Look for the vehicle "B-pillar," integrated seat belt or seat back mount to determine if the belt is being utilized.

All passenger vehicles with a gross vehicle weight up to 10,000 pounds were observed in the survey. The target population included all drivers and right front seat passengers.

The only right front seat occupants excluded from this study were child passengers who were traveling in child passenger safety seats with harness straps. If a child in the right front seat was in a child passenger safety seat, the DCT did not record anything, treating the observation as if that seat was empty. If there was more than one front seat passenger, only the driver and the outboard passenger seating positions were observed.

If the vehicle was equipped with shoulder belts, but they appeared to be improperly used, the person was considered to be NOT belted.

Unknowns

Maryland developed a structure for the inclusion of unknowns in its observation counts. Data Observers and Recorders were instructed to report known belt use only if they were absolutely sure that the occupant was or was not wearing his/her seat belt; otherwise, belt use was to be reported as unknown. Unknowns included any individual in the front seat of a motor vehicle who could not be identified as being properly or improperly restrained.

Classic cars were counted only if the DCT could directly observe the use of a lap belt, as these vehicles were manufactured prior to the legislative mandate requiring vehicles to have both lap and shoulder belt harness systems. If the lap belt could not be seen, these vehicles were excluded and not documented as unknowns.

Site Locations

Maps displaying the locations of all observation sites were provided to each DCT and Quality Control (QC) Monitor on Site Assignment Sheets. Each jurisdiction had a Site Assignment Sheet with an overview of all sites within that set. Site Assignment Sheets indicated the observed road name, the crossroad included within the road segment (or nearest crossroad), assigned date, assigned time, and written directions. A detailed map was included for the observation teams, marking the Observation Post and the direction of traffic to be observed. In addition, each DCT was provided with XY coordinates indicating where to stand to conduct the observations.

Sites within relatively close geographic proximity were assigned as data collection clusters (Site Set). Each data collection cluster was assigned a random day of the week and a random time (between 7 am – 7pm) for completion. The observation schedule included the day and the time. If the observation day was Monday and scheduled time was 7 am then the first site was assigned at 7 am and the other sites within the cluster were assigned to minimize travel distance between sites.

Scheduling and Rescheduling

All seat belt observations were conducted during daylight hours. The schedule included rush hour (before 9:30 AM, after 3:30 PM) and non-rush hour observation times. It was anticipated that fewer than 60 minutes of observation would provide sufficient sample sizes for highways and arterial roads. Thus, data collection was conducted for 20 minutes (Primary), 40 minutes (Secondary), or 60 minutes (Local) at each site, depending on the road classification. Multiple sites were scheduled each day. In 2023, the MHSO authorized the observations to be conducted beginning Monday, June 5th through Monday, June 26th including makeup times. There were two site sets that had to be rescheduled for staffing issues, including a family emergency.

There was one instance in Frederick County where the observation team started an hour late at Site A. The WBA Research supervisor stopped the team and sent them to Site C to get back on track with the scheduled times. However, there was a recent road closure for Site C and a new location had to be identified. Frederick County Highway Operations Offices verified that the road was recently closed, and a new signalized intersection was now operational. The office helped us identify a new, and according to them, a better location for observing. Sites A, B and

C were completed the following week. We also contacted MD-SHA and they too were helpful in addressing this matter. Sites D and E were completed as scheduled.

Data Collection Forms

Observation Form Cover Sheet

The Observation Form Cover Sheet was designed to allow for documentation of descriptive site information, such as date, site location, jurisdiction, start and end times for observation, weather conditions, and more. The Cover Sheet was completed by the DCT at each site before data collection began. The Canadian Wildfires (smoke) was documented for weather on several of the cover sheets.

Data Collection Sheet(s)

Scantron Data Collection Sheet(s) were used to record seat belt use by drivers and right front seat passengers, and hand-held cell use by drivers for up to 100 vehicles per sheet. Multiple sheets were used for each site, if needed.

Observation Form Summary Sheet

The Observation Summary Sheet was used to certify complete and accurate data submission by the DCA as well as to document any comments or concerns related to the site.

Quality Control

QC Monitors from the MHSO filled out QC forms and sent them to the NSC for review upon the completion of the site visit. During these visits, the QC Monitors used standardized forms to document and evaluate Maryland's process. For one jurisdiction site set, the Scantron form site location and page numbers didn't match. The Scantron forms were reviewed by the DCA and DCT and corrections were made.

Data Entry

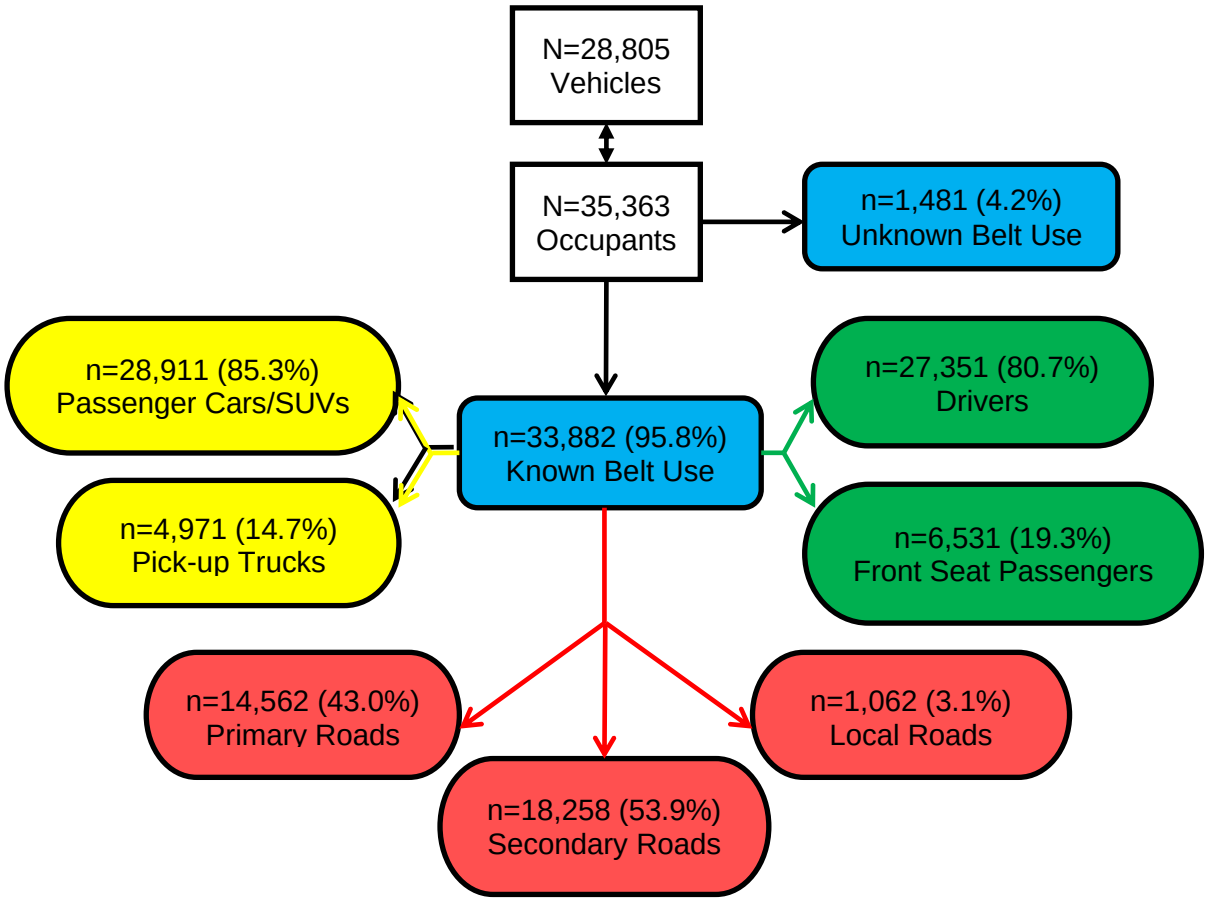
The DCTs inserted all completed data collection forms into the provided Jurisdiction/Site Set envelope and submitted it to the DCA. The DCA forwarded the envelopes to the NSC (designated analysis partner) upon completion of all observations, where (1) formal data entry and QC processes were outlined and (2) databases were designed for the capture of both summary figures and individual record-level data. Trained NSC staff members scanned the Scantron data collection sheets, noting any QC concerns.

Results

NHTSA Sites – Occupants

A total of 28,805 motor vehicles (i.e., passenger cars, sport utility vehicles (SUVs), and pick-up trucks) with 35,363 front seat occupants were observed within the 14 sampled jurisdictions (Figure 1). These totals represented decreases of 14.5% in the number of motor vehicles and 16.2% in the number of front seat occupants observed in the 2022 survey. Known seat belt use was ascertained for 33,882 (95.8%) of the occupants, of whom 27,351 (80.7%) were drivers and 6,531 (19.3%) were right front seat passengers.

Figure 1 – Study Population
Flowchart of Vehicle and Occupant Observations



Of the 33,882 drivers and right front seat passengers with known seat belt usage, 28,911 (85.3%) were occupants of passenger cars or SUVs and 4,971 (14.7%) were occupants of pick-up trucks. Most of the 33,882 occupants were observed on arterial Secondary roadways (n=18,258, 53.9%) as opposed to Interstate/Primary roads (n=14,562, 43.0%) or Local roads (n=1,062, 3.1%).

Data collection by jurisdiction (Table 4) indicated that the largest number of occupants with known belt use were observed in Baltimore County (n=3,375) and the fewest were observed in Caroline County (n=1,341). The average number of occupants observed per jurisdiction with known seat belt usage was 2,420.

Table 4 – Number of Front Seat Occupants Observed With Known Seat Belt Use by NHTSA-Surveyed Jurisdiction of Maryland

Jurisdiction	Number Observed
Baltimore Co	3,375
Howard	3,361
Frederick	2,955
Baltimore City	2,803
Prince George's	2,545
Montgomery	2,483
St. Mary's	2,465
Anne Arundel	2,409
Carroll	2,346
Charles	2,147
Cecil	2,058
Harford	1,991
Washington	1,603
Caroline	1,341

NHTSA Sites – Weighted Analysis

The overall seat belt usage rate among the 14 sampled jurisdictions for all drivers and right front seat passengers, weighted by probability of roadway selection and jurisdictional roadway specific VMT, was 92.1% (Table 5, Figure 2). Weighted usage rates were higher for occupants of passenger cars or SUVs (92.6%) than for occupants of pick-up trucks (89.0%). The overall weighted standard error rate of 0.9% was well below the 2.5% threshold required by NHTSA, yielding a 95% confidence interval of 90.3% to 93.9% for the combined usage rate. Relative to the data collected for passenger cars, the standard error rate for pick-up trucks was higher (1.4% vs. 0.9%) but was still below the 2.5% NHTSA limit.

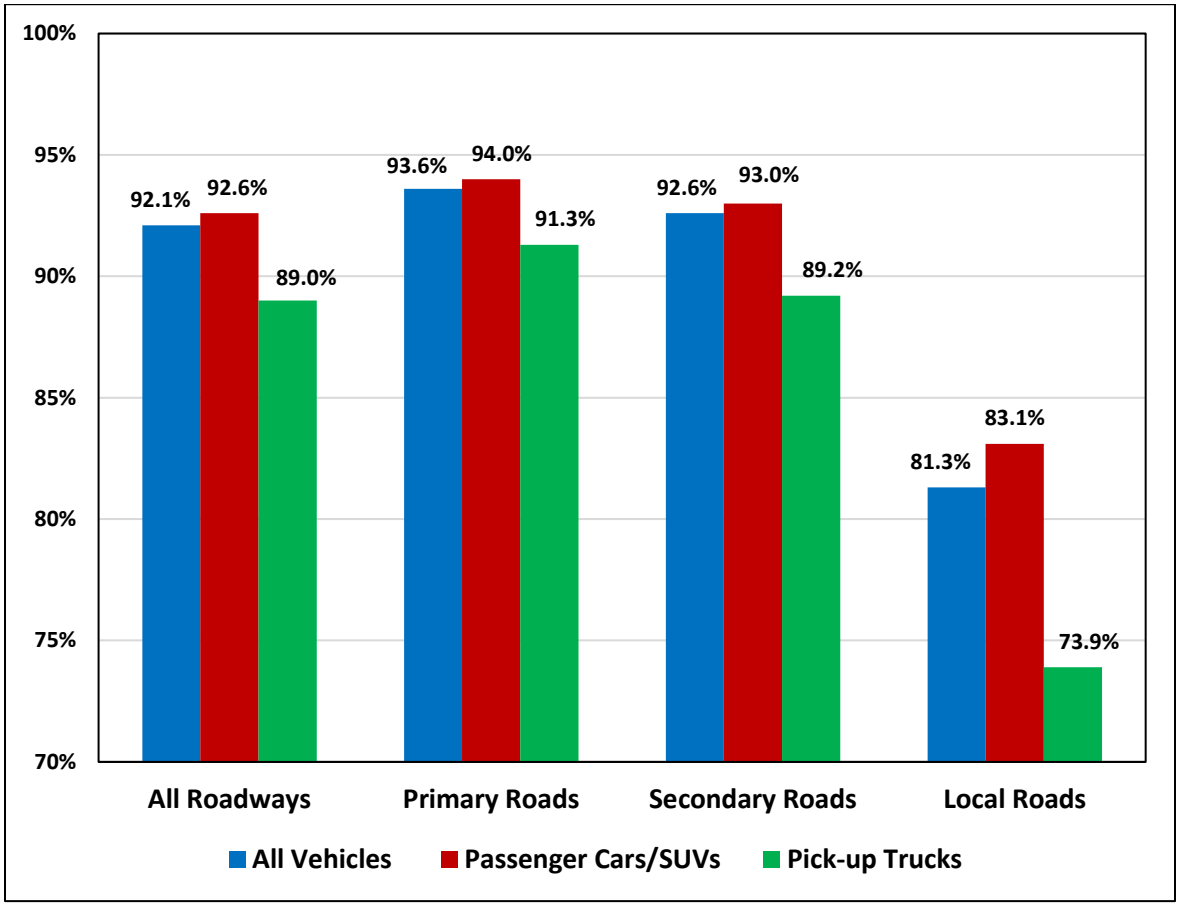
Vehicle occupants were more likely to use seat belts on Interstate/Primary roadways as opposed to Secondary roads and Local roads. Approximately 93.6% of drivers and passengers observed on Primary roadways were belted. This proportion fell to 92.6% on Secondary roads and 81.3% on Local roads. Front seat occupants of passenger cars or SUVs had higher rates than corresponding occupants of pick-up trucks on Primary roads (94.0% vs. 91.3%, respectively), Secondary roads (93.0% vs. 89.2%), and Local roads (83.1% vs. 73.9%).

Table 5 – 2023 Weighted Usage Rates in NHTSA-Surveyed Jurisdictions of Maryland Overall, by Vehicle Type and by Roadway
All Front Seat Occupants Combined With Known Seat Belt Use

All Vehicles					
				95% CI	
	N	**Usage Rate (%)**	**SE (%)**	**Lower Limit (%)**	**Upper Limit (%)**
All Roadways	33,882	92.1	0.9	90.3	93.9
Primary Roads	14,562	93.6	0.8	92.0	95.2
Secondary Roads	18,258	92.6	1.1	90.4	94.8
Local Roads*	1,062	81.3	0	N/A	N/A
Passenger Cars/SUVs					
				95% CI	
	N	**Usage Rate (%)**	**SE (%)**	**Lower Limit (%)**	**Upper Limit (%)**
All Roadways	28,911	92.6	0.9	90.8	94.4
Primary Roads	12,562	94.0	0.9	92.2	95.8
Secondary Roads	15,406	93.0	1.1	90.8	95.2
Local Roads*	943	83.1	0.0	N/A	N/A
Pick-up Trucks					
				95% CI	
	N	**Usage Rate (%)**	**SE (%)**	**Lower Limit (%)**	**Upper Limit (%)**
All Roadways	4,971	89.0	1.4	86.3	91.7
Primary Roads	2,000	91.3	1.2	88.9	93.7
Secondary Roads	2,852	89.2	1.8	85.7	92.7
Local Roads*	119	73.9	0.0	N/A	N/A

*Standard Error = 0% because no more than 1 Local Road was observed per jurisdiction, thus no variability was measured.

Figure 2 - Usage Rate by Vehicle Type and Roadway Following Adjustment for Probability of Road Segment Selection and Vehicle Miles Traveled (VMT)



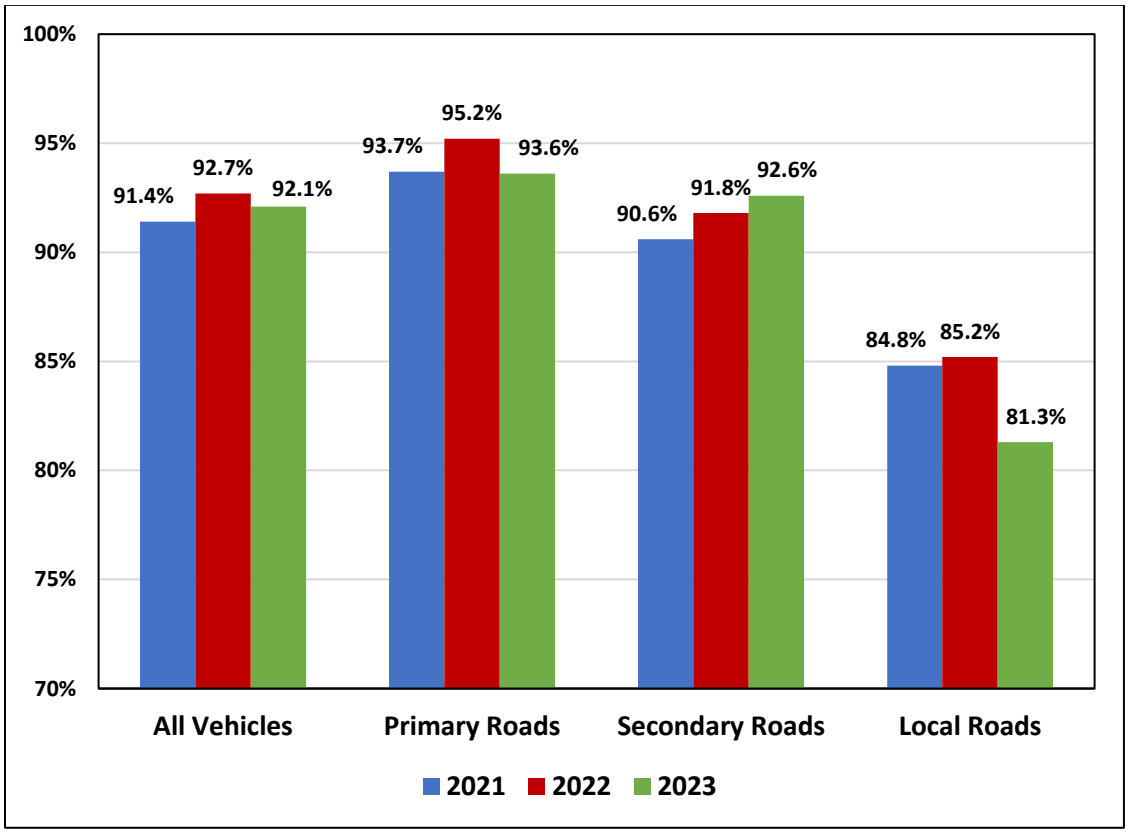
The 2023 Maryland weighted seat belt usage rate decreased by 0.6 percentage points over the previous year (Table 6 and Figures 3 and 4). Relevant to 2022, higher seat belt usage rates in 2023 were observed in trucks (+1.0) and on Secondary roadways (+0.8), while lower rates occurred among passenger cars/SUVs (-0.8) and on Primary (-1.6) and Local roadways (-3.9). An examination of usage rates over the most recent two-year period indicated that passenger cars/SUVs (+0.3), trucks (+3.0), and Secondary roads (+2.0) experienced the largest increases since 2021. In addition, the truck rate is the highest observed since the 2015 study (89.4%) and the Secondary roadway rate is the highest observed in Maryland since the annual study criteria were revised in 2011.

Table 6- Change From 2021[+] to 2023 in Weighted Seat Belt Usage by Vehicle Type & Roadway

	2021[+]	2022	2023	Change in Rate 2022-2023	Change in Rate 2021-2023
All Vehicles	91.4%	92.7%	92.1%	-0.6%	+0.7%
Cars/SUVs	92.3%	93.4%	92.6%	-0.8%	+0.3%
Trucks	86.0%	88.0%	89.0%	+1.0%	+3.0%
Primary Roads	93.7%	95.2%	93.6%	-1.6%	-0.1%
Secondary Roads	90.6%	91.8%	92.6%	+0.8%	+2.0%
Local Roads	84.8%	85.2%	81.3%	-3.9%	-3.5%

[+] Different set of sampled roadways were observed in 2021.

Figure 3 – Comparison from 2021[+] to 2023 of Weighted Seat Belt Usage Rates by Vehicle Type

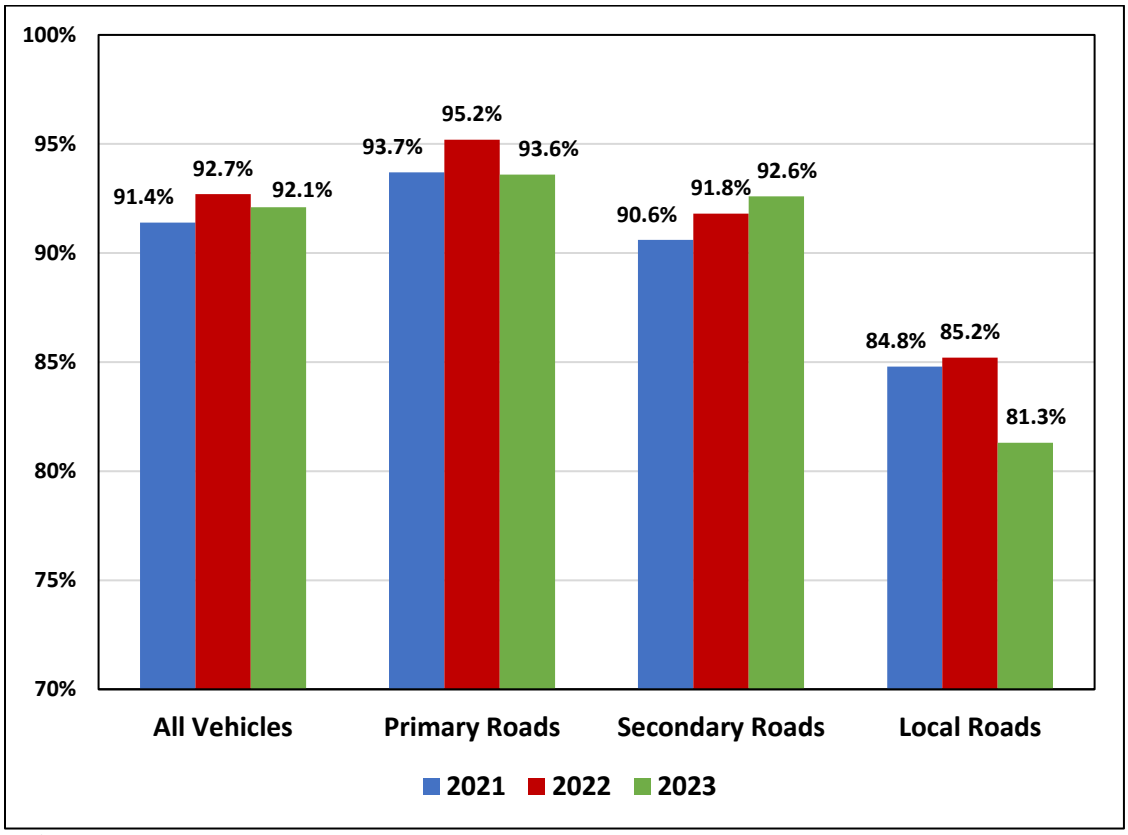


[+] Different set of sampled roadways were observed in 2021.

Table 7 contains a list of weighted belt use and standard error rates by jurisdiction for all vehicles combined. Ten (71.4%) of the 14 jurisdictions had seat belt usage rates of at least 90%. The highest seat belt usage rates were found in Harford County (97.8%), Montgomery County

(94.9%) and Prince George's County (93.8%), while Charles (88.6%), Washington (81.7%) and Caroline (76.1%) counties had the three lowest rates. Jurisdictional standard error rates ranged from a low of 0.4% in Harford and St. Mary's counties to a high of 1.6% in Washington County.

Figure 4 - Comparison from 2021⁺ to 2023 of Weighted Seat Belt Usage Rates by Roadway Type



⁺ Different set of sampled roadways were observed in 2021.

Jurisdictional usage rates of occupants observed in passenger cars or SUVs were also at least 90% in ten (71.4%) of the 14 jurisdictions (see Table 7). Harford (98.3%), Montgomery (95.3%) and Prince George's (94.2%) counties had the highest usage rates among occupants of cars/SUVs, while Charles (88.6%), Washington (85.7%) and Caroline (80.1%) had the lowest rates. The lowest standard error rate of 0.4% occurred in Harford and St. Mary's counties; Washington County had the highest error rate (1.7%).

For occupants of pick-up trucks, five (35.7%) of the 14 jurisdictions had usage rates above 90%. The highest rates were found in Harford (94.4%), Anne Arundel (93.9%) and Howard (93.8%) counties (see Table 7). Overall, there were seven jurisdictions with rates between 80% and 90%, with Washington (75.1%) and Caroline (67.4%) counties owning the only rates below 80%. The standard error rate for trucks ranged from a low of 0.4% in Howard County to a high of 1.9% in Montgomery County. A color-coded map of weighted rates by NHTSA jurisdiction is displayed in Figure A of the Appendix.

Table 7 – 2023 Weighted Usage Rates in NHTSA-Surveyed Jurisdictions of Maryland by Jurisdiction and Vehicle Type
All Front Seat Occupants Combined With Known Seat Belt Use

		All Vehicles			Passenger Cars/SUVs			Pick-up Trucks	
	VMT (millions)	**Usage Rate***	**SE**		**Usage Rate**	**SE**		**Usage Rate**	**SE**
All 14 Jurisdictions	50,358	92.1%	0.9%		92.6%	0.9%		89.0%	1.4%
Harford	2,517	97.8%	0.4%		98.3%	0.4%		94.4%	1.5%
Montgomery	7,206	94.9%	1.3%		95.3%	1.3%		90.1%	1.9%
Prince George's	8,952	93.8%	0.8%		94.2%	0.8%		89.2%	1.5%
Howard	4,084	93.6%	0.8%		93.5%	0.9%		93.8%	0.4%
Anne Arundel	5,899	92.7%	0.9%		92.9%	0.8%		93.9%	1.4%
Cecil	1,300	92.4%	1.0%		92.6%	1.0%		91.3%	1.3%
Baltimore City	3,242	91.7%	0.7%		92.1%	0.7%		87.2%	1.5%
Frederick	3,158	90.7%	0.7%		92.0%	0.6%		87.8%	1.6%
St. Mary's	884	90.7%	0.4%		91.9%	0.4%		89.3%	0.6%
Carroll	1,264	90.2%	0.6%		92.3%	0.5%		84.6%	0.8%
Baltimore Co	8,157	89.7%	0.9%		89.5%	1.0%		86.6%	1.4%
Charles	1,264	88.6%	0.6%		88.6%	0.5%		87.4%	1.1%
Washington	2,047	81.7%	1.6%		85.7%	1.7%		75.1%	1.4%
Caroline	384	76.1%	1.5%		80.1%	1.6%		67.4%	1.8%

* Jurisdictional usage rates are sorted in descending order for all vehicles combined.

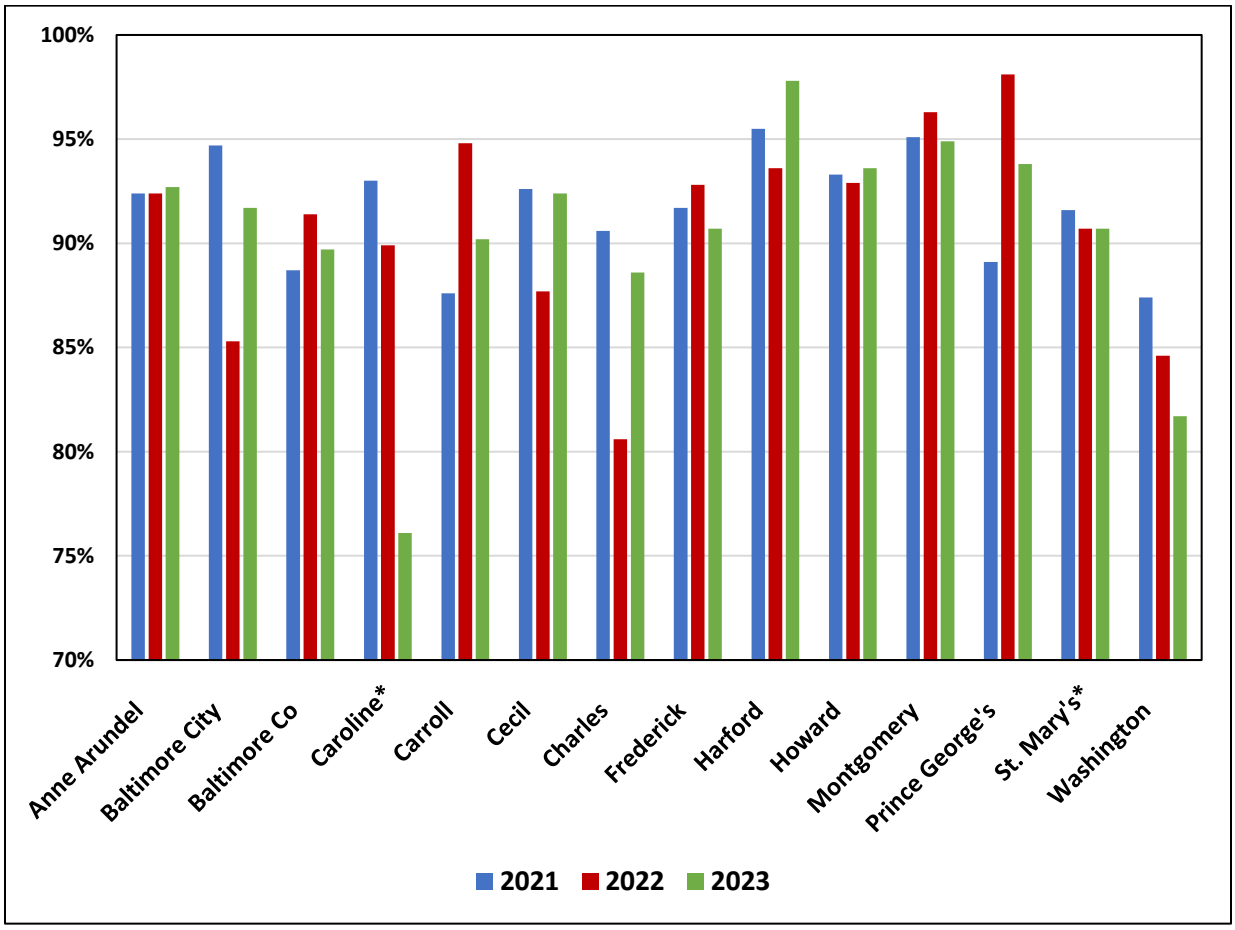
Jurisdictional changes in weighted rates over time are documented in Table 8 and Figure 5. Six (42.9%) of the 14 jurisdictions experienced an increase in usage rate over the previous year, with Charles County (+8.0 percentage points) and Baltimore City (+6.4) experiencing the biggest gains. St. Mary's County experienced no change in its usage rate of 90.7%. The largest declines occurred in Caroline (-13.8) and Carroll (-4.6) counties. Differences in jurisdictional rates since 2021, when a different sample of roads were observed, were also examined. Six (42.9%) of the 14 jurisdictions experienced an increase in rates over the previous two years, led by Prince George's (+4.7) and Carroll (+2.6) counties. Caroline (-16.9) and Washington (-5.7) counties experienced the largest decreases in rates since 2021. Overall, three jurisdictions had a rate that was consistently higher than the statewide rate each year since 2021 (Harford, Howard, and Montgomery).

Table 8 - Changes Between 2021[+] and 2023 in Weighted Seat Belt Usage by Jurisdiction

Jurisdiction	2021[+]	2022	2023	Change in Rate 2022-2023	Change in Rate 2021-2023
All Jurisdictions	91.4%	92.7%	92.1%	-0.6%	0.7%
Anne Arundel	92.4%	92.4%	92.7%	0.3%	0.3%
Baltimore City	94.7%	85.3%	91.7%	6.4%	-3.0%
Baltimore Co	88.7%	91.4%	89.7%	-1.7%	1.0%
Caroline*	93.0%	89.9%	76.1%	-13.8%	-16.9%
Carroll	87.6%	94.8%	90.2%	-4.6%	2.6%
Cecil	92.6%	87.7%	92.4%	4.7%	-0.2%
Charles	90.6%	80.6%	88.6%	8.0%	-2.0%
Frederick	91.7%	92.8%	90.7%	-2.1%	-1.0%
Harford	95.5%	93.6%	97.8%	4.2%	2.3%
Howard	93.3%	92.9%	93.6%	0.7%	0.3%
Montgomery	95.1%	96.3%	94.9%	-1.4%	-0.2%
Prince George's	89.1%	98.1%	93.8%	-4.3%	4.7%
St. Mary's*	91.6%	90.7%	90.7%	0.0%	-0.9%
Washington	87.4%	84.6%	81.7%	-2.9%	-5.7%

[+] Different set of sampled roadways were observed in 2021.
* Usage rates for Caroline and St.Mary's counties were not weighted in 2021.

Figure 5 - Comparison from 2021[+] to 2023 of Weighted Seat Belt Usage Rates by Jurisdiction



[+] Different set of sampled roadways were observed in 2021.
* Usage rates for Caroline and St.Mary's counties were not weighted in 2021.

NHTSA Sites – Unweighted Analysis

An unweighted analysis of seat belt rates was conducted for subgroups of the observed sample that were not examined by probability of selection and VMT weights. These subgroups included drivers only, passengers only, and jurisdiction-specific roadway types.

Approximately 93.4% of all drivers were belted (Table 9). Belt use among drivers was more likely to occur in passenger cars or SUVs (94.0%) than in pick-up trucks (90.1%). Drivers were more likely to be belted on Primary roads (94.7%) than on Secondary roads (92.7%) or Local roads (88.6%). This difference in roadway seat belt usage remained whether the driver was in a car (95.1% vs. 93.4% and 90.2% for Primary, Secondary, and Local, respectively) or in a truck (92.2% vs. 89.2% and 76.2%).

A lower proportion of passengers than drivers were belted overall (91.4%). As for drivers, passengers had a higher usage rate in passenger cars/SUVs (92.1%) than in trucks (87.6%). Passengers were more likely to be belted on Primary roads (93.3%) than on Secondary (90.1%) or Local roads (87.7%). This difference in roadway usage rates remained if the passenger was in a car (93.7% vs. 90.8% vs. 90.0% for Primary vs. Secondary vs. Local) or in a truck (90.5% vs. 86.3% vs. 72.2%).

The data in Table 9 indicate that 2023 usage rates among drivers and passengers were over 90% on Primary roadways for all vehicle types.

Table 9 - 2023 Unweighted Usage Rates in NHTSA-Surveyed Jurisdictions of Maryland Overall, by Vehicle Type and by Roadway Classification Known Seat Belt Use by Front Seat Occupant Status

	All Vehicles			Passenger Cars/SUVs			Pick-up Trucks	
	N	Usage Rate		N	Usage Rate		N	Usage Rate
DRIVERS Only								
All Roadways	27,351	93.4%		23,281	94.0%		4,070	90.1%
Primary Roads	11,729	94.7%		10,066	95.1%		1,663	92.2%
Secondary Roads	14,698	92.7%		12,392	93.4%		2,306	89.2%
Local Roads	924	88.6%		823	90.2%		101	76.2%
PASSENGERS Only								
All Roadways	6,531	91.4%		5,630	92.1%		901	87.6%
Primary Roads	2,833	93.3%		2,496	93.7%		337	90.5%
Secondary Roads	3,560	90.1%		3,014	90.8%		546	86.3%
Local Roads	138	87.7%		120	90.0%		18	72.2%

Analysis by jurisdiction indicated that seat belt usage rates for all occupants and all vehicle types combined were higher on Primary roads than on Secondary or Local roads in eight (72.7%) out of 11 jurisdictions having observations available on Primary roads (Table 10). Similarly, for cars or SUVs, seven (63.6%) of the 11 jurisdictions had higher usage rates on Primary roadways, and eight (72.7%) jurisdictions had higher rates on Primary roads for trucks. Belt use among car/SUV occupants was 100% on Local roads in Caroline, Frederick and Washington counties. Observed restraint usage was also 100% among truck occupants on Local roads in Harford and St. Mary's counties. However, a seat belt rate for trucks could not be calculated for the Local road site in Anne Arundel County, as there were no trucks observed at that site during the observation window.

Table 10 – 2023 Unweighted Usage Rates in NHTSA-Surveyed Jurisdictions of Maryland by Vehicle Type and Roadway Classification Within Jurisdiction
All Front Seat Occupants Combined With Known Seat Belt Use

			Unweighted Seat Belt Usage Rates		
Jurisdiction	**# of Sites**	**Roadway Classification**	**All Vehicles**	**Passenger Cars/SUVs**	**Pick-up Trucks**
Anne Arundel	5	Primary	90.7%	91.2%	88.1%
Anne Arundel	4	Secondary	98.1%	98.2%	97.1%
Anne Arundel	1	Local	66.7%	66.7%	NA
Baltimore City	3	Primary	91.8%	92.6%	81.3%
Baltimore City	6	Secondary	92.4%	92.5%	91.6%
Baltimore City	1	Local	90.8%	91.7%	66.7%
Baltimore Co	5	Primary	93.9%	94.6%	89.4%
Baltimore Co	4	Secondary	90.5%	90.9%	88.4%
Baltimore Co	1	Local	71.4%	62.5%	83.3%
Caroline	9	Secondary	84.7%	86.1%	79.1%
Caroline	1	Local	80.0%	100.0%	60.0%
Carroll	1	Primary	98.0%	98.3%	96.4%
Carroll	8	Secondary	89.9%	91.3%	83.6%
Carroll	1	Local	77.8%	87.5%	70.0%
Cecil	4	Primary	98.2%	98.4%	97.4%
Cecil	5	Secondary	92.5%	93.2%	90.4%
Cecil	1	Local	82.2%	79.4%	90.9%
Charles	9	Secondary	95.2%	95.3%	94.1%
Charles	1	Local	80.0%	87.5%	50.0%
Frederick	6	Primary	94.8%	95.0%	93.4%
Frederick	3	Secondary	84.2%	84.2%	84.1%
Frederick	1	Local	90.0%	100.0%	75.0%

Table 10 Continued
2023 Unweighted Usage Rates in NHTSA-Surveyed Jurisdictions of Maryland by Vehicle Type and Roadway Classification Within Jurisdiction
All Front Seat Occupants Combined With Known Seat Belt Use

Harford	4	Primary	98.3%	98.6%	96.2%
Harford	5	Secondary	98.1%	98.5%	96.1%
Harford	1	Local	97.8%	97.7%	100.0%
Howard	6	Primary	96.0%	95.8%	97.0%
Howard	3	Secondary	94.1%	94.1%	94.1%
Howard	1	Local	90.5%	91.6%	85.7%
Montgomery	4	Primary	94.2%	94.4%	93.1%
Montgomery	5	Secondary	96.0%	96.4%	90.9%
Montgomery	1	Local	91.8%	92.3%	81.8%
Prince George's	5	Primary	96.2%	96.7%	92.2%
Prince George's	4	Secondary	93.1%	93.3%	91.2%
Prince George's	1	Local	77.3%	78.6%	50.0%
St. Mary's	9	Secondary	94.3%	95.4%	90.7%
St. Mary's	1	Local	83.3%	80.0%	100.0%
Washington	5	Primary	85.6%	87.1%	79.3%
Washington	4	Secondary	78.4%	79.6%	72.8%
Washington	1	Local	74.1%	100.0%	53.3%

NHTSA Sites – Unknown Observations

Seat belt usage could not be determined for 4.2% of all front-seat occupants, differing between drivers (5.0%) and passengers (0.4%). Unknown belt use was more prevalent in pick-up trucks (7.1%) than in passenger cars (3.7%) and higher on Secondary roads (4.3%) than on Primary (4.1%) or Local roads (3.1%). Belt use was ascertained for every driver and passenger in 16 (11.4%) of the 140 sites, while 21 sites (15.0%) had an unknown rate of at least 10%. Unknown observations were primarily attributed to glare (caused by bright sunny skies), extensive window tinting, and light rain. The overall proportion of unknown seat belt use in the 2023 survey was 0.5 percentage points higher than that computed in 2022.

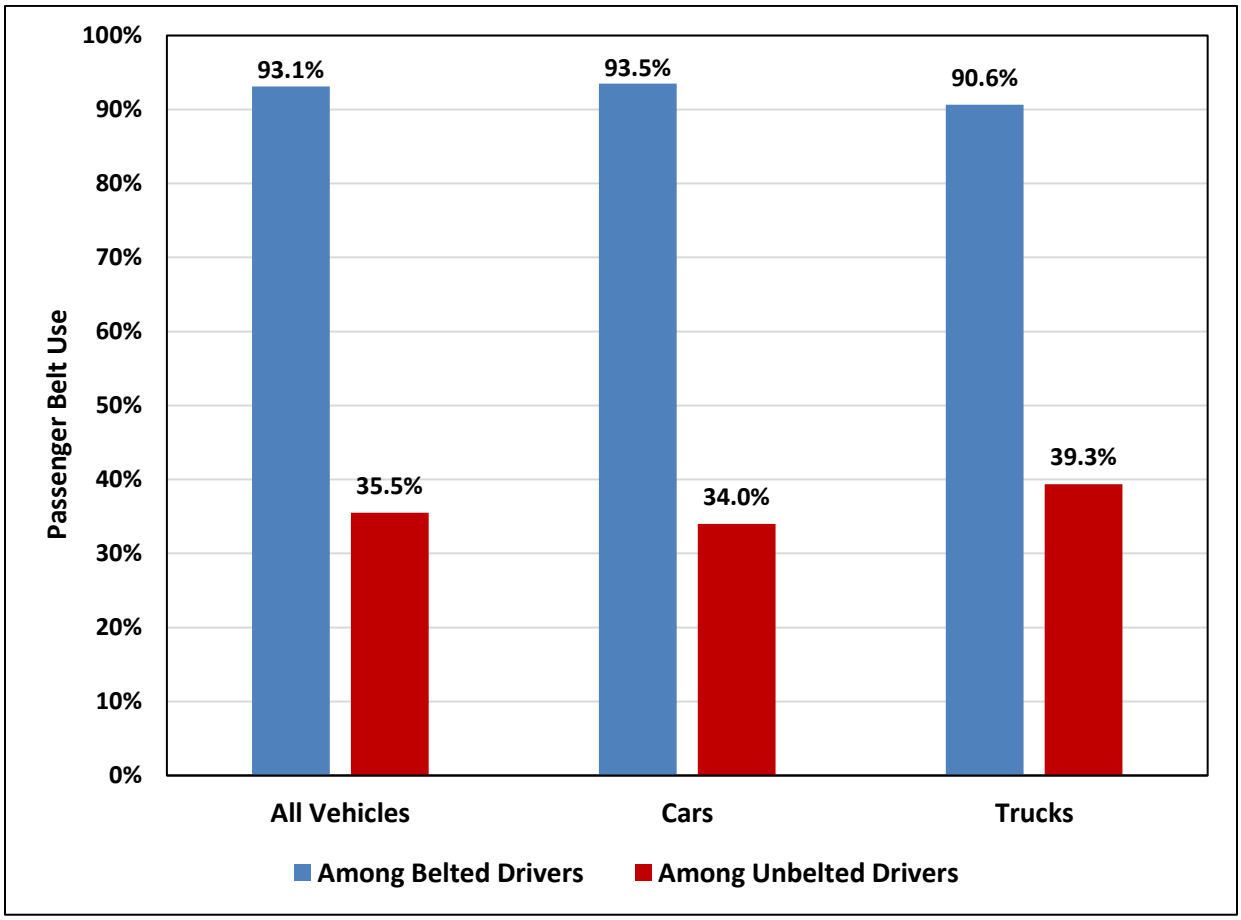
Analysis of Individual Record-Level Data

In addition to the analysis of summary data to calculate overall usage rates, individual record-level data were analyzed for more in-depth study of occupant behavior within NHTSA

jurisdictions. Specific analyses focused on the unweighted belt use of the right front passenger and their association with the driver's unweighted belt use, as well as any connection between unweighted driver belt use and observed hand-held cell phone use. However, because this project is primarily a study of seat belt usage, the cell phone results should not be viewed as being conclusive. Less than ideal observation angles (e.g., from an overpass), glare, and concentration on determining seat belt usage may have contributed to an underestimate of cell phone usage.

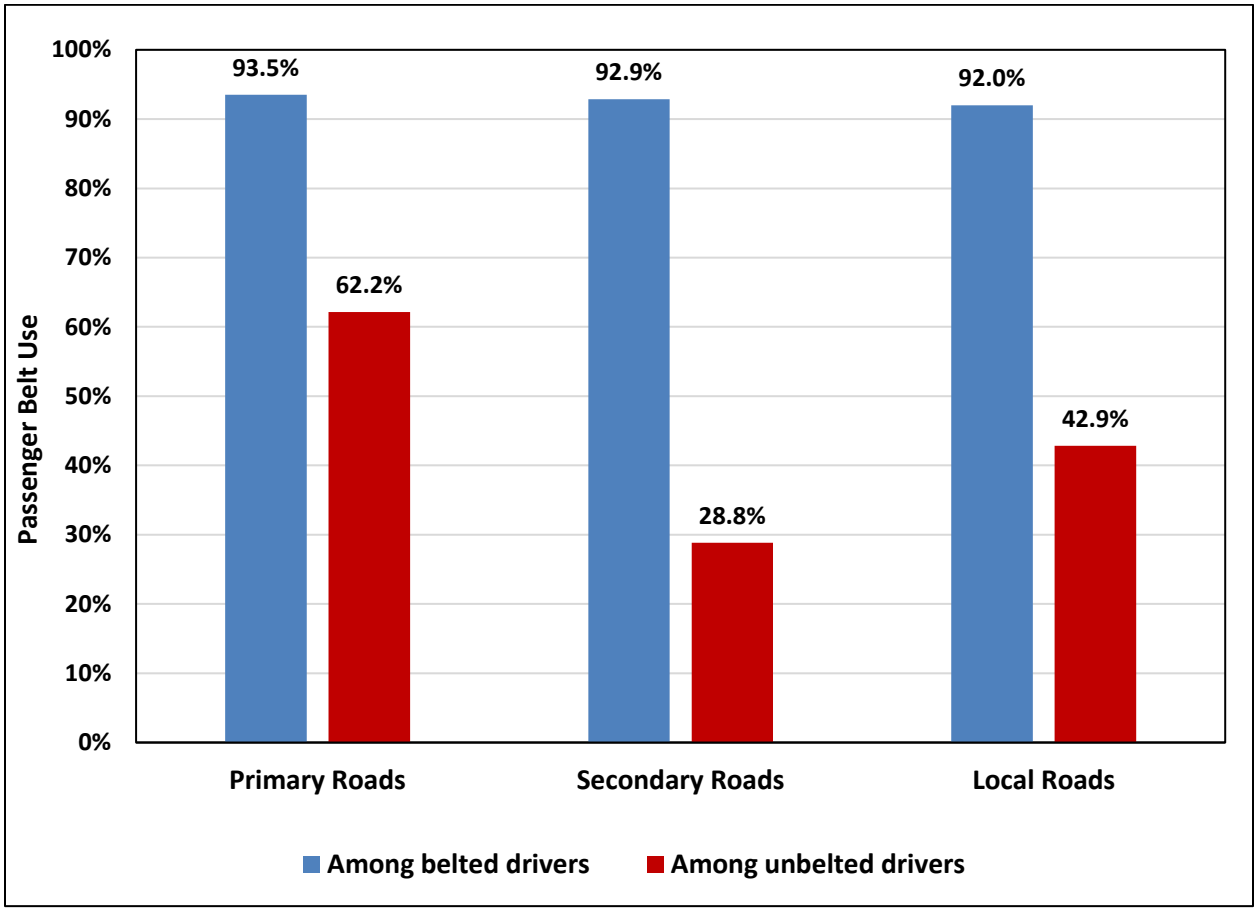
Of the 27,351 belted and unbelted drivers observed in NHTSA jurisdictions, approximately 23.8% (n=6,507) also had a passenger observed in the right front seating position. Approximately 93.4% of those drivers were belted and the majority was riding in cars (85.1%). Of the drivers that were belted with passengers in the vehicle, 93.1% of their passengers were also belted. However, among the cases of unbelted drivers with passengers, only 35.5% of the passengers were belted. This large difference was also prevalent when the data were stratified by vehicle type: 93.5% vs. 34.0% of passengers wore their seat belt in cars with belted and unbelted drivers, respectively, while 90.6% vs. 39.3% of passengers were belted in pick-up trucks with belted and unbelted drivers (Figure 7).

Figure 7 – 2023 Right Front Passenger Seat Belt Use is Associated With Driver Use by Vehicle Type



The associations of lower passenger belt use with unbelted drivers, and the larger difference among those in pickup trucks as compared to cars, were also present when examining the data by roadway classification (Figure 8). The overall difference in passenger belt use between cases of belted and unbelted drivers was 93.5% vs. 62.2% on Primary roads, 92.9% vs. 28.8% on Secondary roads, and 92.0% vs. 42.9% on Local roads. Thus, the large difference in passenger restraint by driver restraint use that was observed on Primary roads was even wider on Secondary and Local roadways.

Figure 8 – 2023 Right Front Passenger Seat Belt Use is Associated With Driver Use by Roadway Classification



The data were further analyzed with regard to observed hand-held cell phone use among drivers. A total of 518 (1.8% of all drivers) were observed using a hand-held cellphone while operating a vehicle. Though representing more than three times the proportion of drivers observed using a cell phone in the 2022 survey (0.5%), this rate is almost half of the average proportion observed from 2019 through 2021 (3.5%).

The proportion of belted drivers observed on a cell phone in 2023 was lower than the proportion of unbelted drivers on a cell phone (1.7% of belted vs. 3.7% of unbelted drivers). This discrepancy in cell phone use mirrored that found between belted and unbelted car drivers (1.5% vs. 3.7%) and was slightly smaller between belted and unbelted truck drivers (2.5% vs. 3.7%, respectively). Analyzing the data from a different perspective, among all drivers on a cell phone with known belt use, 86.7% were belted, with car drivers being restrained slightly more often than truck drivers (86.9% in cars vs. 85.8% in trucks). As might be expected, these belt usage rates were lower than the corresponding belt use rates found among drivers who were not using a cell phone (cars and trucks 93.6%, cars 94.1%, trucks 90.2%).

Analysis of Rural vs. Urban Jurisdictions and Roadway Segments

The Maryland State Office of Rural Health designates 18 out of the 24 jurisdictions in the State as "rural". Using this designation, the 14 NHTSA jurisdictions were classified as being either rural (Caroline, Carroll, Cecil, Charles, Frederick, Harford, St. Mary's and Washington Counties) or urban (Anne Arundel, Baltimore, Howard, Prince George's, Montgomery Counties and Baltimore City). Last year, in collaboration with the Washington College GIS program, each roadway segment within the NHTSA jurisdictions, from the 2022 observation study, was characterized as either rural or urban, based upon the Maryland iMap services and US Census 2020 data. As stated earlier, the same roadway sample will be used for each observation study between 2022 and 2026; hence the rural/urban road segment classifications obtained in 2022 is the same for the 2023 study. Unweighted occupant seat belt usage rates were then calculated to compare (1) urban vs. rural jurisdictions and (2) urban vs. rural roadway segments. The results for 2022 and 2023 are displayed in Table 14, with urban % listed first, rural % second, and higher percentage in **bold** in paragraphs below.

In 2023, the unweighted percent seat belt usage was higher in urban compared to rural jurisdictions for all vehicle types: Cars and Trucks combined (**93.8%** vs 92.2%); Cars (**94.2%** vs 93,1%); Trucks (**91.6%** vs 88.4%). However, the 2022 rates were slightly higher in the rural jurisdictions for all vehicle types: Cars and Trucks combined (92.7% vs **93.3%**); Cars (93.1% vs **94.0%**); Trucks (89.3% vs **89.9%**).

Similarly, the 2023 analysis of specific urban vs rural roadways revealed higher unweighted percent seat belt usage for all vehicle types on urban roads: Cars and Trucks combined (**93.7%** vs 91.7%); Cars (**94.1%** vs 92.7%); Trucks (**91.2%** vs 87.6%). In 2022, when comparing the restraint use on roadways classified as being either urban or rural, there were differences by type of vehicle. The 2022 seat belt usage rate in cars and trucks combined was 93.0% on both rural and urban roadways. However, while seat belt usage rates in cars remained slightly higher on rural roads as compared to urban roads (93.5% vs **93.7%)** , trucks on rural roadways had a slightly lower usage rate as compared to those on urban roadways (**89.8%** vs 89.4%).

The 2022 National Occupant Protection Use Survey (NOPUS) concluded that the unweighted seat belt usage rate for occupants in Urban Areas was 92.0% (95% CI 90.6% - 93.2%) and in Rural Areas 90.8% (95% CI 88.3% - 92.9%). In Maryland, the unweighted statewide rates were even higher (93.8% Urban Areas and 92.2% in Rural Areas).

Table 14 – 2022 and 2023 Unweighted Seat Belt Rates for Urban vs. Rural Jurisdictions and Roadways Among the 14 NHTSA Jurisdictions

	2022	2023
CARS & TRUCKS		
Urban Jurisdictions	92.7%	93.8%
Rural Jurisdictions	93.3%	92.2%
Urban Roadways	93.0%	93.7%
Rural Roadways	93.0%	91.7%
CARS		
Urban Jurisdictions	93.1%	94.2%
Rural Jurisdictions	94.0%	93.1%
Urban Roadways	93.5%	94.1%
Rural Roadways	93.7%	92.7%
TRUCKS		
Urban Jurisdictions	89.3%	91.6%
Rural Jurisdictions	89.9%	88.4%
Urban Roadways	89.8%	91.2%
Rural Roadways	89.4%	87.6%

Summary

The overall observed seat belt usage rate for drivers and right front seat passengers observed in the State of Maryland in June 2023, after weighting by probability of roadway selection and jurisdictional roadway specific VMT, was 92.1%. The 2023 usage rate represented a 0.6 percentage point decrease from the previous year. The Statewide standard error of 0.9% was well below the NHTSA threshold of 2.5%, yielding a 95% confidence interval of 90.3% to 93.9% for the combined usage rate. These rates were based on observation of 28,805 vehicles and 35,363 occupants, representing decreases of 14.5% and 16.2% in the number of vehicles and occupants observed, respectively, in the 2022 survey.

Belt use was highest among passenger cars and SUVs relative to pick-up trucks (92.6% vs. 89.0%, respectively). Seat belt usage was also highest among all front seat occupants traveling on Primary roads relative to Secondary and Local roads (93.6% vs. 92.6% and 81.3%). Since 2022, these rates represent increases for trucks and Secondary roadways.

Harford County (97.8%) had the highest usage rate among Maryland's 14 NHTSA jurisdictions, followed by Montgomery (94.9%), and Prince George's (93.8%) counties. There were ten jurisdictions with combined rates of at least 90%; Charles (88.6%), Washington (81.7%) and Caroline (76.1%) counties experienced the lowest rates. Overall, six of the 14 jurisdictions experienced an increase in combined usage rates over the past year. For occupants of passenger cars or SUVs, ten jurisdictions had usage rates of at least 90%. Among occupants of pick-up trucks, five jurisdictions had a usage rate above 90% and two jurisdictions (Washington and Caroline counties) experienced rates below 80%. Unweighted analysis indicated that drivers had a slightly higher Statewide usage rate (93.4%) than front seat passengers (91.4%).

Seat belt usage could not be ascertained for 4.2% of all drivers and passengers. Unknown belt use was more prevalent in pick-up trucks (7.1%) than in passenger cars (3.7%), higher for drivers (5.0%) than for passengers (0.4%), and higher on Secondary roads (4.3%) compared to Primary roads (4.1%) and Local roads (3.1%).

Examination of individual record-level data, for the instance in which both a driver and passenger were observed in the front seat, indicated that 93.1% of passengers were belted when the driver was belted. However, if the driver was unbelted, only 35.5% of passengers were observed to wear their belt. This large difference in passenger belt use occurred in cars and SUVs (93.5% for belted drivers vs. 34.0% for unbelted drivers) as well as in trucks (90.6% for belted drivers vs. 39.3% for unbelted drivers). There was also an association with roadway classification, with the Secondary or Local roadways corresponding to a larger difference in passenger belt use between belted and unbelted drivers than the discrepancy seen on Primary roads. Finally, cell phone usage was ascertained when possible, indicating that belted drivers were less likely than unbelted drivers to use a hand-held cell phone while driving (1.7% vs. 3.7%, respectively). Drivers on a hand-held cell phone had a lower seat belt usage rate (86.7%) than drivers who were not observed using a cell phone (93.6%).

An additional analysis was carried out to compare urban vs. rural jurisdictions and roadways among the 14 NHTSA jurisdictions. In 2023, the unweighted percent seat belt usage was higher in urban compared to rural jurisdictions for all vehicle types, whereas the 2022 rates were higher in the rural jurisdictions. When comparing the 2023 restraint use findings on specific roadway segments classified as being either urban or rural, rates in all vehicles remained higher on urban roads.

Appendix

Figure A

Maryland Seat Belt Usage Rates for NHTSA Jurisdictions
2023