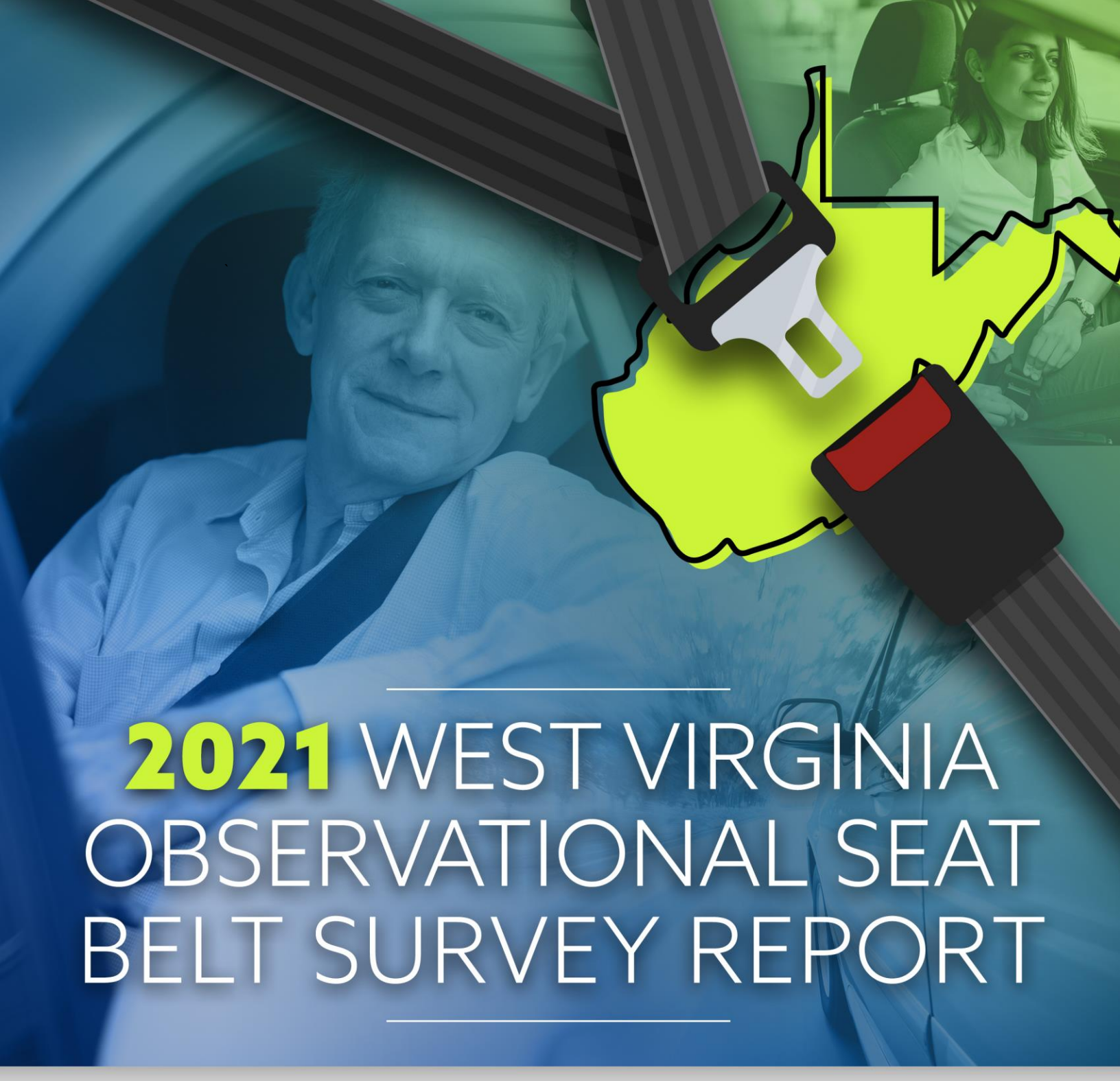

2021 WEST VIRGINIA OBSERVATIONAL SEAT BELT SURVEY REPORT

prepared for

West Virginia Governor's Highway Safety Program

GHSP
WEST VIRGINIA GOVERNOR'S HIGHWAY SAFETY PROGRAM

prepared by

Cambridge Systematics, Inc.

CAMBRIDGE SYSTEMATICS

2021 West Virginia Observational Seat Belt Survey Report

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prepared by

Cambridge Systematics, Inc.
115 South LaSalle Street, Suite 2200
Chicago, IL 60603

date

October, 2021

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Executive Summary

West Virginia has adopted the long-term goal of zero traffic fatalities, with an interim goal of reducing fatalities by one-half by 2030, using 2006 to 2010 as a five-year average base. According to the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS), from 2015 to 2019 the average percentage of unrestrained fatalities in the State was 30.1 percent. To reach the State's target of zero traffic fatalities, reducing nonbelt use should be a top priority.

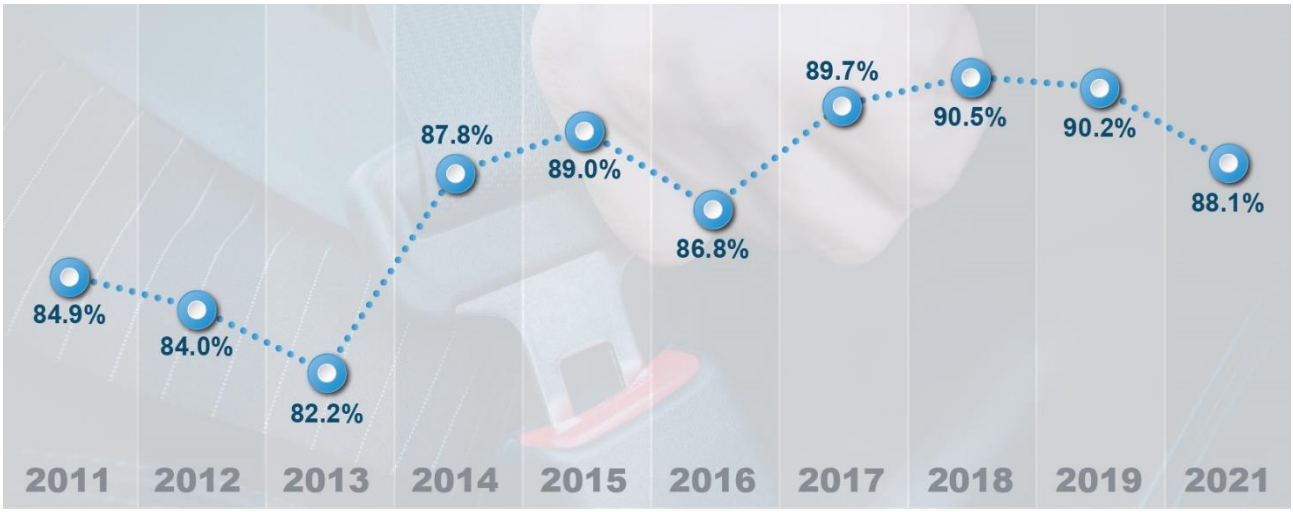
This report outlines the observed seat belt usage rate in West Virginia collected between June 1 and June 15, 2021 during both the weekdays and weekends. This report also documents the seat belt use rate and identifies the primary sources of variation in seat belt use, allowing the Governor's Highway Safety Program (GHSP) and its stakeholders to develop and revise countermeasures to address unrestrained vehicle occupants.

Observers recorded seat belt information on 25,200 drivers and 6,566 onboard front seat passengers for a total of 31,766 observations. Observers were not able to record seat belt use for 318 observations, resulting in a statewide nonresponse unweighted rate of 1.00 percent for the 2021 survey, compared to a nonresponse rate of 0.28 percent for the State's 2019 survey. An observational seat belt survey was not conducted in 2020 due to the COVID-19 pandemic. As such, in the various charts and tables in this report there will be no data to report for 2020.

The 2021 observed seat belt rate in West Virginia fell below 90 percent (Figure ES.1), coming in at 88.12 percent. The rate has a standard error of 0.75 percent (relative standard error = 0.85 percent), well within the standard requirement of 2.5 percent set forth by NHTSA. This is a decrease from the peak observed seat belt usage rate in 2018 of 90.53 percent. All 14 counties where observations occurred had seat belt use rates between 73.8 percent and 96.9 percent in 2021. With the information available, it is unclear if the decline in the observed seat belt usage rate was impacted by the COVID-19 pandemic, such as the reduction in dedicated seat belt enforcement throughout the State.

Figure ES.1 West Virginia Observed Seat Belt Usage Rates

2011 to 2021



Source: https://cdan.nhtsa.gov/stsi.htm# and 2021 observational seat belt survey.

Section 1 of this report discusses the sampling procedures and methods used to obtain an estimate of the seat belt use rate in West Virginia; it also describes procedures for the selection of counties, stratification of roadways, and observation sites. Section 2 details the results of this effort, beginning with the statewide seat belt use rate and trends over several years, along with a summary of the characteristics of occupants, vehicles, and observation sites. The report concludes with an analysis of selected characteristics of vehicle occupants and observation sites. The information provided by this report will help to identify the conditions under which seat belts are more or less likely to be used, allowing safety stakeholders across the State to improve upon their strategies for addressing unrestrained vehicle occupants.

Acknowledgments

Cambridge Systematics, Inc. (CS) began a partnership with the GHSP in 2018 to aid in the selection of new survey sites. CS also was involved in the development of this report. The 2021 West Virginia Observational Seat Belt Survey Report would not have been possible without the administration and support of the GHSP staff. Specifically, CS would like to thank Bob Tipton, Director, Barbara Lobert, Federal Programs Administrator, and Amy Boggs, Grants Program Manager for their assistance in compiling the survey data, overseeing the observers, and managing the day-to-day operations of the project.

1.0 Methodology

In 2011, NHTSA issued new Uniform Criteria for State Observational Surveys of Seat Belt Use in Federal Register Vol. 76, No. 63 (April 1, 2011, Rules and Regulations, pages 18042–18059). This report represents West Virginia's fulfillment of the NHTSA requirement to submit a study and data collection protocol for an annual State survey to estimate passenger vehicle occupant restraint use. The current methodology is fully compliant with the Uniform Criteria and was used to implement West Virginia's 2018 seat belt survey and will remain in effect through 2022.

The present survey design and methodology is similar to previous years but updated to meet NHTSA's updated requirements. The surveyors selected the sample using a multistage, stratified cluster sampling procedure, to reflect the most recent roadway network conditions. West Virginia is divided into 55 counties and 35 of the counties account for 85 percent of all passenger vehicle fatalities. The present survey draws observation sites from an updated selection of 14 counties. Surveyors selected a total of 134 observation sites, resulting in 5 to 15 sites per county during the survey period in June. Surveyors used the same methodology approved by NHTSA in 2018 for the 2021 survey and the methodology is valid through 2022 unless otherwise noted.

The 2018 observation survey design utilized in 2021 involved a five-step process. The steps included:

1. The selection of counties based on vehicle occupant fatalities and regions of the State.
2. The stratification of roads based on functional use classes.
3. The selection of specific road segments within each stratum and county.
4. The development of seat belt use estimation procedures and computations.
5. The establishment of data collection and quality procedures consistent with NHTSA requirements.

1.1 County Selection

Surveyors identified a total of 35 counties as having the most passenger vehicle occupant fatalities. These counties accounted for 85 percent of all fatalities during this time period studied. Of the 35 counties, 14 were selected for inclusion in the 2018 observation survey to represent all three regions of the State. The selection procedure involved dividing the State into three geographic regions, then allocating the number of counties by region based on the number of qualified counties in the region, and within each region making probability-proportional-to-size (PPS) selections with the odds of selection proportional to the county's total roadway length. Appendix A shows the selected counties and identified regions of the State on the map.

1.1.1 Roadway Stratification and Definitions

The 2018 survey design identified 169 total observation sites across 14 counties in the State. A large number of observation sites were necessary to meet NHTSA's requirement of having a standard error no greater than 2.5 percent. The surveyors determined the 169 sites by the mix of counties and road type distributions within counties. Consistent with NHTSA guidelines, the 2018 survey excluded rural local roads in non-Metropolitan Statistical Area (MSA) counties. Road strata include Primary Roadways, Secondary Roadways, and Local Roads (excluding rural local roads in non-MSA counties). Each of the 14 counties has road

segments in two or all three road strata. The weekday survey used six segments in Primary Roadways Strata, four segments in Secondary Roadways Strata, and two segments in Local Roads Strata (excluding rural local roads in non-MSA counties). The weekend survey added one segment in each strata. The weekday and weekend surveys together included 15 segments per county.

1.1.2 Roadway Segment and Site Selection

The surveyors used an approach to identify specific roadway segments that involved a PPS procedure, with lengths of roadways defined as the "size." Segments were randomly drawn from county-stratum populations of road segments, with the probability of drawing any segment proportional to its portion of the total roadway lengths within the county-stratum. Sampling called for selecting twice the number of road segments required, retaining the order of selection, to provide for the necessary sample and an equal number of alternates, or "spare" segments. Surveyors selected and distributed a total of five certainty segments among the 169 primary and alternate segments across the roadway functional strata.

Prior to actual data collection, surveyors selected specific locations for data observations based on visits to the locations, maps, and/or online road-level images. The direction of travel to be observed was randomly selected for each segment and/or site. Sites were selected based on having a clear view of the vehicles and taking into account observer and direction of travel of vehicles. Efforts also were made to select observation sites where traffic naturally slows in an effort to improve accuracy. When specific site locations were unusable or not able to provide a clear view of belt use, observers chose alternate locations within the road segment where they could more effectively observe the same traffic stream. Surveyors documented details and reasons for changing locations; Appendix B provides a complete list of selected primary road segments.

1.1.3 Seat Belt Rate and Standard Error Calculations

Surveyors calculated seat belt use rates using formulas based on the proportion of the State's total roadway length "represented" by the site. Seat belt use rate calculations followed a four-step process. First, estimated rates were calculated for each road type stratum within each county. The general formula for combining observed belt use rates from observation sites on individual segments, for a single county-stratum, is shown in formula (1).

This formula is used when the county-stratum contains certainty segments; the contribution of each segment to the overall county-stratum rate is proportional to the "size" of the segment's contribution to the entire county-stratum traffic (i.e., its roadway length, adjusted by the inverse of the probability of the segment's being selected into the sample).

$$p_{i(j)k} = \frac{\sum_l S_{i(j)k} W_{i(j)k} p_{i(j)k}}{\sum_l S_{i(j)k} W_{i(j)k}} \quad (1)$$

Where $i(j)$ = county i within region j, k = stratum, l= site within stratum and county, $S_{i(j)k}$ = roadway length for segment l in county-stratum $i(j)k$, and $p_{i(j)k}$ = the observed seat belt use rate at site $i(j)k = BS_{i(j)k}/O_{i(j)k}$ where $B_{i(j)k}$ = total number of belted occupants (drivers and outboard front seat passengers) observed at site, $O_{i(j)k}$ = total number of occupants with known belt use observed at site; and $W_{i(j)k}$ = the inverse of the probability of segment l's selection, as described above: (certainty segments) $W_{i(j)k} = 1.00$ or (random segments).

$$W_{i(j)k} = \frac{\sum_{m=1}^{N} S_{i(j)klm}}{n * S_{i(j)k}}$$

Where N = total number of segments in county-stratum $i(j)k$ excluding the certainty segments and n = number of segments to be randomly selected excluding certainty segments. In the case where there were no certainty segments in the county-stratum, formula (1) reduces to the simple formula (1a):

$$p_{i(j)k} = \frac{\sum_{l=1}^{n_{i(j)k}} p_{i(j)k}}{n_{i(j)k}} \ (1a)$$

Where $i(j)$ = county i within region j, k = stratum, l= site within stratum and county, $n_{i(j)k}$ = number of sites within the stratum-county combination, and $p_{i(j)k}$ = the observed seat belt use rate at site $i(j)kl$ = $BS_{i(j)kl}/O_{i(j)kl}$ where $B_{i(j)kl}$ = total number of belted occupants (drivers and outboard front seat passengers) observed at site, $O_{i(j)kl}$ = total number of occupants with known belt use observed at site.

Second, a county-by-county seat belt use rate, $p_{i(j)k}$, was obtained by combining county-stratum seat belt use rates across strata within counties, weighted by the stratum's relative contribution to total county roadway length:

$$p_{i(j)} = \frac{\sum_k S_{i(j)k} p_{i(j)k}}{\sum_k S_{i(j)k}} \ (2)$$

Where $S_{i(j)k}$ = roadway length for all roads in stratum k in county $i(j)$, $p_{i(j)k}$ = the observed seat belt use rate for stratum k in county $i(j)$.

In the third step, category-weighted seat belt use rates for each region of counties were obtained by combining and weighting the rates from the sampled counties in each region by their roadway length and probabilities of being selected:

$$p_j = \frac{\sum_i S_{i(j)} W_{i(j)} p_{i(j)}}{\sum_i S_{i(j)} W_{i(j)}} \ (3)$$

Where $S_{i(j)k}$ = roadway length for all roads k in county i and region j, $W_{i(j)}$ = the inverse of the probability of the county's selection: $W_{i(j)}$ = 1 for certainty counties; and:

$$W_{i(j)} = \frac{\sum_{l=1}^{N(j)} S_{i(j)l}}{n_{i(j)} * S_{i(j)}}$$

Where $N_{(j)}$ = the number of high-fatality counties in region j and $n_{i(j)}$=the number of those counties selected.

Finally, the statewide seat belt use proportion was calculated by combining the category proportions weighted by their proportion of statewide roadway length:

$$p = \frac{\sum_{j=1}^{3} S_j p_j}{\sum_{j=1}^{3} S_j} \ (4)$$

The result was a combination of the individual site seat belt use rates weighted to reflect each site's importance in total State roadway length.

Standard error of estimate values was estimated through a jackknife approach, based on the general formula:

$$\hat{\sigma}_{\hat{p}} = \left[\frac{1}{n*(n-1)}\sum_{i=1}^{n}(\hat{p}_i - \hat{p})^2\right]^{1/2}$$

Where $\hat{\sigma}_{\hat{p}}$ = standard deviation (standard error) of the estimated statewide seat belt use proportion $\hat{p}$ (equivalent to p in the notation of formulas 1–4), n = the number of sites, i.e., 134, and $\hat{p}_i$ = the estimated statewide seat belt use proportion with site i excluded from the calculation. The relative error rate was calculated, as well as the 95 percent confidence interval, i.e., $\hat{p} \pm 1.96\hat{\sigma}_{\hat{p}}$. These values are reported for the overall statewide seat belt use rate.

1.2 Procedures

Specific data collection procedures were established prior to the initiation of data collection, guided by the updated 2011 Uniform Criteria for State Observational Surveys of Seat Belt Use established by NHTSA.

1.2.1 Observers

The seat belt survey observers were hired under the direction of the GHSP. These observers performed all field data collection. Prior to any data collection, all observers received approximately one day of training by CS staff in 2018 after the current methodology used was approved by NHTSA. The observers received classroom instruction and several hours in the field practicing observation. Before observers conducted the training in 2021 GHSP provided a refresher training. The staff developed training to adhere to the observation procedures found in the Uniform Criteria for State Observational Surveys of Seat Belt Use (23 Code of Federal Regulations [CFR] § 1340.7). The topics covered in this training were:

- Review requirements and purpose of the observational seat belt survey.
- Review observation procedures and survey data to be collected.
- Discuss survey scenarios.
- Review survey application.
- Review survey dates and submission process.

Observation protocols dictate that all survey data must be collected through direct observation, surveys must occur at the selected observation sites, surveys must occur on the day and time indicated, and observations should last exactly one hour for each survey site. If the observation point was on a heavily traveled roadway making it difficult for the observer to note every vehicle, a reference point on the roadway in the appropriate lane should be chosen. That same reference point then would be used for the remainder of the observations.

The safety of the observers was a priority and covered in the training as well. All observers were to wear a reflective vest and not stand in a location that would impede traffic. Observers were advised that if

construction or weather conditions, such as heavy rain or fog, were present that it was permissible, after notifying GHSP, to reschedule or request an alternate site for the same day and time.

To ensure quality control, the staff assessed accuracy of observers at the end of classroom training previously conducted. This was done by conducting observations outside the training facility and comparing the simultaneous observations of the same traffic by different observers. Staff identified any differences noted after the observation was completed and discussed and resolved them with the observers.

Lastly, per 23 CFR § 1340.7, observer quality control was overseen by GHSP monitors who went into the field and conducted random unannounced visits at no less than five percent of observation sites. These unannounced visits confirmed that observers were conducting observations at the location, day, and time established in the planning and selection phase. For the 2021 survey, the observer staff remained the same as the previous year. The observers were provided with the PowerPoint presentation from 2018 to serve as a refresher for adherence to the observation procedures found in the Uniform Criteria for State Observational Surveys of Seat Belt Use (23 CFR § 1340.7).

1.2.2 Observation Schedule

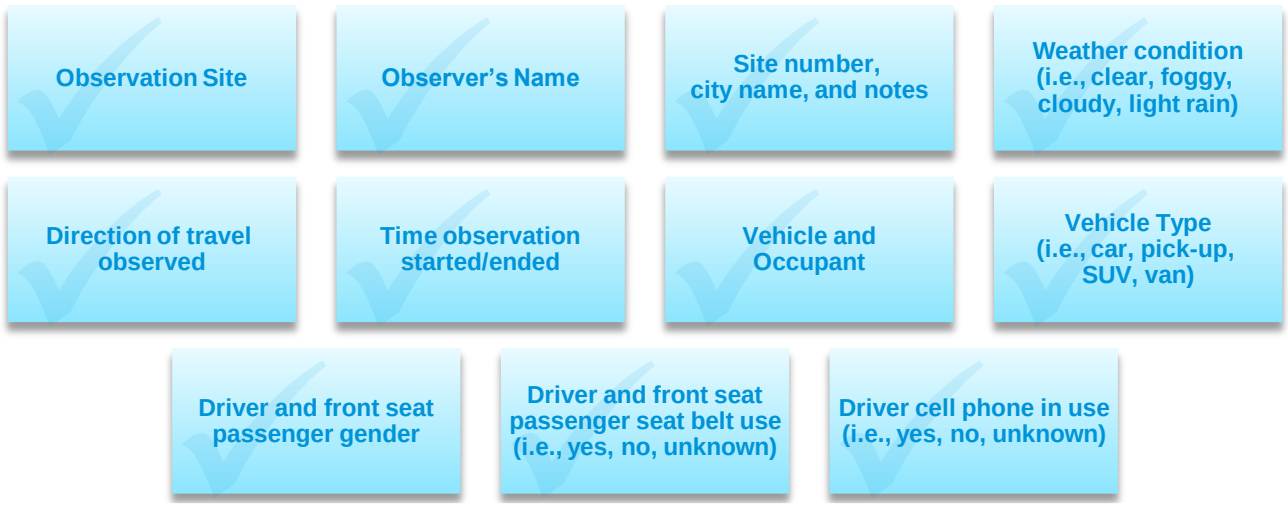
Using the new survey sites approved by NHTSA in March of 2018, CS worked with the GHSP to establish the observation schedule for 2021. Observations were scheduled between 7:00 a.m. and 6:00 p.m. Exact timing of the observation periods was subject to adjustment so that the resulting number of sites being observed throughout the chosen timeframe were approximately equal. Whenever possible, three to five sites within relative proximity to each other were scheduled for one observer on any day. The days of the week assigned were balanced to similar counties to ensure all days of the week have similar clusters. The first site in any cluster to be observed each day was randomly selected, and the additional sites were assigned in an order that provided balance by type of site and time of day while minimizing travel distance and time.

1.2.3 Data Collection Application

To improve not only the timeliness of the observed seat belt usage rate results, but also the uniformity and accuracy of the data collected, observers used a survey application (App) on tablet computers. The survey App (see Appendix C) was specifically tailored for West Virginia's observers and did not materially change between its use in the 2018 survey and the 2021 survey. CS worked with the App developer to provide them with all of the specific 2021 survey site information. The observers were able to select their survey site from a list; the App provided a map overview of the area to conduct the survey and, if applicable, the survey direction.

As part of the observer training, staff conducted an in-class review of the App when it was first utilized in 2018, followed by a one-hour period of testing the App and submitting results. Information collected on the survey App included information on the specific observation site and vehicle and occupant information (Appendix C).

Figure 1.1 Data Collected from Observational Surveys



2.0 Results

This section presents the results of the analysis on the 31,766 vehicle and occupant observations made in 2021. Surveyors made an extensive effort to summarize the characteristics of occupants, vehicles, and observation sites. The table below provides the seat belt use rate based on the weighted sample of observations. In addition to the overall seat belt use rate, this section presents descriptions of the weighted belt use rate by county, roadway type, gender, vehicle type, cell phone use, and observed belt use of both the driver and front seat passenger. The analysis begins with a description of the sample, including the known and unknown number of occupants, their use of a seat belt, and the nonresponse rate for the survey. This information is followed by a brief analysis of the total sample of both drivers and passengers by county.

Table 2.1 Seat Belt Use Rate

Statistic	Values	Notes
WV Statewide Seat Belt Use Rate	88.12%	
Standard Error	0.75%	<2.50%
Relative Error Rate	0.85%	(0.0114 / 0.9017)
95 Percent Confidence Interval Upper Bound	89.6%	0.8812 + 1.96*0.0075
95 Percent Confidence Interval Lower Bound	86.6%	0.8812 - 1.96*0.0075

The table below provides a description of the number of occupants using and not using a seat belt and the statewide nonresponse rate. Observers were able to ascertain seat belt use for 31,766 occupants, including 25,200 drivers and 6,566 front seat passengers. However, observers were not able to record seat belt use for 318 observations. This resulted in a statewide nonresponse rate (weighted) of 0.46 percent for the 2021 survey.

Table 2.2 Statewide Seat Belt Use and Nonresponse Rate

Statistic	Values	Notes
Total Occupants with Unknown Seat Belt Status	318	
Total Occupants Observed	31,766	
Sample Nonresponse Rate	1.00%	
Statewide Nonresponse Rate (Weighted)	0.46%	< 10%

The table below displays the total number and percentage of observed front seat occupants. As shown, a total of 25,200 drivers and 6,566 outboard front seat passengers were observed. These observations were compiled across 134 observation sites and 14 counties. Greater than 13 percent of observations occurred in three counties, Berkeley (13.9 percent), Lewis (13.3 percent), and Harrison (13.1 percent). These counties were followed by Monongalia (11.3 percent), Braxton (10.2 percent), and Putnam (9.3 percent).

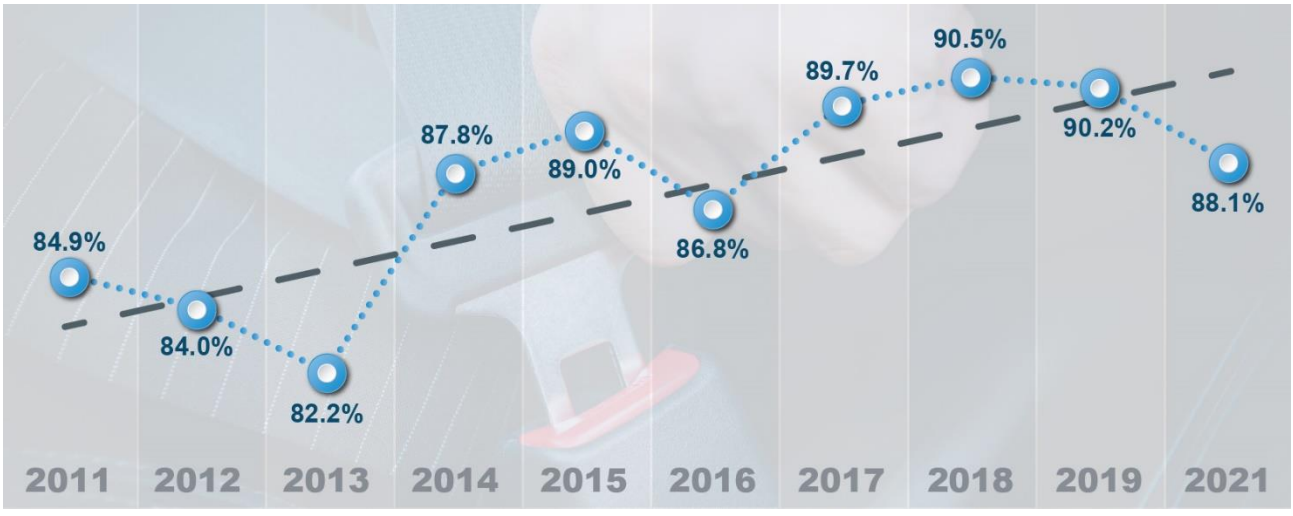
Table 2.3 Observed Rate by County

County	Drivers		Passengers		Total	
	N	%	N	%	N	%
Berkeley	3,822	15.2%	602	9.2%	4,424	13.9%
Boone	799	3.2%	303	4.6%	1,102	3.5%
Braxton	2,277	9.0%	975	14.8%	3,252	10.2%
Greenbrier	1,504	6.0%	387	5.9%	1,891	6.0%
Harrison	3,503	13.9%	648	9.9%	4,151	13.1%
Jackson	1,125	4.5%	308	4.7%	1,433	4.5%
Lewis	3,237	12.8%	980	14.9%	4,217	13.3%
McDowell	238	0.9%	73	1.1%	311	1.0%
Mingo	154	0.6%	48	0.7%	202	0.6%
Monongalia	2,885	11.4%	717	10.9%	3,602	11.3%
Pendleton	490	1.9%	136	2.1%	626	2.0%
Putnam	2,376	9.4%	580	8.8%	2,956	9.3%
Raleigh	2,017	8.0%	612	9.3%	2,629	8.3%
Randolph	773	3.1%	197	3.0%	970	3.1%
Total	**25,200**	**100%**	**6,566**	**100%**	**31,766**	**100%**

Historically over time West Virginia has seen its weighted seat belt use rate climb. In 1992, the usage rate was at 32 percent and climbed to 49.5 percent in 2000. The current rate of 88.12 percent achieved in 2021 is almost 2 percent less than the 2019 rate of 90.2 percent. However, as Figure 2.1 below indicates, the linear trend line over the last 10 years continues to move upwards, indicating that the overall observed seat belt usage rate continues to improve even with slight downturns in a single year.

Figure 2.1 Observed Seat Belt Usage Rates

2011 to 2021



Source: https://cdan.nhtsa.gov/stsi.htm# and 2021 observational seat belt survey.

The percent weighted seat belt use rate for all vehicle occupants by county for 2021 is shown in Figure 2.2. Braxton, Greenbrier, and Monongalia Counties were observed with the highest rate above 95 percent. The lowest rate came from McDowell County with an observed rate of 73.8 percent. Of the 14 counties where observations took place, five counties had an observed rate greater than 90 percent.

Figure 2.2 Weighted Seat Belt Use Rate by County

2021

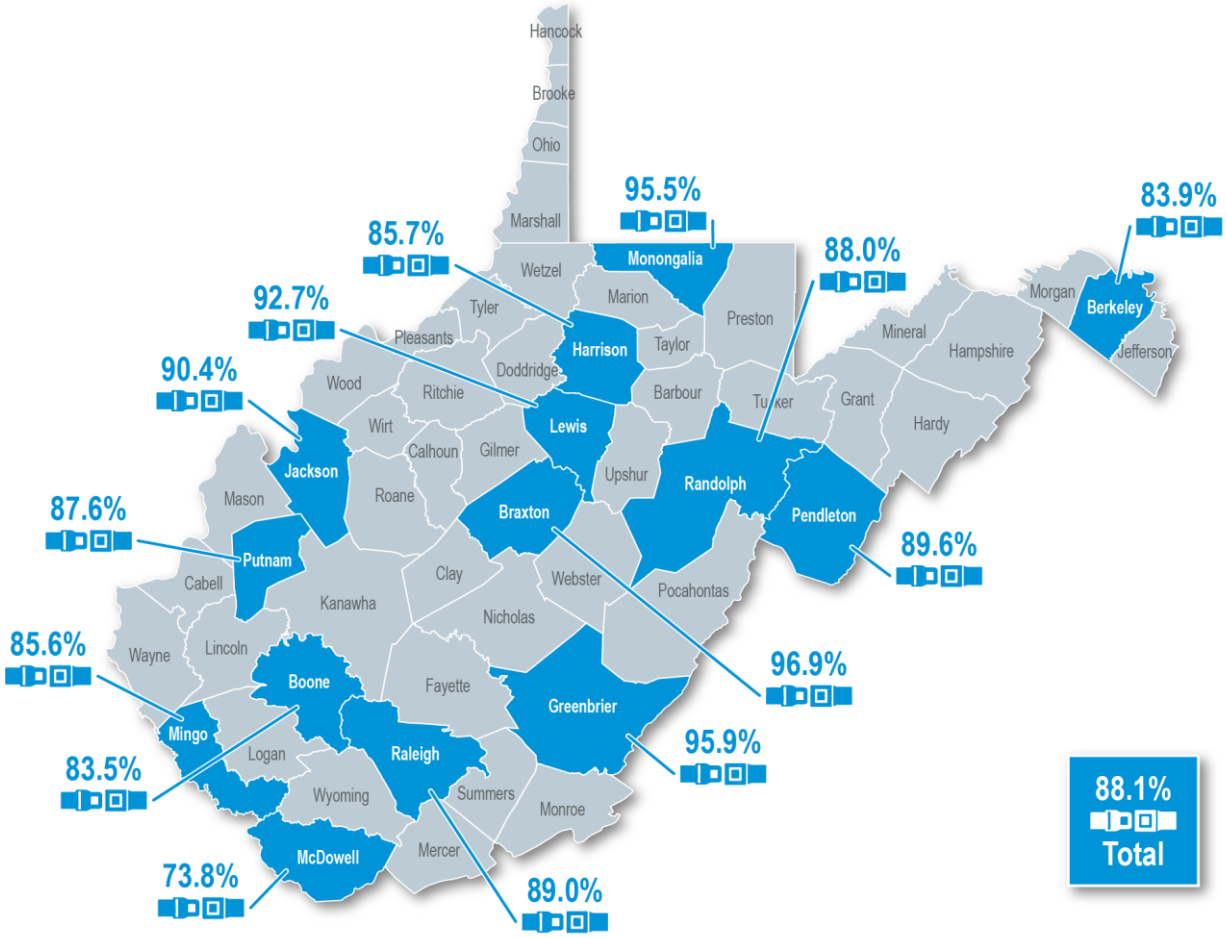


Table 2.4 displays the weighted seat belt use rate by county for 2016 to 2021. However, since new survey sites were selected in 2018, some counties may not have current information. Of the 14 counties where observations occurred in 2018, 7 counties were where observations occurred in 2016 and 2017. Of these seven counties with historical trends, three counties (Greenbrier, Harrison, and Monongalia) had a higher observed rate in 2021 than 2017. Since the new survey sites and counties used in 2018 are valid for five years, moving forward a more comprehensive comparison of the observed seat belt rate for all 14 counties will be available.

Table 2.4 Select County Observed Seat Belt Rates

2016–2021

County	2016	2017	2018	2019	2021
Berkeley	88.4%	89.0%	91.6%	99.7%	83.9%
Boone	90.0%	88.7%	88.4%	93.1%	83.5%
Cabell	92.9%	92.9%			
Fayette	86.9%	90.2%			
Greenbrier	91.3%	90.6%	88.5%	94.9%	95.9%
Harrison	81.6%	82.1%	88.5%	62.2%	85.7%
Jackson	85.6%	93.5%	93.3%	90.1%	90.4%
Jefferson	84.6%	88.5%			
Kanawha	84.6%	92.0%			
Mason	90.9%	99.0%			
Mercer	88.5%	90.3%			
Monongalia	77.0%	80.7%	95.4%	97.2%	95.5%
Raleigh	86.9%	89.5%	92.7%	97.1%	89.0%
Wood	81.8%	86.4%			
Total	**86.8%**	**89.7%**	**90.5%**	**90.2%**	**88.1%**

Table 2.5 shows the survey results for the 14 counties where observations occurred in 2018 through 2021 (except for 2020 because no seat belt data was collected due to COVID-19). Although three years of observation is not long enough to make solid conclusions, some inferences can be made. Most noticeably there was a nearly 23 point gain in Harrison County and a 16 point drop in the observed seat belt use in Berkeley County from 2019 to 2021. These changes fall well outside the expected deviation that would be expected in observations one year to the next. GHSP may want to consider looking further into the counties (Berkeley, Boone, McDowell, Pendleton, Raleigh, and Randolph) that showed a significantly lower observed seat belt usage rate from 2019 to 2021 and implement new or revised programmatic countermeasures to address these declines.

Table 2.5 County Observed Seat Belt Rates

2018–2021

County	2018	2019	2021
Berkeley	91.6%	99.7%	83.9%
Boone	88.4%	93.1%	83.5%
Braxton	93.8%	92.7%	96.9%
Greenbrier	88.5%	94.9%	95.9%
Harrison	88.5%	62.2%	85.7%
Jackson	93.3%	90.1%	90.4%
Lewis	91.3%	95.8%	92.7%

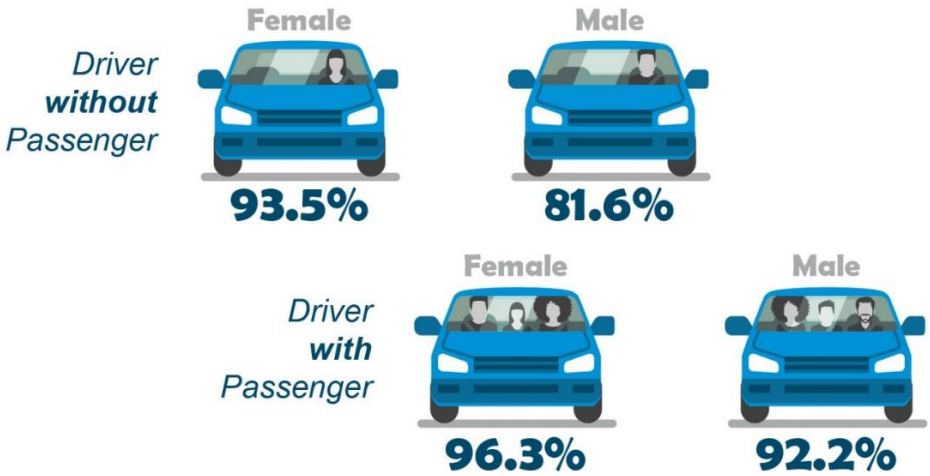
County	2018	2019	2021
McDowell	72.0%	80.5%	73.8%
Mingo	91.7%	72.1%	85.6%
Monongalia	95.4%	97.2%	95.5%
Pendleton	91.3%	98.5%	89.6%
Putnam	96.0%	90.5%	87.6%
Raleigh	92.7%	97.1%	89.0%
Randolph	97.0%	99.7%	88.0%
Total	**90.5%**	**90.2%**	**88.1%**

2.1 Characteristics of Belted Drivers and Passengers

This section analyzes various characteristics of drivers and passengers and their relationship to belt use to identify variations in seat belt usage by occupant, site characteristics, and vehicle type. It is anticipated this information will help to identify the conditions where seat belts are more or less likely to be used in the State to help develop appropriate countermeasures in education and enforcement.

When segmenting the data by seat belt rate for drivers with or without a passenger in the front seat, the observations led to some interesting findings. In the 2018 survey, male drivers had a 4.5 point higher seat belt rate with a passenger than when driving alone. Conversely, female drivers had a 12.6 point lower seat belt rate with a passenger than without. For the 2019 survey, male drivers had a 3.5 point lower seat belt rate with a passenger than driving alone. Female drivers had a 0.9 point higher seat belt rate with a passenger than without. In 2021 survey, male drivers had a 10 point higher seat belt rate with a passenger than driving alone. Female drivers had a 3.0 point higher seat belt rate with a passenger than without. In comparing the three years of data, no solid conclusions can be made, however, it appears there may be a correlation emerging that drivers, specifically males, with a passenger are more likely to be belted. As additional years' worth of data become available, stronger conclusions and correlations may be possible.

Figure 2.3 Weighted Seat Belt Use Rate for Drivers with Passenger versus Without



Generally speaking, male drivers were less likely to use seat belts compared to female drivers (Table 2.6). This finding is consistent with previous observational surveys in West Virginia over the past several years. Male drivers (84.7 percent) continued to be less likely to be observed wearing a seat belt in comparison to female drivers at 94.0 percent. In 2021, the gap between male and female grew bigger from six to nine points. Similarly, in Table 2.7, male passengers were less likely to use a seat belt (82.1 percent) compared to female passengers (95.9 percent).

Table 2.6 shows the distribution of the driver's seat belt use by gender and county in 2021. Of all 14 counties studied, the belt use rate for males (84.7 percent) was lower than females (94.0 percent). Of these same counties, females had a higher seat belt rate in 12 counties. In Harrison and Mingo counties, females had a lower seat belt rate than males. The largest disparity occurred in Berkeley County, which saw a 25.9 point difference in the observed rate with males at 73.9 percent and females at 99.8 percent. Reviewing previous years' data may suggest that the gender gap among drivers is not shrinking (according to 2021 data).

Table 2.6 Driver Belt Use Rates by Gender and County

	Drivers		
	Male %	Female %	Total %
Berkeley	73.9%	99.8%	79.7%
Boone	81.2%	100.0%	87.9%
Braxton	95.1%	98.7%	96.5%
Greenbrier	91.7%	99.8%	94.9%
Harrison	80.4%	76.2%	85.6%
Jackson	80.6%	99.2%	89.3%
Lewis	89.8%	99.4%	92.6%
McDowell	72.4%	87.2%	73.8%
Mingo	82.6%	82.5%	82.3%
Monongalia	94.2%	96.7%	95.4%
Pendleton	87.3%	92.8%	89.5%
Putnam	85.1%	97.5%	89.8%
Raleigh	84.0%	97.2%	87.4%
Randolph	90.8%	91.7%	91.3%
Total	**84.7%**	**94.0%**	**88.0%**

The following Table (Table 2.7) displays the results of seat belt use for passengers by gender and county. Comparable to the results for drivers, the findings illustrate similarities between seat belt use of drivers and passengers by gender. As noted previously with drivers, of the 14 counties studied, the belt use rate for males (82.1 percent) is much less than females (95.9 percent) based on the algorithm used for all sites in the same county and same road stratum weight. Because of weighting the total safety belt usage rate did not fall between the two categories of male and female. Of these same counties, once again males had a slightly higher rate in two counties. The largest disparity was seen in Jackson County, where the female observed seat belt rate (99.4 percent) exceeded males (52.3 percent) by 47.3 points.

Table 2.7 Passenger Belt Use Rates by Gender and County

	Passengers		
	Male %	Female %	Total %
Berkeley	99.7%	100.0%	99.9%
Boone	78.8%	100.0%	99.3%
Braxton	94.2%	99.3%	98.2%
Greenbrier	97.9%	99.8%	99.3%
Harrison	77.2%	93.1%	87.1%
Jackson	52.3%	99.4%	92.2%
Lewis	88.7%	95.0%	93.2%
McDowell	54.2%	97.0%	96.1%
Mingo	100.0%	100.0%	100.0%
Monongalia	76.9%	99.3%	96.4%
Pendleton	89.6%	91.9%	91.1%
Putnam	79.7%	77.8%	81.3%
Raleigh	98.5%	96.4%	97.2%
Randolph	53.8%	95.6%	74.0%
Total	**82.1%**	**95.9%**	**93.5%**

As with most of the nation, West Virginia saw its lowest seat belt usage rate in pickup trucks (83.0 percent), followed by cars (91.4 percent), vans (95.0 percent), and SUVs (96.2 percent). Geographically, the Northern region of the State saw the highest seat belt usage rate (91.5 percent), followed by the Southern region of the State (86.7 percent), with the lowest usage rate coming from the Eastern panhandle at 85.9 percent. A map of the State's regions can be found in Appendix A. When reviewing roadway functional class, local roadways had the lowest observed seat belt rate at 87 percent, followed by secondary roadways at 89.6 percent, with primary roadways showing the highest rate with 93.8 percent.

Table 2.8 Seat Belt Use Rate for Drivers and Passengers by Vehicle Type and Site Characteristics

Vehicle Type and Site Characteristics	Driver	Passenger	Total
Vehicle Type			
Car	89.4%	92.9%	91.4%
Pickup Truck	84.3%	86.0%	83.0%
SUV	91.4%	99.3%	96.2%
Van	94.2%	98.5%	95.0%
Region			
Eastern Panhandle	86.0%	95.5%	85.9%
North	91.8%	90.2%	91.5%
South	84.6%	95.5%	86.7%

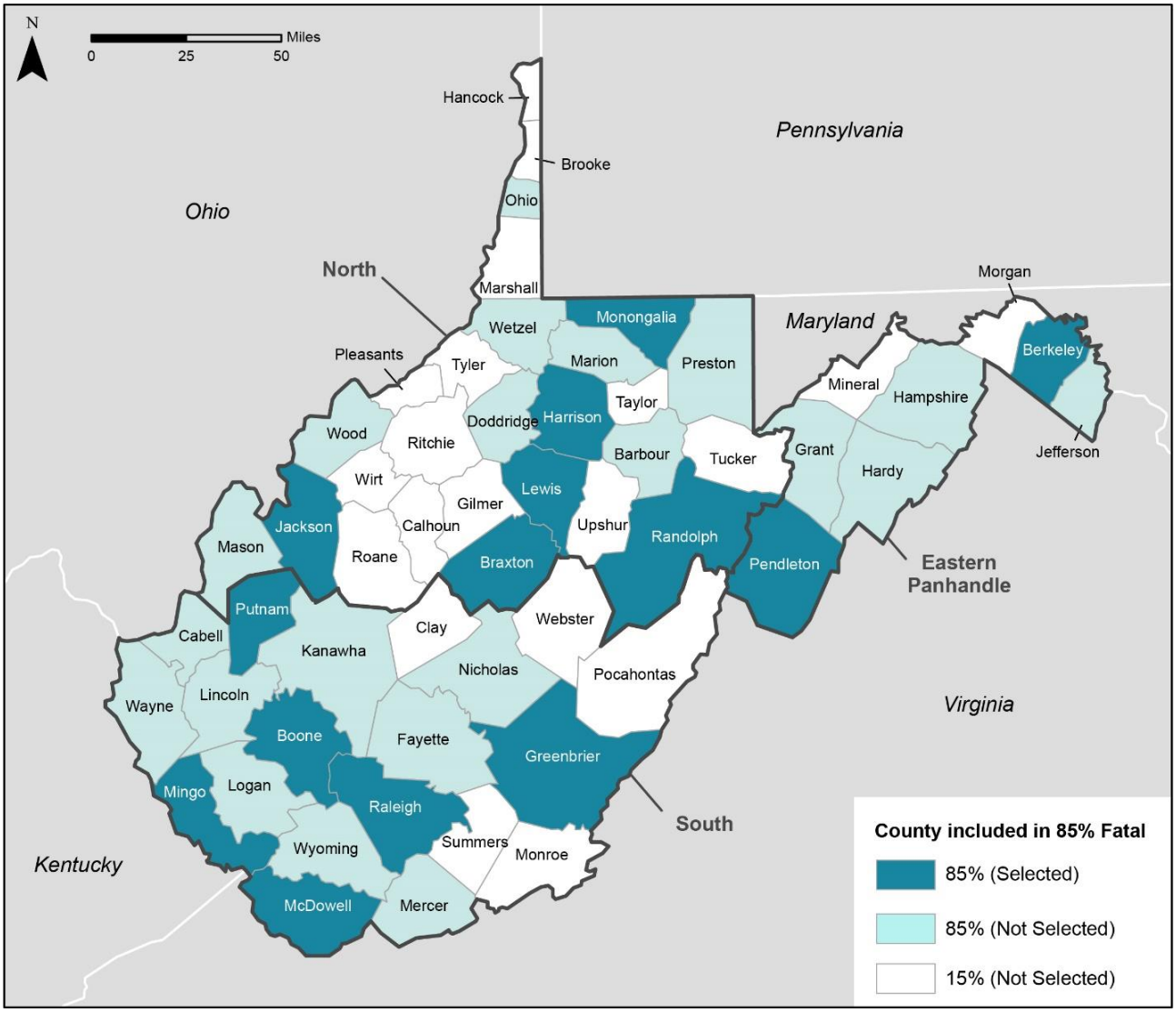
Vehicle Type and Site Characteristics	Driver	Passenger	Total
Functional Class			
Primary	93.3%	96.1%	93.8%
Secondary	89.1%	91.2%	89.6%
Local	87.0%	94.2%	87.0%

Cell phone use while driving is one form of distracted driving. The seat belt observers also were able to capture observed cell phone use during the survey. The table below shows the number of observations of driver cell phone use and no cell phone use and breaks it down by gender and whether a seat belt was in use. Males had an observed cell phone use of 2.8 percent, whereas females had a slightly higher observed use of 3.6 percent. Of drivers using a cell phone, 91.2 percent were using a seat belt, whereas, drivers not using a cell phone were observed using a seat belt 93.1 percent of the time. This could suggest a correlation between belted drivers being less likely to use a cell phone while driving.

Table 2.9 Observed Cell Phone Use by Gender and Seat Belt Use

	Cell Phone Use		No Cell Phone Use	
	Number	Percent	Number	Percent
Gender				
Male Driver	432	57.4%	15,409	63.5%
Female Driver	321	42.6%	8,868	36.5%
Seat Belt Use				
Use	684	91.2%	22,584	93.1%
No Use	66	8.8%	1,683	6.9%

Appendix A. Seat Belt Observational Counties and Regions



Appendix B. Seat Belt Observational Survey Site List

Site ID	Site Type	Date Observed	Sample Weight	Number of drivers	Number of front passengers	Number of occupants[1] belted	Number of occupants unbelted	Number of occupants with unknown belt use
1	Original	6/12/2021	45.73361342	286	104	373	16	1
2	Original	6/12/2021	77.33587919	191	73	250	8	6
3	Original	6/2/2021	86.0043023	83	27	104	6	0
4	Original	6/12/2021	89.21923321	211	92	289	7	7
5	Original	6/2/2021	1987.461907	11	2	10	3	0
6	Original	6/9/2021	5987.249553	17	5	19	3	0
7	Original	6/6/2021	6.917372873	163	34	188	9	0
8	Original	6/1/2021	11.62141419	232	47	265	14	0
9	Original	6/13/2021	13.48384514	213	42	245	10	0
10	Original	6/6/2021	14.65486102	188	35	213	10	0
11	Original	6/13/2021	20.87274804	196	38	225	9	0
12	Original	6/7/2021	21.04028957	176	55	226	5	0
13	Original	6/1/2021	44.87850133	17	4	20	1	0
14	Original	6/1/2021	82.89732518	52	15	59	8	0
15	Original	6/7/2021	152.6504872	180	91	259	12	0
16	Original	6/1/2021	169.8612529	27	6	30	3	0
17	Original	6/7/2021	192.9030542	30	6	34	2	0
18	Original	6/7/2021	230.8339708	30	14	43	1	0
19	Original	6/5/2021	45.02737322	10	4	7	6	1
20	Original	6/2/2021	51.14730567	152	31	126	28	29
21	Original	6/5/2021	54.76903659	34	20	26	25	3
22	Original	6/5/2021	56.46354934	36	17	33	16	4
23	Original	6/2/2021	19.39845236	2	0	1	1	0
24	Original	6/2/2021	35.54882612	4	1	5	0	0
25	Original	6/6/2021	88.65104318	13	5	15	3	0
26	Original	6/1/2021	37.0851945	29	6	30	4	1
27	Original	6/6/2021	55.62878529	15	7	22	0	0
28	Original	6/1/2021	86.9108837	61	20	74	7	0
29	Original	6/1/2021	522.314564	32	7	33	6	0
30	Original	6/6/2021	57.08452165	4	3	1	6	0
31	Original	6/3/2021	3.680139945	474	101	527	35	13
32	Original	6/5/2021	9.967681249	305	145	436	14	0
33	Original	6/4/2021	10.15592279	97	20	104	13	0

Site ID	Site Type	Date Observed	Sample Weight	Number of drivers	Number of front passengers	Number of occupants[1] belted	Number of occupants unbelted	Number of occupants with unknown belt use
34	Original	6/3/2021	11.98994905	568	109	639	28	10
35	Original	6/4/2021	12.97875742	91	18	102	7	0
36	Original	6/4/2021	15.67990886	294	68	321	41	0
37	Original	6/3/2021	25.24157226	200	33	222	1	10
38	Original	6/5/2021	40.43694513	55	30	84	1	0
39	Original	6/5/2021	47.97156484	12	4	16	0	0
40	Original	6/3/2021	166.5711631	208	34	209	21	12
41	Original	6/5/2021	375.3825232	18	6	20	4	0
42	Original	6/4/2021	1375.133871	54	12	59	7	0
43	Original	6/6/2021	13.2754785	261	124	362	17	6
44	Original	6/6/2021	15.76712546	253	52	297	7	1
45	Original	6/6/2021	17.64353949	387	113	485	13	2
46	Original	6/7/2021	17.82385636	172	62	224	9	1
47	Original	6/7/2021	18.1698435	213	71	273	11	0
48	Original	6/7/2021	30.0381895	259	79	329	9	0
49	Original	6/1/2021	19.1669831	132	45	155	18	4
50	Original	6/1/2021	26.82268766	92	14	93	10	3
51	Original	6/7/2021	40.74293337	27	4	28	3	0
52	Original	6/6/2021	49.21841744	40	6	43	2	1
53	Original	6/1/2021	580.676087	5	1	5	1	0
54	Original	6/1/2021	7527.688721	176	41	197	14	6
55	Original	6/5/2021	6.458066299	409	195	591	9	4
56	Original	6/5/2021	6.672338524	439	186	598	19	8
57	Original	6/5/2021	8.878934806	386	205	580	6	5
58	Original	6/5/2021	9.629536395	363	143	488	13	5
59	Original	6/11/2021	29.59831857	47	16	58	2	3
60	Original	6/5/2021	11.99002695	421	166	561	14	12
61	Original	6/11/2021	13.44068885	23	8	30	0	1
62	Original	6/15/2021	20.20759064	31	5	35	1	0
63	Original	6/11/2021	38.15957514	105	38	129	11	3
64	Original	6/11/2021	53.24532237	53	13	60	3	3
65	Original	6/1/2021	3.773260895	490	30	444	74	2
66	Original	6/1/2021	11.67857262	445	115	443	80	37
67	Original	6/2/2021	12.48739186	429	110	500	35	4
68	Original	6/7/2021	13.16497018	365	83	412	36	0
69	Original	6/7/2021	22.41010536	456	74	447	80	3

Site ID	Site Type	Date Observed	Sample Weight	Number of drivers	Number of front passengers	Number of occupants[1] belted	Number of occupants unbelted	Number of occupants with unknown belt use
70	Original	6/2/2021	23.02434555	577	95	611	55	6
71	Original	6/7/2021	22.07383138	275	34	253	55	1
72	Original	6/1/2021	32.70667422	139	30	151	13	5
73	Original	6/1/2021	84.85794074	99	21	76	32	12
74	Original	6/2/2021	72.81256245	220	56	250	23	3
75	Original	6/2/2021	500.1112784	1	0	1	0	0
76	Original	6/7/2021	3883.041244	7	0	5	2	0
77	Original	6/5/2021	6.360541763	183	64	224	21	2
78	Original	6/3/2021	6.720138057	89	16	93	10	2
79	Original	6/7/2021	7.266688998	99	23	100	15	7
80	Original	6/7/2021	9.068643987	66	17	69	14	0
81	Original	6/7/2021	9.291824273	197	76	227	43	3
82	Original	6/7/2021	20.31765929	61	19	68	9	3
83	Original	6/3/2021	15.98874418	159	4	146	17	0
84	Original	6/3/2021	26.0644118	17	3	14	6	0
85	Original	6/3/2021	27.30151327	115	37	142	10	0
86	Original	6/5/2021	37.9293746	107	36	132	11	0
87	Original	6/5/2021	142.216037	19	7	24	2	0
88	Original	6/5/2021	419.0045198	13	6	17	2	0
89	Original	6/9/2021	1.160905053	398	137	509	23	3
90	Original	6/6/2021	1.226107188	542	132	603	60	11
91	Original	6/3/2021	2.032942072	456	159	568	38	9
92	Original	6/9/2021	4.894127115	427	138	528	34	3
93	Original	6/6/2021	5.56566774	557	148	641	57	7
94	Original	6/3/2021	6.651599968	500	197	666	21	10
95	Original	6/9/2021	10.16396576	94	25	114	5	0
96	Original	6/3/2021	60.75669642	72	15	79	6	2
97	Original	6/3/2021	55.97688235	104	8	103	8	1
98	Original	6/6/2021	66.3627308	79	21	74	26	0
99	Original	6/6/2021	116.279576	1	0	1	0	0
100	Original	6/9/2021	113.6754481	7	0	6	1	0
101	Original	6/3/2021	4.859817691	336	72	384	24	0
102	Original	6/3/2021	7.789949126	487	114	556	45	0
103	Original	6/3/2021	8.084083209	419	85	471	33	0
104	Original	6/2/2021	17.2762051	314	79	334	56	3
105	Original	6/11/2021	18.18077989	305	95	376	24	0

Site ID	Site Type	Date Observed	Sample Weight	Number of drivers	Number of front passengers	Number of occupants[1] belted	Number of occupants unbelted	Number of occupants with unknown belt use
106	Original	6/11/2021	20.99163356	365	150	487	28	0
107	Original	6/2/2021	20.10298684	195	30	205	17	3
108	Original	6/3/2021	20.84503839	138	16	144	9	1
109	Original	6/9/2021	21.20013156	43	21	57	7	0
110	Original	6/11/2021	21.78288159	157	37	175	19	0
111	Original	6/2/2021	7655.119362	4	2	6	0	0
112	Original	6/4/2021	9124.738	122	16	127	11	0
113	Original	6/1/2021	14.12061586	8	2	9	1	0
114	Original	6/14/2021	17.33476672	83	23	106	0	0
115	Original	6/14/2021	26.73697507	119	20	132	4	3
116	Original	6/14/2021	217.8398745	251	82	327	5	1
117	Original	6/14/2021	361.603913	17	4	17	4	0
118	Original	6/1/2021	735.9789027	295	66	335	23	3
119	Original	6/1/2021	25.83828668	615	125	717	23	0
120	Original	6/1/2021	3.544109587	396	27	413	10	0
121	Original	6/5/2021	26.091247	167	51	202	16	0
122	Original	6/2/2021	9.856788075	636	163	784	15	0
123	Original	6/2/2021	33.39368988	538	64	580	22	0
124	Original	6/5/2021	22.01213576	373	47	407	13	0
125	Original	6/2/2021	33.04690912	389	28	395	22	0
126	Original	6/5/2021	32.86971207	183	14	186	11	0
127	Original	6/1/2021	41.08583958	302	58	346	14	0
128	Original	6/5/2021	51.48441354	178	20	186	12	0
129	Original	6/2/2021	7208.464058	39	3	38	4	0
130	Original	6/1/2021	1090.305537	6	2	6	2	0
131	Original	6/7/2021	54.14691436	134	37	147	22	2
132	Original	6/7/2021	23.06696604	114	32	130	16	0
133	Original	6/7/2021	23.97637035	82	11	86	7	0
134	Original	6/7/2021	26.69455678	160	56	193	22	1
	Total			**25,200**	**6,566**	**29,390**	**2,058**	**318**

[1] Occupants refer to both drivers and passengers.

Appendix C. Observational Survey Collection Form