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OTSO

OBSERVATIONAL SURVEY OF SEAT BELT USE IN OHIO 2008

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Robert L. Seufert
September, 2008

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All correspondence regarding this report should be directed to the Ohio Traffic Safety Office, by mail at P.O. Box 182081, Columbus, Ohio 43218-2081, by phone at (614) 466-3250.

EXECUTIVE SUMMARY

Overview: Ohio's overall 2008 seat belt usage rate is **82.7%**, surpassing the 2007 belt usage rate of 81.6%. The 2008 estimate, which has an overall minimum margin of error of ± 1%, was derived from the second observational survey which occurred after the combined *Click It or Ticket* media campaign and enforcement initiatives had been fully implemented. The above seat belt use rate for Ohio was formally reported to the National Highway Traffic Safety Administration (NHTSA).

Retired officers of the Ohio State Highway Patrol (OSHP) conducted observation surveys of seat belt use at 244 sites in 47 of Ohio's 88 counties. The 2008 observations included 20,586 occupants (16,706 drivers and 3,880 passengers) of non-commercial passenger cars, vans and minivans, sport utility vehicles (SUVs), and pickup trucks. Additional findings, which remain generally consistent with previous surveys, include the following:

- As in the past four years, the seat belt usage rate of pickup truck occupants (nearly 75%) is significantly lower than that of occupants of passenger cars (83%), minivans (86%), or SUVs (85%), but is an improvement over the 2007 rate of 71%.
- The Southwest region of the state has the highest seat belt usage rate (85%) while the Southeast region continues to have the lowest (73%, a decrease of six percentage points from the 2007 rate of 79%).
- The usage rate for drivers (83%) continued to be slightly higher than that of passengers (82%).
- Female vehicle occupants again have a significantly higher rate of seat belt use (87%) than male occupants (79%).
- Caucasian vehicle occupants have a significantly higher rate of seat belt use (87%) than African-American occupants (77%).
- For vehicle occupants ages 15 and above, there was a steady increase in seat belt use as age increased. Seat belt use is lowest for vehicle occupants ages 15-25 (76%) and highest for occupants ages 65 and above (87%).

Although some groups surveyed during 2008 have relatively low seat belt use rates, individual rates for most subsets of the sample have all improved with the following exceptions: Central and Southeast drivers, and the 15 through 25 and the 65 and older age groups. The primary exception to improved belt use was observed in the Southeast region. Consequently, in spite of improvements, deficiencies in areas such as the Southeast region prevented improvement of the overall Ohio seat belt use rate beyond the observed 82.7%.

The following Ohio trends in seat belt use have occurred in sub-populations since the 2000 campaign:

- Between 2000 and 2008, the overall seat belt use rates have increased significantly in Ohio (i.e., from 65.3% in 2000 to 82.7% in 2008). Since 2000, increases in seat belt use also occurred in Ohio's five regions, as follows:
  - Central region rates of seat belt use increased from 65% in 2000 to a peak of 83% in 2006, and remained at approximately 82% during 2007 and 2008.
  - Northeast region belt use rates increased from 61% to a regional high of 83% in 2008.
  - Northwest region rates increased from 65% to a regional high of nearly 84% in 2008.

  - Southeast region seat belt use rates increased from 67% to a high of 80% in 2006, and then declined to 79% in 2007 and 73% in 2008.
  - Southwest region seat belt use rates increased from 62% to a regional high of 85% in 2008.
- Usage rates for occupants of all vehicle types have increased. Most notably, the seat belt use rate of pickup truck occupants has increased from 49% in 2000 to nearly 75% in 2008, the highest rate yet observed for this vehicle type. Nevertheless, in order to raise the statewide seat belt use rate, it is imperative to improve rates among this occupant group and other subpopulations that fall well below the statewide average.
- Seat belt use rates for both drivers and passengers have increased (from 66% in 2000 to 83% in 2008 for drivers and from 62% in 2000 to 82% in 2008 for passengers, the highest rates observed for both groups).
- Male seat belt use has increased from 55% in 2000 to 79% in 2008, the highest rate for this group since 2000.
- Between 2000 and 2008, seat belt use rates for the following age groups increased: from 54% to 76% for ages 15-25; from 66% to 83% for ages 26-64; and from 71% to 87% for ages 65 and older.

Recommendations: This 2008 survey has identified the following populations that continue to warrant special attention because their relatively lower rates of seat belt use hampers progress on increasing the overall belt use rate. Due to the absence of a **primary** seat belt law in Ohio, to increase overall seat belt use, greater compliance must occur among populations with relatively low rates of seat belt use. Hence, ongoing media and enforcement initiatives which promote greater seat belt use must be strengthened and directed disproportionately at the following populations:

- Southeast Region Vehicle Occupants
- Vehicle Occupants Age 15-25
- Vehicle Occupants Age 5-14
- Male Vehicle Occupants
- Pickup Truck Occupants
- African-American Vehicle Occupants

Background

Since 1991, Ohio has conducted an annual observational survey to determine seat belt use following guidelines set by the National Highway Traffic Safety Administration (NHTSA). These guidelines have traditionally given individual states much discretion in survey design and implementation, with the stipulation that each state must generate a probability-based estimate for seat belt usage of front outboard occupants of passenger vehicles. This seat belt use estimate must have a required level of precision of less than 5% relative error and a 95% confidence coefficient. Individual states have been permitted to decide how much additional information to collect based on the resources available.

In 1998, NHTSA requested that states collect vehicle-specific information as part of the survey process. Specifically, all states were asked to collect information that would permit them to generate usage rates for occupants of four types of vehicles: passenger cars, vans/minivans, sport utility vehicles (SUVs), and pickup trucks. Since 1991, and prior to 1998, Ohio's surveys only collected data from occupants of passenger cars, minivans and SUVs, and results from each site were pooled so that observers did not record use for individual vehicles. That is, prior to 1998, the only data available was aggregated data from each site that provided overall counts of driver and passenger seat belt use. Thus, in 1998, Ohio's survey required some modifications in the way that seat belt use data were collected in order to provide the vehicle-specific information requested by NHTSA. Also, data on license plate origins have not been collected since 1999 because out-of-state vehicles were only a very small proportion of vehicles observed during previous years. In 2008, with exception of minor adjustments—approved by NHTSA—to the number of counties included in the sample and the number of signaled intersections versus freeway off-ramps that were observed, the survey methodology was identical to recent observation surveys.

Data were collected from vehicles stopped at randomly selected intersections and freeway off-ramps so observers had ample opportunity to collect data from each individual vehicle observed. Traffic control devices such as traffic signals or stop signs were present at all observation site locations. This method gives observers not only the opportunity to collect general use data, but to collect additional demographic information on seat belt use in addition to vehicle type. Ohio and other states have found differences in seat belt use as a function of vehicle type, sex, and age. Research also indicates that seat belt use varies as a function of race and ethnicity. Consequently, the race of vehicle occupants was added to the survey in 2004 and retained in subsequent surveys. Modifying the survey to collect vehicle-specific information (i.e., data on usage in various vehicle types) and demographic data vastly increases our knowledge about the Ohioans who are likely to wear (or not wear) their seat belts.

Also, to provide geographical information about regional trends in seat belt use, the survey is structured to estimate seat belt use on a regional level. That is, the sample is stratified by geographic region to allow for estimation of seat belt use in various parts of the state.

This narrative contains the following sections: [1]

- **Methodology**: The methodology, approved by NHTSA, outlines the manner in which observation sites were chosen and data were collected and analyzed.
- **Results**: Descriptive results of seat belt use (e.g., percent of observations by sex, age, vehicle type, race, and region) are presented first in the same manner as in past *Observational Surveys of Seat Belt Use in Ohio*.
- **Recommendations**: Recommendations are based on the data derived from both the descriptive statistics and the multivariate analysis.
- **References** and **Appendices** containing observation sites and forms are also included.

The following section contains a full description of the methodological procedures approved by NHTSA to estimate seat belt use in 2008.

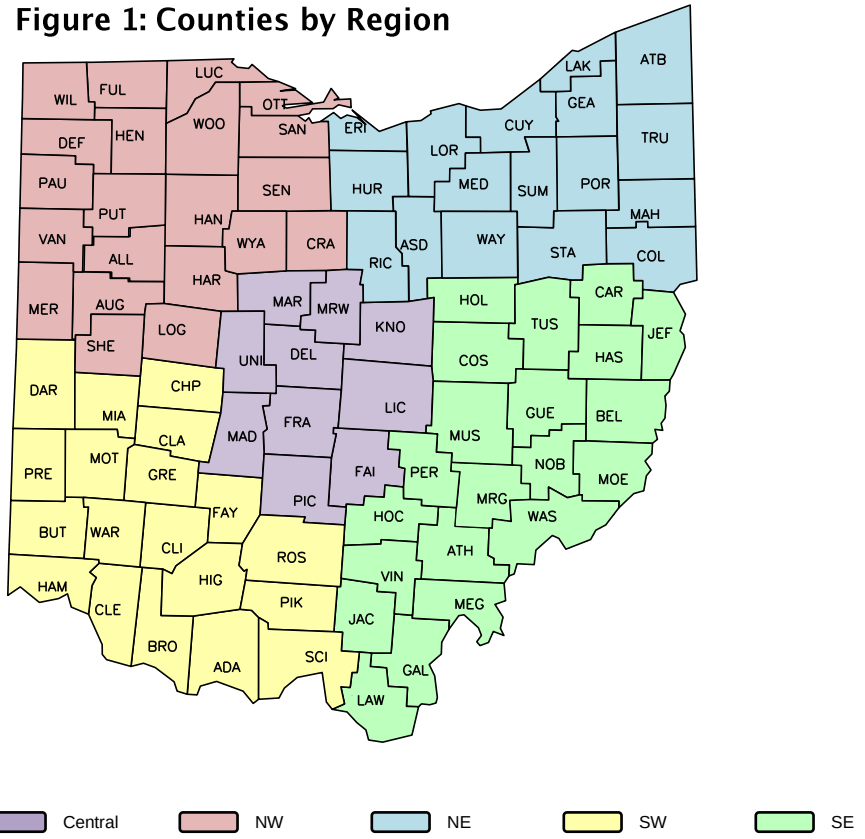
[1] In 2005, extensive statistical analysis was performed on the data to further explore the relationship between the variables (e.g., driver, passenger, vehicle, and site characteristics) in the observational surveys and driver and passenger seat belt use. This included correlation coefficients and logistic regression that showed relationships between variables, helping to further define populations that could benefit from media and/or enforcement initiatives. Comparable statistical analysis of the 2008 data will be included in a separate report.

METHODOLOGY

Sample Stratification

As in previous years, the 2008 sample was stratified by region. Observation sites were randomly selected intersections and off-ramps from each of the five geographic regions of the state (Figure 1). The method of selection described later in this section was used to ensure that all intersections and off-ramps in the state had *an equal probability of selection*. That is, all intersections and off-ramps, regardless of their location or traffic volumes, had equal likelihoods of selection as survey sites.

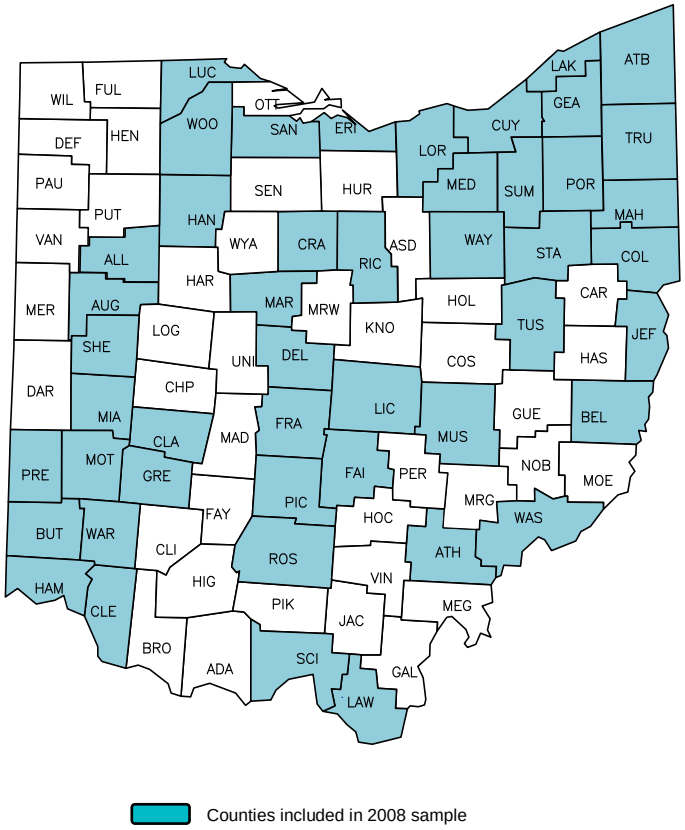
Figure 1: Counties by Region



As a preliminary measure to eliminate many low-volume sites, counties with low populations (and low rates of vehicle-miles of travel [VMT]) were excluded from the sample space. Federal guidelines permit the exclusion of low-population counties (cumulatively accounting for 15% or less of the state's population) from the sample space so that the costs of sampling in these areas may be constrained. The present survey methodology excluded 41 low-population counties that cumulatively account for approximately 13% of the state's population,[2] reducing the sample of Ohio counties from 88 to 47 (see Figure 2 for counties).

[2] Some low-population counties were included to ensure that all regions would be adequately represented in the sample space.

Figure 2: Counties in 2008 Sample



Sample Size and Allocation to Strata

Observation sites within this sample of Ohio counties were randomly selected signalized intersections (i.e., with a traffic signal or stop sign) and freeway off-ramps. These signalized locations allow for more detailed vehicle, driver, and occupant information to be recorded by observers while vehicles are stopped. Studies have shown that there is no discernible difference in the accuracy and reliability of seat belt use estimates obtained through stopped-vehicle direct observation (SVDO) compared to moving-vehicle direct observation (MVDO) (Eby, Streff, & Christoff, 1996). Although Ohio's survey previously employed the MVDO method, the change to an SVDO method enables the collection of more detailed information without any loss in accuracy.

The necessary number of intersection and off-ramp sites was determined based on two factors. Of primary consideration was the number of observations necessary to estimate seat belt use with 5% relative error and 95% confidence. Second, the number of sites had to be large enough to ensure a fairly equitable distribution of sites across days of the week and times of the day. First, the number of observations needed to estimate seat belt use at the alpha = .05 (95% confidence) level was determined. A power analysis was performed using data from Ohio's past observational surveys. Based on this analysis, a minimum of 7,600 observations were required to estimate overall seat belt use with the desired amount of precision.

The next step in determining the necessary number of sites was to estimate the average number of observations that could be made at each site. Pilot tests of Ohio's data collection form, and the results of similar surveys in other states, indicated that a conservative estimate would be an average of 50 observations per site per hour. To achieve the desired minimum of 7,600 observations, at least 152 sites would be required for data collection. For the 2008 survey, with formal approval from NHTSA and considering VMT and the distribution of freeway exit ramps and signaled intersections, this number was reduced from 265 sites to 244 sites to ensure a more representative sample of signaled intersection and freeway off-ramp sites while still maintaining their equitable distribution across strata, days of the week, and times of day. Also, all of the 2008 sites were physically reviewed prior to the official observation to ensure site integrity; these sites were either reviewed by ODPS's Law Enforcement Liaisons, Ohio State Highway Patrol (OSHP) observers or by an employee of the Ohio Traffic Safety Office (OTSO) in 1999, 2000, and 2002 through 2008. Appendix A contains the **Site Locations**.

The number of sites allocated to each stratum was generally proportional to the statewide VMT in each region. Table 1 lists the VMT and number of sites in each stratum. This method of site distribution allocated more sites to more heavily traveled regions of the state. Thus, in the overall state estimate, more statistical weight based on VMT was given to more heavily traveled regions. The reported rates represent seat belt use per VMT travel.

Table 1: Number of Sites Allocated to Strata

Strata	Region	VMT	% of Total	Number of Sites
1	Central	19,125,142,250	17.06%	40
2	Northeast	39,048,316,850	34.83%	89
3	Northwest	16,126,506,650	14.39%	31
4	Southeast	9,527,602,300	8.50%	18
5	Southwest	28,270,348,650	25.22%	66
	TOTAL	112,097,916,700	100.00%	244

Finally, the number of intersections and freeway off-ramps to be observed in each stratum was determined. As a first step in determining the number of intersections and off-ramps that would be selected as observation sites, the percentage of annual traffic on these types of roadways was computed. Based on estimates from the Ohio Department of Transportation, about 33% of all travel occurs on limited access roadways (i.e., interstates and expressways/freeways). Accordingly, 33% of the sites in each stratum should be randomly selected freeway exit ramps, and the remaining 67% of the sites should be randomly selected intersections. Table 2 lists the final number of intersections and off-ramps selected from each stratum.

Table 2: Number of Intersection and Off-Ramp Sites in Strata

Strata	Region	Off-Ramp Sites	Intersection Sites	Number of Sites
1	Central	16	24	40
2	Northeast	27	62	89
3	Northwest	9	22	31
4	Southeast	5	13	18
5	Southwest	22	44	66
	TOTAL	79	165	244

Site Selection Procedures

Sites selected during the planning of the 1998 survey and were used again in the years that followed, with the exception of those sites described as problematic by the observer (for safety, observation clarity, or other reasons) and those considered to be low volume.[3] Such sites were replaced using the same procedures described below. They were then observed for traffic flow. In addition, when an alternate site was observed in 2007, it became a primary site in 2008, and a new alternate site was selected using the following procedures.

Two different methods were used to randomly select intersections versus off-ramps. These methods follow those described in Eby and Streff (1994) and Eby and Hopp (1997). In selecting intersection sites, detailed, equal-scale county maps were used. A grid pattern was overlaid on each county map, with each square in the grid identified by a number on the abscissa (X-axis) and the ordinal (Y-axis). The grid lines were spaced 1/4 inch apart.

The following intersection site selection procedure was used for each stratum. First, all eligible counties in each stratum were assigned a number. Using a statistical program to generate random numbers, a number representing a county was selected. Thus, each eligible county had an equal probability of selection at this point. Once a county was selected, X- and Y-coordinates on the grid were selected, again using the random number generator. As in the first step, all intersections had an equal probability of selection at this stage. If a single intersection fell within the square, that intersection was chosen as an observation site. If the square did not fall within county boundaries, if the square did not contain an intersection, or if the intersection was located one road link from an intersection already selected, the entire selection was discarded and a new county selection was made (i.e., the process started over from the first step). If more than one intersection fell within the grid square, one of the intersections was selected at random and the appropriate weights were applied.

To determine the observer's location at a chosen site, the following procedure was applied: For each intersection, all possible combinations of street and traffic flow were determined. In this set of potential observer locations, one location was selected with probability equal to 1 divided by the number of locations. If the intersection was a four-legged intersection, the probability of selection for observer location was 1/4. In the case of "T" or "Y" intersections, there are only three possible observer locations, so the probability of selecting an observer location was 1/3. The effect of this difference in the probability of selection is negligible (see Eby & Hopp, 1997).

For each primary site chosen using the procedure described above, an alternate site was selected within an estimated 15-square mile radius of the primary site. These sites were also selected using a grid and randomly selected coordinates.

[3] Low-volume sites are defined as sites having 10 or fewer observations in the years 2000 through 2007.

Freeway exit ramps within each stratum were also selected as randomly as possible. All eligible exit ramps in each of the five strata were numbered. The required number of ramps in each stratum was randomly sampled without replacement. Once ramps were selected, all possible combinations of traffic flow and observer locations were determined. These possible locations were then sampled with equal probability. For each site, a direction of travel was randomly selected. Alternate sites were the next interchange on the freeway along this direction. If the exit ramp had no traffic control device (i.e., stop sign or traffic signal) on the selected direction, the observer randomly picked a travel direction and lane with a traffic control device by flipping a coin.

Once all sites were selected, each site was assigned a number between one and 244; this number represents the total number of sites actually observed. Sites were randomly assigned to days of the week (weekdays as well as Saturday and Sunday) and time of day (7:00 AM to 7:00 PM). All days and eligible times had equal probability of selection. If circumstances arose that rendered a site unobservable at a predetermined day and time (e.g., heavy rain, construction, etc.), an administrative decision was made to determine site rescheduling.

Following Eby and Hopp, each observation site was self-weighted by traffic volumes within each stratum. That is, all sites had an equal observation interval (50 minutes). Traffic counts were recorded by observers at each site for the lane of traffic under observation. Only vehicles eligible for inclusion in the survey were counted. Seat belt use in each region (stratum) was then weighted by traffic volumes at the site so that more heavily-traveled sites (compared to those sites with lighter traffic) carried a greater weight in the regional estimates and overall state estimate.

Data Collection and Observer Training

Retired officers of the Ohio State Highway Patrol (OSHP) conducted field observations. Observers were instructed to dress in plain clothes[4] so that their presence would not unduly influence motorists' behavior. Observers were provided a PDA with electronic versions of survey forms (see Appendices B and C), a list of survey sites, alternate sites, observation locations, and a schedule for data collection days and times.

Eligible vehicles were all passenger cars, vans or minivans, SUVs, and pickup trucks. Historic vehicles were not included in the survey; observers were instructed to disregard all vehicles of this type.[5] Observations during 2008 focused on non-commercial vehicles.[6] Therefore, commercial vehicle data were excluded from the 2008 analysis, as recommended by NHTSA. For all eligible vehicles, seat belt use information and demographic information were recorded for front outboard occupants (drivers and front-seat passengers).

[4] Recommended attire for observers in the field was dark pants or shorts and a white or light-colored shirt.
[5] Historic vehicles are defined as any vehicle bearing a state-issued historic vehicle license plate.
[6] Commercial vehicles are defined as any vehicle bearing the name of a business or any unmarked vehicle transporting commercial equipment.

Those conducting the observation surveys attended an Applied Research Center (ARC) training session at a central location. This training provided detailed information on procedures to be followed at each site. Each observer received a manual outlining all field procedures and a site schedule specifying the date and time each site was to be observed. Observers also received specific instructions as to which lane of traffic they should observe at the site and an instrument to perform traffic counts. This location was pre-determined and randomly selected. Training consisted of a review of the documentation, a description of how to input collected data into the PDAs and then uploaded to the ARC's server, and a discussion centering on how to handle unexpected issues in the field. If an observer was unable to attend the training, he or she was sent the training manual and all materials, and required to discuss the observations with either the OTSO survey coordinator or the observer coordinator. Also, ARC personnel provided ongoing technical assistance throughout the survey period.

Of primary consideration in the training session was how to decide when a site would be unobservable. Observations were to be made in all weather conditions unless the weather obscured observers' views into the vehicles in the designated lane of traffic they were observing or presented a safety hazard to the observer in the field. If unexpected conditions made observations difficult or impossible (e.g., construction, damaged power lines, etc.) observers were instructed to document the problem on the site description forms and to move to the alternate site for data collection. If problems arose at the alternate site, observers were instructed to proceed to the closest observable site.

Observers were informed that for quality control purposes, several sites were to be randomly selected for unannounced visits to ensure that the study procedures were followed. Fourteen sites (5% of the total) were monitored by the observer coordinator (through both visits to observers at observation sites and through phone contact) and all monitoring visits or calls indicated that observers were fully complying with field procedures. Regular contact with observers was maintained during the survey period to ensure that survey protocols were followed.

Upon arriving at a site, observers completed an electronic version of the **Site Description Form** (see Appendix B) for each site observed. This form provides information on the nature of the site (intersection or off-ramp), location of the site, time and day observed, start and end times of data collection, and information regarding conditions at the site (e.g, weather, visibility, etc.). Following Eby & Hopp (1997), usage rate estimates are weighted by VMT at the site. Observers recorded traffic counts for five minutes before the observation period began and for another five minutes following the end of the observation period. Weights were applied in the same manner as described in Eby & Hopp.[7]

[7] "The weighting was done by first adding each of the two five-minute counts and then multiplying this number by five so that it would represent a 50-minute duration. The resulting number was the estimated number of vehicles passing the site if all eligible vehicles had been included in the survey during the observation period at the site. The estimated count then was divided by the actual vehicle counts at the site, yielding a weighted N for the number of total drivers and passengers and total number of belted drivers and belted passengers for each vehicle type" (Eby & Hopp 1997, p.14).

Observers collected data at each assigned site for 50 minutes, recording as many observations as possible during that time. Observers recorded seat belt usage information and demographic information, both while vehicles were stopped in the designated lane at the traffic control device, and while traffic was moving through the intersection. When traffic was moving, observers were asked to record data for as many vehicles as possible.

Observers recorded the following information *for each noncommercial vehicle observed* by checking the appropriate category or categories on the PDA's **Data Collection Form** (see Appendix C):

- Vehicle type (passenger car, van/minivan, SUV, pickup truck,)
- Driver and front outboard passenger seat belt usage (belted, unbelted)
- Driver and front outboard passenger sex (Male, Female)
- Driver and front outboard passenger age (0-4, 5-14, 15-25, 26-64, 65+)
- Driver and front outboard passenger race (Caucasian, African-American, Other)

Statistical Analysis

Each PDA's **Site Description Forms** and **Data Collection Forms** were returned directly and electronically to the Miami University Applied Research Center and a cursory review of the forms and data from each observer and site was performed. Site and vehicle-specific information were linked in the final dataset used for statistical analysis. All analyses were performed using a combination of Microsoft Excel, Access, and SPSS.

Estimates from each site were weighted by VMT in corresponding regional estimates, and each regional estimate was weighted by VMT in the overall statewide estimate. To accomplish this, the two five-minute traffic counts from each site were summed and multiplied by five. The resulting value represented the *estimated* total number (N_e) of vehicles that passed through the site during the fifty-minute observation interval (Eby & Hopp, 1997). To compute seat belt usage rates, this estimated count (N_e) was divided by the actual vehicle counts from each site, yielding a weighting factor. Weights were then multiplied by the number of belted front seat occupants and total occupants. This process is summarized in Formula 1.

$$r_h = \frac{\sum \frac{N_e}{N_a} \left(N_b \right)}{\sum \frac{N_e}{N_a} \left(N_o \right)} = \frac{\text{Total number of belted occupants, weighted}}{\text{Total number of occupants, weighted}}$$

Formula 1

where:

r_h = Seat belt usage rate in stratum h
N_e = Estimated traffic count (at site i in stratum h)
N_a = Actual traffic count (at site i in stratum h)
N_b = Number of belted occupants (at site i in stratum h)
N_o = Number of occupants observed (at site i in stratum h)

This formula was used in computing the overall estimate. The formula was modified in estimating usage rates for subgroups. For example, N_a in the formula above was changed to reflect the actual number of vehicles in the subset by drivers, passengers, passenger cars, SUVs, vans/minivans, pickup trucks, males, and females (etc.) observed at a site during the 50-minute observation period. Thus, seat belt usage estimates for subgroups were also weighted by VMT at the sites.

Overall seat belt usage rates were computed from regional estimates using the following formula:

$$r_{total} = \sum_{i=1}^{h} \frac{V_h r_h}{V_{total}}$$

Formula 2

where:

r_{total}	=	Overall seat belt usage rate
r_h	=	Seat belt usage rate in stratum *h*
h	=	Total number of strata in sample
V_h	=	Estimated VMT in stratum *h*
V_{total}	=	Total statewide estimated VMT

Variance for usage rate estimates was computed using the following formula (Eby & Hopp, 1997). First, variance estimates were computed for each stratum using Formula 3.

$$\sigma_h^{\ 2} = \frac{V_h}{V_h - 1} \sum \left(\frac{g_i}{g_{total}} \right)^2 \left(r_i - r_h \right)^2$$

Formula 3

where:

σ_h^2	=	Variance for stratum *h*
V_h	=	Estimated VMT in Stratum *h*
g_i	=	Weighted number of vehicle occupants at site *i*
g_{total}	=	Total weighted number of occupants in stratum *h*
r_i	=	Seat belt usage rate at site *i*
r_h	=	Seat belt usage rate in stratum *h*

Overall variance estimates were computed from stratum variance estimates using Formula 4[8], again following Eby and Hopp (1997).

$$\sigma_{total}^{2} = \sum \left(\frac{N_h}{N} \right)^2 \sigma_h^{2}$$ ***Formula 4***

where:

σ_{total}^2 = Overall variance
N_h = Number of sites in stratum *h*
N = Total number of observed sites
σ_h^2 = Variance for stratum *h*

Standard deviations were computed by taking the square root of the variance. Confidence intervals were computed using the standard formula:

$$\mu = r_{total} \pm 1.96\ \sigma_{total}$$ ***Formula 5***

Other usage rate and corresponding standard deviation may be substituted for r_{total} and σ_{total}.

During 2005, data from the observation surveys and site description forms were combined and analyzed using correlation coefficients and multivariate analysis (i.e., logistic regression). Results of a similar analysis of the 2008 data will be included in a separate report. This multivariate analysis further clarifies the relationship between driver and passenger seat belt use and other driver, passenger, vehicle, and site characteristics. Since the dependent variable is binary (correctly wearing a seat belt = 1 while incorrectly wearing a seat belt or not wearing a seat belt = 0), logistic regression was used to conduct the analysis.

For more than a single independent variable, the logistic regression model can be written as follows:

$$\text{Probability (event)} = \frac{e^z}{1+e^z}$$

or, when Z is due to the linear combination of variables:

$$Z = B_0 + B_1 X_1 + B_2 X_2 + \ldots + B_p X_p$$

In the above regression equation, each B value (i.e., B_1 through B_p) represents the odds of an event, such as correctly wearing a seat belt, controlling for other variables in the logistic regression model or equation (Norusis, 1999; Hosmer and Lemeshow, 2000). As previously reported, results of a multivariate analysis of the 2008 data will be included in a separate report.

[8] This formula may also be expressed as $(V_h/V)^2\ s^2_h$ [where V_h = est. VMT in stratum h and V = total est. VMT], if so desired.

RESULTS

Statewide Seat Belt Use

The 2008 overall seat belt use rate for vehicle occupants from Ohio is 82.7% (Table 3). This rate is an incremental improvement over the 2007 rate of 81.6%. Due to the large 2008 sample size, the survey has a confidence interval of approximately plus or minus 1%.

Alone, the 2008 rate is a point estimate of seat belt usage. Applying a confidence interval determines a range of values that allows seat belt usage to be estimated with a desired amount of confidence. NHTSA guidelines specify a 95% confidence level and a confidence interval of plus or minus 5%. By applying Formula 5, we can be **95% certain** that Ohio's seat belt usage for all vehicle occupants is within ± **1% of 82.7%,** well within NHTSA specifications.

95% Confidence Interval: **81.7% - 83.7%**

A total of 20,586 occupants were observed (16,706 drivers and 3,880 passengers) at 244 sites. This far exceeds the NHTSA minimum requirement of 7,600 observations. This means that on average, 68 vehicles and 84 occupants were observed per site.

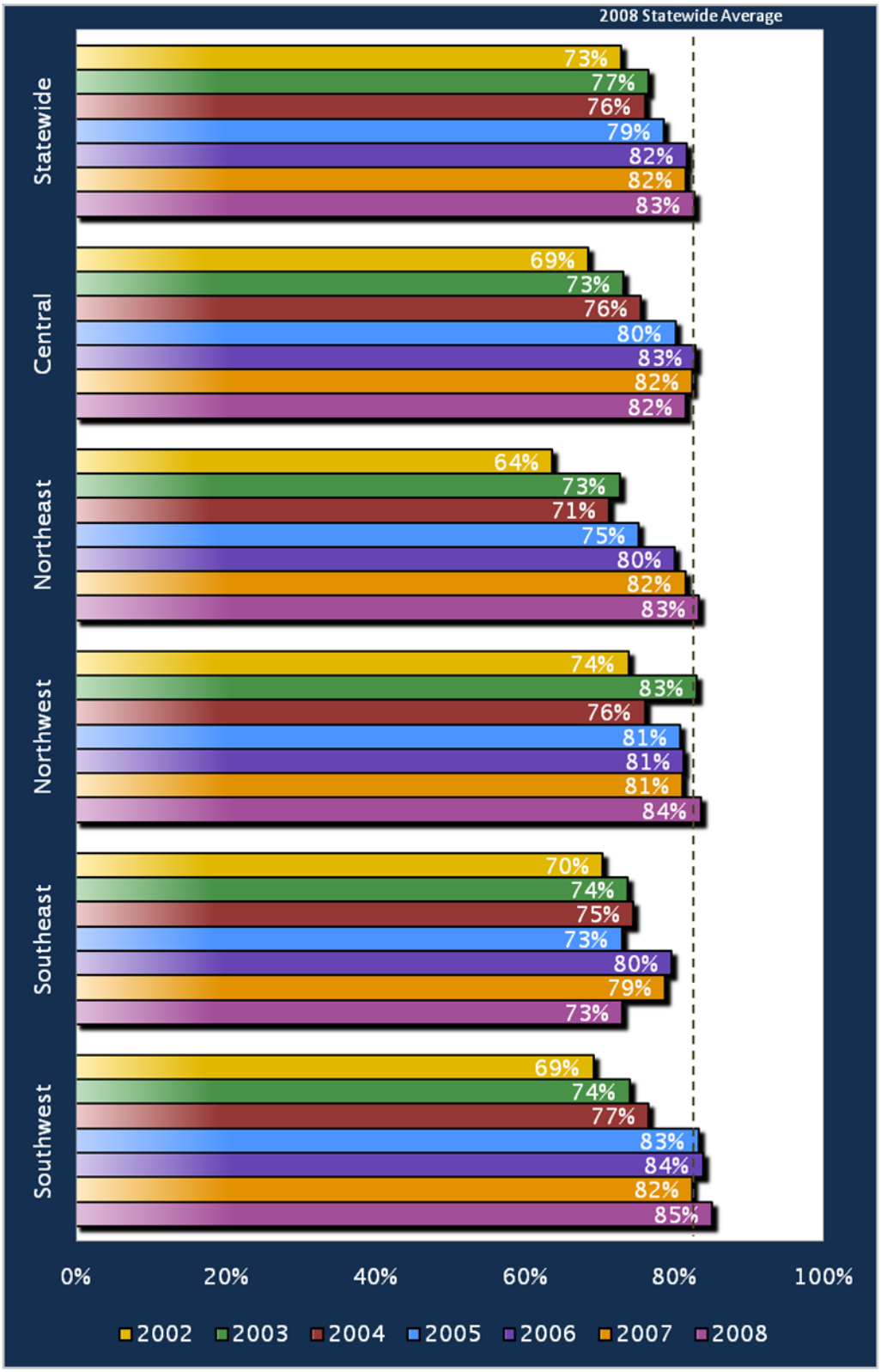
Regional Seat Belt Use

Table 3: Regional Usage Rates

Region	Usage Rate
Central	81.64%
Northeast	83.35%
Northwest	83.58%
Southeast	73.12%
Southwest	85.15%
Statewide	82.68%

As can be seen in Table 3, the Central and Southeast regions of the state have a seat belt use rate below the state average. For the first time in 2008, the Northeast region had a seat belt use rate above the state average. Since the Northeast region is the state's most heavily traveled and heavily populated region, achieving higher rates there is encouraging.

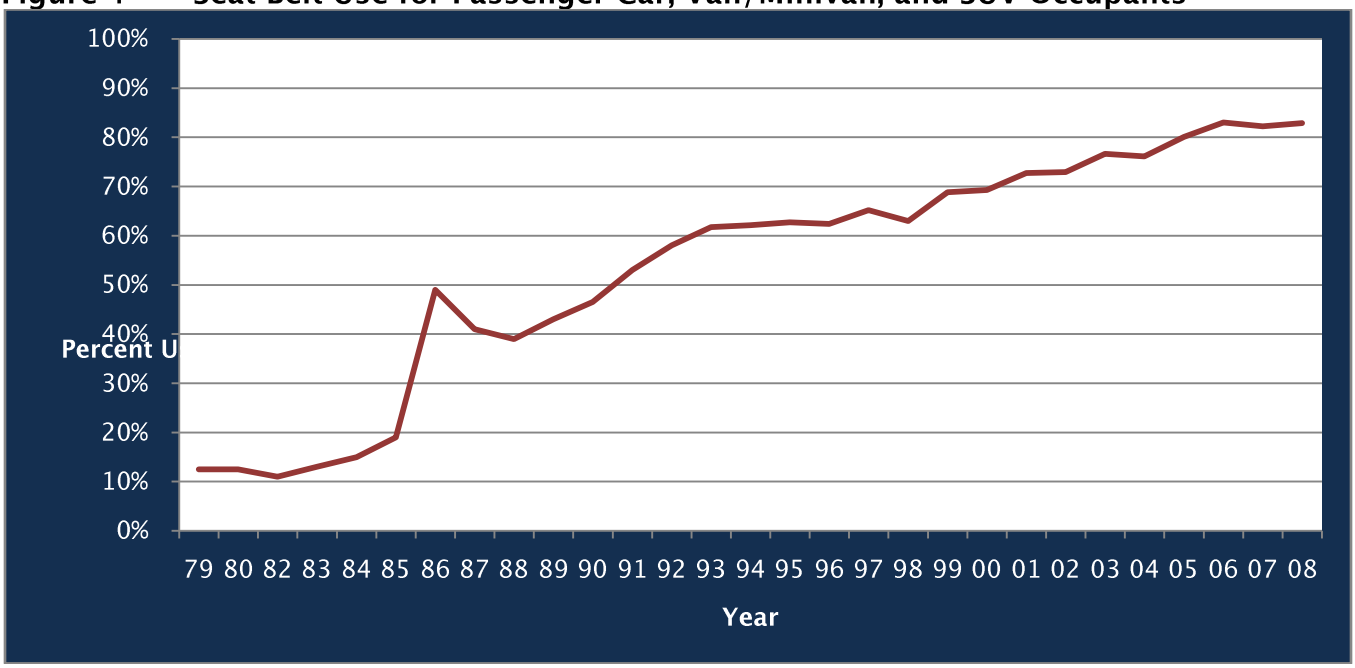
Figure 3 Seat Belt Use Statewide and By Region



As shown in Figure 3, seat belt use increased between 2002 and 2008 for all regions, albeit the gains achieved in the rural Southeast region during 2006 and 2007 were eliminated in 2008 ; also a very small decline occurred in the Central region. Northeast seat belt use increased by a single percentage point between 2007 and 2008. In the Northwest, and Southwest regions, seat belt use increased by 3 percentage points during this same time period.

It is important to note that the overall estimate is based on all front outboard occupants observed in all four vehicles types.[9] Because pickup trucks were excluded from the survey until 1998, this year's rate is only comparable to rates since 1998. Calculating the 2008 rate without pickup trucks indicates a usage rate of approximately 84%. Figure 3 represents unweighted seat belt usage rates including only passenger cars, vans/minivans, and SUVs. Also, commercial vehicles were excluded from this historically comparable rate as specified by NHTSA.

Figure 4 Seat Belt Use for Passenger Car, Van/Minivan, and SUV Occupants



Vehicle Type and Seat Belt Use

As in previous surveys, pickup truck occupants have a significantly lower seat belt use rate than other vehicle occupants during 2008, presenting an opportunity to increase overall seat belt use in the future (see Table 4).

Table 4: Usage Rate by Vehicle Type

Vehicle Type	Usage Rate
Passenger Car	83.27%
Van/Minivan	85.85%
SUV	84.96%
Pickup Truck	74.52%

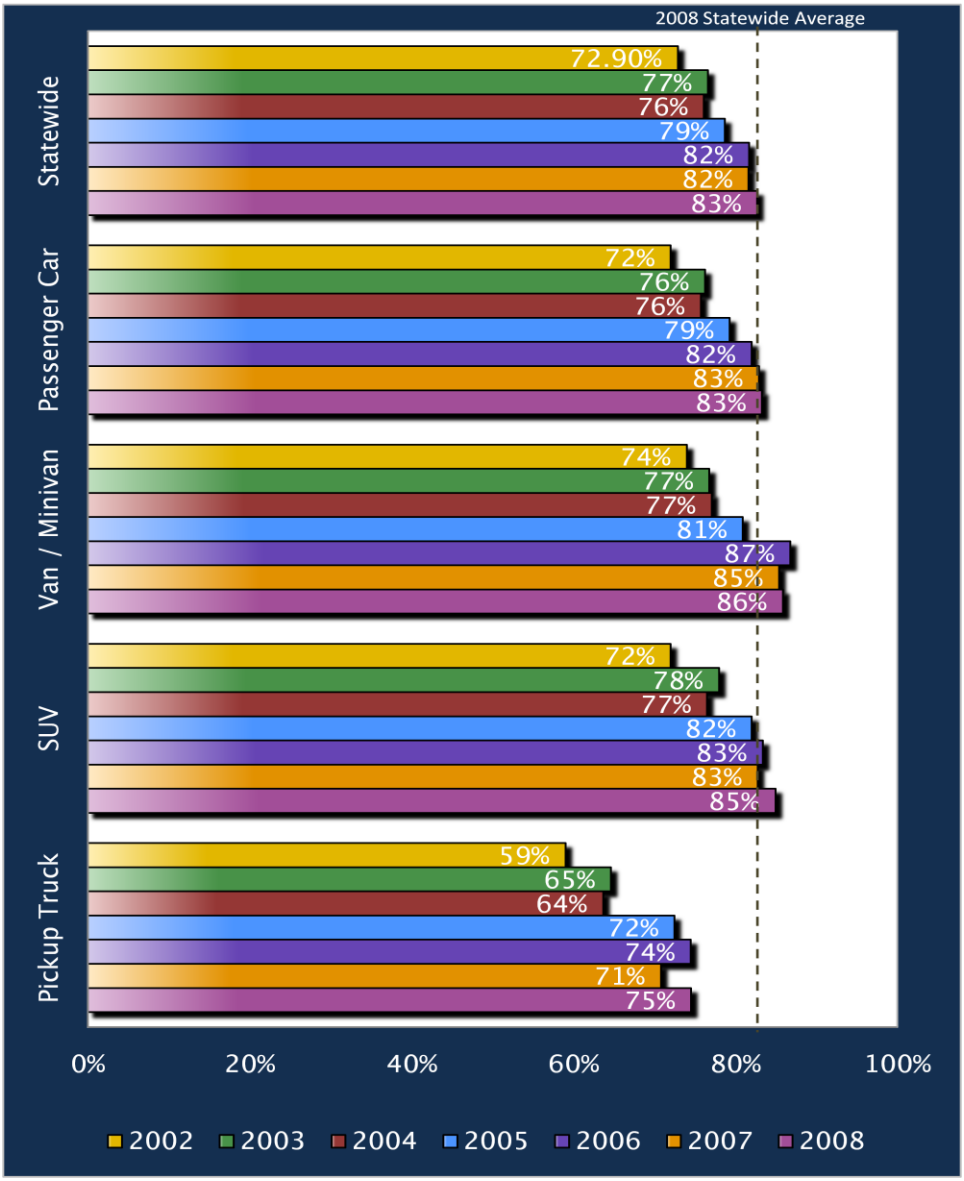
[9] Data on the four vehicle types – passenger cars, vans/minivans, Sport Utility Vehicles, and pickup trucks – have been collected since the 1998 survey.

The results for each vehicle type by region are presented in Table 5.[10] As shown, occupants of pickup trucks had a significantly lower rate of seat belt use rates than occupants in all other vehicle types, regardless of region. Seat belt use was lowest among truck occupants in the Southeast region; the Southeast also had the lowest rates for the three other vehicle types.

Table 5: Vehicle Type Regional Usage Rates

Region	Passenger Car	Unweighted N	Van / Minivan	Unweighted N	SUV	Unweighted N	Pickup Truck	Unweighted N
Central	81.79%	2,024	85.86%	475	83.18%	812	74.22%	484
Northeast	84.35%	5,231	84.67%	1,116	84.26%	1,604	76.96%	1,226
Northwest	83.70%	945	91.56%	250	87.37%	364	73.79%	300
Southeast	75.60%	712	71.84%	137	79.13%	264	57.79%	236
Southwest	85.11%	2,562	88.93%	519	87.70%	763	77.46%	556
Statewide	83.27%	11,474	85.85%	2,497	84.96%	3,807	74.52%	2,802

Figure 5 Seat Belt Use Statewide and by Vehicle Type



[10] "Unweighted N" indicates the total number in observations of that category.

Figure 5 shows that although seat belt use increased substantially between 2002 and 2006 for each vehicle type, seat belt use fell slightly for vans, SUVs, and pickup trucks in 2007. However, except for vans, those losses were recouped 2008, with slight increases in seat belt use among occupants of each vehicle type.

Driver and Passenger Seat Belt Use

Ohio's seat belt observation survey has traditionally found differences between drivers and passengers in their rates of seat belt use. Table 6 summarizes the results for drivers and passengers, respectively, by region. 1.) As in previous years, the overall seat belt use rate for drivers is slightly higher than that of passengers, although it is interesting to note that passenger use rates are higher than driver use rates in some regions. The seat belt use disparity between driver and passenger rates was greatest in the Central region. 2.) Driver seat belt use was again highest in the Southwest, and it was again lowest in the Southeast region. 3.) Passenger seat belt use was highest in the Northwest by a very small margin; it was lowest in the Southeast.

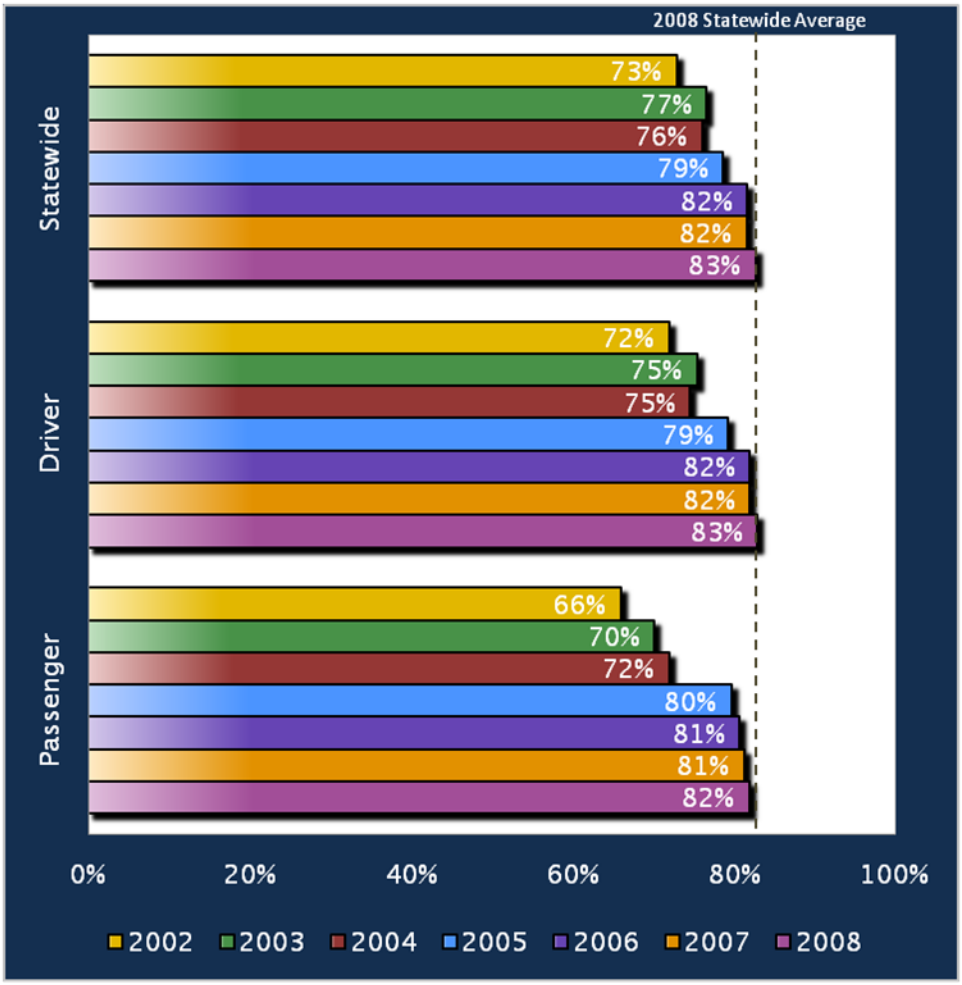
Also of note, again this year a direct relationship was found between driver and passenger seat belt use. The correlation between driver use and passenger use was $r = .64$, $p \leq .001$. Although causality cannot be inferred from a correlation, the strength of the association between driver and passenger seat belt use suggests that passengers were more likely to be belted when drivers were belted and vice versa.

Table 6: Driver and Passenger Usage Rates by Region

Region	Drivers	Unweighted N	Passengers	Unweighted N
Central	82.37%	2,961	78.22%	441
Northeast	83.80%	7,594	83.72%	854
Northwest	82.74%	1,452	83.80%	204
Southeast	72.54%	1,035	73.75%	163
Southwest	85.95%	3,664	82.13%	441
Statewide	82.99%	16,706	81.54%	2,103

Passenger seat belt use has increased since 2002 but has remained fairly steady for the past three years (Figure 6).

Figure 6 Seat Belt Use Statewide and by Occupant Type



Sex of Vehicle Occupants and Seat Belt Use

Detailed information was collected on occupants' sex, and separate estimates were generated for male and female front outboard occupants. Consistent with past Ohio survey results, *female occupants had significantly higher rates of seat belt usage than male occupants*. The disparity was about 8 and 9 percentage points for each region (Table 7).

Table 7: Male and Female Occupants Usage Rates by Region

Region	Males	Unweighted N	Females	Unweighted N
Central	77.53%	1,920	85.63%	1,873
Northeast	79.88%	4,657	87.58%	4,511
Northwest	78.83%	994	87.82%	865
Southeast	68.87%	681	76.70%	667
Southwest	81.43%	2,204	89.30%	2,195
Statewide	78.78%	10,456	86.79%	10,1111

A comparison of male and female driver and passenger seat belt use rates depicted in Tables 8 and 9 reveals the following: although male drivers are less likely than female drivers to wear seat belts, this gap becomes even more pronounced when male and female passengers' rates are compared. When riding as passengers, only 75% of males were observed to be buckled up in 2008, compared to nearly 86% of female passengers. While male passenger seat belt use declined slightly between 2007 and 2008, the rates for female passengers increased by two percentage points from 84% to approximately 86%. For both males and females, drivers were somewhat more likely to wear seat belts than passengers.

The results for male and female drivers and passengers are summarized by region in Table 8 and Table 9.

Table 8: Male Driver and Passenger Usage Rates

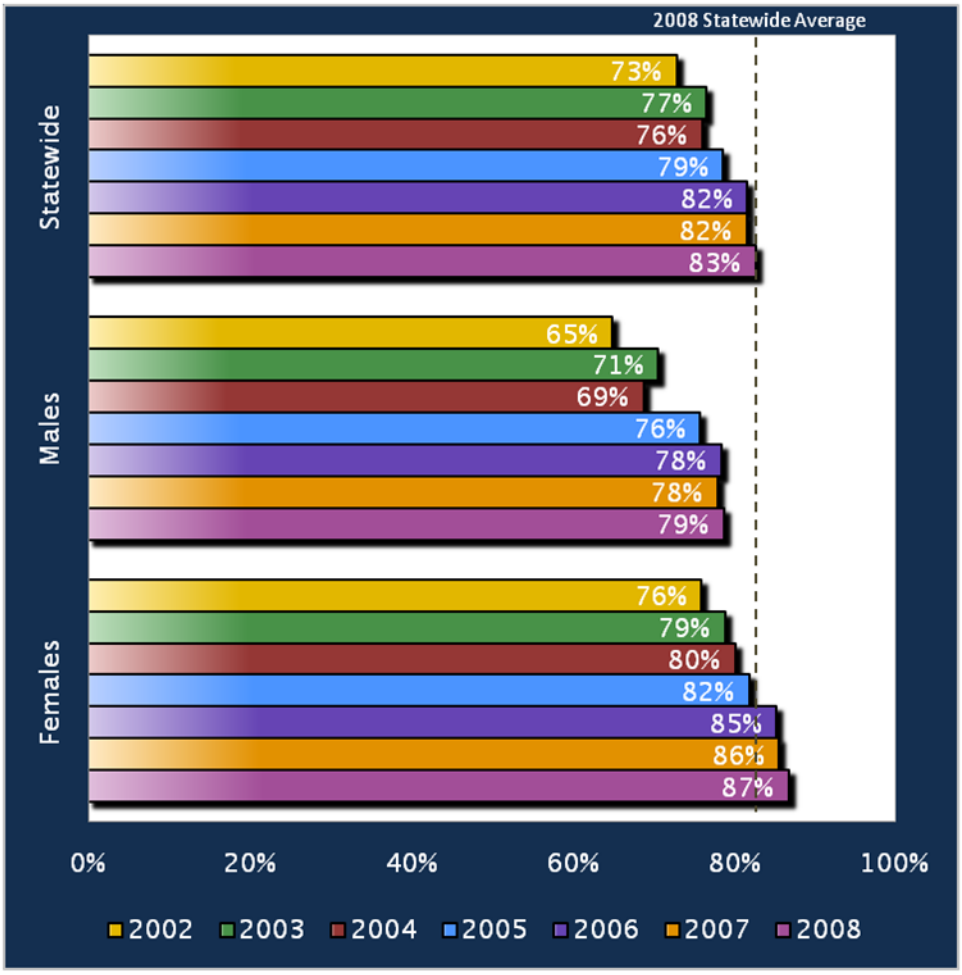
Region	Male Driver	Unweighted N	Male Passenger	Unweighted N
Central	78.22%	1,604	73.49%	316
Northeast	80.94%	4,183	73.73%	474
Northwest	79.37%	849	75.93%	145
Southeast	68.97%	559	68.61%	122
Southwest	82.20%	1,963	79.10%	241
Statewide	79.55%	9,158	74.92%	1,298

Table 9: Female Driver and Passenger Usage Rates

Region	Female Driver	Unweighted N	Female Passenger	Unweighted N
Central	86.29%	1,356	82.09%	517
Northeast	87.39%	3,404	87.83%	1,107
Northwest	85.77%	603	89.97%	262
Southeast	76.38%	475	76.31%	192
Southwest	90.15%	1,701	86.76%	494
Statewide	86.73%	7,539	85.91%	2,572

Figure 7 demonstrates that male occupants, a high-risk group, improved their seat belt use by 14 percentage points between 2002 and 2008. While female seat belt use increased 11 percentage points, their overall rate of use was, as expected, much greater than that of males.

Figure 7 Seat Belt Use Statewide and by Sex



Age of Vehicle Occupants and Seat Belt Use

Table 10 and Figure 8 illustrate the following relationships between age and seat belt use: 1.) Seat belt use for vehicle occupants age 5-14 was 83%, an improvement over 2007, but not enough to recoup the rate decrease observed between 2006 and 2007. However, it is important to note that the number of observations of 5-14 age occupants is relatively low, especially when cross-tabulated by region. 2.) Compared to other age groups, seat belt use was lowest (76%) among vehicle occupants age 15-25. 3.) However, seat belt use increases among older occupants, reaching 83% among occupants age 26-64 and nearly 87% among those ages 65 and older. The small sample of very young occupants made it impossible to generate a reliable estimate for the 0-4 age group.[11]

[11] In one sense, the low number of observations for the 0-4 age group is encouraging, as there are many risks associated with children in this age group riding as front-seat passengers. The small number observed may reflect the fact that parents are placing their small children in safety seats in the back seat of the vehicle. However, this practice renders them unobservable in this survey, as the results only describe usage for front outboard occupants.

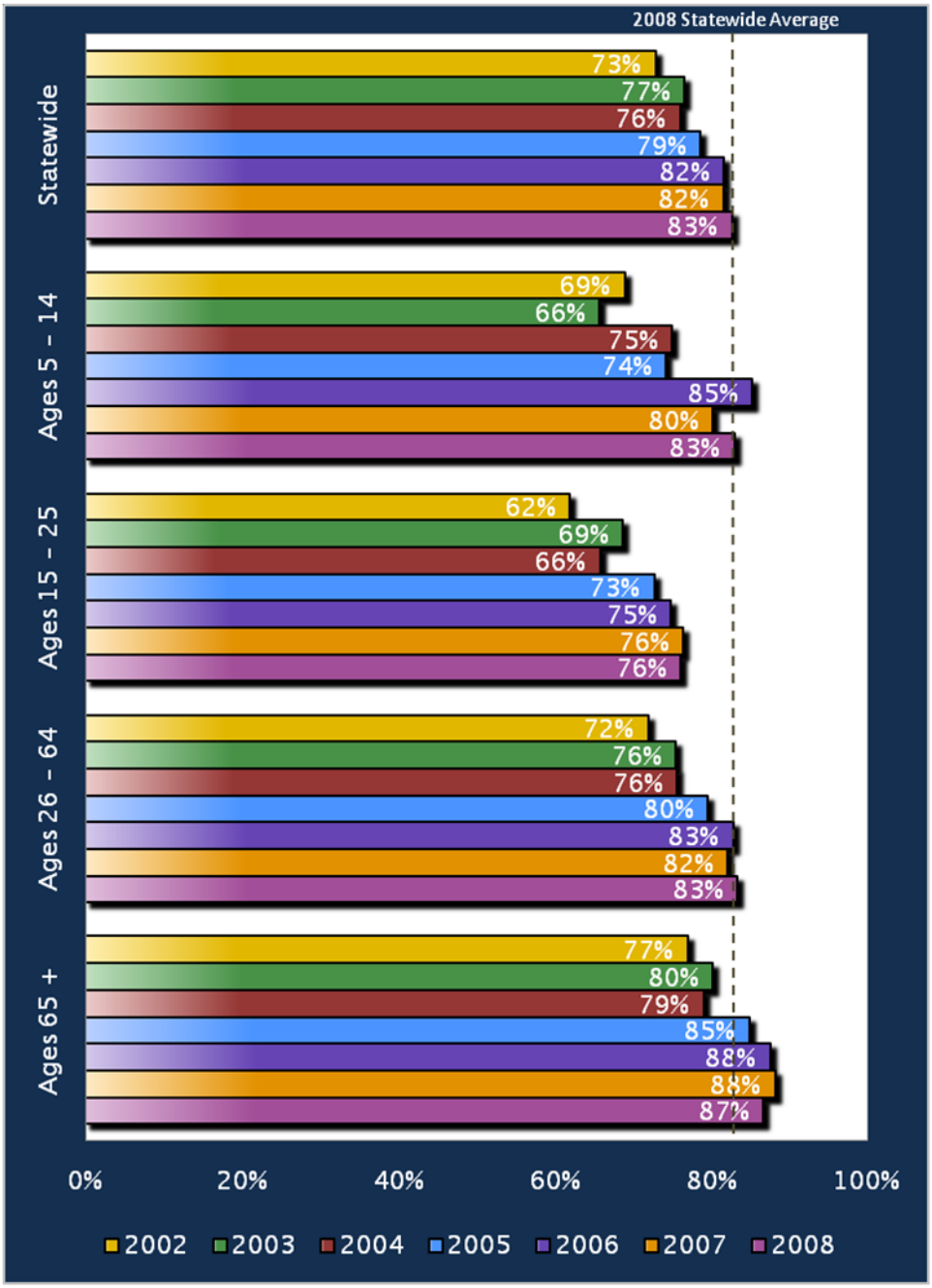
Table 10 and Figure 8 summarize the results for each age group by region. The longitudinal trends between 2002 and 2008 in seat belt use by age group are contained in Figure 8.

Table 10: Occupants restraint use by age group

	5 – 14		15 – 25		26 – 64		65 +	
Region	**Rate**	**Unweighted N**	**Rate**	**Unweighted N**	**Rate**	**Unweighted N**	**Rate**	**Unweighted N**
Central	83.86%	114	71.53%	657	82.99%	2,489	86.09%	528
Northeast	86.49%	124	75.64%	1,292	84.01%	6,746	85.14%	1,009
Northwest	88.93%	34	81.35%	399	83.42%	1,236	88.75%	190
Southeast	52.01%	26	69.26%	373	73.67%	783	80.98%	1160
Southwest	84.82%	69	79.35%	1,031	86.21%	2,835	90.04%	464
Statewide	83.04%	367	76.15%	3,752	83.43%	14,089	86.71%	2,351

Figure 8 shows that since 2002, vehicle occupants age 15-25 (the highest risk group) improved their seat belt use by 14 percentage points, although the rate remained the same (76%) between 2007 and 2008. Occupants age 5-14 increased their seat belt use by 14 percentage points during this time interval. All age groups showed a marked increase in seat belt use since 2002; however, it is important to note that recent changes have been very small, in some cases "backsliding" from highs reached in earlier years. The improvement in occupant restraint use for young children is in keeping with recent efforts by the OTSO, although the current survey methodology does not address the issue of proper booster seat use among children who have outgrown safety seats.

Figure 8 Seat Belt Use Statewide and by Age Group



Race of Vehicle Occupants and Seat Belt Use

Beginning in 2004, the observation survey assessed seat belt use by race: Caucasian, African-American, and individuals of other races ("other"). The present observation methodology precluded the collection of more detailed race information. Therefore, these surveys provide data on seat belt use primarily by Caucasians and African-Americans. Also, due to demographic characteristics of Ohio and the difficulty of clearly determining race with the current methodology, the number of vehicle occupants identified as African-American was relatively small (1,120 vehicles and 1,350 occupants) and is probably an undercount. However, data from the 2001 National Household Travel Survey indicates that approximately 95% of Caucasian households compared to only about 80% of African-American households own one or more motor vehicles. Also, Caucasian households are relatively more likely than African-American households to own multiple vehicles. Nevertheless, the number of African-Americans observed increased relative to Caucasians since 2007. Mindful of these caveats, the overall statewide data are consistent with findings from other research (Shults et. al., 2004). Overall statewide seat belt use among African-Americans (77%) is significantly lower than the 87% usage rate among Caucasians (Table 14). In addition, while seat belt use increased by 3 percentage points for African-Americans since 2007, seat belt use among Caucasians increased by 5 percentage points.

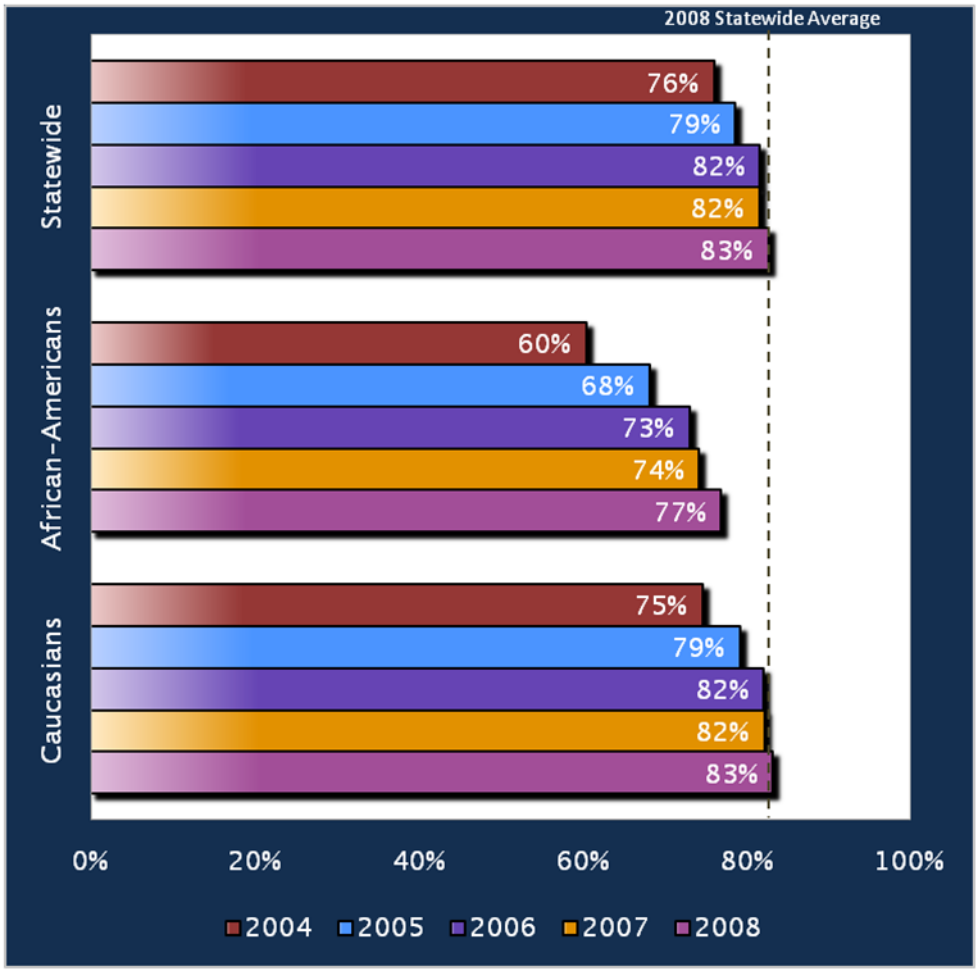
While there were too few African-American observations to generate reliable estimates for most of the other subgroup comparisons (i.e., age, sex, vehicle type, and some regions), the sizable disparity between African-American and Caucasian seat belt use persists and represents a significant highway safety issue. For instance, among occupants in Central Ohio, there is a 16-percentage point disparity between African-Americans and Caucasians. Consequently, while being mindful of the relatively small sample of minorities in this study, African-Americans may be at greater risk of death and serious injury in crashes that occur on the many intersections and freeway ramps in the Columbus area and elsewhere throughout Ohio.

Table 11: Seat Belt Use Rates by African-American and Caucasian Occupants and Region

Region	African-American	Unweighted N	Caucasian	Unweighted N
Central	69.17%	203	85.63%	1,873
Northeast	80.51%	603	87.58%	4,511
Northwest	81.22%	76	87.82%	865
Southeast	63.38%	32	76.70%	667
Southwest	79.48%	436	89.30%	2,195
Statewide	76.96%	1,350	86.79%	10,111

Figure 9 shows that seat belt use among African-Americans has increased progressively since data were first collected. However, their current use rates are comparable to Caucasian rates from 2004 and 2005, and the Caucasian use rate in 2008 is 6 percentage points higher than that of African-Americans in 2008.

Figure 9 Seat Belt Use Statewide and by Race



Observation Site Type and Seat Belt Use

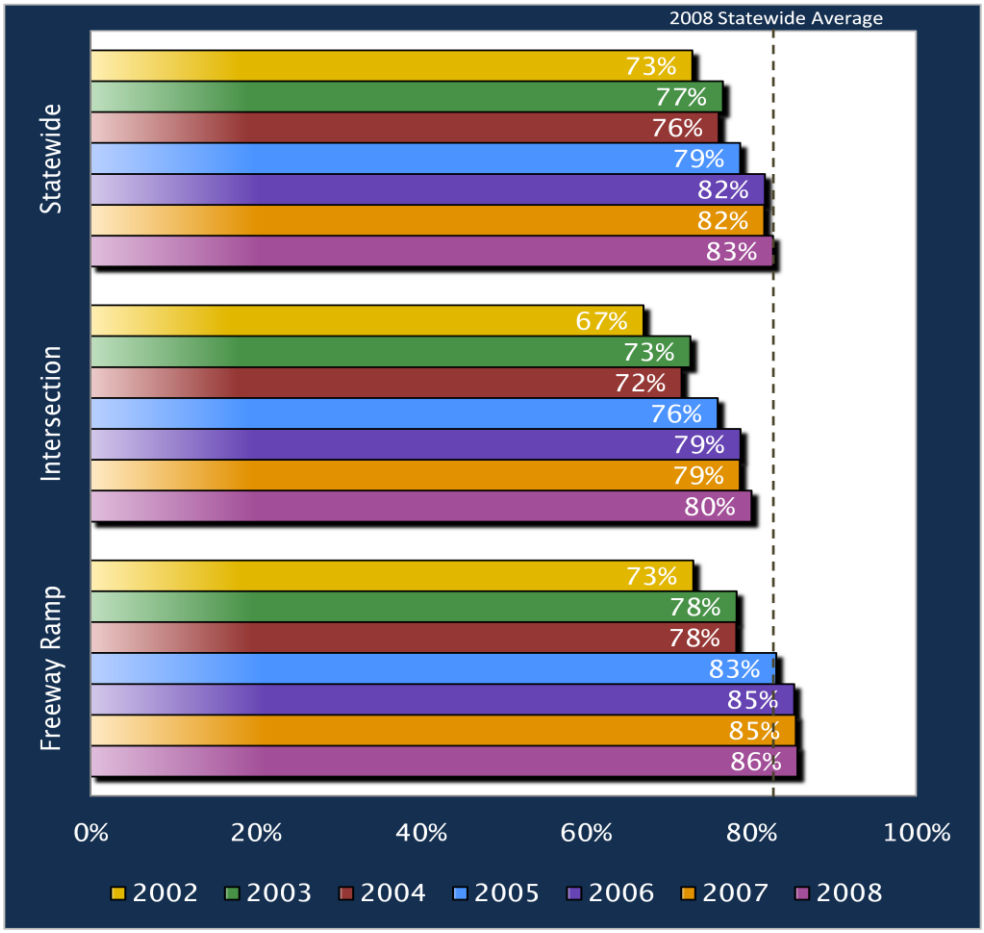
Historically and in the observation data collected since 2002, seat belt use has been higher on limited access roadways (i.e., interstates and expressways). This was again true in 2008 and is most likely due to the greater perceived risk and subsequent behavior associated with travel at higher speeds on limited access roadways and, on average, traveling a relatively longer distance on such roadways. Table 15 summarizes the results for usage by observation site type.

Table 12: Usage Rates by Road Type

Region	Usage Rate	Unweighted N
Intersection	80.07%	13,010
Freeway Ramp	85.65%	7,576

As shown in Figure 10, during the past seven years, observed seat belt use increased by similar percentage points (13%) on both freeway ramps and intersections. However, seat belt use on freeway exit ramps remained substantially higher than at intersections throughout all seven years.

Figure 10 Seat Belt Use Statewide and by Site Type



Cross-tabulations of Observation Characteristics and Seat Belt Use

Tables 16 through 18 illustrate seat belt use rates based on several demographic, occupant, and vehicle characteristics. As indicated and consistent with previous survey results, male pickup truck drivers of ages 15-25 had the lowest seat belt usage rate of all drivers, while van/minivan drivers aged 65 years or older had the highest rate of all drivers. Many of the passenger seat belt use rates are based on relatively few observations and thus have a larger sampling error. That caveat should be kept in mind when interpreting data in those categories. However, these rates do indicate that passengers of pickup trucks had relatively low usage rates, especially males.

Table 13: Driver and Passenger Usage Rates by Age and Sex

		Drivers	Unweighted N	Passengers	Unweighted N
Ages 15-25	Males	69.19%	1,343	69.87%	400
	Females	82.06%	1,489	78.12%	519
Ages 26-64	Males	80.28%	6,707	70.34%	551
	Females	87.13%	5,494	85.90%	1,327
Ages 65+	Males	85.47%	1,108	78.78%	153
	Females	89.48%	556	92.37%	534

Table 14: Driver and Passenger Usage Rates by Age and Vehicle Type

		Drivers	Unweighted N	Passengers	Unweighted N
Ages 15-25	Passenger Car	77.93%	2,002	77.26%	572
	Van / Minivan	83.82%	137	81.97%	97
	SUV	78.02%	382	73.75%	138
	Pickup Truck	57.74%	312	63.20%	112
Ages 26-64	Passenger Car	84.77%	6,310	80.08%	911
	Van / Minivan	85.86%	1,603	89.03%	303
	SUV	85.86%	2,507	83.56%	406
	Pickup Truck	76.11%	1,785	76.52%	261
Ages 65+	Passenger Car	86.97%	1,059	90.09%	433
	Van / Minivan	93.88%	182	88.55%	99
	SUV	89.42%	211	92.67%	94
	Pickup Truck	72.06%	211	88.28%	61

Table 15: Driver and Passenger Usage Rates by Sex and Vehicle Type

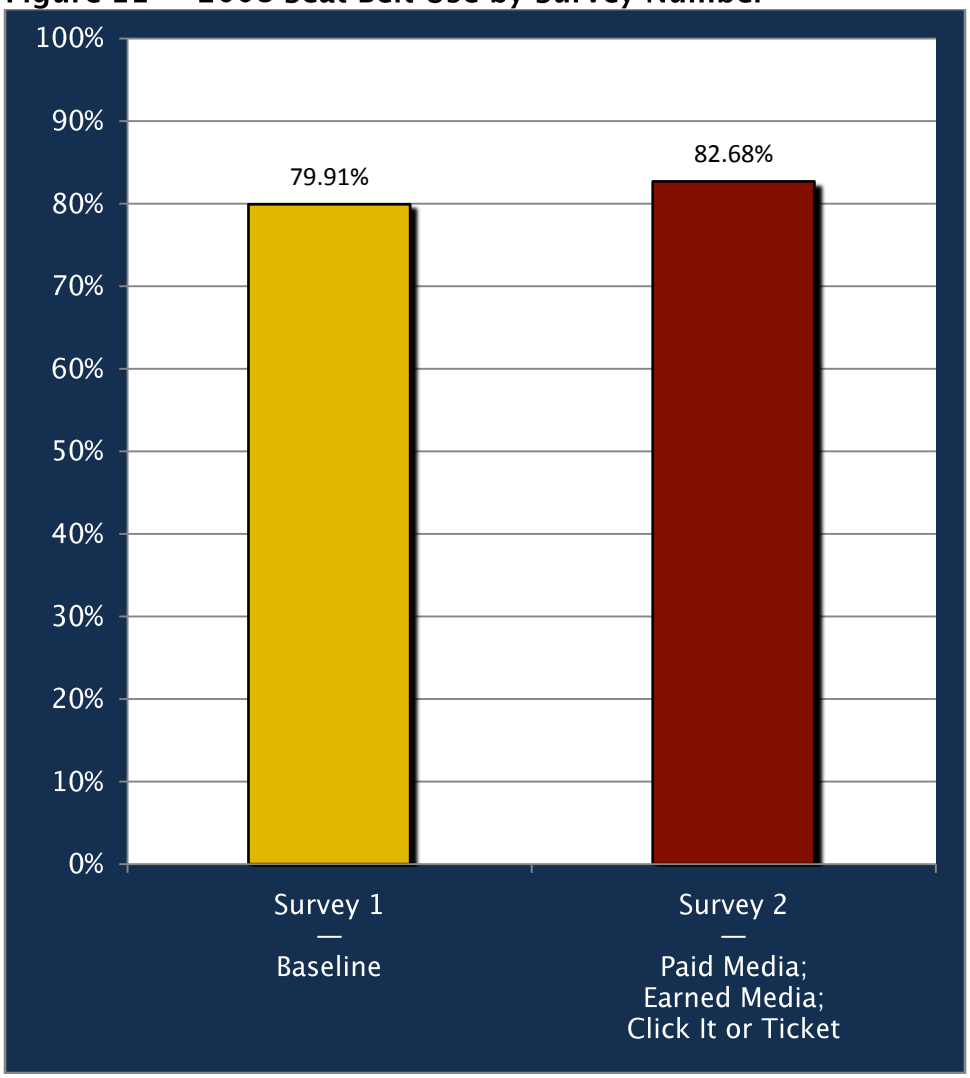
		Drivers	Unweighted N	Passengers	Unweighted N
Males	Passenger Car	80.98%	4,743	69.89%	669
	Van / Minivan	80.80%	881	83.41%	187
	SUV	81.73%	1,536	80.22%	222
	Pickup Truck	73.10%	1,996	65.61%	220
Females	Passenger Car	86.30%	4,625	86.17%	1,428
	Van / Minivan	89.06%	1,041	91.81%	388
	SUV	87.66%	1,563	87.20%	483
	Pickup Truck	82.67%	308	77.42%	273

Media and Enforcement Interventions

The 2008 Observational Seat Belt Study reports only results from the second observational survey which occurred after multiple interventions, including media campaigns and enforcement initiatives such as *Click It or Ticket*. Therefore it is useful to compare usage rates among Surveys 1 (Baseline) and 2, shown in Figure 11.

As shown below, statewide occupant seat belt use increased nearly 3 percentage points from Survey 1 to Survey 2, which is expected and consistent with previous years' surveys.

Figure 11 2008 Seat Belt Use by Survey Number



Conclusions

As reported, the 2008 overall Ohio seat belt use rate is 82.7%, an improvement over the 2007 rate of 81.6%. Also, seat belt usage for specific populations has generally continued to increase. Nevertheless, consistent with previous state surveys, the 2008 survey has identified groups that warrant special attention because of their lower rates of seat belt use. Due to the absence of a primary seat belt law in Ohio, to increase overall seat belt use, significantly greater compliance with the present secondary seat belt law must occur among those populations that consistently have relatively low rates of seat belt use. Hence, media and enforcement initiatives which promote greater seat belt use must be strengthened; ongoing, rather than periodic; and directed disproportionately at the following populations and goals:

- Southeast Region Vehicle Occupants
- Vehicle Occupants Age 15-25
- Vehicle Passengers Age 5-14
- Male Vehicle Occupants
- Pickup Truck Occupants
- African-American Vehicle Occupants

One approach to increase seat belt use is cited by Williams and Wells (2004: 179). They maintain that what is necessary in the United States to achieve seat belt use rates of 90% or greater is widespread, methodical, and sustained application of enforcement programs, augmented by the use of creative publicity campaigns. Another approach is the passage of a primary seat belt law which could initially increase overall use rates by as much as 10 percentage points, such as occurred in the State of Washington. A primary law could continue to increase seat belt use in diminishing increments thereafter until a state maximum level is reached. For instances, among states that enacted a primary seat belt law between 2001 and 2007, the average initial increase was 5.4%. Of 26 states that have enacted a primary law, 17 (65%) had rates of 85% or higher. Of those states without a primary law, only 6 (25%) of the 24 states had rates of 85% or higher (NHTSA, 2007). The national seat belt use rate in 2007 was 82%, slightly higher than Ohio's 81.6% rate that year. The passage of a primary seat belt law could give Ohioans the "push" they need to comply with seat belt laws. Even if the initial gain is the above average of 5.4%, Ohio's overall seat belt use would reach 88%. A recent policy white paper by the Applied Research Center outlined Ohioans' support for a primary law and their intent to obey it, based on statewide telephone surveys conducted yearly (Seufert, Kubilius, & Walton, 2007). Public support for a primary law is very promising. However, in absence of a primary seat belt law, Ohio can only strive to achieve a seat belt use rate of 85% or greater through widespread, methodical, and sustained enforcement programs and creative media campaigns directed disproportionately at the above groups who are least compliant with Ohio's existing seat belt law.

RECOMMENDATIONS

The 2008 Observation Survey of Seat Belt Use increases and reaffirms knowledge about Ohioans who are and are not using seat belts. While the survey results show incremental gains in seat belt use overall and in many subpopulations, the following groups have again been identified as meriting special attention due to relatively low usage rates: Southeast Ohio vehicle occupants and those from other rural areas; young drivers and their passengers; male drivers and their passengers; pickup truck occupants (i.e., both drivers and passengers); and African-American vehicle occupants. For the most part, these groups are identical to those identified during previous surveys. Furthermore, without a state primary seat belt law, increasing compliance with existing law by vehicle occupants with these characteristics is necessary to achieve a statewide seat belt use rate of 85% or greater.

1. **Southeast Region Vehicle Occupants:** During 2008, compared to other Ohio regions, the rural Southeast region of the state had the lowest usage rate (73%), a decline of nearly six percentage points from the previous year's rate (79%). Since much of Southeast Ohio is rural, a comparatively greater proportion of its observation sites are intersections, which typically have a lower usage rate than freeway ramps. Also, a higher proportion of occupants were observed in trucks in the Southeast than in the other regions. Once again, truck drivers and their passengers are a high risk subpopulation. However, it is important to emphasize that vehicle occupants in the Southeast Region had relatively lower levels of seat belt use for every vehicle type and occupant characteristic (i.e., driver and passenger, male and female, age and race).

2. **Vehicle Occupants Age 15 -25:** Vehicle occupants age 15-25 continued to exhibit a relatively low seat belt usage rate (76%). Although their seat belt usage rate continues to improve annually, improvement has been less dramatic over the course of the past four years. The Southeast seat belt usage rate of 72% for occupants age 15-25, nearly unchanged from 2007, is especially low compared to other regions of the state. Since motor vehicle crashes are the leading cause of death among people age 15-20 (NHTSA, 2005), increasing seat belt use among young drivers and passengers is especially imperative. Therefore, increased statewide and targeted law enforcement and education initiatives should be directed toward this population. The life-saving rationale for greater seat belt use should be clearly emphasized. Also, innovative drivers' education programs and other initiatives aimed at increasing driving skill, knowledge, judgment, and personal responsibility among novice drivers would be highly beneficial.

3. **Vehicle Passengers Age 5-14:** Seat belt use among vehicle occupants aged 5-14 years improved somewhat over the last year. In 2008, the seat belt use rate for occupants age 5-14 was 83%, compared to 80% in 2007. Due to the small number of observed occupants age 5-14, it is difficult to determine accurate regional belt use trends for this group. While a relatively small number of occupants age 5-14 were observed, they have among the highest rates of injury in traffic crashes compared to other age groups. In large part this is because seat belts are usually too large for the youngest members of this group. Therefore, it is important for passengers

age 5-14 to fully understand the importance of buckling up on their own and act in accordance with this knowledge, instead of merely because an adult requests that they do so. Establishing an inherent motivation to buckle up among this age group should logically increase seat belt usage when they reach driving age. Consequently, increasing seat belt use among youths through school-based and other program initiatives is essential in helping to reduce traffic-related fatalities and injuries in the state. Ohio's initiatives to increase booster seat use among young children will also help this endeavor.

4. **Male Vehicle Occupants:** Overall, male drivers and passengers are significantly less likely to wear seat belts in comparison to female drivers and passengers. For instance, during 2008, male driver and passenger seat belt usage rates were 80% and 75% respectively, while usage rates were 87% for female drivers and 86% for female passengers. Thus, messages designed to promote belt use should be directed specifically to males and their "significant others." By appealing to their sense of responsibility toward their families, children, and friends, as well as emphasizing the tangible safety benefits, male seat belt use should increase. Coupled with strict law enforcement, this multi-faceted effort would increase seat belt use among males while driving and riding as a passenger.

5. **Pick-up Truck Occupants:** As in previous years, pickup truck occupants are one of the most important groups on which to focus media and enforcement initiatives. These individuals, and especially male pick-up truck drivers and their passengers of all ages generally have significantly lower seat belt usage rates than occupants of other vehicles. For example, the seat belt usage rate among male pickup truck drivers is 73% and for male pickup truck passengers it is 66%. In contrast, usage rates are 83% for female pickup truck drivers and 77% for female pickup truck passengers. The usage rate is also low for male pickup truck drivers and passengers ages 15 to 25. Overall, pickup trucks accounted for 14% of the vehicles observed during the 2008 survey. Based on the percentage of all registered vehicles in Ohio that are pickup trucks, the percent that are involved in fatal crashes, and the low compliance with seat belt law among pickup truck occupants, this group is at higher risk for death or serious injury from crashes. Therefore, increasing seat belt use among pickup truck drivers and passengers, especially males, is very important to reducing Ohio's traffic-related fatalities and serious injuries.

6. **African-American Vehicle Occupants**: During the 2008 survey, the statewide seat belt use rate by African-Americans of 77% is significantly lower than the 83% usage rate by Caucasians. African-Americans comprise only 6.6% of occupants in the observational survey, but make up 12.0% of Ohio's population. However, according to the National Household Travel Survey (2001), 21.6% of black households do not own vehicles, compared with 5.3% of white households. Nevertheless, correcting the low seat belt use of African-Americans is extremely importance since traffic accidents are the leading cause of death for black children and the second greatest cause of death among African-Americans between the ages of 15 and 24 (Wald,

2000). Therefore, culturally appropriate media and enforcement initiatives which promote greater seat belt use by members of the African-American community, especially youth, should definitely be increased.

In summary, innovative and sustained actions by ODPS and OTSO on the above six recommendations should be directed disproportionately at the above "high risk" group in order to achieve significantly higher seat belt use in Ohio. In addition, concerned Ohioans should continue to pursue the passage of a primary seatbelt law. For instance, surveys of a representative sample of Ohioans with valid driver's licenses illustrate that a majority would favor a primary seat belt law for the state, would obey such a law, and believe a primary law would have a significant positive impact on highway safety in Ohio (Seufert et. al., 2003-2007). Furthermore, a state can expect to experience a marked increase in seat belt use with the passage of a primary seat belt use law, perhaps by as many as 10 percentage points. This may be particularly important in light of the fact that seat belt use has increased by only 1 percentage point during the last three Observation Surveys of Seat Belt Use in Ohio. Therefore, positive outcomes on seat belt use resulting from ODPS and OTSO actions on the six recommendations would be further enhanced and sustained by passage of a primary seatbelt law.

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Appendix A: Site Locations

Site No.	County	Region	Primary Location	Municipality/ Township	Site Type
1	Delaware	C	EB Center Village Road / SR 605	Harlem	I
2	Delaware	C	EB Home Road / Dublin Road (SR745)	Rathbone	I
3	Delaware	C	EB East Powell Road / South Old State Road	Orange	I
4	Delaware	C	WB West Williams Street / S Washington Street	Delaware	I
5	Delaware	C	NB Liberty Road / Home Road	Liberty	I
6	Fairfield	C	WB W. Sixth / Harrison	Lancaster	I
7	Fairfield	C	SB N. Broad Street / 5th Avenue	Lancaster	I
8	Fairfield	C	NB SR 664 / SR37	Rush Creek	I
9	Franklin	C	NB Diley Road / Long Road	Pickerington	I
10	Franklin	C	SB Hendron Road / Main Street	Groveport	I
11	Franklin	C	NB Demorst / Cline	Briggsdale	I
12	Franklin	C	EB Southwest Blvd / Demorest	Grove City	I
17	Licking	C	NB SR 13 / US 40	Newark	I
18	Licking	C	SB Jacksontown Road / US 40	Jacksontown	I
19	Licking	C	WB Country Club Drive / Granville Road	Newark	I
20	Licking	C	WB Refugee Road / Outville Road	Harrison	I
21	Licking	C	SB SR 661 / US 62	Burlington Twp.	I
22	Marion	C	WB Owens / Gooding	Pleasant	I
23	Marion	C	NB SR 423 / CR 138 Barrs Road	Marion	I
24	Marion	C	EB SR 47 / SR 203	Prospect	I
25	Pickaway	C	NB Nicholas Drive / Northridge Road (SR 188)	Circleville	I
26	Pickaway	C	WB US 22 / SR 104	Deercreek	I
27	Pickaway	C	EB CR 32 / CR 7	Walnut	I
33	Ashtabula	NE	WB East Main Street / Andover Square	Andover	I
35	Ashtabula	NE	WB Water Street / SR 45	Morgan Twp.	I
36	Ashtabula	NE	SB Centennial Street / Eastwood Street	Geneva	I
37	Ashtabula	NE	EB Center Street / Elm Avenue	Ashtabula	I
40	Columbiana	NE	WB North Street / N Market Street	East Palestine	I
42	Columbiana	NE	WB Cameron Road (CR 424) / SR 45		I
43	Columbiana	NE	WB McKinnon Street / Street Clair Avenue	East Liverpool	I
44	Columbiana	NE	SB Park Way / Anderson Blvd	East Liverpool	I
46	Cuyahoga	NE	WB Egbert Road / Union Street	Bedford Hts.	I
47	Cuyahoga	NE	WB Drake Road / Pearl Road	Strongsville	I
48	Cuyahoga	NE	WB McCracken Blvd. / E. 98th Street	Garfield Hts.	I
49	Cuyahoga	NE	EB Emery Road / Brainard Road	Warrensville Hts.	I
50	Erie	NE	EB Mason Road / SR 61	Florence	I
51	Erie	NE	NB SR 61 / SR 113	Berlin	I
52	Erie	NE	SB Patten Tract Road / Mason Road	Oxford	I
53	Geauga	NE	WB Music Street / Hemlock Point	Russell	I
54	Geauga	NE	WB US 322 / SR 608	Claridon	I
55	Geauga	NE	NB SR528 / SR166	Thompson	I
56	Geauga	NE	WB Merritt Road / SR 44	Munson	I
58	Lake	NE	EB Madison Road / SR 84	Perry Twp	I
59	Lake	NE	WB Maple Grove Road / Somrack Drive	Willoughby Hills	I
60	Lake	NE	NB Ohio Street / Reynolds Road	Mentor	I
62	Lake	NE	EB Blase-Nemeth Road / CR 305	Painesville	I
63	Lake	NE	WB Oakwood Blvd. / Hardy Road	Painesville	I
64	Lorain	NE	SB Root Road / Station Road	Columbia	I

Site No.	County	Region	Primary Location	Municipality/ Township	Site Type
65	Lorain	NE	NB West Road / SR 18	Penfield	I
66	Lorain	NE	SB Oberlin Road / Cleveland Oberlin Road	New Russia	I
67	Lorain	NE	WB Ohio Street / Glenwood	Elyria	I
68	Mahoning	NE	EB Boardman Canfield Road / E Parkside Drive	Boardman	I
69	Mahoning	NE	SB SR 46 / US62	Canfield Twp.	I
70	Medina	NE	WB Outlet Mall Road / SR83	Harrisville	I
71	Medina	NE	WB SR 162 / SR 94	Sharon	I
72	Medina	NE	NB US 42 / CR 76	Medina	I
73	Portage	NE	NB Walnut Street / Central Avenue	Ravenna	I
74	Portage	NE	WB Lynn Road / Rootstown Road	Rootstown	I
75	Portage	NE	SB Franklin Avenue / Cherry Street	Kent	I
76	Portage	NE	NB Sebring Johnson Road / SR 14	Deerfield	I
77	Richland	NE	SB Rock Road / Myers Road	Jackson	I
78	Richland	NE	EB Shelby-Ganges Road / CR 191	Jackson	I
79	Richland	NE	WB Marion Avenue / Home Road	Mansfield	I
80	Stark	NE	EB Lincoln Way West / 23rd Street	Massillon	I
81	Stark	NE	NB SR 44 / Edison Street (SR 619)	Marlboro	I
82	Stark	NE	EB Farber Street / SR 800	East Sparta	I
83	Summit	NE	EB Steels Corners Road / Wyoga Lake Road	Cuyahoga Falls	I
84	Summit	NE	WB Huston Street / 5th Street	Barberton	I
85	Summit	NE	WB Memorial Parkway / North Portage Path	Akron	I
86	Summit	NE	NB Brown Street / E Thornton Street	Akron	I
87	Summit	NE	NB Hametown Road / Minor Road	Copley	I
88	Summit	NE	SB Arlington Road / Moore Road	Green	I
89	Summit	NE	WB Carey Avenue / 26th Street	Akron	I
90	Trumbull	NE	NB High Avenue / East Main Street	Cortland	I
91	Trumbull	NE	EB SR 305 / SR 193	Fowler Twp.	I
92	Trumbull	NE	EB Youngstown / Central Parkway	Warren	I
93	Wayne	NE	EB Schrock Road / South Elm	Orrville	I
94	Wayne	NE	NB Fredericksburg Road / US250	Franklin Twp.	I
95	Wayne	NE	EB CR 30A / US 250	Chester	I
97	Wayne	NE	EB Milltown Road / Melrose Road	Wooster	I
98	Allen	NW	SB Yoakam Road / Zurmehly Road	Fort Shawnee	I
99	Allen	NW	WB Grand Avenue / Main Street	Lima	I
100	Allen	NW	SB Bentley Road / Augsburger Road	Richland	I
101	Auglaize	NW	WB Benton Street / Water Street	Wapakoneta	I
102	Auglaize	NW	SB SR 65 / SR 67	Uniopolis	I
105	Auglaize	NW	EB SR 67 / SR 65	Uniopolis	I
106	Crawford	NW	NB Popular Street / Mansfield St	Bucyrus	I
107	Crawford	NW	NB SR 4 / SR 103	Chatfield	I
108	Hancock	NW	SB TR 234 / CR 205	Marion	I
114	Lucas	NW	WB Nebraska Avenue / Holland-Sylvania Rd	Toledo	I
115	Lucas	NW	WB Liberty Street / Broadway Street	Oregon	I
116	Sandusky	NW	SB SR 101 / CR 177	York Township	I
117	Sandusky	NW	NB South Tiffin Road / Hurdic Road	Ballville	I
118	Sandusky	NW	NB Church Street / Main Street	Helena	I
119	Sandusky	NW	EB Napoleon Street / Brush Street	Sandusky Twp.	I
120	Seneca	NW	SB CR 15 / CR 38	Pleasant Township	I
121	Shelby	NW	EB Ft Loramie-Swanders Road / SR 29	Turtle Creek	I
122	Shelby	NW	NB SR 29 / Hoewisher Street	Sidney	I

Site No.	County	Region	Primary Location	Municipality/ Township	Site Type
123	Shelby	NW	SB SR 66 / SR 705	Ft Loramie	I
124	Wood	NW	WB Rees Road / Lemoyne Road	Freedom	I
125	Athens	SE	EB US50 / SR32	Lee	I
126	Belmont	SE	WB CR 56 / SR 9	Richland	I
127	Belmont	SE	NB Marietta Street / Main Street	St. Clairsville	I
128	Jefferson	SE	NB Standard Avenue / McLister	Mingo Junction	I
129	Jefferson	SE	EB SR 22 / John Scott Connector	Steubenville	I
130	Jefferson	SE	NB Lovers Lane / CR 43	Steubenville	I
131	Lawrence	SE	NB SR 243 / SR 378	Union	I
132	Muskingum	SE	SB Piketon Road / Maysville Road	Newton Twp.	I
133	Tuscawaras	SE	WB Main Street / Walnut Street	Gnadenhutten	I
134	Tuscawaras	SE	NB CR10 / CR14	Washington	I
135	Washington	SE	WB CR 375 / SR 821	Fearing Twp.	I
136	Washington	SE	EB Washington / Third Street	Marietta	I
137	Butler	SW	WB Hamilton-New London Road / US 27	Ross	I
138	Butler	SW	SB Briel Blvd / Roosevelt Blvd	Middletown	I
139	Butler	SW	WB Roosevelt Blvd / Wycoff	Middletown	I
140	Butler	SW	WB SR 747 / SR 4	Liberty	I
141	Butler	SW	SB Brofield Drive / Bayberry Drive	Fairfield	I
142	Butler	SW	WB Todhunter Road / Yankee Road	Lemon	I
143	Butler	SW	EB Minton Road / Boyle Road	Hanover	I
144	Clark	SW	WB Santa Monica Drive / Red Coach Drive	N. Estates	I
145	Clark	SW	NB US 68 / Fairfield Pike	Springfield	I
146	Clark	SW	WB SR 40 / SR 571	New Carlisle	I
147	Clermont	SW	WB SR 756 / SR 133	Felicity	I
148	Clermont	SW	SB Laurel Lindale Road / Bethel	Franklin	I
149	Clermont	SW	SR 133 / SR222	Franklin	I
150	Clermont	SW	WB Brooklyn Avenue / SR 28	Millford	I
153	Montgomery	SW	EB Wyoming Street / Wayne Avenue	Dayton	I
154	Montgomery	SW	NB Farmersville Road / Elm Street	Farmersville	I
155	Miami	SW	WB Broadway / High Street	Covington	I
156	Miami	SW	EB SR 571 / SR 48	West Milton	I
157	Greene	SW	NB Colonel Glen Hwy / Ravenwood Drive	Fairborn	I
158	Greene	SW	SB US42 / Main St (US35)	Xenia	I
159	Greene	SW	SB Colorado Drive/ Alabama Drive	Xenia	I
160	Greene	SW	WB Brown Road / Wilmington Pike	Sugarcreek	I
161	Hamilton	SW	WB Losantville Avenue / Wiehe Road	Golf Manor	I
162	Hamilton	SW	SB Woodland Avenue / Madison Road	Oakley	I
163	Hamilton	SW	EB Fleming Avenue / Grandview Avenue	East Walnut Hills	I
164	Hamilton	SW	NB Eight Mile Road / Batavia Road	Anderson Twp	I
165	Hamilton	SW	NB Race Road / West Fork Road	Cheviot	I
166	Hamilton	SW	EB Waycross / Hanover	Cincinnati	I
167	Hamilton	SW	NB Shakerdale Road / Montgomery Road	Montgomery	I
168	Hamilton	SW	WB Hanley Road / Sheed Road	Colerain	I
169	Miami	SW	EB SR 55 / SR 589	Casstown	I
170	Miami	SW	WB West Main Street / 4th Street	Tipp City	I
172	Miami	SW	WB US 40 / SR 201	Bethel	I
174	Miami	SW	NB North Main Street / W. Hayes Street (SR571)	West Milton	I
175	Montgomery	SW	EB Leo Street / Webster Street	Dayton	I
176	Montgomery	SW	SB West Wilmington Ave./ Citation Ave.	Walnut Hills	I

Site No.	County	Region	Primary Location	Municipality/ Township	Site Type
177	Preble	SW	NB Commerce Street (SR503) / Dayton Street	Lewisburg	I
179	Ross	SW	EB Kellenberger Road / Orr Road	Green	I
180	Ross	SW	SB Biers Run Road / CR 550	Union Twp.	I
181	Ross	SW	WB SR 372 / US 23	Franklin	I
183	Warren	SW	EB Pleasant Street / Columbus Avenue	Lebanon	I
184	Delaware	C	SB I-71 @ SR 36	Berkshire Twp.	OR
185	Franklin	C	NB I-71 @ Morse Road		OR
186	Franklin	C	EB SR 161 @ New Albany Road		OR
187	Franklin	C	EB SR 161 @ Little Turtle Way		OR
188	Franklin	C	NB I-71 @ Greenlawn Road		OR
189	Franklin	C	SB I-270 @ Roberts Road		OR
190	Franklin	C	WB SR 104 @ Groveport Road		OR
191	Franklin	C	NB SR 315 @ Ackerman Road		OR
192	Geauga	NE	WB US 422 @ SR 44		OR
193	Greene	SW	NB I-675 @ Dayton-Yellow Springs Road		OR
194	Greene	SW	SB I-675 @ North Fairfield Road		OR
195	Hamilton	SW	WB SR 126 @ Galbraith Road (CR 101)		OR
196	Hamilton	SW	SB I-71 @ Edwards		OR
197	Hamilton	SW	EB I-275 @ US 127		OR
198	Hamilton	SW	NB I-75 @ Sharon Road		OR
199	Hamilton	SW	NB I-275 @ US 42		OR
200	Hamilton	SW	NB I-71 @ Mason-Montgomery Road		OR
201	Hancock	NW	SB I-75 @ SR 103		OR
202	Hancock	NW	NB I-75 @ US 224		OR
203	Jefferson	SE	NB SR 7 @ SR 151		OR
204	Lake	NE	WB SR 2 @ E. 305th Street		OR
205	Lake	NE	EB I-90 @ SR 306		OR
206	Lake	NE	EB SR 2 @ SR 306	Mentor	OR
207	Licking	C	WB I-70 @ SR 158	Kirkersville	OR
208	Licking	C	EB SR 16 @ 21st Street	Newark	OR
209	Licking	C	WB SR 16 @ O'Bannon Avenue	Newark	OR
211	Lorain	NE	WB I-90 @ SR 83	Avon	OR
212	Lorain	NE	EB SR 2 @ Oak Point Road		OR
213	Lorain	NE	WB SR 10 @ SR 83		OR
214	Lucas	NW	SB I-75 @ Willy's Parkway		OR
215	Lucas	NW	NB I-280 @ Manhattan Blvd.		OR
216	Lucas	NW	SB I-475 @ Salisbury Road (CR 19)		OR
217	Mahoning	NE	NB SR 11 @ CR 18	Austintown	OR
218	Mahoning	NE	NB I-680 @ Meridian Road		OR
219	Mahoning	NE	NB SR 45 @ Mahoning Avenue	Jackson	OR
220	Marion	C	NB US 23 @ SR 309		OR
221	Medina	NE	NB I-71 @ SR 3	Medina	OR
222	Miami	SW	SB I-75 @ SR 55	Troy	OR
223	Miami	SW	NB I-75 @ US 36	Piqua	OR
224	Montgomery	SW	SB I-75 @ Benchwood Road		OR
225	Montgomery	SW	NB IS75 @ Leo Street	Dayton	OR
226	Montgomery	SW	SB I-675 @ Wilmington Pike		OR
227	Montgomery	SW	EB US 40 @ Peters Pike	Vandalia	OR
228	Montgomery	SW	SB I-75 @ US 40		OR
229	Montgomery	SW	WB I-70 @ SR 48 (Main St)	Englewood	OR

Site No.	County	Region	Primary Location	Municipality/ Township	Site Type
230	Muskingum	SE	WB I-70 @ Underwood Street	Zanesville	OR
231	Richland	NE	EB US 30 @ Wayne Street	Mansfield	OR
232	Scioto	SW	WB US 52 / SR 522		OR
233	Stark	NE	NB SR 21 @ SR 93		OR
234	Stark	NE	WB US 30 & US 62 @ Richville Drive (CR 248)		OR
235	Stark	NE	WB US 62 @ SR 44		OR
236	Summit	NE	EB I-76 & US 224 @ Cleveland-Massillon Road	Norton	OR
237	Summit	NE	NB I-271 @ SR 303	Boston Twp	OR
238	Trumbull	NE	NB North Leavitt Road / West Market	Leavittsburg	OR
239	Trumbull	NE	NB SR 11 @ Tibbetts Wick Road (CR 28)	Liberty	OR
240	Trumbull	NE	NB SR 11 @ SR 305	Bazetta Twp	OR
241	Trumbull	NE	EB I-80 @ SR 193		OR
242	Tuscarawas	SE	NB I-77 @ US 36		OR
243	Warren	SW	SB I-71 @ SR 741		OR
244	Washington	SE	NB I 77 NB @ CR 301(Exit 16)		OR
245	Wayne	NE	NB SR 83 @ SR 3	Wooster	OR
246	Wood	NW	NB I-75 NB @ US 6		OR
247	Wood	NW	NB I-75 @ Eagleville Road (TR 34)		OR
248	Allen	NW	EB US 30 @ Lincoln Highway		OR
249	Allen	NW	SB SR 65 / Lincoln Highway	Cairo	OR
251	Ashtabula	NE	NB SR 11 @ US 20	Ashtabula	OR
252	Ashtabula	NE	SB SR 46 / SR 307	Jefferson	I
253	Athens	SE	NB SR 682 @ Richland Avenue	Athens	OR
254	Auglaize	NW	SB I-75 @ Wapak-Fisher Road	Wapakoneta	OR
255	Belmont	SE	WB I-70 @ SR 331		OR
256	Clark	SW	NB US 68 @ County Line Road		OR
257	Clark	SW	EB I-70 @ SR 54	South Vienna	OR
258	Columbiana	NE	NB SR 11 @ SR 344		OR
259	Columbiana	NE	EB US 30 & SB SR 11 @ E. Liverpool Road	St Clair	OR
260	Crawford	NW	WB US 30 @ SR 4	Bucyrus	OR
261	Cuyahoga	NE	EB I-480 @ SR 94	Cleveland	OR
262	Cuyahoga	NE	SB I-71 @ SR 82	Strongsville	OR
263	Cuyahoga	NE	WB I-480 @ SR 252	North Olmstead	OR
264	Cuyahoga	NE	EB I-90 & SR 2 @ SR 252	Westlake	OR
300	Delaware	C	NB US42 @ SR36	Delaware	OR
301	Licking	C	WB SR 16/37 @ SR661		OR
302	Licking	C	EB I-70 @ SR79	Hebron	OR
303	Franklin	C	WB US62 @ SR161	New Albany	OR
305	Franklin	C	EB SR161 @ Hamilton Road		OR
310	Butler	SW	SB I-75 @ Tylersville Road		OR
311	Butler	SW	NB SR4 @ SR129	Fairfield	OR
312	Hamilton	SW	SB US27 @ SR126		OR
313	Hamilton	SW	WB I-275 @ SR4		OR
314	Greene	SW	NB I-71 @ SR 72		OR
322	Portage	NE	NB SR44 @ Ohio Turnpike		OR
323	Summit	NE	NB SR59 @ Main Street	Akron	OR

APPENDIX B: SITE DESCRIPTION FORM[12]

Statewide Safety Belt Survey – Site Description Form – 2008

Site No: _____ **Site Location:** _____

Observer Name: _____

Date: _____ **County:** _____ **City:** _____

Day of Week: ○ Monday ○ Tuesday ○ Wednesday ○ Thursday ○ Friday ○ Saturday ○ Sunday

Start Time: _____ **(military)**

End Time: _____ **(military)**

Interruptions: _____ **(total number of minutes)**

Weather:
- ○ Sunny/Mostly Sunny
- ○ Cloudy/Mostly Cloudy
- ○ Light Rain
- ○ Heavy Rain
- ○ Snow
- ○ Other _____

Visibility:
- ○ Poor
- ○ Satisfactory
- ○ Excellent

Site:
- ○ Primary
- ○ Alternate
- ○ Other _____

Site Type:
- ○ Intersection
- ○ Freeway Ramp

Draw diagram of site and indicate location and lane observed in the space below.

Total number of lanes at site in direction being observed
○1 ○2 ○3 ○4 ○5 ○6 ○7 ○8

Description of Observation Location:

_____

_____

_____

_____

_____

First Traffic Count (5 min):_____

Second Traffic Count (5 min): _____

Observer Comments:

_____

_____

_____

_____

[12] Electronic versions of Site Description and Data Collection forms were used in PDAs.

Appendix C: Data Collection Form

Statewide Safety Belt Survey - Data Collection Form - 2008

Note: Observe ONLY non-commercial vehicles.
Remember, when marking items on a list, please fill-in the boxes like this: ☒ or ■ or ☑ Please keep your marks INSIDE the boxes.

Site Number: ☐

Vehicle Type
- ☐ *Passenger Car*
- ☐ *Van / Minivan*
- ☐ *SUV*
- ☐ *Pickup Truck*

DRIVER

Restraint Use
- ☐ *Belted*
- ☐ *Unbelted*

Gender
- ☐ *Male*
- ☐ *Female*

Age
- ☐ *15 - 25*
- ☐ *26 - 64*
- ☐ *65 +*

Race
- ☐ *Caucasian*
- ☐ *African American*
- ☐ *Other*

FRONT RIGHT PASSENGER

Restraint Use
- ☐ *Belted*
- ☐ *Unbelted*
- ☐ *Child (under age 4, under 40 lbs) in Safety Seat*
- ☐ *Child (under age 4, under 40 lbs), Belted*
- ☐ *Child (under age 4, under 40 lbs), Unrestrained*

Gender
- ☐ *Male*
- ☐ *Female*

Age
- ☐ *0-4*
- ☐ *5-14*
- ☐ *15 - 25*
- ☐ *26 - 64*
- ☐ *65 +*

Race
- ☐ *Caucasian*
- ☐ *African American*
- ☐ *Other*