

NEW YORK STATE

2011 Observational Survey of Seat Belt Use



**New York State Governor's Traffic Safety Committee
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2011 OBSERVATIONAL SURVEY OF SEAT BELT USE

INTRODUCTION

New York State's seat belt law was implemented on December 1, 1984, with full enforcement beginning January 1, 1985. New York's 1984 law covers all front seat occupants and children under age ten in the back seat. Effective November 28, 2000, the law was amended to require the use of safety belts by back seat passengers under 16 years of age. In November 2009, New York strengthened the state's child restraint laws by requiring children to remain in an appropriate child restraint system until they reach the age of eight. All children under the age of four must be restrained in federally-approved child seats that are securely affixed to the vehicle; children under four must also be restrained on school buses. Children ages four to seven in any seating position of a motor vehicle are required to be restrained in a child restraint system appropriate for their height and weight. Booster seats are recommended when a child weighs more than 40 pounds and is over 40 inches in height. The GTSC's child passenger safety program promotes keeping all children in child restraints, regardless of age, until they are 4'9" tall and weigh 100 pounds or more.

Primary enforcement is allowed under New York's law and a fine of up to \$50.00 is imposed for violations of the law pertaining to occupants age 16 and over. A fine of not less than \$25.00 nor more than \$100.00 is assessed for violations involving occupants under age 16. The only vehicles excluded from coverage under the law are emergency vehicles, taxis and liveries, and buses, with the exception of the driver. Rural mail carriers in the process of delivering the mail are also excluded.

Since 1984, New York State has conducted periodic statewide observational surveys of seat belt use. With few exceptions, the statewide use rate has risen steadily each year from a pre-law usage rate of 16% to 90% in 2010. Based on this year's survey conducted June 6-23, 2011, New York's seat belt compliance rate increased again to 91%.

The 2011 survey replicated the observational surveys conducted annually in New York State since 1998. The two-stage probability-based sampling design used to conduct these surveys is described below.

SYNOPSIS OF SAMPLING PLAN

STAGE 1: SELECTION OF COUNTIES

New York's survey design calls for the designation of counties as the primary sampling units with all 62 counties (100% of the population) in New York State eligible for inclusion in the survey sample. The first step in the sampling plan was the stratification of the state into ten regions based on geographic proximity, with each region containing approximately equal numbers of counties, i.e., eight regions with six counties and two regions with seven counties.

A total of 20 counties were selected for inclusion in the sample in the following manner. In order to ensure representation of the major population centers in the state, the most populous county in each of the ten regions was selected with certainty for inclusion in the sample. The remaining ten counties, one

from each region, were selected with probabilities equal to each county's proportion of the population in the remaining counties for that region. The 20 counties selected for inclusion in the survey are listed below:

<u>Region</u>	<u>Counties</u>	<u>Population</u>
1	Kings	2,504,700
	Nassau	1,339,532
2	Westchester	949,113
	Orange	372,813
3	Sullivan	77,547
	Columbia	63,096
4	Albany	304,204
	Saratoga	219,607
5	Clinton	82,128
	Warren	65,707
6	Oneida	234,878
	Herkimer	64,519
7	Onondaga	467,026
	Broome	200,600
8	Steuben	98,990
	Chemung	88,830
9	Monroe	744,344
	Ontario	107,931
10	Erie	919,040
	Niagara	216,469

STAGE 2: SELECTION OF ROADWAY SEGMENTS

The second stage of the sampling plan was the selection of roadway segments where the observation sites would be located. Taking into account both the precision of the estimate and the survey costs associated with the sample size, it was determined that the survey should include a total of 200 sites.

Stratification of Roads

Two strata of roads were identified: major roads and local roads. The statewide distribution of vehicle miles traveled (VMT) by roadway type was 50.3% on major roads and 49.7% on local roads; county VMT data were not available. Based on the statewide distribution of VMT between the two road strata, equal numbers of major roads and local roads were selected from each county in the following manner. First, the major roads in each county were identified and a listing of the roadway segments was compiled.

Because of the very large number of local roads in a county it was impractical to list them in the same manner. Therefore, an additional step was added to the selection process. For each county, two census tracts were selected with equal probabilities of selection from a listing of all census tracts in the county. Using maps of the selected census tracts, lists of the local road segments within each selected tract were compiled.

In constructing the lists of major road segments, a roadway segment was identified as the point where the roadway intersects with another roadway; for controlled access highways, the exits denoted the segments. The local roads identified from the census tract maps included “through” streets; only major cross streets or roads were used to designate segments of these roads. Strictly residential streets, dead ends, or rural roads that did not connect to other more major streets or roads were excluded from the listing.

For each county, a simple random sample of five sites was selected from the listing of major roadway segments. The five local roadway segments for the county were selected as follows: a simple random sample of three sites was selected from the census tract selected first and a simple random sample of two sites was selected from the second selected census tract in the county. The direction of traffic to be observed at each site was randomly assigned.

SURVEY PROCEDURES

OBSERVATION PERIODS AND ASSIGNMENT OF DAYS AND TIMES

Observations were conducted for exactly 40 minutes at each site. All observations were conducted during daylight hours and were scheduled across all days of the week. The assignment of days and times was random; however, to minimize the amount of travel between sites, sites in close proximity were randomly assigned to times within the same morning or afternoon schedule.

POPULATION OF INTEREST

The population observed in the survey of seat belt use consisted of drivers and outboard front seat occupants in the following vehicles: passenger cars, minivans, vans, sport utility vehicles, and pickup trucks.

DATA COLLECTION METHOD

Hand-held counters were used to record observations of shoulder belt use and observations of non-use. New York State has used this method of data collection since 1984 because it allows for seat belt observations in moving traffic. The observers held a counter in each hand, using one to count front seat occupants wearing shoulder belts and the other to count front seat occupants not wearing shoulder belts. At the end of the observation period, the totals from the counters were entered on a paper form along with other information related to the site and observation period. A copy of this summary data collection form appears in Appendix A.

TRAINING OF OBSERVERS

The training program for the observers included both classroom instruction in the data collection procedures and actual field practice to demonstrate a thorough understanding of the procedures and accuracy in conducting observations. The field training included practice in following the maps and instructions to locate an observation site and determine an appropriate observation point, and in conducting and recording accurate observations at a variety of types of sites. During the field training, reliability checks were conducted to ensure that all designated vehicles and occupants were being observed, that an accurate determination of seat belt use was being made, and that the data collection form was being completed properly.

DATA COLLECTION PROCEDURES

Each observer was given a list of his or her assigned sites, maps with site numbers indicated, and a schedule which indicated the date and time for conducting observations at each site. The direction of traffic to be observed at each site was also provided. The observers were instructed to observe traffic on only the assigned roadway. For example, if the site was listed as Main Street (northbound) at Elm Avenue, only the traffic traveling north on Main Street was to be observed.

The observers were instructed on selecting an appropriate location for conducting the observations and on the procedures to follow if the designated observation point was found to be inaccessible or unsafe. Since the sites are roadway segments and are not limited to intersections, observations can be conducted anywhere on the designated segment as long as the same traffic is observed.

For sites on multi-lane highways, observations were limited to traffic in the outside lane at each site. However, the observers were instructed to record the total number of lanes of traffic traveling in the direction observed. In a few instances the traffic volume was too heavy to allow observation of every eligible vehicle. In these cases, the observer was instructed to determine what pattern of observation was feasible, e.g., every other vehicle, every third vehicle. Once this pattern was established, it was followed for the entire observation period regardless of any decrease in the traffic volume. The observer indicated the observation pattern on the data collection form.

Observations were not conducted during periods of heavy rain or thunderstorms. In the event that an observation period was missed due to inclement weather or another reason, the site was rescheduled for a comparable period, i.e., weekday versus week-end day; rush hour versus non-rush hour.

SEAT BELT USAGE RATE ESTIMATE

The results of the June 2011 survey indicate a statewide seat belt use rate of 90.54%, with a relative standard error of 1.63%. The standard error of the estimate is 1.48% and the lower and upper limits of the use rate are 87.58% and 93.49%, at the 95% confidence interval. The estimate was based on observations made at 200 sites within 10 predefined regions of the state. The data used to derive the estimate are provided in Appendix B.

NYS SEAT BELT USAGE RATE ESTIMATE June 2011

Usage Rate %	Relative Standard Error %	Standard Error %	95% Confidence Interval	
			% Lower	% Higher
90.54	1.63	1.48	87.58	93.49

CALCULATION OF SEAT BELT USAGE RATE

For each site, the number of front seat vehicle occupants observed wearing seat belts and the number not wearing seat belts were counted. In the small number of cases where every other vehicle or every third vehicle was observed, the counts were doubled or tripled as appropriate. For multi-lane roads, the observed counts were multiplied by the number of lanes of traffic traveling in one direction.

Within a county, the estimate of safety belt use on major roadways was obtained by directly combining the counts for the five major roadway sites, since these sites were selected as a simple random sample. Likewise, within a census tract, the estimate of use on local roads was obtained by simply combining the observed counts of users and total occupants. Further, since the census tracts were randomly selected, county-level estimates of usage rates for local roads were obtained by directly combining the observed counts. Since county VMT data by road strata were not available, to obtain a county usage rate per VMT, the state VMT estimates for major roads (49.7%) and local roads (50.3%) were used as weights for all counties. The county estimates of belt use (weighted by roadway type) were then calculated as:

$$P_j = \frac{\sum_{i=1}^2 \frac{n_{ij} * Total_j * w_i}{Total_{ij}}}{Total_j} \quad (1)$$

where, i denotes the roadway type (1 = Major; 2 = Local)
 j denotes the county ($j = 1, 2, \dots, 20$)
 k denotes the region ($k = 1, 2, \dots, 10$)
 w_i is the weight for roadway type i
 w_{pj} is the weight for passenger vehicles in county j
 n_{ij} is the total number of occupants observed wearing seat belts in county j at sites of roadway type i
 $Total_{ij}$ is the total number of persons observed in county j at sites of roadway type i
 $Total_j$ is the total number of persons observed in county j
 $Total_k$ is the total number of persons observed in region k

[Note that n_{ij} , $Total_{ij}$, $Total_j$, and $Total_k$ were all based on the counts obtained after multiplying the number observed by the number of lanes.]

Since county VMT data were not available, registered passenger vehicles was the surrogate selected for VMT. Registered passenger vehicles include vans, sport utility vehicles, and pickup trucks. The ten regional estimates of belt use rates were obtained by weighting the usage rate of the certainty county by the number of registered vehicles in that county and the usage rate of the probability-selected county by the number of vehicles registered in all of the remaining counties for that region. The regional estimates of belt use (weighted by registered passenger vehicles) were calculated as:

$$\begin{aligned}
 P_{k=1} &= \sum_{j=1}^2 (P_j * wP_j) \\
 P_{k=2} &= \sum_{j=3}^4 (P_j * wP_j) \\
 &\vdots \\
 P_{k=10} &= \sum_{j=19}^{20} (P_j * wP_j)
 \end{aligned}
 \tag{2}$$

The ten regional estimates were then combined directly, i.e., combining the weight-estimated numerators and dividing by the statewide count of observed occupants. No further weighting of the regional estimates was desired since the total counts are assumed to be proportional to the VMT within the region.

Statewide estimate of seat belt use:

$$P = \frac{\sum_{k=1}^{10} (P_k * Total_k)}{\sum_{k=1}^{10} Total_k}
 \tag{3}$$

ESTIMATE OF VARIANCE

The jackknife method was used to estimate the variance of P. For this method, 10 estimates of the usage rate, P_k , $k = 1, \dots, 10$ were calculated by excluding the regions one at a time and calculating the rate as in equations (1), (2) and (3). The variance of P was then calculated as:

$$V(P) = \frac{9}{10} \sum_{i=1}^{10} (P_i - P)^2$$

The relative standard error of the estimate was calculated as:

$$S_r = \frac{[V(P)]^{1/2}}{P}$$

**Data Collection Form
New York State Safety Belt Survey**

INSTITUTE FOR TRAFFIC SAFETY MANAGEMENT AND RESEARCH

518-453-0291

OBSERVER: _____

DATE: _____

County Number	Site Number	Day of Week	Start Time	Number of Lanes (one direction)	Ratio of Vehicles Observed	Number of Persons Belted	Number of Persons Non-Belted

APPENDIX A

The ratio of vehicles that you observe must be kept constant, i.e. every other or every third or fourth vehicle if the traffic flow is fast or heavy. Also remember that you are observing vehicles only in the lane (not a turning lane) closest to you, and then indicating the number of lanes.

TIME PERIODS

- 8:00-8:40 =1
- 9:00-9:40 =2
- 10:00-10:40 =3
- 11:00-11:40 =4
- 12:00-12:40 =5
- 1:00-1:40 =6
- 2:00-2:40 =7
- 3:00-3:40 =8
- 4:00-4:40 =9

**NEW YORK STATE SEAT BELT SURVEY
JUNE 2011**

COUNTY	WEIGHTED BY VMT			COUNTY USAGE	PASS VEHICLE	REGIONAL USAGE	REGIONAL BELTED	REGIONAL TOTAL	STATE USAGE
	BELTED	NONBLTD	TOTAL	RATE	WEIGHT	RATE	USERS	OBSERVED	RATE
01	KINGS	4736	1105	5841	0.8108	0.1061	0.8263	8902	10774
02	NASSAU	4085	848	4933	0.8281	0.8939			
03	WESTCHESTER	3149	687	3836	0.8209	0.4013	0.8061	6982	8662
04	ORANGE	3842	984	4826	0.7961	0.5987			
05	SULLIVAN	2124	580	2704	0.7855	0.1554	0.9098	5123	5631
06	COLUMBIA	2730	197	2927	0.9327	0.8446			
07	ALBANY	6527	344	6871	0.9499	0.3121	0.9436	12075	12796
08	SARATOGA	5574	351	5925	0.9408	0.6879			
09	CLINTON	5878	243	6121	0.9603	0.2620	0.9403	12291	13071
10	WARREN	6486	464	6950	0.9332	0.7380			
11	ONEIDA	7618	474	8092	0.9414	0.3783	0.9441	12389	13123
12	HERKIMER	4758	273	5031	0.9457	0.6217			
13	ONONDAGA	12885	571	13456	0.9576	0.4956	0.9068	17783	19611
14	BROOME	5274	881	6155	0.8569	0.5044			
15	STEUBEN	2350	284	2634	0.8922	0.2868	0.8582	7282	8486
16	CHEMUNG	4942	910	5852	0.8445	0.7132			
17	MONROE	16227	882	17109	0.9484	0.6542	0.9460	21732	22973
18	ONTARIO	5520	344	5864	0.9413	0.3458			
19	ERIE	7101	977	8078	0.8791	0.6286	0.8849	14281	16138
20	NIAGARA	7213	847	8060	0.8949	0.3714			
STATE TOTAL	119,019	12,246	131,265				118,841	131,265	90.54%

APPENDIX B