

2012 ANNUAL DIRECT OBSERVATION SURVEY OF SAFETY BELT USE



Prepared for:
Office of Highway Safety Planning
333 South Grand Avenue
Lansing, MI

Prepared by:
Wayne State University
Transportation Research Group
Detroit, MI

Date: December 2012



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16. Abstract This report documents the results of the 2012 Annual Direct Observation Survey of safety belt use. Safety belt use by drivers and front seat passengers was monitored at a total of 191 intersection/interchange sites during September of 2012. In addition to belt use, data were collected for vehicle type and use, as well as the gender, age and race of each observed occupant. The results of this survey show that the safety belt usage rate in the State of Michigan is 93.6 percent. Males and pick-up truck drivers continue to trail in the use of safety belts.			
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1.0 INTRODUCTION

Increasing the use of safety restraint systems among motor vehicle occupants is one of the most effective means of reducing injuries and fatalities on the nation's highways. Efforts have been made to increase the use of safety belts over three decades, yet according to the 2011 nationwide safety belt surveys, approximately 16 percent of drivers and front-seat passengers continue to travel unrestrained [1]. The national safety belt use rate of 84% is statistically unchanged from the use rate of 85% observed in 2010 [1]. In Michigan, past statewide safety belt use studies indicate that the overall use by drivers and front-seat passengers has generally increased from 2004 to 2009, and then decreased in 2010 and 2011. The past eight years' statewide safety restraint use experience is as follows:

2004	-	90.5%
2005	-	92.9%
2006	-	94.3%
2007	-	93.7%
2008	-	97.2%
2009	-	97.9%
2010	-	95.2%
2011	-	94.5%

The above data indicate that the safety belt use rate in Michigan is ahead of the national average and Michigan is one of twenty states and territories with reported safety belt use rates greater than 90 percent [2]. It is important to recognize that Michigan is a "primary law" state, which means a motorist can be stopped and cited for the sole reason of not wearing a safety belt while driving or riding as a front-seat passenger. In "secondary law" states, motorists must be stopped for another traffic-related offense in order to be ticketed for not wearing a safety belt. The "primary law" states averaged a safety belt use rate of 87 percent as compared to the "secondary law" states, which only averaged 76 percent in 2011 [1].

The use of safety belts is the single most effective means of reducing fatal and non-fatal injuries in vehicular crashes. In 2011, 21,253 passenger vehicle occupants were killed in traffic crashes

in the USA [3]. Among these fatalities, approximately 52 percent of the occupants were unrestrained [3]. The National Highway Traffic Safety Administration (NHTSA) estimates that an 80 percent safety belt use rate saves more than 15,000 lives per year and an overall societal cost of 50 billion dollars in the country each year [4]. NHTSA estimated that 12,546 lives were saved in 2010 due to the use of safety belts [5] among passenger vehicle occupants over age 4.

Currently, airbag systems are a part of standard equipment in all vehicles. Vehicles equipped with airbags need the occupants to be restrained by safety belts in order to be effective in saving lives and reducing injuries in the event of a severe crash. Safety belts protect vehicle occupants in the following ways:

- Reduces the chance of being in contact with the interior of the vehicle,
- Prevents the occupants from ejection, and
- Prevents occupants from being too close to the deployed airbags, thus avoiding severe injuries from the airbags, ejection from the vehicle and vehicle interior contacts.

Past research indicates that the use of safety belts reduces the risk of fatal injury for the driver and front seat passengers by approximately 45 percent for passenger vehicles and 60 percent for light trucks. Moreover, the use of safety belts reduces the risk of moderate to critical injury by 50 percent for occupants of passenger vehicles and 65 percent for the occupants of light trucks [5]. Therefore, a small increase in safety belt use often results in a large overall savings to society.

The non-use of safety belts is a behavioral issue; therefore programs aimed at changing driver behavior related to the use of safety belts often leave a long lasting impact on the affected drivers and front seat passengers. Various safety belt use improvement programs are often targeted to specific areas within a state. Knowing the areas within a state that have lower safety belt use rates may assist the program coordinators in the Office of Highway Safety Planning (OHSP) to allocate enforcement funding to specific areas, which may result in higher rates of safety belt use. There are, of course, statewide initiatives which are expected to impact the entire state.

The safety belt use data can be used for the following:

- To fulfill reporting requirements to NHTSA.
- To allocate statewide safety funding to specific program areas.
- To provide targeted funding to specific areas within the state where use rates are lower than the statewide average.
- To provide targeted programs for certain segments of the population.

1.1 Study Purpose and Objectives

The purpose of this study was to perform an annual observational survey at 191 intersections and interchanges to determine the percentage of drivers and front-seat passengers utilizing their safety belts.

The specific objectives of this study were as follows:

- Finalize the methodology for collecting data for a representative sample of sites throughout the State, which ensured reliable statewide statistics, in an economically feasible manner.
- Provide training to all staff conducting the observation surveys and conduct quality assurance/quality control (QA/QC) of the data collection efforts.
- Conduct the annual observational surveys of safety belt use for two weeks following the Labor Day holiday.
- Summarize and cross-tabulate the observational data in a spreadsheet format indicating overall safety belt use, safety belt use by strata, safety belt use by time of day and day of week, and safety belt use by various demographic characteristics.
- Continue to track changes in safety belt use and generate necessary comparative data and statistical analyses to assess the relevancy of the 2012 data and results to previous observational results.

1.2 Study Area

The study area for the statewide observational survey included counties that represent at least 85 percent of the population in the State of Michigan.

2.0 METHODOLOGY

In order to develop targeted policies and programs to increase safety belt use, it is necessary to determine the distribution of safety belt use rates in various parts of the state and among various demographic groups. Furthermore, the statewide use rate must be determined by following a sampling strategy and data collection procedure that will result in data that are representative of the statewide population as required by NHTSA.

The site selection methodology for this study followed the general procedures used in the Direct Observation of Safety Belt Use in Michigan surveys from 2005 to 2011. Those studies were based upon the uniform criteria as presented in the Federal Register and the National Highway Traffic Safety Administration documents. The areas selected for the 2012 observation surveys included 32 counties in the State of Michigan which represented 86.9 percent of the state's population based upon 2011 U.S. Bureau of Census Data estimates as shown in Table 1. The geographic locations of the counties included in the sampling frame are depicted in Figure 1.

These counties were partitioned into four strata based upon historical safety belt use rates and vehicle miles of travel (VMT). Counties with similar belt use rates were aggregated into strata while attempting to balance the VMT between each stratum. Wayne County was retained as a separate stratum given its disproportionate VMT in comparison to other counties. The number of observation sites within each stratum was determined proportionally based on VMT. Table 2 provides details of county and stratum-level VMT, as well as the number of observation sites in each stratum. Forty-eight (48) sites were observed for Stratum 1, 53 sites for Stratum 2, 53 sites for Stratum 3, and 37 sites for Stratum 4. The use of 191 sites allows for a precise estimate of safety belt use. A complete listing of the 191 sites is provided in Appendix I.

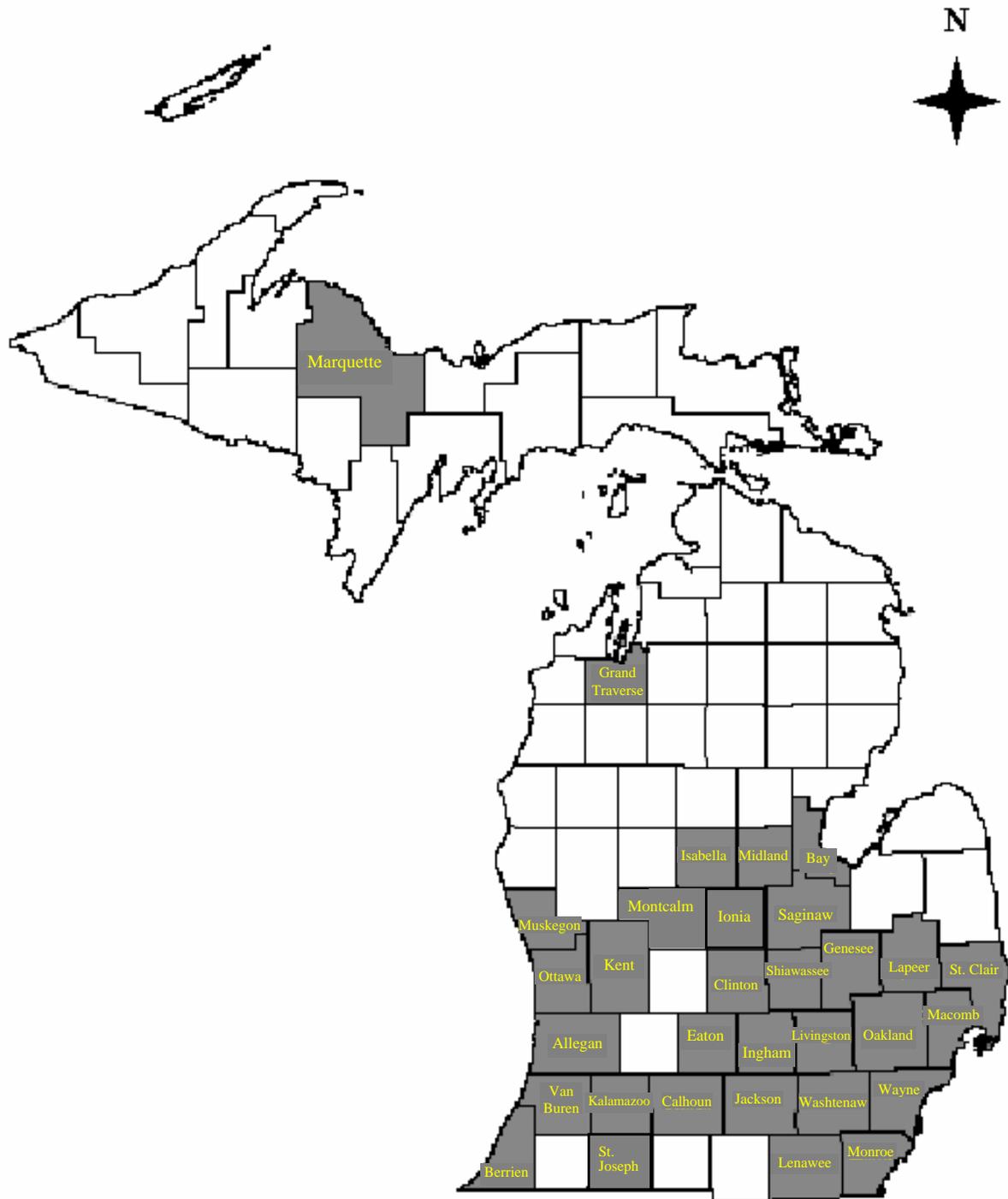


Figure 1. 32-County Statewide Sample for the Direct Observation Safety Belt Surveys

Table 1. Population Data for the Selected Counties in Michigan
[Source: U.S. Census Bureau 2011 Estimates]

Name of County	Population	Percent of Statewide Population	Cumulative Percentage of Statewide Population	County Ranking by Population
Wayne County	1,802,096	18.25%	18.25%	1
Oakland County	1,210,145	12.25%	30.50%	2
Macomb County	842,145	8.53%	39.03%	3
Kent County	608,453	6.16%	45.19%	4
Genesee County	422,080	4.27%	49.46%	5
Washtenaw County	347,962	3.52%	52.98%	6
Ingham County	281,613	2.85%	55.84%	7
Ottawa County	266,300	2.70%	58.53%	8
Kalamazoo County	252,074	2.55%	61.08%	9
Saginaw County	199,088	2.02%	63.10%	10
Livingston County	181,722	1.84%	64.94%	11
Muskegon County	171,302	1.73%	66.68%	12
St Clair County	161,642	1.64%	68.31%	13
Jackson County	159,748	1.62%	69.93%	14
Berrien County	156,941	1.59%	71.52%	15
Monroe County	151,560	1.53%	73.05%	16
Calhoun County	135,490	1.37%	74.43%	17
Allegan County	111,234	1.13%	75.55%	18
Eaton County	108,056	1.09%	76.65%	19
Bay County	107,110	1.08%	77.73%	20
Lenawee County	99,440	1.01%	78.74%	21
Grand Traverse County	88,349	0.89%	79.63%	22
Lapeer County	88,082	0.89%	80.52%	23
Midland County	84,063	0.85%	81.37%	24
Van Buren County	76,131	0.77%	82.15%	25
Clinton County	75,469	0.76%	82.91%	26
Isabella County	70,622	0.72%	83.62%	27
Shiawassee County	69,841	0.71%	84.33%	28
Marquette County	67,694	0.69%	85.02%	29
Ionia County	63,979	0.65%	85.66%	30
Montcalm County	63,185	0.64%	86.30%	31
St Joseph County	61,136	0.62%	86.92%	32
State of Michigan Total	9,876,187			

Table 2. 2011 Vehicle Miles of Travel by Stratum
[Source: Michigan Department of Transportation]

Stratum and County	VMT (2011) (in Thousands)	Stratum VMT (in Thousands)	Percent of Total Strata VMT	Number of Sites
Stratum 1				
Ingham	2,068,200	20,531,961	25.24%	48
Kalamazoo	2,409,510			
Oakland	12,331,819			
Washtenaw	3,722,432			
Total Stratum 1 VMT				
Stratum 2				
Bay	1,259,849	22,516,801	27.68%	53
Eaton	1,175,013			
Gd Traverse	839,375			
Jackson	1,566,039			
Kent	5,755,429			
Macomb	6,323,855			
Midland	793,392			
Monroe	1,857,158			
Ottawa	2,016,164			
Van Buren	930,526			
Total Stratum 2 VMT				
Stratum 3				
Allegan	1,267,572	22,680,541	27.88%	53
Berrien	1,923,016			
Calhoun	1,595,161			
Clinton	1,064,829			
Genesee	4,090,373			
Ionia	695,611			
Isabella	634,847			
Lapeer	888,846			
Lenawee	880,831			
Livingston	2,149,895			
Marquette	566,584			
Montcalm	562,968			
Muskegon	1,570,279			
Saginaw	2,021,755			
Shiawasee	739,937			
St Clair	1,500,987			
St Joseph	527,050			
Total Stratum 3 VMT				
Stratum 4				
Wayne	15,623,729	15,623,729	19.20%	37
Total Stratum 4 VMT				
Total Strata VMT				
		81,353,031	100%	191

The locations of the 191 observation sites were randomly selected from candidate intersections and limited access highway interchanges. The sites were randomly chosen using a method that ensured an equal probability for each location in each stratum being selected as a candidate study location. For the selection of the candidate locations, large scale (3/8 inch = 1 mile) road maps were obtained for each county. A computerized grid was overlaid on each county map at 0.5-mile intervals in the horizontal and vertical directions of the map. These squares represented a square area of 0.25 square miles. For the selection of the intersections, each grid on the county map was assigned two numbers representing an X and Y coordinate and was also assigned a number by stratum. For each stratum, a random number was chosen between one and the number of grids covering the stratum. Then two additional random numbers were selected representing the X and Y coordinates of the selected grid. Random coordinates were chosen until an intersection was found located at the grid coordinates. This process was repeated until the required number of intersection observation sites were selected for all four strata. In addition, alternative secondary intersections were also selected for each primary intersection. Secondary intersections were selected within a 16 square mile area from the primary intersection location. For the selection of observation sites along limited access highways, exit ramps were selected. This was done by sequentially numbering all the exit ramps on limited access highways located within each stratum. Random numbers were then selected between one and the number of ramps to determine which exit ramps would be considered as candidate observation locations. An alternate exit ramp was also selected for each candidate observation location.

Upon the selection of the sites, the direction of traffic flow, day of the week and time of day at each observation location was determined through a similar random sampling method ensuring equal probability. For each intersection, the direction of traffic flow for observation was also randomly selected. Random numbers between one and four were assigned for each primary and secondary intersection's direction of traffic movement. The selected random numbers represented "1" for eastbound, "2" for southbound, "3" for westbound and "4" for northbound. This process allowed a random selection of the direction of traffic flow as well as the roadway for inclusion in the observation study. In order to minimize the travel time and distance required

to conduct this study, the observation sites were clustered into geographic regions upon final selection without compromising the randomness of the data.

3.0 OBSERVATIONAL STUDY DATA COLLECTION

For each selected observation site, vehicles were observed for exactly 50 minutes. These observations were appropriately weighted, as explained in the Data Analysis Section of this report. The data collected for the 191 observation sites provided a representative sample for each day of the week and each hour of the day for the safety belt use characteristics of the state.

Only stopped vehicles were observed at each site, due to the difficulty of accurately observing the safety belt use data while the target vehicle is moving. These vehicles were observed at stop-controlled and signalized intersections. Since it is often not possible to accurately observe all vehicles passing the observation site while collecting the safety belt use data, a 10-minute traffic count of all vehicles passing the observation point was the basis for estimating the total number of vehicles passing the observation site per unit of time. This data introduced a weighting factor for each observation site. The 10-minute count was collected in two 5-minute intervals; five minutes prior to the safety belt use observational period and five minutes following the observational period.

The driver of each vehicle and the passenger in the front right seat of the vehicle were observed for safety belt use, non-use and misuse. The driver and passenger belt observation categories included 'belted correctly', 'not belted correctly', and 'unknown belt use'. The 'unknown belt use' category was marked if an observer was unable to determine an occupant's belt use. These observations are not included in the final sample but a record was kept to calculate the non-response rate which is discussed in the data analysis section of this report. In the surveys, both the driver and front-seat passenger were separately identified based upon their gender, estimated age and race. The driver age categories included 16-29, 30-59, and 60 and over. The passenger age categories included 0-15, 16-29, 30-59, and 60 and over. The driver and passenger races were categorized as Caucasian, African American, Asian or Pacific Islander, Hispanic, and Native American. The vehicles were categorized into four groups: Passenger Cars, Sport Utility

Vehicles, Vans or Minivans, and Pick-up Trucks. The vehicles were also identified as being Commercial or Non-commercial vehicles.

Observations were manually recorded in the field on survey forms and returned back to the office within 24 hours of the data collection. The data were then entered electronically into spreadsheets by office staff.

4.0 OBSERVER TRAINING

Members of the WSU-TRG staff participated in data collection for this project. Each of these staff members has received or is pursuing an engineering degree and has been trained in general traffic data collection methods and procedures. For this project, each data collector received specific training composed of a day-long workshop, technical assistance, and multiple days of field data collection exercises.

The reliability and repeatability studies were performed at various intersections near the Wayne State University campus, as well as additional locations in southeastern Michigan. These intersections represented various site characteristics that could be challenging for observational data collection. Over a period of several weeks, observers were randomly divided into groups and assigned to collect safety belt observational data independently.

The data was then summarized and compared among the observers in each group to determine the accuracy of their observations. Upon completion of the training for the data collection, each member of the data collection team received a training manual composed of the information received during the training session, the schedule of data collection and all necessary field supplies. Two field supervisors monitored the performance of the field observers. The field data collectors submitted their observational data on a daily basis and it was immediately entered and compiled on computer spreadsheets at the WSU campus office.

5.0 QUALITY CONTROL

The policies and procedures utilized during the conduct of each wave of direct observation surveys of safety belt use are based upon the *Uniform Criteria for State Observational Surveys of Seat Belt Use* from Title 23, Part 1240.12 of the Code of Federal Regulations. The study design for the Annual Survey is consistent with these criteria, which establish that observations should be conducted on specific dates and times and in particular directions of travel, all of which are determined randomly in advance of the studies. Further, the criteria state that policies should be in place in the event that observations cannot be made due to unanticipated events, such as road construction. In such situations, data collectors are instructed to observe at a pre-assigned alternate location. Policies must also be established for the case where traffic flow is too heavy to observe all vehicles or traffic is moving too quickly for observation. In most instances, high traffic volumes prohibit data collectors from observing all vehicles. Consequently, data collectors are instructed to observe as many vehicles as is feasible for observation under such conditions for the required time period of 50 minutes.

During the full-scale data collection activities, independent auditors were sent out to the field to covertly observe the data collectors. These field audits were conducted to ensure compliance with the data collection procedures. No major violations of policies or procedure were observed as a part of these audits. The random checks were conducted at least twice for each observer and at 5% of all observational sites.

6.0 DATA ANALYSIS

The data collected in the field were entered into a spreadsheet by the observer at the conclusion of the data collection activities for each day and verified for accuracy. Rates for safety belt use were determined for each survey stratum, county, location, etc., as well as the statewide average. A 95-percent confidence interval for the estimate of safety belt use was determined according to the NHTSA guidelines.

6.1 Weighted Safety Belt Use Calculations

A weighting procedure was performed when determining the belt use rates as described in the following sample calculations. The number of vehicles observed during the 10-minute volume count was multiplied by 5 to estimate the total number of vehicles that passed the observation location during a standard 50-minute survey period. The total number of vehicles available for observation was then divided by the number of vehicles that were actually observed. The resulting calculation produced the volume weighting factor for that particular site. The total number of drivers and passengers belted and not belted were then multiplied by the weighting factor to obtain the total number of weighted drivers and passengers that were belted and not belted. The weighted overall safety belt use rate by stratum was then determined by dividing the total (weighted) number of belted drivers and passengers by the total (weighted) number of drivers and passengers. The following calculations further describe the procedure outlined above.

Kalamazoo County, Sprinkle and Centre,

Survey length = 50 minutes

Number of vehicles observed in 50 minutes = 27 vehicles

10-minute volume count = 10 vehicles

Total number of vehicles available for observation = 10-minute vehicle count x 5 =

10 vehicles x 5 intervals = 50 vehicles in 50 minutes

$$\text{Intersection volume weighting factor} = \frac{\text{Total Number of Vehicles}}{\text{Observed Number of Vehicles}} = \frac{50}{27} = 1.85$$

The variance for each stratum was determined by following Cochran's techniques [6] using the following equation:

$$Variance_j = \frac{n_j}{n_j - 1} \sum_{i=1}^{n_i} \left[\left(\frac{g_{ij}}{\sum_{i=1}^{n_i} g_{ij}} \right)^2 (r_{ij} - r_j)^2 \right]$$

Where,

n_j = number of observation locations stratum j

g_{ij} = number of observations at location i in stratum j

r_i = safety belt use rate for location i in stratum j

r_j = overall safety belt use rate for stratum j

6.2 Overall Statewide Safety Belt Use Calculations

The weighted safety belt use rate was calculated by summing up the strata safety belt use rates, each multiplied by a vehicle miles of travel weighting factor for that stratum, divided by the sum of the vehicle miles of travel weighting factor. The 2011 vehicle miles of travel from the Michigan Department of Transportation, as shown previously in Table 2, were used for these calculations. The four vehicle miles of travel totals were compared and Stratum 3 had the highest total, 22,680,541,000, and was assigned a weight factor of 1.0. The other three strata's weight factors were determined by dividing the vehicle miles of travel for that stratum by Stratum 3's vehicle miles of travel. Stratum 1 was assigned a weight factor equal to 0.905 (20,531,961,000 divided by 22,680,541,000). Stratum 2 was assigned a weight factor equal to 0.993 (22,516,801,000 divided by 22,680,541,000). Stratum 4 was assigned a weight factor equal to 0.689 (15,623,729,000 divided by 22,680,541,000). The sum of the weight factors for all four strata equaled 3.587.

The overall statewide variance was calculated using the following formula:

$$Variance_{TOTAL} = \frac{\sum_{\forall j} (w_j^2 Var_j)}{(\sum_{\forall j} w_j)^2}$$

Where, w_j = VMT weight factor for stratum j .

The 95 percent confidence interval is equal to the weighted safety belt use rate plus/minus 1.96 (for the Z-test at $\alpha = 0.05$) multiplied by the square root of the stratum's or statewide variance expressed as a percent. The standard error is equal to the square root of the variance.

The data were also analyzed and compared with studies from previous years to assess the progress of the safety belt campaign in the State of Michigan.

6.3 Non-Response Rate

According to NHTSA's guidelines, the non-response rate for the annual safety belt survey cannot exceed 10%. A non-response occurs when the observer is not able to determine the safety belt use of a front seat vehicle occupant. This can occur due to a variety of reasons such as tinted windows, sun glare, ect... Observers in the field marked either 'vehicle not observable' or 'unknown belt use' to keep a record of the non-response rate. There were a total of 250 non-response observations which represents 1.7% of the total number of observations. This non-response rate is well below the allowable maximum of 10% and, as such, there was no need to collect additional data.

7.0 RESULTS AND CONCLUSIONS

The Annual Direct Observational Survey was performed between Tuesday, September 4th and Monday, September 17th of 2012. During this observation period, a total of 14,798 occupants were observed at 191 observation sites randomly selected to represent statewide safety belt use.

The overall weighted statewide safety belt use rate, determined on a strata-basis, is shown in Table 3. The overall weighted statewide safety belt use rate was calculated based upon the procedure described in the "Overall Statewide Safety Belt Use Calculations" section in the Data Analysis section of the report. When the safety belt usage rates were calculated, belted occupants included all drivers and front-seat passengers who were belted correctly. The "not

belted” occupants included drivers and front-seat passengers who were not belted or who were wearing the belt either under their arm or behind their back.

Table 3. Statewide Weighted Safety Belt Use Rate for Drivers and Front-Seat Passengers

Observational Wave	Safety Belt Use Rate*	Standard Error
Annual Direct Observational Survey	93.6% ± 0.5%	0.3%

* Weighted Safety Belt Usage ± 95% Confidence Band

The findings for the Annual Observational Survey for each stratum are shown in Table 4. It should be noted that the stratus-based estimate may not be directly comparable to data from previous years due to the reassignment of some counties to different strata and the changing of some study sites. Complete details of the observations on an intersection level are provided in Appendix I.

Table 4. Weighted Safety Belt Use Rate for Drivers and Front-Seat Passengers by Stratum

Stratum	Annual Direct Observational Survey	
	Safety Belt Usage Rate*	Standard Error
Stratum 1	95.4% ± 0.8%	0.4%
Stratum 2	93.8% ± 1.1%	0.5%
Stratum 3	92.5% ± 1.1%	0.6%
Stratum 4	92.5% ± 1.3%	0.7%

* Weighted Safety Belt Usage ± 95% Confidence Band

Stratum 1 exhibited the highest weighted safety belt use rate at 95.4%, while strata 3 and 4 both exhibited the lowest weighted safety belt use rate at 92.5%. Table 5 summarizes the descriptive

statistics regarding the Annual Observation Survey for all vehicles, in terms of day of the week and time of the day.

Table 5. Statewide Descriptive Statistics

Day of the Week	Annual Safety Belt Observations			
	No. of Sites Observed	Percent of Sites in Day of Week	Actual Total No. of Observations (Occupants)	Percent of Observations in Day of Week (Occupants)
Sunday	19	9.9%	1,495	10.1%
Monday	24	12.6%	1,969	13.3%
Tuesday	23	12.0%	1,702	11.5%
Wednesday	32	16.8%	2,048	13.8%
Thursday	35	18.3%	2,725	18.4%
Friday	36	18.8%	2,958	20.0%
Saturday	22	11.5%	1,901	12.8%
Total	191	100%	14,798	100%
Time of the Day	Annual Safety Belt Observations			
	No. of Sites Observed	Percent of Sites in Time of Day	Actual Total No. of Observations (Occupants)	Percent of Observations in Time of Day (Occupants)
7 am - 8 am	7	3.7%	546	3.7%
8 am - 9 am	9	4.7%	690	4.7%
9 am - 10 am	11	5.8%	812	5.5%
10 am - 11 am	16	8.4%	1,607	10.9%
11 am - 12 pm	22	11.5%	1,480	10.0%
12 pm - 1 pm	20	10.5%	1,299	8.8%
1 pm - 2 pm	23	12.0%	1,619	10.9%
2 pm - 3 pm	19	9.9%	1,380	9.3%

3 pm - 4 pm	18	9.4%	1,739	11.8%
4 pm - 5 pm	19	9.9%	1,526	10.3%
5 pm - 6 pm	16	8.4%	1,269	8.6%
6 pm - 7 pm	11	5.8%	831	5.6%
Total	191	100%	14,798	100%

The safety belt use rate can be described by the overall use rate, as well as by vehicle type and various demographics. Table 6 summarizes the safety belt use rate for the statewide survey by driver, front-seat passenger and total observations. It should be noted that the overall safety belt use rates presented in Tables 6 through 13 vary from those provided in Tables 3 and 4. The overall statewide and stratum-level weighted safety belt use percentages provided in Tables 3 and 4 were calculated by weighting the safety belt use rates at each location by an intersection weighting factor and then by a strata-based VMT weighting factor (as described in Section 6.2 Overall Statewide Safety Belt Use Calculations). The safety belt use rates provided in Tables 6 through 13 are un-weighted and represent the actual number of observations.

Table 6. Statewide Safety Belt Use Summary

Belt Use	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Drivers	11,975	11,213	93.6%
Passengers	2,823	2,582	91.5%
Total	14,798	13,795	93.2%

Table 7 summarizes the statewide driver and front-seat passenger safety belt use rates by county. In Table 7, the counties are listed by stratum. Because of the relatively low number of sites and/or observations in many counties, the safety belt use rates listed may not be fully representative of each county.

Table 7. Statewide Safety Belt Use Rates by Stratum and County

Stratum 1	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Ingham County	1,047	992	94.7%
Kalamazoo County	684	645	94.3%
Oakland County	1,325	1,259	95.0%
Washtenaw County	998	957	95.9%
Total	4,054	3,853	95.0%

Table 7. Statewide Safety Belt Use Rates by Stratum and County (Continued)

Stratum 2	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Bay County	331	317	95.8%
Eaton County	479	433	90.4%
Grand Traverse County	97	93	95.9%
Jackson County	365	338	92.6%
Kent County	555	518	93.3%
Macomb County	711	653	91.8%
Midland County	228	216	94.7%
Monroe County	511	475	93.0%
Ottawa County	109	104	95.4%
Van Buren County	222	211	95.0%
Total	3,608	3,358	93.1%
Stratum 3	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Allegan County	297	278	93.6%
Berrien County	211	200	94.8%
Calhoun County	331	314	94.9%
Clinton County	269	236	87.7%
Genesee County	584	531	90.9%
Ionia County	129	122	94.6%
Isabella County	57	53	93.0%
Lapeer County	43	38	88.4%
Lenawee County	136	125	91.9%
Livingston County	518	482	93.1%
Marquette County	95	89	93.7%
Montcalm County	120	100	83.3%
Muskegon County	138	122	88.4%
Saginaw County	43	38	88.4%
Shiawassee County	160	149	93.1%
St. Clair County	174	167	96.0%
St. Joseph County	116	111	95.7%
Total	3,421	3,155	92.2%
Stratum 4	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Wayne County	3,715	3,429	92.3%
Total	3,715	3,429	92.3%
Grand Strata Total	14,798	13,795	93.2%

Tables 8 through 12 summarize occupant safety belt use for drivers and front-seat passengers by vehicle type for the day of the week, time of the day, gender, age and race for the Annual Observation Survey.

Table 8. All Vehicles Statewide Summary

Day of the Week	All Vehicle Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	1,495	1,401	93.7%
Monday	1,969	1,803	91.6%
Tuesday	1,702	1,585	93.1%
Wednesday	2,048	1,901	92.8%
Thursday	2,725	2,568	94.2%
Friday	2,958	2,757	93.2%
Saturday	1,901	1,780	93.6%
Total	14,798	13,795	93.2%
Time of the Day	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am - 8 am	546	513	94.0%
8 am - 9 am	690	649	94.1%
9 am - 10 am	812	771	95.0%
10 am - 11 am	1,607	1,484	92.3%
11 am - 12 pm	1,480	1,378	93.1%
12 pm - 1 pm	1,299	1,204	92.7%
1 pm - 2 pm	1,619	1,497	92.5%
2 pm - 3 pm	1,380	1,282	92.9%
3 pm - 4 pm	1,739	1,639	94.2%
4 pm - 5 pm	1,526	1,417	92.9%
5 pm - 6 pm	1,269	1,184	93.3%
6 pm - 7 pm	831	777	93.5%
Total	14,798	13,795	93.2%

Table 8. All Vehicles Statewide Summary (Continued)

Vehicle Type	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Passenger Cars	6,944	6,535	94.1%
Sport Utility	3,691	3,474	94.1%
Vans/Minivans	1,846	1,727	93.6%
Pick-Up Trucks	2,317	2,059	88.9%
Total	14,798	13,795	93.2%
Gender	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	7,913	7,250	91.6%
Female	6,880	6,540	95.1%
Unknown	5	5	100.0%
Total	14,798	13,795	93.2%
Age	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0-15	265	242	91.3%
16-29	3,733	3,438	92.1%
30-59	8,401	7,849	93.4%
60+	2,398	2,265	94.5%
Unknown	1	1	100.0%
Total	14,798	13,795	93.2%
Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	12,564	11,770	93.7%
African American	1,767	1,588	89.9%
Asian or Pacific Islander	301	292	97.0%
Hispanic	148	131	88.5%
Native American	6	5	83.3%
Unknown	12	9	75.0%
Total	14,798	13,795	93.2%

Table 9. Passenger Cars Statewide Summary

Day of the Week	Passenger Cars Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	677	632	93.4%
Monday	1,014	940	92.7%
Tuesday	762	711	93.3%
Wednesday	1,005	948	94.3%
Thursday	1,251	1,198	95.8%
Friday	1,352	1,264	93.5%
Saturday	883	842	95.4%
Total	6,944	6,535	94.1%
Time of the Day	Passenger Cars Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am - 8 am	280	266	95.0%
8 am - 9 am	355	340	95.8%
9 am - 10 am	347	335	96.5%
10 am - 11 am	750	701	93.5%
11 am - 12 pm	630	597	94.8%
12 pm - 1 pm	641	598	93.3%
1 pm - 2 pm	734	691	94.1%
2 pm - 3 pm	622	586	94.2%
3 pm - 4 pm	838	796	95.0%
4 pm - 5 pm	752	700	93.1%
5 pm - 6 pm	606	561	92.6%
6 pm - 7 pm	389	364	93.6%
Total	6,944	6,535	94.1%

Table 9. Passenger Cars Statewide Summary (Continued)

Gender	Passenger Cars Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	3,469	3,229	93.1%
Female	3,472	3,303	95.1%
Unknown	3	3	100.0%
Total	6,944	6,535	94.1%
Age	Passenger Cars Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0-15	92	86	93.5%
16-29	2,219	2,058	92.7%
30-59	3,494	3,310	94.7%
60+	1,138	1,080	94.9%
Unknown	1	1	100.0%
Total	6,944	6,535	94.1%
Race	Passenger Cars Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	5,681	5,391	94.9%
African American	1,033	934	90.4%
Asian or Pacific Islander	155	148	95.5%
Hispanic	67	56	83.6%
Native American	4	3	75.0%
Unknown	4	3	75.0%
Total	6,944	6,535	94.1%

Table 10. Sport Utility Vehicles Statewide Summary

Day of the Week	Sport Utility Vehicles Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	385	367	95.3%
Monday	452	418	92.5%
Tuesday	446	414	92.8%
Wednesday	450	419	93.1%
Thursday	665	634	95.3%
Friday	784	736	93.9%
Saturday	509	486	95.5%
Total	3,691	3,474	94.1%
Time of the Day	Sport Utility Vehicles Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am - 8 am	134	127	94.8%
8 am - 9 am	169	156	92.3%
9 am - 10 am	184	177	96.2%
10 am - 11 am	391	371	94.9%
11 am - 12 pm	380	356	93.7%
12 pm - 1 pm	295	276	93.6%
1 pm - 2 pm	394	367	93.1%
2 pm - 3 pm	366	347	94.8%
3 pm - 4 pm	448	421	94.0%
4 pm - 5 pm	369	344	93.2%
5 pm - 6 pm	353	336	95.2%
6 pm - 7 pm	208	196	94.2%
Total	3,691	3,474	94.1%

Table 10. Sport Utility Vehicles Statewide Summary (Continued)

Gender	Sport Utility Vehicles Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	1,639	1,516	92.5%
Female	2,051	1,957	95.4%
Unknown	1	1	100.0%
Total	3,691	3,474	94.1%
Age	Sport Utility Vehicles Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0-15	87	82	94.3%
16-29	767	715	93.2%
30-59	2,265	2,133	94.2%
60+	572	544	95.1%
Unknown	0	0	N/A
Total	3,691	3,474	94.1%
Race	Sport Utility Vehicles Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	3,153	2,983	94.6%
African American	416	375	90.1%
Asian or Pacific Islander	94	92	97.9%
Hispanic	22	20	90.9%
Native American	2	2	100.0%
Unknown	4	2	50.0%
Total	3,691	3,474	94.1%

Table 11. Vans/Minivans Statewide Summary

Day of the Week	Vans/Minivans Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	191	186	97.4%
Monday	244	220	90.2%
Tuesday	189	177	93.7%
Wednesday	259	237	91.5%
Thursday	390	370	94.9%
Friday	381	363	95.3%
Saturday	192	174	90.6%
Total	1,846	1,727	93.6%
Time of the Day	Vans/Minivans Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am - 8 am	57	52	91.2%
8 am - 9 am	81	77	95.1%
9 am - 10 am	125	116	92.8%
10 am - 11 am	212	190	89.6%
11 am - 12 pm	195	179	91.8%
12 pm - 1 pm	155	149	96.1%
1 pm - 2 pm	214	200	93.5%
2 pm - 3 pm	178	161	90.4%
3 pm - 4 pm	219	210	95.9%
4 pm - 5 pm	178	169	94.9%
5 pm - 6 pm	136	131	96.3%
6 pm - 7 pm	96	93	96.9%
Total	1,846	1,727	93.6%

Table 11. Vans/Minivans Statewide Summary (Continued)

Gender	Vans/Minivans Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	925	850	91.9%
Female	920	876	95.2%
Unknown	1	1	100.0%
Total	1,846	1,727	93.6%
Age	Vans/Minivans Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0-15	59	52	88.1%
16-29	271	256	94.5%
30-59	1,179	1,096	93.0%
60+	337	323	95.8%
Unknown	0	0	N/A
Total	1,846	1,727	93.6%
Race	Vans/Minivans Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	1,557	1,463	94.0%
African American	213	189	88.7%
Asian or Pacific Islander	45	45	100.0%
Hispanic	30	29	96.7%
Native American	0	0	N/A
Unknown	1	1	100.0%
Total	1,846	1,727	93.6%

Table 12. Pick-up Trucks Statewide Summary

Day of the Week	Pickup Trucks Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	242	216	89.3%
Monday	259	225	86.9%
Tuesday	305	283	92.8%
Wednesday	334	297	88.9%
Thursday	419	366	87.4%
Friday	441	394	89.3%
Saturday	317	278	87.7%
Total	2,317	2,059	88.9%
Time of the Day	Pickup Trucks Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am - 8 am	75	68	90.7%
8 am - 9 am	85	76	89.4%
9 am - 10 am	156	143	91.7%
10 am - 11 am	254	222	87.4%
11 am - 12 pm	275	246	89.5%
12 pm - 1 pm	208	181	87.0%
1 pm - 2 pm	277	239	86.3%
2 pm - 3 pm	214	188	87.9%
3 pm - 4 pm	234	212	90.6%
4 pm - 5 pm	227	204	89.9%
5 pm - 6 pm	174	156	89.7%
6 pm - 7 pm	138	124	89.9%
Total	2,317	2,059	88.9%

Table 12. Pick-up Trucks Statewide Summary (Continued)

Gender	Pickup Trucks Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	1,880	1,655	88.0%
Female	437	404	92.4%
Unknown	0	0	N/A
Total	2,317	2,059	88.9%
Age	Pickup Trucks Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0-15	27	22	81.5%
16-29	476	409	85.9%
30-59	1,463	1,310	89.5%
60+	351	318	90.6%
Unknown	0	0	N/A
Total	2,317	2,059	88.9%
Race	Pickup Trucks Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	2,173	1,933	89.0%
African American	105	90	85.7%
Asian or Pacific Islander	7	7	100.0%
Hispanic	29	26	89.7%
Native American	0	0	N/A
Unknown	3	3	100.0%
Total	2,317	2,059	88.9%

Occupants of passenger cars and sport utility vehicles both exhibited the highest safety belt use rate among vehicle types at 94.1%. Occupants of vans and minivans exhibited a use rate of 93.2%, while occupants of pickup trucks exhibited the lowest use rate at 88.9%. Safety belt use rates were relatively consistent among the different days of the week, except for Monday which experienced the lowest safety belt usage rate at 91.6%. Safety belt use rates were highest on Thursdays with a rate of 94.2%. The late morning hour from 10:00 am to 11:00 am experienced lower usage rates than all other times of the day at 92.3%.

Female occupants had higher use rates than their male counterparts by 3.5 percent (95.1% use rate for females vs. 91.6% use rate for males), a finding consistent with past years. The safety belt usage rate was the highest for occupants above the age of 60 at 94.5%. Safety belt use rates were lowest for occupants age 0-15 with a use rate of 91.3%, followed by occupants age 16-29 with a use rate of 92.1%. In general, belt use was lower among African American, Hispanic, and Native American occupants.

Table 13 summarizes occupant safety belt use rates by gender, age, and race. Male African Americans age 16-29 exhibited the lowest belt use of any demographic group with a use rate of 85.2%. Female occupants age 0-15 also exhibited a low belt use rate with 89.7%. Females age 30-59 exhibited the highest safety belt use rate at 95.7%. Young and male pickup truck occupants exhibited low safety belt use rates, consistent with past findings.

Table 13. All Vehicles Statewide Demographic Summary

Demographic Data			All Vehicles Safety Belt Use		
Gender	Age	Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	0-15	Caucasian	123	115	93.5%
		African American	21	18	85.7%
		Asian or Pacific Islander	4	4	100.0%
		Hispanic	1	1	100.0%
		Total	149	138	92.6%
	16-29	Caucasian	1,541	1,404	91.1%
		African American	305	260	85.2%
		Asian or Pacific Islander	45	45	100.0%
		Hispanic	39	34	87.2%
		Unknown	3	2	66.7%
		Total	1,933	1,745	90.3%
	30-59	Caucasian	3,873	3,549	91.6%
		African American	485	440	90.7%
		Asian or Pacific Islander	99	93	93.9%
		Hispanic	57	49	86.0%
		Native America	2	2	100.0%
		Unknown	6	4	66.7%
		Total	4,522	4,137	91.5%
	60+	Caucasian	1,236	1,163	94.1%
		African American	64	58	90.6%
		Asian or Pacific Islander	5	5	100.0%
Hispanic		3	3	100.0%	
Native America		1	1	100.0%	
Total		1,309	1,230	94.0%	
TOTAL			7,913	7,250	91.6%

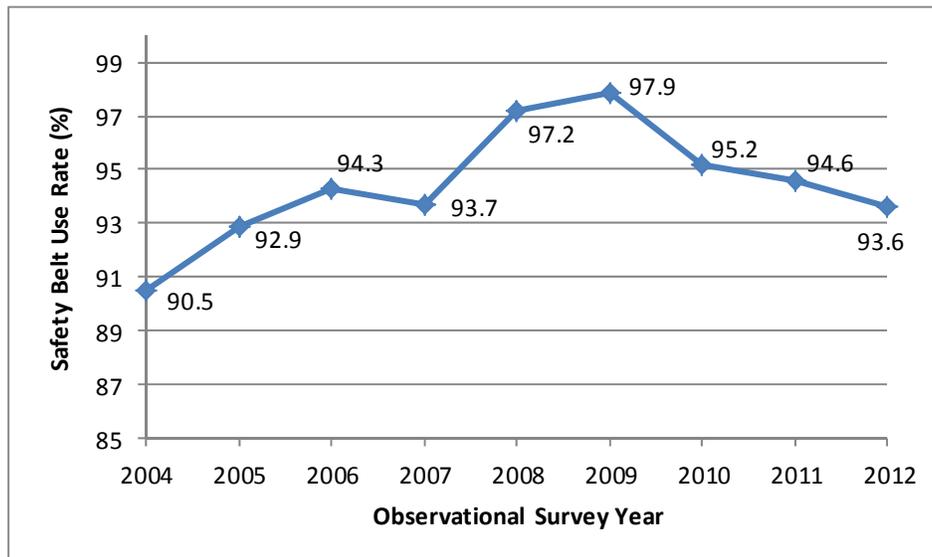
Table 13. All Vehicles Statewide Demographic Summary (Continued)

Demographic Data			All Vehicles Safety Belt Use		
Gender	Age	Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Female	0-15	Caucasian	92	81	88.0%
		African American	19	18	94.7%
		Asian or Pacific Islander	4	4	100.0%
		Hispanic	1	1	100.0%
		Total	116	104	89.7%
	16-29	Caucasian	1,453	1,381	95.0%
		African American	292	259	88.7%
		Asian or Pacific Islander	39	38	97.4%
		Hispanic	12	11	91.7%
		Unknown	1	1	100.0%
		Total	1,797	1,690	94.0%
	30-59	Caucasian	3,226	3,107	96.3%
		African American	523	480	91.8%
		Asian or Pacific Islander	95	94	98.9%
		Hispanic	32	29	90.6%
		Native American	3	2	66.7%
		Total	3,879	3,712	95.7%
	60+	Caucasian	1,018	968	95.1%
		African American	58	55	94.8%
		Asian or Pacific Islander	10	9	90.0%
		Hispanic	2	2	100.0%
		Total	1,088	1,034	95.0%
	TOTAL			6,880	6,540

Figure 2 summarizes the findings of the 2004 through 2012 Annual Observation Surveys. The 2012 Annual Survey resulted in a 1% decrease in safety belt use as compared to the 2011 observational survey. This continues a decreasing trend dating back to 2009.

Based upon these safety belt use rate trends, continued public awareness and enforcement efforts are warranted to increase safety belt use. Continued evaluation of these media and enforcement efforts will allow for the identification of at-risk vehicle occupants and geographic areas that are prone to low belt use rates.

Figure 2. 2004 through 2012 Safety Belt Use Rate Trends



As shown in this study, males and pick-up truck drivers continue to exhibit lower use rate. Belt use was also found to lag behind the state average in urban and lowly populated rural areas. These areas should be emphasized in subsequent program efforts.

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**APPENDIX I – COMPLETE LISTING OF THE OBSERVATIONAL
SITES IN MICHIGAN BY STRATUM AND COUNTY, INCLUDING
OBSERVATIONAL DATA FOR EACH SITE**

Stratum	County	Observational Site	Actual Total Observations	Actual Belted Observations	Weighted Total Observations	Weighted Belted Observations
1	Ingham	Haslett and Zimmer	49	47	49	47
1	Ingham	Barnes and Eden	27	26	27	26
1	Ingham	Marsh and Tihart	50	46	56	52
1	Ingham	M-36 and M-52	32	30	41	39
1	Ingham	Oak St. (Rossman) and South Onondaga Rd.	55	46	72	60
1	Ingham	Cedar and US-127	105	104	147	145
1	Ingham	M-106 and M-52	37	30	65	53
1	Ingham	M-52 and M-43	89	84	231	218
1	Ingham	North Hagadorn and East Lake Lansing	76	74	276	269
1	Ingham	M-43 and Williamston	88	81	440	405
1	Ingham	I-496 and Dunckel	83	80	492	475
1	Ingham	Cavanaugh and Pennsylvania	84	82	506	494
1	Ingham	Michigan and Waverly	127	124	288	281
1	Ingham	US-127 and Saginaw	145	138	1888	1797
1	Kalamazoo	U Ave. and 8th	41	40	55	54
1	Kalamazoo	M-89 and 34th St.	37	33	54	48
1	Kalamazoo	G and Riverview	99	88	151	134
1	Kalamazoo	Sprinkle and Centre	33	32	61	59
1	Kalamazoo	M-89 and M-43	61	55	133	120
1	Kalamazoo	Sprinkle and H	57	53	151	141
1	Kalamazoo	8th and Q Ave.	77	74	260	250
1	Kalamazoo	M-43 and 9th	87	83	364	348
1	Kalamazoo	G Ave. and 32nd-33rd St.	143	140	768	752
1	Kalamazoo	Sprinkle and Zylman	49	47	308	295
1	Oakland	9 Mile Rd. and Taft Rd.	105	102	213	207
1	Oakland	Dixie and Davisburg	140	132	337	317
1	Oakland	Holly and Grange Hall	196	184	672	631
1	Oakland	Baldwin and Clarkston	106	101	371	354
1	Oakland	Lapeer and Walton	86	84	304	297
1	Oakland	I-75 and Sashabaw	94	86	403	369
1	Oakland	Northwestern and Middlebelt	90	85	392	370
1	Oakland	8 Mile Rd. and M-10	86	81	555	522
1	Oakland	Grand River Ave. and Taft Rd.	100	96	671	644
1	Oakland	I-696 (Eastbound Service Dr.) and Woodward	75	68	609	553
1	Oakland	Rochester and Snell	77	75	727	708
1	Oakland	14 Mile and Main St.	68	64	709	668
1	Oakland	I-696 and Orchard Lake Rd.	102	101	1196	1184
1	Washtenaw	Dixboro and Territorial	15	15	15	15
1	Washtenaw	Zeeb Rd. and North Territorial	4	4	4	4
1	Washtenaw	Saline-Milan and Mooreville	44	44	45	45
1	Washtenaw	Austin and Schneider	66	60	129	117
1	Washtenaw	Mooreville and Stony Creek	78	76	160	155
1	Washtenaw	Geddes and Dixboro	130	125	367	353
1	Washtenaw	North Maple Rd. and Miller	129	124	532	511
1	Washtenaw	Ann Arbor-Saline and South Main St.	154	149	686	664
1	Washtenaw	I-94 and Jackson Ave.	96	92	437	419
1	Washtenaw	I-94 and Huron	141	133	1066	1006
1	Washtenaw	I-94 Eastbound Exit Ramp and South State St.	141	135	1152	1103

Stratum	County	Observational Site	Actual Total Observations	Actual Belted Observations	Weighted Total Observations	Weighted Belted Observations
2	Bay	I-75 and Pinconning	35	33	35	33
2	Bay	M-61 and M-30	110	102	110	102
2	Bay	Adams and Kochville	122	120	165	162
2	Bay	Munger and M-15 (Tuscola)	64	62	111	107
2	Eaton	Nixon and Willow	84	77	107	98
2	Eaton	Royston Rd. and Island Highway	42	37	57	50
2	Eaton	M-43 and M-50	56	53	82	78
2	Eaton	Washington St. and East Lawrence Ave.	59	49	90	75
2	Eaton	Ainger Rd. and Battle Creek Rd.	18	12	28	19
2	Eaton	West Kalamo Hwy. and Battle Creek Rd.	25	22	49	43
2	Eaton	M-43 and Canal	195	183	1181	1109
2	Grand Traverse	US-31 and M-72	97	93	502	482
2	Jackson	Cady and Wolflake	40	36	40	36
2	Jackson	Rosehill and Elm	80	75	91	85
2	Jackson	US-127 and East Michigan Ave.	97	92	146	139
2	Jackson	Michigan and Lake	78	70	205	184
2	Jackson	US-127 and Page	70	65	191	177
2	Kent	17 Mile and Myers Lake	36	28	36	28
2	Kent	14 Mile and Harvard	37	34	37	34
2	Kent	10 mile and Wabasis	20	19	23	22
2	Kent	Barfield and Glen Echo	38	35	48	44
2	Kent	Sparta and Ball Creek	49	41	64	54
2	Kent	Walker and 4 Mile	94	89	153	145
2	Kent	36th St. and Paris	39	38	108	105
2	Kent	US-131 and 68th	94	92	506	495
2	Kent	US-131 and 10 Mile	67	67	376	376
2	Kent	US-131 and 84th	81	75	497	460
2	Macomb	34 Mile and Van Dyke	61	53	61	53
2	Macomb	Martin and Jefferson	43	37	51	44
2	Macomb	27 Mile and Romeo Plank	55	48	79	69
2	Macomb	22 Mile and Heydenreich	102	94	152	140
2	Macomb	Moravian and Harrington	69	66	257	246
2	Macomb	Clinton River and Hayes	60	59	447	440
2	Macomb	23 Mile and Van Dyke	112	104	849	788
2	Macomb	I-696 and Groesbeck	112	105	864	810
2	Macomb	19 Mile and Mound	97	87	762	684
2	Midland	M-20 and Homer Rd.	46	45	46	45
2	Midland	Redstone and 11 Mile	61	58	67	64
2	Midland	Curtis and Lake Sanford	38	36	44	42
2	Midland	Redstone and Coleman	44	38	55	48
2	Midland	Badour and Pine River Rd.	39	39	111	111
2	Monroe	US-23 and Plank Rd.	54	54	54	54
2	Monroe	Hull and Dunbar	70	60	83	71
2	Monroe	Ostrander and Plank	55	49	75	67
2	Monroe	US-23 and US-233	48	44	92	85
2	Monroe	Ann Arbor and Tecumseh	164	154	352	331
2	Monroe	Telegraph and Seventh	120	114	526	499
2	Ottawa	104th and Quincy	21	20	21	20
2	Ottawa	Olive and Lake Michigan	88	84	137	131
2	Van Buren	CR-681 and CR-384	44	41	44	41
2	Van Buren	CR-681 and CR-380	35	34	40	38
2	Van Buren	I-196 and Phoenix	79	76	154	148
2	Van Buren	M-51 and North Phelps St.	64	60	200	188

Stratum	County	Observational Site	Actual Total Observations	Actual Belted Observations	Weighted Total Observations	Weighted Belted Observations
3	Allegan	US-131 and M-89	94	86	145	133
3	Allegan	30th and 128th	21	21	33	33
3	Allegan	Bridge and Main	85	79	213	198
3	Allegan	US-131 and 135th	97	92	387	367
3	Berrien	Union Pier and Lakeside	36	34	36	34
3	Berrien	I-94 and I-139	100	96	204	196
3	Berrien	Sodus/Nickerson and Pipestone	75	70	214	200
3	Calhoun	Michigan Ave. and 15 Mile Rd.	68	66	68	66
3	Calhoun	Evanston and Michigan Ave.	16	15	16	15
3	Calhoun	I-94 and Beckley	60	57	141	134
3	Calhoun	Beckley and Capital	187	176	830	782
3	Clinton	Upton and Clark	27	26	27	26
3	Clinton	M-21 and Shepardsville	44	36	61	50
3	Clinton	Main and Westphalia	73	66	133	121
3	Clinton	Hyde and Welling	58	48	107	89
3	Clinton	M-21 and Clinton (Alternate)	67	60	283	254
3	Genesee	Grand Blanc and Duffield	31	29	36	33
3	Genesee	Elms and Beecher	170	158	435	404
3	Genesee	Flushing and Balleuges	120	101	485	408
3	Genesee	Vassar and M-57	6	6	30	30
3	Genesee	M-57 and I-75	151	139	940	866
3	Genesee	Chavez and Court	106	98	755	698
3	Ionia	Cross and Main	44	41	66	62
3	Ionia	Bridge and State Street	85	81	247	236
3	Isabella	Winn and Blanchard	57	53	60	56
3	Lapeer	M-24 and Coulter	7	5	20	14
3	Lapeer	M-24 and Otter Lake	36	33	273	250
3	Lenawee	US-12 and Brooklyn	62	57	62	57
3	Lenawee	Pentecost and Monroe	16	14	20	18
3	Lenawee	Clinton Macon and Macon	58	54	137	127
3	Livingston	M-36 and M-106	46	43	54	51
3	Livingston	Grand River and Pleasant Valley Rd.	121	115	277	263
3	Livingston	US-23 and Clyde Rd.	91	88	269	261
3	Livingston	Grand River and Kensington Rd.	102	91	338	301
3	Livingston	M-36 and Dexter	91	85	357	333
3	Livingston	M-59 and Old US-23	67	60	869	778
3	Marquette	M-95 and CR-LG	9	7	11	9
3	Marquette	Washington and McClellan	86	82	899	857
3	Montcalm	M-91 and Sidney	60	57	60	57
3	Montcalm	Main and Sibley	42	29	42	29
3	Montcalm	Main and Condensery	18	14	28	22
3	Muskegon	Blackmer and Heights Ravenna	33	25	33	25
3	Muskegon	Heights Ravenna and Moorland	30	27	39	36
3	Muskegon	Heights Ravenna and Maple Island	75	70	107	100
3	Saginaw	Fergus and Bueche	43	38	43	38
3	Shiawasee	M-52 and I-69	64	58	69	62
3	Shiawasee	Juddville and Chipman	63	59	90	84
3	Shiawasee	Grand River and M-52	33	32	47	46
3	St. Clair	M-19 and Bordman	49	47	70	67
3	St. Clair	I-69 and Riley Center Rd	46	44	77	73
3	St. Clair	M-29 and Palms	79	76	216	208
3	St. Joseph	Klinger Lake and Banker St.	30	30	55	55
3	St. Joseph	US-131 and Millard	86	81	1061	999

Stratum	County	Observational Site	Actual Total Observations	Actual Belted Observations	Weighted Total Observations	Weighted Belted Observations
4	Wayne	Waltz and Willow	130	118	130	118
4	Wayne	Huron River and Waltz	32	23	36	26
4	Wayne	Van Horn and Inkster	114	109	171	164
4	Wayne	Sumpter and Oakville Waltz	50	50	82	82
4	Wayne	Ecourse and Haggerty	89	86	146	141
4	Wayne	Rawsonville and Willis	78	70	139	125
4	Wayne	Ecourse and Monroe	89	79	177	157
4	Wayne	McNichols and Evergreen	101	85	253	213
4	Wayne	Geddes and Canton Center	157	148	445	420
4	Wayne	East Huron River and Haggerty	102	92	291	263
4	Wayne	Wayne and Wick	97	92	289	274
4	Wayne	Main and Sumpter	122	117	394	378
4	Wayne	Schaefer and Grand River	104	91	336	294
4	Wayne	7 Mile and Van Dyke	86	77	307	275
4	Wayne	Vernier and Lake Shore Dr.	121	113	444	414
4	Wayne	Warren and Woodward	57	51	218	195
4	Wayne	Middlebelt and Eureka	135	131	517	502
4	Wayne	Plymouth and Greenfield	103	84	396	323
4	Wayne	I-96 and Livernois	111	98	455	402
4	Wayne	Fort St. and Goddard St.	108	101	553	517
4	Wayne	8 Mile Rd. and Randolph	111	108	588	572
4	Wayne	Farmington and Plymouth	76	73	423	407
4	Wayne	Rawsonville and Textile	87	81	487	454
4	Wayne	Warren and Evergreen	91	85	553	516
4	Wayne	Eureka and Telegraph	141	134	861	818
4	Wayne	9 Mile and Greenfield	89	80	544	489
4	Wayne	Vernier and Mack	158	147	984	916
4	Wayne	I-94 and Vernier	144	136	999	943
4	Wayne	I-75 and Southfield Rd.	101	98	754	732
4	Wayne	Ford and Sheldon	119	112	906	853
4	Wayne	Northline and I-75	102	97	900	856
4	Wayne	Jefferson and Randolph	128	116	1196	1084
4	Wayne	Greenfield and Michigan Ave	86	72	951	796
4	Wayne	8 Mile and Grand River	82	77	988	928
4	Wayne	I-96 and Middlebelt (Service Dr.)	73	70	982	942
4	Wayne	Outer Drive and Rotunda Village	69	62	1041	935
4	Wayne	M-10 (Service Dr.) and Greenfield	72	66	1378	1263