

SAFETY BELT/MOTORCYCLE HELMET USAGE SURVEYS

Final Report

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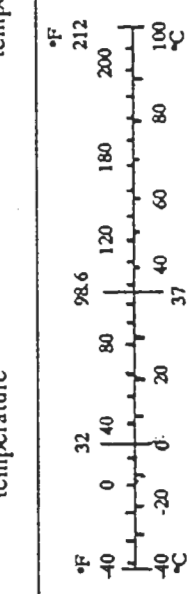
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16. Abstract <p>A field survey, conducted in the summer of 1996, consisted of observations of nearly a quarter million drivers and front seat, outboard passengers to determine safety belt usage. Observations were taken at a random sample of Highway Performance Monitoring System stations throughout Connecticut. The overall usage rate was found to be 59.2%. Significant differences were found between high-speed facilities (64.7%) and other facilities (53.8%). A limited number of in-depth studies showed usage rates varying from 42% at a golf course to 79% at an Interstate rest area.</p> <p>In conjunction with the safety belt survey, observations were made of motorcycle helmet and protective jacket usage. Not surprisingly, given that neither helmets nor jackets are required by law, the overall usage rates was much less than for safety belts. The overall usage rates were 41% and 20% for helmets and jackets, respectively.</p>					
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS				APPROXIMATE CONVERSIONS TO SI UNITS			
Symbol	When You Know	Multiply By	To Find	Symbol	When You Know	Multiply By	To Find
<u>LENGTH</u>							
in	inches	25.4	millimetres	mm	mm	0.039	inches
ft	feet	0.305	metres	m	m	3.28	feet
yd	yards	0.914	metres	m	m	1.09	yards
mi	miles	1.61	kilometres	km	km	0.621	miles
<u>AREA</u>							
in ²	square inches	645.2	millimetres squared	mm ²	mm ²	0.0016	square inches
ft ²	square feet	0.093	metres squared	m ²	m ²	10.764	square feet
yd ²	square yards	0.836	metres squared	m ²	ha	2.47	acres
ac	acres	0.405	hectares	ha	km ²	0.386	square miles
mi ²	square miles	2.59	kilometres squared	km ²	<u>VOLUME</u>		
<u>VOLUME</u>							
fl. oz.	fluid ounces	29.57	millilitres	mL	mL	0.034	fluid ounces
gal	gallons	3.785	litres	L	L	0.264	gallons
ft ³	cubic feet	0.028	metres cubed	m ³	m ³	35.315	cubic feet
yd ³	cubic yards	0.765	metres cubed	m ³	<u>MASS</u>		
<u>MASS</u>							
oz	ounces	28.35	grams	g	g	0.035	ounces
lb	pounds	0.454	kilograms	kg	kg	2.205	pounds
T	short tons (2000 lb)	0.907	megagrams	Mg	Mg	1.102	short tons (2000 lb)
<u>TEMPERATURE (exact)</u>							
°F	Fahrenheit temperature	5(F-32)/9	Celcius temperature	°C	°C	1.8C + 32	Fahrenheit temperature

NOTE: Volumes greater than 1000 L shall be shown in m³.



*SI is the symbol for the International System of Measurement

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1. INTRODUCTION

The Division of Highway Safety (DHS) of the Connecticut Department of Transportation (ConnDOT) has responsibility for administering Connecticut's Highway Safety Program (HSP). Two program areas for which the Division has responsibility are Occupant Protection (safety belts) and Motorcycle Safety (helmets).

1.1 Background

In March 1995, the Principal Investigators met with Ms. Susan Maloney, Highway Safety Program Manager. She described the HSP in general and the need for assistance in designing and conducting surveys and analyzing the results for the two specific areas. The work described herein is the result of those discussions.

1.2 Significance of the Work

In 1990, motor vehicle accidents accounted for 45,000 deaths in the United States. This is the equivalent of a major airline crash every day for a year. For the population in the age group 15 to 24, these accidents produced nearly twice the number of deaths as the next closest cause. Comparable statistics may be cited for personal injuries and property damage.

Recognizing the staggering costs of highway motor vehicle accidents, Congress has provided for the establishment of Highway Safety Programs in each of the states. The Governors are responsible for the administration of these programs through a state agency. In Connecticut, that agency is the Department of Transportation. In the current year, the budget for Connecticut's HSP is approximately \$3 million.

While the numbers of fatalities and injuries are staggering, there is a bright spot in the picture in that fatality and injury **rates** have been going down with time. There are several reasons for this improvement, including safer highway and motor vehicle design. If a crash does occur, deaths and injuries can be reduced through occupant protection, including safety belts and (for motorcycles) helmets. However, neither of these is of any value if not used. To effectively address this problem, it is important to monitor usage.

1.3 Scope of the Research

The objectives of the research reported herein were to:

- Design a statistically valid survey for determining helmet and safety belt usage.
- Conduct the survey.
- Analyze the survey results.

- Write a final report with recommendations.

2. SURVEY

The survey was conducted during July and August of 1995.

2.1 Survey Design

- Out of the 169 towns in Connecticut, 21 were selected at random, with each town weighted according to vehicle miles of travel (VMT).
- In the selected towns, a certain number of Highway Performance Monitoring System (HPMS) sites were selected based on the table on page 28904 of the *Guidelines for State Observational Surveys of Safety Belt and Motorcycle Helmet Use* (Fed. Reg./Vol.57, No. 5/6,29,92). For example, if a town had 100 HPMS sites, 23 were selected at random. Note that these sites were distributed uniformly with respect to geographic location and functional class of roadway.
- Observation sites were assigned one of four observation periods and a day of observation (all days of the week were eligible). The observation periods were:
 - A. 7:00 am - 9:00 am
 - B. 11:00 am - 1:00 pm
 - C. 1:30 pm - 3:30 pm
 - D. 4:00 pm - 6:00 pm
- Observation periods were assigned at random, but neighboring sites were lumped into groups of up to four. To minimize travel time for the observer teams, each site in a group of four was assigned a different observation time period.

2.2 Field Survey

- The observation teams consisted of graduate students from the Departments of Civil and Environmental Engineering and Mathematics. Graduate students were chosen because of their maturity and reliability.
- The observers were given three training sessions before going into the field. During these sessions, the observers were checked for inter-observer reliability.
- The observers were given a letter describing the survey to be shown to local authorities should the need arise. The observers were instructed to call the local police department to inform them of their observations on the day prior to the field visit.

- Random accuracy checks were made on the observation teams. To guard against mistakes due to fatigue, observers were given a short break every 30 minutes.
- Observations were not made during periods of heavy rainfall.
- If a given site could not be safely observed, a nearby location was substituted. Three of the sites had to be completely abandoned.
- At a site, the direction of observation was chosen by a coin toss and, on multi-lane highways, the lane was chosen by the toss of a die.
- Observations were made by one of two means. Where feasible, a data form (Attachment A) was completed. Where not feasible due to high speed, tally counters were used to collect just the basic information.

3. RESULTS

A summary of the results of the survey is given in Tables 1 through 7.

3.1 Safety Belt Usage

Table 1 shows an overall use rate for safety belts of 59.2 %. Note that nearly a quarter of a million riders were observed. Also note that on high-speed facilities, the use rate is significantly higher than on non-high-speed facilities. This finding is not surprising and it shows up several places in the results.

TABLE 1. Total riders (drivers and outboard passengers) using safety belts

	<u>Number Riders</u>	<u>Number Protected</u>	<u>Use Rate _(%)</u>	<u>Standard Error</u>	<u>Relative Error</u>
Regular	123,104	66,272	53.8	0.0014	0.0026
HS ^a	119,402	77,290	64.7	0.0014	0.0021
Total	242,506	143,562	59.2	0.0010	0.0017

^a High-speed

Safety belt use by time of day is given in Table 2. Note that the use rate varies from a low of 50.8 % on low-speed facilities at mid-day to a high of 66.1 % on high-speed facilities during the morning peak hours.

TABLE 2. Safety belt use by time of day

<u>Time</u>	<u>Facility Type</u>	<u>Total Number</u>	<u>Number Protected</u>	<u>Use Rate</u>
7:00 am - 9:00 am	Regular	29,775	17,029	57.2%
	High Speed	28,434	18,802	66.1%
	Total	58,209	35,831	61.6%
11:00 am - 1:00 pm	Regular	33,442	16,993	50.8%
	High Speed	25,152	16,101	64.0%
	Total	58,594	33,094	56.5%
1:30 pm - 3:30 pm	Regular	31,073	17,297	55.7%
	High Speed	23,073	14,528	63.0%
	Total	54,146	31,825	58.8%
4:00 pm - 6:00 pm	Regular	28,815	14,953	51.9%
	High Speed	20,161	12,795	63.5%
	Total	48,976	27,748	56.7%

Table 3 gives safety belt use rates by weather. Here, the rates vary from a low of 52.3% on low-speed facilities during rain to a high of 68.2 % on high-speed facilities during rain.

TABLE 3. Safety belt use by weather

<u>Weather</u>	<u>Facility Type</u>	<u>Total Number</u>	<u>Number Protected</u>	<u>Use Rate</u>
Sunny	Regular	84,680	44,729	52.8%
	High Speed	73,672	46,233	62.8%
	Total	158,352	90,962	57.4%
Cloudy	Regular	34,812	19,653	56.5%
	High Speed	34,646	23,499	67.8%
	Total	69,458	43,152	62.1%
Rain	Regular	3,613	1,890	52.3%
	High Speed	11,084	7,558	68.2%
	Total	14,697	9,448	64.3%

Table 4 gives safety belt use rate by gender. The use rate for males is 49.7 %, while that of females is 59.0 %. The difference in rates is statistically significant.

TABLE 4. Safety belt use by gender

<u>Gender</u>	<u>Total Number</u>	<u>Number Protected</u>	<u>Use Rate</u>
Male	68,617	34,117	49.7%
Female	52,889	31,198	59.0%

A limited number of observations were taken at sites selected for ease of observation. At these sites it was possible to observe a number of statistics which would have been very difficult or impossible to observe in the larger survey. At these sites, the following statistics were observed for *all* riders:

- State of registration
- Race
- Sex
- Age

Table 5 gives the overall use rates at the selected locations. The rates vary from a low of 42 % at the golf course from 11:00 am to 1:00 pm to a high of 79 % at the rest area from 11:00 am to 1:00 pm. Note the consistency of results at the malls.

TABLE 5. Safety belt use at selected locations

<u>Location</u>	<u>Use Rate Mid-day</u>	<u>(%)^a PM Peak</u>
West Farms Mall	50	53
Buckland Hills Mall	52	63
Eastbrook Mall	52	57
Dept. Motor Vehicles	69	59
I-84 Rest Area	79	62
Twin Hills Golf Course	44	42

^a Safety belts, drivers only

3.2 Motorcycle Helmet Usage

The overall results for motorcycle helmet usage are given in Table 6 for both drivers and passengers. Note that slightly less than a thousand riders were observed - significantly less than for safety belts. The overall use rate is only 41.2%, which is not surprising given that helmets are not required by law.

TABLE 6. Total riders (drivers and passengers) using motorcycle helmets

<u>Number Riders</u>	<u>Number Protected</u>	<u>Use Rate (%)</u>	<u>Standard Error</u>	<u>Relative Error</u>
701	289	41.2	0.0186	0.045

Table 7 breaks down the motorcycle results by drivers and passengers. It also gives use rates for protective jackets. Note that jacket use rate is about half that of helmets.

TABLE 7. Motorcycle riders wearing helmets and protective jackets

	<u>Total Number</u>	<u>Number Helmets</u>	<u>Use Rate</u>	<u>Number Jackets</u>	<u>Use Rate</u>
Drivers	615	255	41%	126	20%
Passengers	86	34	40%	13	15%
Total	701	289	41%	139	20%

4. SUMMARY

A field survey, conducted in the summer of 1996, consisted of observations of nearly a quarter million drivers and front seat, outboard passengers to determine safety belt usage. Observations were taken at a random sample of Highway Performance Monitoring System stations throughout Connecticut. The overall usage rate was found to be 59.2%. Significant differences were found between high-speed facilities (64.7%) and other facilities (53.8%). A limited number of in-depth studies showed usage rates varying from 42% at a golf course to 79% at an Interstate rest area.

In conjunction with the safety belt survey, observations were made of motorcycle helmet and protective jacket usage. Not surprisingly, given that neither helmets nor jackets are required by law, the overall usage rates was much less than for safety belts. The overall usage rates were

41% and 20% for helmets and jackets, respectively.