1998 FLORIDA OBSERVATIONAL MOTORCYCLE HELMET USE STUDY

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Prepared For:

The Florida Department of Transportation
State Safety Office

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CUTR
Center For Urban Transportation Research

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Prepared For

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Introduction

Research Background

Riding motorcycles is a popular form of recreation and transportation. Unfortunately, motorcycle riding also has inherent dangers. Each year, motorcycle crashes claim thousands of lives and several thousand more suffer incapacitating injuries. According to the National Highway Traffic Safety Administration (NHTSA), 2,160 motorcyclists died in 1996 and an additional 56,000 suffered injuries in traffic crashes in the United States. Although motorcycles represent only two percent of all registered vehicles, motorcyclists were involved in six percent of all fatal crashes, three percent of injury crashes, and constituted seven percent of all incapacitating injuries (NHSTA). NHTSA's latest crash statistics indicate that per vehicle mile, motorcyclists are 16 times as likely as car occupants to die in a traffic crash and about 4 times as likely to suffer injuries. Many of the deaths and serious disabilities associated with motorcycle crashes result from head trauma. Several studies report that helmet use by motorcycle riders significantly decreases the risk of head injury, death, and disability in the event of a crash. According to NHSTA, helmets saved 490 motorcylists' lives in 1996 and if all riders had worn helmets, another 279 riders would have lived. NHSTA estimates that using a helmet reduces a motorcyclist's overall risk of death in a crash by 29 percent and the risk of brain injury by 67 percent.

Over the past 20 years, motorcycle crash trends in Florida have reflected the changing popularity of the activity. Motorcycle registrations nearly doubled from the early 1970s to the mid-1980s, along with fatal crashes. Considering that motorcycle-riding season in Florida is year around, motorcycles are involved in a large proportion of the state's fatal and incapacitating crashes. In 1996, motorcycle crashes killed 160 Floridians and injured over 4,700 motorcycle occupants (only California had more fatalities – 232). An examination of Florida's crash statistics from 1990-1996 shows that, although motorcycles comprised only two percent of all registered vehicles, motorcycle occupants represented 6.7 percent of all traffic fatalities (see Table 1). Evidence suggests that efforts to reduce motorcycle fatalities may be paying off. Trends indicate that since 1993, the percentage of motorcycle occupants killed in all traffic crashes has declined from 7.4 to 5.7 in recent years (see Table 1). Further, as Figure 1 illustrates, the fatal crash rate per 10,000 registered motorcycles peaked at 11.6 in 1993 and declined to a record low of 8.2 in 1996.

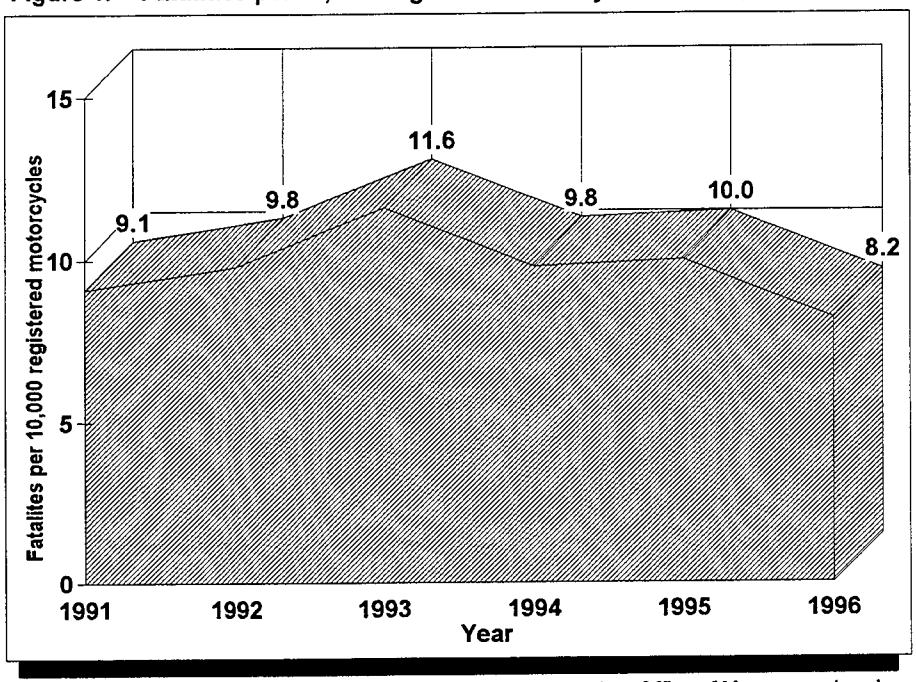
Although Florida law requires all motorcyclists to wear helmets, statistics reported on the Florida Traffic Crash Report show that 16 percent of all drivers and 30 percent of passengers killed in motorcycle crashes were not wearing safety helmets (DHSMV, 1996). Moreover, in crashes resulting in incapacitating injuries, 20 percent of all motorcycle drivers and passengers were not wearing helmets. At first glance, these numbers may appear alarming. However, law enforcement officers report whether motorcycle occupants are

Table 1. Florida Motorcycle Occupants Killed By Year: 1990-1996

Year	Total Traffic Fatalities	Registered Motorcycles (Thousands)	Motorcycle Occupants Killed	% of Total Fatalities	Motorcyclist Fatalities per 10,000 Registered Motorcycles
1990	2,951	NA	214	7.3	NA
1991	2,523	184	168	6.7	9.1
1992	2,480	178	175	7.1	9.8
1993	2,719	173	200	7.4	11.6
1994	2,722	174	170	6.2	9.8
1995	2,847	181	181	6.4	10.0
1996	2,806	196	160	5.7	8.2
Total	**19,048**	**NA**	**1,268**	**6.7**	**NA**

NOTE: NA=NOT AVAILABLE
SOURCE: FLORIDA DEPARTMENT OF HIGHWAY SAFETY AND MOTOR VEHICLES, OFFICE OF MANAGEMENT AND PLANNING.

Figure 1. Fatatities per 10,000 Registered Motorcycles Florida, 1991-1996



Source: Florida Department of Highway Safety and Motor Vehicles, Office of Management and Planning, 1996.

wearing safety helmets *after* the crash occurs. Thus, in crashes where safety equipment becomes detached at some point *during* the crash, there is no way to know if motorcycle occupants were wearing safety devices *before* the crash. Thus, these data may not be sufficient in monitoring statewide compliance with the motorcycle helmet law.

In states with universal helmet laws, some motorcycle riders protest by wearing illegal headgear and it appears that the production and use of illegal helmets may be on the rise. According to a 1996 *Traffic Safety* article, the two states with the most riders wearing illegal head gear are California and Florida (Glamser, 1996). Although illegal helmet use among California motorcyclists was estimated at 10 percent in 1992, a recent California study of

2,600 motorcyclists suggested illegal helmet usage may be as high as 30 percent[1]. In spite of the fact that Florida law requires all motorcycle riders to wear protective head and eye gear that complies with DOT standards, a 1993 study found that 15 percent of all motorcycle riders in Florida wore illegal helmets[2]. Some reasons cited for illegal helmet use were confusion over what constitutes a legal helmet, high costs of legal helmets, and perceived lack of enforcement. Because crash data do not differentiate between DOT compliant and non-compliant or "novelty" helmet use[3], there is no way to determine if the use of illegal helmets among motorcyclists has increased or decreased in recent years.

Research Objectives

In 1997, the Florida Department of Transportation (FDOT) State Safety Office contracted with the Center for Urban Transportation Research (CUTR) to conduct a second statewide observational helmet-use survey. The objectives of this research were to determine motorcycle helmet-use rates on Florida roadways, and second, to estimate the level of novelty helmet use among motorcycle occupants. The study findings allow the FDOT Safety Office to monitor statewide compliance with Florida's helmet law and compare use rates to previous as well as future results. This is particularly important given strong efforts to repeal the State's motorcycle helmet law in recent Legislative sessions. The research results also provide insight to the FDOT for use in developing public information and education programs that promote safe motorcycling in Florida.

Research Approach

CUTR researchers completed several activities in order to accomplish the research objectives. These activities included developing a field survey plan, training personnel for field data collection, implementing the field observational survey and collecting and analyzing the survey data. Each of these tasks are outlined below.

- Development of Field Survey Plan. Researchers developed a survey sampling plan according to NHTSA guidelines. The completion of this task required an extensive review of the literature, including several observational helmet surveys from other states. Researchers also defined the sample population, outlined data collection procedures, developed the data collection instrument, determined the appropriate number of field survey sites, and determined the location of each survey site. NHTSA and the FDOT project manager gave final approval to the sampling plan.

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[1]Observational survey conducted by Dr. David McArthur, Southern California Injury Prevention Research Center, UCLA School of Public Health, Los Angeles, California, 1996.

[2]Florida Motorcycle Helmet Observational Survey, Center for Urban Transportation Research, College of Engineering, University of South Florida, September, 1993.

[3]A "compliant" motorcycle helmet is a helmet certified by a manufacturer as meeting or exceeding Federal Motor Vehicle Safety Standard (FMVSS) No. 218 and is affixed with a "DOT" label on the back of the helmet. Helmets meeting DOT criteria have an inner lining of firm polystyrene foam, usually about an inch thick. A "non-compliant", "fake," "bogus," or "novelty" helmet does not meet the DOT standard, lacks the "DOT" sticker or has an unofficial one , and are typically smaller in diameter, lighter, and thinner than legal headgear. Novelty helmets typically have an inner lining of soft foam or no lining at all.

- Data Collection Personnel Training. In this task, researchers developed a training manual and used it, along with videos, to instruct personnel in data collection methods. Observers learned to use the survey instrument, to identify different types of motorcycles and motorcycle helmets, to distinguish between legal and illegal motorcycle helmets, to locate survey sites and to interpret and record data on the survey instrument. Observers also received information regarding on-site protocol and special situations that might be faced during the data collection process. The training also included field practice sessions so that observers could obtain real-world experience using the survey instrument.

- Field Survey and Data Collection. This task involved implementing the observational survey sampling plan. Observations were conducted in thirteen Florida counties over a two-month period to document motorcycle helmet compliance rates and to estimate novelty helmet-use rates on Florida's roadways.

- Data Analysis. In this task, researchers converted data into a computer readable format and conducted the statistical analyses. The analyses included a combination of descriptive and inferential statistics. Standard frequency distributions were computed and bivariate analyses were conducted using SPSS, a standard cross-tabulation program. Finally, researchers used Microsoft Word and Excel and Micrografx Charisma to produce tables and graphs summarizing the statistical output.

- Preparation of Final Report. In this task, researchers documented the study tasks and presented the results both graphically and in writing. This report constitutes the project deliverable.

Report Organization

The remainder of this report is divided into four chapters. Chapter 2 presents the information collected during the literature review, including observational surveys conducted by other states, as well as Florida, and a discussion of current helmet laws and regulations. Chapter 3 details the research methodology, including survey sampling plan and instrument design, surveyor training, and data collection methods and schedule. Chapter 4 summarizes the results of the observational surveys and presents these results graphically. The final chapter includes the research conclusions and recommendations.

Chapter
2

Literature Review

Introduction

An extensive literature review was conducted on several relevant topics to assist with the development of a research methodology. These topics included previous observational motorcycle helmet studies, as well as general information regarding motorcycle helmet laws and regulations, their importance, and the effects of helmet repeal. In addition to providing context and background for the 1998 survey, the literature was collected and reviewed with the understanding that it would:

- Assist in the development of the sampling plan by highlighting both strong and weak points to previous research methodologies,
- Assist in the conceptualization and design of the data collection instrument – the field observation form, and
- Allow for comparison of Florida's helmet laws, regulations, and compliance rates to those of other states with and without similar helmet legislation.

As such, the remaining portion of this chapter is devoted to summarizing the relevant literature and is divided into two sections: 1) previous observational motorcycle helmet studies, including surveys conducted in Florida, Tennessee, Virginia, Wisconsin, and Connecticut, and 2) motorcycle helmet laws and regulations.

Previous Motorcycle Helmet Observational Studies

1993 Florida Motorcycle Helmet Observational Survey

In 1993, the FDOT Safety Office contracted with CUTR to collect data to estimate motorcycle helmet use in Florida. The sampling plan was approved by NHTSA and the FDOT Safety Office, and included 14 counties with 25 observation sites per county. The sampled counties were: Broward, Clay, Dade, Duval, Hernando, Hillsborough, Lake, Leon, Okaloosa, Osceola, Palm Beach, Pinellas, Polk, and St. Lucie. Four counties (Dade, Duval, Hillsborough, and Polk) were double-sampled to meet the minimum sample requirement of 450 sites.

The observational surveys of helmet use were conducted from March to August 1993, with a total of 1,559 motorcyclists being observed. Of these motorcyclists, 1,317 were observed wearing DOT-approved helmets, indicating an 84.5 percent rate of compliance with Florida's helmet law. An additional 234 motorcyclists were observed wearing fake,

non-approved helmets. In addition to helmet use, information was collected on motorcyclist safety practices concerning the use of protective jackets, pants, shoes, eyewear, and gloves. The report's complete findings are summarized in Table 2.

Table 2. 1993 Florida Observational Helmet-Use Survey Results

Observation Type	Total Observed	Percentage
Wearing helmets	1,551	99.5
Wearing approved helmets	1,317	84.5
Wearing fake helmets	234	15.0
Wearing eye protection	1,515	97.2
Wearing shoes	1,444	92.6
Wearing long pants	1,152	72.9
Wearing jacket or long sleeved shirt	392	25.1
Wearing gloves	298	19.1
Total	**1,559**	**100**

SOURCE: 1993 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY

Other State Observational Surveys Reviewed

Tennessee Observational Survey of Safety Belt and Motorcycle Helmet Use, 1992

The 1992 Tennessee observational survey of safety belt and motorcycle helmet use was a statewide survey that was administered, analyzed, and documented by the University of Tennessee's Transportation Center for the Tennessee Department of Transportation. Data were to be collected and analyzed by the UT Transportation Center on a yearly basis, during the late summer months. The sampling plan, data collection techniques, and estimation procedures for the survey were all developed in accordance with NHTSA's survey guidelines. The survey covered 16 Tennessee counties and included 440 total observation sites, selected primarily according to road segment classification as rural or urban interstate, arterial, or collector/local. The state's four largest counties were chosen for double sampling.

Virginia Observational Surveys of Safety Belt and Motorcycle Helmet Use, 1992-1995

Between 1992 and 1995, Virginia conducted a series of annual statewide surveys to estimate safety belt and motorcycle helmet-use rates. These surveys, performed by the Virginia Transportation Research Council, were initiated to qualify the state for incentive funds in accordance with the requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA), Section 153. By following the specified NHTSA survey guidelines, the state received approximately $1.6 million in funding between 1991 and 1993, when the funding program was discontinued. The Virginia Department of Transportation requested that data continue to be collected using state funds and a subsequent survey was conducted in 1995. An identical sampling plan was used in all 4 years, and was nearly identical to that which was used in the Tennessee survey, as both conformed to the same NHTSA survey guidelines. All four years of the survey revealed

identical estimations - that the motorcycle helmet-use rate in Virginia was 100 percent. Table 3 summarizes the study findings.

Table 3. 1992-1995 Virginia Study Findings

Year	Number Observed	Drivers Protected	Passengers Protected	Use Rate
1992	53	47	6	100%
1993	236	208	28	100%
1994	105	90	15	100%
1995	247	208	39	100%

SOURCE: TECHNICAL ASSISTANCE REPORT, SAFETY BELT AND MOTORCYCLE HELMET USE IN VIRGINIA: RESULTS OF THE 1992 THROUGH 1995 SURVEYS BY THE VIRGINIA TRANSPORTATION RESEARCH COUNCIL

Field Observation of Helmet Usage in Wisconsin, 1993

This survey, conceptualized and performed by the Wisconsin Department of Transportation, was conducted in order to determine statewide average use of protective and conspicuity gear. As is the case with the previously discussed surveys, the sampling plan was design in accordance with NHTSA guidelines, and divided into two phases: 1) a random sample of counties, and 2) a random sample of road segments, for a total of 19 counties and 3,000 observations. Of all the studies examined, the survey form was the most useful for our survey instrument design. The form collected information on helmet use, other rider safety equipment such as headlight use, age and gender of the rider, and motorcycle type. These elements were incorporated into the final design of the Florida survey instrument form.

Connecticut Observational Safety Belt and Motorcycle Helmet-use Survey, 1996

This statewide survey was sponsored by the Joint Highway Research Advisory Council of the University of Connecticut and the Connecticut Department of Transportation. The Department of Civil and Environmental Engineering at the University of Connecticut planned, analyzed, and administered the survey. The primary difference between their sampling plan and previous examples from Tennessee, Virginia, and Wisconsin was the selection of sites based on towns, rather than counties. In total, 21 Connecticut towns were selected to sample based on total vehicle miles of travel. The number of sites selected was dependent upon the total number of road segments in each town. The survey found an overall helmet-use rate of 41.2 percent, with 289 out of 701 riders wearing helmets. In addition to observing helmet use, data were also collected on the use of protective jackets showing an even lower use rate of 20 percent (139 riders out of 701).

As was previously stated, the primary purpose of the literature review was to assist with the research methodology and provide examples for the survey design phase of the 1998 Florida survey. As such, the review of sampling plans developed for other states along with NHTSA guidelines provided researchers with insights that helped conceptualize the Florida survey instrument and determine the specific items to be observed. A complete list of the literature reviewed is contained in the bibliography at the end of this report.

Motorcycle Helmet Laws and Regulations

There is no question that motorcycle helmets reduce a motorcycle rider's risk of premature death and debilitating injury and it is no surprise that head injuries are the leading cause of death among motorcycle riders. A motorcyclist riding without a helmet is fifteen times more likely to suffer a head injury and forty times more likely to die from a head injury.[4] Although helmets cannot protect riders from all types of bodily injuries, a recent NHTSA study showed that motorcycle helmets are 67 percent effective in preventing brain injuries.[5] According to NHTSA, helmets saved the lives of more than 7,944 motorcyclists between 1984 and 1996. Moreover, NHTSA estimates that 6,561 additional lives may have been saved during those years if all motorcycle drivers and passengers wore helmets. A University of Southern California study that analyzed 3,600 motorcycle crash reports concluded that helmet use was the single most important factor contributing to one's survival in a motorcycle crash[6].

There is a tremendous social and economic burden placed on individuals, governments, and businesses because of the injuries and deaths that result from motorcycle crashes. The use of helmets can help lower these costs. NHTSA estimated that motorcycle helmet use saved $10.4 billion dollars between 1984 and 1992. During that time, an additional $9.2 billion might have been saved if everyone involved in a motorcycle crash was wearing a helmet. Helmet use saved $638 million in 1996 alone. The cost of inpatient care for head injuries to those not wearing helmets is approximately twice as much as that for helmet wearers. Hospital costs for injuries suffered by unhelmeted riders are greater, and studies show that these riders are far less likely to have insurance.[7] These expenses do not begin to cover the long-term costs of brain injuries. Almost every state has acted to reduce injuries, deaths, and costs associated with failure of motorcycle riders to wear helmets.

Only three states in the United States (Colorado, Illinois, and Iowa) do not have some type of helmet-use legislation in effect. Among the 47 states that do have helmet laws, 23 of them, along with the District of Columbia and Puerto Rico, require helmet use by all motorcycle drivers and passengers, regardless of age. California and Florida, the states with the highest number of motorcycle fatalities, have this strict legislation in place. Helmet-use requirements in the 24 other states are age-specific, with most (19) only requiring helmets on motorcycle riders under 18 years old. With an age limitation set at 21 years old, the State of Rhode Island has the highest age requirement, while Maine, with its limit set at 15 years, has the lowest. In addition to age limitations; Maine, Rhode Island, and Ohio require first-year novice riders to ride with helmets. Texas mandates the use of helmet by all riders under 20 years old and is the only state that ties minimum insurance coverage and driver safety training to helmet-use. Motorcycle riders in Texas must complete a training course

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[4]U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1995 – Motorcycles*. Washington, D.C.: National Center for Statistics & Analysis, 1995.

[5]U.S. Department of Transportation, National Highway Traffic Safety Administration, *1996 Crash Outcome Data Evaluation System (CODES): Report to Congress on Benefits of Safety Belts and Motorcycle Helmets.*. Washington, D.C.: National Center for Statistics & Analysis, 1996.

[6]U.S. Department of Transportation, National Highway Traffic Safety Administration, *State Legislative Fact Sheet*. Washington, D.C.: National Center for Statistics & Analysis, September, 1996.

[7]U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1995 – Motorcycles*.

and carry at least $10,000 medical insurance coverage to ride helmet-free. Table 4 summarizes the current motorcycle helmet laws in each state.

Table 4. Current Motorcycle Helmet Law Status By State

Helmet Law Provisions	State
Helmet use required for: ▪ All riders	Alabama, California, D.C., Florida, Georgia, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Puerto Rico, Tennessee, Vermont, Virginia, Washington, West Virginia
Helmet use required only for: ▪ Riders under 21 years of age ▪ First year novices	Rhode Island
Helmet use required only for: ▪ Riders under 20 years of age ▪ Riders without completion of a rider training course ▪ Riders without $10,000 medical insurance coverage	Texas
Helmet use required only for: ▪ Riders under 19 years of age ▪ All others must at least carry helmet	Delaware
Helmet use required only for: ▪ Riders under 18 years of age ▪ First year novices	Ohio
Helmet use required only for: ▪ Riders under 18 years of age	Alaska, Arizona, Arkansas, Connecticut, Hawaii, Idaho, Indiana, Kansas, Minnesota, Montana, New Hampshire, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Utah, Wisconsin, Wyoming
Helmet use required only for: ▪ Riders under 15 years of age ▪ Novices ▪ Holders of learner's permit	Maine
Helmet use not required	Colorado, Illinois, Iowa

SOURCE: NHTSA STATE LEGISLATIVE FACT SHEET: MOTORCYCLE HELMET USE LAWS, JANUARY 1998

According to Motorcycle Safety Foundation data, mandatory helmet-use laws have been effective in raising voluntary use rates from 45-55 percent to over 90 percent. Previous NHTSA surveys show that helmet use is essentially 100 percent in states with laws governing all motorcycle riders. In states with laws limited to minors or without any helmet use requirements at all, helmet-use rates fall to 34 percent to 54 percent.[8] According to NHTSA's 1995 Motor Vehicle Occupant Safety Survey, approximately 82 percent of Americans 16 years and older support motorcycle helmet laws. Many states have reinstated helmet-use requirements. Since 1989, six states (Oregon, Nebraska, Texas, Washington, California, and Maryland) have implemented full motorcycle helmet laws, and in the first year, each state experienced a reduction in fatality rates between 15 percent and 37

[8]U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1996 – Motorcycles.* Washington, D.C.: National Center for Statistics & Analysis, 1996, p.5.

percent. Data from states that have repealed and then readopted full helmet laws wholly reinforce this assertion. In the case of Louisiana, there was an increase in helmet use from about 50 percent to 96 percent after the full helmet law was adopted, and the fatality rate dropped 30 percent in the first year. The benefits of motorcycle helmets can be easily seen and legislation compelling the use of helmets has enjoyed considerable support. Unfortunately, there is not a unanimous opinion on this subject. Some vocal interest groups have started to pressure state legislatures to loosen or completely repeal mandatory helmet-use laws.

Florida requires all motorcycle riders to wear helmets. Florida statute 316.211, originally established in 1967, states that "no person shall operate or ride upon a motorcycle unless the person is properly wearing protective headgear that complies with the standards established by the department." The only other type of gear required by the law is a DOT-approved eye-protective device.

Despite the national statistics that led Florida to enact these laws, the effort to combat the full helmet law has continued to grow. Each year, safety proponents do battle with other legislators and motorcyclists who want the law to be weakened or completely repealed. Opponents of helmet legislation feel that such laws interfere with their personal right to "ride free". They also argue that DOT-approved helmets are cumbersome and dangerously limit operator hearing and vision, however, no studies have yet to support these claims.

In summary, studies show that repeal of helmet laws has significant impacts on both use and injury/fatality rates. More than 25 states either repealed or weakened their helmet-use laws between 1975 and 1984. During that same period, these states experienced a 10.4 percent to 33.3 percent increase in the fatality rate per motorcycle crash.[9] Riders without helmets had twice the overall head-injury rate as helmeted riders, and up to six times the critical or head injury rate.[10] These statistics lead to only one possible conclusion: state laws are effective in saving lives and decreasing head injury rates among the cycling population.

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[9]de Wolf, Virginia A. *The effect of Helmet-law repeal on motorcycle fatalities.* Washington, D.C.: National Center for Statistics and Analysis, Mathematical Analysis Division, December 1986.
[10]Berkowitz, A. *Effect of m/c helmet usage on head injuries and the effect of usage laws on helmet-wearing rates.* Washington, D.C.: National Traffic Safety Administration, March 1981.

Chapter
3

Research Methodology

Overview

This chapter describes the methodology used to design and implement a statistically valid survey for determining motorcycle helmet-use rates in Florida. Several research tasks were completed as part of this effort. First, researchers developed a survey sampling plan in accordance with NHSTA guidelines. The project team defined the sample population and determined the number and location of field survey sites. Second, researchers developed a data collection survey instrument to record the observational data. Finally, a training session was conducted so that observers could learn survey techniques and data collection procedures, and how to identify different types of motorcycle helmets, motorcycle body types, and safety equipment. The following sections describe these tasks in detail.

Survey Sampling Plan Design

A major focus of the research methodology was the development of a survey sampling plan in accordance to NHSTA guidelines. These guidelines, together with information obtained from the literature review, heavily influenced the final survey design. The purpose of the sampling plan was to determine which counties would be surveyed, the number of observational sites in each county, the specific location of these sites, and the observation schedule. The final multi-stage stratified sampling design, approved by NHTSA and the FDOT project manager, was a slight modification of the two-stage sampling design used in the 1993 survey.

The multi-stage, stratified sampling design included:

- Stratification. To increase the precision of sample estimates for a given sample size according to population, number of registered motorcycles, daily vehicle miles traveled (DVMT), and functional classification of roadways; and

- Clustering. To achieve cost effectiveness and efficiency by grouping together sites within designated timeframes.

The three-step process is described next. Tables containing supporting data are located in Appendix A.

Step One: Determine counties to be surveyed

All 67 counties in Florida were ranked according to 1997 population estimates and the percentage that each county contributes to the overall state population was calculated (see Table A-1 in Appendix A). Next, the cumulative percentages were calculated and those counties that did not fall within the 85th percentile were removed from the sample population as recommended in the NHSTA guidelines. Thus, the remaining 23 counties comprised 85 percent of the total state population.

Next, the 23 counties were ranked according to the number of registered motorcycles based on 1996 DHSMV data (see Table A-2 in Appendix A). Four counties, Monroe, Bay, Martin, and Charlotte, initially omitted due to their position outside of the 85th percentile, had significantly high numbers of registered motorcycles. As a result, the project team added these four counties to the sample population. Thus, the 27 counties included in the sample population comprised 89 percent of the registered motorcycles in the state.

According to NHTSA guidelines, a sample size of 17 counties should be used in a state with 60 counties. In states with 70 counties, 18 counties should be included in the sample population. Because Florida has 67 counties, 18 counties were selected for sampling. The 27 counties were ranked according to the number of registered motorcycles and cumulative percentages calculated (see Table A-3 in Appendix A). Based on the cumulative percentages, a random number generator technique was used to select the final counties to be sampled. Figure 2 shows the 13 counties selected, 5 of which were selected for double sampling. Counties selected for double sampling include: Broward, Dade, Duval, Hillsborough, and Volusia. Alachua, Brevard, Collier, Orange, Palm Beach, Pasco, Pinellas, and Monroe were selected for single sampling.

Step Two: Determine the number of observational sites for each county

NHTSA guidelines dictate that the average number of road segments in each county determine the number of observational sites per county. Florida has three major roadway types that carry 90 percent of the state's daily vehicle miles of travel (DVMT). Thus, the project team determined that potential observational sites would be selected from roadways classified as urban principle arterials (UPA), urban minor arterials (UMA), and rural principle arterials (RPA).[11] According to the FDOT Statistical Database, there are approximately 30,000 such road segments[12] among these three roadway classifications across the state. Thus, each county averages a total of 447 road segments.

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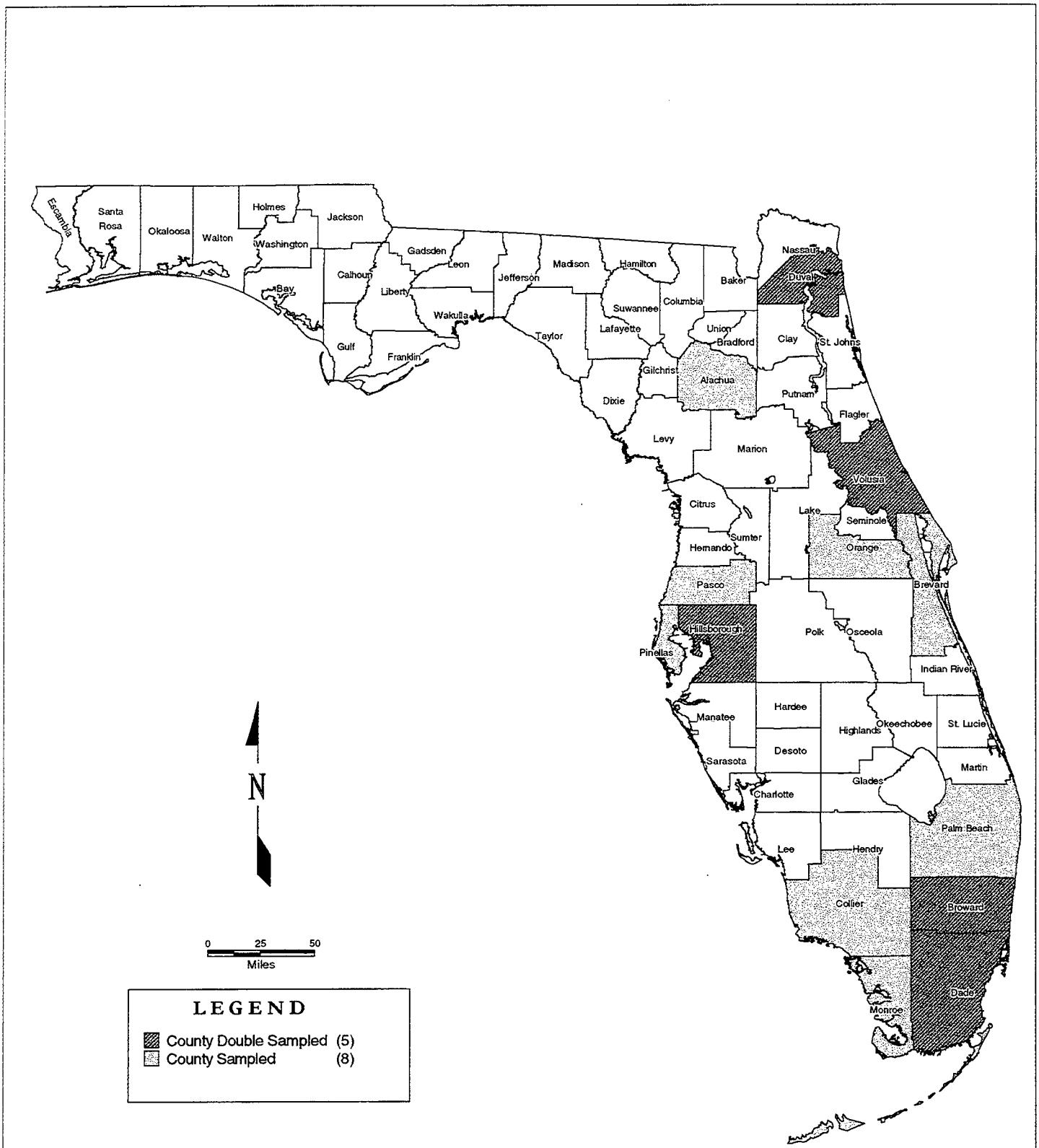
[11]These three types of functional road classes were chosen because 1) RPAs account for 86.2% of all DVMTs for the four classes of rural roads in Florida and 2) UPAs and UMAs account for 98.9% of all DVMTs for the three classes of urban roads.

[12]For the purpose of this study, a road segment is defined as "that part of the road between two major intersections."

FIGURE 2. FLORIDA COUNTIES SELECTED FOR MOTORCYCLE HELMET USE SURVEY, 1998



Based on NHTSA tables, 27 observation sites per county was the minimum established threshold for a statistically valid sample for counties averaging 400 to 500 road segments. For counties selected for doubled sampling, that number was doubled. Thus, for all 13 counties in the sample population, the number of observation sites totaled 486.

Step Three: Determine specific observation sites for each county

The data files used to select count locations were obtained from the FDOT Transportation Statistics Office in the form of an ArcInfo coverage of the Florida State Highway System and its connections. This database consisted of the "Basemap" linear referenced roadway network and associated "Info" attribute files "Arc0000.Dat" through "Arc0082.Dat" containing data for county name, functional class, intersecting road/street, and average daily traffic, all with respect to roadway identification number and milepost. A merged attribute file "intsec.dbf" was created by selecting and merging together intersections on roadways in the target functional classes in the target counties that had named intersecting public roads and streets as well as non-zero traffic counts. This file represented the statistical universe from which sample sites were selected. The main data file consisted of approximately 70,000 potential intersections on named public roads and streets on the Florida State Highway System along with thousands of additional unnamed alleyways, driveways, and curb-cuts.

The project team applied several criteria to generate a list of observation sites within each county from the data file. First, only intersections located on named public roads or streets with named cross streets were eligible for sampling. Second, only intersections on roads or streets with certain functional classifications were eligible for sampling. Next, because the sampling reflected each roadway type's contribution to DVMT for each county, only roadways with reported ADT figures (from which segment DVMT could be calculated) were selected. (For a complete listing of roadway distributions for each county, see Table A-4 in Appendix A.) These criteria were applied to each county to select the final observation sites.

Final site selections in each county were closely representative of the ratio that each roadway classification contributed to the overall DVMT. For the counties to be single-sampled, 27 sites and 6 alternatives were randomly selected. For double-sampled counties, 54 sites and 12 alternatives were randomly selected. Alternatives were selected in case observation sites could not be located, recent road construction had altered roadways, or if the project team determined the site to be dangerous in any manner.

Step Four: Determine days and times for data collection and schedule

According to NHSTA guidelines, all days of the week and all daylight hours should be included in the random selection process. However, to increase cost-effectiveness and project efficiency, clustering was acceptable. Therefore, data collection sessions in counties that required travel and overnight stays were clustered between Thursday and Sunday. This included the following counties: Alachua, Brevard, Collier, Orange, and Monroe. In every case, all daylight hours, between 7am and 8pm, were available for random selection. For counties not requiring overnight travel, all days of the week and all hours between 7am and 8pm were included in random selection process.

Observers were assigned to counties based on availability. In addition, observers with friends or family in a particular county were assigned to conduct observations in those counties. Initially, two observers were assigned to each site. However, after initial observations in Hillsborough and Pinellas counties, it became apparent that observations could be made by a single observer. This, in turn, further reduced project costs without sacrificing the quality of data collected. Table 5 presents the final data collection schedule by county along with the data collection teams.

Table 5. 1998 Florida Motorcycle Helmet Data Collection Schedule By County

County	Data Collection Dates	Data Collector
Hillsborough	5/2 – 5/8	Schang & Chraibi
Dade	5/4 – 5/10	Stoffle
Pinellas	5/11, 5/13, 5/15	Schang & Chraibi
Broward	5/12 – 5/18	Stoffle
Pasco	5/12, 5/14, 5/17	Schang
Orange	5/14 - 5/17	Chraibi
Palm Beach	5/19 – 5/22	Stoffle
Collier	5/21-5/24	Chraibi
Monroe	5/27 – 5/30	Turner/Stoffle
Alachua	5/28 – 5/31	Zokovitch
Duvall	6/5 – 6/11	Chraibi
Volusia	6/9 – 6/15	Schang
Brevard	6/18 – 6/21	Schang

SOURCE: 1998 FLORIDA OBSERVATIONAL MOTORCYCLE USE SURVEY, CENTER FOR URBAN TRANSPORTATION, UNIVERSITY OF SOUTH FLORIDA, CONDUCTED MAY 2, 1998 THROUGH JUNE 21, 1998.

Observational Survey Instrument Design

During the design phase of the 1998 observational survey, researchers studied several previous state observational surveys, including the 1993 Florida survey instrument. The project team identified shortcomings and strong points of each prior survey and compiled a list of relevant data to include on the 1998 survey form.

In addition to helmet-use, the project team agreed that the survey form should gather information about four general categories: the observation site session, rider demographics, motorcycle type, and rider safety measures. Data collected about each survey session were location (county and street), road classification, rider travel direction, observer name, observation start and end times, date, day of the week, and weather.

Rider demographics observed were gender and age group. Motorcycle classifications included sport, cruiser, touring, standard, and on/off road. A small chart was included on the observation form to provide observers with visual identifiers to determine motorcycle types.

Data collected about rider safety measures focused on protective gear and type of helmet worn by each rider and headlight use. Protective gear observed included: jackets, pants,

shoes, gloves, and eye protection. Helmet types observed were full face, open face, motorcross, novelty (not DOT-approved), unknown, and none. A visual example of each motorcycle helmet type was provided on the observation form as a quick reference guide for observers.

The project team also wanted the survey instrument to be easily read by observers and data entry personnel. A first draft of the survey form was reviewed at the observer training session and practice observation sessions were conducted. The final survey form included revisions made based on the knowledge gained during the practice sessions. The final version of the survey form is located in Appendix B.

Observer Training

A well trained, highly motivated observation team is vital to the success of any observational survey. It was obvious to researchers that data collection for this project would prove to be especially challenging. In most cases, the observed subject was going to be speeding by on a high-powered motorcycle, while the observer would only have a few seconds to accurately see and record a large amount of data.

A training session was held at CUTR on March 19, 1998 and attended by the CUTR principal investigator, the FDOT project manager, and student observers. A great deal of energy was expended on preparing and organizing the observation training session. A manual was developed and used during the session to train observers on observational survey techniques and data collection procedures. In addition, the manual contained information on helmet types, novelty helmets, motorcycle types, and other riding safety gear. The training session was divided into three sections: (See Appendix C for examples of training materials.)

- Section 1: Helmets and Safety Gear
- Section 2: Observational Survey Instructions
- Section 3: Sampling Plan and Site Selection

The training session began with an overview of the project. The purpose and goals of the project were discussed, along with an explanation of the funding sources and how the data collected would be used.

Section 1 of the training session focused on identifying different types of helmets, and specifically, the differences between DOT-approved helmets and "novelty" helmets. Printed documents reviewed included those from NHTSA, the Motorcycle Safety Foundation, and Bell Helmets. The Motorcycle Safety Foundation's "Riding Gear for the Motorcyclists" was used to investigate other safety gear such as eye protection, gloves, and appropriate riding clothes.

To become more familiar with legal and illegal helmets, observers watched two videotapes. The first video, filmed at Bike Week in Daytona, Florida, by CUTR researchers, demonstrated the variety of DOT-approved helmets and novelty helmets used by

motorcyclists. A second video, "Fake Helmets: Unsafe on Any Head", provided an in-depth look into the different types of fake helmets and how they can be accurately identified. The key features used to differentiate between DOT-approved helmets and novelty helmets were identified as helmet thickness, the presence of the DOT sticker on the back of the helmet, as well as the basic style.

In Section 2 of the training session, observational survey instructions were explained in detail. This included a discussion on survey methods, planning and safety issues, and the observational survey instrument.

In reference to survey methods, trainees learned the appropriate steps in recording the helmet type and safety equipment used by motorcycle operators and their passengers. Observers were instructed to record the information for operators first and then passengers. Because individual observations would last only a few seconds, observers were instructed to record the helmet and motorcycle data first and then the proceed in collecting the remaining demographic and safety equipment data. If observers encountered a large group of motorcyclists, they were instructed to collect data on every other one with helmet type having the highest priority. Observers were asked to leave the section blank on the survey instrument if they could not collect all the information. If helmet type, motorcycle type, safety equipment or demographic information could not be determined, observers were instructed to check "unknown" on the survey instrument.

Observers were told to arrive on time at the intersection and remain for a one-hour period. The observation schedule was set up so that observers had a half hour between observation times in order to get to the next site on time and fill out the appropriate session information on the survey instrument. Observations would continue to be made during inclement weather unless it was deemed unsafe by the observer. In this case, observers were told to continue with observations according to the schedule and return to the missed sites at the scheduled times on the next possible day. Observers were also advised to have a pair of binoculars in order to closely scrutinize the motorcyclists' helmets, and carry an adequate supply of water, sunglasses, protective lotion, and gear for inclement weather.

Several instructions were given regarding behavior at the field data collection sites. Observers were instructed to position their vehicles in a safe location near the intersection to minimize the impact on traffic flow and maximize the amount of traffic directions that could be observed. If there was no appropriate place to park the vehicle or if the observer determined that the area was not safe, observers were told to drive north or east on the arterial road until an appropriate spot was found. If there was no spot in the immediate area, then they were instructed to go to the first alternative site of the same functional road classification on the site list. Further, observers were also advised to remain in their vehicles while conducting observations.

Observers were asked to refrain from making eye contact with motorcyclists and not to draw attention to themselves by wearing bright clothing. For security purposes, observers were asked to carry few personal belongings. If their right to conduct the survey was challenged, observers were asked to very calmly explain the purpose of the survey and provide copies of the authorization letters. If the situation were to escalate, observers were told to promptly leave the observation site.

Finally, each item on the observational survey instrument was explained in detail. Observers were instructed on the meaning of each data item to be collected to help ensure data quality. For example, motorcyclists wear many different types of footwear, but which will be considered appropriate safety gear for this survey?

Section 3 of the training session explained the sampling plan and site selection. The project team felt that it was important for observers to understand the process of selecting the counties, roads and specific intersections, so that they would not deviate from the data collection schedule.

Following the training session, observers were divided into teams and assigned to area intersections for practice data collection sessions. The teams reconvened after an hour of observations to provide feedback about the survey instrument and refine data collection techniques. This resulted in some minor changes to the survey instrument to improve the recording and quality of data.

Chapter
4

Survey Analysis

Introduction

The purpose of this research was to conduct a second statewide survey of motorcycle helmet use in accordance with NHTSA's guidelines to estimate motorcycle helmet usage in Florida. Because of concerns that illegal helmet use may be on the rise in states with universal helmet laws, data were also collected to estimate the level of novelty helmet use. Motorcycle helmet data continue to be collected at the request of the FDOT Safety Office so that longitudinal data can be compared between years and over a period of years and used to monitor compliance with Florida's motorcycle helmet law.

Baseline motorcycle helmet data collected in 1993 showed that 99.5 percent of all motorcyclists in Florida used helmets and that 85 percent of the motorcyclists observed wore DOT-approved helmets. The following sections provide a detailed discussion of the survey analysis and results for the second observational survey of motorcycle helmet use.

Data Entry and Statistical Analysis

A survey codebook was created using the motorcycle observational survey instrument for the data entry process (see Appendix B). Graduate students entered the survey data into Statistical Package for Social Sciences (SPSS) Data Entry creating separate files for each county. After all survey data were entered, the 13 separate county files were merged into one large data file. Verification testing was conducted for data input accuracy. The single data file was sorted and separated into a driver-only file, a passenger-only file, and a combined driver/passenger file for more detailed analyses.

A combination of descriptive and inferential statistics was used to analyze the survey data. Standard frequency distributions were computed for each item collected on the survey instrument. Bivariate analyses were conducted using SPSS, yielding the appropriate tests of statistical significance. Finally, tables and graphs summarizing the statistical output were created with Microsoft Word and Excel, and Micrografx Charisma.

The survey findings are presented in three major categories. These categories include motorcycle observations, helmet usage, and safety equipment usage. Results are presented first on motorcycle occupants (drivers and passengers combined), followed by analyses conducted on drivers and passengers separately. Brief narratives are provided and accompanied by corollary data in graphical format.

Survey Results

Motorcycle Observations

In May-June, 1998, data collectors observed motorcyclists at 486 observation sites throughout 13 counties. Overall, data collectors recorded at least one observation during the one-hour observation period at 92 percent of the sampled sites. Over the two-month period, a total of 2,498 motorcycle riders and passengers were observed. Among those observed, 2,037 were motorcycle drivers and 461 were passengers (see Table 6).

Typically, doubled-sampled counties comprised about 15 percent of all observations while single-sampled counties contributed between 2 to 9 percent of total observations. However, in Dade and Broward counties, there were significantly lower numbers of recorded observations compared to other double-sampled counties. One explanation for the low number of recorded observations may be related to the higher traffic volumes on roadways where observations were scheduled. For example, in Dade County, almost 90 percent of the observation sites were located on urban principle arterials. Moreover, a large percentage of sites with no recorded observations in Dade County were scheduled during peak AM and PM commute hours. Thus, it may be that motorcyclists travel on less congested roadways during peak travel times in these counties.

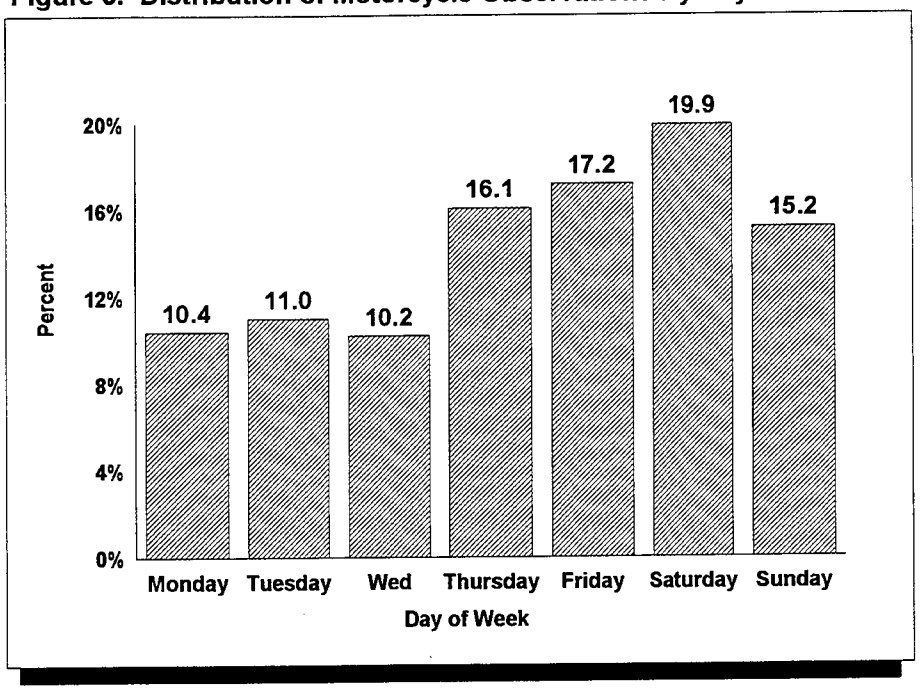
Table 6. Motorcycle Helmet-use Survey Sample Observations By County, 1998

County	Observation sites	# Sites w/at least 1 obs	Drivers Observed	Passengers Observed	Total Observed	% of Total
Dade*	54	48	122	20	142	5.7
Broward*	54	51	153	25	178	7.1
Volusia*	54	52	313	66	379	15.2
Pinellas	27	26	150	13	163	6.5
Palm Beach	27	25	71	11	82	3.3
Orange	27	26	171	64	235	9.4
Hillsborough*	54	51	312	63	375	15.0
Duval*	54	52	267	103	370	14.8
Brevard	27	26	43	7	50	2.0
Monroe	27	24	145	35	180	7.2
Pasco	27	26	126	13	139	5.6
Alachua	27	23	95	9	104	4.2
Collier	27	24	69	32	101	4.0
Total	**486**	**447**	**2,037**	**461**	**2,498**	**100%**

NOTE: *INDICATES COUNTY WAS DOUBLE-SAMPLED.
SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

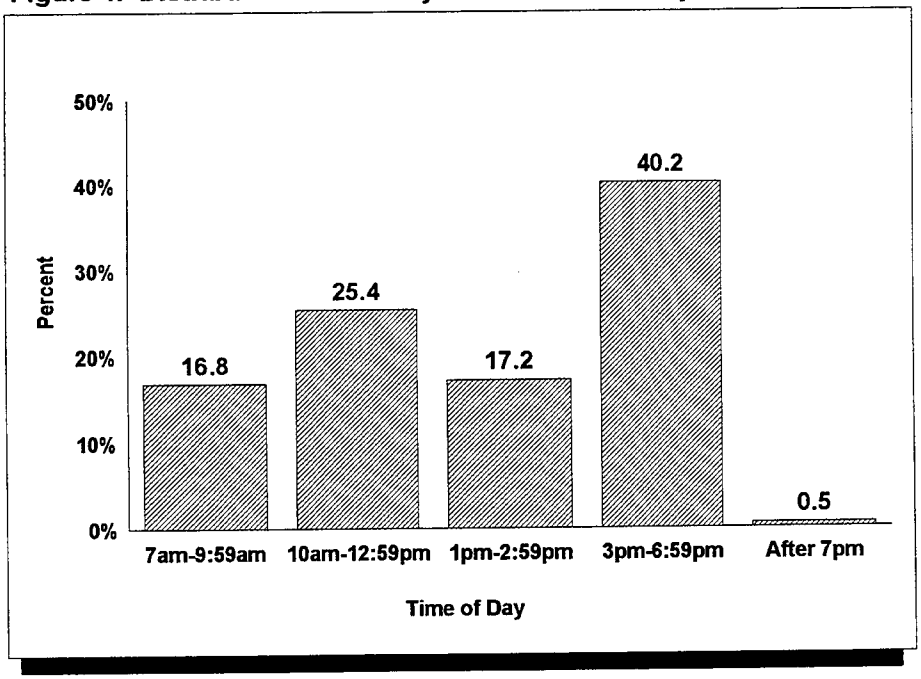
Data collectors recorded several items about the observation session on the survey instrument such as day and time, roadway classification, and prevailing weather conditions. As illustrated in Figure 3, the majority (68.4 percent) of motorcycle helmet observations took

Figure 3. Distribution of Motorcycle Observations By Day of Week



Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

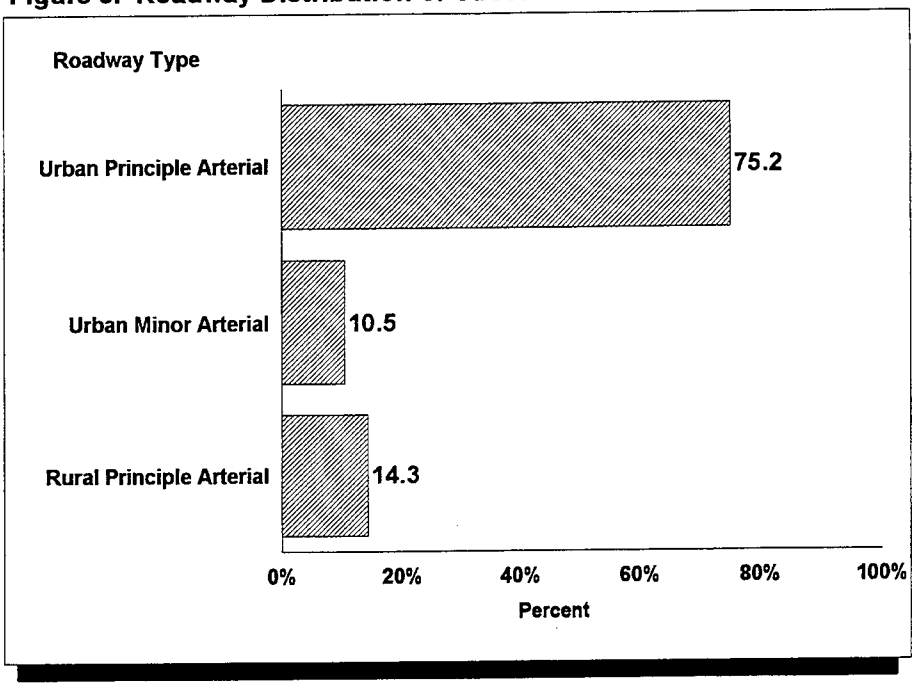
Figure 4. Distribution of Motorcycle Observations By Time of Day



Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

place Thursday through Sunday with almost one fifth of the observations conducted on Saturday (19.9 percent). As shown in Figure 4, a large number of observations occurred during the midday (25.4 percent) and in the peak PM travel hours (40.2 percent) on urban principle arterials (see Figure 5). Because the survey was conducted in May and June, the weather was quite cooperative. Almost all observations took place on sunny (80.6 percent) and partly cloudy days (18.4 percent).

Figure 5. Roadway Distribution of Observations



Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

Other data recorded during the observations included information about the age and gender of drivers and passengers, type of motorcycle driven, headlight use, type of helmet worn, and use of other safety equipment such as eyegear, jackets, gloves, pants, and shoes.

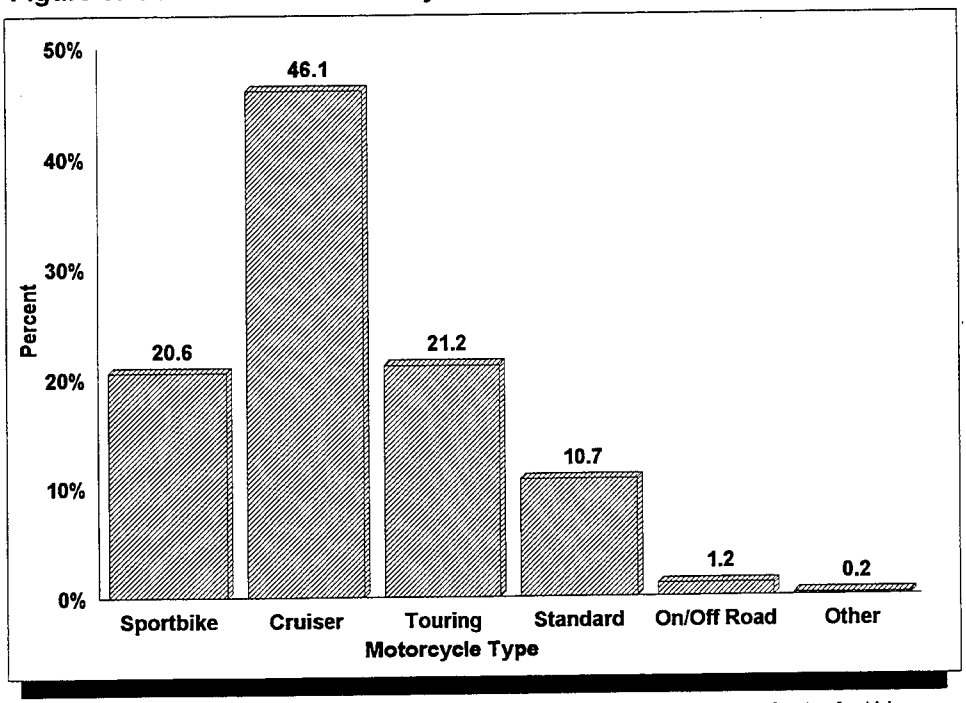
Data collected on driver and passenger age were omitted from the analysis due to the high degree of difficulty in estimating the age of the motorcycle occupant. As expected, three out of every four motorcycle occupants observed were male drivers (see Table 7). Almost one-half of the 2,307 riders (46.1 percent) observed drove cruiser-type motorcycles (see Figure 6). Other popular motorcycle styles observed include touring bikes (21.2 percent), sportbikes (20.6 percent), and standard-type motorcycles (10.7 percent). Further, 14 percent of all riders were driving without headlights, in spite of the fact that the law requires motorcyclists to drive with the headlights on at all times (see Table 8).

Table 7. Motorcycle Occupant Gender: All Observations

Gender	No. Observed	Percentage
Male	1,946	77.9%
Female	541	21.7%
Unknown	11	0.4%
Total	**2,498**	**100%**

SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Figure 6. Distribution of Motorcycles Observed: All Motorcycle Occupants



Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Table 8. Motorcycle Occupant Headlight Use: All Observations

Headlight Use	No. Observed	Percentage
Yes	1662	81.6%
No	291	14.3%
Unknown	84	4.1%
Total	**2037**	**100%**

SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Summary tables containing the breakdown of survey frequencies by all motorcycle occupants, drivers only, and passengers only are presented in Appendix D.

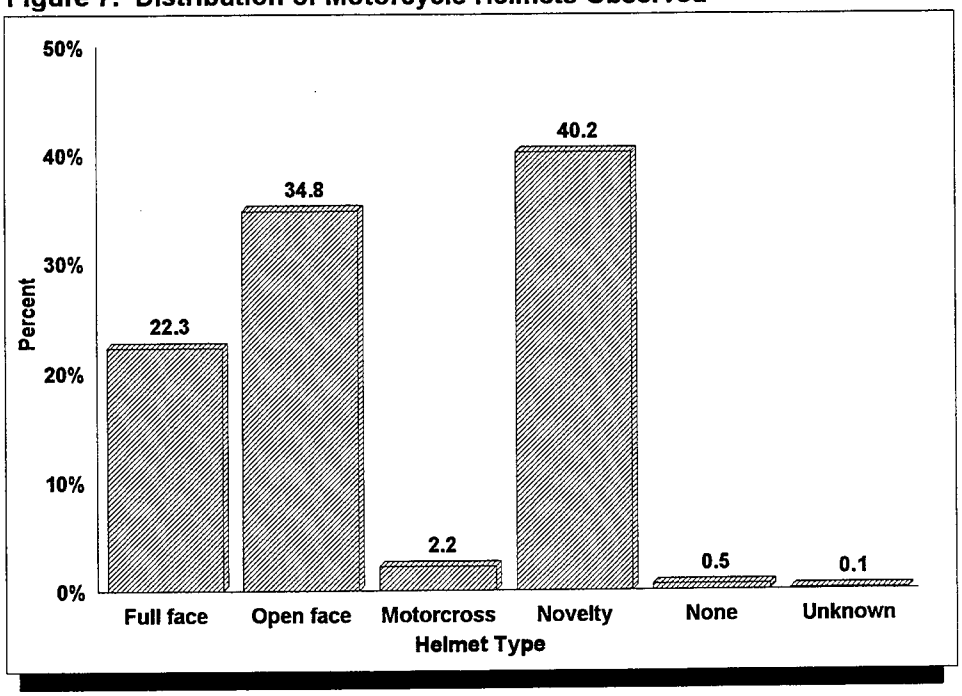
Motorcycle Helmet Usage

Almost all motorcycle occupants wore some type of helmet protection as the state-level observed usage rate for drivers and passengers is 99.5 percent. This figure remains the same as the 1993 observed state-level helmet usage rate.

An examination of the data on the type of helmet worn provides some interesting findings and is presented in Figure 7. Results indicate that 40.2 percent of motorcycle occupants observed wore novelty helmets. This figure represents a 63 percent increase in novelty helmet use over a five-year period (reported as 15 percent in 1993). Among motorcyclists wearing DOT-compliant helmets, over one-third of the occupants (34.8 percent) wore open face helmets while about one-fifth of all drivers and passengers (22.3 percent) wore full-face helmets.

Weighted estimates were calculated for the use of helmets and other protective gear. (For weighted estimates of helmet use and the use of other protective gear by occupant type, see Tables D-1, D-23, and D-33 located in Appendix D). The weighted state level estimate for novelty helmet use is 34.8 percent. This percent is significantly less than the observed rate (40.2 percent) because the highest-weighted county, Dade, had one of the lowest reported uses of novelty helmets (20.4 percent). Although the survey did not collect information about the reasons for the increase in novelty helmet use, possible explanations include the increased availability of novelty helmets, the reduction in cost of novelty helmets, the relatively high price of DOT-approved helmets, and the perceived lack of helmet law enforcement.

Figure 7. Distribution of Motorcycle Helmets Observed



Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

A total of 12 motorcycle occupants were observed riding without head protection. Thus, overall helmet-usage rates showed little variance across counties. (See Appendix E for a complete breakdown of survey results by county). However, observed incidence rates for novelty helmet use varied significantly by county from as low as 15 percent in Alachua to as high as 61 percent in Duval County. Other counties with higher than average (40.2 percent) novelty helmet usage rates were: Volusia (54.1 percent), Pasco (43.2 percent), Orange (41.3 percent), and Collier (40.6 percent). For a complete breakdown of observed and weighted helmet-compliance rates by county, please see Table E-4, Appendix E.

Although the survey findings cannot explain why there is such a difference between counties, the low rate of compliance in Volusia County may be associated with Daytona's Bike Week and the trends set for motorcycle culture at the event. Another reason for the differences may be related to perceived risk in congested traffic. For example, the low rate of novelty helmet use in Dade County may be associated with its high volume of traffic, urbanization, and an increased need for motorcycle safety. Also, differences in the way in which police enforce motorcycle helmet laws in the various counties may be another influential factor.

A comparison of the same six counties observed in 1993 and 1998 show significant increases in novelty-helmet usage rates (see Table 9). All counties experienced overall increases in the proportion of novelty helmets observed except for Dade County, which showed a 13 percent reduction. The highest percent increases were in Duval (84.4) and Palm Beach (82.1 percent).

Table 9. Observed Novelty Helmet Use By County, 1993 and 1998

County	Novelty helmet use 1993	Novelty helmet use 1998	percent Change
Dade	23.1	20.4	-13.2
Broward	15.8	32.0	50.6
Pinellas	16.1	33.1	51.4
Palm Beach	5.9	32.9	82.1
Hillsborough	16.1	31.5	48.9
Duval	9.5	60.8	84.4

SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

When driver and passenger data are analyzed separately, results show that the rate for novelty helmet use is higher among passengers than drivers (47.1 percent versus 38.6 percent, respectively). One possible explanation for this difference is that the second helmet carried on motorcycles may be cheaper, less expensive novelty helmets instead of the more expensive DOT-compliant helmet. Another reason for higher novelty helmet use among passengers may be related to motorcycle type and gender which is discussed under the corresponding section.

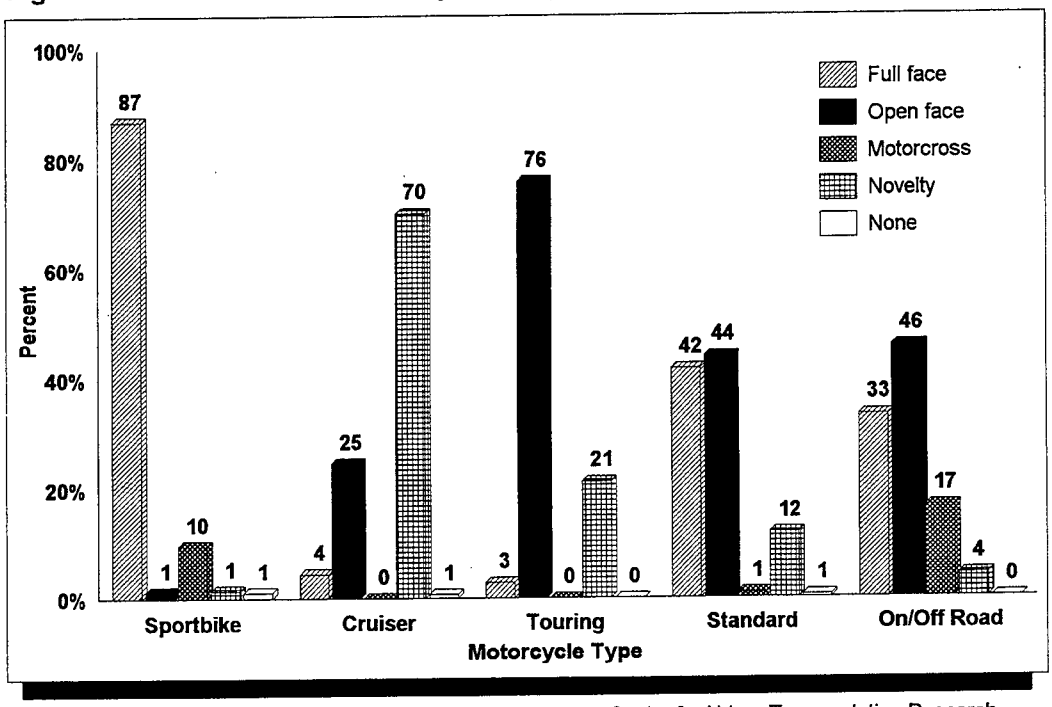
Helmet Use By Motorcycle Type

The type of helmet motorcyclists choose to wear may be related to the type of motorcycle they drive. As shown in Figure 8, almost 90 percent of the motorcycle occupants who rode sportbikes wore full-face helmets. Motorcyclists riding touring style bikes tend to wear open

face helmets (76 percent) while those that drive standard bikes wear both full face and open face helmets (42 percent and 44 percent respectively.)

Survey results indicate that novelty helmet use is typically associated with cruiser style motorcycles. (Harley Davidson manufactured the majority of cruiser-style motorcycles observed). DOT-approved helmet compliance by motorcycle occupants on cruisers was only 29.1 percent, compared to 97.6 percent compliance for sportbike riders, 95.8 percent compliance for on/off road motorcycle riders, 86.7 percent compliance for standard motorcycle riders, and 78.7 percent compliance for riders of touring motorcycles. Of all novelty helmets observed, 83.8 percent were associated with drivers of cruiser-type motorcycles. Moreover, almost three-fourths of all passengers (73.7 percent) wearing novelty helmets were riding on the back of cruiser-type motorcycles. Because there is such a high rate of novelty helmet use among occupants of cruiser-type motorcycles (70.9 percent), it may warrant further studies to determine why compliance rates are considerably lower compared to riders of other motorcycle types.

Figure 8. Observed Helmet Use By Motorcycle Type: All Motorcycle Occupants



Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

Helmet Use By Gender

Some of the more interesting findings from the survey involved the relationship between gender and novelty helmet use. Some may assume that female motorcyclists are more safety conscious and, thus, more likely to wear DOT-approved helmets. However, among drivers observed, females were almost twice as likely as males to wear novelty helmets. (65.1 percent compared to 36.4 percent) Furthermore, among females using novelty helmets, most were observed driving cruiser-type motorcycles (90.5 percent). Female

passengers exhibited similar trends. Almost one-half of all female passengers (48.1 percent) wore novelty helmets. Among those female passengers wearing novelty helmets, 74.1 percent were passengers on cruiser type motorcycles.

The reason for lower helmet compliance rates among female drivers, especially when associated with cruiser-type motorcycles, is not clear. Again, because the survey did not examine motivations for novelty helmet use among male and female riders, perhaps these findings warrant further investigation.

Safety Equipment Use

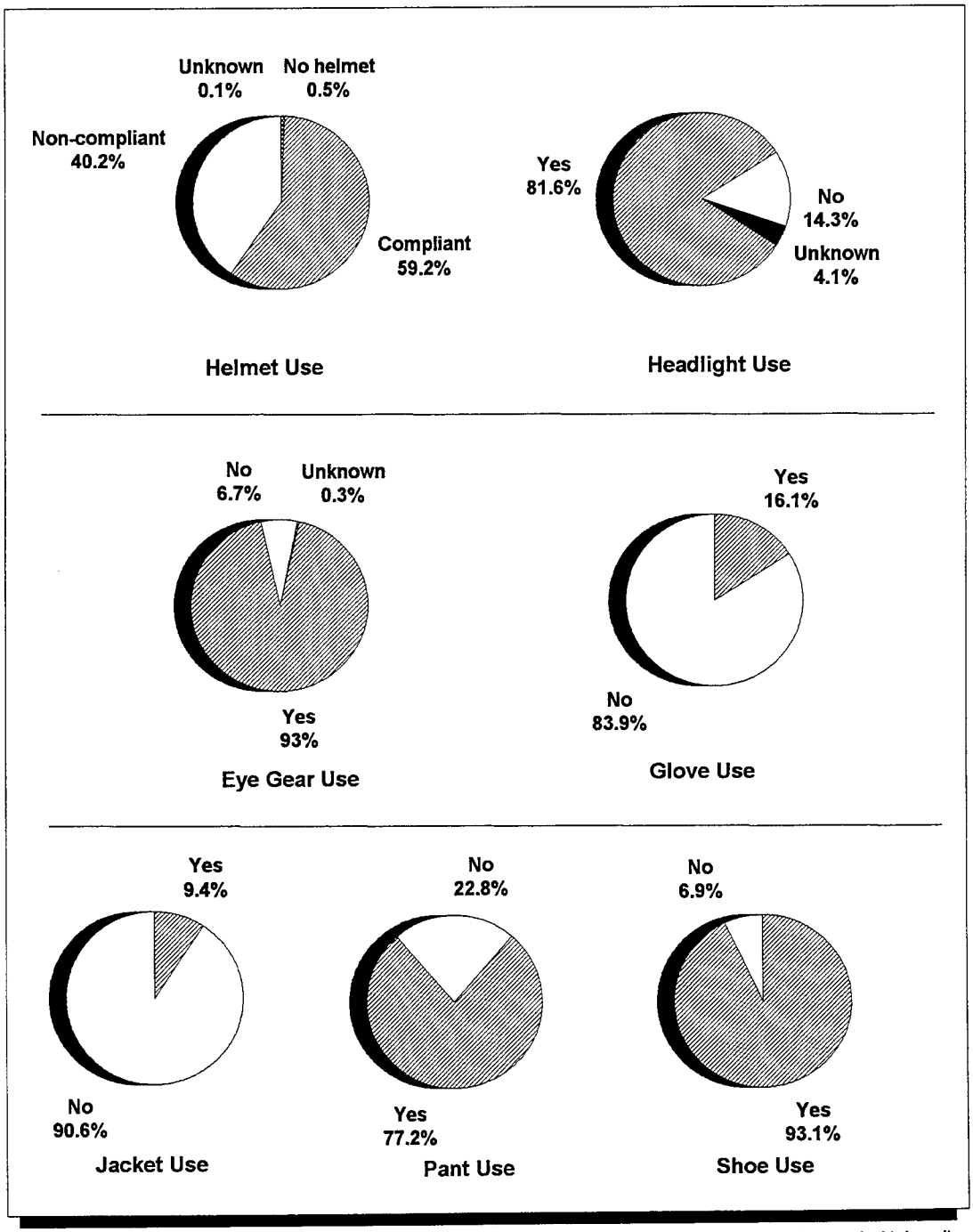
Figures 9-11 contain summaries of observed safety equipment use for motorcycle occupants, drivers only, and passengers only. In addition to results on helmet and headlight use, information is presented on the use of eye gear, jackets, pants, and shoes.

There were few changes regarding the use of other protective safety gear when compared to the 1993 survey findings. Although the use of protective eye gear is mandatory, observed rates of use fell from 97.2 percent in1993 to 93 percent in 1998. Glove use also dropped from 19.1 percent to 16.1 percent. More motorcyclists were observed wearing long pants (77.2 percent compared to 72.9 percent in 1993) and the use of appropriate footwear increased slightly from 92.6 percent to 93.1 percent. Jacket use could not be compared because the 1993 survey design included long-sleeve shirts in this category.

Among motorcycle drivers and passengers, the greatest variance in the use of other protective gear is seen in glove and pant use. Drivers are much more likely to wear long pants compared to passengers (82.9 percent vs. 52.1 percent) as well as gloves (19.4 percent vs. 1.5 percent). As with helmet use, the use of other protective safety gear may be related to gender as 92.4 percent of all passengers were female.

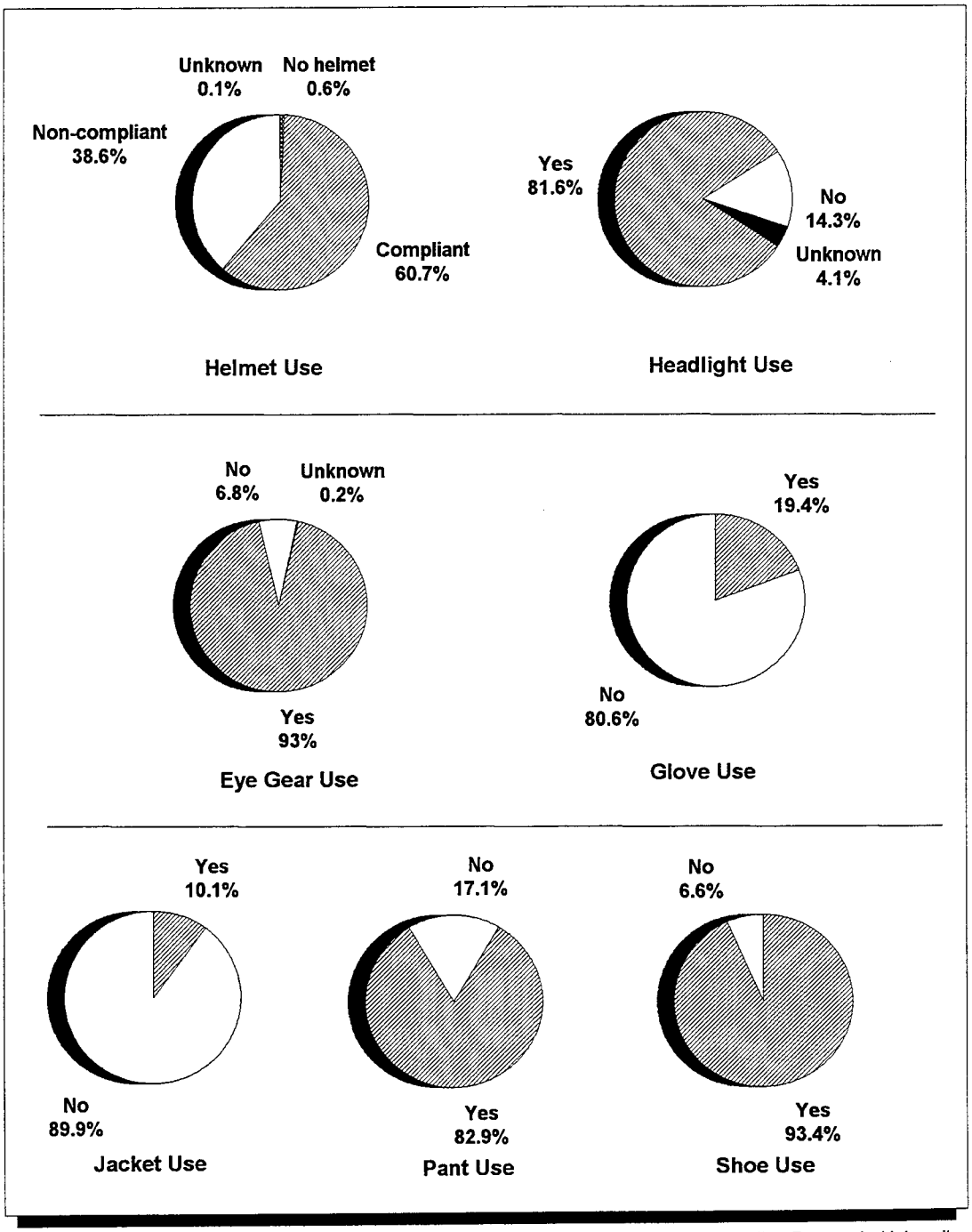
Survey results regarding demographic information, helmet use by motorcycle type, helmet use rates, headlight use, and use of other safety equipment for each county are summarized in Figures E-1 through E-13 in Appendix E.

Figure 9. Safety Equipment Use Summary: All Motorcycle Occupants



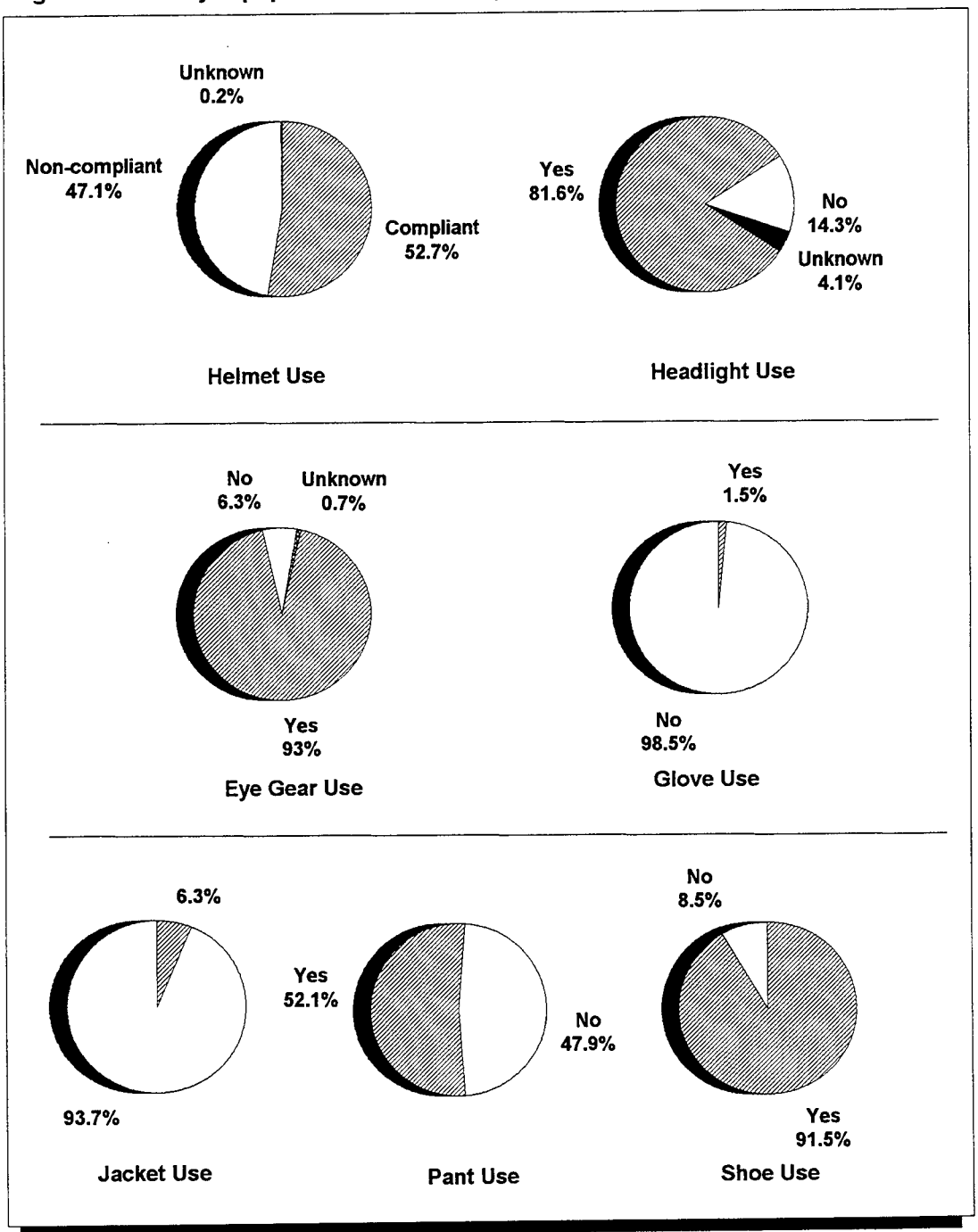
Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

Figure 10. Safety Equipment Use Summary: All Motorcycle Drivers



Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

Figure 11. Safety Equipment Use Summary: All Motorcycle Passengers



Source: Florida Observational Motorcycle Helmet Use Survey, Center for Urban Transportation Research, University of South Florida, Tampa, conducted May - June, 1998.

Chapter

5

Conclusions & Recommendations

The 1998 Florida observational motorcycle helmet-use survey produced many significant findings concerning helmet use that will be of interest to the Florida Department of Transportation, safety advocates, and legislative representatives. A summary of the major finding are contained in Table 10.

Overall, 99.5 percent of all motorcyclists wore helmets. However, as the summary results indicate, the last five years have seen a dramatic increase in the use of non DOT-approved, or novelty helmets. As indicated in Table 10, the projected state-level weighted compliance rate is 64.6 percent with a standard error of +/- 1.58 percent. Although almost all motorcyclists wear some type of protective headgear, over one-third (34.8 percent) of the helmets worn on Florida roadways are novelty helmets.

Table 10. Summary of Motorcycle Helmet-use Survey Findings, 1998: All Motorcycle Occupants

Observation type	No. observed		Sample percentage		Weighted percentage	
	1993	1998	1993	1998	1993*	1998
Wearing helmets	1,551	2,486	99.5	99.5%	99.5	99.5%
Wearing approved helmets	1,317	1,480	84.5	59.2%	NA	64.6%
Wearing novelty helmets	234	1,003	15.0	40.2%	NA	34.8%
Wearing eye protection	1,515	2,324	97.2	93.0%	NA	94.2%
Wearing shoes	1,444	2,325	92.6	93.1%	NA	94.5%
Wearing long pants	1,152	1,929	72.9	77.2%	NA	74.2%
Wearing jackets	392**	235	25.1	9.4%	NA	7.7%
Wearing gloves	298	402	19.1	16.1%	NA	12.2%
Total	**1,559**	**2,498**				

NOTES: *WEIGHTED ESTIMATES WERE ONLY CALCULATED FOR HELMET USE.
**JACKET USE INCLUDED WEARING LONG SLEEVE SHIRTS.
SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Because the purpose of having a mandatory helmet law in Florida is to reduce motorcycle injuries and fatalities as well as the cost of treating head injuries, the increase in novelty helmet use is alarming. Further studies are necessary in order to estimate the impact of the

novelty helmet use on head-injuries and medical costs and to determine what factors may have contributed to the increase.

A significant survey finding is that the type of helmet used may be related to the type of motorcycle driven and the gender of drivers and passengers. This study found that, overall, novelty helmet use was higher for passengers than for drivers. This may be related to the cost of purchasing a second DOT-compliant helmet which is typically much higher than novelty helmets.

The study also found that most observed novelty helmets were worn by drivers and passengers riding on cruiser-type motorcycles. A large percentage of females wearing novelty helmets were also driving cruiser-type motorcycles. Further, among female passengers wearing novelty helmets, the majority were passengers on cruiser-type motorcycles. Because there is a high rate of novelty helmet use among this population group, further studies should be conducted to determine why compliance rates differ from riders driving different types of motorcycles.

In addition, there are probably many reasons why females exhibit lower rates of compliance than male counterparts, especially when associated with cruisers. Thus, further investigation may be warranted to determine the role that gender plays in helmet use as well as the use of other protective safety equipment. Recall that 30 percent of all motorcycle passengers killed in 1995 did not wear a helmet and that the majority of passengers observed were female. Thus, it may also be beneficial to investigate why passengers and drivers exhibit different behaviors regarding safety equipment use while riding motorcycles so that safety messages can be properly targeted.

Compliance rates among counties varied significantly. The lowest observed rate was Duval County with only 38.9 percent compliance. Alachua County had the highest compliance rate at 83.7 percent. Although the survey findings cannot explain why there is such a difference between counties, differences may be related to perceived risks in counties with higher traffic volumes and urbanization, the prevailing motorcycle culture, and differences in helmet law enforcement policies. Perhaps further investigation of how and if the motorcycle helmet law is enforced by local, county and state law enforcement agencies would be beneficial in determining why some counties have higher observed rates of novelty helmet use.

Finally, in terms of other safety equipment, there were no major changes when compared to the 1993 findings. The use of eye protection dropped slightly, along with the use of gloves. Overall, pant use increased as well as the use of appropriate footwear. The study found differences related to gender and occupant type and safety equipment use. Drivers were more likely to wear long pants and gloves compared to passengers (the majority of passengers were female). To better understand the relationship between safety equipment use and gender, further analysis should be conducted. However, to answer these questions, surveys are not the only means of data collection. Individual and group interviews conducted by social scientists are also needed to attain the necessary qualitative data.

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Appendix A

Florida Observational Motorcycle Helmet Survey Sampling Plan Supporting Data

Table A-1. Florida Population and Daily Vehicle Miles Traveled (DVMT) By County

Pop Rank	County	County Pop.	State Pop.	% of State Pop.	Cum. % of State Pop.	Co. DVMT	% of State DVMT
1	Dade	2070573	14712922	14.073	14.073	24112.0	10.428
2	Broward	1423729	14712922	9.677	23.750	21164.4	9.154
3	Palm Beach	1003798	14712922	6.823	30.573	14000.3	6.055
4	Hillsborough	928731	14712922	6.312	36.885	14616.8	6.322
5	Pinellas	888141	14712922	6.036	42.921	8502.3	3.677
6	Orange	803614	14712922	5.462	48.383	13438.7	5.812
7	Duval	741508	14712922	5.040	53.423	15201.8	6.575
8	Polk	459010	14712922	3.120	56.543	7656.9	3.312
9	Brevard	458035	14712922	3.113	59.656	8039.9	3.477
10	Volusia	413668	14712922	2.812	62.468	7403.7	3.202
11	Lee	394244	14712922	2.680	65.148	4101.5	1.774
12	Seminole	337498	14712922	2.294	67.442	3981.9	1.722
13	Pasco	315785	14712922	2.146	69.588	3867.2	1.672
14	Sarasota	311043	14712922	2.114	71.702	4155.2	1.797
15	Escambia	291135	14712922	1.979	73.681	4511.0	1.950
16	Manatee	241422	14712922	1.641	75.322	3624.3	1.567
17	Marion	237204	14712922	1.612	76.934	4262.8	1.843
18	Leon	227714	14712922	1.548	78.482	3217.8	1.392
19	Alachua	208125	14712922	1.415	79.897	4502.3	1.947
20	Collier	200024	14712922	1.360	81.257	2395.4	1.036
21	Lake	188331	14712922	1.280	82.537	3379.3	1.462
22	St. Lucie	179133	14712922	1.218	83.755	3119.0	1.349
23	Okaloosa	171038	14712922	1.163	84.918	3169.9	1.371
	Bay	144584	14712922	0.983	85.901	2350.1	**78.896**
	Osceola	143828	14712922	0.978	86.879	3507.7	
	Charlotte	131307	14712922	0.892	87.771	1704.1	
	Clay	127926	14712922	0.869	88.640	1605.9	
	Hernando	122099	14712922	0.830	89.470	1583.0	
	Martin	116359	14712922	0.791	90.261	2938.5	
	Citrus	109984	14712922	0.748	91.009	1145.9	
	St. Johns	105965	14712922	0.720	91.729	2949.8	
	Indian River	104605	14712922	0.711	92.440	1858.7	
	Santa Rosa	102338	14712922	0.696	93.136	2181.6	
	Monroe	84743	14712922	0.576	93.712	2283.5	
	Highlands	79536	14712922	0.541	94.253	1256.3	
	Putnam	70243	14712922	0.477	94.730	1094.4	
	Columbia	53684	14712922	0.365	95.095	2228.4	
	Nassau	52740	14712922	0.358	95.453	1570.4	
	Gadsden	49740	14712922	0.338	95.791	1225.4	
	Jackson	49387	14712922	0.336	96.127	1450.2	
	Sumter	44366	14712922	0.302	96.429	1643.7	

Table A-1. Florida Population and Daily Vehicle Miles Traveled (DVMT) By County

Pop Rank	County	County Pop.	State Pop.	% of State Pop.	Cum. % of State Pop.	Co. DVMT	% of State DVMT
	Flagler	41190	14712922	0.280	96.709	1174.5	
	Walton	36094	14712922	0.245	96.954	1443.5	
	Okeechobee	34746	14712922	0.236	97.190	739.2	
	Suwannee	33223	14712922	0.226	97.416	1026.9	
	Levy	31591	14712922	0.215	97.631	713.6	
	Hendry	30308	14712922	0.206	97.837	547.9	
	DeSoto	27224	14712922	0.185	98.022	415.9	
	Bradford	25231	14712922	0.171	98.193	639.2	
	Hardee	22447	14712922	0.153	98.346	469.1	
	Baker	21138	14712922	0.144	98.490	672.8	
	Washington	20116	14712922	0.137	98.627	585.9	
	Taylor	19184	14712922	0.130	98.757	453.3	
	Madison	19035	14712922	0.129	98.886	928.5	
	Wakulla	18660	14712922	0.127	99.013	328.7	
	Holmes	17609	14712922	0.120	99.133	458.8	
	Gulf	14103	14712922	0.096	99.229	231.4	
	Jefferson	13988	14712922	0.095	99.324	657.5	
	Hamilton	13708	14712922	0.093	99.417	905.3	
	Union	13103	14712922	0.089	99.506	193.8	
	Dixie	13039	14712922	0.089	99.595	290.1	
	Calhoun	12876	14712922	0.088	99.683	274.6	
	Gilchrist	12531	14712922	0.085	99.768	234.1	
	Franklin	10497	14712922	0.071	99.839	209.5	
	Glades	9648	14712922	0.066	99.905	341.0	
	Liberty	7694	14712922	0.052	99.957	137.3	
	Lafayette	7002	14712922	0.048	100.005	141.3	
	TOTAL	**14,712,922**	**14,712,922**	**100.00**		**231,216**	

SOURCE: ESTIMATED POPULATION FIGURES FOR APRIL 1, 1997 FROM, BUREAU OF ECONOMIC AND BUSINESS RESEARCH, "FLORIDA POPULATION STUDIES", VOLUME 31, NO. 2, BULLETIN 120, UNIVERSITY OF FLORIDA, JANUARY 1998. DAILY VEHICLE MILES OF TRAVEL FIGURES FROM FLORIDA DEPARTMENT OF TRANSPORTATION STATISTICS OFFICE REPORT DATED DECEMBER 1997.

Table A-2. Florida Population and Daily Vehicle Miles Traveled By Registered Motorcycles

Motorcycle Rank	Pop. Rank	County	Co. Pop.	% FL Pop.	Co. DVMT	% DVMT	Reg. MC	% Reg. MC
1	1	Dade	2070573	14.073	24112.0	10.428	18279	8.977%
2	2	Broward	1423729	9.677	21164.4	9.154	16600	8.153%
3	10	Volusia	413668	2.812	7403.7	3.202	13599	6.679%
4	5	Pinellas	888141	6.036	8502.3	3.677	13077	6.423%
5	3	Palm Beach	1003798	6.823	14000.3	6.055	12260	6.021%
6	6	Orange	803614	5.462	13438.7	5.812	10217	5.018%
7	4	Hillsborough	928731	6.312	14616.8	6.322	9972	4.898%
8	7	Duval	741508	5.040	15201.8	6.575	8753	4.299%
9	9	Brevard	458035	3.113	8039.9	3.477	8626	4.237%
10	34	Monroe	84743	0.576	2283.5	0.988	7183	3.528%
11	11	Lee	394244	2.680	4101.5	1.774	6440	3.163%
12	12	Seminole	337498	2.294	3981.9	1.722	5783	2.840%
13	8	Polk	459010	3.120	7656.9	3.312	5765	2.831%
14	13	Pasco	315785	2.146	3867.2	1.672	5248	2.577%
15	14	Sarasota	311043	2.114	4155.2	1.797	4996	2.454%
16	17	Marion	237204	1.612	4262.8	1.843	3697	1.816%
17	19	Alachua	208125	1.415	4502.3	1.947	3477	1.708%
18	16	Manatee	241422	1.641	3624.3	1.567	3293	1.617%
19	15	Escambia	291135	1.979	4511.0	1.950	3204	1.574%
20	21	Lake	188331	1.280	3379.3	1.462	3149	1.547%
21	23	Okaloosa	171038	1.163	3169.9	1.371	3095	1.520%
22	20	Collier	200024	1.360	2395.4	1.036	2943	1.445%
23	22	St. Lucie	179133	1.218	3119.0	1.349	2817	1.384%
24	24	Bay	144584	0.983	2350.1	1.016	2518	1.237%
25	29	Martin	116359	0.791	2938.5	1.271	2411	1.184%
26	26	Charlotte	131307	0.892	1704.1	0.737	2227	1.094%
27	18	Leon	227714	1.548	3217.8	1.392	2123	1.043%
28	25	Osceola	143828	0.978	3507.7	1.517	1997	89.264%
29	31	St. Johns	105965	0.720	2949.8		1994	
30	27	Clay	127926	0.869	1605.9	0.695	1874	
31	30	Citrus	109984	0.748	1145.9		1847	
32	28	Hernando	122099	0.830	1583.0	0.685	1726	
33	32	Indian River	104605	0.711	1858.7		1617	
34	33	Santa Rosa	102338	0.696	2181.6		1301	
35	42	Flagler	41190	0.280	1174.5		1289	
36	35	Highlands	79536	0.541	1256.3		1092	
37	36	Putnam	70243	0.477	1094.4		910	
38	38	Nassau	52740	0.358	1570.4		607	
39	44	Okeechobee	34746	0.236	739.2		560	
40	41	Sumter	44366	0.302	1643.7		510	
41	37	Columbia	53684	0.365	2228.4		489	

Table A-2. Florida Population and Daily Vehicle Miles Traveled By Registered Motorcycles

Motorcycle Rank	Pop. Rank	County	Co. Pop.	% FL Pop.	Co. DVMT	% DVMT	Reg. MC	% Reg. MC
42	46	Levy	31591	0.215	713.6		404	
43	47	Hendry	30308	0.206	547.9		311	
44	45	Suwannee	33223	0.226	1026.9		277	
45	40	Jackson	49387	0.336	1450.2		267	
46	49	Bradford	25231	0.171	639.2		256	
47	43	Walton	36094	0.245	1443.5		238	
48	48	DeSoto	27224	0.185	415.9		223	
49	55	Wakulla	18660	0.127	328.7		212	
50	39	Gadsden	49740	0.338	1225.4		178	
51	50	Hardee	22447	0.153	469.1		160	
52	53	Taylor	19184	0.130	453.3		148	
53	51	Baker	21138	0.144	672.8		145	
54	63	Gilchrist	12531	0.085	234.1		139	
55	54	Madison	19035	0.129	928.5		126	
56	56	Holmes	17609	0.120	458.8		119	
57	61	Dixie	13039	0.089	290.1		117	
58	52	Washington	20116	0.137	585.9		116	
59	57	Gulf	14103	0.096	231.4		106	
60	64	Franklin	10497	0.071	209.5		100	
61	65	Glades	9648	0.066	341.0		90	
62	60	Union	13103	0.089	193.8		78	
63	58	Jefferson	13988	0.095	657.5		63	
64	62	Calhoun	12876	0.088	274.6		60	
65	59	Hamilton	13708	0.093	905.3		50	
66	67	Lafayette	7002	0.048	141.3		33	
67	66	Liberty	7694	0.052	137.3		30	
		TOTAL	**14,712,922**	**100.0**	**231,216**		**203,611**	

SOURCES: ESTIMATED POPULATION FIGURES FOR APRIL 1, 1997 FROM, BUREAU OF ECONOMIC AND BUSINESS RESEARCH, "FLORIDA POPULATION STUDIES", VOLUME 31, NO. 2, BULLETIN 120, UNIVERSITY OF FLORIDA, JANUARY 1998.
DAILY VEHICLE MILES OF TRAVEL FIGURES FROM FLORIDA DEPARTMENT OF TRANSPORTATION STATISTICS OFFICE REPORT 1: ALL ROADS, DECEMBER 1997.
MOTORCYCLE REGISTRATION DATA FROM THE FLORDIA DEPARTMENT OF HIGHWAY SAFETY AND MOTOR VEHICLES (DHSMV) REVENUE REPORT, 1997.

Table A-3. Sample Population of Counties for Random Selection Process

Motor-cycle Rank	Pop. Rank	County	Co. Pop.	% FL Pop.	Co. DVMT	% DVMT	Reg. MC	Reg. MC %	Cum MC %
1	1	Dade	2070573	14.073	24112.0	10.428	18279	10.057%	10.057%
2	2	Broward	1423729	9.677	21164.4	9.154	16600	9.133%	19.190%
3	10	Volusia	413668	2.812	7403.7	3.202	13599	7.482%	26.673%
4	5	Pinellas	888141	6.036	8502.3	3.677	13077	7.195%	33.868%
5	3	Palm Beach	1003798	6.823	14000.3	6.055	12260	6.745%	40.613%
6	6	Orange	803614	5.462	13438.7	5.812	10217	5.621%	46.234%
7	4	Hillsborough	928731	6.312	14616.8	6.322	9972	5.487%	51.721%
8	7	Duval	741508	5.040	15201.8	6.575	8753	4.816%	56.537%
9	9	Brevard	458035	3.113	8039.9	3.477	8626	4.746%	61.283%
10	34	Monroe	84743	0.576	2283.5	0.988	7183	3.952%	65.235%
11	11	Lee	394244	2.680	4101.5	1.774	6440	3.543%	68.778%
12	12	Seminole	337498	2.294	3981.9	1.722	5783	3.182%	71.960%
13	8	Polk	459010	3.120	7656.9	3.312	5765	3.172%	75.132%
14	13	Pasco	315785	2.146	3867.2	1.672	5248	2.887%	78.019%
15	14	Sarasota	311043	2.114	4155.2	1.797	4996	2.749%	80.768%
16	17	Marion	237204	1.612	4262.8	1.843	3697	2.034%	82.802%
17	19	Alachua	208125	1.415	4502.3	1.947	3477	1.913%	84.715%
18	16	Manatee	241422	1.641	3624.3	1.567	3293	1.812%	86.527%
19	15	Escambia	291135	1.979	4511.0	1.950	3204	1.763%	88.290%
20	21	Lake	188331	1.280	3379.3	1.462	3149	1.733%	90.023%
21	23	Okaloosa	171038	1.163	3169.9	1.371	3095	1.703%	91.726%
22	20	Collier	200024	1.360	2395.4	1.036	2943	1.619%	93.345%
23	22	St. Lucie	179133	1.218	3119.0	1.349	2817	1.550%	94.895%
24	24	Bay	144584	0.983	2350.1	1.016	2518	1.385%	96.280%
25	29	Martin	116359	0.791	2938.5	1.271	2411	1.327%	97.607%
26	26	Charlotte	131307	0.892	1704.1	0.737	2227	1.225%	98.832%
27	18	Leon	227714	1.548	3217.8	1.392	2123	1.168%	100.000%
Total			**12,970,496**		**191,701**		**181,752**	**100%**	

Table A-4 Selected Counties & Number of Survey Sites By Roadway Functional Classification

County	# of Survey Sites	UPA* DVMT	UMA* DVMT	RPA* DVMT	Total	% UPA	% UMA	% RPA
Dade	54	18778.3	3843.7	1413	24035	78%	16%	6%
Broward	54	17570.8	2864.1	520	20954.9	84%	14%	2%
Volusia	54	4061.8	295	2818.8	7175.6	57%	4%	39%
Pinellas	27	6572	1908.2	0	8480.2	77%	23%	0%
Palm Beach	27	10670.7	1582.3	1187.1	13440.1	79%	12%	9%
Orange	27	10150.9	1867.8	1311	13329.7	76%	14%	10%
Hillsborough	54	11671.7	903.5	2033.2	14608.4	80%	6%	14%
Duval	54	11642.1	2877.1	614.8	15134	77%	19%	4%
Brevard	27	4772.2	479.6	2562	7813.8	61%	6%	33%
Monroe	27	950.6	16.6	1316.4	2283.6	42%	1%	58%
Pasco	27	1889.8	88.1	1864.7	3842.6	49%	2%	49%
Alachua	27	1502.7	409.3	2156.2	4068.2	37%	10%	53%
Collier	27	856.5	197.7	1128.4	2182.6	39%	9%	52%
Total	**486**	**101,090**	**17,333**	**18,926**	**137,349**	**74% (avg)**	**13% (avg)**	**14% (avg)**

NOTES: UPA = URBAN PRINCIPLE ARTERIAL
UMA = URBAN MINOR ARTERIAL
RPA = RURAL PRINCIPLE ARTERIAL

SOURCE: ROAD CLASSIFICATION FIGURES FROM FDOT STATISTICS OFFICE, STATE HIGHWAY SYSTEM REPORT 1: ALL ROADS, DECEMBER 31, 1997.

Appendix B

Florida Observational Motorcycle Helmet Use Survey Form & Codebook

MOTORCYCLE HELMET OBSERVATION FORM

(A)

Session 1 Information

Site Location: _____ (1) (County)

(2) (Site #) _____ (3) (Street/Intersection Name)

Road Classification: _____ (4)

Direction of Travel Being Observed: ☐N ☐E ☐S ☐W (5)

Observer Name(s): _____ (6)

Start Time: _____ (7) ☐AM ☐PM End Time: _____ (8) ☐AM ☐PM

Date: _____ (9)

Day: ☐M ☐Tu ☐W ☐Th ☐F ☐Sa ☐Su (10)

Session 2 Information

Site Location: _____ (County)

_____ (Site #) _____ (Street Name)

Road Classification: _____

Direction of Travel Being Observed: ☐N ☐E ☐S ☐W

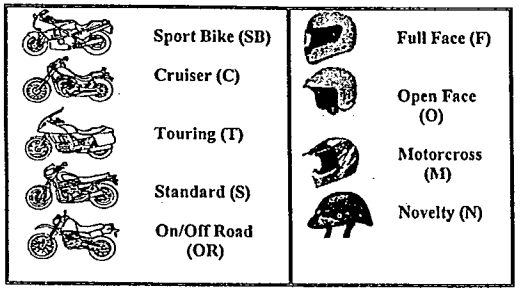
Observer Name(s): _____

Start Time: _____ ☐AM ☐PM End Time: _____ ☐AM ☐PM

Date: _____

Day: ☐M ☐Tu ☐W ☐Th ☐F ☐Sa ☐Su

Vehicle and Helmet Coding (C)



Session 1 Observations (B)

No.	Rider (11) D = Driver P = Passenger	Helmet (12) F = Full Face O = Open Face M = Motorcross N = Novelty (Not DOT Approved) NH = No Helmet U = Unknown	Protective Gear (13) J = Jacket P = Pants S = Shoes G = Gloves E = Eye Protection	Age Group (14) 1 = 0-15 2 = 16-59 3 = 60+ U = Unknown	Gender (15) M = Male F = Female U = Unknown	Cycle (16) SB = Sport Bike C = Cruiser T = Touring S = Standard OR = On/Off Road M = Moped/Scooter O = Other (custom/unknown)	Headlights On (17) Y = Yes N = No	Weather (18) C = Clear/ Sunny PC = Partly Cloudy R = Raining
1	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
2	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
3	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
4	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
5	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
6	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
7	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
8	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
9	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
10	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
11	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
12	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
13	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
14	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
15	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R

Session 2 Observations

No.	Rider D = Driver P = Passenger	Helmet F = Full Face O = Open Face M = Motorcross N = Novelty (Not DOT Approved) NH = No Helmet U = Unknown	Protective Gear J = Jacket P = Pants S = Shoes G = Gloves E = Eye Protection	Age Group 1 = 0-15 2 = 16-59 3 = 60+ U =Unknown	Gender M = Male F = Female U = Unknown	Cycle SB = Sport Bike C = Cruiser T = Touring S = Standard OR = On/Off Road M = Moped/Scooter O = Other (custom/unknown)	Headlights On Y = Yes N = No	Weather C = Clear/ Sunny PC = Partly Cloudy R = Raining
1	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
2	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
3	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
4	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
5	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
6	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
7	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
8	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
9	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
10	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
11	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
12	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
13	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
14	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
15	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R

Observational Instrument Codebook

1. Survey #
= Continuous

2. Site Location (County)
1= Dade
2= Broward
3= Volusia
4= Pinellas
5= Palm Beach
6= Orange
7= Hillsborough
8= Duval
9= Brevard
10= Monroe
11=Pasco
12= Alachua
13= Collier

3. Site #
= the site number from Co. observation site form

4. Road Classification
1= Urban Principle Arterial (FC 14)
2= Urban Minor Arterial (FC 16)
3= Rural Principle Arterial (FC 2)

5. Direction of Travel
1= North
2= East
3= South
4= West
5=N/S
6=E/W
7=all

6. Observers
1= Sloan
2= Issam
3= Chris
4= Brent
5= Patty
6= Jeff
7= Sloan and Issam
8= Chris and Jeff

7. Start time
= Use military time, e.g. 1:30pm = 13:30

8. End time
=Use military time, as above

9. Date
= Enter mm/dd/yy

10. Day
1= Monday
2= Tuesday
3= Wednesday
4= Thursday
5= Friday
6= Saturday
7= Sunday

11. Observation #
= from observation form

12. Rider
1= Driver
2= Passenger

13. Helmet
0= No Helmet
1= Full Face
2= Open Face
3= Motorcross
4= Novelty
5= Unknown

14. Gear-J (Jacket)
0= no
1= yes

15. Gear-P (Pants)
0= no
1= yes

16. Gear-S (Shoes)
0= no
1= yes

17. Gear-G (Gloves)
0= no
1= yes

18. Gear-E (Eye Protection)
0= no
1= yes

19. Age
1= 0-15
2= 16-59
3= 60+
4= unknown

20. Gender
1= male
2= female
3= unknown

21. Cycle
1= SB (Sport Bike)
2= C (Cruiser)
3= T (Touring
4= S (Standard)
5= OR (On/off Road)
6= M (Moped/Scooter)
7= O (other)

22. Lights On
0= no
1= yes

23. Weather
1= C (Clear/Sunny)
2= PC (Partly Cloudy)
3= R (Raining)

Note: If it is a passenger do not fill out anything past gender.

If no observations were recorded at the site, fill out all the info and place a zero in the observation number column.

Come see me to get Road Classifications if you can't find them.

If you have any other questions, don't hesitate to ask me.

Appendix C

Florida Observational Motorcycle Helmet Survey Training Materials

TRAINING SESSION AGENDA

I. MORNING (10AM - 12PM)

A. Project Overview (Turner)
   1. Who is funding project, and how the collected data will be used
   2. Comparison to previous 1993 survey
      a. Purpose
      b. Major errors

B. Discussion on Helmets and Safety Gear (Schang)
   1. What we're looking for
   2. Discuss illustrations of correct/incorrect equipment and use
   3. Watch and discuss videos, "Bike Week", and "Fake Helmets: Unsafe on Any Head."

C. Discussion of Observational Form (Turner)
   1. Sample survey form
   2. Written Instructions – explanation of categories, coding, and what is expected for each
   3. The "age category" issue

D. Survey Planning (Turner/Zambito)
   1. What to bring for personal comfort
   2. Rules of data collection - stay alert, stay at site for full time allotment
   3. Safety
      a. How to position yourself
      b. How to handle confrontation (letter(s) of intent)

E. Discussion of Sampling Plan and Site Selection (Hagelin)
   1. Sampling plan overview/background – how counties were chosen
   2. How specific intersections/road segments will be chosen

II. AFTERNOON (1PM -) PILOT SURVEY

A. Brief Overview
   1. Why conduct a pilot survey
   2. Teams
      a. Team 1: Connie and Patty
      b. Team 2: Brent and Jeff
      c. Team 3: Chris, Sloan, and Tony
   3. Locations
      a. Fowler Avenue and Nebraska Avenue
      b. Dale Mabry Highway and Fletcher Avenue

B. Conduct Pilot Observation Survey

C. Post-Survey Discussion - what did and didn't work

Observational Survey Instructions

Survey Objectives

To estimate the helmet usage for motorcycle riders in the state of Florida.

Observation Methods

What: Observe and record number of drivers and passengers using helmets and other variables.

Who: Observe motorcycle operator first, then the passenger. If you encounter a group of motorcycles where there are too many to observe at one time, observe every second motorcycle.

When: Observations should begin at or as close as possible to the time indicated by the schedule. All observations must be made for the fully specified time of one hour.

Where: The observers should make every possible effort to position their vehicle so that it is possible to make observations from inside the car, as this will minimize the impact that may be made on traffic behavior, as well as minimize the possibility of conflict. Each observation team may divide the responsibilities as they see fit, perhaps having one member verbally call out the observations while the second makes the written notations. It is highly recommended that each team bring at least one pair of binoculars for closer examination of the rider's helmet.

How: Each team will be provided with a notebook containing the appropriate county maps, with observation sites clearly marked on them, and corresponding spreadsheets that give the time and day during which each observation will take place. Once an observation is complete, the observer should initial and date the corresponding space on the provided spreadsheets.

Survey Planning and Safety

What to Bring:

The observer should bring anything that will maximize his or her personal comfort, without disrupting the data collection (reading, hand held games, etc). This would include: an adequate supply of drinking water, sunglasses, protective lotion, and gear for inclimate weather.

Safety Concerns:

Common sense should be used at all times, especially considering Florida's high rate of pedestrian accidents and deaths. Do not make eye contact with motorcycle riders. Strategically position your vehicle at the intersection upon arrival at the observation site. Observers should not wear clothing that will call attention to themselves (bright colors), and should minimize their personal

belongings (cash, jewelry, etc.) in case of a criminal confrontation. If the observer's right to conduct this survey is challenged, he or she should very calmly explain the project's purpose and provide copies of all authorization letters (see sample enclosed in this section). If the situation escalates, the observer should promptly leave the observation site, and indicate this action on the observation form. Remember, no aspect of this survey is worth injury to your person.

Observation Form

(See following sample form for corresponding lettered and numbered sections)

(A) Session 1 Information: You will notice that there is space on the form for information pertaining to two separate sessions. A total of fifteen observations may be made under each session heading. If an observer has more than fifteen observations at one site, then the information indicated under session one will be carried over to session two. Otherwise, this form is designed so that the observations from two different sites may be recorded on one sheet of paper, reducing the overall amount of paperwork.

(1) County: The observer will enter the name of the county he or she is conducting observations.

(2) Site #: The observer will enter the numerical value assigned to that site/location by the sampling plan. This will be provided in advance.

(3) Street/Intersection Name: The observer will enter the actual name of the street or intersection where he or she is observing motorcycles.

(4) Road Classification: The observer will enter the road type (principal or minor arterial), which will be provided in advance.

(5) Direction of Travel Being Observed: The observer will check the box corresponding to the direction(s) of travel being observed. If possible, the observer should record motorcycles traveling in both directions at the observation site. If this is not possible (i.e. the road is too wide to observe both directions) then the observer should observe the side of the road that is closest, and record the direction of traffic on the observation form.

(6) Observer Name(s): All of the names of the observers participating in each session should be recorded here.

(7) Start Time: The observer should enter the exact start time of the session here, being sure to indicate AM or PM.

(8) End Time: The observer should enter the exact end time of the session here, being sure to indicate AM or PM.

(9) Date: The observer should enter the numerical calendar date of the session here.

(10) Day: The observer should check the corresponding day of the session here.

(B) Session 1 Observations: It is in this section of the form that the actual observation data will be recorded. The information entered here should correspond with what is entered under the Session 1 Information heading, and the same is true for both of the session 2 sections.

(11) Rider: The observer should indicate here whether he or she is observing the characteristics of a motorcycle driver or passenger. Information on the driver should be recorded first, followed by the passenger, and should be recorded in succession (If the driver is observation no. 1, then the passenger should be observation no. 2). Information on the bike type, headlights, and weather conditions will remain the same for the driver and the passenger.

(12) Helmet: The observer should indicate the presence and type of the helmet being used. Answering "N", for "novelty helmet" will indicate that the rider is wearing a helmet, but one that is not DOT approved. Section (C) on the form provides a quick reference illustration of helmet types and their corresponding codes.

(13) Protective Gear: The observer should indicate what types of protective gear is being worn by the rider, marking all that apply. See Section I of the training booklet for specific information on safety gear.

(14) Age Group: The observer should indicate his or her best estimate on the rider's age. If unable to make a comfortable estimate, the observer should mark "U" for "unknown."

(15) Gender: The observer should indicate his or her best estimate of the rider's gender. If unable to make a comfortable estimate, the observer should mark "U", for "unknown."

(16) Cycle: The observer should indicate what type of motorcycle is being ridden. Sample motorcycle pictures and lists of distinguishing characteristics have been included in this booklet to help with this category. It would be very beneficial for the observer to bring this to each observation session as a detailed reference. Section (C) on the form provides a quick reference illustration of bike types and their corresponding codes.

(17) Headlights On: The observer should indicate whether or not the motorcycle's headlights are turned on. Pursuant to Florida Statute 316.405(1), motorcycle operators must have the headlights turned on at all times, day or night.

(18) Weather: The observer should indicate the state of the weather at the time of each individual observation, according to the choices listed.

(C) Vehicle and Helmet Coding: This section is provided as a quick reference guide to identifying motorcycle and helmet types. For a more detailed explanation of each motorcycle type, see Section II of the training booklet. For a more detailed explanation of helmet types, see Section I of the booklet.

MOTORCYCLE HELMET OBSERVATION FORM

Session 1 Information

Site Location: _____
(County)

_____ _____
(Site #) (Street/Intersection Name)

Road Classification: _____

Direction of Travel Being Observed: ☐N ☐E ☐S ☐W

Observer Name(s): _____

Start Time: _____ End Time: _____
☐AM ☐PM ☐AM ☐PM

Date: _____
Day: ☐M ☐Tu ☐W ☐Th ☐F ☐Sa ☐Su

Session 2 Information

Site Location: _____
(County)

_____ _____
(Site #) (Street Name)

Road Classification: _____

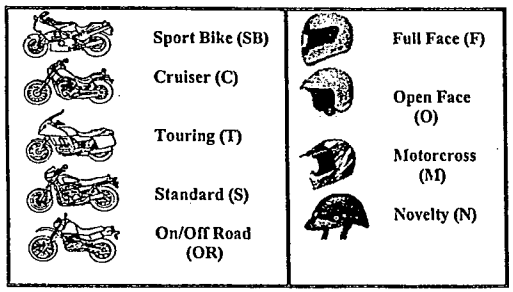
Direction of Travel Being Observed: ☐N ☐E ☐S ☐W

Observer Name(s): _____

Start Time: _____ End Time: _____
☐AM ☐PM ☐AM ☐PM

Date: _____
Day: ☐M ☐Tu ☐W ☐Th ☐F ☐Sa ☐Su

Vehicle and Helmet Coding

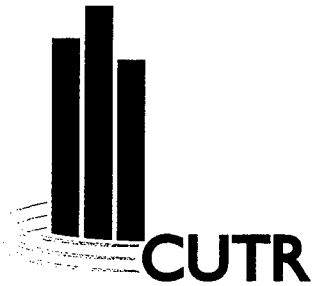


Session 1 Observations

No.	Rider D = Driver P = Passenger	Helmet F = Full Face O = Open Face M = Motorcross N = Novelty (Not DOT Approved) NH = No Helmet U = Unknown	Protective Gear J = Jacket P = Pants S = Shoes G = Gloves E = Eye Protection	Age Group 1 = 0-15 2 = 16-59 3 = 60+ U = Unknown	Gender M = Male F = Female U = Unknown	Cycle SB = Sport Bike C = Cruiser T = Touring S = Standard OR = On/Off Road M = Moped/Scooter O = Other (custom/unknown)	Headlights On Y = Yes N = No	Weather C = Clear/ Sunny PC = Partly Cloudy R = Raining
1	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
2	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
3	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
4	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
5	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
6	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
7	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
8	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
9	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
10	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
11	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
12	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
13	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
14	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
15	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R

Session 2 Observations

No.	Rider D = Driver P = Passenger	Helmet F = Full Face O = Open Face M = Motorcross N = Novelty (Not DOT Approved) NH = No Helmet U = Unknown	Protective Gear J = Jacket P = Pants S = Shoes G = Gloves E = Eye Protection	Age Group 1 = 0-15 2 = 16-59 3 = 60+ U =Unknown	Gender M = Male F = Female U = Unknown	Cycle SB = Sport Bike C = Cruiser T = Touring S = Standard OR = On/Off Road M = Moped/Scooter O = Other (custom/unknown)	Headlights On Y = Yes N = No	Weather C = Clear/ Sunny PC = Partly Cloudy R = Raining
1	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
2	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
3	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
4	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
5	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
6	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
7	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
8	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
9	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
10	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
11	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
12	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
13	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
14	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R
15	D P	F O M N NH U	J P S G E	1 2 3 U	M F U	SB C T S OR M O	Y N	C PC R



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SunCom 574-3120
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Web: *http://www.cutr.eng.usf.edu*

May 1, 1998

To Whom It May Concern:

The individual holding this letter is part of a research survey team from the University of South Florida's Center for Urban Transportation Research. This team is studying the use of helmets by motorcycle riders in 13 Florida counties: Alachua, Brevard, Broward, Collier, Dade, Duval, Hillsborough, Monroe, Orange, Palm Beach, Pasco, Pinellas, and Volusia. In order to do this properly, it is necessary for team members to place themselves at a good vantage point in a pre-determined observation location. This study is a joint venture between the Center for Urban Transportation Research at the University of South Florida and The Florida Department of Transportation Safety Office.

If you should have any questions or concerns, please contact me at the University of South Florida at the number or address listed above.

Patricia A. Turner

Patricia Turner
Research Associate in Transportation Safety

Appendix D

Florida Motorcycle Helmet Use Survey Frequencies

All Observations: This section includes frequencies for all motorcycle occupants observed which includes drivers and passengers.

Table D-1. Standard Error and Confidence Intervals: All Motorcycle Occupants

Category	Helmet use	Compliant helmet use	Eye protection use	Jacket use	Shoe Use	Glove use	Pant use
Percent	99.4%	64.6%	94.2%	7.7%	94.5%	12.2%	74.2%
Standard error	0.2%	1.6%	0.8%	1.1%	1.8%	1.1%	2.5%
Confidence interval 95%	0.3%	3.1%	1.5%	2.2%	3.5%	2.1%	4.6%

Note: Standard errors and confidence intervals were determined using the NPTS formula for stratified samples. Due to errors in standard SAS formulas for determining standard errors and confidence intervals for stratified samples, a new program was written especially for this study.

Table D-2. Motorcycle Occupant Type: All Observations

Rider Type	No. Observed	Percentage
Drivers	2037	81.5%
Passengers	461	18.5%
Total	**2,498**	**100%**

Table D-3. Motorcycle Occupant Gender: All Observations

Gender	No. Observed	Percentage
Males	1,946	77.9%
Females	541	21.7%
Unknown	11	0.4%
Total	**2498**	**100%**

Table D-4. Motorcycle Occupant Bike Type: All Observations

Motorcycle Type	No. Observed	Percentage
Sportbike	420	20.6%
Cruiser	939	46.1%
Touring	431	21.2%
Standard	218	10.7%
On/off road	24	1.2%
Other	5	0.2%
Total	**2037**	**100%**

Table D-5. Motorcycle Occupant Helmet Use: All Observations

Observation Type	No. Observed	Percentage
None	12	0.5%
Full face	556	22.3%
Open face	870	34.8%
Motor cross	54	2.2%
Novelty (not DOT approved)	1003	40.2%
Unknown	3	0.1%
Total	**2498**	**100%**

Table D-6. Motorcycle Occupant Helmet Compliance: All Observations

Compliance	No. Observed	Percentage
No helmet	12	0.5%
Compliant helmet	1,480	59.2%
Non-compliant helmet	1003	40.2%
Unknown	3	0.1%
Total	**2498**	**100%**

Table D-7. Motorcycle Occupant Eye Protection Use: All Observations

Eye Protection Use	No. Observed	Percentage
Yes	2324	93.0%
No	167	6.7%
Unknown	7	0.3%
Total	**2498**	**100%**

Table D-8. Motorcycle Occupant Glove Use: All Observations

Glove Use	No. Observed	Percentage
Yes	402	16.1%
No	2096	83.9%
Total	**2498**	**100%**

Table D-9. Motorcycle Occupant Jacket Use: All Observations

Jacket Use	No. Observed	Percentage
Yes	235	9.4%
No	2263	90.6%
Total	**2498**	**100%**

Table D-10. Motorcycle Occupant Pant Use: All Observations

Pant Use	No. Observed	Percentage
Yes	1929	77.2%
No	569	22.8%
Total	**2498**	**100%**

Table D-11. Motorcycle Occupant Shoe Use: All Observations

Shoe Use	No. Observed	Percentage
Yes	2325	93.1%
No	173	6.9%
Total	**2498**	**100%**

Table D-12. Motorcycle Occupant Headlight Use: All Observations

Headlight Use	No. Observed	Percentage
Yes	1662	81.6%
No	291	14.3%
Unknown	84	4.1%
Total	**2037**	**100%**

Driver Observations: This section includes frequency distributions of survey data collected on all motorcycle drivers observed.

Table D-13. Gender: Drivers Only

Gender	No. Observed	Percentage
Males	1,920	94.3%
Females	115	5.6%
Unknown	2	0.1%
Total	**2037**	**100%**

Table D-14. Motorcycle Type: Drivers Only

Motorcycle Type	No. Observed	Percentage
Sportbike	420	20.6%
Cruiser	939	46.1%
Touring	431	21.2%
Standard	218	10.7%
On/off road	24	1.2%
Other	5	0.2%
Total	**2037**	**100%**

Table D-15. Helmet Type: Drivers Only

Observation Type	No. Observed	Percentage
None	12	0.6%
Full face	517	25.4%
Open face	674	33.1%
Motor cross	46	2.3%
Novelty (not DOT approved)	786	38.6%
Unknown	2	0.1%
Total	**2037**	**100%**

Table D-16. Helmet Compliance: Drivers Only

Compliance	No. Observed	Percentage
No helmet	12	0.6%
Compliant helmet	1237	60.7%
Non-compliant helmet	786	38.6%
Unknown	2	0.1%
Total	**2037**	**100%**

Table D-17. Eye Protection Use: Drivers Only

Eye Protection Use	No. Observed	Percentage
Yes	1895	93.0%
No	138	6.8%
Unknown	4	0.2%
Total	**2037**	**100%**

Table D-18. Glove Use: Drivers Only

Glove Use	No. Observed	Percentage
Yes	395	19.4%
No	1642	80.6%
Total	**2037**	**100%**

Table D-19. Jacket Use: Drivers Only

Jacket Use	No. Observed	Percentage
Yes	206	10.1%
No	1831	89.9%
Total	**2037**	**100%**

Table D-20. Pant Use: Drivers Only

Pant Use	No. Observed	Percentage
Yes	1689	82.9%
No	348	17.1%
Total	**2037**	**100%**

Table D-21. Shoe Use: Drivers Only

Shoe Use	No. Observed	Percentage
Yes	1902	93.4%
No	134	6.6%
Unknown	1	0.0%
Total	**2037**	**100%**

Table D-22. Headlight Use: Drivers Only

Headlight Use	No. Observed	Percentage
Yes	1662	81.6%
No	291	14.3%
Unknown	84	4.1%
Total	**2037**	**100%**

Table D-23. Standard Error and Confidence Intervals: Drivers Only

Category	Helmet use	Compliant helmet use	Eye protection use	Jacket use	Shoe use	Glove use	Pant use
Percent	99.3%	66.0%	94.0%	8.0%	95.0%	14.3%	82.0%
Standard error	0.2%	2.0%	0.8%	1.1%	1.7%	1.2%	2.3%
Confidence interval 95%	0.4%	3.9%	1.6%	2.2%	3.3%	2.3%	4.6%

Note: Standard errors and confidence intervals were determined using the NPTS formula for stratified samples . Due to errors in standard SAS formulas for determining standard errors and confidence intervals for stratified samples, a new program was written especially for this study.

Passenger Observations: This section includes frequency distributions of survey data collected on all motorcycle passengers observed.

Table D-24. Gender:- Passengers Only

Gender	No. Observed	Percentage
Males	26	5.6%
Females	426	92.4%
Unknown	9	2.0%
Total	**461**	**100%**

Table D-25. Motorcycle Type: Passengers Only

Motorcycle Type	No. Observed	Percentage
Sportbike	39	8.5%
Cruiser	214	46.4%
Touring	189	41.0%
Standard	19	4.1%
On/off road	0	0.0%
Other	0	0.0%
Total	**461**	**100%**

Table D-26. Helmet Type: Passengers Only

Observation Type	No. Observed	Percentage
None	0	0.0%
Full face	39	8.5%
Open face	196	42.5%
Motor cross	8	1.7%
Novelty (not DOT approved)	217	47.1%
Unknown	1	0.2%
Total	**461**	**100%**

Table D-27. Helmet Compliance: Passengers Only

Compliance	No. Observed	Percentage
No helmet	0	0.0%
Compliant helmet	243	52.7%
Non-compliant helmet	217	47.1%
Unknown	1	0.2%
Total	**461**	**100%**

Table D-28. Eye Protection Use: Passengers Only

Eye Protection Use	No. Observed	Percentage
Yes	429	93.1%
No	29	6.3%
Unknown	3	0.7%
Total	**461**	**100%**

Table D-29. Glove Use: Passengers Only

Glove Use	No. Observed	Percentage
Yes	7	1.5%
No	454	98.5%
Total	**461**	**100%**

Table D-30. Jacket Use: Passengers Only

Jacket Use	No. Observed	Percentage
Yes	29	6.3%
No	432	93.7%
Total	**461**	**100%**

Table D-31. Pant Use: Passengers Only

Pant Use	No. Observed	Percentage
Yes	240	52.1%
No	221	47.9%
Total	**461**	**100%**

Table D-32. Shoe Use: Passengers Only

Shoe Use	No. Observed	Percentage
Yes	422	91.5%
No	39	8.5%
Total	**461**	**100%**

Table D-33. Standard Error and Confidence Intervals: Passengers Only

Category	Helmet use	Compliant helmet use	Eye protection use	Jacket Use	Shoe Use	Glove Use	Pant Use
Percent	99.9%	58.0%	95.2%	6.1%	92.0%	1.4%	52.9%
Standard error	0.1%	4.8%	1.1%	1.8%	1.9%	0.8%	5.1%
Confidence interval 95%	0.2%	9.3%	2.2%	3.5%	3.8%	1.5%	10.2%

Note: Standard errors and confidence intervals were determined using the NPTS formula for stratified samples. Due to errors in standard SAS formulas for determining standard errors and confidence intervals for stratified samples, a new program was written especially for this study.

Appendix E

Florida Motorcycle Helmet Use Survey Frequencies By County

Table E-1. Total Observations By County: All Motorcycle Occupants

County	Drivers Observed	Passengers Observed	Total Observed	Percentage
Dade	122 85.9%	20 14.1%	142	5.7%
Broward	153 86.0%	25 14.0%	178	7.1%
Volusia	313 82.6%	66 17.4%	379	15.2%
Pinellas	150 92.0%	13 8.0%	163	6.5%
Palm Beach	71 86.6%	11 13.4%	82	3.3%
Orange	171 72.8%	64 27.2%	235	9.4%
Hillsborough	312 83.2%	63 16.8%	375	15.0%
Duval	267 72.2%	103 27.8%	370	14.8%
Brevard	43 86.0%	7 14.0%	50	2.0%
Monroe	145 80.6%	35 19.4%	180	7.2%
Pasco	126 90.6%	13 9.4%	139	5.6%
Alachua	95 91.3%	9 8.7%	104	4.2%
Collier	69 68.3%	32 31.7%	101	4.0%
Total	**2037** **81.5%**	**461** **18.5%**	**2498**	**100%**

SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Table E-2. Gender Distribution By County: All Motorcycle Occupants

County	Males Observed	Females Observed	Unknowns	Total
Dade	124 87.3%	17 12.0%	1 0.7%	142
Broward	152 85.9%	26 14.6%	0	178
Volusia	311 82.1%	68 17.9%	0	379
Pinellas	148 90.8%	14 8.6%	1 0.6%	163
Palm Beach	71 86.6%	11 13.4%	0	82
Orange	150 63.8%	83 35.3%	2 0.9%	235
Hillsborough	293 78.1%	80 21.3%	2 0.5%	375
Duval	227 61.4%	140 37.8%	3 0.8%	370
Brevard	43 86.0%	7 14.0%	0	50
Monroe	144 80.0%	35 19.4%	1 0.6%	180
Pasco	128 92.1%	11 7.9%	0	139
Alachua	93 89.4%	11 10.6%	0	104
Collier	62 61.4%	38 37.6%	1 1.0%	101
Total	**1946** **77.9%**	**541** **21.7%**	**11** **0.4%**	**2498**

SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Table E-3. Helmet Type By County: All Motorcycle Occupants

County	No Helmet	Full face	Open face	Motor X	Novelty	Other	Total
Dade	1 0.7%	62 43.7%	50 35.2%	0	29 20.4%	0	142
Broward	2 1.1%	66 37.1%	53 29.8%	0	57 32.0%	0	178
Volusia	5 1.3%	52 13.7%	116 30.6%	1 0.3%	205 54.1%	0	379
Pinellas	0	34 20.9%	75 46.0%	0	54 33.1%	0	163
Palm Beach	0	37 45.1%	17 20.7%	1 1.2%	27 32.9%	0	82
Orange	1 0.4%	27 11.5%	101 43.0%	8 3.4%	97 41.3%	1 0.4%	235
Hillsborough	1 0.3%	101 26.9%	150 40.0%	5 1.3%	118 31.5%	0	375
Duval	0	37 10.0%	75 20.3%	32 8.6%	225 60.8%	1 0.3%	370
Brevard	0	8 16.0%	31 62.0%	0	11 22.0%	0	50
Monroe	2 1.1%	52 28.9%	63 35.0%	0	63 35.0%	0	180
Pasco	0	21 15.1%	58 41.7%	0	60 43.2%	0	139
Alachua	0	50 48.1%	33 31.7%	4 3.8%	16 15.4%	1 1.0%	104
Collier	0	9 8.9%	48 47.5%	3 3.0%	41 40.6%	0	101
Total	**12** **0.5%**	**556** **22.3%**	**870** **34.8%**	**54** **2.2%**	**1003** **40.2%**	**3** **0.1%**	**2498**

SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Table E-4. Helmet Compliance By County, Observed and Weighted: All Motorcycle Occupants

County	No Helmet		Compliant Helmets		Non-compliant Helmet		Unknown	Total
	Observed	Weighted	Observed	Weighted	Observed	Weighted		
Dade	1 0.7%	0.6%	112 78.9%	79.1%	29 20.4%	20.3%	0	142
Broward	2 1.1%	1.0%	119 66.9%	67.2%	57 32.0%	31.8%	0	178
Volusia	5 1.3%	1.4%	169 44.6%	47.2%	205 54.1%	51.4%	0	379
Pinellas	0		109 66.9%	65.9%	54 33.1%	34.1%	0	163
Palm Beach	0		55 67.1%	65.4%	27 32.9%	34.6%	0	82
Orange	1 0.4%	0.4%	136 57.9%	60.4%	97 41.3%	38.8%	1 0.4%	235
Hillsborough	1 0.3%		256 68.3%	69.5%	118 31.5%	30.5%	0	375
Duval	0		144 38.9%	39.0%	225 60.8%	61.0%	1 0.3%	370
Brevard	0		39 78.0%	73.8%	11 22.0%	26.2%	0	50
Monroe	2 1.1%	1.5%	115 63.9%	70.6%	63 35.0%	27.8%	0	180
Pasco	0		79 56.8%	65.2%	60 43.2%	34.8%	0	139
Alachua	0		87 83.7%	85.9%	16 15.4%	14.1%	1 1.0%	104
Collier	0		60 59.4%	57.1%	41 40.6%	42.9%	0	101
Total	**12** **0.5%**	**0.4%**	**1,480** **59.2%**	**64.7%**	**1,003** **40.2%**	**34.8**	**3** **0.1%**	**2,498**

SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Table E-5. Safety Equipment Use By County: All Motorcycle Occupants

County	Eye Protection Use	Glove Use	Jacket Use	Pant Use	Shoe Use	Light Use	Total
Dade	129 90.8%	4 2.8%	5 3.5%	115 81.0%	137 96.5%	116 95.1%	142
Broward	172 96.6%	2 1.1%	4 2.2%	138 77.5%	173 97.2%	153 100%	178
Volusia	348 91.8%	63 16.6%	38 10.0%	289 76.3%	365 96.3%	280 89.5%	379
Pinellas	150 92.0%	26 16.0%	18 11.0%	146 89.6%	161 98.8%	128 85.3%	163
Palm Beach	81 98.8%	0	0	51 62.2%	80 97.6%	71 100%	82
Orange	228 97.0%	57 24.3%	33 14.0%	194 82.6%	233 99.1%	109 63.7%	235
Hillsborough	336 89.6%	65 17.3%	85 22.7%	326 86.9%	353 94.1%	192 61.5%	375
Duval	355 95.9%	130 35.1%	7 1.9%	289 78.1%	367 99.2%	245 91.8%	370
Brevard	49 98.0%	6 12.0%	3 6.0%	39 78.0%	50 100%	39 90.7%	50
Monroe	160 88.9%	6 3.3%	19 10.6%	88 48.9%	66 36.7%	133 91.7%	180
Pasco	131 94.2%	21 15.1%	12 8.6%	125 89.9%	139 100%	109 86.5%	139
Alachua	84 80.8%	16 15.4%	9 8.7%	73 70.2%	101 97.1%	30* 31.6%	104
Collier	101 100%	6 5.9%	2 2.0%	56 55.4%	100 99.0%	57 82.6%	101
Total	2324 93.0%	402 16.1%	235 9.4%	1929 77.2%	2325 93.1%	1662 81.6%	2498

NOTE: * HIGH AMOUNT OF UNKNOWNS (65.3%)
SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Table E-6. Motorcycle Type By County: Drivers Only

County	Sportbikes	Cruisers	Touring	Standard	On/off Road	Other	Total
Dade	45 36.9%	38 31.1%	18 14.8%	20 16.4%	1 0.8%	0	122
Broward	61 39.1%	43 28.1%	33 21.6%	15 9.8%	1 0.7%	0	153
Volusia	33 10.5%	203 64.9%	42 13.4%	33 10.5%	2 0.6%	0	313
Pinellas	25 16.7%	83 55.3%	27 18.0%	15 10.0%	0	0	150
Palm Beach	32 45.1%	19 26.8%	10 14.1%	9 12.7%	1 1.4%	0	71
Orange	31 18.1%	81 47.4%	48 28.1%	7 4.1%	3 1.8%	1 0.6%	171
Hillsborough	63 20.2%	139 44.6%	72 23.1%	35 11.2%	3 1.0%	0	312
Duval	54 20.2%	118 44.2%	76 28.5%	17 6.4%	2 0.7%	0	267
Brevard	5 11.6%	22 51.2%	8 18.6%	8 18.6%	0	0	43
Monroe	17 11.7%	60 41.4%	36 24.8%	24 16.6%	8 5.5%	0	145
Pasco	15 11.9%	70 55.6%	25 19.8%	16 12.7%	0	0	126
Alachua	28 29.5%	30 31.6%	15 15.8%	18 18.9%	3 3.2%	1 1.1%	95
Collier	11 15.9%	33 47.8%	21 30.4%	1 1.4%	0	3 4.3%	69
Total	**420** **20.6%**	**939** **46.1%**	**431** **21.2%**	**218** **10.7%**	**24** **1.2%**	**5** **0.2%**	**2037**

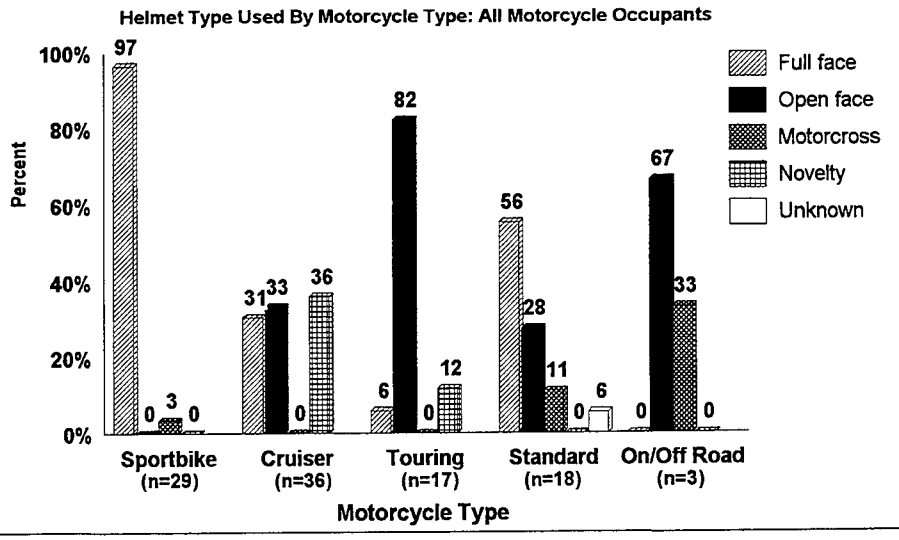
SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

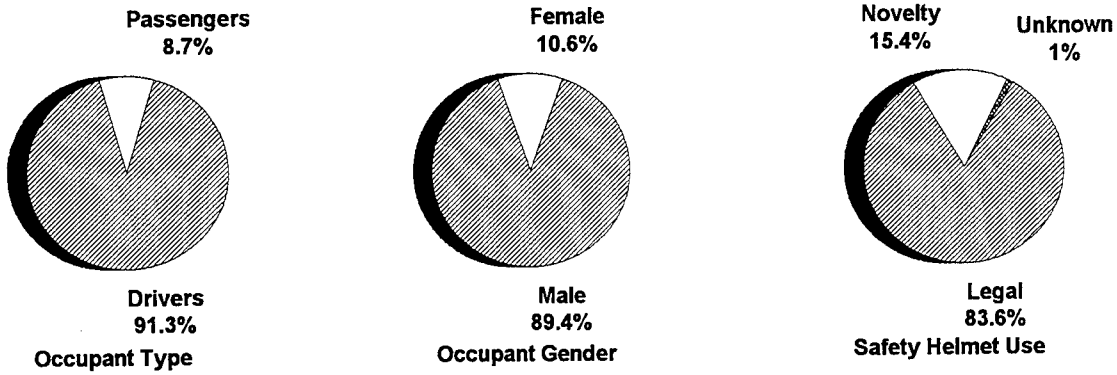
Table E-7. Motorcycle Type By County: Passengers Only

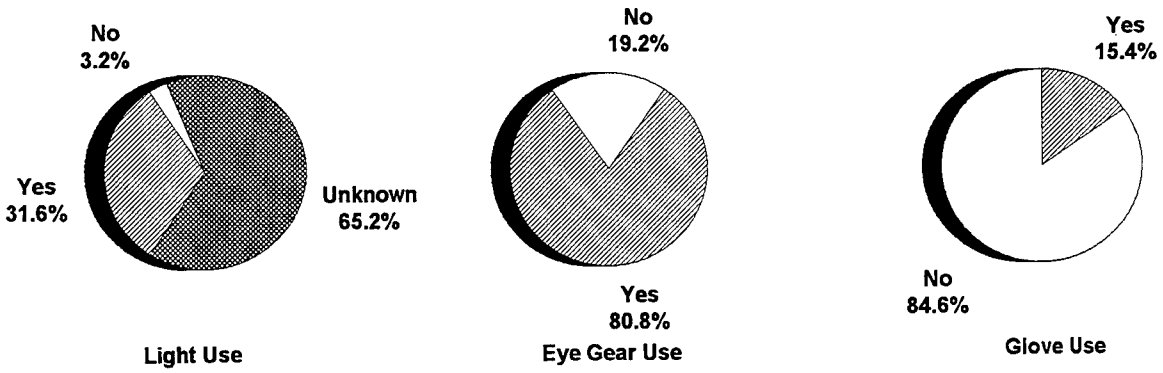
County	Sportbikes	Cruisers	Touring	Standard	On/off Road	Other	Total
Dade	3 15.0%	11 55.0%	4 20.0%	2 10.0%	0	0	20
Broward	3 12.0%	12 28.1%	7 21.6%	3 9.8%	0	0	25
Volusia	2 30.0%	34 51.5%	25 37.9%	5 7.6%	0	0	66
Pinellas	0	5 35.5%	8 61.5%	0	0	0	13
Palm Beach	4 36.4%	3 27.3%	4 36.4%	0	0	0	11
Orange	7 10.6%	33 50.0%	26 39.4%	0	0	0	66
Hillsborough	6 9.5%	25 39.7%	30 47.6%	2 3.2%	0	0	63
Duval	7 6.9%	56 55.4%	37 36.6%	1 1.0%	0	0	101
Brevard	0	1 14.3	6 85.7%	0	0	0	7
Monroe	0	11 31.4%	20 57.1%	4 11.4%	0	0	35
Pasco	3 23.1%	1 7.7%	7 53.8%	2 15.4%	0	0	13
Alachua	1 29.5%	6 31.6%	2 15.8%	0	0	0	9
Collier	3 9.4%	16 50.0%	13 40.6%	0	0	0	32
Total	**39** **8.5%**	**214** **46.4%**	**189** **41.0%**	**19** **4.1%**	**0**	**0**	**461**

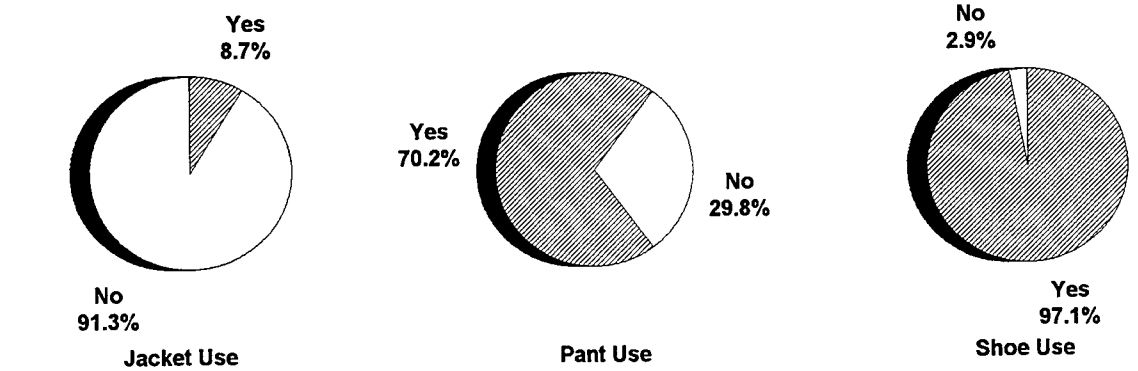
SOURCE: 1998 FLORIDA MOTORCYCLE HELMET OBSERVATIONAL SURVEY CONDUCTED BY THE CENTER FOR URBAN TRANSPORTATION RESEARCH, UNIVERSITY OF SOUTH FLORIDA, TAMPA, MAY – JUNE, 1998.

Figure E-1. Motorcycle Safety Equipment Use Summary: Alachua County



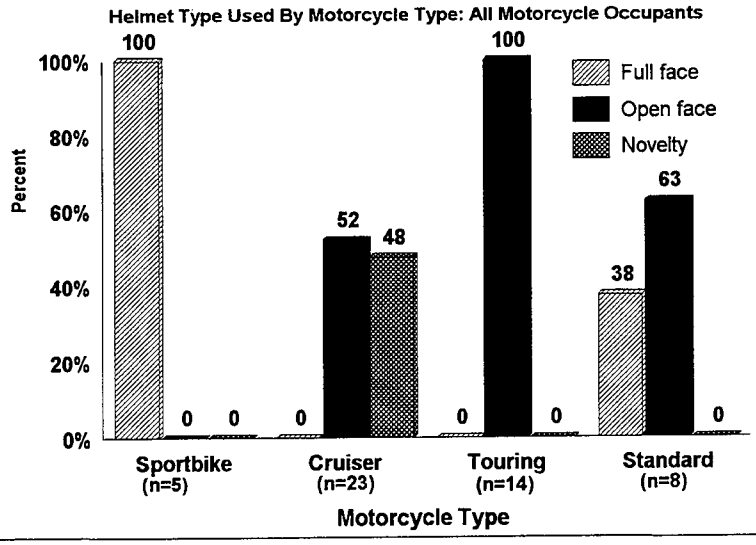


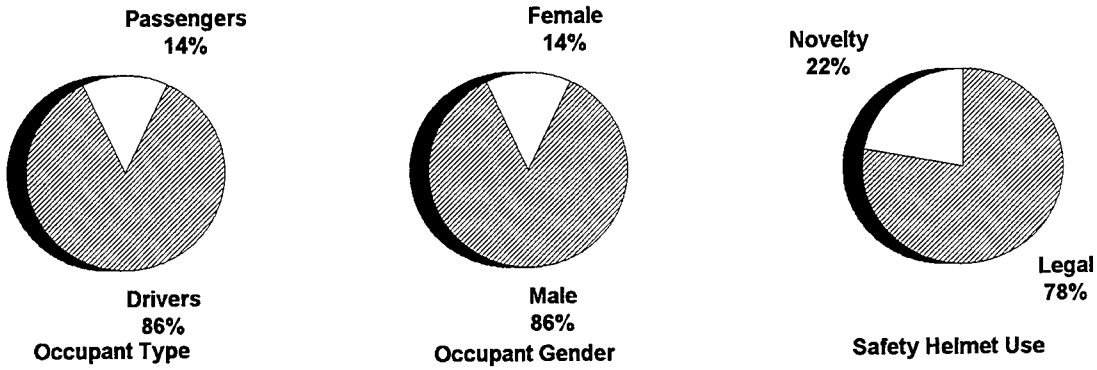


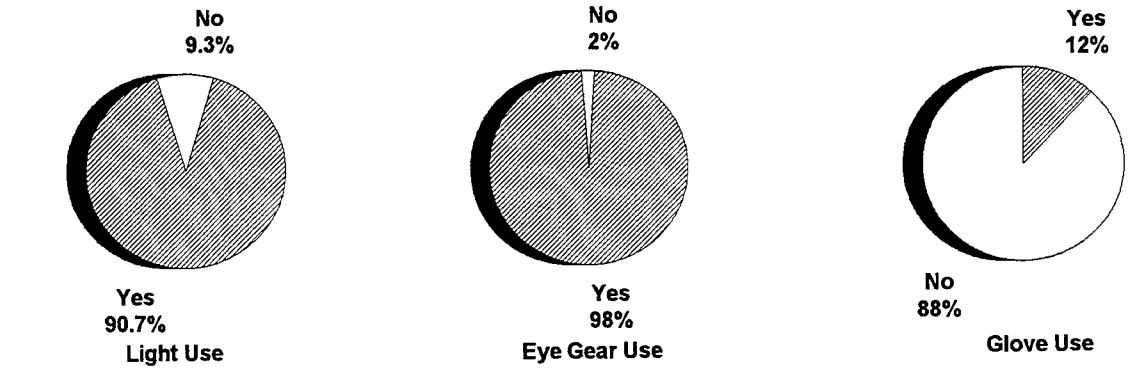


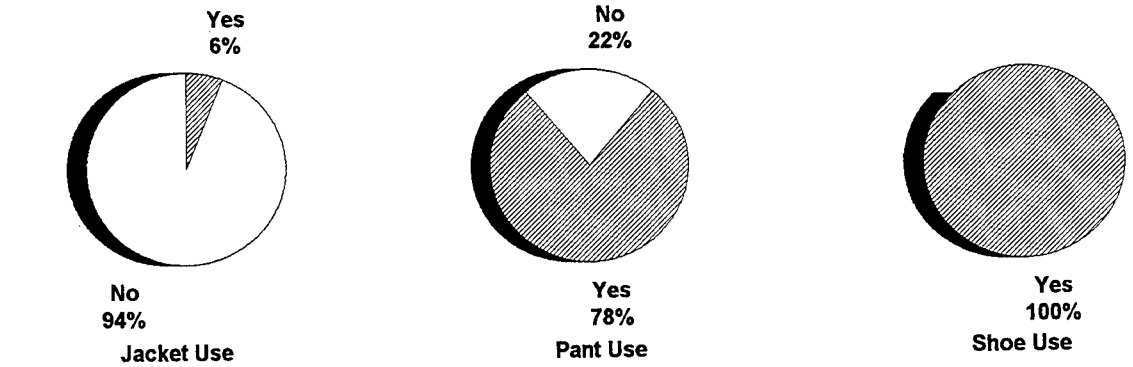
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-2. Motorcycle Safety Equipment Use Summary: Brevard County



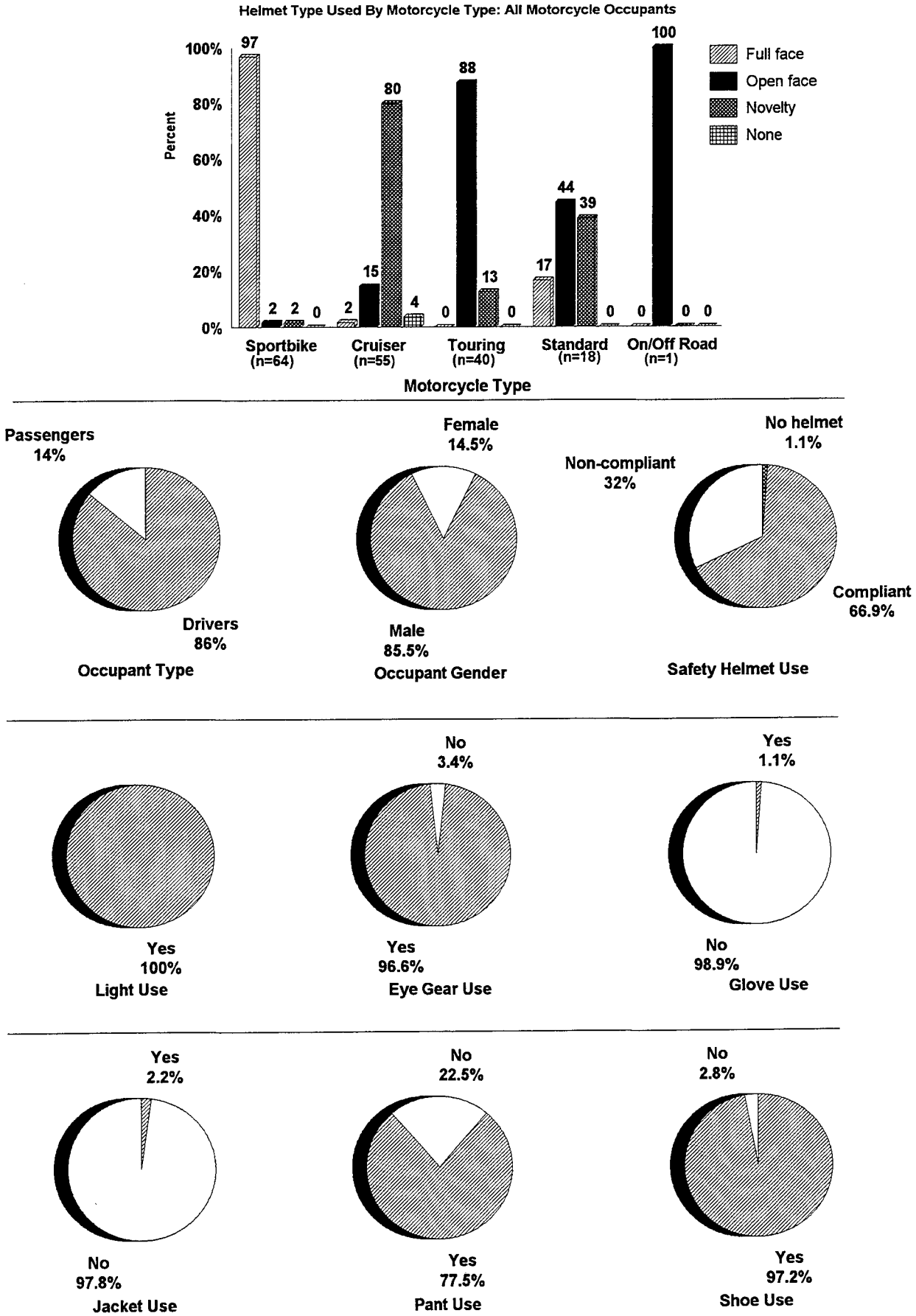






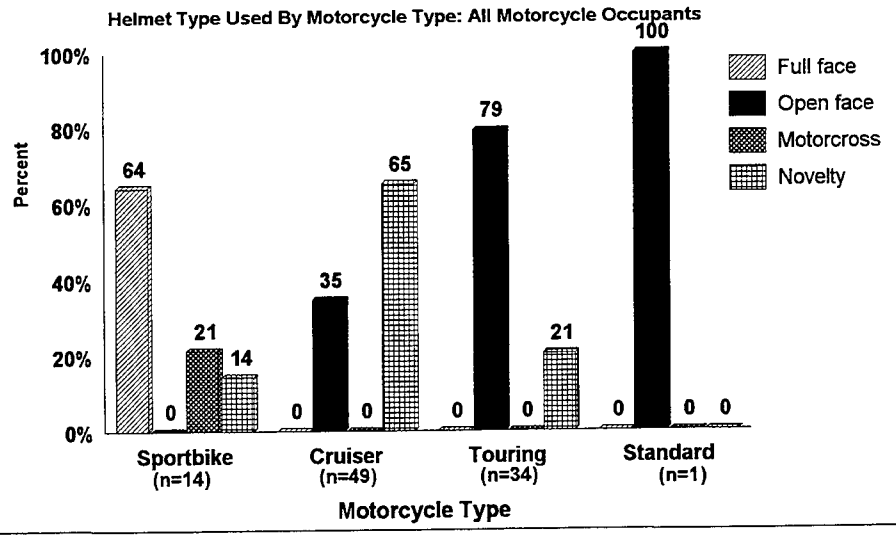
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

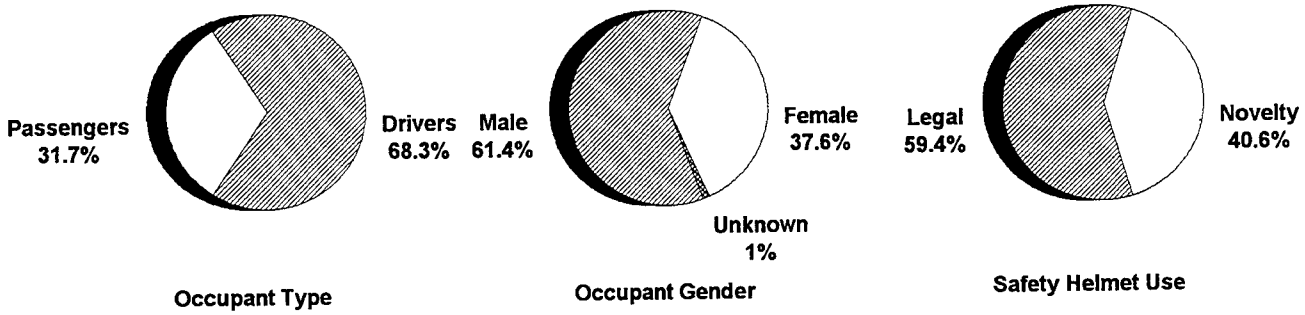
Figure E-3. Motorcycle Safety Equipment Use Summary: Broward County

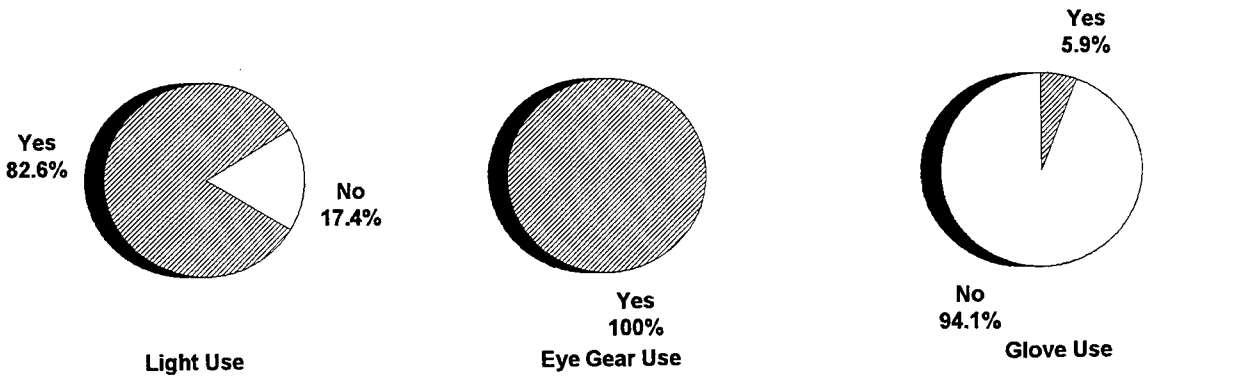


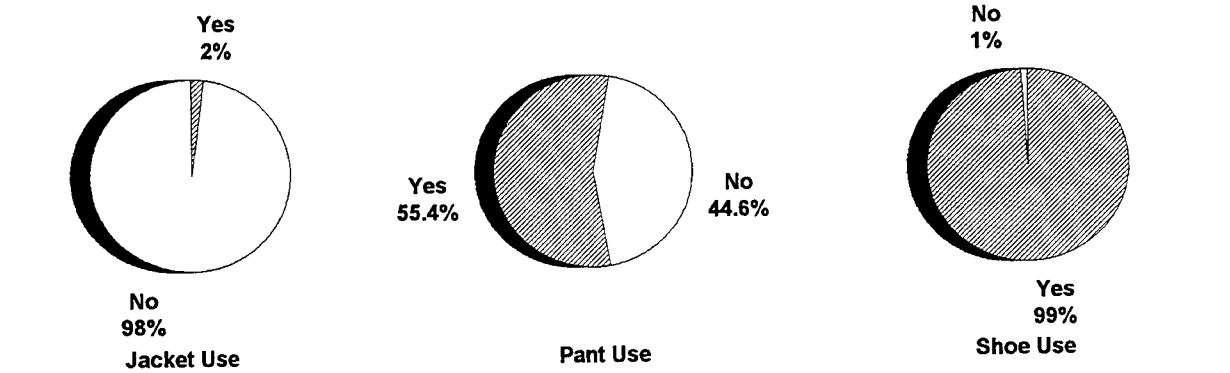
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-4. Motorcycle Safety Equipment Use Summary: Collier County



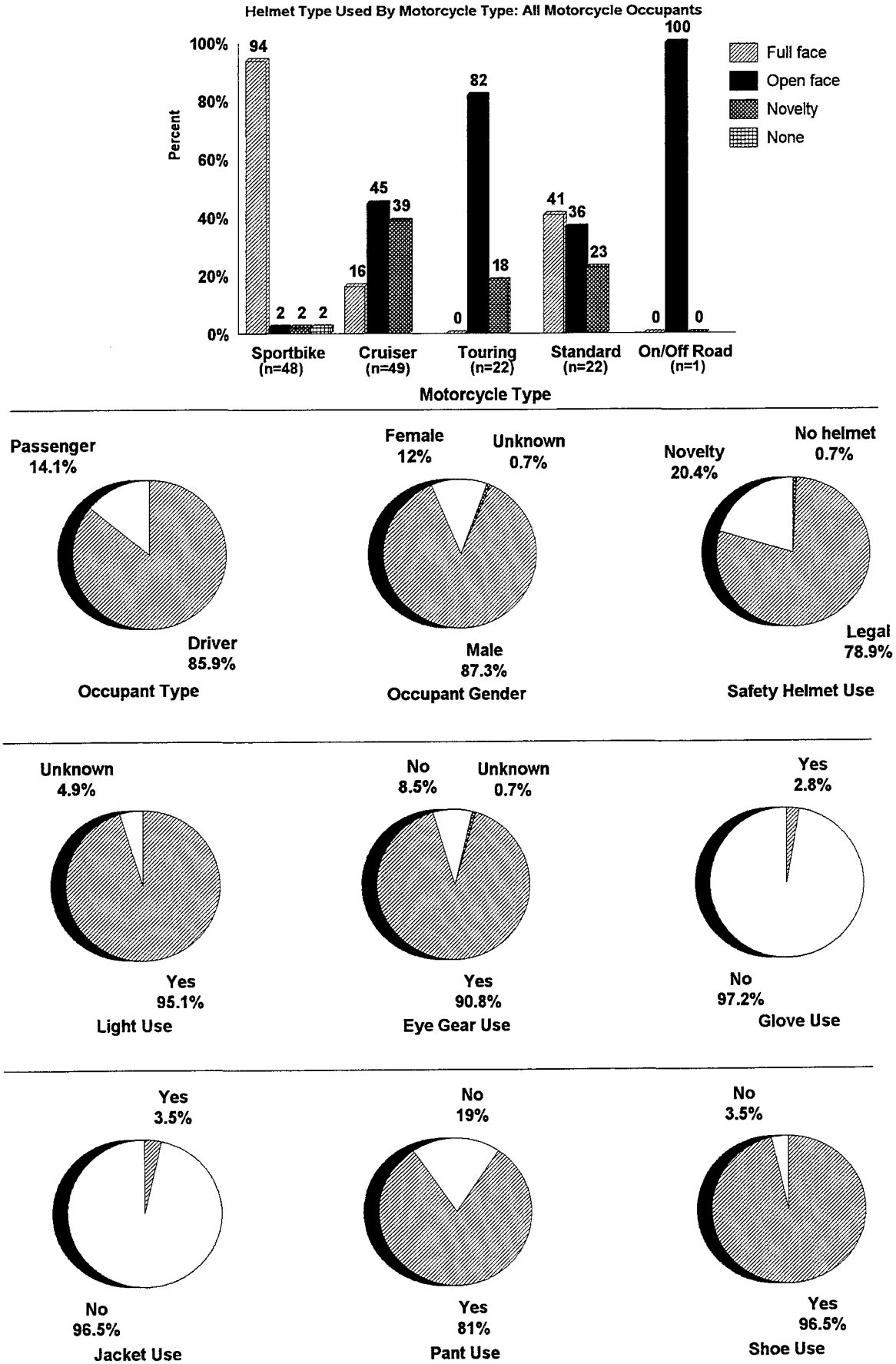






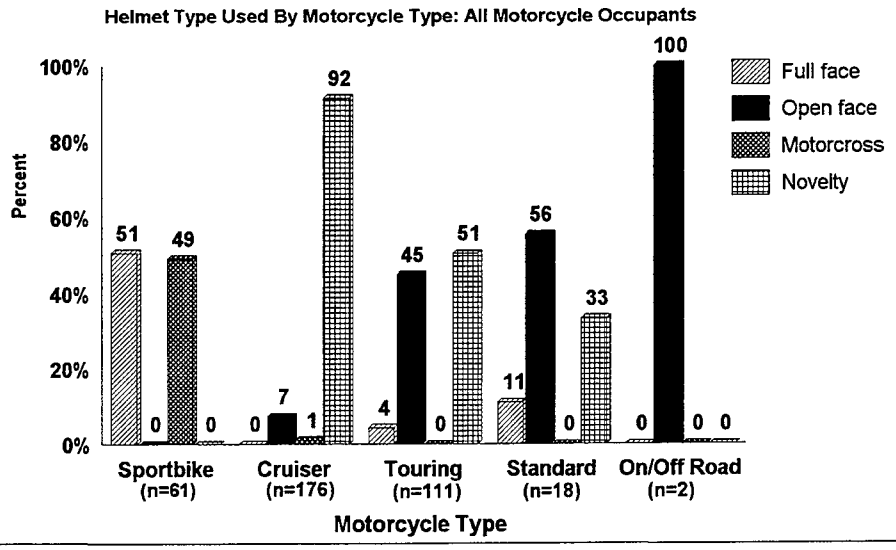
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

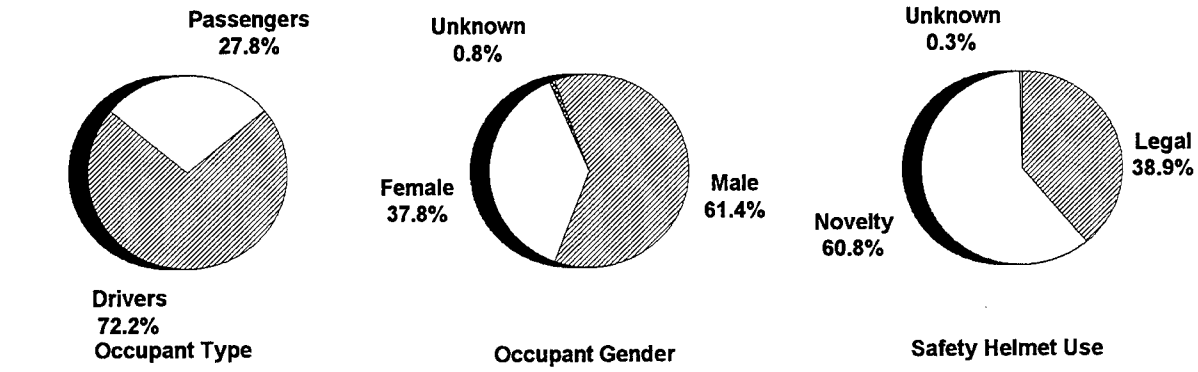
Figure E-5. Motorcycle Safety Equipment Use Summary: Dade County

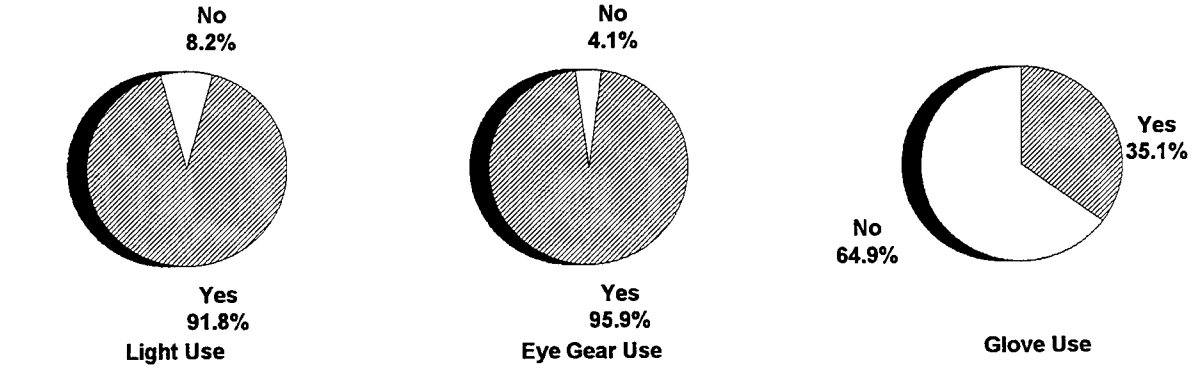


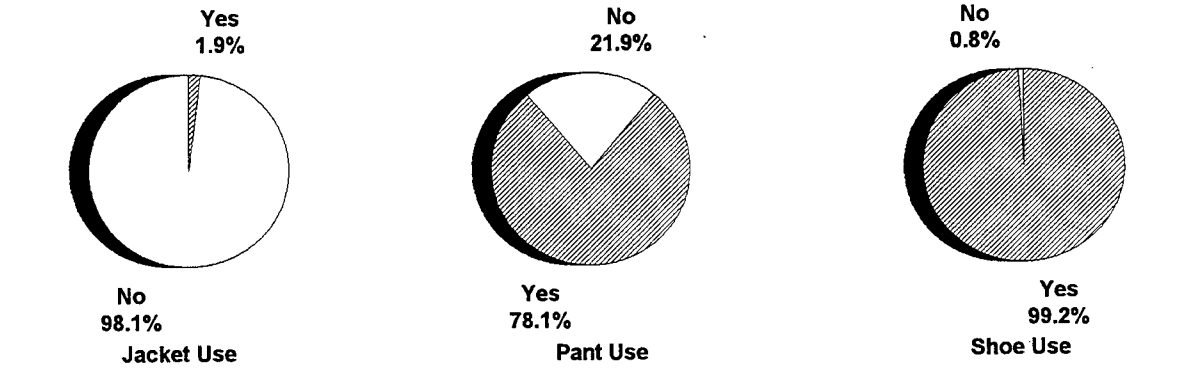
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-6. Motorcycle Safety Equipment Use Summary: Duval County



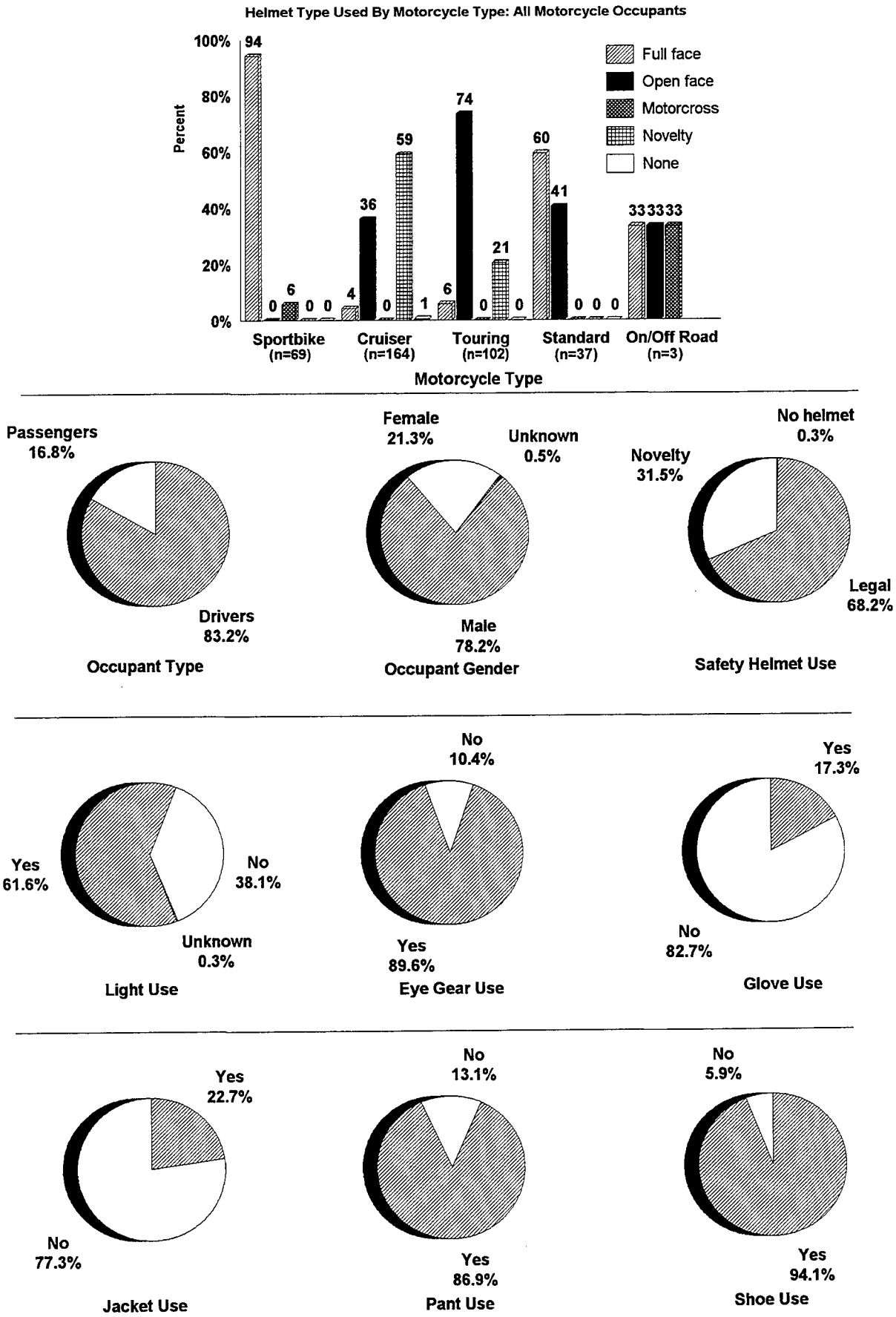






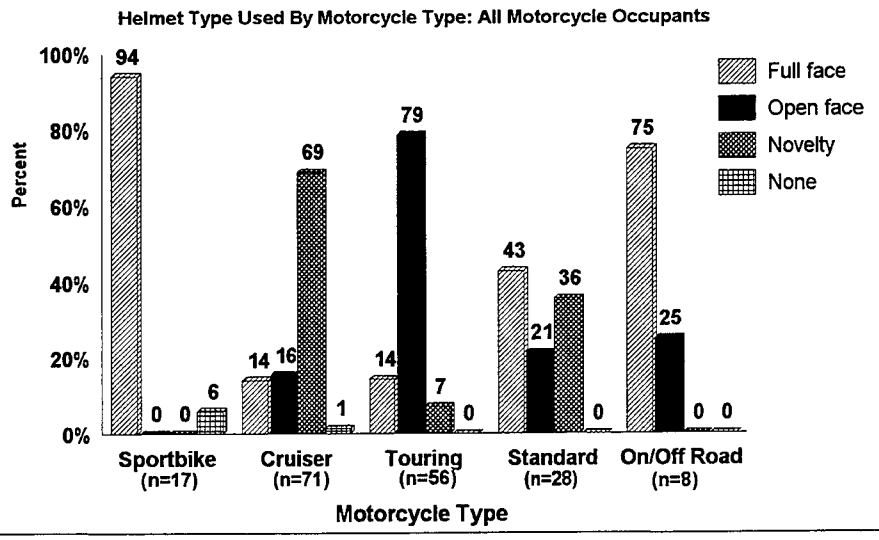
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

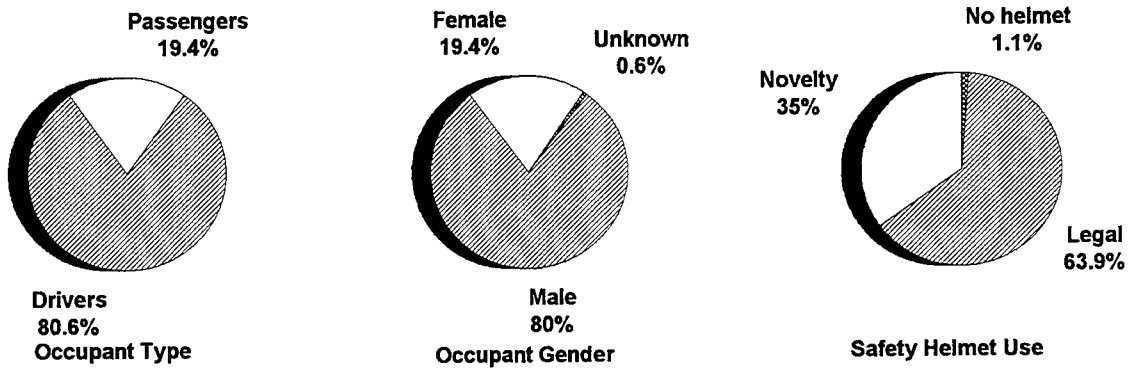
Figure E-7. Motorcycle Safety Equipment Use Summary: Hillsborough County

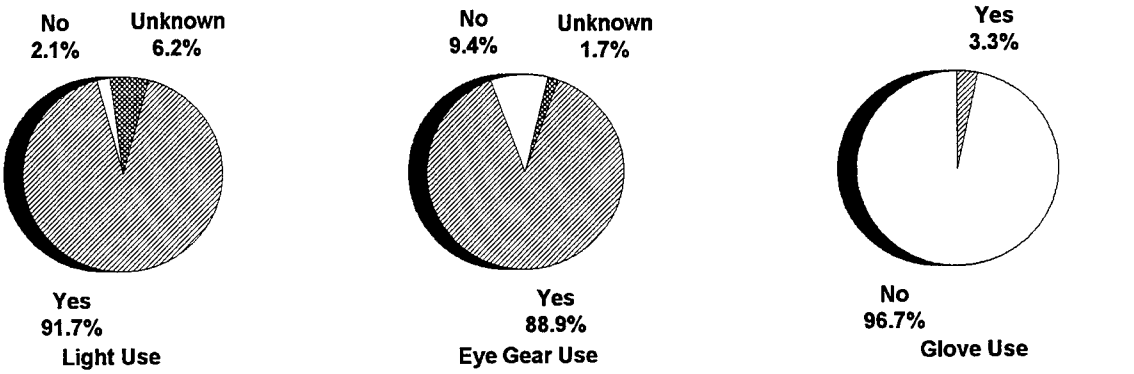


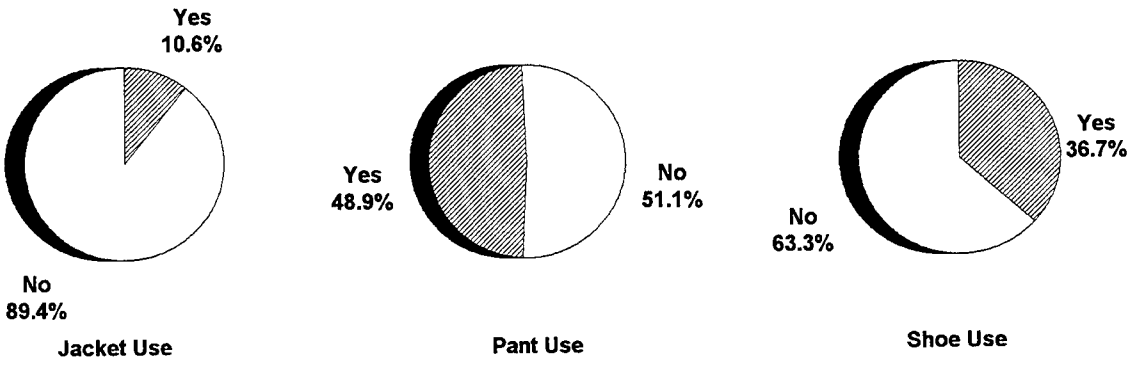
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-8. Motorcycle Safety Equipment Use Summary: Monroe County



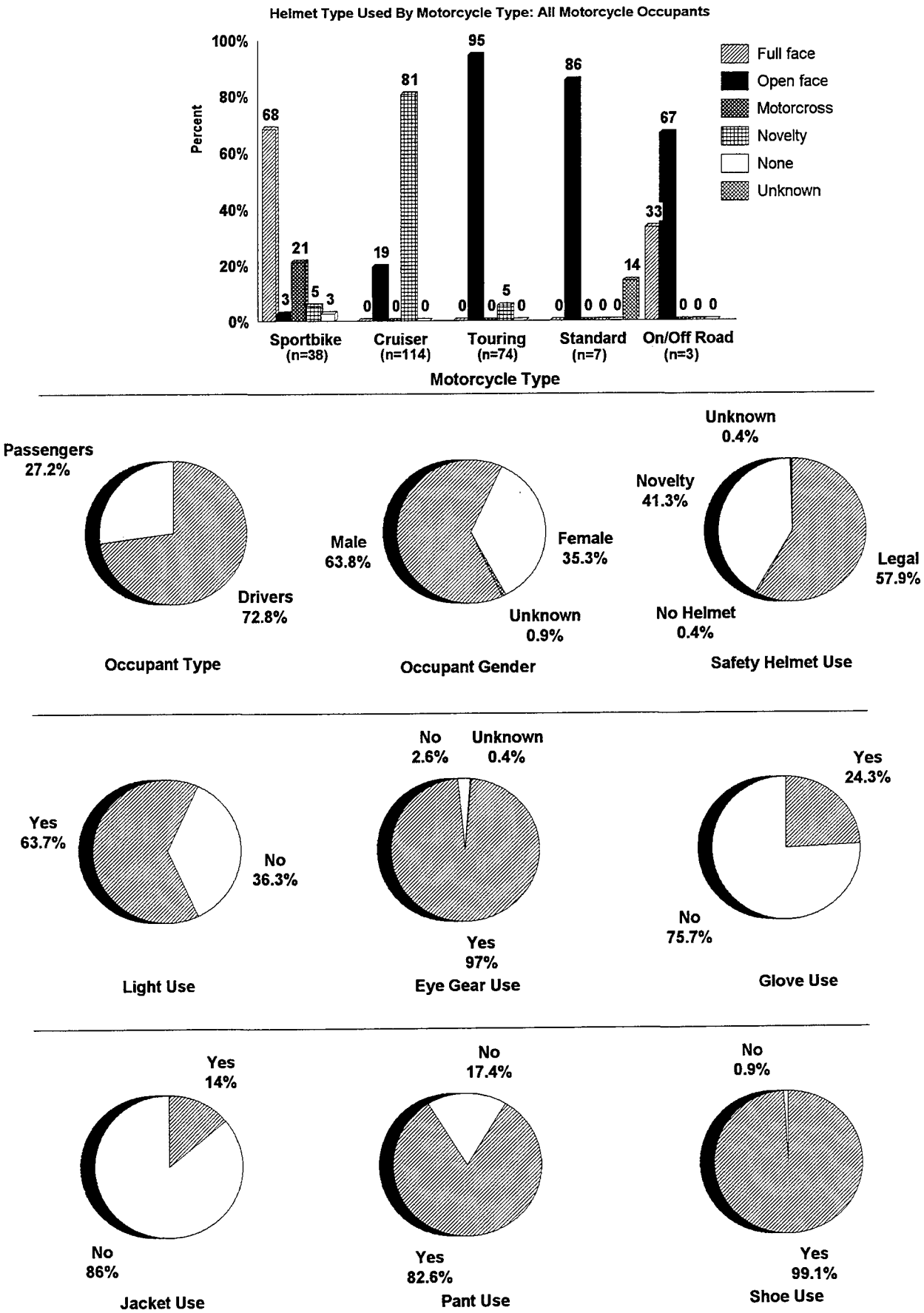






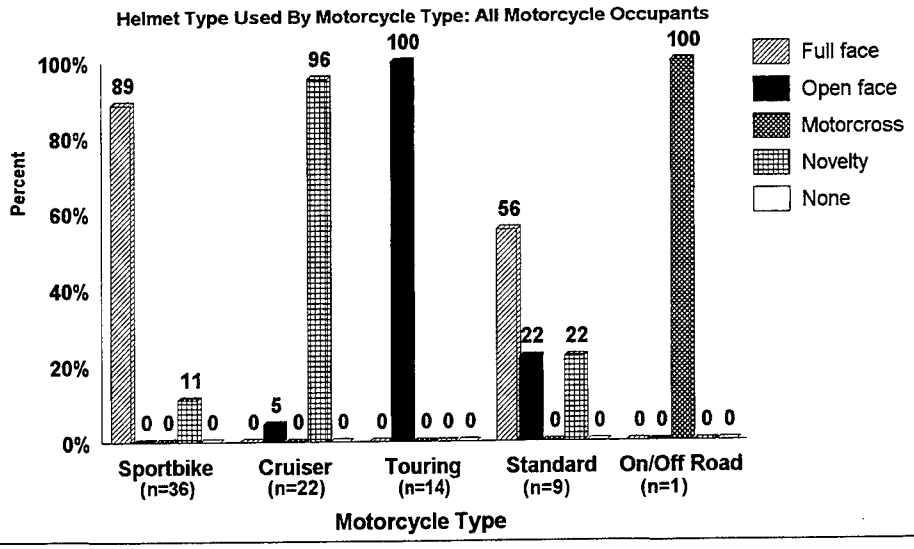
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

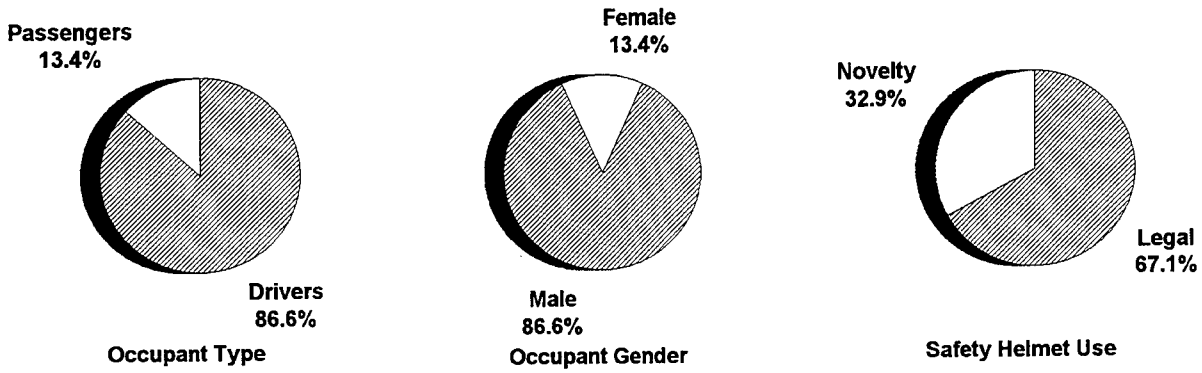
Figure E-9. Motorcycle Safety Equipment Use Summary: Orange County

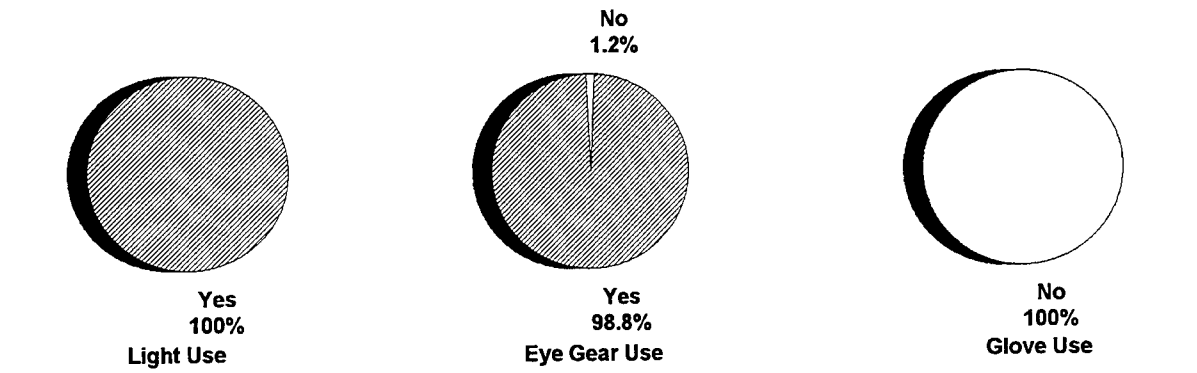


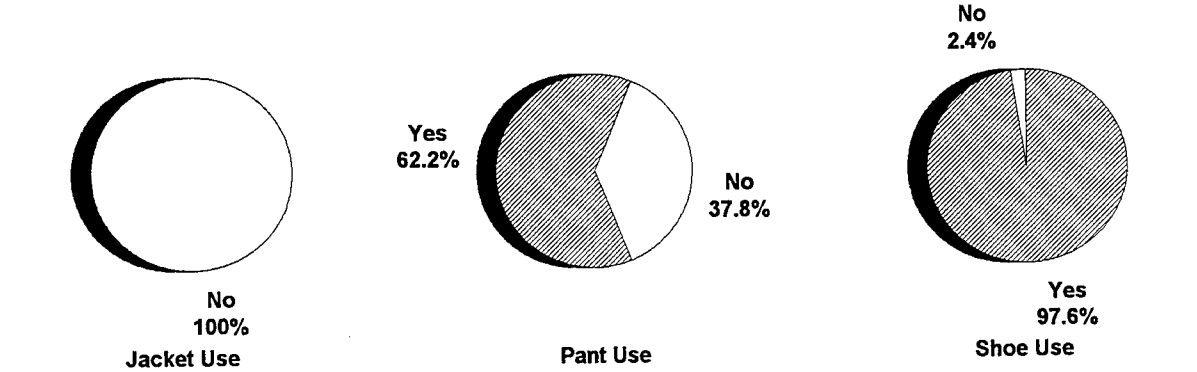
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-10. Motorcycle Safety Equipment Use Summary: Palm Beach County



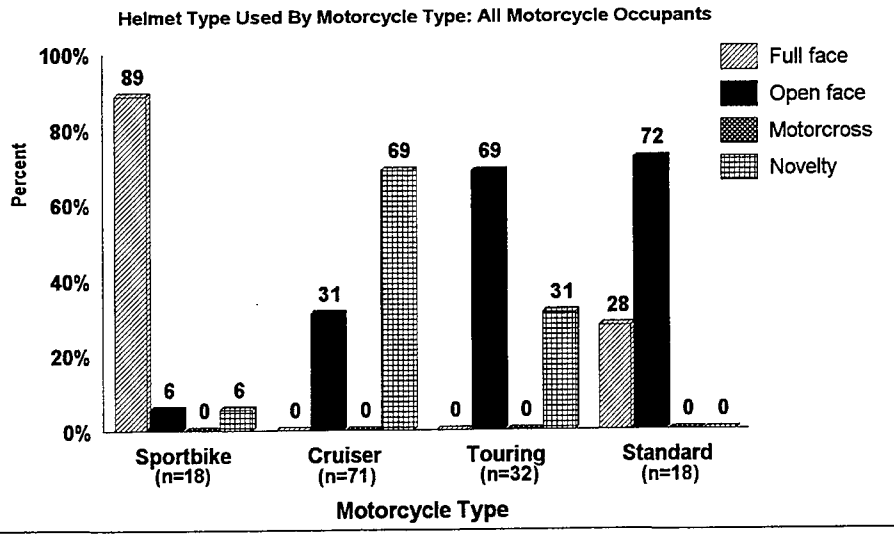


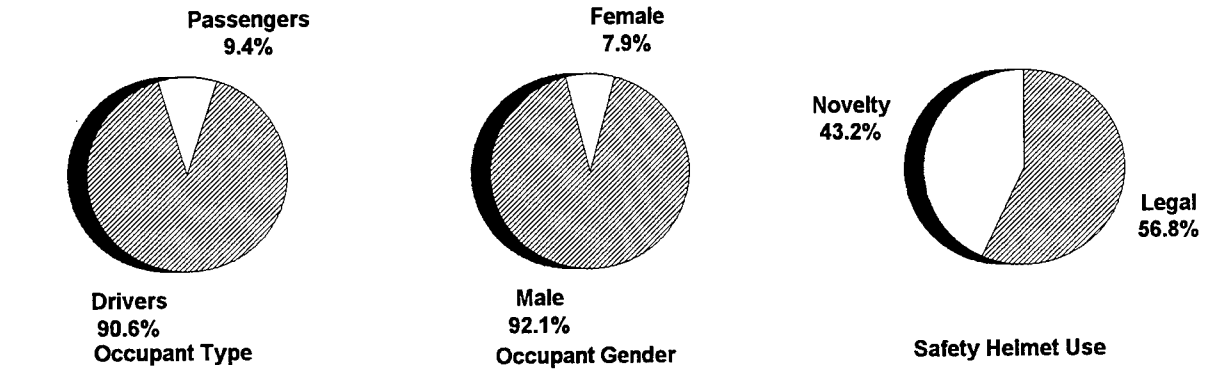


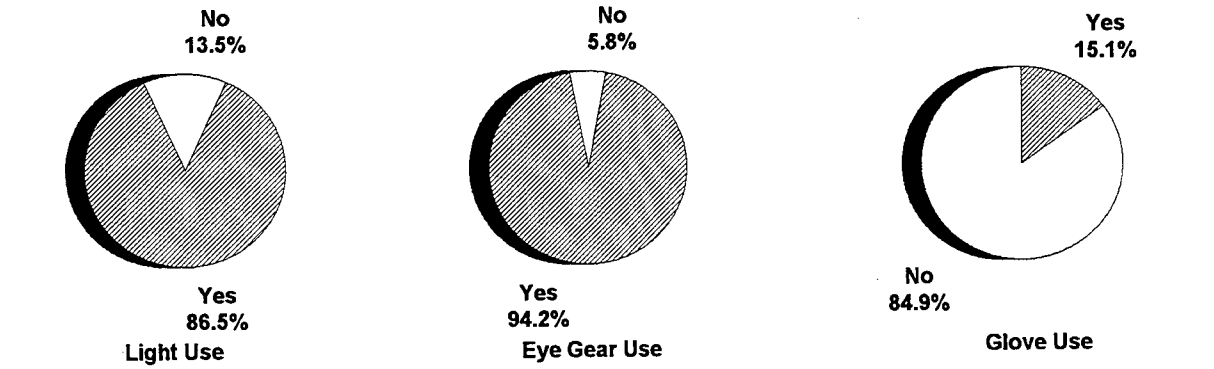


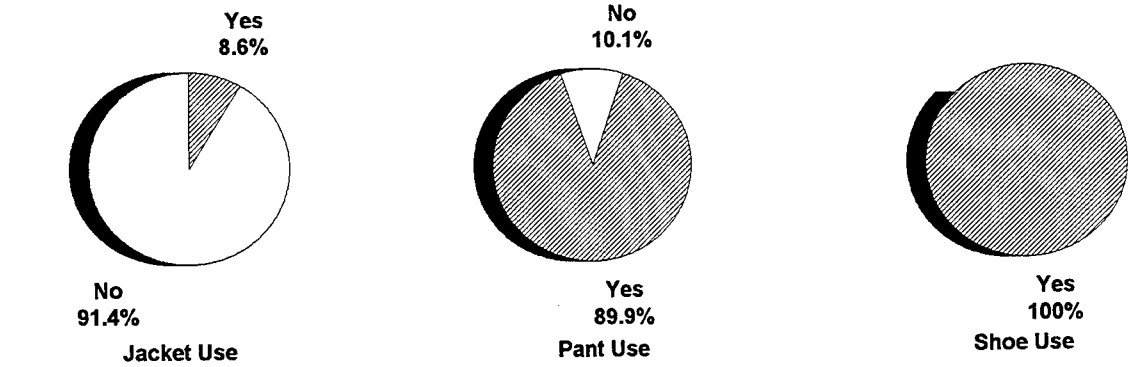
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-11. Motorcycle Safety Equipment Use Summary: Pasco County



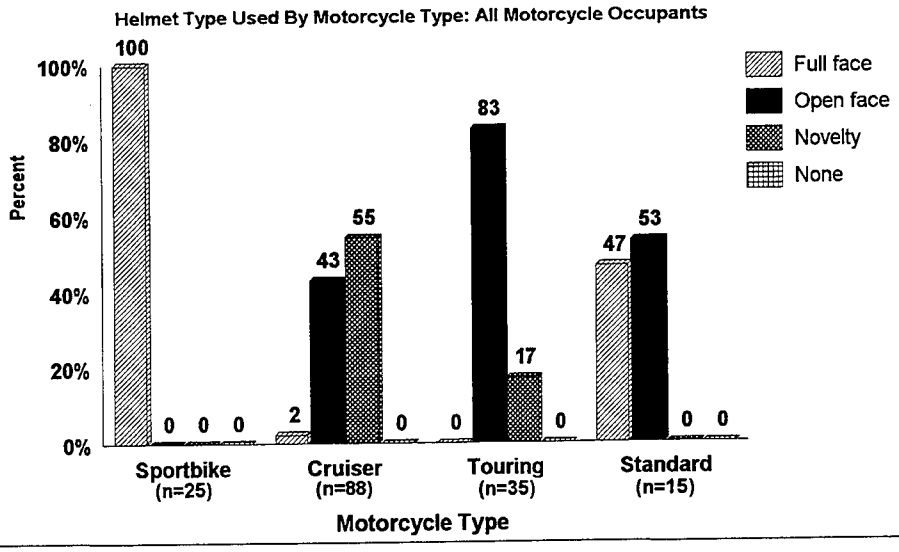


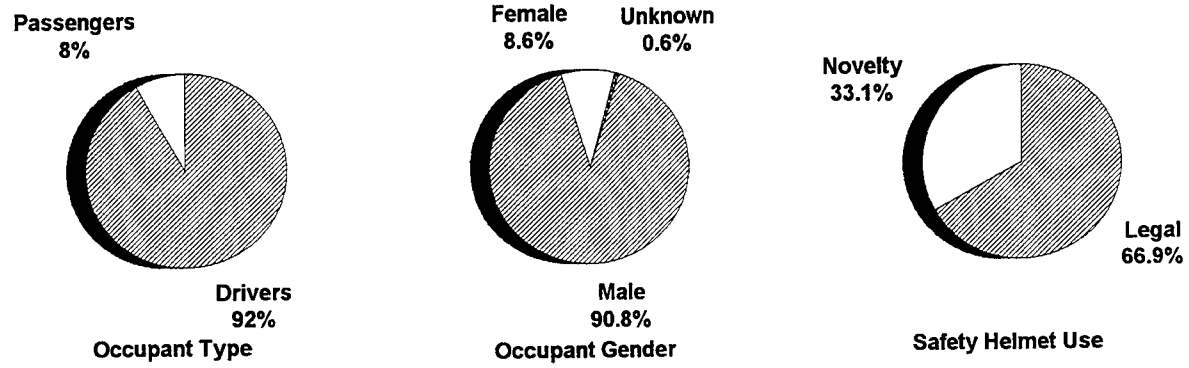


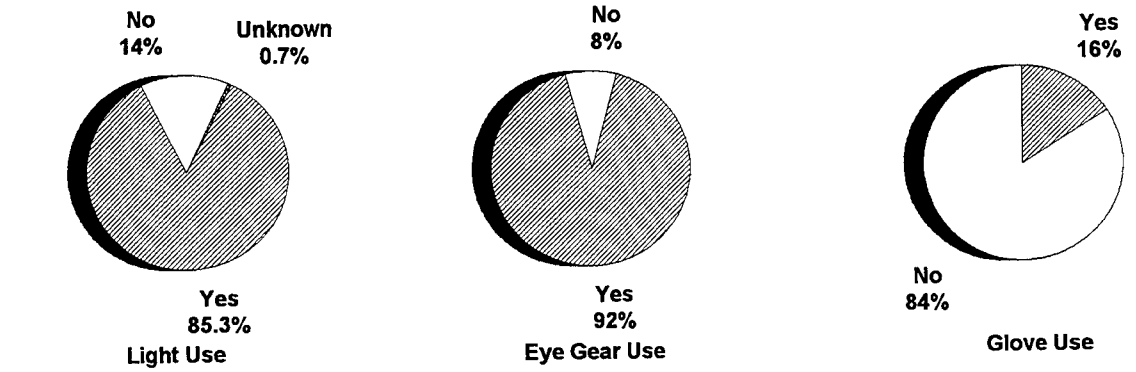


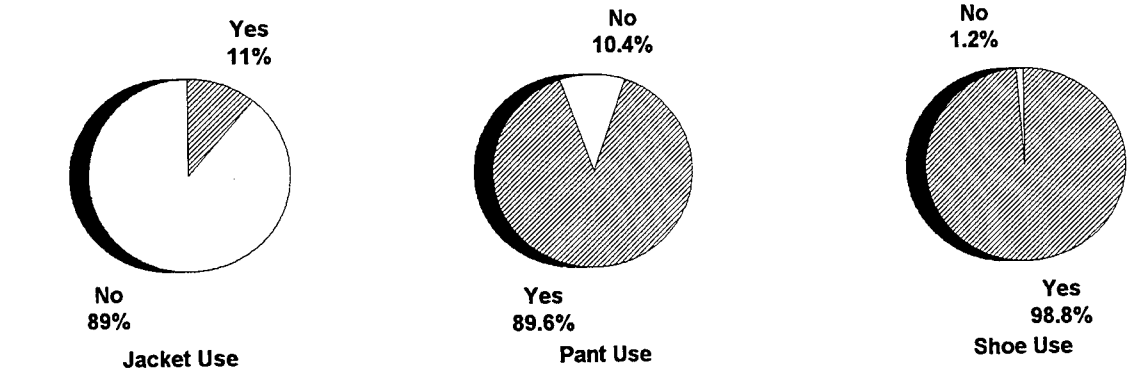
Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-12. Motorcycle Safety Equipment Use Summary: Pinellas County



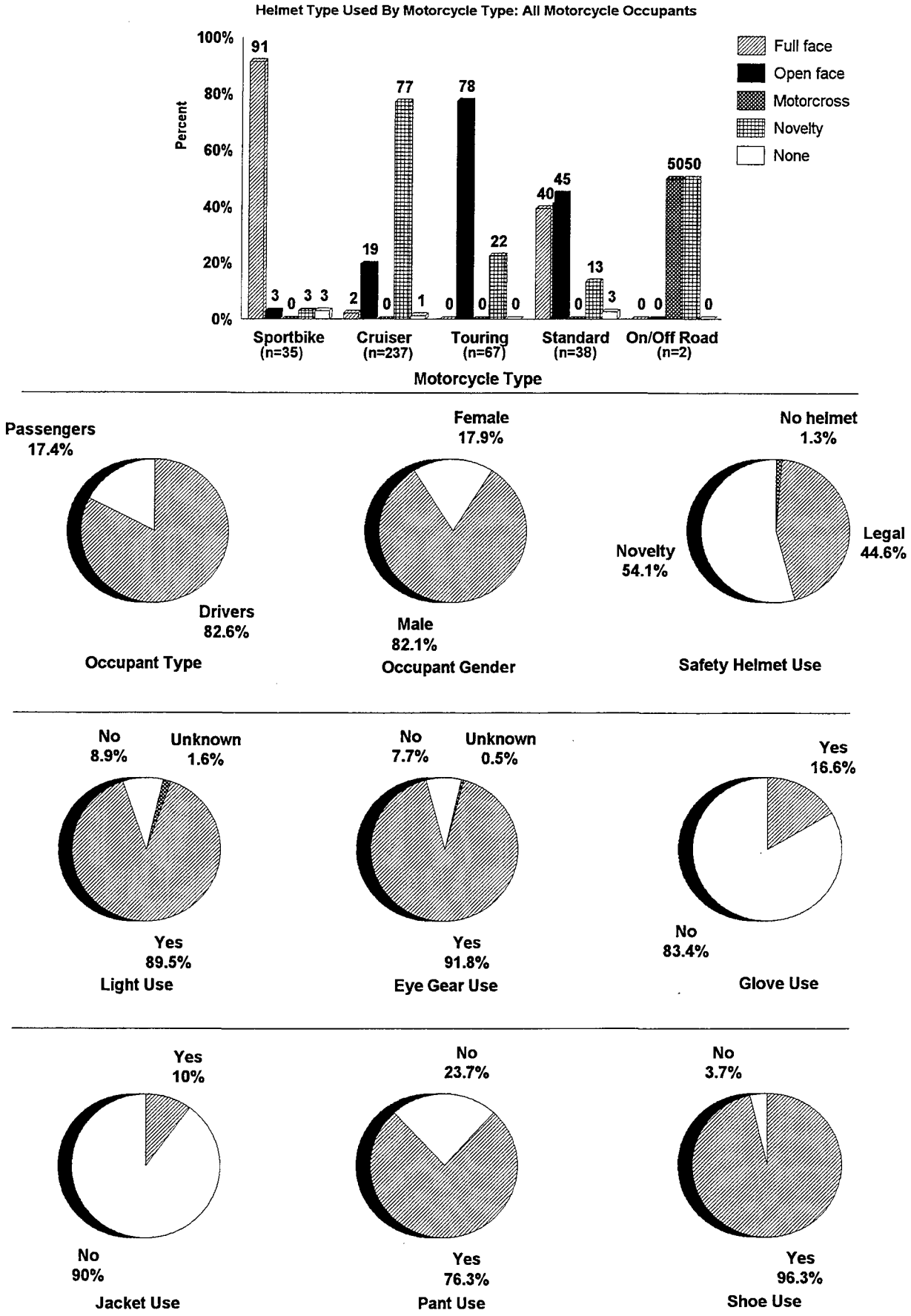






Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.

Figure E-13. Motorcycle Safety Equipment Use Summary: Volusia County



Source: Florida Observational Motorcycle Helmet Use Survey conducted by the Center for Urban Transportation Research, University of South Florida, Tampa, May - June, 1998.