Changes to Puerto Rico's Motorcycle Rider Law

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16. Abstract

In 2007 Puerto Rico enacted Law 107, a motorcycle safety law that introduced or expanded previous safety-related statutes such as requiring motorcycle riders and passengers to wear (1) reflective vests at night and protective gear at all times of day, (2) maintain daytime running headlights and taillights while operating the motorcycle at all times, (3) stay in the same lane as other vehicles, and (4) it lowered the illegal level of per se blood alcohol concentration (BAC) illegal level for motorcycle riders from .08 g/dL to .02 g/dL. The purpose of this project was to examine the degree to which the law was enforced, assess motorcycle riders' reactions to the law, and estimate the law's impact on motorcycle crashes, fatalities, and arrests.

Observations of motorcycle riders found that 366 (86.3%) wore Department of Transportation-compliant helmets, 49 (11.6%) wore non-DOT-compliant helmets, and 9 (2.1%) did not wear any type of helmet. Over 80 percent of observed riders wore protective gear; 416 (98.1%) wore long pants, 340 (80.2%) wore protective shoes that covered the ankle, 397 (93.6%) wore some type of eye protection, and 354 (83.5%) wore protective gloves.

Discussions with motorcycle riders indicated that riders accepted the statutes of the motorcycle law, especially those requiring protective gear. However, the perception among these riders was that enforcement of the law was lacking or uneven. Discussions with law enforcement officers revealed that officers perceived that helmet and protective gear use quickly and clearly increased among riders after the law's enactment. Also, officers noted that it was difficult to recognize cues of impairment for motorcycle riders with BACs at or just over .02 g/dL.

BAC data collected at checkpoints revealed that 6.5 percent of passenger car drivers had positive BACs compared to 29.1 percent of motorcycle riders. Data from citation logs issued at checkpoints suggest that motorcycle riders were cited at BACs lower than .08 g/dL. For example, about 20 percent of passenger car drivers and over 50 percent of motorcycle riders were cited at BACs between .01 and .07 g/dL. This difference may indicate that the .02 BAC law for riders was being enforced.

Until 2007 Puerto Rico had experienced a steady increase in motorcycle crash fatalities beginning in 2003 with 54 fatalities until a peak at 2006 with 111 fatalities. Following 2007 (the year the law was enacted), fatalities decreased steadily, from 2007 onward with 83 fatalities, to 47 fatalities in 2012 (the latest data that were available at the time of this study).

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Executive Summary

In 2007 Puerto Rico revised its motorcycle safety law, Law No. 107. The revisions took effect on October 10, 2007. The law contained provisions that addressed different aspects of motorcycle safety, including a requirement for motorcycle riders and passengers to wear eye protection, safety gloves, long pants, and footwear that covers the ankle, and a reflective vest from 6 p.m. to 6 a.m. The law introduced requirements regarding the ages of motorcycle riders and passengers, riding in the same lane as other vehicles, and motorcycle-rider training and licensing. The new law also lowered the illegal per se blood alcohol concentration (BAC) limit for riding a motorcycle from .08 grams per deciliter (g/dL) of blood to .02 g/dL.

The goal of this project was to examine the law in terms of rider compliance with the law, efforts to enforce the law, and impacts on safety. The project included observing motorcycle riders for compliance with helmet and safety gear requirements, assessing the perceptions of motorcycle riders and law enforcement officials of the law, and analyzing citation and crash data. Data collection took place in 2011.

Observations of 424 motorcycle riders showed that up to 98 percent of riders wore some type of helmet, with 366 (86.3%) wearing DOT-compliant helmets, 49 (11.6%) wearing non-DOT-compliant helmets, and 9 (2.1%) not wearing any type of helmet. In addition, more than 80 percent of observed motorcycle riders wore protective gear (in addition to helmets), with 416 (98.1%) wearing long pants, 340 (80.2%) wearing protective shoes that covered the ankle, 397 (93.6%) wearing some type of eye protection, and 354 (83.5%) wearing protective gloves.

Discussions with local riders revealed that in general they accepted the provisions of the motorcycle laws, particularly the requirement to wear protective gear. However, riders indicated that there was a perception that enforcement was lacking or uneven. We learned from law enforcement officers that their view was that, after the law's enactment, riders increased their use of helmets and protective gear. Officers also indicated that detecting a rider with a BAC at or just over a .02 g/dL was difficult, especially considering that there is not much training on recognizing cues of impairment at BACs of .02 g/dL. Training to recognize impairment cues is typically based on behavior from riders with higher BACs (e.g., at .08 g/dL).

After the law went into effect in 2007, the number of citations issued to motorcycle riders decreased. The downward trend in citations may be due to increased levels of rider compliance, a decrease in enforcement intensity, or a combination of each of these factors.

A review of citations for impaired motorcycle operation issued at checkpoints in 2010 and 2011 found that riders were cited at BACs lower than .08g/dL. For example, at the checkpoints we observed, more than 50 percent of motorcycle riders were cited at BACs between .01 and .07 g/dL. This difference between rider and driver citations for BACs below .08 suggests that the .02 BAC law was enforced at the checkpoints.

It is worth noting that, after enactment of the law, the use of DOT-compliant helmets increased, even though Puerto Rico had a universal helmet use law in place prior to 2007. Specifically, the percentage of motorcycle riders wore DOT-compliant helmets increased from 39.4 percent in 2006 to 56.4 percent in 2007. Three years after enactment of the law in 2007, DOT-compliant helmet use was consistently higher than 70 percent, based on observations of Puerto Rico traffic

safety observers. It reached as high as 86 percent according to the observations from the current project.

We conducted an analysis of the Fatality Analysis Reporting System (FARS) for Puerto Rico for 2000 to 2007 (pre-law years) and 2008 to 2009 (post-law years) to examine any changes in the fatality rates among riders in terms of alcohol involvement or impairment. The number of fatalities from motorcycle traffic crashes after 2007 decreased steadily, but the analysis did not reveal statistically significant differences in fatalities between the pre-law and post-law years in positive BAC prevalence or distribution.

In summary, the findings indicate that awareness and acceptance of Law No. 107 was high among members of the motorcycle riding community and law enforcement agencies. Despite the previous existence of a universal helmet-use law, the use of DOT-compliant helmets, as well as protective clothing, increased after the law's enactment. An analysis of fatal crash data did not reveal statistically significant changes in alcohol and helmet usage in a pre-law to post-law comparison. Fatal motorcycle crashes decreased in Puerto Rico after the law was enacted.

Introduction

Motorcycle registrations in Puerto Rico increased substantially from 2003 to 2006. There was also an increase in motorcycle rider deaths due to motor vehicle crashes. In 2003 there were 54 fatalities in motorcycle traffic crashes; in 2005 there were 89 fatalities; and in 2006 there were 111 fatalities (Puerto Rico Traffic Safety Commission, 2009). In response, traffic safety, public health, and medical officials worked with the Puerto Rican Legislature to revise the motorcycle safety statutes. The revisions were enacted in August 2007 and became effective in October 2007. The revisions included the following:[1]

- Prohibiting any person under 12 years old as a passenger;
- Requiring safety gloves that cover the palms to be worn on both hands;
- Requiring footwear that covers the ankles;
- Requiring long trousers that cover the ankle area;
- Requiring every motorcycle operator to keep headlights and taillights on at all times while the motorcycle is in motion;
- Requiring motorcycle operators to stay in the same lane as other vehicles;
- Requiring every motorcycle operator and passenger to wear a reflective vest or device while operating his or her vehicle between the hours of 6 p.m. and 6 a.m.;
- Changing the illegal per se BAC from .08 g/dL to .02 g/dL for motorcycle riders;
- Creating new requirements for training and licensing;
- Establishing a seven-member Motorcycle Rider Advisory Council;
- Establishing a minimum of eight closed-course motorcycle-safety-training ranges throughout the island; and
- Conducting an information campaign for motorcycle operators and the general public regarding changes to law.

At that time, Puerto Rico was the only State, territory, or commonwealth in the United States to require the use of reflective vests at night, safety gloves, long pants and shoes covering the ankle at all times, and to establish an illegal per se limit of .02 g/dL BAC for motorcycle riders. It is important to understand the law's effects on motorcycle crashes, fatalities, and enforcement, and whether provisions in this law could or should be considered by other States for the purpose of improving safety and reducing fatalities.

[1] A universal DOT-approved helmet use law in Puerto Rico existed prior to 2007.

Background

Puerto Rico revised Law No. 107, its motorcycle safety law, in October 2007 in response to an increase in motorcycle fatalities, from 55 in 2004 to 89 in 2005, and to 111 in 2006 (GHSA, 2008). During this time, there was also an increase in the number of registered motorcycles. The steady rise in fatalities as a result of motorcycle crashes raised sufficient concern among stakeholders and the legislature to expand Puerto Rico's motorcycle safety law by comprehensively addressing many aspects of riding, including protective clothing, visibility and conspicuity, impaired riding, and training requirements.

Motorcycling and Safety Apparel

Many motorcycle crashes are attributable, at least in part, to other road users infringing on motorcycle riders' right of way. These road users often claim that they did not see the motorcycle riders. Riders have long been urged to take steps to increase their conspicuity. For example, a recommendation of the National Agenda for Motorcycle Safety (NAMS) rated as "essential" is to "encourage motorcycle riders to enhance their conspicuity" (NHTSA & Motorcycle Safety Foundation, 2000). The current project included an evaluation of rider compliance with provisions aimed at encouraging riders to increase their conspicuity by wearing reflective vests.

Motorcycle riders are far more likely to be injured in crashes than drivers of passenger vehicles due, at least in part, to the relative lack of protection afforded by the motorcycle compared to a car. Wearing protective equipment and clothing such as helmets, boots, gloves, and skid-resistant jackets and pants has long been encouraged by safety advocates. The current project included an examination of the portion of the law intended to encourage riders to wear protective apparel.

Motorcycling and Alcohol

Evidence reveals that alcohol plays a major role in motorcycle crashes. For example, in 2009 about 29 percent of motorcycle operators involved in fatal crashes had BACs of .08 g/dL or higher, compared to 23 percent for drivers of passenger vehicles. No other vehicle type has a higher proportion of drivers with BACs of .08 g/dL or higher in fatal crashes (NHTSA, 2011). The difference in BACs between motorcycle riders and passenger vehicle operators is even greater when one considers the number who had been drinking (though not necessarily to intoxication). For example, in 2009 some 37 percent of motorcycle riders involved in fatal crashes had BACs of .01 g/dL or higher, compared to 27 percent for drivers of passenger cars. While 8 percent of motorcycle riders involved in fatal crashes had BACs from .01 to .07 g/dL, only 4 percent of passenger car drivers in fatal crashes had BACs in that range.

Operating a motorcycle requires greater skill and coordination than operating a passenger vehicle (NHTSA, 1999), which suggests that alcohol impairment while operating a motorcycle is riskier than it is when operating a passenger vehicle. It therefore seems reasonable to reduce impaired riding as a means to reduce the number of serious motorcycle crashes.

A comparison of injury crashes of motorcycle riders to those of passenger car drivers found that about the same proportion of each group had measurable BACs, but the mean BAC of the

positives was .12 g/dL for the motorcycle riders compared to .18 g/dL for the passenger car drivers (Sun, Kahn, & Swan, 1998). This finding and other evidence led the authors to suggest that a lower illegal per se BAC limits for operating a motorcycle is reasonable because of the greater coordination and balance required when operating a motorcycle as opposed to a car. In a study conducted for NHTSA in which motorcycle riders performed skill test exercises on a closed course at a range of BACs (.00, .02, .05, and .08 g/dL), riders performing hazard avoidance tasks at the .05 g/dL level showed slower reaction times and avoided hazards by a narrower margin (Creaser, Ward, Rakauskas, Boer, Shankwitz, & Nardi, 2007). This finding suggests that impairment of motorcycle operation begins at BACs lower than .08 g/dL.

Enforcing a .02 g/dL per se limit requires identifying motorcycle riders at BACs as low as .02 g/dL, which may be difficult. Research conducted by Stuster (1993), which forms the basis of training materials for the identification of intoxicated motorcycle riders, identified behavioral cues of intoxication from riders determined by police officers to be impaired. Out of 94 riders tested, 96 percent had BACs above .08 g/dL, and the average BAC was .145 g/dL. A study by McKnight, McKnight, Langston, Maruqes, & Tippetts (1997) identified cues of impairment in a social setting that included subjects at BACs below .08 g/dL. They found no usable cues of impairment below .04 g/dL; however, several cues of impairment were found in the .04 g/dL to .08 g/dL range, some of which (bloodshot eyes, deliberate speech, slouching) might be of use in identifying motorcycle riders with relatively low BACs.

In every State, a BAC of .08 g/dL or greater is considered per se evidence of alcohol-impaired driving. For special classes of drivers, such as school bus drivers, drivers of commercial vehicles, and young drivers, the per se levels are set at lower BACs. Zero-tolerance laws for drivers under 21, which most States have set at .02 g/dL, have been shown to be effective in decreasing alcohol- related crashes and injuries of young drivers (Voas, Tippetts, & Fell, 2003; Hingson, Heeren, & Winter, 1994).

The 2000 National Agenda for Motorcycle Safety (NAMS)[2] presented recommendations for improving motorcycle safety, and identified reducing impaired riding as one of the most urgent recommendations.

Puerto Rico's Law No. 107

Puerto Rico's Law No. 107 was enacted on August 10, 2007, and took effect in October 2007 with provisions on motorcycle safety, including the following:

- Prohibiting any person under 12 years old as a passenger;
- Requiring safety gloves that cover the palms to be worn on both hands;
- Requiring footwear that covers the ankles;
- Requiring long trousers that cover the ankle area;
- Requiring every motorcycle operator to keep headlights and taillights on at all times while the motorcycle is in motion;
- Requiring motorcycle operators to stay in the same lane as other vehicles;

[2] NAMS was the result of a collaborative effort between NHTSA, the Motorcycle Safety Foundation, and a team of experts in motorcycle safety, including researchers, educators, law enforcement, insurers, the medical community, and representatives of motorcycle rider associations.

- Requiring every motorcycle operator and passenger to wear a reflective vest or device while operating his or her vehicle between the hours of 6 p.m. and 6 a.m.;
- Changing the illegal per se BAC from .08 g/dL to .02 g/dL for motorcycle riders;
- Creating new requirements for training and licensing;
- Establishing a seven-member Motorcycle Rider Advisory Council;
- Establishing a minimum of eight closed-course motorcycle-safety-training ranges throughout the island; and
- Conducting an information campaign for motorcycle operators and the general public regarding changes to law.

The law did not make changes to the previous protective headgear requirements, because Puerto Rico had a universal DOT-compliant helmet-use law that also required riders to use an eye-protection device.

The law lowered the illegal per se BAC limit for motorcycle riders from .08 g/dL to .02 g/dL. Although impairment can begin with any amount of alcohol (there is evidence of motorcycle rider impairment at a BAC of .05 g/dL, noted above), all States and the District of Columbia have per se levels for motorcycle riders of .08 g/dL.

Objectives

The objectives of this project were to examine the impact of Law No. 107 on motorcycle riding safety, rider acceptance and compliance, and enforcement of the law. Specifically, the project sought to determine the following.

- The extent to which the law was being enforced. There must be some enforcement of a law to affect behavior, which requires at the least, that law enforcement officers are aware of the law, and have the means and the will to enforce it. Assessing the extent of enforcement involved reviewing citations and/or arrests for the law's provisions after enactment.
- Rider awareness of the law. This question includes the degree to which the law was publicized (e.g., through official campaigns to publicize the law).
- Rider acceptance of the law. Did riders accept some parts of the law more than others?
- Rider adoption of safety gear, including reflective vests at night, protective gear, etc., based on observational surveys of safety gear use.
- Rider response to the lower BAC illegal per se limit, as assessed by analyzing the number of fatalities that were alcohol-related (BAC of .02 g/dL and higher), alcohol-impaired (BAC of .08 g/dL and higher), or non-alcohol-related (BAC=.00 g/dL) before and after enactment of the law; and counts of motorcycle rider DWI arrests.

Methods

Awareness and Perception of the Law

The researchers obtained information from motorcycle clubs in Puerto Rico, including Grupo Llamas, Ladies of Harley, and Happy Eagles Moto Club. A limitation of this method is that these groups are interested in motorcycle safety, and as such, may not represent other rider groups, or all riders. Among the topics discussed were the law's lower BACs, requirements regarding safety clothing, enforcement of the law, and the media campaign to publicize the law (see Appendix A). Nine motorcycle riders participated in the group discussion.

We also obtained the perspective of five law enforcement officials regarding how well the law was being enforced, the difficulty/ease of enforcing it, and how to detect a motorcycle rider with a BAC above .02 g/dL (see Appendix B). The five participants were members of the traffic division in the Puerto Rico Police Department, San Juan Police Department, and Guaynabo Police Department. The Puerto Rico Police Department is similar to a State Police department and employs more than 17,000 active duty officers. San Juan and Guaynabo Police Departments are large police agencies in large cities. A limitation of this approach is that there were no participants from smaller or more rural law enforcement agencies.

The discussions lasted two hours. Participants were unpaid volunteers. Researchers facilitated the discussions which were conducted both in English and Spanish. The discussions were recorded and key points were extracted from the recordings.

We also obtained information regarding the media and publicity campaign about the law from the Puerto Rican Traffic Safety Commission.

Observations of Motorcycle Riders and Their Protective Gear

Data collectors conducted observations (Appendix C) of motorcycle riders riding on the road regarding:

- Helmet use (none, DOT-compliant helmet, non-DOT compliant helmet),
- Reflective vest use (after 6 p.m.), and
- Protective gear use (such as shoes that covered the ankle, gloves, eye protection, and long pants).

The observations took place over two 2-hour periods on a Saturday and a Sunday from 9 a.m. to 9 p.m. by four to six data collectors typically located in parking lots observing riders who passed the parking lots on adjacent roads.

The first wave of data collection took place in January 2011 in the eastern and central parts of the island. The locations included rural coastal roads, seaside villages, urban areas, and rural mountainous roads. Temperatures were in the upper 80s. The second wave took place in June 2011 in the western part of the island. These locations also included rural coastal and mountainous roads, seaside villages, and urban areas. Temperatures were in the low 80s with strong rain storms.

The research team selected locations for the observations on roads known to be used commonly by motorcyclists.

BACs Obtained at Checkpoints

The data collectors collected BAC data from both passenger vehicle drivers and motorcycle riders at sobriety checkpoints. All data was provided on a voluntary and anonymous basis. This information was collected to compare BAC data from motorcycle riders and passenger car drivers.

Data was obtained at three separate checkpoints. Two checkpoints were conducted on a Sunday afternoon, at a time when many motorcycle riders in Puerto Rico are on the road. The Sunday checkpoints were held on October 2 and November 13, 2011, from about 4 p.m. to 8 p.m. The third checkpoint was on a Saturday night held on November 12, 2011, from 7 p.m. to 11 p.m. The checkpoint conducted on Saturday was held at a location not noted for high motorcycle traffic. Checkpoints held on Sundays were located in areas known to have relatively high concentrations of recreational motorcycling.

Because much of weekend motorcycling is recreational, it is likely that a large proportion of riders tested at checkpoints were returning from rides which included stops at drinking establishments. Because a smaller proportion of passenger cars encountered at the checkpoints were on a recreational trip, a smaller proportion was likely to have been coming from drinking establishments. Conducting checkpoints at these locations had the advantage of high motorcycle traffic; however, the resulting BAC data were likely skewed by including more drinking riders than there would be at other times. Because the primary purpose of the data collection was to collect BAC data from riders, nearly all motorcycle riders who passed through checkpoints were stopped and asked for breath samples, whereas the passenger car drivers who were stopped and asked to participate were randomly selected.

BACs of Riders and Drivers Issued Citations at Checkpoints

Data collectors reviewed reports of riders and drivers who had received citations at checkpoints in 2010 and 2011 including BAC data. The citation included the date, time and BAC (if taken) of the operator, allowing a comparison of impaired operating citations between motorcycle riders and car drivers at the same checkpoints and at around the same time. In some cases, only one citation for a passenger vehicle driver matched citations for multiple motorcycle riders. (The motorcycle-centric checkpoint deployment locations resulted in fewer citations for passenger vehicle drivers than for motorcycle riders in the data file.) The mean and median BACs for citations for motorcycle/scooter riders were compared to matching passenger vehicle drivers. We also determined the proportion of drivers and riders suspected of driving impaired and breath tested for a BAC at these checkpoints.

These data supplement the data collected under PIRE supervision at the checkpoints described above. The BAC was recorded for riders and drivers that law enforcement officers considered worthy of testing, which likely occurred when officers judged a driver or rider to be impaired. In the case of motorcycle and scooter riders, it is possible that officers tested rider BACs with the .02 BAC per se limit in mind.

Number of Motorcycle Rider Fatalities in Traffic Crashes

We analyzed Fatality Analysis Reporting System (FARS) data for the years 2000 to 2007 (pre-law years) and for 2008 and 2009 (post-law years). Fatal crashes in Puerto Rico were compared

to those in Florida, Hawaii, and two counties in California that border Mexico, Imperial County and San Diego County.

For each BAC category (BAC>.00, BAC=.02+; BAC=.08+, and BAC=.15+ for motorcycle riders compared to passenger car drivers involved in fatal crashes), the odds in the pre-law years were tested against the odds in the post-law years by means of logistic regression. Motorcycle riders and passenger car drivers were examined separately. The odds refer to the ratio of people in the category of interest to the remaining people. For example, the odds of BAC>.00 are calculated by dividing the number of BAC-positive people by the number of zero BAC people, while the odds of BAC=.02+ are calculated by dividing the number of BACs equal to or above .02 by the number of BACs below .02. We chose to use odds in the analysis instead of the proportions, mainly because of the nature of the FARS BAC Imputation File, which makes it challenging to combine Pearson's chi-squares calculated from multiple imputation files. Results from logistic regression, on the other hand, can be easily synthesized with standard statistical software. Note that Pearson's chi-square test and logistic regression are two alternative ways of analyzing categorical data, and they usually yield similar results.

In addition, a Pearson's chi-square test was conducted on the overall proportions of motorcycle riders wearing helmets between the pre-law and post-law years, while logistic regression was employed to analyze the ratio of nighttime (6 p.m. to 6 a.m.) to daytime (6 a.m. to 6 p.m.) motorcycle rider fatal crashes. This nighttime to daytime ratio is used as a surrogate measure of the ratio of impaired driving crashes to non-impaired driving crashes.

Project Challenges

There were limitations to evaluating the impact of the law, including the following.

- Limited access to crash data files for vehicles and motorcycles. Ideally, we would have had access to records of the alcohol-related (at a BAC of .02 g/dL and higher), alcohol-impaired (at a BAC of .08 g/dL and higher), non-alcohol-related (BAC=.00 g/dL), and total motorcycle crashes before and after enactment of the law. However, we had limited access to crash data files, making it impossible to analyze possible changes to alcohol-related, alcohol-impaired, and non-alcohol-related crashes. At the time of this study, the database included only crash records through 2006, precluding a post-law analysis.
- The lack of an electronic database of BACs for motorcycle riders arrested for impaired riding. Individual law enforcement agencies do not enter citation information into a database but record it on paper citations. Obtaining information on BACs would have required reviewing paperwork to find motorcycle driver-under-the-influence (DUI) citations, which would have required reviewing more than 3,500 citations per month.
- Limited access to motorcycle citation data. The Puerto Rico Police Department tracks citations given to motorcycle riders, but other departments do not; rather, they store motorcycle citations with all other citations. Identifying citations for motorcycle riders would have required reviewing each paper citation.
- Limited data on motorcycle rider enforcement activities prior to the law, limited comparison of enforcement activities before and after implementation of the law. The only law enforcement agency tracking the number of DUI arrests of motorcycle riders was the Puerto Rico Police Department, which only began tracking that information in July 2006, a year before implementation of the law.

Results

Motorcycle Riders

To gauge motorcycle riders' reactions to the law, a discussion group was held with members of various motorcycle clubs in Puerto Rico. It is important to note that only a small group of motorcycle riders was interviewed and participants were members of clubs (Grupo Llamas, Ladies of Harley, and Happy Eagles Moto Club) that are considered to be pro-safety. Accordingly, their views may not be representative of other motorcycle riders in Puerto Rico.

Three issues emerged from these discussions. First, the consensus was that the majority of motorcycle riders in Puerto Rico was aware of, accepted, and obeyed the provisions introduced in Law No. 107, especially those requiring protective gear. It did take some time for people to get used to the new provisions; however, as one participant stated, "Motorcycle riders are getting used to the fact that if they ride, they need to wear the gear and follow the law. You can't ride if you aren't following the law."

According to participants, motorcycle club members supported the law and encouraged other members to follow the law. In fact, participants in the discussion were aware of the law as some of them had played a role in drafting aspects of the law. Most members viewed the changes in the law to be positive, and a change that needed to occur. In contrast to motorcycle riders who often are resistant to laws requiring riders to wear specific protective gear, these riders were not resistant to the changes in the law, and did not view the law as the government "telling riders what to do."

Participants expressed the opinion that the educational campaign following enactment was important in getting the message out to the public about the changes to the law. Participants mentioned that they talked about the changes to the law within their own motorcycle clubs but the majority of the educational campaign was conducted by the Traffic Safety Commission through outreach via the media, or attendance at motorcycle festivals and other events.

Second, participants stated that enforcement of the changes in the law was uneven and lacking in some locations. Participants said that in some of the bigger cities on the island, law enforcement were more likely to give citations to riders for not wearing protective gear. In addition, participants believed that there was little or no enforcement of motorcycle laws in the interior of the island and in rural areas.

Some participants stated that since the passage of the law revisions, law enforcement were more aggressive with motorcycle riders than with drivers of other vehicles, especially during checkpoints. Participants also believed that law enforcement rarely gave out citations to scooter riders, who reportedly rarely wore any protective gear including helmets.

Third, there was lack of consensus among participants in regards to the effectiveness of lowering the illegal BAC for riders to .02 g/dL. There was no disagreement among participants that drinking is a large part of the culture in Puerto Rico, especially among riders. They stated that the majority of motorcycle riding is done on weekends, particularly Sundays, as a means of relaxing, and includes stopping along their route to share alcoholic beverages among friends. Some participants stated that the .02 g/dL level was too low. One participant offered the

following reason, “Everyone drinks in Puerto Rico and you are basically not allowing people to drink.” Individuals who accepted the .02 g/dL illegal level as a reasonable level stated that motorcycle riding was different from driving a vehicle and a slight mistake on a motorcycle caused by impairment can carry a greater risk than making that same mistake in a car. One participant expressed the belief that, if riders know they are going to be riding motorcycles, then they know they should not drink alcohol; the choice is to either ride a motorcycle or to drink.

Law Enforcement Officers

Law enforcement officials from the Puerto Rico, San Juan, and Guaynabo Police Departments who participated in the discussion group stated that citations for violating the new provisions of the law have increased, including DWI arrests. Participants acknowledged that the focus on riders increased, but not dramatically. Four other issues emerged in these discussions. First, once the law was implemented, the change was obvious and rapid in terms of riders using helmets and protective gear. Officers stated that riders seemed to understand that if they were not wearing any protective clothing, especially helmets, that they would be stopped and cited.

Second, officers acknowledged that it was difficult to detect a motorcycle rider with a BAC at or just over a .02 g/dL. Officers reportedly had little training in the identification of impaired riders and that identifying a rider solely from their riding at a lower BAC is not easy. Rather, the only way to suspect a rider of having a positive BAC is while having face-to-face contact. However, participants noted that other provisions of the law made it easier to intervene and create an opportunity for face-to-face contact with a rider. For example, officers had a reason to stop and intervene with a motorcycle rider who is not wearing protective clothing, such as the safety gloves or long pants. Once in contact with the riders, if an officer smelled alcohol, they could ask for a breath test. Officers stated that they do not conduct special enforcement initiatives aimed solely at motorcycle riders, but they often pay special attention to riders during regular sobriety checkpoints or safety checkpoints.

Third, officers noted that the court system frequently dismisses cases or reduces the charge for motorcycle riders with low BACs. Officers expressed the opinion that judges may view a low BAC as an indication that the motorcycle rider was not impaired. Nonetheless, officers noted that they believed they needed to continue arresting motorcycle riders who violate the law, even if the court dismissed the charges. Some officers said that the BAC shouldn’t be above zero at all, and they did not have any issue with the law’s lower BAC level. The officers stated that the illegal per se limit should not be restored to .08 g/dL.

Fourth, officers expressed the opinion that the fines for violating the law were too low. Fines for violating each portion of protective clothing provisions of the law are $50. Officers stated that increasing the fines would create an incentive for riders to wear protective gear.

Law enforcement participants did not mention whether motorcycle riders were more frequently refusing breath tests as a result of the lower BACs. The participants indicated that there is little organized outreach or educational by law enforcement aimed at adult motorcycle riders. The outreach campaign was delegated primarily to the Traffic Safety Commission, and is focused primarily on school children and conducted in schools.

Media and Publicity

After the enactment of the law, the Puerto Rican Traffic Safety Commission conducted a motorcycle educational campaign in 2007 to inform the public about the additions to Law No. 107. The campaign consisted of media spots on television and radio, and newspaper insertions including multi-page sections inserted into various newspapers.

In addition to paid media, the Traffic Safety Commission displayed safety advertisements on billboards, cinema screens, and internet web banners; distributed dinner placemats to every Denny's restaurant in Puerto Rico; and distributed educational brochures to all junior high and high schools in Puerto Rico.

As a direct means of contacting motorcycle riders, Traffic Safety Commission staff attended motorcycle events such as jamborees to hand out educational brochures. The motorcycle safety specialist at the Traffic Safety Commission participated in a weekly cable television show devoted to motorcycle issues during which a motorcycle safety specialist had five minutes to discuss motorcycle safety issues.

The themes of the outreach campaign varied depending on whether the target was the public at large or motorcycle riders. Campaign material for motorcycle riders consisted of information on safety clothing, helmet use, and impaired riding. Campaign material devoted to the general public highlighted the importance for motorists to notice and respect motorcycle riders on the roadways. For example, one campaign targeted at passenger vehicle drivers was called *Sharing the Road* (*Comparte la Carretera*). A series of public service announcements (PSA) and posters reminded drivers that motorcycle riders have the same rights to use the road as all drivers, that riders need the same amount of space as a vehicle, and to be alert for motorcycles when changing lanes. One PSA poster showed a picture of a motorcycle in a side view mirror with the tag line *Share the Road* while another featured a motorcycle in the rear view mirror with the same tag line.

The amount of earned media spots and investments made to the media campaign is shown in Table 1.

Table 1. Number of Paid Media Spots and Total Investment by Year

Paid Media	2007-08 Spots	2008-09 Spots	2009-10 Spots
Television	100	971	595
Newspaper Insertions	96	11	32
Radio	1284	1472	40
Cinema	0	200	0
Internet Web Banners	0	0	5
Outdoor Media	0	0	225
Total Investment	$350,000	$391,000	$280,000

Impact on Use of Helmets, Reflective Vests, and Protective Gear

One of the objectives of this project was to measure the law's impact on motorcycle riders' use of protective gear and helmets and the use of reflective vests (at night). Data collectors observed riders during one weekend in January 2011 and one weekend in June 2011.

The first observation included 334 riders. Of those, 284 (85%) wore DOT-compliant helmets, 42 (12.6%) wore non-compliant helmets, and 8 (2.4%) did not wear any type of helmet. Nearly all of the observed motorcycle riders were male (320 or 95.8%). More than 80 percent wore protective gear. Of all observed riders, 331 (99.1%) wore long pants, 277 (82.9%) wore protective shoes that covered the ankle, 317 (94.9%) wore some type of eye protection (either goggles or visors attached to the helmet), and 291 (87.1%) wore protective gloves. Of all observed motorcycle riders, 80 (24%) wore reflective vests. Of 75 motorcycle riders observed after 6 p.m., 51 (68%) wore reflective vests.

The second observation included 90 riders. Of those, 82 (91.1%) motorcycle riders were wearing DOT-compliant helmets, 7 (7.8%) motorcycle riders wore non-DOT-compliant helmets, and 1 (1.1%) motorcycle rider did not wear any type of helmet. Again, almost all of these observed motorcycle riders were male (88 or 97.7%). More than 80 percent of observed motorcycle riders wore protective gear. Of all observed riders, 85 (94.4%) wore long pants, 63 (70%) wore protective shoes that covered the ankle, 80 (88.8%) wore eye protection, and 63 (70%) wore protective gloves. Due to stormy weather, only 14 riders were observed after 6 p.m.; of these, only 2 (14%) were wearing reflective vests.

Table 2 summarized the combined results of 424 rider observations during both weekends. Of those, 366 (86.3%) wore DOT-compliant helmets, 49 (11.6%) wore non-DOT-compliant helmets, and 9 (2.1%) did not wear any type of helmet. Nearly all of the observed motorcycle riders were male (408 or 96.2%). Of all observed riders, 416 (98.1%) wore long pants, 340 (80.2%) wore protective shoes that covered the ankle, 397 (93.6%) wore some type of eye protection, and 354 (83.5%) wore protective gloves.

Table 2. Results of Motorcycle Rider Observation

	Observed	DOT-Compliant Helmet	Non-DOT-Compliant Helmet-	Long Pants	Protective Shoes	Eye Protection	Protective Gloves
First Observation	334	284	42	331	277	317	291
Second Observation	90	82	7	85	63	80	63
Total	424	366 (86.3%)	49 (11.6%)	416 (98.1%)	340 (80.2%)	397 (93.6%)	354 (83.5%)

Motorcycle passengers were observed during the January and June motorcycle observational surveys. Passenger data were recorded only if the surveyor had obtained data on the motorcycle driver. None of the passengers appeared to be under 13 years old (recall that one of the changes in the 2007 law was to make it illegal for motorcycle passengers to be under 13 years old). Table 3 summarizes the results of the survey.

Table 3. Results of Motorcycle Passenger Observation

	Observed	Under 13	DOT-Compliant-Helmet	Non-DOT Compliant Helmet	Long Pants	Protective Shoes	Eye Protection	Protective Gloves
First Observation	103	0	87 (84.5%)	14 (14%)	103 (100%)	86 (83.5%)	96 (93%)	70 (86%)
Second Observation	14	0	10 (71.4%)	3 (21.4%)	11 (78.6%)	4 (28.6%)	10 (71.4%)	4 (28.6%)
Total	117	0	97 (82.8%)	17 (14.5%)	114 (97.4%)	90 (76.9%)	106 (90.6%)	74 (63.2%)

The Puerto Rican Traffic Safety Commission conducts observational surveys of motorcycle riders for helmet use only and also found high rates of use. In 2010 there were observations of 700 riders; with 505 (72.1%) riders having worn DOT-compliant helmets, 170 (24.3%) riders wore non-DOT-compliant helmets, and 25 (3.6%) riders who did not wear any type of helmet.

Table 4 summarizes the results of the Puerto Rican Traffic Safety Commission motorcycle observational surveys on helmet use, which shows a high use rate (consistently greater than 92%). As stated earlier, a universal helmet law had been in place in Puerto Rico prior to enactment of Law No. 107. The use of DOT-compliant helmets increased after the law's enactment. In 2006 39.4 percent of riders wore DOT-compliant helmets and the use-rate increased in 2007 to 56.4 percent. In the three years following enactment, DOT-compliant helmet use was consistently greater than 70 percent.

Table 4. Results of Puerto Rico's Motorcycle Rider Helmet Use Observational Surveys

	2006	2007	2008	2009	2010
Observed	198	479	317	274	700
Helmet Use	99.0%	92.3%	94.6%	93.5%	96.4%
DOT-Compliant	39.4%	56.4%	72.2%	70.8%	72.1%
Non-DOT-Compliant	59.6%	35.9%	22.7%	22.6%	24.3%
No Helmet Use	1.0%	7.7%	5.4%	6.6%	3.6%

BACs at Checkpoints

BAC information from riders arrested or cited for impaired driving was not available for this project. As a result data collectors obtained BAC data from passenger car drivers and motorcycle riders passing through three sobriety checkpoints conducted by the Puerto Rico Police Department. The information was collected anonymously and voluntarily. Table 5 shows the results of the first checkpoint held in Aguadilla on Sunday, October 2, 2011. Tables 6 and 7 show the results of the BACs obtained at the checkpoint held in Isla Verde on Saturday, November 12, 2011, and Bayamon on Sunday, November 13, 2011. Table 8 shows the results of the three checkpoints combined. Table 9 shows the BAC distributions that were obtained at the three checkpoints in Puerto Rico.

Table 5. Results of BAC Samples Obtained in Aguadilla

Drivers	Total Interviewed	BAC Samples	Refused	% Provided	Positive BACs	% Positive
Passenger Vehicle	194	153	41	79%	5	3.3%
Motorcycle	41	35	6	85%	6	17.1%
Total	235	188	47	80%	11	5.9%

Table 6. Results of BAC Samples Obtained in Isla Verde

Drivers	Total Interviewed	BAC Samples	Refused	% Provided	Positive BACs	% Positive
Passenger Vehicle	105	64	41	61%	11	17.2%
Motorcycle	2	2	0	100%	0	0.0%
Total	107	66	41	62%	11	16.7%

Table 7. Results of BAC Samples Obtained in Bayamon

Drivers	Total Interviewed	BAC Samples	Refused	% Provided	Positive BACs	% Positive
Passenger Vehicle	153	122	31	80%	6	4.9%
Motorcycle	48	42	6	87%	17	40.5%
Total	201	164	37	82%	23	14.0%

Table 8. Results of BAC Samples Obtained at Checkpoints

Drivers	Total Interviewed	BAC Samples	Refused	% Provided	Positive BACs	% Positive
Passenger Vehicle	452	339	113	75%	22	6.5%
Motorcycle	91	79	12	87%	23	29.1%
Total	543	418	125	77%	45	10.8%

Table 9. Distribution of BAC Samples at Checkpoints

Drivers/Riders	.00 BAC	.01 - .04 BAC	.05 - .07 BAC	.08 - .14 BAC	.15+ BAC
Passenger Vehicle Drivers	317 (93.5%)	15 (4.4%)	3 (0.8%)	0 (0.0%)	4 (1.2%)
Motorcycle Riders	56 (70.9%)	10 (12.7%)	11 (13.9%)	1 (1.3%)	1 (1.3%)

Analysis of Motorcycle Rider Citations by Category

Data collectors obtained weekly reports on citations issued from the Puerto Rico Police Department for the citations it issued from 2006 to 2010. The new types of citations relating to the provisions in the 2007 law (such as wearing gloves, long pants, etc.) were analyzed for trends. Helmet usage and impaired-driving citations, which were illegal both before and after the

2007 law, were analyzed, using an interrupted time series analysis to assess whether the law had an impact.

Attire-Related Citations: Trends

The following graphs display the monthly numbers of citations from November 2007 to July 2010 for each attire-related category. Clearly, there were decreasing trends among all the categories, and most of the trends were highly statistically significant based on autocorrelation tests. The only exception was pants-related citations (see Figure 4), which shows a significant downward trend only at a borderline p-value of 0.054. The spike in citations in November 2007 was most likely due to intense enforcement right after the law was adopted.

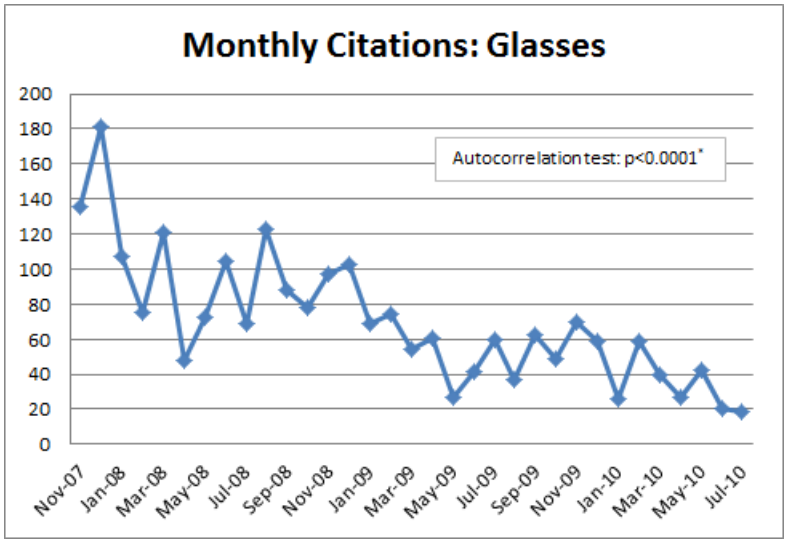

Figure 1. Monthly Citations for Not Wearing Protective Eye Gear

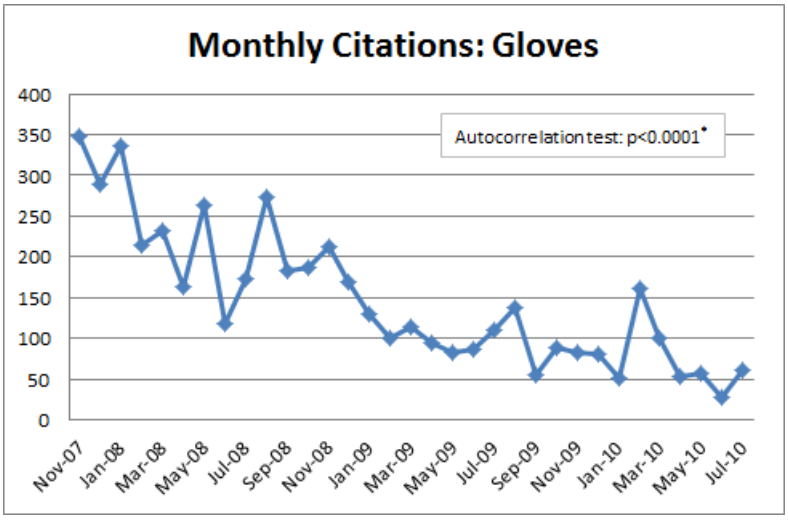

Figure 2. Monthly Citations for Not Wearing Gloves

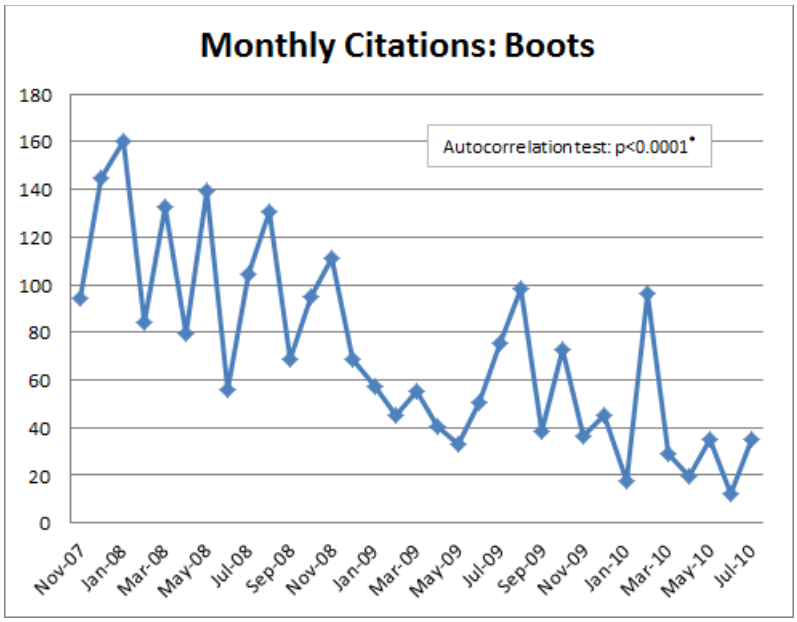

Figure 3. Monthly Citations for Not Wearing Boots

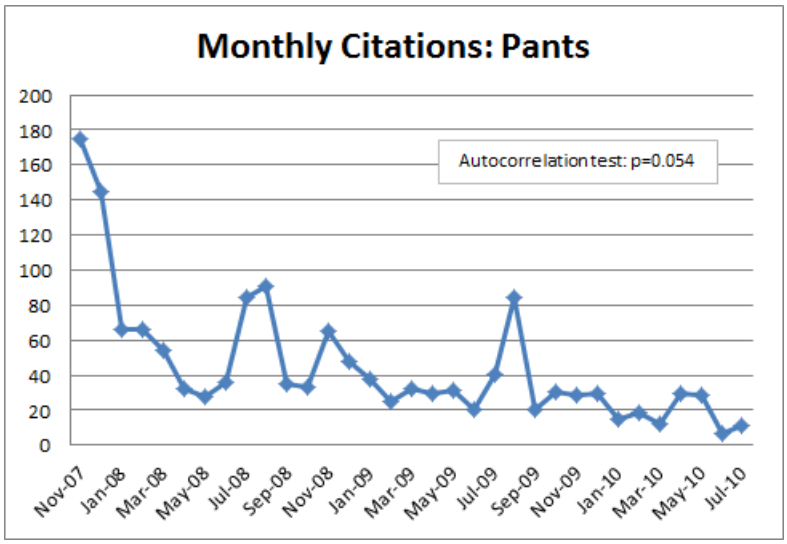

Figure 4. Monthly Citations for Not Wearing Protective Pants

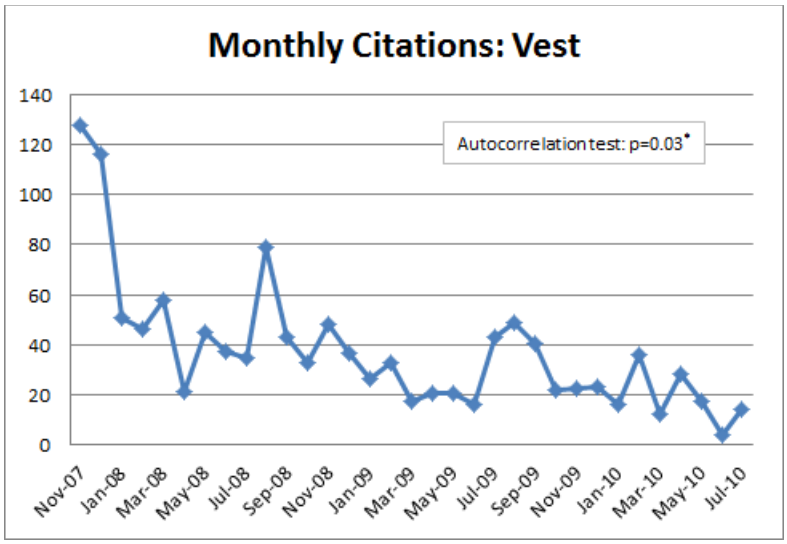

Figure 5. Monthly Citations for Not Wearing Protective/Reflective Vests

Helmet Citations

The monthly numbers of helmet non-use citations from July 2006 to July 2010 are presented in Figure 6. Overall, there was a decreasing trend in citations, which flattened during the post-law years. The trend was not statistically significant, however, according to interrupted time series models. This result is not surprising considering that Puerto Rico already had a universal helmet law. There was a moderate increase in the number of citations immediately after the law took effect. This statistically significant change was detected by an ARIMA (autoregressive integrated moving average) (1, 1, 0) model at the point of November 2010 ($\beta = 324$, $p = 0.0002$), but this upward tendency was temporary and did not sustain over the following few months.

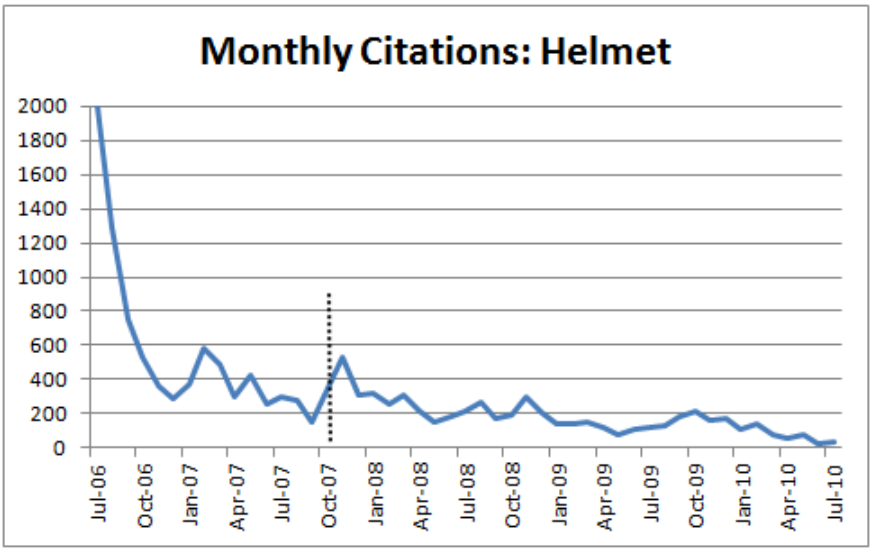

Figure 6. Monthly Citations for Not Wearing Helmets

Impaired Driving Arrests

Figure 7 shows that the monthly numbers of impaired-driving citations were generally very small (some were 0), which adds noise to time series modeling and reduces the statistical power of the technique. Alternately, if the numbers were to be combined the numbers to obtain bi-monthly totals, it would further reduce the length of the already short time series to 24, which would not meet the minimum sample size requirement for running any type of time series analysis (i.e., there needs to be at least 30 data points). Therefore, the time series models were run based on the current monthly series and, not surprisingly, no significant effect of the law was found. A much longer series of impaired-driving citations is needed for future analyses. Additionally, it should be noted that April 2007 witnessed an unusually large number of impaired-driving citations, which could be due to intensive checkpoint crackdowns that month.

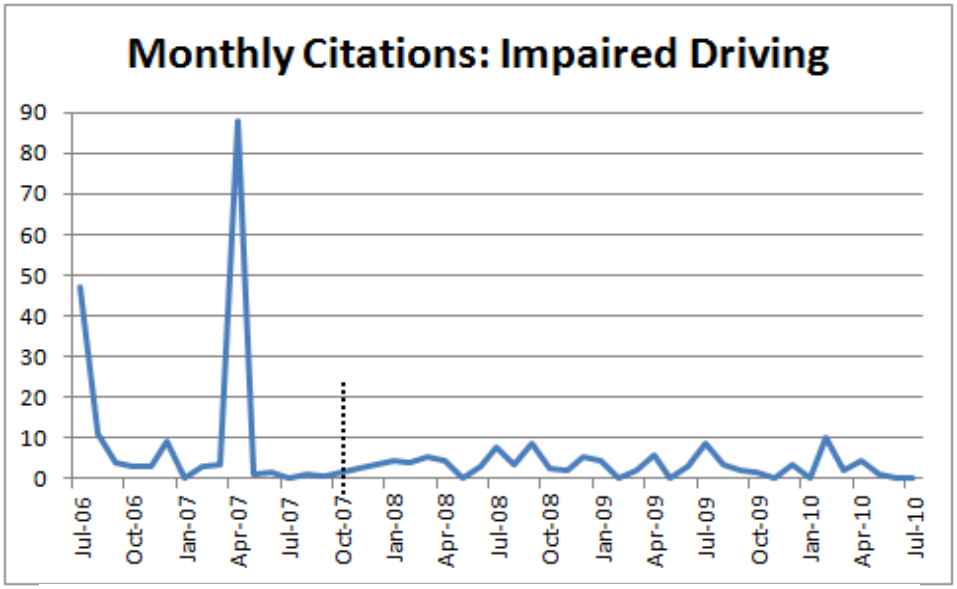

Figure 7. Monthly Impaired Riding Arrests of Motorcycle Riders

BACs of Riders and Drivers Issued Citations at Checkpoints

This study examined BAC distributions and proportions of operators breath-tested by vehicle type by reviewing citations issued at checkpoints in 2010 and 2011. The mean and median BACs for the motorcycle/scooter riders were lower than the mean and median BACs for car drivers. However, an independent samples T-test found the difference to be non-significant (p= .074). Because a lack of statistical significance can be a function of a low sample size, we computed a logistic regression to compensate for the small sample size. The analysis showed that the BAC test results of motorcycle and scooter riders were statistically significantly more likely to be below .08 BAC, while car drivers were more likely to be above .08 BAC (p= .013). This difference in BAC between riders and drivers could occur if riders who drank and rode, drank less than the drivers, possibly as a result of the .02 BAC per se law. Another possibility is that law enforcement officers were more likely to have probable cause to test the riders for their BAC

than to test passenger car drivers, due to the lower illegal per se BAC limit for motorcycle and scooter riders than for drivers (.02 BAC versus .08 BAC). Table 10 compares the BAC data for drivers and riders cited at these checkpoints.

Table 10. Drivers and Riders Cited at Checkpoints

Operator Type	N for Operator Type	N for Those Given a BAC Test	Proportion Given a BAC Test	Minimum BAC Recorded	Maximum BAC Recorded	Average Positive BAC	Median Positive BAC	Std. Dev.
Car Driver	184	26	.141	.01	.226	.115	.110	.053
Motorcycle Rider	193	42	.212	.00	.280	.088	.068	.060
Scooter Rider	36	1	.028	.13	.13	.13	.130	.
Motorcycle and Scooter Riders Combined	229	43	.183	.00	.280	.089	.068	.060

This study conducted logistic regression analyses to determine whether differences in the proportions of operators suspected of driving impaired and tested for their BAC differed significantly by vehicle type. When motorcycle and scooter riders were combined into one category, the differences in proportions tested for BAC were non-significant (p=.253). When car drivers were compared with motorcycle riders alone, the difference was significant (p=.010). This suggests that officers at checkpoints may be conducting breath tests for motorcycle riders (but not scooter riders) more often than for car drivers. Another possible explanation is that police officers at these checkpoints may have been more inclined to test riders for their BAC due to the lower BAC limit for riders. Table 11 shows BAC distributions by vehicle operator type.

Table 11. BAC Distributions by Operator Type

	BAC .00 - .07	BAC >=.08
Cars Drivers	19.2%	80.8%
Riders	52.4%	47.6%

Alcohol-Related and Alcohol–Impaired Crashes

In order to analyze the law's effect on alcohol-related and alcohol-impaired motorcycle crashes, fatalities, and arrest outcomes, it would be necessary (or at least useful) to have data on alcohol-related and alcohol-impaired motorcycle crashes and fatalities. It would be helpful (or helpful) also to have the BAC of motorcycle riders involved in crashes before and after enactment, the percentage of breath tests refused by motorcycle riders before and after enactment, and arrest and conviction rates for DWI. Unfortunately, it was not possible to obtain detailed motorcycle DWI

arrest, test refusal, and conviction data. Limited data from one police department are reported later in this document.

Analysis of FARS Data

FARS Analysis: Motorcycle and Passenger Car Fatalities

We compared motorcycle and passenger car fatalities from FARS from 2000 to 2009 between Puerto Rico and Florida, Hawaii, and two southern counties in California. We examined quarterly numbers of fatalities for each State for trends, presented in Figure 8 through Figure 15. Table 12 shows the annual totals by State. The trends in fatalities for all States except Hawaii were statistically significant, according to autocorrelation tests ($p<0.05$). The small numbers of fatalities in Hawaii may have precluded the emergence of a statistically significant trend (Figure 11). In general, from 2002 to 2009 motorcycle fatalities increased across the States, whereas during this period, passenger vehicle fatalities decreased. For example, Puerto Rico had a steady increase in motorcycle fatalities until 2006, followed by a gradual decrease[3] (see Figure 8). By comparison, in the two California counties and Florida, the decrease in fatalities did not emerge until 2008 (see Figure 9 and 10). Passenger vehicle fatalities also decreased in Puerto Rico at this time (see Figure 12), but fatalities did not decrease in Southern California and Florida until almost 2006 (see Figure 13 and 14).

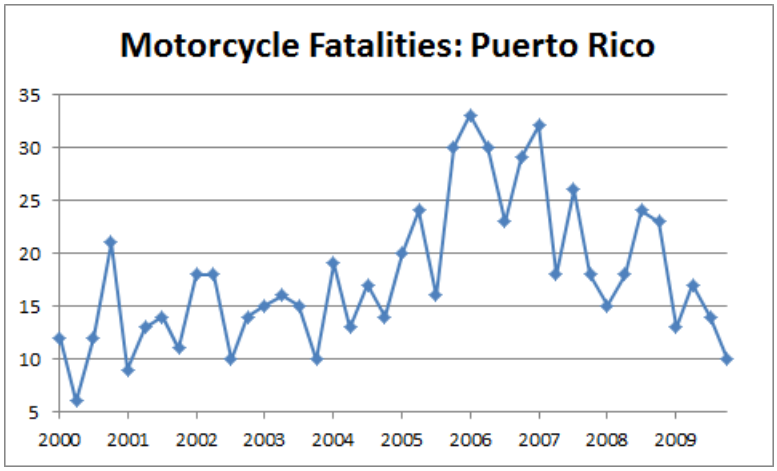

Figure 8. Quarterly Motorcycle Fatalities in Puerto Rico

[3] After the period of this report (2009), motorcycle crash fatalities in Puerto Rico continued a downward trend, see Appendix D-10. Motorcycle Rider Fatalities in Motor Vehicle Traffic Crashes by Year and Rider's BAC, 2002-2012.

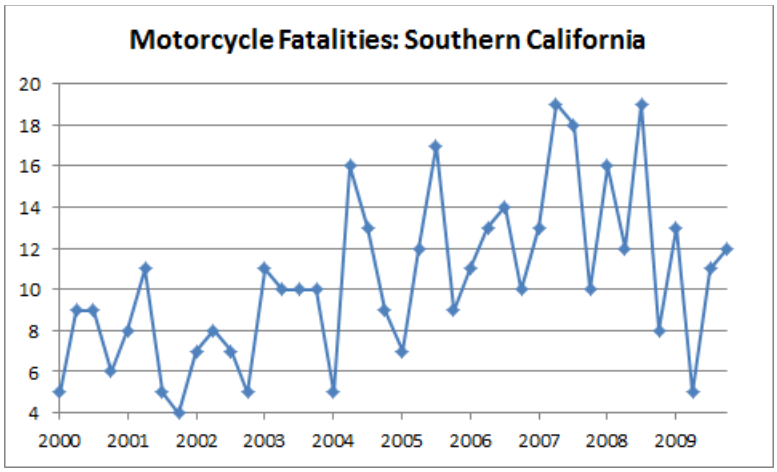

Figure 9. Quarterly Motorcycle Fatalities in Two California Counties

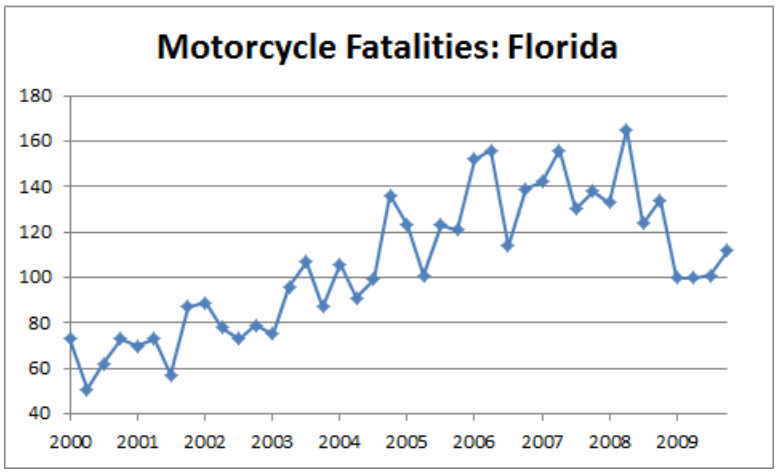

Figure 10. Quarterly Motorcycle Fatalities in Florida

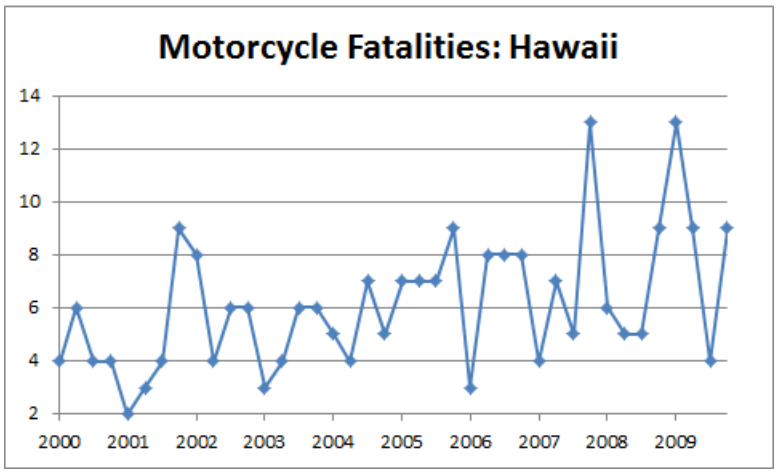

Figure 11. Quarterly Motorcycle Fatalities in Hawaii

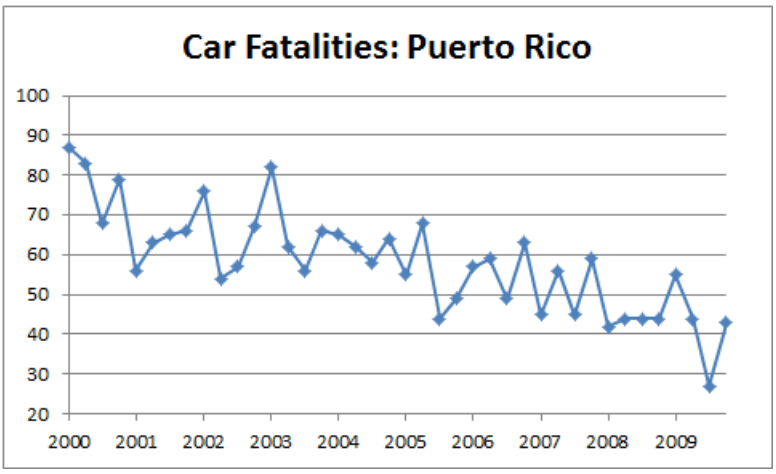

Figure 12. Quarterly Passenger Car Fatalities in Puerto Rico

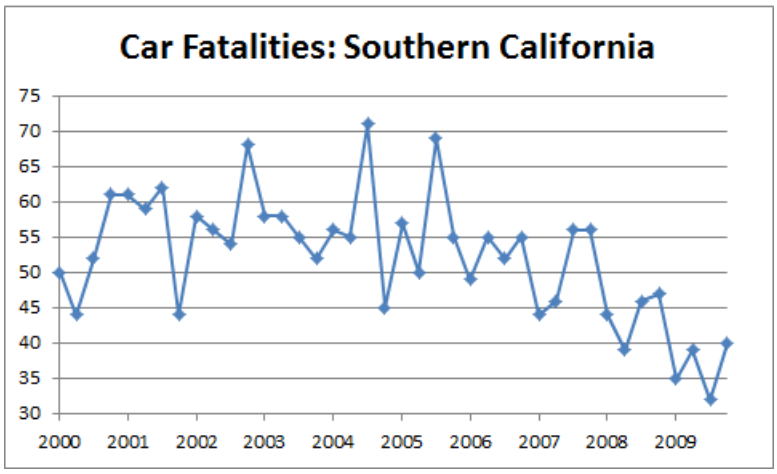

Figure 13. Quarterly Passenger Car Fatalities in Two California Counties

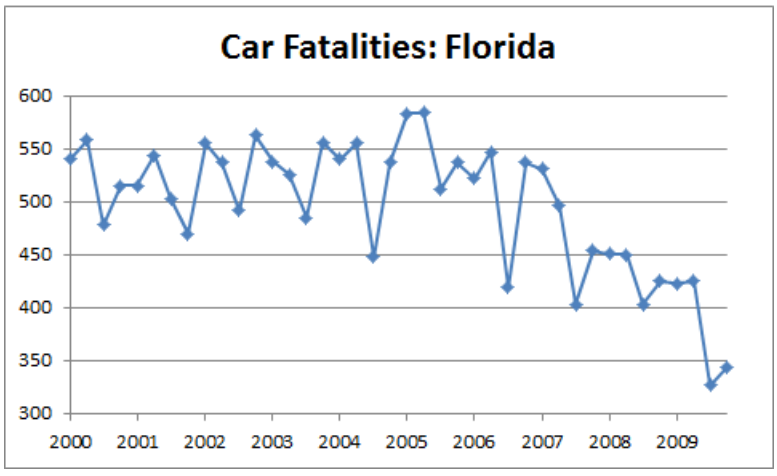

Figure 14. Quarterly Passenger Car Fatalities in Florida

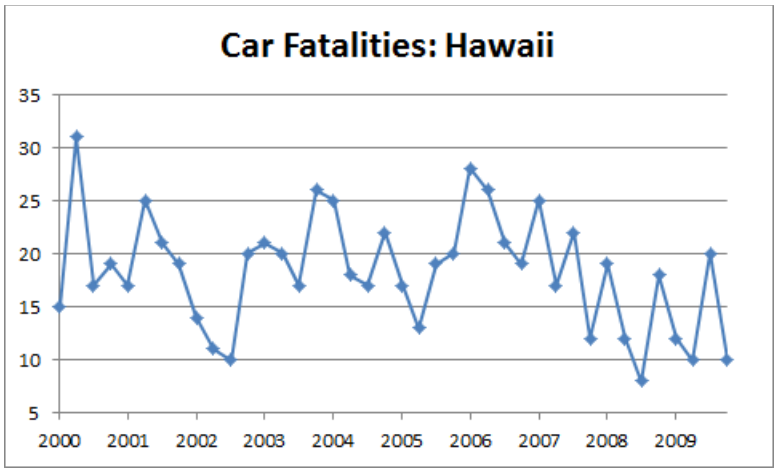

Figure 15. Quarterly Passenger Car Fatalities in Hawaii

Table 12. Motorcycle and Passenger Car Fatalities in California, Florida, Hawaii, and Puerto Rico (2000–2009)

Motorcycle Fatalities			Passenger Car Fatalities		
STATE	**YEAR**	**Total**	**STATE**	**YEAR**	**Total**
California	2000	29	California	2000	207
	2001	28		2001	226
	2002	27		2002	236
	2003	41		2003	223
	2004	43		2004	227
	2005	45		2005	231
	2006	48		2006	211
	2007	60		2007	202
	2008	55		2008	176
	2009	41		2009	146
STATE	**YEAR**	**Total**	**STATE**	**YEAR**	**Total**
Florida	2000	259	Florida	2000	2091
	2001	287		2001	2032
	2002	319		2002	2147
	2003	365		2003	2105
	2004	432		2004	2080
	2005	468		2005	2216
	2006	561		2006	2025
	2007	566		2007	1884
	2008	556		2008	1729
	2009	413		2009	1519

STATE	YEAR	Total
Hawaii	2000	18
	2001	18
	2002	24
	2003	19
	2004	21
	2005	30
	2006	27
	2007	29
	2008	25
	2009	35

STATE	YEAR	Total
Hawaii	2000	82
	2001	82
	2002	55
	2003	84
	2004	82
	2005	69
	2006	94
	2007	76
	2008	57
	2009	52

Motorcycle Fatalities

STATE	YEAR	Total
Puerto Rico	2000	51
	2001	47
	2002	60
	2003	56
	2004	63
	2005	90
	2006	115
	2007	94
	2008	80
	2009	54

Passenger Car Fatalities

STATE	YEAR	Total
Puerto Rico	2000	317
	2001	250
	2002	254
	2003	266
	2004	249
	2005	216
	2006	228
	2007	205
	2008	174
	2009	169

Alcohol-Related and Alcohol-Impaired Motorcycle Fatalities

BAC Distribution

Odds ratios that are greater than 1 indicate increases occurring after 2007, the year that the law was enacted. Odds ratios less than 1 indicate decreases after the law was adopted. The analyses did not reveal a significant difference in Puerto Rico between the pre-law and post-law years in BAC distribution, for either motorcycle riders or passenger car drivers. In comparison, there were significant increases (indicated by an asterisk next to the ratio) in the BAC ratios of Florida motorcycle riders across all BAC categories (see Appendix D-1), as well as in those of Hawaii passenger car drivers for BAC=.08+ or BAC=.15+ (see Appendix D-2). The odds ratios are presented in Tables 13 and 14.

Table 13. Odds Ratios of BAC Change in Fatal Crashes From Pre-Law to Post-Law Years: Motorcycle Riders

State	BAC>.00	BAC>=.02	BAC>=.08	BAC>=.15
California	0.84	0.85	0.95	0.60
Florida	1.19*	1.21*	1.25*	1.22*
Hawaii	1.29	1.34	1.32	1.82
Puerto Rico	1.03	1.01	1.03	1.25

*p<.05

Table 14. Odds Ratios of BAC Change in Fatal Crashes From Pre-Law to Post-Law Years: Passenger Vehicle Drivers

State	BAC>.00	BAC>=.02	BAC>=.08	BAC>=.15
California	0.99	1.01	1.12	1.16
Florida	0.99	1.00	1.01	1.03
Hawaii	1.25	1.23	1.38*	1.68*
Puerto Rico	0.91	0.90	0.87	0.91

*p<.05

Additionally, there were no interaction effects between State and time period, which may explain the extent of change in each comparison State relative to Puerto Rico from the pre-law to post-law period. The analyses did not find a statistically significant difference between motorcycle riders in Puerto Rico and any of the comparison States in regards to BAC distribution (which may be due to the small sample sizes of motorcycle rider fatal crashes). On the other hand, there was a statistically significant upward trend for passenger car drivers in Hawaii in the BAC ratios for levels above .08 or .15, compared to a decrease in Puerto Rico in those categories. Such differences are indicated by the positive interaction terms in Table 15 (also see Appendix D-2).

Table 15. Logistic Regression Estimates of Interaction Between State (Puerto Rico as the Reference Level) and Time Period (From Pre-Law to Post-Law Years): Passenger Car Drivers

Interaction	BAC>=.08	BAC>=.15
Hawaii*Time period	0.46*	0.62*

*p<.05

When comparing motorcycle riders with passenger car drivers, we found differences in terms of the change in BAC ratios from the pre-law to post-law period (except for the BAC category of .15+), as suggested by statistically significant interactions between type of driver and time period (see Table 16). For BAC>.00 and BAC=.02+, the BAC ratios of motorcycle riders *increased* during the post-law years, compared to a downward trend among passenger car drivers. For BAC=.08+, both motorcycle riders and passenger car drivers experienced an increase in the ratio, but to a greater extent among riders. Note that the above-mentioned significant differences did not vary across Puerto Rico and the comparison States, given non-significant three-way interactions among State, type of driver, and time period.

Table 16. Logistic Regression Estimates of Interaction between Type of Driver (Motorcycle Rider Versuss Passenger Car Driver) and Time Period (From Pre-Law to Post-Law Years)

Interaction	BAC>.00	BAC>=.02	BAC>=.08	BAC>=.15
Motorcycle Rider *Time Period	0.16*	0.16*	0.18*	0.14

*p<.05

Ratio of Nighttime to Daytime Crash

We examined the ratio of nighttime to daytime motorcycle rider fatal crashes (a surrogate measure of impaired driving), but did not find a difference between the pre-law and post-law years across Puerto Rico and all comparison States, using nighttime to daytime ratios based on single-vehicle crashes, multiple-vehicle crashes, and total fatal crashes.

Use of Helmet in Fatal Crashes

There was no significant difference between the pre-law and post-law years in terms of helmet use in fatal crashes in Puerto Rico or any of the comparison States. Likewise, the change in Puerto Rico did not differ significantly from the comparison States, as indicated by a non-significant interaction term between State and time period.

Conclusions

Field observations showed that motorcycle riders had a high rate of helmet use, with nearly 86 percent having worn a DOT-compliant helmet and an additional 11 percent of motorcycle riders who wore non-DOT-compliant helmets. The majority of motorcycle riders wore other protective gear required by the 2007 law, including long pants (98.1%), protective shoes that cover the ankle (80.2%), eye protection (93.6%) and protective gloves (83.5%). The increase in the percent of motorcycle riders wearing DOT-compliant helmets appears to be associated with the 2007 law, an interesting finding considering that prior to 2007, Puerto Rico had a universal helmet use law. There were increases in helmet use from 39 percent in 2006 (before the law), to 56 percent in 2007 (the year the law went into effect), to 72 percent in 2008, 2009, and 2010 (the years that followed).

Data on the use of protective gear corroborate what participants stated in both discussion groups (of the motorcycle riders and law enforcement officials), namely, that the majority of Puerto Rican motorcycle riders accepted and obeyed the revisions of the motorcycle laws, especially those requiring protective gear. Law enforcement officials stated that once the law was implemented, the change was obvious and rapid, in terms of riders using helmets and protective gear. Officers noted that riders seemed to understand that if they were not wearing any protective clothing, especially helmets, they would be stopped and cited.

Officers apparently had little training in recognizing cues of impaired riding, particularly at the lower illegal per se level introduced by the law (.02 g/dL). Available law enforcement training generally is based on riders with BACs at and above .08 g/dL, and therefore probably not well suited to riders between .02 g/dL and .08 g/dL. Increased enforcement of the .02 g/dL per se limit for motorcycles might result if officers receive training on detecting impairment in riders who have relatively low BACs. Additionally, the use of passive alcohol sensors might be helpful in identifying riders at low BACs.

Data collected from logs of citations issued at checkpoints in Puerto Rico suggest that motorcycle riders were cited at BACs lower than .08 g/dL. While about 20 percent of passenger car drivers were cited at BACs between .01 and .07 g/dL, over 50 percent of motorcycle riders were cited at these low BACs. This finding may suggest that law enforcement officers are leveraging the .02 BAC law to test, and possibly arrest, riders who they would not otherwise test, at least at checkpoints.

Analyses of the motorcycle rider attire-related citations indicate a decreasing trend for all citations since the law went into effect in 2007. This study was unable to assess whether this meant that there were fewer violations after the law was imposed, or whether enforcement intensity waned, or both. However, the observational study indicates that compliance with those provisions of the law was very high. Motorcycle rider DWI arrests were difficult to analyze, due to the very small numbers that were obtained. No significant effect of the lower illegal per se BAC law was detected, but the spike in citations in April 2007 indicated that larger numbers of arrests could be generated at sobriety checkpoints.

The analyses performed using FARS data did not reveal any statistically significant changes in impaired driving or helmet use pre-and-post Law 107. There was a steady drop in motorcycle

fatalities in Puerto Rico after 2007, but the study could not determine a definitive cause-and-effect relationship between the decreases in fatalities and the 2007 law.

The BAC data obtained at checkpoints revealed that 6.5 percent of passenger car drivers had positive BACs compared to 29.1 percent of motorcycle riders. Given the constraints of a relatively small sample size and lacking trend data, this observation is difficult to interpret. Checkpoint data reflect information collected at locations most likely to be populated with drinking riders. Nevertheless, the fact that 29 percent of those riders had positive BACs suggests that the .02 BAC law may not have had a large effect at that point. Because similar pre-law data are not available, a firm conclusion in that regard is not possible.

There were several data limitations that affected the study's ability to definitively evaluate the impact of Puerto Rico's revised motorcycle law. Difficulties in obtaining sufficient or up-to-date data, especially non-fatal crash data files, BAC data from motorcycle rider DWI arrests, rider DWI conviction rates and sanctions, limited the ability to draw conclusions about the possible effects of Puerto Rico's Law No. 107 on alcohol-related and alcohol-impaired motorcycle crashes, fatalities, and arrest outcomes. Nonetheless, the observed high compliance with the attire related provisions of the law are encouraging, as is the downward trend in motorcycle traffic fatalities.

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This report also uses various FARS data from the National Highway Traffic Safety Administration's databases for 2009 to 2011.

Appendices

Appendix A: Rider Group Discussion Guide

DATE: _____

EXAMINATION OF THE PUERTO RICO .02 BAC LAW

FOR MOTORCYCLE RIDERS

RIDER GUIDE

As of August 2007, there is a law which affects motorcycle riders in Puerto Rico. The law includes such things as: (1) A BAC limit of .02 for motorcycle riders; (2) a requirement that DOT-compliant helmets be worn; (3) a requirement that passengers on motorcycles be 12 years or older; (4) requirements that motorcycle riders and passengers wear protective gear that includes eye protection, safety gloves, pants that cover the ankle and footwear that covers the ankle; and (5) a requirement for motorcycle riders and passengers to wear reflective vests between 6 p.m. and 6 a.m.

1. Were you aware of this law? If so, how did you find out about it?

2. Are you aware of any communications campaigns (TV, radio, newspapers, newsletters, and internet) to publicize this law?

3. Are you a member of a rider group? Has the law been mentioned in your discussions with other club members? How much has it been discussed?

4. Which specific aspects of the law were mentioned in these conversations?

5. What do you think about the requirements of the law?

6. What do people generally think about the requirements of the law?

7. How much do you think people are obeying the law? The zero tolerance part (BAC>.02)? The passenger age limit? The protective clothing? The night visibility clothing?

8. How strictly do you think the law is being enforced? Are people being apprehended and arrested?

9. Do you know whether the law has been mentioned on the Web sites or in newsletters of your group? How about on bulletin boards or forums?

Appendix B: Law Enforcement Discussion Guide

EXAMINATION OF THE PUERTO RICO .02 BAC LAW FOR MOTORCYCLE RIDERS

LAW ENFORCEMENT GUIDE

---

1. Has the number of DWI arrests of motorcycle riders' changed since passage of the law?

   ☐ Yes ☐ No

   Additional Comments:

---

2. What are the requirements for making a stop (on a suspected DWI motorcycle rider)?

---

3. Are per se violation arrests more likely to occur in conjunction with motorcycle rider crashes compared to passenger car driver crashes?

   1. ☐ Yes ☐ No

   Additional Comments:

4. Do the motorcycle riders need to exhibit signs of impairment or is just the smell of alcohol on their breath adequate?

☐ Signs of impairment

☐ Just the smell of alcohol on breath

Additional Comments:

---

5. Have citations or arrests been made for other provisions of the law since its passage?

   ☐ Yes ☐ No

   Additional Comments:

---

6. Has the number of citations for motorcycle helmet violations increased since the passage of the law?

   ☐ Yes ☐ No

   Additional Comments:

---

7. Has Puerto Rico conducted any special enforcement initiatives?

☐ Yes ☐ No

Additional Comments:

---

8. Does Puerto Rico participate in NHTSA's impaired-driving crackdowns, and conduct checkpoints and/or saturation patrols?

   ☐ Yes ☐ No

   Additional Comments:

---

9. Has any special attention been given to motorcycle riders during these impaired-driving initiatives?

   ☐ Yes ☐ No

   Additional Comments:

---

10. If law enforcement officers are not enforcing the law, why aren't they?

---

11. How were/are officers trained on these new aspects to motorcycle laws in PR?

---

12. Is there a special division within law enforcement that is primarily responsible for enforcing these new laws (i.e. traffic division; or impaired-driving unit; or special motorcycle unit)?

    ☐ Yes ☐ No

    Additional Comments:

---

13. Has law enforcement officials reached out to the motorcycle riding community to educate them about the law?

    ☐ Yes ☐ No

    Additional Comments:

14. What aspects of the law are difficult to enforce?

15. What has been officers' reaction to these new laws?

16. Do law enforcement officials feel that the new laws are making a difference in motorcycle rider behavior?

    2. ☐ Yes ☐ No

    Additional Comments:

17. Is there any evidence that arrested motorcycle riders are refusing the BAC test more often since the new law was passed?

    3. ☐ Yes ☐ No

    Additional Comments:

Please return completed form to [redacted]

Thank you!

Appendix C: Safety Gear Observation Form

MOTORCYCLE OBSERVATIONS PIRE 2011

PAGE ____ OF ____

DAY ___________________ OBSERVER NAME _______________________ TEMPERATURE ___________________________________

DATE __________________ LOCATION __________________________ WEATHER CONDITIONS ___________________________

START TIME ____________ END TIME ______________ SAMPLING RATE 1:1 1:2 1:3

DRIVER **PASSENGERS**

Helmet Y = Yes N = No U = DK	*Gender* F=Female M = Male U = DK	*Long Pants* Y = Yes N = No U = DK	*Boots (Cover Ankles)* Y = Yes N = No U = DK	*Eye Protection* Y = Yes N = No U = DK	*Reflective Vest* Y = Yes N = No U = DK	*Gloves* Y = Yes N = No U = DK	*Scooter*		*Age* N = No Pass Y = ↓ 12 A = Adult U = DK	*Helmet* Y = Yes N = No U = DK	*DOT Approved* Y = Yes N = No U = DK	*Long Pants* Y = Yes N = No U = DK	*Boots (Cover Ankles)* Y = Yes N = No U = DK	*Eye Protection* Y = Yes N = No U = DK	*Reflective Vest* Y = Yes N = No U = DK	*Gloves* Y = Yes N = No U = DK
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U

PAGE ____ OF ____

DRIVER **PASSENGERS**

Helmet Y = Yes N = No U = DK	*Gender* F=Female M = Male U = DK	*Long Pants* Y = Yes N = No U = DK	*Boots (Cover Ankles)* Y = Yes N = No U = DK	*Eye Protection* Y = Yes N = No U = DK	*Reflective Vest* Y = Yes N = No U = DK	*Gloves* Y = Yes N = No U = DK	*Sco*oter		*Age* N = No Pass Y = ↓ 12 A = Adult U = DK	*Helmet* Y = Yes N = No U = DK	*DOT Approved* Y = Yes N = No U = DK	*Long Pants* Y = Yes N = No U = DK	*Boots (Cover Ankles)* Y = Yes N = No U = DK	*Eye Protection* Y = Yes N = No U = DK	*Reflective Vest* Y = Yes N = No U = DK	*Gloves* Y = Yes N = No U = DK
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
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DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
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DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U	F M U	Y N U	Y N U	Y N U	Y N U	Y N U			N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
DOT?									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U
Y N U									N Y A U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U	Y N U

Appendix D: FARS Analysis

D-1: BACs of Motorcycle Riders

State	Year	Total	BAC> .00	% BAC>.00	BAC> =.02	% BAC>=.02	BAC> =.08	% BAC>=.08	BAC>= .15	% BAC>=.15	BAC+/BAC= .00 Ratio
California	2000	29	7	25.17%	7	25.17%	5	16.90%	3	10.34%	0.34
	2001	30	9	30.00%	9	30.00%	6	19.33%	3	11.33%	0.43
	2002	27	8	28.15%	8	28.15%	5	19.63%	3	9.63%	0.39
	2003	42	14	33.81%	14	33.81%	12	28.10%	7	16.43%	0.51
	2004	46	15	31.96%	15	31.96%	12	26.52%	8	17.61%	0.47
	2005	50	13	25.40%	13	25.40%	10	20.80%	7	14.00%	0.34
	2006	51	13	24.90%	12	22.94%	9	18.04%	5	10.00%	0.33
	2007	64	17	26.41%	17	26.41%	15	23.44%	11	16.41%	0.36
	2008	57	17	30.00%	17	30.00%	14	24.21%	6	11.05%	0.43
	2009	44	8	17.73%	8	17.73%	8	17.27%	3	5.68%	0.22
Florida	2000	270	93	34.41%	91	33.67%	66	24.59%	45	16.59%	0.53
	2001	292	104	35.45%	104	35.45%	89	30.41%	49	16.61%	0.55
	2002	336	131	39.02%	129	38.39%	108	32.17%	64	19.17%	0.64
	2003	380	145	38.16%	144	37.89%	115	30.21%	66	17.34%	0.62
	2004	437	153	35.03%	145	33.20%	111	25.31%	66	15.01%	0.54
	2005	485	192	39.57%	187	38.52%	153	31.44%	97	20.08%	0.66
	2006	586	169	28.91%	161	27.49%	125	21.33%	78	13.29%	0.41
	2007	579	185	31.99%	181	31.26%	135	23.25%	92	15.89%	0.47
	2008	576	235	40.76%	231	40.07%	190	32.95%	114	19.86%	0.69
	2009	431	157	36.52%	154	35.82%	126	29.21%	81	18.86%	0.58
Hawaii	2000	20	12	60.50%	12	60.50%	9	47.00%	6	29.50%	1.58
	2001	19	5	24.74%	5	24.74%	4	18.42%	1	3.16%	0.33
	2002	23	7	30.43%	7	30.43%	6	26.09%	1	4.35%	0.44
	2003	21	7	33.33%	7	33.33%	6	27.62%	3	16.19%	0.5
	2004	21	10	48.10%	10	48.10%	9	42.38%	7	31.90%	0.93
	2005	30	13	43.33%	12	40.00%	8	26.67%	6	20.00%	0.76
	2006	27	8	29.63%	8	29.63%	8	29.63%	5	18.52%	0.42
	2007	33	13	38.18%	12	35.15%	8	25.15%	5	15.15%	0.62
	2008	26	12	46.15%	12	46.15%	10	38.46%	7	26.92%	0.86
	2009	36	16	43.33%	16	43.33%	12	34.17%	10	28.06%	0.77
Puerto Rico	2000	51	16	30.39%	14	28.24%	11	22.16%	6	12.35%	0.44
	2001	49	23	47.55%	23	47.55%	17	35.10%	9	17.35%	0.91
	2002	63	24	37.62%	23	36.03%	17	26.98%	6	10.00%	0.6
	2003	58	22	37.24%	22	37.07%	12	21.03%	7	11.38%	0.6
	2004	68	26	38.24%	26	38.24%	22	32.65%	13	19.41%	0.62
	2005	89	43	48.76%	43	48.76%	34	37.75%	15	17.30%	0.95
	2006	116	37	31.90%	37	31.90%	28	24.14%	17	14.74%	0.47
	2007	96	37	38.96%	37	38.96%	27	27.71%	15	15.52%	0.64
	2008	84	39	46.79%	38	45.60%	28	32.74%	18	21.19%	0.88
	2009	56	16	28.04%	16	28.04%	13	23.57%	8	13.39%	0.39

D-2: BACs of Passenger Car Drivers

State	Year	Total	BAC> .00	% BAC>.00	BAC> =.02	% BAC>=.02	BAC> =.08	% BAC>=.08	BAC>= .15	% BAC>=.15	BAC+/BAC= .00 Ratio
California	2000	359	78	21.75%	76	21.20%	60	16.71%	42	11.56%	0.28
	2001	386	117	30.28%	114	29.51%	93	24.04%	60	15.52%	0.43
	2002	404	99	24.46%	94	23.22%	76	18.91%	47	11.73%	0.32
	2003	371	87	23.40%	86	23.13%	71	19.22%	42	11.32%	0.31
	2004	388	111	28.69%	109	28.17%	91	23.32%	57	14.72%	0.4
	2005	380	99	26.11%	98	25.84%	80	21.16%	49	12.97%	0.35
	2006	361	85	23.43%	84	23.16%	68	18.73%	48	13.32%	0.31
	2007	348	91	26.12%	90	25.83%	78	22.53%	57	16.29%	0.35
	2008	304	75	24.61%	75	24.61%	67	22.17%	49	16.25%	0.33
	2009	300	79	26.23%	78	25.90%	68	22.80%	42	14.10%	0.36
Florida	2000	3574	891	24.94%	874	24.45%	735	20.57%	482	13.48%	0.33
	2001	3592	840	23.39%	819	22.80%	701	19.50%	473	13.18%	0.31
	2002	3665	831	22.68%	813	22.19%	704	19.20%	478	13.05%	0.29
	2003	3599	853	23.69%	842	23.40%	711	19.75%	496	13.79%	0.31
	2004	3652	833	22.80%	813	22.25%	703	19.25%	471	12.89%	0.3
	2005	3875	961	24.81%	945	24.38%	814	21.01%	531	13.70%	0.33
	2006	3718	853	22.95%	838	22.53%	717	19.29%	461	12.39%	0.3
	2007	3484	802	23.01%	790	22.66%	687	19.72%	466	13.38%	0.3
	2008	3213	733	22.80%	720	22.39%	619	19.27%	417	12.98%	0.3
	2009	2755	664	24.08%	657	23.85%	569	20.65%	395	14.34%	0.32
Hawaii	2000	155	34	21.61%	34	21.61%	29	18.52%	15	9.55%	0.28
	2001	149	48	32.15%	47	31.48%	39	26.17%	23	15.50%	0.48
	2002	132	36	27.35%	35	26.59%	30	22.95%	11	8.41%	0.38
	2003	136	47	34.41%	45	32.94%	34	25.00%	23	16.84%	0.53
	2004	160	40	25.25%	39	24.63%	32	19.81%	17	10.75%	0.34
	2005	133	46	34.74%	45	33.98%	40	29.77%	25	18.80%	0.53
	2006	157	58	37.20%	56	35.92%	46	29.49%	30	19.11%	0.59
	2007	129	49	37.83%	45	34.73%	34	26.51%	23	17.75%	0.61
	2008	104	34	32.60%	32	30.67%	28	26.63%	19	18.46%	0.48
	2009	92	37	40.22%	36	39.13%	33	36.20%	24	26.41%	0.67
Puerto Rico	2000	584	190	32.60%	188	32.26%	146	25.03%	90	15.36%	0.48
	2001	522	168	32.22%	167	32.01%	139	26.57%	88	16.90%	0.48
	2002	516	153	29.67%	151	29.26%	114	22.13%	62	12.00%	0.42
	2003	522	172	32.93%	170	32.53%	135	25.88%	88	16.80%	0.49
	2004	475	155	32.72%	154	32.51%	133	27.96%	89	18.63%	0.49
	2005	441	139	31.54%	136	30.86%	107	24.17%	65	14.63%	0.46
	2006	477	119	24.88%	118	24.68%	97	20.38%	58	12.08%	0.33
	2007	473	127	26.79%	126	26.58%	100	21.23%	62	13.17%	0.37
	2008	402	109	27.19%	106	26.44%	84	20.97%	51	12.69%	0.37
	2009	360	108	29.89%	107	29.61%	82	22.78%	54	15.00%	0.43

D-3: Helmet Use: Overall

State	Year	Total	Helmet Use	% Helmet Use
California	2000	28	24	85.71%
	2001	30	29	96.67%
	2002	27	25	92.59%
	2003	42	34	80.95%
	2004	46	37	80.43%
	2005	50	46	92.00%
	2006	50	45	90.00%
	2007	64	58	90.63%
	2008	56	50	89.29%
	2009	44	40	90.91%
Florida	2000	270	192	71.11%
	2001	290	129	44.48%
	2002	336	116	34.52%
	2003	380	143	37.63%
	2004	435	187	42.99%
	2005	444	215	48.42%
	2006	545	293	53.76%
	2007	549	286	52.09%
	2008	540	282	52.22%
	2009	406	200	49.26%
Hawaii	2000	20	5	25.00%
	2001	17	4	23.53%
	2002	23	9	39.13%
	2003	21	8	38.10%
	2004	21	8	38.10%
	2005	29	9	31.03%
	2006	27	6	22.22%
	2007	33	10	30.30%
	2008	26	8	30.77%
	2009	36	14	38.89%
Puerto Rico	2000	51	20	39.22%
	2001	49	13	26.53%
	2002	63	19	30.16%
	2003	58	24	41.38%
	2004	68	24	35.29%
	2005	89	36	40.45%
	2006	116	52	44.83%
	2007	96	33	34.38%
	2008	84	30	35.71%
	2009	56	19	33.93%

D-4: Helmet Use: Those With BAC>.00

State	Year	Total	Helmet Use	% Helmet Use
California	2000	7	5	69.40%
	2001	9	9	100.00%
	2002	8	6	81.79%
	2003	14	11	77.39%
	2004	15	9	57.73%
	2005	13	11	84.17%
	2006	13	11	83.73%
	2007	17	16	94.07%
	2008	17	11	64.55%
	2009	8	7	87.06%
Florida	2000	93	55	58.80%
	2001	103	33	32.11%
	2002	131	26	19.66%
	2003	145	37	25.24%
	2004	153	47	30.59%
	2005	171	55	32.32%
	2006	152	60	39.34%
	2007	177	76	43.01%
	2008	218	85	39.03%
	2009	147	55	37.51%
Hawaii	2000	12	3	25.55%
	2001	5	2	33.83%
	2002	7	2	28.57%
	2003	7	2	28.27%
	2004	10	1	10.82%
	2005	12	4	33.33%
	2006	8	0	0.00%
	2007	13	3	25.41%
	2008	12	3	25.00%
	2009	16	5	32.11%
Puerto Rico	2000	16	6	37.72%
	2001	23	6	24.85%
	2002	24	6	26.59%
	2003	22	8	35.74%
	2004	26	11	41.57%
	2005	43	19	42.63%
	2006	37	13	35.10%
	2007	37	10	27.24%
	2008	39	16	41.22%
	2009	16	3	21.71%

D-5: Helmet Use: Those With BAC>=.02

State	Year	Total	Helmet Use	% Helmet Use
California	2000	7	5	69.40%
	2001	9	9	100.00%
	2002	8	6	81.79%
	2003	14	11	77.39%
	2004	15	9	57.73%
	2005	13	11	84.17%
	2006	12	10	82.26%
	2007	17	16	94.07%
	2008	17	11	64.55%
	2009	8	7	87.06%
Florida	2000	91	54	58.99%
	2001	103	33	32.11%
	2002	129	26	19.98%
	2003	144	37	25.42%
	2004	145	44	30.21%
	2005	167	54	32.51%
	2006	145	56	38.56%
	2007	173	73	42.26%
	2008	214	81	37.89%
	2009	144	53	36.90%
Hawaii	2000	12	3	25.55%
	2001	5	2	33.83%
	2002	7	2	28.57%
	2003	7	2	28.27%
	2004	10	1	10.82%
	2005	11	4	36.36%
	2006	8	0	0.00%
	2007	12	3	27.61%
	2008	12	3	25.00%
	2009	16	5	32.11%
Puerto Rico	2000	14	5	32.83%
	2001	23	6	24.85%
	2002	23	5	23.35%
	2003	22	8	35.45%
	2004	26	11	41.57%
	2005	43	19	42.63%
	2006	37	13	35.10%
	2007	37	10	27.24%
	2008	38	15	39.68%
	2009	16	3	21.71%

D-6: Helmet Use: Those With BAC>=.08

State	Year	Total	Helmet Use	% Helmet Use
California	2000	5	4	77.00%
	2001	6	6	100.00%
	2002	5	5	93.33%
	2003	12	9	73.60%
	2004	12	7	58.09%
	2005	10	8	80.66%
	2006	9	7	78.37%
	2007	15	14	93.32%
	2008	14	8	56.36%
	2009	8	7	86.75%
Florida	2000	66	38	57.41%
	2001	89	29	32.24%
	2002	108	17	15.68%
	2003	115	27	23.36%
	2004	110	31	27.82%
	2005	135	40	29.70%
	2006	110	41	37.27%
	2007	128	50	39.43%
	2008	176	60	34.09%
	2009	117	38	31.94%
Hawaii	2000	9	2	19.15%
	2001	4	2	42.50%
	2002	6	1	16.67%
	2003	6	2	30.67%
	2004	9	1	12.28%
	2005	8	4	50.00%
	2006	8	0	0.00%
	2007	8	2	26.39%
	2008	10	2	20.00%
	2009	12	3	24.42%
Puerto Rico	2000	11	3	26.96%
	2001	17	3	15.60%
	2002	17	3	17.69%
	2003	12	5	37.15%
	2004	22	7	33.30%
	2005	34	15	44.98%
	2006	28	9	31.06%
	2007	27	6	23.68%
	2008	28	12	42.88%
	2009	13	3	25.82%

D-7: Helmet Use: Those With BAC>=.15

State	Year	Total	Helmet Use	% Helmet Use
California	2000	3	2	84.17%
	2001	3	3	100.00%
	2002	3	2	95.00%
	2003	7	5	70.71%
	2004	8	4	50.08%
	2005	7	5	70.87%
	2006	5	5	90.90%
	2007	11	10	90.44%
	2008	6	4	68.10%
	2009	3	3	100.00%
Florida	2000	45	26	58.77%
	2001	49	12	24.97%
	2002	64	11	17.55%
	2003	66	13	20.19%
	2004	65	19	29.14%
	2005	86	22	26.00%
	2006	68	22	32.86%
	2007	86	35	40.16%
	2008	107	37	35.00%
	2009	74	24	31.75%
Hawaii	2000	6	0	6.19%
	2001	1	0	30.00%
	2002	1	0	0.00%
	2003	3	0	10.00%
	2004	7	0	1.43%
	2005	6	2	33.33%
	2006	5	0	0.00%
	2007	5	1	20.00%
	2008	7	1	14.29%
	2009	10	1	9.91%
Puerto Rico	2000	6	1	11.43%
	2001	9	2	27.05%
	2002	6	1	16.01%
	2003	7	2	33.93%
	2004	13	5	36.55%
	2005	15	7	45.54%
	2006	17	5	31.12%
	2007	15	3	20.18%
	2008	18	8	47.18%
	2009	8	1	15.95%

D-8: Crash by Time of Accident: Single-Vehicle Motorcycle Rider Crashes

State	Year	Crash Type	Total	Daytime	Nighttime	Nighttime to Daytime Ratio
California	2000	SV	12	7	5	0.71
	2001	SV	14	10	4	0.40
	2002	SV	14	10	4	0.40
	2003	SV	19	10	9	0.90
	2004	SV	17	10	7	0.70
	2005	SV	15	7	8	1.14
	2006	SV	21	9	12	1.33
	2007	SV	27	15	12	0.80
	2008	SV	25	16	9	0.56
	2009	SV	13	5	8	1.60
Florida	2000	SV	85	39	46	1.18
	2001	SV	100	32	68	2.13
	2002	SV	127	40	87	2.18
	2003	SV	138	48	90	1.88
	2004	SV	151	51	100	1.96
	2005	SV	166	59	107	1.81
	2006	SV	213	82	131	1.60
	2007	SV	198	65	133	2.05
	2008	SV	206	65	141	2.17
	2009	SV	162	63	99	1.57
Hawaii	2000	SV	9	3	6	2.00
	2001	SV	10	6	4	0.67
	2002	SV	10	2	8	4.00
	2003	SV	6	4	2	0.50
	2004	SV	14	5	9	1.80
	2005	SV	15	6	9	1.50
	2006	SV	13	7	6	0.86
	2007	SV	11	2	9	4.50
	2008	SV	14	6	8	1.33
	2009	SV	17	5	12	2.4
Puerto Rico	2000	SV	16	8	8	1.0
	2001	SV	24	10	14	1.4
	2002	SV	26	8	18	2.25
	2003	SV	19	9	10	1.11
	2004	SV	30	9	21	2.33
	2005	SV	37	10	27	2.7
	2006	SV	43	21	22	1.05
	2007	SV	28	8	20	2.50
	2008	SV	34	11	23	2.09
	2009	SV	22	8	14	1.75

D-9: Crash by Time of Accident: Multiple-Vehicle Motorcycle Rider Crashes

State	Year	Crash Type	Total	Daytime	Nighttime	Nighttime to Daytime Ratio
California	2000	MV	16	9	7	0.78
	2001	MV	13	9	4	0.44
	2002	MV	13	8	5	0.63
	2003	MV	21	15	6	0.40
	2004	MV	25	15	10	0.67
	2005	MV	31	25	6	0.24
	2006	MV	28	20	8	0.40
	2007	MV	33	22	11	0.50
	2008	MV	28	16	12	0.75
	2009	MV	30	23	7	0.30
Florida	2000	MV	173	86	87	1.01
	2001	MV	184	87	97	1.11
	2002	MV	195	79	116	1.47
	2003	MV	219	101	118	1.17
	2004	MV	273	133	140	1.05
	2005	MV	304	144	160	1.11
	2006	MV	341	167	174	1.04
	2007	MV	359	174	185	1.06
	2008	MV	350	165	185	1.12
	2009	MV	249	94	155	1.65
Hawaii	2000	MV	10	3	7	2.33
	2001	MV	9	6	3	0.5
	2002	MV	13	6	7	1.17
	2003	MV	13	6	7	1.17
	2004	MV	7	4	3	0.75
	2005	MV	15	4	11	2.75
	2006	MV	14	6	8	1.33
	2007	MV	18	9	9	1.00
	2008	MV	12	7	5	0.71
	2009	MV	18	9	9	1.00
Puerto Rico	2000	MV	33	9	24	2.67
	2001	MV	24	7	17	2.43
	2002	MV	35	13	22	1.69
	2003	MV	37	13	24	1.85
	2004	MV	35	20	15	0.75
	2005	MV	50	26	24	0.92
	2006	MV	69	26	43	1.65
	2007	MV	61	24	37	1.54
	2008	MV	47	14	33	2.36
	2009	MV	33	14	19	1.36

D-10 Motorcycle Rider Fatalities in Motor Vehicle Traffic Crashes by Year and Rider BACs, 2002-2012, in Puerto Rico

Year	Total	BAC=.00		BAC=.01-.07		BAC=.08+	
		Number	Percent	Number	Percent	Number	Percent
2002	59	37	63%	5	9%	22	37%
2003	54	34	62%	8	16%	20	38%
2004	58	34	58%	4	6%	25	42%
2005	87	45	52%	10	11%	42	48%
2006	111	74	67%	9	8%	37	33%
2007	83	48	58%	9	11%	35	42%
2008	76	37	48%	12	16%	39	52%
2009	53	36	67%	3	5%	17	33%
2010	45	26	59%	5	11%	19	41%
2011	49	29	60%	5	10%	20	40%
2012	47	26	56%	5	11%	21	44%

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