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A 50-State Survey of Bicycle Crash Reporting Policies

Kathryn D. Woei-A-Sack
Georgia State University

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A 50-State Survey of Bicycle Crash Reporting Policies

A Capstone Submitted to the Graduate Faculty of the School of Public Health

Georgia State University

In Partial Fulfillment of the Requirements for the Degree
Master of Public Health

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Kathryn Woei-A-Sack

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ABSTRACT

Bicycle crashes result in many injuries and deaths in the United States each year. Bicyclists represented 2.3 percent of the total traffic crash fatalities in 2013, despite the bicycle mode share being less than 1%. Bicycle crash fatality data is collected at the federal level through FARS. However, FARS relies on state-level data that is coded by state analysts. The Model Minimum Uniform Crash Criteria (MMUCC) provides guidance to the states on which elements should be reported in a crash. However, the MMUCC is currently optional, and states are very inconsistent in their bicycle crash reporting policies. Better crash reporting policies would provide more accurate and consistent data on the public health impact of bicycle crashes.

A 50-state survey of bicycle crash reporting laws using Westlaw Next was conducted. The survey revealed that very few states legislate bicycle crash reporting. Only six states currently have a statute relating to bicycle crash reporting and only four states have a regulation that requires bicycle crash reporting. Of the states with a statute or regulation, only six of them have at least one law that requires reporting that exceeds what is reported by FARS.

To better understand the public health impact of bicycle crash reporting, all states should follow the MMUCC guidelines. A model law should be developed that requires reporting of crashes involving a bicyclist who is injured or killed and requires that reports include specific data in a consistent format. Laws should require reporting of specific precrash data so that infrastructure can be implemented which better protects bicyclists. Each state should adopt the model law or a similar version of it. Because law is not always one-hundred

percent enforced, bicycle advocacy groups and public health departments and organizations should provide education on the importance of bicycle crash reporting.

INTRODUCTION

The National Highway Traffic Safety Administration (NHTSA) reported that 743 bicyclists died in traffic crashes in the United States in 2013 (“Bicycles”). These deaths represented 2.3 percent of the total fatalities due to traffic crashes in 2013 (“Bicycles”), despite the bicycle commuting mode share being only 0.62 % in 2013 (McLeod, 2014). The Centers for Disease Control and Prevention reports approximately 494,000 serious bicycle-related injuries resulting in emergency room visits for the same year (“Bicycle Safety,” 2016). Bicycle injuries and fatalities in 2010 were estimated to cost \$10 billion in medical expenses and lost productivity (“Bicycle Safety,” 2016).

At the national level, bicycle crash data are available through Fatality Analysis Reporting System (FARS) (“NCSA”). The Model Minimum Uniform Crash Criteria Guideline (MMUCC) provides guidelines for the states on which elements should be included in a crash report (“SDS Overview”). Because the MMUCC is currently optional and FARS relies on state-level data collection, it is important to examine state-level policies for bicycle crash reporting. The Pedestrian and Bicycle Information Center identifies several sources that may collect local bicycle crash data. Those include police departments, hospitals, state or local departments of transportation and departments of public health (“Pedestrian”).

In Georgia, it is a crime to leave the scene of a crash if there is an injury, death, or property damage (“Georgia,” 2006). Since motor vehicle crashes involving injury and death

must be reported, theoretically, crashes involving a motor vehicle(s) and a bicycle(s) will be reported (“Georgia,” 2006). However, Georgia does not currently legislate specific reporting requirements for crashes involving bicycles, and the current crash form used by law enforcement does not include important crash elements (“Georgia,” 2006). The Georgia Bicycle Law Enforcement Pocket Guide published by Georgia Bikes recommends that law enforcement should consider including visibility, surface hazards, view obstructions, site location, specific characteristics of the cyclist and specific characteristics of the motorist in their reports of bicycle crashes (“Georgia,” 2006). The guide also acknowledges the importance of reporting bicycle crashes that do include motor vehicles (“Georgia,” 2006).

Currently, there is much inconsistency among states with regards to reporting of bicycle crashes (“NCSA”). Additionally, most states only require that traffic crashes which involve fatalities or property damage greater than a minimum amount to be reported. Further, information is lacking regarding the distance traveled by cyclists and the time spent cycling each year to truly determine the risk of bicycling as compared to other modes of transportation (“Pedestrian”).

The League of American Bicyclists published a compendium of bicycle laws in each of the 50 states (“State Bike,” 2012). Information is available through their website on each’s states laws related to bicycling including helmet laws, dooring laws, laws regarding treatment as a vehicle, etc. for each state (“State Bike,” 2012). States are split on whether bicycles are included in the statutory definition of motor vehicle, but states seem to all concur in granting bicyclists the same rights and duties of all road users (“State Bike,” 2012). However, no known

research is available that identifies and compares requirements for reporting of bicycle crashes in each of the states.

The purpose of this project was to conduct a 50-state survey to identify and compare existing laws and regulations regarding reporting of crashes involving bicycles in each of the 50 states and the District of Columbia. The results of this survey were analyzed to determine gaps in existing laws and regulations among states and to provide recommendations to state legislatures for laws to support better bicycle crash reporting.

REVIEW OF THE LITERATURE

According to the Centers for Disease Control and Prevention, almost 193,000 people die from injury annually, and millions more are admitted to the hospital (“Key Injury,” 2015). Injuries have many consequences in addition to possible death or hospitalization (“CDC Injury,” 2014). Injuries can also cause temporary or permanent disability and place a huge burden on hospitals and other emergency care facilities (“CDC Injury,” 2014). Further, injuries often result in huge economic, physical and emotional consequences (“CDC Injury,” 2014). Injuries in the United States in 2013 cost \$671 billion in lifetime medical costs and lost productivity (“Key Injury,” 2015). These burdens to individuals and society caused by injuries create a huge public health issue (“CDC Injury,” 2014).

Motor vehicle crashes account for a significant number of the injuries in the U.S. each year (“CDC Injury,” 2014). In 2013, motor vehicle crashes caused greater than 33,000 deaths (“Key Injury,” 2015). Bicyclists make up a significant number of the deaths from motor vehicle crashes, (“Bicycles”) and hundreds of thousands of bicyclists are injured in traffic crashes

annually (“Bicycle Safety,” 2016). The risk of injury or death is higher among bicyclists than among those in motor vehicles (“Bicycle Safety,” 2016).

Significantly more male bicyclists than female are injured or killed (“Bicycle Safety,” 2016). The highest rates of injury and death occur in individuals aged 5-24 and adults over 40 (“Bicycle Safety,” 2016). Urban areas account for the majority of bicyclist deaths, and most deaths occur outside of traffic intersections (“Bicycle Safety,” 2016). One way to prevent many bicycle injuries and deaths is to implement bicycle facilities such as bike lanes and other protective infrastructure like cycle tracks and separate paths (“Bicycle Safety,” 2016).

Better reporting of crashes involving bicycles would allow roads, bike facilities, and intersections to be better designed for safety (Lusk, Asgarzadeh, & Farvid, 2015). Currently, crash reports focus on motor vehicles and are recorded by police using state crash templates (Lusk, Asgarzadeh, & Farvid, 2015). Often, bicycle crashes are not reported unless a motor vehicle was involved in the crash in some capacity (Lusk, Morency, Miranda-Moreno, Willett, & Dennerlein, 2013). Police may choose to identify bicycle related information in the reports under written descriptions, but state crash reports do not specifically contain codes for bicycles (Lusk, Asgarzadeh, & Farvid, 2015). A 2014 50-state survey on state traffic crash databases by the Harvard School of Public Health revealed that the templates only consistently included a category for non-motorist and for use of helmet (Lusk, Asgarzadeh, & Farvid, 2015). Current data fail to adequately identify the factors that cause a crash involving a bicycle, making it impossible for transportation and urban planners to implement effective strategies to prevent bicycle crashes (Hamann & Peek-Asa, 2013). Some experts even hypothesize that this lack of

evidence for effective crash prevention strategies is the primary reason that many places lack safe bicycle infrastructure (Hamann & Peek-Asa, 2013).

Other information that could be required in reporting templates includes bicycle environments, bicycle crash-scene patterns, and bicycle potential impact points (Lusk, Asgarzadeh, & Farvid, 2015). This information would provide more data that would lead to more accurate reports and information on bicycle crashes in order to implement safer roads and bike facilities (Lusk, Asgarzadeh, & Farvid, 2015). An effective method for including these additional coding requirements without substantially increasing the police's burden is to include the codes as part of an electronic report by listing each option as a drop-down item under a menu for crashes involving bicycles (Lusk, Asgarzadeh, & Farvid, 2015).

Most road safety efforts have been based on engineering and education (Kerr, Rodriguez, Evenson & Aytur, 2013). However, there is a need for policy change to address bicycling safety (Kerr, Rodriguez, Evenson & Aytur, 2013). Policy change is crucial because of its potential to affect the population at a broader scale, including through rules and regulations, and therefore have a bigger impact on public health (Kerr, Rodriguez, Evenson & Aytur, 2013).

FEDERAL REPORTING GUIDELINES

At the federal level, NHTSA relies on crash data from various sources, including FARS ("NCSA"). FARS is a census of motor vehicle crashes that occur on a public roadway and involve at least one motorist or non-motorist fatality within 30 days of the crash ("NCSA"). Each of the 50 states has their own FARS analysts who obtain crash data for their state and submit it in the standard format to the National Center for Statistics and Analysis (NCSA), which directs FARS

("NCSA"). FARS analysts gather crash fatality data from a broad range of documents including Police Accident Reports (PAR), Death Certificates, State Vehicle Registration Files, and many other state documents ("NCSA"). The analysts interpret such documents and code them according to over 100 FARS data elements ("NCSA"). In 2010, additional data elements were added to FARS to include more precrash data that provides information on the cause of the crash ("NCSA"). New elements for precrash data specifically related to pedestrians and bicyclists were added to better understand the conditions and actions that lead to the crash ("NCSA"). Some of the elements added include type of intersection and presence of a bicycle lane ("NCSA").

NHTSA also has a State Data Program ("SDS Overview"). One such part of the program, the State Data System (SDS) consists of the data from police accident reports in participating states ("SDS Overview"). Currently, 32 states participate by sharing their coded data ("SDS Overview"). NHTSA hopes that all states will join the program so that traffic statistics will be complete and not rely on estimates ("SDS Overview"). SDS is distinct from FARS in that it includes data for crashes involving certain injuries and property damage in addition to crashes involving fatalities ("State Data"). The data are converted directly from police accident reports ("State Data").

To encourage the states to provide consistent and high-quality data, NHTSA and the Governors Highway Safety Association (GHSA) have provided guidance to the States on what should be included in crash reports ("SDS Overview"). The Model Minimum Uniform Crash Criteria Guideline (MMUCC) provides guidance to the States ("About MMUCC") about specific data elements that should be included in a state's crash database; however, it is not required

("SDS Overview"). The MMUCC recommends that states require reporting of crashes that include a personal injury or more than \$1000 in property damage as well as crashes involving a death ("What"). States following the MMUCC should report all people involved in the crash regardless of whether they were injured and the crash elements, according to the MMUCC's guidelines ("What"). The crash elements are coded in a standardized way such that data is consistent among states following the MMUCC ("What"). Such elements include crash data elements such as the date and location, vehicle data elements such as the vehicle make and model, person data elements such as each person's age and injury, and elements that identify the type of roadway ("What"). The state data program also includes the Crash Outcome Data Evaluation System (CODES), which links state crash data to behaviors and other factors ("State Data").

NHSTA acknowledges that despite its efforts, states are not consistent in their method of crash reporting ("National"). All states still have some police jurisdictions that use paper-based reporting systems for crashes ("National"). It usually takes years to complete reports that are not filed electronically ("National").

To continue to promote standardization of data among the states and to further encourage states' participation, NHSTA has conditioned states' receipt of funding from a recent grant to their use of the model elements identified by NHSTA ("Section 408"). Section 408 of SAFETEA-LU is an incentive program that provides grants to states for the purpose of implementing better data programs ("Section 408"). To receive this grant initially, a State must establish a committee for highway safety data and traffic records, develop a strategic plan for

safety data and traffic records, and demonstrate that it is using the data elements identified by the Secretary (“Section 408”).

METHODS AND PROCEDURES

A survey was conducted to determine bicycle crash reporting policies in each of the 50 states and the District of Columbia. The survey methodology consisted of a search of *Westlaw Next* to determine all of the existing state statutes and regulations regarding bicycle crash reporting policies. The search terms *adv: PR, TI, TE(bicycle cycle bike /s crash! collision accident wreck* were used to identify statutes that include the word bicycle or known synonyms (cycle or bike) within the same sentence as crash or synonyms of crash (collision, accident, or wreck) within the preliminary, title and text fields. The statutes were then filtered to include state statutes only, which returned 62 statutes. The search was repeated to identify relevant regulations. Thirty state regulations met these search criteria.

Each statute was reviewed to determine if it involved a state requirement for reporting of bicycle crashes. The same was done for regulations. Each state’s relevant statute or regulation was recorded in an Excel spreadsheet. Data were analyzed based on the reporting requirement, the threshold for reporting and the section of the code in which it was listed. Finally, the statutes and regulations were characterized based on the information each required to be reported. Laws that require more than what FARS includes were characterized as exceeding FARS, laws that met FARS data were characterized as met, and laws that required less than what is reported by FARS were characterized as less than FARS.

RESULTS

The 50-state survey¹ revealed that few states have statutes or regulations in place requiring specific procedures for reporting bicycle crashes. In fact, most states do not have a requirement in their code that specifies when or if bicycle crashes should be reported. Of the 50 states plus the District of Columbia, only ten states have either a statute or regulation relating to the reporting of a crash involving a bicycle. Two states have two relevant statutes. Two of the state laws require less than what is reported by FARS. Three of the laws meet the standard that is reported by FARS. The other seven state laws exceed what is required by FARS because they require reporting of crashes involving injuries rather than solely fatalities, and some even require additional data to be reported.

Colorado, the District of Columbia, Massachusetts, New Jersey, New York, and Rhode Island have at least one statute that provides some rules for reporting of bicycle crashes. Alabama, Hawaii, Kansas, and North Carolina have at least one regulation relating to the reporting of bicycle crashes. No state has both a statute and a regulation that fit within the search criteria for this project.

Of the six states that have statutes on bicycle crash reporting, most are located within a Vehicles and Traffic title or a title with a similar name related to motor vehicles or traffic. Massachusetts is an exception. Its relevant statutes fall under the title of Public Ways and Works under the code section on Administration of the Government.

¹ The District of Columbia was treated as a state for purposes of the survey and therefore the survey includes 51 total “states.”

With the exception of the District of Columbia, the states' statutes have some similarities to each other. The District of Columbia Statute is unique in that it merely requires that the Department of Transportation report any statistics on bicycle crashes which were collected during the previous calendar year; however, it does not impose a requirement to report bicycle crashes in the first place. The other five states require that collisions involving bicycles be reported, although the threshold for triggering the reporting requirement varies among the states. Massachusetts, New Jersey, New York and Rhode Island have statutes that require the operator of a vehicle to report a collision involving a bicycle, usually to the local police, if the accident involves death, injury or in most cases, property damage of a certain dollar amount (greater than \$500 in New Jersey, greater than \$1000 in New York). New York has a second statute that requires police to report an accident involving death or serious injury and specifically identify the type of vehicle including bicycles involved. A serious physical injury is one that creates a substantial risk of death or causes disfigurement or organ impairment for purposes of this statute. Colorado's statute also requires that, upon request, law enforcement report bicycle incidents involving death or injury, and it provides an additional requirement that such incidents be reported regardless of whether they involved a motor vehicle. Massachusetts also has a statute that requires that police departments establish a training program for police that includes training on how to report bicycle crashes.

The four states with regulations have more varied requirements for bicycle crash reporting. Hawaii and North Carolina have regulations for bicycle crash reporting from the Department of Transportation. Hawaii's regulation requires that crashes be reported in a manner that is consistent with the code to provide consistent and efficient data. North

Carolina's regulation is similar to the District of Columbia statute in that it requires annual reports of traffic crashes which specify the type of vehicles involved. Alabama and Kansas have more unique and narrow regulations. Alabama has a regulation promulgated by the State Board of Health, which applies only to hospitals that lack resources or experience to properly evaluate trauma. Such centers must record the mechanism of the crash if the trauma patient was involved in a bicycle crash in which he was thrown at least ten feet from the bicycle. The Department of Health and Environment Division of Health Care Finance in Kansas promulgated a regulation requiring crashes involving bicycles to be reported immediately when they occur on the property of a state institution.

See Master Table of All States in Appendix for all information gathered on the 50 states and the District of Columbia.

Table 1: State Statutes and Regulations on Bicycle Crash Reporting

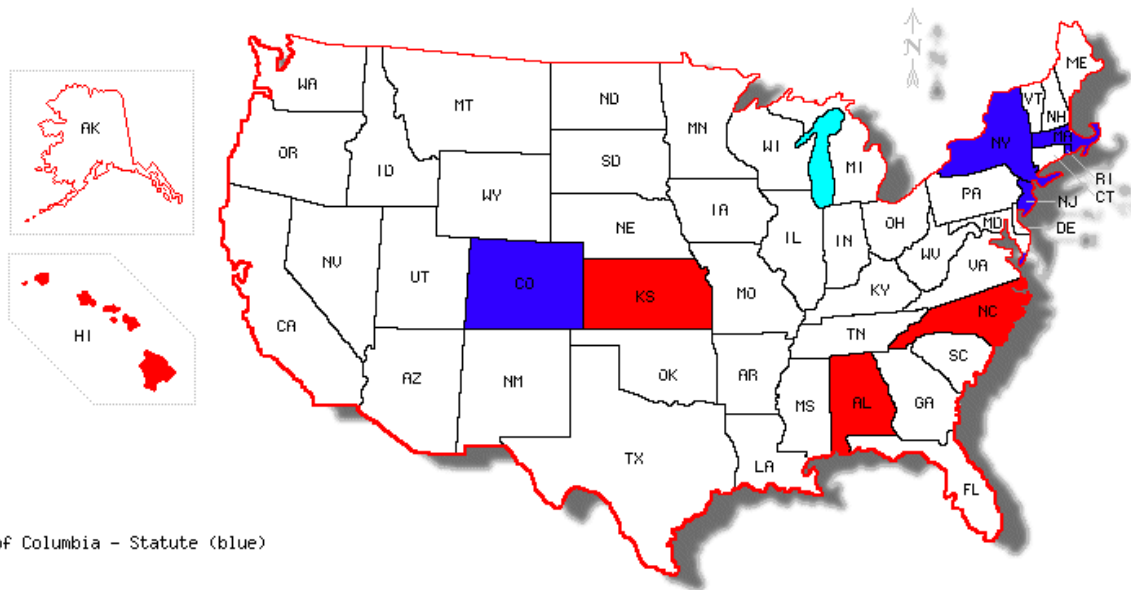
STATE	WHO MUST REPORT	WHAT MUST BE REPORTED	THRESHOLD FOR REPORTING	POLICY	STRENGTH
AL	hospital personnel	bicycle crash with the patient being thrown at least ten feet from the bicycle	patient involved in a trauma	Regulation	less
CO	law enforcement	injury or death that involves a bicycle or assisted bicycle on the state roadways even if such accident does not involve a motor vehicle	"upon request"; injury or death	Statute	exceeds
DC	District of Columbia Department of Transportation	any statistics collected regarding bicycle accidents and injuries during preceding year	NA	Statute	meets
HI	police officer	accidents must be classified as specified in the code; must be specified if involves a motor vehicle collision with bicycle	NA	Regulation	meets
KS	institution's security officers	accidents, collisions, fires, or thefts involving motor vehicles or bicycles	if on state institution property	Regulation	less
MA	operator of bicycle	must report the accident to police department	personal injury or property damage in excess of \$100	Statute	exceeds
	police	police must establish a training course for law enforcement which includes training on bicycle crash reporting	N/A	Statute	exceeds
NC	Collision Reports/ General Services Section	summary of motor vehicle traffic accidents with information on types of motor vehicles, pedestrian and bicycle accidents; categorized by county, rural or urban, time of day, day of week, drivers by day and sex	NA	Regulation	meets
NJ	driver of motor vehicle or owner of vehicle; unless law enforcement completes report	injury or death or property damage involving cyclist	injury; death; damage to property greater than \$500.00	Statute	exceeds
NY	police	conduct investigation & determine type of vehicles involved	serious physical injury or death	Statute	exceeds
	operator of bicycle	person operating a bicycle which is in any manner involved in an accident on a public highway	person is killed (other than operator) or suffers serious physical injury	Statute	exceeds
RI	operator of motor vehicle	accident with a person riding a bicycle	driver knowingly involved in an accident resulting in injury to, serious bodily injury to, or death of any person	Statute	exceeds

NA= Not Addressed; N/A= Non-applicable

Figure 1

States with Bicycle-Specific Crash Reporting Requirements

- - Statute
- - Regulation



DISCUSSION

Injury is one of the biggest public health problems in the United States, and motor vehicle crashes account for a large percentage of severe injuries. Injuries can cause death and disability, as well as huge financial and psychological burdens. Bicyclists account for a significant number of the total deaths and injuries due to traffic collisions each year, and the percentage of bicyclists that are injured or killed is higher than the mode share of bicyclists on roads. The number would almost certainly be larger if bicycle crashes were reported consistently. At the federal level, there are only guidelines and incentives for requiring bicycle crashes to be reported consistently and effectively. It is up to the states to follow the federal

guidelines to code crashes using the State Data System to provide accurate data that truly represents the scale of bicycle crashes in the United States. Yet, few states have either statutes or regulations that require bicycle crashes to be reported.

One potential explanation for the fact that most states do not have laws specifically requiring bicycle crashes to be reported is that states may assume that bicycles are considered to be included in their motor vehicle crash report policies. Most states have a code in their motor vehicle crash reports to indicate if the crash involved a non-motorist and extra space to provide any additional information on the circumstance of the crash. However, this leaves considerable room for interpretation by law enforcement and operators of vehicles regarding whether a crash with a bicycle is reported, and if so, whether details of the bicyclist, bicycle environment or other bicycling characteristics will be reported.

Another potential explanation is that states' legislatures and regulatory agencies may believe that these are policies that should be left to the local governments and police departments to handle. This survey examined state-level statutes and regulations; local laws and policies were not identified. Therefore, some requirements for reporting of bicycle crashes may be present at the local level that are not discussed in the results of this study. However, thorough reporting at the local level or by different enforcement groups is not a substitute for state-level reporting and analysis. If each county or city or department promulgates their own policies, it becomes almost impossible to compare data across cities and states or to combine data to determine overall risk in the United States.

A third possibility for the lack of bicycle reporting requirements is that legislators and policy makers may be unaware of the public health impact of bicycle crashes. Further, they

may lack knowledge regarding the opportunity to prevent death and injury to bicyclists. Individuals in lawmaking positions may not be aware of the connection between better reporting and more accurate data and the ability to create safer infrastructure to prevent injuries and deaths.

It is important to be able to demonstrate the true public health impact of bicycle crashes in the United States as well as to identify potential for creating a safer bicycling environment and implementing prevention measures. Better reporting policies will lead to more accurate and complete data, which will help policy makers and planners understand the true need for bicycling infrastructure and create safer roads and bicycle routes. Consistent reporting will also allow comparisons of state bicycle crash burdens and trends across years, as well as before and after infrastructure improvement.

However, it is important to consider that not all laws are followed or are easily enforceable. Even if all states implement bicycle crash reporting policies, there is no guarantee that all crashes will be reported. Another consideration is that bicycle crash reporting can be time consuming and expensive. If all states used every element of the MMUCC, it would take a substantial amount of time for law enforcement to report a collision. Law enforcement would also likely need additional training to learn all of the new elements which may require additional resources. However, this additional training could easily be justified by the benefit of better and more accurate reports which eventually lead to safer bicycling infrastructure.

RECOMMENDATIONS

All states should join the State Data System and should require that police officers report crashes using the MMUCC elements at a minimum to ensure consistent data that can easily be shared with NHSTA. However, this alone is not enough. The MMUCC only requires reporting of crashes involving injury, death or property damage of a minimum of \$1000. Many bicycle crashes may be left out because they do not meet the property threshold or do not involve a serious injury. Therefore, states need to adopt policies on crash investigation and reporting.

Based on the 50-state survey conducted for this paper, bicycle crash reporting laws in nearly all states do not provide sufficient information about the burden and risk factors involved in bicycling crashes and regulations. To provide consistent and accurate crash report data to show the true public health impact of bicycling, all states should have a statute within their vehicle and traffic code section that requires that crashes involving bicycles be reported. Ideally, all of the states should implement statutes that incorporate the best aspects of the state statutes that currently address bicycle crash reporting. All states should take Colorado's lead in requiring that law enforcement report crashes involving bicycles even when no motor vehicle was involved. However, since Colorado only requires that crashes involving injury or death be reported, states should model the threshold for reporting after Rhode Island's statute which simply states that a driver of a motor vehicle must stop and report an accident with a bicyclist. Bicyclists are more vulnerable than motorists, and some health consequences may not be apparent immediately. Additional data on bicycle crashes and injuries beyond the

current reporting systems are needed to determine the actual burden of injury and to identify prevention measures.

In addition to requiring reporting the crash itself, all states should require that police obtain data about the bicycle environment and roadway conditions to determine the cause of or factors related to crash. Also, most of the existing requirements are based on crashes on public land (i.e., streets and roadways); however, crashes could occur on private land as well such as in parking lots and on trails.

Public health organizations and transportation agencies should work together to establish a model state law requiring reporting crashes involving bicycles. The model law should establish the role of law enforcement in investigating and reporting bicycle crashes and should require law enforcement agencies to establish a training program for officers on bicycle crash reporting and how to reduce bicycle crashes (“Uniform,” 2006). It should also require reporting of bicycle crashes that involve both fatalities and serious injuries regardless of whether a motor vehicle was involved (“Georgia,” 2006). Finally, the model law should provide variables that must be included in a report as electronically coded elements that match MMUCC standards (Lusk, Asgarzadeh, & Farvid, 2015). Required variables should include four possible bicycle environments: roads, sharrows, bike lanes, and cycle tracks; 18 possible motor vehicle impact points; four possible bicycle impact points; turning directions and motor vehicle categories that apply to bicyclists (Lusk, Asgarzadeh, & Farvid, 2015).

States could then choose to adopt the law or a similar version. Government funding could be conditioned on the adoption of a version of the model law to encourage participation and consistency throughout the states similar to the way in which government funding has

been conditioned for other roadway safety programs. In partnership with community bicycling advocacy groups, public health personnel should also provide education and advocacy on the importance of the law and of improved data.

Because of the potential limitations of the law and enforcement, it is important to implement other strategies in addition to legislation and regulations to ensure that bicycle crashes are recorded. Improved bicycling infrastructure (built environment), education for both motor vehicle operators and bicyclists, safety campaigns, and other such initiatives could be used in conjunction with more laws and regulations. Also, more stringent consequences for failure to report crashes involving bicycles could be imposed to encourage better reporting.

States and public health organizations should implement strategies at the local level. Local bicycling organizations should provide education and advocacy on the benefits of reporting bicycle crashes. If bicyclists and others are more aware of the importance of reporting, they may be more likely to report crashes even if they are unaware or unconcerned from a legal perspective. Other local organizations and agencies should be engaged to advocate for stronger laws, education, and better infrastructure to improve the safety of bicycling in the United States.

States should also consider implementing a Vision Zero Initiative similar to what has been implemented in Sweden. This program began in Sweden in 1997 (“Vision Zero,” 2013) and is based on the principle that “no loss of life is acceptable,” (“Vision Zero Report,” 2015). Vision Zero Initiative collects information about traffic safety (“Safety at”). Using the information collected, it accounts for human mistakes and seeks to design and implement traffic and roadway infrastructure such that human error does not cause deaths (“Safety at”).

The Vision Zero Initiative has been successful in Sweden, which saw a 50% decline in pedestrian deaths from 2008 to 2013 (“Vision Zero,” 2013). Currently, Sweden has one of the lowest roadway fatality rates in the world (“Vision Zero,” 2013). Several U.S. cities have already begun implementing Vision Zero policies and have achieved significant successes (“Vision Zero,” 2013). The executive director of the New York City Vision Zero program stated the importance of continuous evaluations of traffic fatalities and of the Vision Zero program to ensure that the program remains progressive and effective (“Vision Zero Report,” 2015). A few U.S. states have implemented similar programs including Minnesota, Utah, and Washington State, and each has seen at least a 40% decline in crash fatalities (“Vision Zero,” 2013). All U.S. states should consider adopting this aggressive model for improving roadway safety for bicyclists and all users.

LIMITATIONS

The laws identified in this project only address public roadways and usually relate to collisions with motor vehicles. Future research into reporting of bicycle crashes on private lands and separated bicycle facilities may show a need for additional laws to encourage reporting in these scenarios.

The results of this survey are also limited by the search criteria used in Westlaw. The search terms were selected in an attempt to incorporate all existing statutes and regulations related to bicycle reporting while minimizing the chance of returning an unmanageable amount of mostly irrelevant results. Because the search results were limited by the terms used in the search, it is possible that some relevant statutes or regulations were not included. For

example, if a statute used another term for crash than the ones listed or if it included the term in a separate sentence than bicycle, then it would be missed by this search. A future study using more broad search criteria may reveal additional results.

More research is needed to determine whether the state laws identified in this project have actually improved bicycle crash reporting and consequently bicycle safety in their respective states. States with stronger reporting laws such as Massachusetts should be studied to determine the impact of the law on bicycle crash data collected. It would be beneficial to look at bicycle crash reports before the implementation of the law versus current reports to determine the effect of the law. Future research could also look at the difference in bicycle crash injuries and fatalities before and after the implementation of such laws.

REFERENCES

- About MMUCC. (n.d.). Retrieved May 02, 2016, from <http://www.mmucc.us/about-mmucc>
- Bicycles. (n.d.). Retrieved May 02, 2016, from <http://www.nhtsa.gov/Bicycles>
- Bicycle Safety. (2016, April 11). Retrieved May 02, 2016, from <http://www.cdc.gov/motorvehiclesafety/bicycle/>
- CDC Injury Fact Book. (2014, September, 26). Retrieved May 03, 2016, from http://www.cdc.gov/injury/publications/factbook/preventing_injuries_in_america-public_health_in_action-2006-a.pdf
- Georgia Bicycle Law Enforcement Pocket Guide. (2006, January). Retrieved May 03, 2016, from <http://www.gahighwaysafety.org/docs/gabicyclelawenforcementguide.pdf>
- Hamann, C. & Peek-Asa, C. (2013). On-road bicycle facilities and bicycle crashes in Iowa, 2007-2010. *Accident Analysis & Prevention*, 56, 103-109. Doi:10.1016/j.aap.2012.12.031
- Kerr, Z. Y., Rodriguez, D. A., Evenson, K. R., & Aytur, S. A. (2013). Pedestrian and bicycle plans and the incident of crash-related injuries. *Accident and Analysis Prevention*, 50, 1252-1258. Doi:10.1016/j.aap.2012.09.028
- Key Injury and Violence Data. (2015, September 30). Retrieved May 02, 2016, from http://www.cdc.gov/injury/wisqars/overview/key_data.html
- Lusk, A. C., Asgarzadeh, M., & Farvid, M. S. (2015). Database improvements for motor vehicle/bicycle crash analysis. *Injury Prevention*, 21(4), 221-230. Doi:10.1136/injuryprev-2014-041317

Lusk, A. C., Morency, P., Miranda-Moreno, L. F., Willett, W. C., & Dennerlein, J. T. (2013). Bicycle Guidelines and Crash Rates on Cycle Tracks in the United States. *American Journal of Public Health, 103*(7), 1240-1248. Doi:10.2105/ajph.2012.301043

McLeod, K. (2014, September 29). Updated: Bike Commute Data Released. Retrieved May 02, 2016, from <http://bikeleague.org/content/updated-bike-commute-data-released>

National Highway Traffic Safety Administration. (n.d.). Retrieved May 02, 2016, from <http://www-nrd.nhtsa.dot.gov/Pubs/811337.pdf>

NCSA Publications & Data Request. (n.d.). Retrieved May 02, 2016, from <http://www-nrd.nhtsa.dot.gov/Pubs/812214.pdf>

Pedestrian and Bicyclist Crash Statistics. (n.d.). Retrieved from May 02, 2016, from http://www.pedbikeinfo.org/data/factsheet_crash.cfm

Safety at every turn. (n.d.). Retrieved May 03, 2016, from <http://www.visionzeroinitiative.com/about-us/>

SDS Overview | National Highway Traffic Safety Administration (NHTSA). (n.d.). Retrieved May 02, 2016, from <http://www.nhtsa.gov/Data/State+Data+Programs/ci.SDS+Overview.print>

Section 408 SAFETEA-LU Fact Sheet (n.d.). Retrieved May 2, 2016, from <http://www.nhtsa.gov/Laws+&+Regulations/Section+408+SAFETEA-LU+Fact+Sheet>

State Bike Laws. (2012). Retrieved May 03, 2016, from <http://www.bikeleague.org/StateBikeLaws>

State Data Programs. (n.d.). Retrieved May 03, 2016, from <http://www.nhtsa.gov/Data/State+Data+Programs>

Uniform Guidelines for State Highway Safety Programs. (2006, November). Retrieved May 03, 2016, from

<http://www.nhtsa.gov/nhtsa/whatsup/tea21/tea21programs/pages/PedBikeSafety.htm>

Vision Zero: Learning from Sweden's Successes. (2013). Retrieved May 03, 2016, from

<http://centerforactivedesign.org/visionzero>

Vision Zero Report Card: 2015. Retrieved May 03, 2016, from

<https://www.transalt.org/report/vision-zero-report-card-2015>

What is MMUCC? (n.d.). Retrieved May 03, 2016, from <http://www.mmucc.us/mmucc-faq>

APPENDIX

Master Table of All States' Bicycle Crash Reporting Statutes and Regulations

