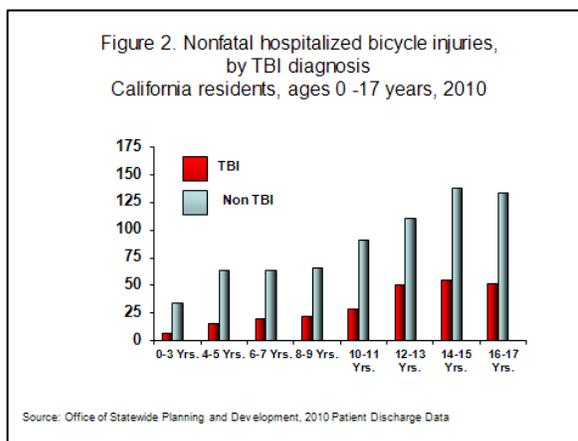
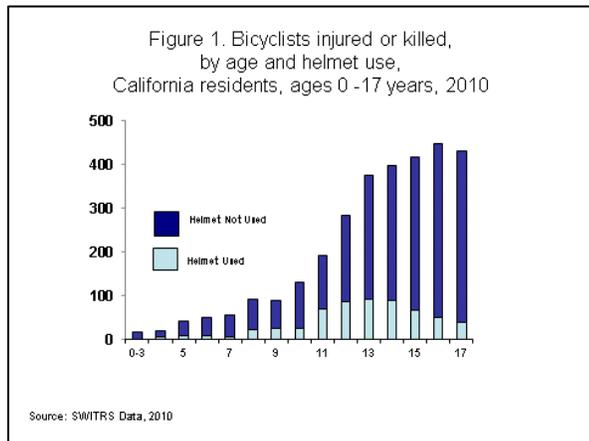


## Helmet Use Reduces Traumatic Brain Injury Among Young Bicyclists

Bicycles have always been a means of transportation and recreation. And now they are increasingly recognized as having a significant role in promoting healthy lifestyles. Young people who lead sedentary lives are more likely to become obese and to develop chronic diseases like diabetes. One excellent antidote to inactivity is riding a bicycle. In fact, the U.S. Department of Health and Human Services has created a Healthy People 2020 national objective to increase the number of trips made by bicycle. Although many young people ride a bicycle at least occasionally, barriers to bicycling remain. One barrier is safety. For example, parents are often reluctant to encourage their children to walk or bike to school out of concern for traffic-related dangers (2, 3).

Bicycle injuries are common, while deaths are fewer by comparison. Among Californians under age 18 in 2011, bicycle injuries caused 20 deaths (4). However, there were 1,000 hospitalizations and more than 20,000 emergency department visits (5). Traumatic brain injuries (TBI) are one of the most serious but preventable kinds of bicycling injuries. TBI carries a much higher risk of long-term disability than other types of injuries. So much so, that reducing death and disability from TBI is a new Healthy People 2020 draft objective (IVP-17).

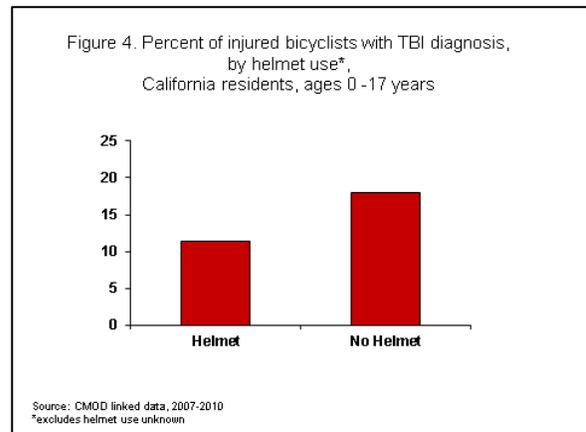
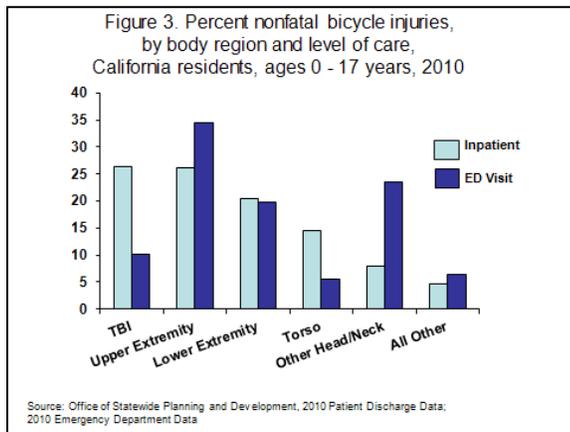
For bicyclists, a major defense against TBI is a properly worn safety helmet, which can be 88% effective in preventing TBI (6). Many states have some kind of safety helmet requirements for children. California Vehicle Code Section 21212 requires all bicycle riders under age 18 on public roads to wear a bicycle helmet. Despite the law, many children in California do not wear safety helmets.



In Figure 1, police reports show that only a small percentage of children injured or killed in bicycle crashes were using helmets. For these age groups, the average helmet use was 20%. Among children killed, only 13% wore a helmet.

Figure 2 is based on medical records of children with nonfatal bike injuries serious enough to require hospitalization. There was a range in the proportion of TBI diagnosis among the age groups, highest for older children.

Figure 3 shows that more than one-quarter (26%) of all children hospitalized for a bike injury had a TBI. Ten percent of emergency department visits for bicycle injuries were for TBI. Skull fractures and concussions were the most common type of TBI for those hospitalized for their bike injury. Unspecified head injuries and concussions were the most frequent type of TBI among injured bicyclists presenting to the emergency department.



To see whether helmet use is protective against TBI, we used data that linked police reports and medical records. Figure 4 shows that young bicyclists treated in the emergency department (ED) or hospitalized for their injuries were significantly less likely to have a TBI if they were wearing a helmet than if they were not (11% vs. 17%).\*

### Summary

Linked police and medical data demonstrate helmet use is protective against TBIs among young children injured as bicyclists. Among children requiring an ED visit or hospitalization for their bicycle injury, those wearing a helmet had a significantly lower percentage of TBI (11%) than those who did not wear a helmet (17%). Despite California's bicycle safety helmet law, however, California has yet to achieve a high enough level of helmet use to take full advantage of the protective value of bicycle helmets for children. Increasing safety helmet use should be part of a larger strategy—including education (for bicyclists *and* motorists), engineering (e.g. safe street designs), enforcement and emergency services—to increase safer bicycling (7, 8). Safer bicycling would, in turn, be part of a larger effort to help California children live healthier lives.

#### About the data

This fact sheet uses various sources (death records, hospital emergency room and inpatient data, police collision reports) to describe bike injuries among California youth, including those not involving a car. Each source captures a different aspect of the overall burden of these injuries. In addition to the overall surveillance provided by these sources, we used linked crash-medical data to describe the relationship between helmet use and TBI for the 50% of non-fatally injured child bicyclists (5,962/11,893) for whom we have 2007-2010 linked data.

\*Odds Ratio = 0.63 (95% Confidence Interval = 0.50-0.79) for TBI given helmet use among child bicyclists hospitalized or requiring an ED visit for their injury.

The Crash Medical Outcomes Data (CMOD) Project, modeled after the National Highway Transportation Safety Administration's Crash Outcome Data Evaluation System (CODES), probabilistically links police collision records to health data from emergency department visits and hospitalizations (OSHPD).

Information for persons injured in crashes in California may be accessed through the CMOD online query [Linked Crash-Medical Data](http://EpiCenter.cdph.ca.gov). This query is part of the EpiCenter California Injury Data Online accessed at <http://EpiCenter.cdph.ca.gov>. There you may create tables to see how victim characteristics and crash circumstances affect the victim's medical outcome. For technical assistance using the query or for other questions related to the CMOD project, contact [Lynn.Walton-Haynes@cdph.ca.gov](mailto:Lynn.Walton-Haynes@cdph.ca.gov).

This fact sheet was developed under the guidance of the CMOD Project. For further information about this fact sheet contact [Lynn.Walton-Haynes@cdph.ca.gov](mailto:Lynn.Walton-Haynes@cdph.ca.gov).

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## References

- 1) <http://www.who.int/dietphysicalactivity/childhood/approaches/en/> Accessed July 19, 2013.
- 2) Centers for Disease Control and Prevention. Barriers to Children Walking to or from School United States 2004, Morbidity and Mortality Weekly Report September 30, 2005  
[www.cdc.gov/mmwr/preview/mmwrhtml/mm5438a2.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5438a2.htm) Accessed: August 30, 2013.
- 3) [http://guide.saferoutesinfo.org/introduction/the\\_decline\\_of\\_walking\\_and\\_bicycling.cfm](http://guide.saferoutesinfo.org/introduction/the_decline_of_walking_and_bicycling.cfm) Accessed September 4, 2013.
- 4) <http://epicenter.cdph.ca.gov/ReportMenus/CustomTables.aspx> Accessed July 19, 2013
- 5) Source: California Office of Statewide Health Planning and Development, Inpatient Discharge Data, Prepared by: California Department of Public Health, Safe and Active Communities Branch, <http://epicenter.cdph.ca.gov> Accessed July 19, 2013
- 6) Snell Memorial Foundation. Circumstances and Severity of Bicycle Injuries.  
<http://www.smf.org/articles/report.html> Accessed July 19, 2013.
- 7) Alliance for Walking and Biking. Bicycling and Walking in the United States: 2010 Benchmarking Report.  
[http://peoplepoweredmovement.org/site/index.php/site/memberservices/alliance\\_2010\\_benchmarking\\_report\\_information\\_findings](http://peoplepoweredmovement.org/site/index.php/site/memberservices/alliance_2010_benchmarking_report_information_findings) Accessed: August 30, 2013.
8. California Department of Transportation. Local Roadway Safety, A Manual for California's Local Road Owners (Version 1.1). [http://www.dot.ca.gov/hq/LocalPrograms/HSIP/Documents/hsip/CA\\_SM4LROv11.pdf](http://www.dot.ca.gov/hq/LocalPrograms/HSIP/Documents/hsip/CA_SM4LROv11.pdf)

