

Exploring the Relationship Between Mandatory Helmet Use Regulations and Adult Cyclists' Behavior in California Using Hybrid Machine Learning Models

Project 2024
September 2021

Fatemeh Davoudi Kakhki, PhD
Maria Chierichetti, PhD



In California, bike fatalities increased by 8.1% from 2015 to 2016. Even though the benefits of wearing helmets in protecting cyclists against trauma has been determined, its use is still limited, and there is opposition against mandatory helmet use, particularly for adults. Therefore, exploring perceptions of adult cyclists regarding mandatory helmet use is a key element in understanding cyclists' behavior, and determining the impact of mandatory helmet use on cycling rates. The objective of this research is to identify sociodemographic characteristics and cycling behaviors that are associated with the use and non-use of bicycle helmets among adults and to assess if the establishment of a bicycle helmet law will result in a change in cycling rates. The project addresses the lack of empirical data regarding helmet use and non-use in California.

Study Methods

This project collected data regarding cycling behavior and beliefs and socio-demographic aspects of the population in California by distributing a survey to the population.

The collected data is analyzed with a three-tier statistical approach that identifies relationships between mandatory helmet usage, sociodemographic factors and cycling trends. The first tier of data analysis is based on descriptive statistics; it identifies what type of cyclists responded to the survey and which participants are more likely to wear a helmet, in presence or not of mandatory helmet regulations. The second step of analysis establishes a statistical relationship between key participant characteristics and the likelihood of changing their biking habits due to a bicycle helmet law using a logistic regression method. Key participants characteristics included in the analysis are gender, age, education, race, income level, frequency of bicycle use and frequency of helmet use. The third step of analysis automatically identifies groups of participants with similar socio-demographic features that also share common perception about a helmet mandate. The analysis determines two clusters of participants with similar beliefs regarding a helmet law and, within each group, what are the barriers to wearing a helmet. This knowledge supports

