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Bicycling Safety Meets Citizen Science

Commuting can be dangerous for a bicyclist in the city, as Professor [Trisalyn Nelson](#) knows all too well. While biking home from work one day in Victoria, Canada, a driver nearly cut her off. It was far from the first time she had such a close encounter, and always at the same location.

“I thought, ‘if I die on my bike, it’s going to be at this spot,’” recalled Nelson, who holds the Jack and Laura Dangermond Chair in Geography at UC Santa Barbara. “And I got mad.”

Her anger sparked action. Nelson’s frustration that day inspired a project that would become a significant aspect of her still young career: [BikeMaps.org](#), an international initiative aimed at increasing bicycle safety. The website allows cyclists to report problem areas.

“I called a bicycle safety researcher and talked to her about the idea,” Nelson continued. “And she said, ‘Trisalyn, this is actually a super serious problem. Only 20% of bike crashes are reported to official sources. So, when it comes time to make bicycling safer, planners often have no idea about where to start.’”

This was a perfect issue for Nelson to tackle. She specializes in GIS, short for geographic information systems. GIS technology enables researchers to capture and analyze geographic information. These researchers are essentially data scientists

who work with map-based data, Nelson explained.

Her team developed a website where anyone, anywhere in the world, can map a bicycle incident or accident, as well as report any hazards. Beyond promoting the website and encouraging people to use it, the project also involves analyzing the data to generate new knowledge about how to increase cycling safety.

Since its inception in 2014, BikeMaps.org has expanded its coverage to 40 countries and been translated into French, German, Spanish and Icelandic. The database now contains records of nearly 10,000 bicycle crashes, near-misses and hazards. The project has received roughly \$1.5 million to support its mission, which has enabled the team to expand to 15 strong.

BikeMaps.org has partnered with a number of cities — including Victoria, Ottawa, Reykjavik and Tempe — looking for better data to make infrastructure decisions with an eye toward cycling safety and accessibility. The team can combine its own data with official datasets to create maps of 10-25 bicycle-safety hotspots that cities can then work on fixing. They can also build statistical models to determine factors that predict injuries.

In addition to working with cities, Nelson and her team have generated several papers on citizen science and the causes of bicycling injuries. BikeMaps.org recently partnered with Outside Magazine to help elucidate the causes of cycling deaths in the United States. Based on their research so far, the most dangerous situation for bicyclists on the road is when vehicles are turning left.

“As a driver there is a cognitive complexity to turning that leads to incidents and injury,” Nelson said.

A significant aspect of analyzing data from BikeMaps.org is measuring exposure, or the number of people that cycle in a given area. “Studying safety without exposure is like studying COVID cases without considering population size,” Nelson said.

The team uses data from Strava, a popular bicycling fitness app, to map the number of people on bicycles. The researchers developed statistical and GIS methods to convert the Strava sample of bicycling ridership into maps of bicyclists. These maps are critical for their research and also provide cities with important planning and management information.

Nelson and her team have just received funding for a new project, WalkRollMap.org: a crowdsourced tool for the public to map micro-barriers to walking and rolling (and other kinds of mobility assistance) in urban areas. “People will be able to map things like uneven pavement that might impede mobility for someone with impaired balance,” Nelson said, “or places that need lighting to enable safer travel at night.”

Having recently joined the faculty at UC Santa Barbara from a position at Arizona State University, Nelson intends to expand BikeMaps.org’s presence in California. “The biggest barrier to more people riding — and experiencing all the health, economic and sustainability benefits of getting on their bike — is a concern about safety,” Nelson said. “So BikeMaps.org is really about overcoming barriers and creating healthier people and cities.”

About UC Santa Barbara

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