

# UC Berkeley

## Research Brief

### Title

Connecting Public Health and Transportation - Applying Crowdsourcing and Community Engagement Principles to Traffic Safety

### Permalink

<https://escholarship.org/uc/item/9b88z0gs>

### Authors

Crowner, Jarah  
Chen, Katherine L.

### Publication Date

2024-09-01



# Connecting Public Health and Transportation - Applying Crowdsourcing and Community Engagement Principles to Traffic Safety

Jarah Crowner, Katherine L. Chen

## Introduction

Motor vehicle traffic fatalities are a public health problem in the United States. In 2022, there were 42,514 people killed and another 2.38 million people injured on U.S. roadways (National Center for Statistics and Analysis [NCSA], 2024). These fatalities are a leading cause of death and kill over 116 people each day. According to the Centers for Disease Control and Prevention (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS), in 2022, for people ages 15-24, motor vehicle crashes were the leading cause of death in the United States (CDC, 2022). Across all age groups, motor vehicle crashes are in the top 10 leading causes of death.

The burden of traffic crashes is not borne equally. The proportion of people killed “inside the vehicle” has declined from a high of 80 percent in 1996 to 64 percent in 2022, which means the corresponding proportion of people killed “outside the vehicle” (e.g., motorcyclists, pedestrians, bicyclists, and other non-occupants) has climbed to a high of 36 percent (NCSA, 2024). Specifically, the 7,522 pedestrians killed represents the highest number since 1981 and the 1,105 bicyclists killed is the highest since 1975 when data collection into the Fatality Analysis

Reporting System began (NCSA, 2024). Males continue to be killed at a higher rate than females, and, fatalities among people aged 65 and older continue to increase (NCSA, 2024).

## Transportation Safety and Public Health

While the overall number of fatalities and serious injuries have generally decreased in 2022, vulnerable road user fatalities and serious injuries are rising. Reports suggest that transportation decision-making at each level (state, regional, and local) should consider the health implications of transportation options before making decisions about infrastructure and non-infrastructure improvements. Public health professionals are integral to community engagement, capacity building, and can act as liaisons between organizations, agencies, and their constituents.

Public health models like the Health Belief Model (HBM) detail how people’s perceptions of safety affect and influence their behaviors (Rosenstock, 1974). Developed in the 1950s by the U.S. Public Health Service to understand why people fail to adopt disease prevention strategies, the HBM can

also be used to predict the likelihood of a person adopting traffic safety related behaviors. When applied to traffic safety, the HBM predicts whether an individual may adopt a specific behavior – such as walking to school, wearing a helmet when riding a bike, or driving impaired – based on their perception of crash risk and injury severity combined with the benefits and barriers they perceive of the behavior. The HBM is a useful framework when designing behavior change interventions. However, there are also limitations to the HBM because it does not account for an individuals’ attitudes and beliefs, demographics, or socioeconomic circumstances which may also impact their behavior (Cooper and Nichols, 2022).

As seen in Figure 1, the U.S. Department of Health and Human Services’ Healthy People 2030 initiative identifies five main domains for the social determinants of health: economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context. Professionals’ knowledge of these social determinants of health can provide a macro view to inform and aid transportation planners and engineers in addressing concerns when prioritizing traffic safety projects, applying for funding, and/or developing needs assessments. Encouraging behavior change alone will not have the greatest impact on improving road safety. Instead, public health encourages multidisciplinary efforts between transportation, education, and housing sectors to eliminate the compounding disparities that affect the most disadvantaged populations. For example, access to reliable transportation can make it easier to travel to food, school, and employment opportunities.



Figure 1. Healthy People 2030 Social Determinants of Health Graphic. Source: U.S. Department of Health and Human Services.

More recently, Ederer et al. introduced a new traffic safety framework linking public health practice to transportation (Ederer et al, 2023). The framework combines the transportation paradigm shift of Vision Zero and the Safe System Approach with the two public health models, the Health Impact Pyramid and the Hierarchy of Controls, into the Safe Systems Pyramid as seen in Figure 2. The pyramid argues that interventions are more effective when targeted at the population level because it allows us to address socioeconomic variables, rather than relying on individualistic behavior change to improve traffic safety.



Figure 2. Adapted from the Health Impact Pyramid, Ederer’s Safe Systems Pyramid for roadway safety practitioners consists of education, active measures, latent safety measures, the built environment, and socioeconomic factors (image designed by Michelle Lieberman of the University of California at Davis).

## Community Engagement

At the core of many of these public health transportation models is the goal to save lives. However, regardless of the many different methods and frameworks traffic safety and public health professionals use, it is critical that they be person-centered and engage community members directly about safety issues to achieve long-term, sustainable outcomes, relationships, and discourse. One way agencies and organizations can do this work is to develop surveys that collect community-level data regarding perceptions of safety. Using the community-based participatory research approach (CBPR), multidisciplinary researchers, community leaders and members can also develop project plans that involve community meetings, walk and bike audits, and temporary project demonstrations to gain perspective about community travel experiences while driving, walking, biking, or rolling. Other methods include the use of technology like crowdsourcing platforms or images and videos to capture safety perceptions and experiences in the community. The use of these methods can then be shared on a larger scale using multiple media channels to educate and encourage community involvement in the planning process of safety projects.



## Crowdsourcing Data

Crowdsourcing is a newer approach to collaboration in the field of active transportation planning – one that harnesses many of the quickly evolving technologies changing how transportation planners collect information and communicate about the work. The process includes obtaining information, insight, and knowledge from user-generated data provided through Web and mobile applications to engage individuals who may not participate in traffic planning through traditional avenues and to raise awareness about traffic safety issues affecting their community.

Effective data collection through crowdsourcing efforts can help address safety issues related to those biking, walking, and rolling, and the active transportation infrastructure they encounter on their community's roads. These efforts can help provide perspectives from many demographic and geographic regions on topics related to personal travel experiences, community projects and priorities, and the built environment. Crowdsourcing tools can inform and add value to planning projects which may not necessarily include community experiences and feedback from the start. Because of their low cost, they can also collect a huge amount of information from a large number of people at a more affordable scale than other strategies.

### Street Story

[Street Story](#) is an example of a crowdsourcing platform, which agencies can use to collect transportation data on crashes, near misses, hazards, and safe locations to travel within the state of California and gain community awareness and input regarding their travel safety experiences. The data collected can be used as a supplemental reporting system to support police-reported data, like the Statewide Integrated Traffic Records System (SWITRS), to inform and prioritize safety projects, and to include in funding applications. It has been used as a part of pedestrian plans, during walk audits, and introduced at community meetings.

Street Story is free, publicly accessible, and can be used by California residents age 13 and older. To better serve the unique needs of communities and the diversity of residents, Street Story is available in English and Spanish, and in electronic and paper form. This engagement tool features a short survey to gauge a user's travel experience in areas they frequently commute whether they are a pedestrian, bicyclist, driver, or use another mode of transportation. Agencies and organizations can use the qualitative data, or narratives, to gain insight into a user's perception of safety and help inform a planning process, non-infrastructure, or infrastructure improvements in a specified area.

## PhotoVoice and VideoVoice

PhotoVoice and VideoVoice are projects where residents collect and use images or videos to describe their personal experiences and perspectives, and raise awareness of traffic safety issues impacting their communities. It is an opportunity that allows communities to advocate for their needs and control the narrative of their story in active transportation planning.

PhotoVoice is a way to engage communities by documenting their experiences in pictures. Through images, community members can address issues and start conversations about actionable solutions. For example, residents can assess current walking and biking conditions which they experience as problematic in order to improve them. Community residents may walk or bike around areas, photograph them, and then assemble them into presentations for decision makers, elected officials, etc.

Similar to PhotoVoice, VideoVoice is a method of gathering public feedback on traffic safety issues with short videos instead of images. Community members may be interviewed at the site of an area of concern, describe the problem, and offer suggestions. While it's possible to convey a story in a photograph, it's sometimes more compelling to use moving images to capture a moment or emotions because videos can make it easier to tell a story.

### Case Study: Castro Valley VideoVoice Project

In Spring 2023, SafeTREC and California Walks staff conducted a VideoVoice training session for the Castro Valley community. Participants learned how to use images and videos to bring awareness to safety issues and capture travel experiences of staff and the parents of children who attend Proctor Elementary School. Participants wanted to highlight and raise awareness of those walking, biking, and rolling, and the importance of pedestrian and bicycle safety in the community. Following the training session, the Project Team photographed students crossing the street near campus, gathered observations from participants on the safety of those walking, biking, and rolling to school, and interviewed both a parent and a teacher on their safety concerns while traveling to and from school each day. The images and videos captured were then developed into a VideoVoice project by the Project Team and shared with the community in the summer of 2023.

[Read more about their VideoVoice project.](#)

## Conclusion

Transportation-related fatalities and injuries, under current trends, will continue to greatly impact peoples' lives and their perceptions of safety in the United States. Transportation engineers and planners heavily rely on quantitative data to make changes, but there is a need for qualitative, anecdotal data as well for informing decisions around traffic safety improvements that reduce the number of deaths and serious injuries on U.S. roads each year. Public health professionals, methods, and models are essential to incorporate within active transportation best practices in order to capture the ideas, desires, and needs of communities that can better inform decision-making and make a lasting impact in communities. These best practices may also increase community trust, capacity, and education involving traffic safety issues. Addressing safety concerns should be cross-functional in its approach to make streets safer for all.

## References

- Centers for Disease Control and Prevention (CDC). [WISQARS — Web-based Injury Statistics Query and Reporting System](#). U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2022.
- Cooper, J.F. and Nichols, A. (2022). Peer Influence and Perceptions of Safety. Safe Transportation Research and Education Center. Retrieved September 17, 2024 from <https://safetrec.berkeley.edu/sites/default/files/publications/pluralisticignoranceresearchbrieffinalsp22.pdf>.
- Ederer, D. J., Panik, R. T., Botchwey, N., & Watkins, K. (2023). The Safe Systems Pyramid: a new framework for traffic safety. *Transportation research interdisciplinary perspectives*, 21, 100905. <https://doi.org/10.1016/j.trip.2023.100905>.
- Healthy People 2030, U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Retrieved August 13, 2024, from <https://health.gov/healthypeople/objectives-and-data/social-determinants-health>.
- Hine, J. (2017). Road safety and public health. *Journal of Health & Transport*, 4, 8-9. <https://doi.org/10.1016/j.jth.2017.03.007>.
- Koehler, K., Latshaw, M., Matte, T., Kass, D., Frumkin, H., Fox, M., Hobbs, B. F., Wills-Karp, M., & Burke, T. A. (2018). Building Healthy Community Environments: A Public Health Approach. *Public Health Reports (1974-)*, 133(1S), 35S-43S. <https://www.jstor.org/stable/26572692>.

Jackson, R.J. and Kochtitzky, C. (2012). *Creating a Healthy Environment : the Impact of the Built Environment on Public Health*. Retrieved September 17, 2024 from <https://stacks.cdc.gov/view/cdc/142680>.

National Center for Statistics and Analysis. (2024, June, Revised). Overview of motor vehicle traffic crashes in 2022 (Traffic Safety Facts Research Note. Report No. DOT HS 813 560). National Highway Traffic Safety Administration.

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education Monographs*. 2(4), 328–335. <https://doi.org/10.1177/10901981740020040>.

Smith, A. (2015). Crowdsourcing for Active Transportation. *Institute of Transportation Engineers. ITE Journal*, 85(5), 30-35. <https://www.proquest.com/scholarly-journals/crowdsourcing-active-transportation/docview/1682435382/se-2>.

## About the Program

This research brief was developed as part of the Community Pedestrian and Bicycle Safety Program (CPBSP). The aim of the CPBSP is to reduce pedestrian and bicyclist fatalities and serious injuries in California. We partner with communities across California to discuss, plan, and implement safety improvements and projects.

The CPBSP prioritizes working in communities that are at disproportionate risk for road traffic injuries and addressing the safety needs of people who are underserved by traditional transportation resources and planning. For more information, visit: <https://bit.ly/CPBSP> or email us at [safetrec@berkeley.edu](mailto:safetrec@berkeley.edu)

## About the Funder

Funding for this program was provided by a grant from the California Office of Traffic Safety, through the National Highway Traffic Safety Administration. This report was prepared in cooperation with the California Office of Traffic Safety (OTS). The opinions, findings and conclusion expressed in this publication are those of the author(s) and not necessarily those of the OTS.

Photo by Emilio Hernandez (California Walks)