

Examining Traffic Safety Across Communities: A National Perspective and Case Studies in Arizona, Maryland, North Carolina, and Oregon

INTRODUCTION

Road safety continues to pose a public health challenge in the United States, with persistent disparities in crash outcomes across diverse demographic and geographic groups. These disparities are influenced by a combination of historical developments in transportation infrastructure, uneven resource allocation, and long-standing policy decisions. In addition, sociodemographic factors such as gender, sex, age, race, and socioeconomic status often interact in complex ways that may affect individuals' exposure to risk and severity of injury in traffic crashes. Understanding these relationships is critical for identifying at-risk populations and informing equitable strategies that improve safety outcomes for all communities. Together, these components provide a foundation for understanding where disparities exist, why they persist, and how they can be addressed through targeted, equity-centered solutions.

This study examines and addresses disparities in traffic safety through three primary objectives. It begins by identifying and analyzing differences in traffic safety outcomes across various sociodemographic and socioeconomic groups. Next a comprehensive quantitative analysis explores the interconnected sociodemographic, infrastructural, and systemic factors that may contribute to these disparities. Finally, the study develops targeted policy recommendations and solutions based on both interview data and quantitative analysis, with the goal of promoting more comprehensive safety outcomes. These proposed interventions may help reduce the most significant disparities while also offering broader benefits to all road users.

METHODOLOGY

The study framework consists of three main components: a review of existing literature to establish context, a quantitative analysis to identify and measure disparities, and a qualitative assessment that uses interviews to gain deeper insights and inform policy recommendations. The quantitative and qualitative analyses are conducted at the national level and in four states: Arizona, Maryland, North Carolina, and Oregon.

TECHNICAL REPORT:

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ABOUT THE AAA FOUNDATION FOR TRAFFIC SAFETY

Founded in 1947, the AAA Foundation for Traffic Safety in Washington, D.C., is a nonprofit, publicly supported charitable research and educational organization dedicated to saving lives by preventing traffic crashes and reducing injuries when crashes occur. Funding for this research was provided by voluntary contributions from AAA/CAA and their affiliated motor clubs, individual members, AAA-affiliated insurance companies, and other organizations or sources.

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The literature review focused on studies examining crash disparities across various sociodemographic and socioeconomic groups in the United States, primarily covering the years 2019 to 2024, and was further divided into crashes involving motor vehicles, pedestrians, and bicyclists. The quantitative analysis began by analyzing crash rates nationally and within the four selected states, disaggregated by sex, age group, and race for drivers, pedestrians, and bicyclists. Crashes were mapped to geographic boundaries using an area-based method. To identify crash risks, double-bootstrap data envelopment analysis and machine learning models were applied at the county level nationwide and the census tract level in four selected states. Finally, interviews were conducted with individuals from federal and state agencies, industry, and the academy to explore underlying factors contributing to these disparities and possible policy interventions.

RESULTS

The study revealed significant variations in traffic safety outcomes across demographic groups and geographic regions. Nationally, male fatality rates were approximately 3.5 times higher than female rates per 100,000 population, with notable state-by-state differences observed across the United States. American Indian and Alaska Native (Native American) populations experienced the highest fatality rates among racial groups, while Arizona consistently showed higher pedestrian and bicyclist fatality rates across nearly all demographic categories compared to both national averages and other benchmark states (Oregon, Maryland, and North Carolina).

Data envelopment analysis results indicated that crash risks and injury severity patterns differ substantially by both demographic composition and geographic location. While higher poverty rates were consistently associated with higher crash risks, other variables such as racial characteristics differed across state- and national-level findings. In Arizona, higher proportions of White, Black, and Hispanic residents were linked to greater risks. In Maryland, risks rose with Black, Asian, Hispanic, and multiracial populations, while White populations experienced safer outcomes. In Oregon, risks were higher in areas with more White, Asian, Hispanic, and multiracial residents, but lower in areas with higher

Black and Pacific Islander residents. Machine learning analysis confirmed that no single demographic group or community maintained consistently higher or lower risk levels across all regions, with injury severity and crash-related costs showing strong regional dependence.

Qualitative findings highlighted data limitations related to tribal communities and emphasized the importance of community-centered engagement approaches. The interview findings also revealed institutional biases toward motorist safety in transportation planning practices, along with the compounded challenges faced by lower-income communities. These populations frequently experience both deficient transportation infrastructure and greater reliance on higher-risk transportation modes, creating a dual disadvantage in traffic safety outcomes.

Data and interviews from this study reveal persistent, place-based disparities in traffic safety, highlighting the complex interplay of demographic, geographic, and socioeconomic factors that shape outcomes across population groups and regions. The findings emphasize the need for community-tailored interventions that account for localized risk patterns while addressing systemic challenges. By combining diverse analytics and data-driven information with meaningful community engagement, transportation agencies can develop more effective safety strategies that prioritize high-risk populations and generate solutions that create safer outcomes for all road users.

This study highlights the potential to move from traditional standardized approaches toward more nuanced and targeted solutions, underscoring the importance of sustained stakeholder collaboration, culturally responsive planning, and strategic infrastructure investments in underserved communities with the greatest need. These insights offer guidance for policymakers aiming to align equity objectives with practical measures to improve safety for all road users, including through targeted infrastructure investments, revised decision-making standards, and community-driven planning approaches. The findings also underscore the need to identify and address gaps in data that may obscure disparities or limit the effectiveness of safety interventions.