RTI INTERNATIONAL

RTI Center for

Evidence-Based Strategies to Reduce Firearm Violence

Producing Nonfatal Firearm Violence Estimates for all U.S. Counties

RTI International, a non-profit research organization committed to improving the human condition, is conducting this project.

The Problem

In the United States, the number of fatal and nonfatal shootings increased precipitously in 2020, and firearm violence is now the leading cause of death among children. There are good data on the people killed by firearms, but two to three times more people get shot and survive. Unfortunately, nonfatal shootings are not well documented or understood, perpetuating an underfunded and underinformed ecosystem of firearm violence research, etiology, and prevention activities. We lack important administrative data on where and how many nonfatal shootings occur, and efforts to reconstruct these data from media sources are prone to bias. Having reliable, county-level estimates of the number and rate of nonfatal shootings will support the development and implementation of data-informed injury prevention interventions and policies to address the firearm violence problem that is devastating communities.

A Potential Solution

This project uses multiple 2022 data sources, weighting, and statistical modeling to produce nonfatal firearm violent injury estimates (i.e., nonfatal interpersonal shootings) for all U.S. counties. Data sources include the National Vital Statistics System (NVSS), the National Incident-Based Reporting System (NIBRS), and an array of ancillary county-level measures, including demographics, the locations of trauma centers, and gun-related policies. We are using the number of homicide victims from NVSS—not suicides or justifiable homicides; and the number of violent crime (i.e., murder, negligent manslaughter, aggravated assault, robbery, rape, kidnapping, or human trafficking) victims who were killed (fatal) or majorly injured (nonfatal) during an incident involving a firearm from NIBRS—not violent crime victims who were not shot.

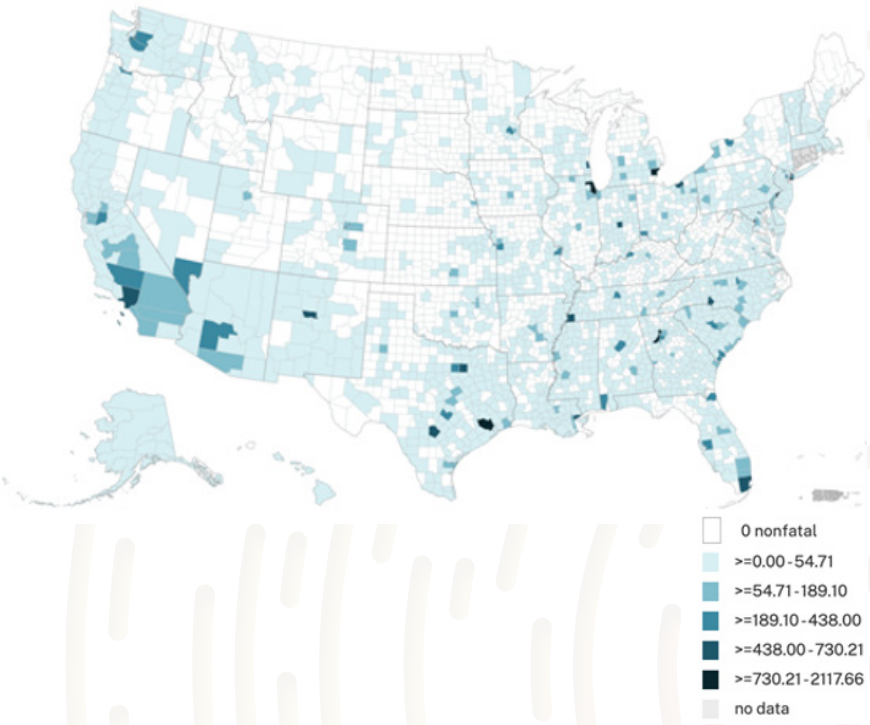
This project started with the assumption that NVSS and NIBRS fatal estimates, as well as NIBRS fatal and nonfatal estimates, would be highly correlated at the county-level, which proved to be true. For U.S. counties with at least 80% coverage by NIBRS, (2,398 out of 3,136, or 76%), we modeled the relationship between NVSS fatal shooting victims and NIBRS fatal shooting victims, while controlling for county-level characteristics. We then used the parameters from that model to estimate the number of fatal shooting victims for the remaining U.S. counties. We then modeled the relationship between the number of NIBRS fatal shooting victims and NIBRS nonfatal shooting victims, controlling for covariates, and used the parameters to estimate the number of nonfatal shooting victims for the remaining U.S. counties. The results are a blend of direct and modeled county-level estimates of the number of fatal and nonfatal shooting victims for the entire U.S.

Next Steps for this Project

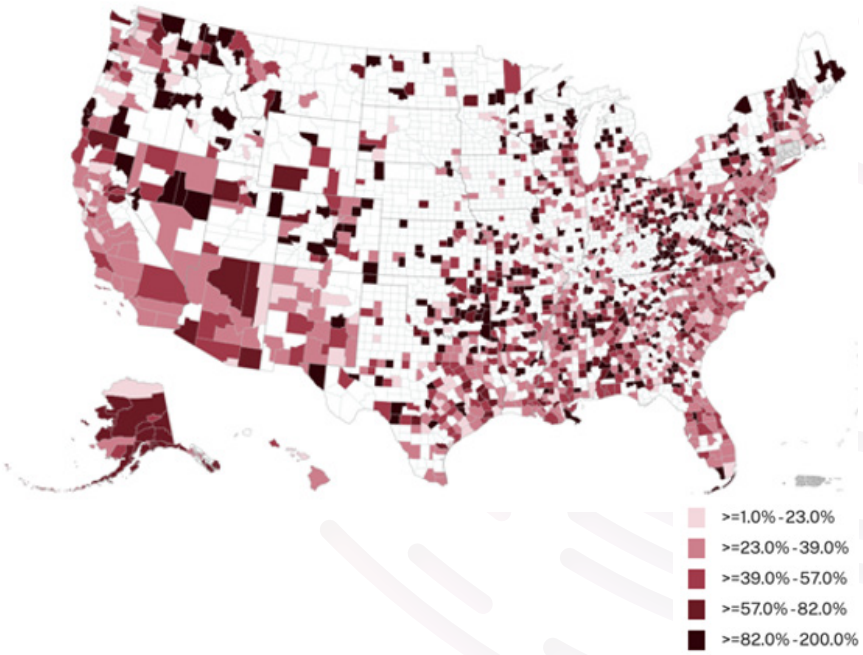
- **Continue to validate results against independent sources.** RTI is in the process of validating county-level estimates against public firearm crime data for select municipalities and Gun Violence Archive estimates. Next, we plan to compare the estimates to record management system data obtained from a stratified sample of counties and their respective law enforcement agencies.
- **Produce estimates of uncertainty.** Statistical modeling introduces some level of uncertainty or margin of error. RTI's Small Area Estimation experts are developing standard errors and confidence intervals for the estimates of fatal and nonfatal shooting victims.
- **Produce firearm violence estimates for more years (2016-2023) and for demographic subgroups.** This methodology will be applied to additional years and subgroups when and where sufficient NIBRS data and coverage exist.
- **Provide a fuller accounting of firearm violence.** The estimates communicate a fuller account of the impact of gun violence, and offer the first nationwide source of county-level nonfatal firearm violence estimates derived from administrative data.
- **Offer a new firearm violence outcome.** The estimates provide potential outcomes for firearm-related program and policy evaluation, particularly once additional years of data are made available. The inclusion of nonfatal events will improve evaluators' ability to detect effects and understand impacts. RTI is currently exploring two such use cases.
- **Share insights for additional research.** The estimates can help identify counties that merit in-depth study or intervention. By learning why counties vary in terms of nonfatal firearm violence and the shooting fatality rate (see right), we can inform and make evidence-based improvements to policy and practice.

Sample Results

Number of Nonfatal Shooting Victims per 100,000 Population



Percentage of Shooting Victims Who Die (Shooting Fatality Rate)



More Information

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