

## Rurality and injury

### 35 INVESTIGATING INTERSECTIONS BETWEEN FIREARM SUICIDE, DRUG-RELATED MORTALITY AND PRIMARY ECONOMIC DEPENDENCY IN RURAL AMERICA: A CROSS-SECTIONAL STUDY

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**Statement of Purpose** Rural counties in the United States have higher firearm suicide rates and opioid overdoses than urban counties.

We determined whether rural counties can be grouped based on ‘diseases of despair’ by firearm suicides, drug deaths, opioid prescriptions, and socioeconomic characteristics.

**Methods** We performed a cross-sectional study of all rural county residents in the United States from 2012 to 2016. Age-adjusted firearm suicide death rates; drug-related death rates; homicide rate, opioid prescribing rate, %black, %Native American and %veteran population, median home price, violent crime rates, primary economic dependency (non-specialized, farming, mining, manufacturing, government and recreation), and economic variables (low education, low employment, retirement destination, persistent poverty, persistent child poverty).

**Results** Hierarchical clustering using complete linkage yielded five distinct rural county clusters. The firearm suicide rates in the clusters were 5.9, 6.8, 6.4, 8.5 and 3.8 per 100,000 respectively. The counties in cluster 1 were poor, mining dependent, with population loss, cluster 2 were non-specialized economies, with high opioid prescription rates, cluster 3 were manufacturing and government economies with moderate unemployment, cluster 4 were recreational economies with substantial veterans and Native Americans populations, high median home price, drug death rates, opioid prescribing, and violent crime and cluster 5 were farming economies, with high population loss; low median home price; low rates of drug mortality; opioid prescribing; and violent crime. Cluster 4 counties were spatially adjacent to urban counties.

**Conclusions** Interventions to reduce firearm suicides should be community-based and include programs to reduce other diseases of despair.

**Significance** Focusing on prevention related to firearms alone without considering the built environment may not be effective. A targeted approach towards high-risk areas identified by intersectionality between opioid and firearm use particularly in recreational counties that abut urban areas may be a better-tailored strategy for prevention.

## Innovation methods

### 37 CHANGES IN PATTERNS OF MORTALITY RATES AND YEARS OF LIFE LOST DUE TO FIREARMS IN THE UNITED STATES, 1999 TO 2016: A JOINTPOINT ANALYSIS

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**Statement of Purpose** Firearm-related death rates and years of potential life lost (YPLL) vary widely between population

subgroups and states. However, changes or inflections in temporal trends within subgroups and states are not fully documented. We assessed temporal patterns and inflections in the rates of firearm deaths and %YPLL due to firearms for overall and by sex, age, race/ethnicity, intent, and states in the United States between 1999 and 2016.

**Methods** We extracted age-adjusted firearm mortality and YPLL rates per 100,000, and %YPLL from 1999 to 2016 by using the WONDER (Wide-ranging Online Data for Epidemiologic Research) database. We used Joinpoint Regression to assess temporal trends, the inflection points, and annual percentage change (APC) from 1999 to 2016.

**Results** National firearm mortality rates were 10.3 and 11.8 per 100,000 in 1999 and 2016, with two distinct segments; a plateau until 2014 followed by an increase of APC=7.2% (95% CI 3.1, 11.4). YPLL rates were from 304.7 and 338.2 in 1999 and 2016 with a steady APC increase in %YPLL of 0.65% (95% CI 0.43, 0.87) from 1999 to an inflection point in 2014, followed by a larger APC in %YPLL of 5.1% (95% CI 0.1, 10.4). The upward trend in firearm mortality and YPLL rates starting in 2014 was observed in subgroups of male, non-Hispanic blacks, Hispanic whites and for firearm assaults. The inflection points for firearm mortality and YPLL rates also varied across states.

**Conclusions** Within the United States, firearm mortality rates and YPLL remained constant between 1999 and 2014 and have been increasing subsequently. There was, however, an increase in firearm mortality rates in several subgroups and individual states earlier than 2014.

**Significance** Future interventions, programs, and policies should be created to address this shifting burden locally and should bear in mind the populations that are most affected.

## School violence

### 38 SCHOOL SHOOTINGS, NEIGHBORHOOD CHARACTERISTICS, AND GOOGLE TRENDS

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**Statement of Purpose** The neighborhood socio-economic factors associated with school-shootings and the differences in the public interest are unknown. We characterized the relationship between median home price, poverty rate, black population, homicide rate and population size with the incidence of school shootings at the zip code level, and additionally intent of the shooter and number of victim fatalities with google trends of school shootings.

**Methods** We performed a cross-sectional study between 01/01/2013–12/31/2018 using school-shooting data from Everytown database (K-12 and colleges/Universities) and K12 (only K-12). Median house price, poverty rate, black population, and population size was obtained from American Community Survey, homicide rate from Center for Disease Control and Prevention, and intent of shooting and number of fatal victims were from the school shooting databases. Google trends for each day for ‘school’ and ‘shooting’ was obtained for six years and standardized using year weights created as total proportion of total hits in months per total hits during six years.

**Results** There were 405 and 295 school shooting incidents in Everytown and K12 datasets respectively. From 2013 to 2018,