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,

school shooting incidences per 10 million population increased from 1.45 to 3.12 in Everytown data and from 1.04 to 2.96 in K12 data. The zip code areas with higher poverty rate (Incidence ratio, IRR=1.37 [95% CI, 1.09–1.73], larger black population [IRR=1.24, 95% CI 1.13–1.37], higher homicide rate [IRR=1.08, 95% CI 1.04–1.12] and larger population size [IRR=2.34, 95% CI 2.00–2.75] had an increased incidence of school shooting. Increasing public interest or Google trends for school-shooting was independently associated only with the death of victims.

Conclusion/Significance Although school shootings are more likely in large neighborhoods with high homicide and a larger proportion of the black population, public interest in school shootings depended only on whether the death occurred during school-shooting.

Social determinants of health and injury

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A COMPARATIVE CASE STUDY OF CHANGES IN CRIME SURROUNDING A HOME RENOVATION/REBUILD PROGRAM OF THE NATIONWIDE CHILDREN'S HOSPITAL IN COLUMBUS, OH

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Neighborhood environments are a known social determinant of health. Vacant and abandoned buildings and lots, poor or hazardous housing conditions, combined with crime and violence can affect residents' health and well-being. Nationwide Children's Hospital launched its Healthy Neighborhoods Healthy Families initiative in 2008 which sought to improve residents' health by rejuvenating vacant and abandoned properties and increasing homeownership in the South Side neighborhood of Columbus, Ohio. Between 2008 and 2019 the program funded 309 repairs or renovations in this neighborhood. We conducted a ZIP code-level comparative case study of HNHF program housing interventions using a synthetic control methodology to evaluate changes in crime in the program area compared to those in a synthetic control area. We found evidence of relative reduction in total crimes in the HNHF program area, relative to its synthetic control, after the intervention. This decrease can largely be accounted for by a decline in thefts. Some evidence of additional decline in drug possession is seen. This program to repair, rebuild, and increase ownership of housing has shown social benefit for neighbors of the Nationwide Children's Hospital.

Domestic and sexual violence

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THE IMPACT OF INTIMATE PARTNER VIOLENCE ON BREAST AND CERVICAL CANCER TREATMENT AMONG PATIENTS IN AN INTEGRATED, SAFETY-NET SETTING

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Statement of Purpose Examine the impact of intimate partner violence (IPV) on receipt of cancer treatment and surveillance.

Methods Longitudinal data were collected for breast and cervical cancer survivors from 2009–2017 at Parkland Health and Hospital System. Data were extracted and merged from two sources. First, electronic health records were used to assess survivors' cancer treatment modalities (i.e. surgery, chemotherapy, radiation, hormone replacement therapy) and concordance with National Comprehensive Cancer Network (NCCN) surveillance guidelines. Second, survivors were invited to participate in a phone survey that included 9-item validated screened for IPV. Regression models were used to evaluate the impact of IPV history on cancer treatment and NCCN guidelines.

Results/Findings 54% of survivors were a victim of IPV in their lifetime and 10% of victims experienced victimization during active cancer treatment. IPV victims were more likely to get a single agent chemotherapy compared to non-victims ($x^2=6.68$, $p\text{-value}<0.02$) and less likely get hormone replacement therapy ($x^2=12.55$; $p\text{-value}<0.001$). There was no significant relationship between IPV history and concordance with NCCN guidelines. After adjusting for key confounders, the odds of hormone replacement therapy was 0.34 times less likely among patients with a history of IPV compared to patients without a history of victimization (OR=0.34; 95% CI: 0.19, 0.60).

Conclusion Largely, cancer treatment and surveillance do not differ for women with a history of IPV. This suggests that, for this limited time of active treatment, access to the healthcare system is not restricted by abusive partners. Healthcare systems can leverage this valuable window to help the victim access social services.

Significance IPV screening is recommended as standard practice in healthcare because it improves patient health and safety. New evidence suggests screening is especially important in oncology clinics, where victims are more likely to be diagnosed with cancer and less likely to survive from cancer.

Firearm violence

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INTERSTATE FIREARM TRANSFERS AND STATE FIREARM LAWS: A STUDY OF GEOGRAPHIC NETWORKS

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Statement of Purpose Firearms ended the lives of almost 40,000 people in the United States in 2017, including over 14,000 by homicide. Stronger state firearm laws are associated with fewer firearm homicides and are an essential element of a comprehensive approach to preventing firearm homicide. However, flow of firearm across state lines can undermine prevention efforts in states with strong firearm laws. The purpose of this study was to assess the flow of firearms across US states relative to state firearm laws.

Methods The Bureau of Alcohol, Tobacco, Firearms and Explosives provided data for all firearms that were used in crimes for 2015–2017 and could be traced to a retail purchase location. We created a 48x48 matrix of the contiguous US states for counts of firearm transfers for origin states (where firearms were first purchased) and destination states (where crimes were committed). We linked these data to 2015 firearm laws for origin and destination states, and assessed