Current Epidemiological Trends in Firearm Mortality in the United States

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More than 652 000 people in the US died from firearm injuries between 1999 and 2018.[1] Given that firearms are embedded within US culture (in 2018, 21.9% of individuals owned a firearm and 35.2% lived in households with firearms[2]) evidence-based public health measures and policies that enhance firearm safety are needed. Firearm injuries are multifaceted; for example, there are nearly twice as many nonfatal firearm injuries as deaths, and assaults comprise a majority of nonfatal injuries while suicides comprise a majority of deaths.[3] In this Viewpoint, we narrowed the scope to firearm mortality trends from 1999 to 2018 and current regional/demographic trends available from US Centers for Disease Control and Prevention WISQARS/WONDER.[1,4]

National Temporal Trends

Total mortality fluctuated around 10.3 firearm-related deaths per 100 000 person-years from 1999 to 2014 before increasing to 11.3 per 100 000 person-years in 2015 and thereafter shifting to approximately 11.8 per 100 000 person-years from 2016 to 2018 (Figure). Age-adjusted firearm suicide rates decreased from 2002 to 2006 (7.1%; 5.92 vs 5.54) and increased nearly every year from 2007 to 2018, mirroring trends in nonfirearm suicides. Age-adjusted firearm homicide rates, while consistently higher than nonfirearm homicide rates, fluctuated more from 1999 to 2018. From 1999 to 2014, firearm homicide rates varied around 4.0 firearm-related deaths per 100 000 person-years and were highest from 2005 to 2007 (approximately 4.3 per 100 000 person-years) and lowest from 2009 to 2014 (approximately 3.8 per 100 000 person-years); in 2015, rates rebounded to 4.3 firearm-related deaths per 100 000 person-years, leading to a higher plateau (approximately 4.7 per 100 000 person-years in 2016–2018). Unintentional firearm death rates decreased from 1999 to 2018, reaching rates of 0.15 or fewer firearm-related deaths per 100 000 person-years in recent years (2014–2018), continuing longer-term trends in decreasing unintentional firearm deaths.[5] Suicides comprised a consistent majority of firearm deaths during this period, ranging from 54.6% (2006) to 63.7% (2014) of firearm deaths.

Current Urbanicity Trends

As previously reported, there is considerable state-to-state heterogeneity in firearm mortality trends[6]; we distill that information here by focusing on trends by urbanicity. Age-adjusted firearm mortality rates are highest in more rural counties in 2018 (Figure). Age-adjusted firearm suicide rates increase with increasing county rurality, with rates per 100 000 person-years in the most rural counties more than 2 times those of urban counties (10.9 vs 4.8). Age-adjusted firearm homicides show less gradient across urbanicity categories, with rates 12.8% lower (4.1 vs 4.7) in the most rural counties compared with all others. Other firearm mortality dynamics vary by urbanicity. For example, childhood (age <18 years) firearm mortality rates increased 24.3% (2.35 vs 2.92) in the most rural counties from 2016 to 2018 but were unchanged (2.44 vs 2.41) in urban counties; those changes were largely attributable to changes in firearm suicides.

Current Demographic Trends

A large fraction of the firearm mortality burden falls on younger people, with 42.1% of all firearm decedents 35 years or younger in 2018. Among high school–aged youth (age 14–18 years), firearms are the leading cause of death (when examined by mechanism), with 10.19 deaths per 100 000 person-years, a rate more than 25% higher than traffic-related motor vehicle deaths, the next leading cause of death in this age group. Overall, firearm mortality rates peak in late adolescence/early adulthood, but rates remain high among middle-aged adults and older adults (Figure). Homicide and suicide are both large contributors of firearm death among younger people, but suicides comprise a large majority among older adults (Figure). For example, among those aged 15 to 24 years, 56.6% of firearm deaths were homicides, while among those older than 65 years, 91.2% were suicides.

Firearm mortality rates were more than 6 times higher among men in 2018, and more than 85% of all firearm decedents were men. This relative difference is robust across mechanisms, age groups, and regions. Specifically, 83.8% and 86.4% of firearm homicide and suicide decedents, respectively, were men. Similarly, 87.0% and 88.9% of firearm deaths in age groups 15 to 34 years and older than 65 years, respectively, were among men. Finally, the fraction of firearm deaths that were among men was 87.1% and 84.5% in the most urban and most rural counties, respectively. Thus, men are at much higher risk of firearm mortality across a broad set of circumstances. Despite these disparities across sex, it should be noted that intimate partner homicide disproportionately affects US female individuals, and perpetrator access to a firearm increases the risk of intimate partner homicide by 5 times.[7]

Implications

Descriptive epidemiology provides prerequisite knowledge for prevention by detailing the mechanisms, subpopulations, and regions most affected by a given cause. The information summarized here demonstrates that firearm mortality is heterogeneous, highlighting that prevention strategies, and their scope, should reflect the subpopulations and/or mechanisms being addressed.

Given the lethality of suicide attempts, which have a case fatality rate of nearly 90%,[8] lethal means intervention strategies must be prioritized, especially for rural US regions. In comparison, firearm homicides occur at more similar per-capita rates in rural counties and in nonrural counties; there are promising strategies for interpersonal violence prevention,[9] and coupling those with available tools for risk stratification[10] is critical and not only in urban areas. Successful public health approaches have been applied to reverse worsening mortality trajectories for other mechanisms of injury, such as motor vehicle crash. If a similar road map is followed with regard to firearm mortality, it may be possible to reverse the current trend and reset to a new, lower, endemic firearm mortality rate.

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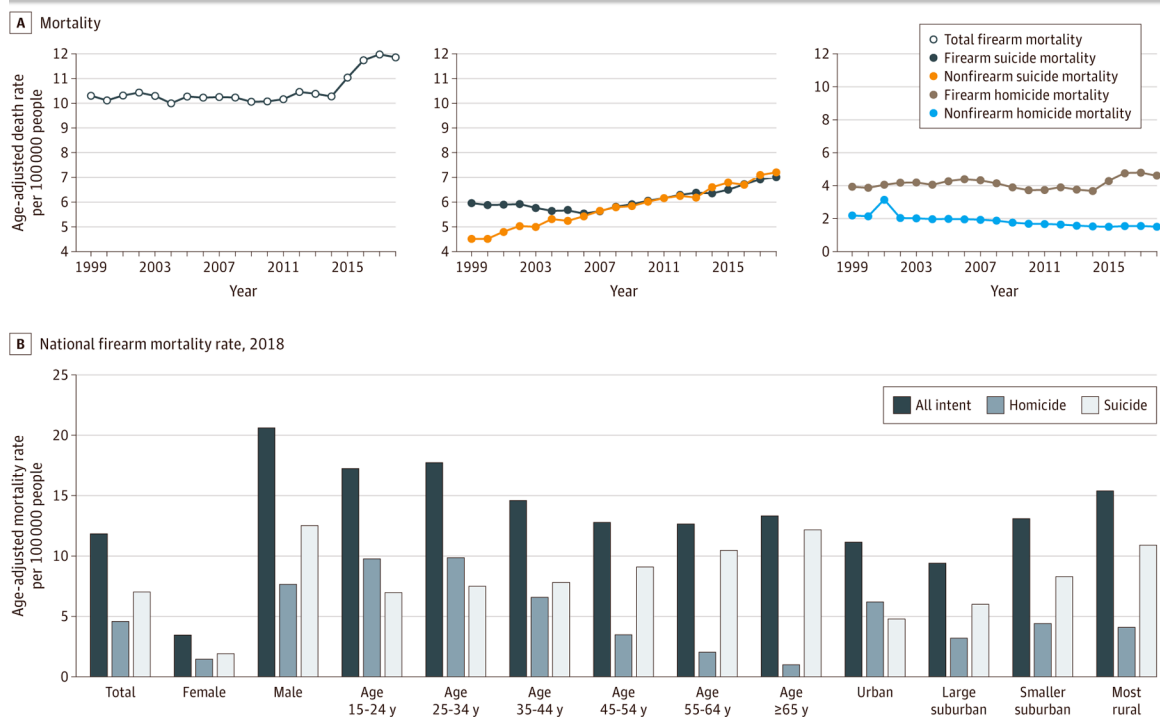
Figure.

Trends in Firearm Mortality, Suicide, and Homicide and Demographic Breakdown of Firearm Mortality in 2018

All rates, with the exception of age-specific rates, are age-standardized with regard to the 2000 Census. Total firearm mortality includes all intents or manners of firearm death: homicide, including legal intervention homicide (*International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* [*ICD-10*]: X93-X95, Y35.0, U01.4), suicide (I*CD-10*: X72-X74), unintentional (*ICD-10*: Y22-Y24), and undetermined intent (*ICD-10*: W32-W34). The urbanicity categorization is based on a condensed version of the 2013 National Center for Health Statistics (NCHS) county urban-rural categorization (https://www.cdc.gov/nchs/data/series/sr_02/sr02_166.pdf). We used the same 4-group categorization used in prior data briefs (https://www.cdc.gov/nchs/products/databriefs/db151.htm) and adopted the labels urban (NCHS: large central metro), large suburban (NCHS: large fringe metro; described as a large suburban area in data briefs), smaller suburban (NCHS: medium metro and small metro), and most rural (NCHS: micropolitan and noncore).