JAMA | Original Investigation

Global Mortality From Firearms, 1990-2016

The Global Burden of Disease 2016 Injury Collaborators

IMPORTANCE Understanding global variation in firearm mortality rates could guide prevention policies and interventions.

OBJECTIVE To estimate mortality due to firearm injury deaths from 1990 to 2016 in 195 countries and territories.

DESIGN, SETTING, AND PARTICIPANTS This study used deidentified aggregated data including 13 812 location-years of vital registration data to generate estimates of levels and rates of death by age-sex-year-location. The proportion of suicides in which a firearm was the lethal means was combined with an estimate of per capita gun ownership in a revised proxy measure used to evaluate the relationship between availability or access to firearms and firearm injury deaths.

EXPOSURES Firearm ownership and access.

MAIN OUTCOMES AND MEASURES Cause-specific deaths by age, sex, location, and year.

RESULTS Worldwide, it was estimated that 251 000 (95% uncertainty interval [UI], 195 000-276 000) people died from firearm injuries in 2016, with 6 countries (Brazil, United States, Mexico, Colombia, Venezuela, and Guatemala) accounting for 50.5% (95% UI, 42.2%-54.8%) of those deaths. In 1990, there were an estimated 209 000 (95% UI, 172 000 to 235 000) deaths from firearm injuries. Globally, the majority of firearm injury deaths in 2016 were homicides (64.0% [95% UI, 54.2%-68.0%]; absolute value, 161 000 deaths [95% UI, 107 000-182 000]); additionally, 27% were firearm suicide deaths (67 500 [95% UI, 55 400-84 100]) and 9% were unintentional firearm deaths (23 000 [95% UI, 18 200-24 800]). From 1990 to 2016, there was no significant decrease in the estimated global age-standardized firearm homicide rate (−0.2% [95% UI, −0.8% to 0.2%]). Firearm suicide rates decreased globally at an annualized rate of 1.6% (95% UI, 1.1-2.0), but in 124 of 195 countries and territories included in this study, these levels were either constant or significant increases were estimated. There was an annualized decrease of 0.9% (95% UI, 0.5%-1.3%) in the global rate of age-standardized firearm deaths from 1990 to 2016. Aggregate firearm injury deaths in 2016 were highest among persons aged 20 to 24 years (for men, an estimated 34 700 deaths [95% UI, 24 900-39 700] and for women, an estimated 3580 deaths [95% UI, 2810-4210]). Estimates of the number of firearms by country were associated with higher rates of firearm suicide ($P < .001$; $R^2 = 0.21$) and homicide ($P < .001$; $R^2 = 0.35$).

CONCLUSIONS AND RELEVANCE This study estimated between 195 000 and 276 000 firearm injury deaths globally in 2016, the majority of which were firearm homicides. Despite an overall decrease in rates of firearm injury death since 1990, there was variation among countries and across demographic subgroups.

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Video and Supplemental content

Group Information: The Global Burden of Disease 2016 Injury Collaborators are listed at the end of this article.

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The Geneva Declaration on Armed Violence and Development (2006) estimated that 90% of violent deaths occurred outside of conflict situations.[1] Worldwide, firearms are frequently the lethal means in cases of homicide, suicide, and unintentional injuries, indicating an important public health problem with social and economic costs that extend beyond the immediate loss of life. Rates of firearm-related death vary between locations, and the causal elements in these global disparities are related to complex issues that differ by region and country. These variables include the illegal drug trade,[2] substance abuse (including alcohol),[3] inadequate support for mental health,[4] the social and intergenerational transmission of firearm violence (indicates parents, family members, intimate partners, friends, and peers),[5] and socioeconomic inequities[6]—all of which complicate efforts to generalize across settings. Access to firearms (the availability of firearms to individuals) and level of firearm ownership have been associated with firearm deaths at the population, household, and individual levels, and are associated with the strength and enforcement of laws and regulations controlling firearms.[7]

Comparative studies of the magnitude of firearm violence are rare but present an important opportunity to examine national, regional, and local patterns that may inform public health strategies. Although national and regional assessments of firearm deaths are available, to our knowledge, no other assessment that evaluates firearm deaths among the 195 countries and territories included in this study has occurred. The primary objective of this study was to undertake a comprehensive assessment of patterns of firearm-related mortality by cause, age, sex, and location using the consistent methods and updated database of the Global Burden of Diseases, Injuries, and Risk Factors Study 2016 (GBD 2016) and to relate these patterns to what is known about national levels of firearms availability.

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Summary Video Global Firearm Mortality, 1990-2016

Methods

The 2016 update of the GBD study incorporated additional data sources and refinements to modeling strategies that are substantially improved over previous iterations.[8] *International Classification of Diseases, Tenth Revision* (*ICD-10*) codes providing definitions for causes of death included in this analysis are described in eTable 1 in the Supplement. From the complete cause list developed for GBD 2016, this study presents detailed estimation for levels and rates of death for unintentional firearm deaths, self-harm (suicide) by firearm, and interpersonal violence (homicide) by firearm and summed these to estimate aggregate deaths from these causes. Deaths from conflict and terrorism (conflict hereafter) and deaths attributed to executions and police conflict included deaths from nonfirearm causes and were estimated separately (refer to eTable 1 in the Supplement for *ICD-10* definitions of these categories). The level and trend in conflict deaths was provided for comparison and context to firearm homicides, firearm suicides, and unintentional firearm deaths.

The GBD study used deidentified aggregated data, and the waiver of informed consent was reviewed and approved by the University of Washington Institutional Review Board (application number 46665). The cause-of-death database compiled for GBD 2016 contained 13 812 location-years of vital registration data on firearm-related homicide, firearm-related suicide, and firearm-related unintentional injury deaths. The database also included census and survey data, police records for some injuries, and verbal autopsy (an interview with persons familiar with the deceased individual in which health information and a description of events prior to death is obtained to help assign a probable cause of death).[9] The GBD 2016 cause-of-death analysis was undertaken across all countries and causes for the complete time series of data available (1980-2016). However, because data were sparse in the GBD database for developing countries prior to 1990, with lower estimated completeness than for later time periods, the cause-specific results in this study were restricted to the time period of 1990-2016. Specific data sources used in the estimation of firearm-related deaths are identifiable through the GBD data tool.[10]

The GBD study methodology incorporated data of varying completeness and quality using consistent methods for data standardization and adjustments for incomplete data (eAppendix Section 2.2 and eTable 2 in the Supplement with additional details published elsewhere).[8] Sources characterized as less than 50% complete in any given location were excluded to minimize the potential for selection bias in incomplete vital registration data. Sources were characterized as nonrepresentative if completeness was estimated to be between 50% and 70%, or they were excluded from

Key Points

Question What is the burden of firearm mortality at the global, regional, and national level between 1990 and 2016 by sex and age?

Findings Using a combination of deidentified aggregated data from vital registration, verbal autopsy, census and survey data, and police records in models for 195 countries and territories, this study estimated 251 000 (95% uncertainty interval [UI], 195 000-276 000) people died globally from firearm injuries in 2016, compared with 209 000 (95% UI, 172 000-235 000) deaths in 1990. There was an annualized decrease of 0.9% (95% UI, 0.5%-1.3%) in the global rate of age-standardized firearm deaths from 1990 to 2016.

Meaning This study provides an estimate of the global burden of firearms deaths in 2016, change in this burden from 1990, and variation in levels and rates among countries.

the estimation process when greater than 50% of insufficiently specific or implausible cause-of-death codes were found to be at level 1 or level 2 of the GBD cause hierarchy (eAppendix section 1.1 in the Supplement). These completeness estimates were used to inform variance in statistical models, with lower completeness resulting in higher variance. A standardized modeling framework was used for all countries and territories and described in Section 2.3 in the Supplement. For countries with high-quality data, estimates were derived directly from those data. With decreasing data available to the model, for reasons of availability, completeness, or exclusion due to insufficiently specific or implausible cause-of-death codes, model predictions were increasingly derived from covariate data. The list of covariates used for each firearm cause are listed in eTable 3 in the Supplement.

The quality of the vital registration and verbal autopsy database, established for GBD 2016, was assessed based on representativeness of deaths from all causes, including those that were not firearm related. This was quantified using the percent well certified, which is defined as the percentage of total deaths in a country-year for which a detailed cause was known. For vital registration, percent well certified was measured by multiplying the completeness of each country-year of data by the proportion of registered deaths for which a detailed cause was known. A reported cause was considered as being detailed if it contained enough information to be mapped to a GBD level 3 cause of death (eg, *ICD-10* code I64, *stroke, not specified as hemorrhage or infarction*, was considered to be a detailed cause of death [ie, it can be mapped to the GBD level 3 cause—*stroke*]; whereas, *ICD-10* code X59, *accidental exposure to other and unspecified factors*, was not considered to be a detailed cause [because it can only be mapped to the GBD level 1 cause—*injuries*]). Completeness was measured by dividing the total number of registered deaths by the all-cause mortality estimates from GBD 2016 for that country-year.

To summarize country performance on this metric, a star rating system was created for GBD 2016 that assigned stars in proportion to the percentage of well-certified deaths across the time series. This system is an overall metric that is based on the completeness of death registration and the fraction of deaths assigned to specified codes, but it does not consider misspecification of deaths. These ratings provide context for assessing overall reliability of estimates for a location and were not used to directly adjust estimates. For each interval, 3 measures were multiplied: (1) completeness of cause-of-death registration; (2) the fraction of deaths that were not assigned to insufficiently specific or implausible cause-of-death codes; and (3) the fraction of deaths that were assigned to detailed GBD causes. Use of these measures produced a percent well certified by location and interval assigned by bins meant to capture a range from highest to lowest: 5 stars (percent well certified ≥85%); 4 stars (65%-<85%); 3 stars (35%-<65%); 2 stars (10%-<35%); 1 star (>0%-<10%); and 0 stars (0% well certified). More information on the calculation of this star rating system for data quality is included in the eAppendix (causes of death data star rating calculation; section 2.2.5 in the Supplement).

The percent well certified incorporates 2 possible sources of bias in GBD study estimates. The first is the completeness of vital registration. Incomplete vital registration data are unlikely to accurately reflect the population of the country it covers and may be overselective across important demographic variables. For example, one study of death registration in rural South Africa found a significant effect of both income and age on the completeness of death registration.[11] The second source of bias incorporated in percent well certified was the quantity of insufficiently specific or implausible cause-of-death codes, data in which the cause of death was not directly assignable to a cause analyzed in the GBD study. A greater proportion of insufficiently specific or implausible cause-of-death codes required greater redistribution of these codes to GBD causes, which made the results for those locations more sensitive to the redistribution algorithms. Separate cause-of-death ensemble models, an estimation approach in which a large number of model specifications are systematically tested and models performing best on out-of-sample predictive validity tests are incorporated into a weighted ensemble model, were developed for each of the 3 causes of death by firearm included in GBD 2016. Covariates for these models (eTable 3 in the Supplement) and additional details of model testing and construction are provided in eAppendix section 2.3 in the Supplement. Uncertainty bounds were estimated using 1000 draws from the posterior distribution of cause-specific mortality for each age-sex-year-location and are represented as 95% uncertainty intervals (UIs). These values were considered statistically significant if the UI did not include zero. In general, in countries and territories with high-quality data (ie, vital registration data that were extensive and complete), uncertainty was largely driven by sample sizes; whereas in locations with lower-quality data, the sparsity of data, strength of the covariates used in modeling, or the extent of insufficiently specific or implausible cause-of-death codes contributed to greater estimated uncertainty. Analyses were completed using Python version 2.7.3 and R version 3.2.2. The development and documentation of the GBD 2016 study follows the GATHER statement (Guidelines for Accurate and Transparent Health Estimates Reporting).[12]

Determining whether rates of firearm injury death are increasing or decreasing for a given location is complicated by the potential for nonlinearity in time trends, particularly as longer time periods are evaluated. To address this challenge, the figures include sparklines (small, graphic representations of trends without coordinates or axes) and summary statistics describing the linear fit to the data for each country and firearm subcause. Estimates of rates of change over the entire data series associated with poor linear fits and visual evidence of nonlinearity in data should be evaluated cautiously.

Although public attention is frequently focused on firearm homicide, firearm suicides represent the greater fraction of firearm mortality in some locations. These differences in the relative proportion of firearm homicide and firearm suicide may be useful in directing intervention policies or programs. To identify countries with similar profiles of firearm injury deaths, the global median age-standardized mortality rate of firearm homicide and firearm suicide estimated by this study in 2016 was used to establish quadrants defined by the relationship between these 2 rates.

Access to firearms is a necessary precondition for firearm injury to occur; however, the strength of the relationship between access to firearms and variation in levels of firearm violence has not been previously evaluated at the level used in this study. Assessing the relationship between firearm deaths and availability of firearms is challenging, in part because data on the total number and distribution of legal and illegal firearms within civilian populations are limited. Two measures have been extensively used to analyze the relationship between firearm access level of firearm violence. Each measure has distinct advantages and disadvantages.

The first measure uses estimates from the Small Arms Survey, which was last updated in 2007.[13] Although estimates from the Small Arms Survey provide the most comprehensive set of firearm registry data (75 countries; eTable 4 in the Supplement), estimates for other locations rely on interpolation from global regressions or independent expert estimation (eAppendix section 3.2 in the Supplement).[13]

The second approach uses a proxy measure based on the proportion of suicide for which a firearm was the lethal means (the proportion of firearm suicides from total suicides) (estimating firearm access or ownership; eAppendix section 3.3 in the Supplement).[14] Although the proportion of suicides due to firearms includes the most recent data available for each location, it does not account for cultural variability in factors connecting firearm access to use as a means of suicide, and it has been validated mostly for Western societies.

To capture the advantages of each measure while addressing some of their separate limitations, a new proxy measure was created by transforming each of the prior options on a scale from 0 to 100 and then averaging both measures (eAppendix Section 3.4 in the Supplement). The maximum value of this combined metric was a mean score of 100 for the United States, while the minimum value was calculated for Japan with a score of 0.3 (eTable 5 in the Supplement). This combined metric was used as a proxy for per capita access to firearms to evaluate the relationship between availability of firearms and deaths from firearm homicide (eTable 6A in the Supplement). To avoid the circularity inherent in using a proxy measure that contains total firearm suicides to evaluate the relationship to total firearm suicide, only the Small Arms Survey data were used to assess the relationship between firearm access and firearm suicide levels (eTable 6B in the Supplement).

Additionally, GBD 2016 developed and refined a sociodemographic index (SDI) as a means for comparing health progress between countries. The SDI score is a composite of the geometric mean of 3 components (lag-dependent income per capita, total fertility rate for the population, and the mean educational attainment in the population older than 15 years of age) and is subsequently rescaled between 0 and 1 (eAppendix section 3.5.1 in the Supplement). An SDI value was calculated for each country-year. For the year 2016, the highest SDI value was estimated for Luxembourg (0.93) and the lowest value was estimated for South Sudan (0.19).[8] This study uses SDI values for the year 2016 to evaluate the contribution of the combined role of income, mean fertility, and education to differences in firearm violence between countries.

Results

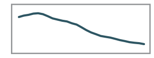
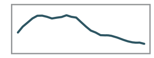
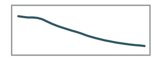
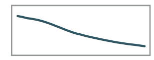
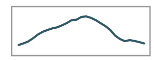
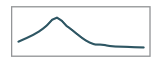
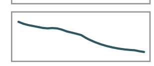
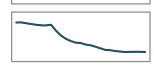
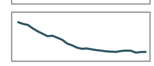
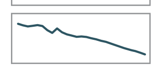
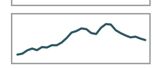
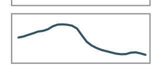
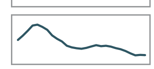
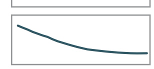
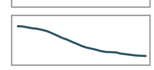
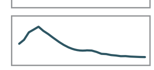
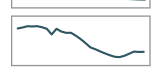
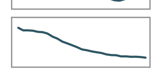
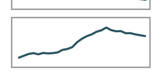
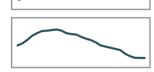
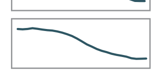
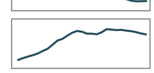
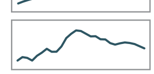
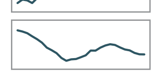
Data Completeness

This study incorporated 2861 sources of data on firearm mortality between 1980 and 2016, with a median of 9 data sources per country. Including sources of data on overall levels of homicide, suicide, or unintentional injuries, all but 20 countries were represented by at least 1 data source between 1980 and 2016, in part because 116 countries had police data on overall levels of homicide. Overall, 21.7% of the data sources on firearm mortality were from 1980-1989, 26.5% were from 1990-1999, 34.5% were from 2000-2009, and 17.3% were from 2010-2016. When considering the quality of the database for all causes of death, a total of 25 countries (12.8%) were given 5-star rating (based on the percent of data well certified; see Methods), 48 (24.6%) were given a 4-star rating, 30 (15.4%) were given a 3-star rating, 21 (10.7%) were given a 2-star rating, 44 (22.5%) were given a 1-star rating, and 27 countries (13.8%) were given a rating of 0 stars (**Figure 1**, **Figure 2**, **Figure 3**, **Figure 4**, **Figure 5**, **Figure 6**, **Figure 7**, and **Figure 8**).

Levels and Trends in Aggregate Firearm Injury Deaths

In 2016, there were an estimated 251 000 (95% UI, 195 000-276 000) firearm injury deaths worldwide; a global age-standardized rate of 3.4 deaths (95% UI, 2.6-3.7) per 100 000 persons (Figure 1). In 1990, there were an estimated 209 000 (95% UI, 172 000 to 235 000) firearm injury deaths. Globally, the number of firearm injury deaths were greater than those from conflict in almost every year between 1990 and 2016 (eFigure 1B in the Supplement), with the maximum difference occurring in 2001 when firearm injury deaths were estimated at 243 000 (95% UI, 188 000-263 000) and conflict deaths were estimated at 38 000 (95% UI, 27 300-49 500). The exception occurred in 1994 when deaths from the genocide in Rwanda contributed to a global conflict death total (551 000 deaths [95% UI, 222 000-874 000]) that exceeded those from firearm injuries (232 000 deaths [95% UI, 186 000-259 000]). Among the countries reporting the most firearm injury deaths in 2016, 50.5% [95% UI, 42.2%-54.8%] of deaths occurred in countries that in combination held less than 10% of the global population[15] in that year (data are reported alphabetically by country or territory; Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8): Brazil (43 200 deaths [95% UI, 24 800-50 400]), the United States (37 200 deaths [95% UI, 29 000-41 200]), Mexico (15 400 deaths [95% UI, 8680-18 900]), Colombia (13 300 deaths [95% UI, 9420-16 300]), Venezuela (12 800 deaths [95% UI, 7220-18 300]), and Guatemala (5090 deaths [95% UI, 2650-7250]). A plurality of these deaths occurred in

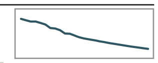
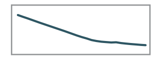
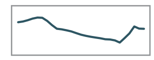
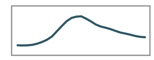
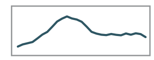
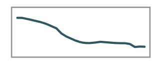
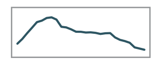
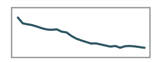
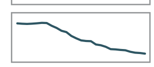
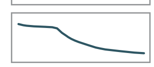
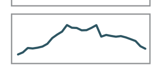
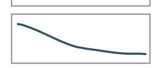
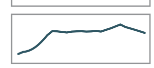
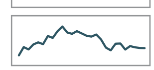
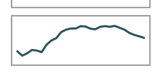
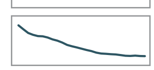
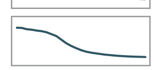
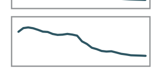
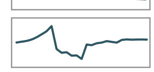
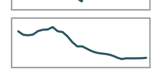
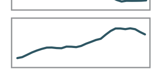
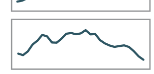
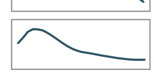
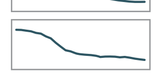
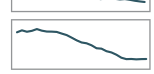
Figure 1. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 20 Countries and Territories (Afghanistan to Bermuda) and by Firearm Subcause for Global Data

Location	No. of Deaths (95% Uncertainty Interval)		Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval)		% Change (95% Uncertainty Interval), 1990-2016	2-Sided *P* Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
	1990	2016	1990	2016				
Global (G)								
Firearm death	209 000 (172 000 to 235 000)	251 000 (195 000 to 276 000)	4.2 (3.5 to 4.7)	3.4 (2.6 to 3.7)	-0.9 (-1.3 to -0.5)	<.001	★★★☆☆	
Homicide by firearm	117 000 (82 000 to 143 000)	161 000 (107 000 to 182 000)	2.2 (1.6 to 2.8)	2.1 (1.4 to 2.4)	-0.2 (-0.8 to 0.2)	<.001		
Suicide by firearm	63 700 (52 900 to 81 600)	67 500 (55 400 to 84 100)	1.4 (1.2 to 1.8)	0.9 (0.8 to 1.1)	-1.6 (-2.0 to -1.1)	<.001		
Unintentional firearm death	28 000 (22 000 to 30 500)	22 900 (18 200 to 24 800)	0.6 (0.4 to 0.6)	0.3 (0.3 to 0.3)	-2.3 (-2.6 to -1.9)	<.001		
Afghanistan (AFG)	1370 (819 to 2330)	4050 (2410 to 6640)	14.0 (8.7 to 23.4)	14.2 (8.9 to 22.6)	0.1 (-1.0 to 1.4)	.76	★☆☆☆☆	
Albania (ALB)	158 (115 to 197)	100 (80.2 to 129)	4.9 (3.6 to 6.0)	3.2 (2.6 to 4.2)	-1.6 (-2.6 to -0.4)	<.001	★★★☆☆	
Algeria (DZA)	328 (209 to 476)	382 (269 to 545)	1.5 (0.9 to 2.1)	1.0 (0.7 to 1.4)	-1.7 (-2.9 to -0.6)	<.001	★☆☆☆☆	
American Samoa (ASM)	1.67 (1.06 to 2.07)	1.31 (0.93 to 2.15)	4.2 (2.7 to 5.1)	1.9 (1.4 to 3.1)	-3.1 (-4.6 to -1.0)	<.001	★★★☆☆	
Andorra (AND)	0.619 (0.231 to 1.62)	0.753 (0.263 to 2.14)	1.1 (0.4 to 2.9)	0.8 (0.3 to 2.2)	-1.6 (-3.3 to 0.3)	<.001	☆☆☆☆☆	
Angola (AGO)	354 (223 to 542)	473 (292 to 779)	4.3 (2.8 to 6.5)	2.5 (1.6 to 3.9)	-2.1 (-3.9 to -0.2)	<.001	★☆☆☆☆	
Antigua and Barbuda (ATG)	2.62 (2.09 to 3.86)	5.2 (3.4 to 6.56)	4.3 (3.5 to 6.2)	5.4 (3.6 to 6.8)	0.9 (-1.1 to 2.3)	<.001	★★★★☆	
Argentina (ARG)	2720 (2240 to 3500)	3120 (2420 to 3910)	8.8 (7.3 to 11.3)	7.0 (5.4 to 8.8)	-0.9 (-1.7 to -0.1)	<.001	★★★★☆	
Armenia (ARM)	97.9 (71.9 to 126)	65.5 (44.2 to 83.2)	2.9 (2.2 to 3.7)	2.0 (1.3 to 2.5)	-1.6 (-2.6 to -0.6)	<.001	★★★★☆	
Australia (AUS)	614 (407 to 702)	274 (222 to 451)	3.4 (2.3 to 3.9)	1.0 (0.8 to 1.6)	-4.9 (-5.7 to -2.3)	<.001	★★★★★	
Austria (AUT)	364 (280 to 460)	253 (160 to 351)	4.1 (3.2 to 5.3)	2.1 (1.4 to 3.0)	-2.7 (-4.1 to -1.6)	<.001	★★★★★	
Azerbaijan (AZE)	305 (181 to 404)	286 (178 to 403)	4.4 (2.8 to 5.7)	2.8 (1.8 to 3.8)	-1.8 (-2.9 to -0.6)	<.001	★★★☆☆	
Bahrain (BHR)	5.7 (4.22 to 8.49)	13.3 (8.37 to 19.5)	1.2 (0.9 to 1.9)	0.9 (0.6 to 1.3)	-1.3 (-3.3 to 0.3)	<.001	★★★☆☆	
Bangladesh (BGD)	1700 (697 to 2880)	1170 (690 to 1900)	1.8 (0.7 to 3.1)	0.7 (0.4 to 1.2)	-3.3 (-4.9 to -1.3)	<.001	★★☆☆☆	
Barbados (BRB)	9.35 (6.32 to 17.6)	12.8 (6.36 to 17.4)	3.3 (2.2 to 6.2)	4.5 (2.3 to 6.2)	1.3 (-1.4 to 3.5)	<.001	★★★★☆	
Belarus (BLR)	254 (185 to 348)	169 (117 to 243)	2.4 (1.8 to 3.3)	1.5 (1.0 to 2.2)	-1.8 (-2.9 to -0.7)	<.001	★★★★☆	
Belgium (BEL)	428 (335 to 545)	250 (170 to 338)	3.8 (3.0 to 4.9)	1.7 (1.2 to 2.4)	-3.1 (-4.4 to -2.0)	<.001	★★★★☆	
Belize (BLZ)	12.4 (9.03 to 21.5)	52.1 (27.4 to 74.8)	7.6 (5.6 to 13.0)	14.2 (7.5 to 19.8)	2.4 (-0.4 to 4.5)	<.001	★★★★☆	
Benin (BEN)	167 (116 to 237)	378 (286 to 473)	4.4 (3.3 to 6.1)	4.6 (3.5 to 5.6)	0.2 (-1.3 to 1.2)	<.01	★☆☆☆☆	
Bermuda (BMU)	1.45 (0.954 to 2.77)	1.16 (0.476 to 1.75)	2.8 (1.8 to 5.3)	1.6 (0.7 to 2.4)	-2.2 (-5.2 to 0.3)	<.01	★★★★★	

The GBD 2016 percentage of well-certified deaths across the time series by location was assigned a 0- to 5-star rating: (5 stars [≥85%], 4 stars [65%-<85%], 3 stars [35%-<65%], 2 stars [10%-<35%], 1 star [>0%-<10%], 0 stars [0%]).

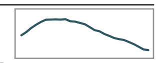
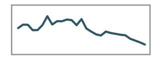
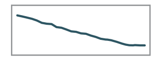
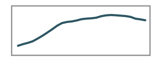
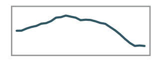
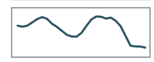
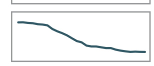
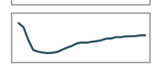
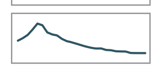
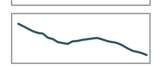
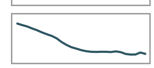
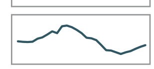
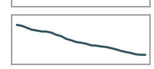
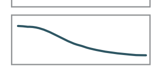
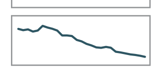
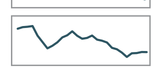
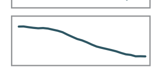
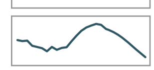
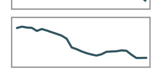
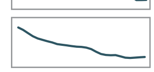
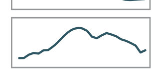
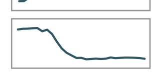
Descriptive statistics report the linear fit of a time trend to the data for each location. See the age-standardized mortality rates for aggregate firearm deaths by subcause, year, and location in eTables 8-11 in the Supplement.[40]

Figure 2. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 25 Countries and Territories (Bhutan to Cyprus)

Location	No. of Deaths (95% Uncertainty Interval)		Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval)		% Change (95% Uncertainty Interval), 1990-2016	2-Sided *P* Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
	1990	2016	1990	2016				
Bhutan (BTN)	7.97 (4.25 to 11.7)	8.09 (4.82 to 13.2)	2.0 (1.2 to 2.9)	1.0 (0.6 to 1.7)	-2.5 (-4.2 to -0.7)	<.001	☆☆☆☆☆	
Bolivia (BOL)	495 (364 to 645)	535 (342 to 728)	8.0 (5.9 to 10.4)	5.0 (3.3 to 6.8)	-1.8 (-3.4 to -0.1)	<.001	★☆☆☆☆	
Bosnia and Herzegovina (BIH)	69.2 (41 to 104)	58.5 (32.9 to 77)	1.5 (0.9 to 2.2)	1.3 (0.7 to 1.8)	-0.3 (-2.9 to 1.6)	<.001	★★☆☆☆	
Botswana (BWA)	28.1 (17.9 to 46.8)	80.6 (33.8 to 131)	3.0 (1.9 to 4.7)	3.8 (1.6 to 6.1)	0.8 (-2.4 to 3.1)	.07	☆☆☆☆☆	
Brazil (BRA)	27 300 (21 000 to 40 000)	43 200 (24 800 to 50 400)	18.4 (14.0 to 27.2)	19.4 (11.2 to 22.6)	0.2 (-1.3 to 1.0)	.59	★★★★☆	
Brunei (BRN)	2.05 (1.52 to 2.7)	2.52 (1.87 to 3.48)	1.1 (0.8 to 1.4)	0.7 (0.5 to 0.9)	-2.0 (-3.1 to -0.8)	<.001	★★★☆☆	
Bulgaria (BGR)	167 (137 to 250)	142 (100 to 198)	1.8 (1.5 to 2.7)	1.7 (1.2 to 2.4)	-0.4 (-1.8 to 0.7)	<.001	★★★★☆	
Burkina Faso (BFA)	170 (110 to 303)	271 (177 to 473)	3.3 (2.1 to 5.6)	2.5 (1.6 to 4.1)	-1.0 (-2.0 to 0.0)	<.001	★☆☆☆☆	
Burundi (BDI)	112 (63.3 to 180)	176 (118 to 325)	3.3 (1.9 to 5.4)	2.4 (1.6 to 4.7)	-1.2 (-2.8 to 0.3)	<.001	★☆☆☆☆	
Cambodia (KHM)	225 (140 to 299)	230 (146 to 399)	3.1 (2.0 to 3.9)	1.5 (1.0 to 2.5)	-2.9 (-4.8 to -0.6)	<.001	★☆☆☆☆	
Cameroon (CMR)	408 (323 to 507)	906 (562 to 1210)	4.7 (3.7 to 5.9)	4.8 (3.1 to 6.3)	0.1 (-1.4 to 1.3)	.13	☆☆☆☆☆	
Canada (CAN)	1380 (942 to 1640)	893 (693 to 1180)	4.7 (3.2 to 5.6)	2.1 (1.6 to 2.8)	-3.1 (-4.0 to -1.8)	<.001	★★★★★	
Cape Verde (CPV)	23.8 (16.8 to 31.5)	55.8 (32.7 to 72.8)	8.5 (6.1 to 11.3)	10.4 (6.2 to 13.5)	0.8 (-1.1 to 2.4)	<.001	★★☆☆☆	
Central African Republic (CAF)	112 (70.3 to 161)	211 (116 to 337)	4.8 (3.1 to 6.8)	4.9 (2.7 to 7.6)	0.0 (-1.2 to 1.3)	.42	☆☆☆☆☆	
Chad (TCD)	217 (156 to 314)	570 (435 to 714)	5.0 (3.6 to 7.0)	5.5 (4.0 to 7.3)	0.4 (-0.9 to 1.4)	<.001	☆☆☆☆☆	
Chile (CHL)	738 (563 to 1040)	495 (325 to 772)	5.9 (4.5 to 8.2)	2.6 (1.7 to 4.0)	-3.2 (-4.8 to -1.8)	<.001	★★★★☆	
China (CHN)	7950 (4710 to 9420)	2910 (2580 to 4080)	0.8 (0.5 to 1.0)	0.2 (0.2 to 0.3)	-5.2 (-6.0 to -3.1)	<.001	★★★☆☆	
Colombia (COL)	19 100 (12 900 to 21 600)	13 300 (9420 to 16 300)	56.7 (38.3 to 65.5)	25.9 (18.4 to 31.9)	-3.0 (-3.6 to -2.3)	<.001	★★★★☆	
Comoros (COM)	8.55 (5.4 to 14)	19.4 (10.1 to 33.5)	3.2 (2.0 to 5.7)	3.3 (1.8 to 6.2)	0.0 (-2.1 to 1.6)	.95	☆☆☆☆☆	
Congo (COG)	71.3 (40.5 to 108)	91.7 (52.4 to 142)	3.9 (2.3 to 5.8)	2.4 (1.5 to 3.7)	-1.8 (-3.5 to 0.2)	<.001	☆☆☆☆☆	
Costa Rica (CRI)	131 (87.9 to 182)	307 (142 to 403)	4.7 (3.2 to 6.5)	5.9 (2.8 to 7.8)	0.8 (-1.0 to 2.2)	<.001	★★★★★	
Cote d'Ivoire (CIV)	419 (276 to 921)	798 (514 to 1680)	5.1 (3.5 to 10.0)	5.0 (3.4 to 9.0)	-0.0 (-1.1 to 0.9)	.3	★☆☆☆☆	
Croatia (HRV)	251 (185 to 305)	135 (97.1 to 192)	5.0 (3.6 to 6.0)	2.6 (1.9 to 3.7)	-2.5 (-3.7 to -1.1)	<.001	★★★★☆	
Cuba (CUB)	279 (215 to 478)	205 (164 to 298)	2.4 (1.9 to 4.0)	1.5 (1.2 to 2.3)	-2.0 (-2.9 to -1.1)	<.001	★★★★★	
Cyprus (CYP)	18.5 (15.4 to 25.6)	18.6 (15.3 to 24.9)	2.8 (2.3 to 3.9)	1.7 (1.4 to 2.4)	-1.8 (-2.6 to -1.1)	<.001	★★☆☆☆	

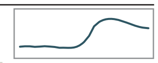
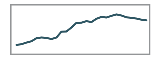
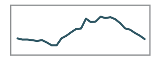
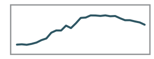
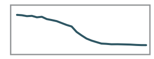
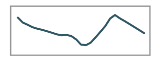
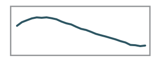
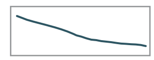
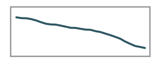
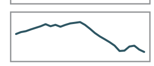
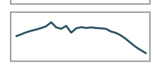
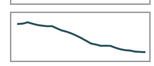
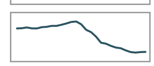
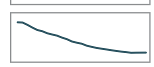
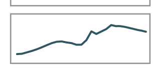
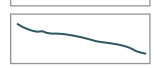
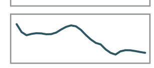
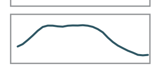
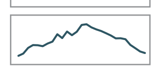
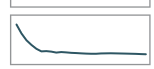
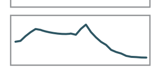
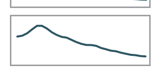
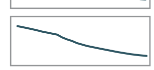
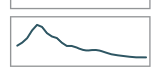
See caption for Figure 1.

Figure 3. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 25 Countries and Territories (Czech Republic to Guam)

Location	No. of Deaths (95% Uncertainty Interval)		Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval)		% Change (95% Uncertainty Interval), 1990-2016	2-Sided *P* Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
	1990	2016	1990	2016				
Czech Republic (CZE)	209 (171 to 346)	209 (130 to 275)	1.9 (1.5 to 3.1)	1.5 (1.0 to 2.0)	-0.8 (-3.3 to 0.4)	<.001	★★★★☆	
Democratic Republic of the Congo (COD)	856 (551 to 1160)	1770 (1140 to 2400)	3.2 (2.1 to 4.2)	2.9 (1.9 to 3.9)	-0.3 (-1.2 to 0.5)	<.001	★☆☆☆☆	
Denmark (DNK)	156 (106 to 200)	84 (58.7 to 131)	2.6 (1.8 to 3.4)	1.2 (0.8 to 1.9)	-3.2 (-4.8 to -1.4)	<.001	★★★★☆	
Djibouti (DJI)	9.88 (5.77 to 15.1)	22.7 (12.4 to 34.3)	2.4 (1.4 to 3.8)	2.9 (1.6 to 4.4)	0.6 (-1.5 to 2.4)	<.001	☆☆☆☆☆	
Dominica (DMA)	1.29 (0.903 to 2.65)	3.19 (1.48 to 4.4)	1.9 (1.4 to 3.8)	4.1 (1.9 to 5.7)	3.0 (-0.2 to 5.1)	<.001	★★★★☆	
Dominican Republic (DOM)	523 (397 to 879)	1110 (711 to 1440)	8.1 (6.3 to 13.1)	10.6 (6.7 to 13.8)	1.1 (-1.8 to 2.6)	<.001	★★★☆☆	
Ecuador (ECU)	1080 (824 to 1720)	1520 (941 to 2010)	11.7 (8.8 to 19.1)	9.2 (5.7 to 12.2)	-0.9 (-2.5 to 0.3)	<.01	★★★★☆	
Egypt (EGY)	346 (201 to 499)	543 (311 to 830)	0.8 (0.4 to 1.1)	0.6 (0.4 to 1.0)	-0.6 (-2.3 to 0.6)	.65	★★★☆☆	
El Salvador (SLV)	2120 (1660 to 2510)	2500 (1750 to 3030)	44.8 (34.8 to 52.9)	39.2 (27.5 to 47.4)	-0.5 (-1.6 to 0.4)	.01	★★★☆☆	
Equatorial Guinea (GNQ)	18 (10.3 to 28.8)	11.6 (5.59 to 22.9)	5.3 (3.1 to 8.3)	1.7 (0.8 to 3.3)	-4.5 (-7.2 to -1.1)	<.001	☆☆☆☆☆	
Eritrea (ERI)	89.6 (63.1 to 122)	170 (101 to 243)	4.6 (3.4 to 6.0)	4.4 (2.8 to 5.9)	-0.2 (-1.8 to 1.3)	.1	☆☆☆☆☆	
Estonia (EST)	78.6 (54.1 to 105)	29.5 (20.1 to 46.5)	4.9 (3.3 to 6.5)	1.9 (1.3 to 3.1)	-3.7 (-5.2 to -1.7)	<.001	★★★★★	
Ethiopia (ETH)	1820 (1090 to 3900)	3270 (2300 to 5050)	5.5 (3.4 to 11.2)	4.3 (3.2 to 6.5)	-0.8 (-3.0 to 1.0)	<.001	★★☆☆☆	
Federated States of Micronesia (FSM)	3.91 (2.15 to 5.6)	3.33 (1.83 to 5.19)	5.2 (2.8 to 7.3)	3.5 (1.9 to 5.5)	-1.6 (-3.1 to -0.1)	<.001	☆☆☆☆☆	
Fiji (FJI)	3.82 (2.62 to 5.72)	5.02 (3.31 to 7.5)	0.6 (0.4 to 0.9)	0.6 (0.4 to 0.9)	-0.1 (-1.9 to 1.5)	<.01	★★☆☆☆	
Finland (FIN)	366 (252 to 475)	186 (134 to 298)	6.8 (4.7 to 8.7)	2.7 (1.9 to 4.3)	-3.5 (-5.1 to -1.9)	<.001	★★★★★	
France (FRA)	3990 (3110 to 4780)	2330 (1710 to 3220)	6.4 (5.1 to 7.8)	2.7 (2.0 to 4.0)	-3.3 (-4.3 to -2.1)	<.001	★★★★☆	
Gabon (GAB)	25.2 (15.5 to 35.1)	34.9 (20.8 to 56)	3.4 (2.1 to 4.6)	2.3 (1.4 to 3.6)	-1.5 (-3.3 to 0.3)	<.001	☆☆☆☆☆	
Georgia (GEO)	219 (151 to 295)	124 (87.7 to 194)	3.9 (2.7 to 5.3)	2.9 (2.0 to 4.5)	-1.2 (-2.6 to 0.2)	<.001	★★★★☆	
Germany (DEU)	1580 (1240 to 2320)	1220 (833 to 1590)	1.7 (1.3 to 2.5)	0.9 (0.7 to 1.3)	-2.2 (-3.5 to -1.1)	<.001	★★★★☆	
Ghana (GHA)	438 (288 to 1010)	835 (575 to 1760)	4.0 (2.8 to 8.3)	3.6 (2.6 to 7.1)	-0.3 (-1.3 to 0.7)	.55	★☆☆☆☆	
Greece (GRC)	174 (141 to 221)	166 (116 to 204)	1.6 (1.3 to 2.1)	1.3 (0.9 to 1.6)	-0.9 (-1.7 to -0.1)	<.001	★★★★☆	
Greenland (GRL)	29.4 (19.1 to 37.5)	12.6 (9.34 to 18)	59.0 (40.4 to 75.4)	25.9 (19.3 to 36.7)	-3.2 (-4.6 to -1.5)	<.001	★★★☆☆	
Grenada (GRD)	1.73 (1.32 to 2.72)	2.96 (2.06 to 4.22)	2.1 (1.6 to 3.2)	2.6 (1.8 to 3.6)	0.8 (-1.0 to 2.3)	.05	★★★★☆	
Guam (GUM)	6.52 (4.13 to 8.15)	5.47 (4.05 to 7.66)	5.1 (3.3 to 6.3)	3.1 (2.3 to 4.4)	-1.8 (-3.2 to -0.2)	<.001	★★★☆☆	

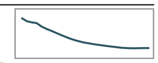
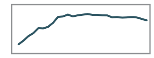
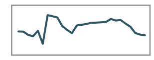
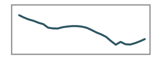
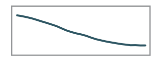
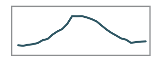
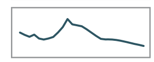
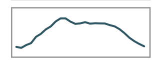
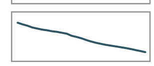
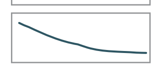
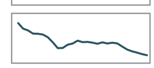
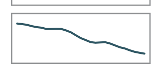
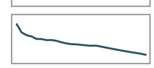
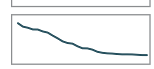
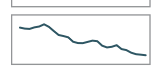
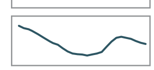
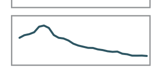
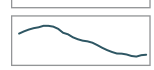
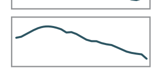
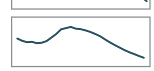
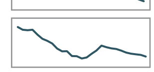
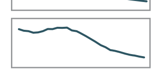
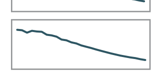
See caption for Figure 1.

Figure 4. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 25 Countries and Territories (Guatemala to Latvia)

Location	No. of Deaths (95% Uncertainty Interval)		Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval)		% Change (95% Uncertainty Interval), 1990-2016	2-Sided *P* Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
	1990	2016	1990	2016				
Guatemala (GTM)	1490 (902 to 2660)	5090 (2650 to 7250)	20.9 (13.0 to 36.7)	32.3 (16.7 to 45.7)	1.7 (-1.0 to 4.2)	<.001	★★★★☆	
Guinea (GIN)	205 (153 to 306)	480 (355 to 638)	4.4 (3.3 to 6.3)	5.0 (3.6 to 6.7)	0.5 (-1.0 to 1.7)	<.001	★☆☆☆☆	
Guinea-Bissau (GNB)	60.8 (42.1 to 84.7)	109 (78.8 to 145)	7.4 (5.3 to 10.4)	7.4 (5.3 to 10.0)	-0.0 (-1.3 to 1.2)	<.01	★☆☆☆☆	
Guyana (GUY)	45.6 (29.4 to 98.1)	78.9 (45.3 to 105)	6.2 (4.1 to 13.5)	10.7 (6.0 to 14.2)	2.3 (-0.7 to 4.4)	<.001	★★★★☆	
Haiti (HTI)	723 (506 to 959)	734 (486 to 1050)	11.2 (7.9 to 14.8)	6.6 (4.5 to 9.3)	-2.0 (-3.5 to -0.4)	<.001	★☆☆☆☆	
Honduras (HND)	919 (648 to 1340)	1780 (1120 to 2680)	23.7 (16.7 to 34.8)	22.5 (14.4 to 33.5)	-0.2 (-2.0 to 1.6)	.77	★★☆☆☆	
Hungary (HUN)	122 (95.9 to 173)	90.5 (60.5 to 124)	1.1 (0.9 to 1.6)	0.7 (0.5 to 1.0)	-1.7 (-3.3 to -0.5)	<.001	★★★★★	
Iceland (ISL)	6.96 (5.18 to 9.24)	5.3 (3.79 to 7.87)	2.7 (2.0 to 3.6)	1.4 (1.0 to 2.1)	-2.6 (-3.8 to -1.5)	<.001	★★★★★	
India (IND)	22 500 (15 300 to 31 200)	26 500 (18 300 to 33 900)	3.0 (2.1 to 4.1)	2.1 (1.4 to 2.6)	-1.4 (-2.1 to -0.5)	<.001	★★☆☆☆	
Indonesia (IDN)	797 (546 to 1100)	890 (642 to 1210)	0.5 (0.4 to 0.7)	0.4 (0.3 to 0.5)	-1.3 (-2.1 to -0.6)	<.001	★★☆☆☆	
Iran (IRN)	614 (393 to 846)	945 (615 to 1280)	1.4 (0.9 to 1.9)	1.1 (0.7 to 1.5)	-0.9 (-2.4 to 0.6)	<.001	★★★☆☆	
Iraq (IRQ)	1520 (1160 to 1930)	3240 (2160 to 4410)	11.1 (8.4 to 14.1)	9.8 (6.7 to 13.3)	-0.5 (-2.2 to 1.0)	<.001	★☆☆☆☆	
Ireland (IRL)	45.8 (29.7 to 58.3)	34.9 (20.6 to 48.7)	1.3 (0.9 to 1.7)	0.7 (0.4 to 1.0)	-2.4 (-3.7 to -1.0)	<.001	★★★★★	
Israel (ISR)	149 (108 to 186)	169 (101 to 233)	3.5 (2.6 to 4.4)	2.1 (1.3 to 3.0)	-2.0 (-3.7 to -0.4)	<.001	★★★★☆	
Italy (ITA)	1610 (1040 to 1930)	974 (620 to 1230)	2.5 (1.6 to 3.1)	1.2 (0.8 to 1.5)	-3.0 (-3.9 to -1.7)	<.001	★★★★★	
Jamaica (JAM)	249 (193 to 297)	533 (320 to 705)	11.1 (8.4 to 13.3)	18.1 (10.7 to 24.0)	1.8 (0.4 to 3.0)	<.001	★★★☆☆	
Japan (JPN)	346 (293 to 443)	455 (299 to 521)	0.3 (0.2 to 0.3)	0.2 (0.1 to 0.2)	-1.4 (-2.4 to -1.0)	<.001	★★★★☆	
Jordan (JOR)	87.6 (67.9 to 121)	199 (125 to 279)	3.3 (2.6 to 4.6)	2.8 (1.7 to 3.8)	-0.6 (-2.6 to 0.9)	<.001	★★☆☆☆	
Kazakhstan (KAZ)	403 (286 to 624)	337 (232 to 551)	2.5 (1.8 to 3.8)	1.9 (1.3 to 3.0)	-1.2 (-2.3 to -0.0)	<.01	★★★★☆	
Kenya (KEN)	459 (273 to 720)	1090 (775 to 1550)	3.1 (1.9 to 4.9)	3.2 (2.3 to 4.2)	0.1 (-1.0 to 1.3)	.4	★☆☆☆☆	
Kiribati (KIR)	1.45 (0.71 to 2.06)	1.25 (0.853 to 1.7)	2.2 (1.1 to 3.1)	1.2 (0.8 to 1.6)	-2.3 (-3.6 to -0.3)	<.001	★★☆☆☆	
Kuwait (KWT)	14.9 (7.87 to 21.7)	19.4 (10.7 to 36)	0.8 (0.5 to 1.2)	0.5 (0.3 to 0.9)	-2.0 (-3.9 to -0.1)	<.001	★★★★☆	
Kyrgyzstan (KGZ)	98.9 (62.9 to 133)	75.8 (54.5 to 117)	2.6 (1.7 to 3.4)	1.4 (1.0 to 2.0)	-2.5 (-3.4 to -1.3)	<.001	★★★★☆	
Laos (LAO)	107 (61.9 to 162)	72.4 (37.2 to 126)	3.0 (1.8 to 4.9)	1.2 (0.6 to 2.1)	-3.8 (-5.3 to -2.0)	<.001	★☆☆☆☆	
Latvia (LVA)	91.5 (61.4 to 123)	40.6 (29.8 to 56)	3.3 (2.2 to 4.4)	1.7 (1.2 to 2.4)	-2.5 (-3.9 to -0.9)	<.001	★★★★★	

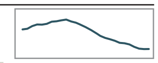
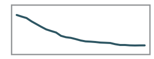
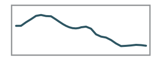
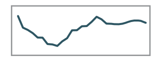
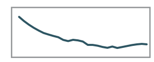
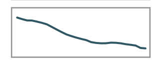
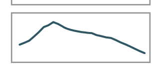
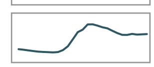
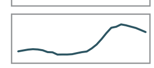
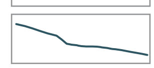
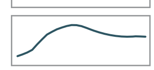
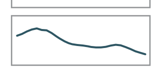
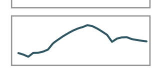
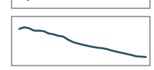
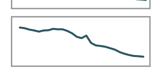
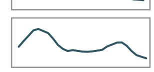
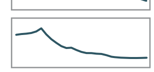
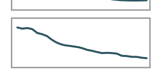
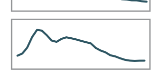
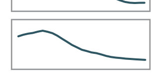
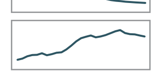
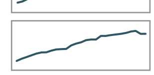
See caption for Figure 1.

Figure 5. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 25 Countries and Territories (Lebanon to Nepal)

Location	No. of Deaths (95% Uncertainty Interval)		Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval)		% Change (95% Uncertainty Interval), 1990-2016	2-Sided *P* Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
	1990	2016	1990	2016				
Lebanon (LBN)	90.1 (50.6 to 149)	91.2 (50.1 to 146)	3.5 (2.0 to 5.6)	1.4 (0.8 to 2.2)	-3.5 (-5.1 to -1.4)	<.001	★☆☆☆☆	
Lesotho (LSO)	78.1 (38.6 to 125)	172 (62.3 to 288)	6.5 (3.2 to 10.6)	8.9 (3.2 to 14.8)	1.1 (-0.9 to 3.1)	<.001	☆☆☆☆☆	
Liberia (LBR)	74.9 (56.3 to 97.1)	148 (99.4 to 187)	4.7 (3.7 to 6.1)	4.7 (3.1 to 6.2)	-0.1 (-1.5 to 1.0)	.36	★☆☆☆☆	
Libya (LBY)	54.5 (37.9 to 78.4)	82.3 (50.9 to 119)	1.5 (1.1 to 2.1)	1.3 (0.8 to 1.9)	-0.5 (-1.9 to 0.8)	<.001	★☆☆☆☆	
Lithuania (LTU)	102 (66.3 to 132)	50.7 (38.8 to 71.5)	2.7 (1.7 to 3.4)	1.5 (1.2 to 2.2)	-2.2 (-3.2 to -0.8)	<.001	★★★★★	
Luxembourg (LUX)	13.3 (10.2 to 17.3)	8.87 (6.15 to 12.8)	3.1 (2.4 to 4.0)	1.2 (0.9 to 1.8)	-3.5 (-4.9 to -2.2)	<.001	★★★★☆	
Macedonia (MKD)	39.9 (31.2 to 51.2)	48.6 (28.6 to 58.6)	2.0 (1.6 to 2.5)	2.1 (1.3 to 2.5)	0.1 (-1.4 to 1.0)	.56	★★★☆☆	
Madagascar (MDG)	173 (133 to 238)	378 (256 to 533)	2.4 (1.8 to 3.1)	2.1 (1.5 to 2.9)	-0.4 (-1.8 to 0.9)	.01	★☆☆☆☆	
Malawi (MWI)	140 (85.2 to 268)	275 (178 to 478)	2.4 (1.6 to 4.1)	2.4 (1.6 to 3.9)	0.0 (-1.6 to 1.7)	.62	★☆☆☆☆	
Malaysia (MYS)	285 (236 to 393)	321 (252 to 455)	2.1 (1.8 to 2.7)	1.1 (0.9 to 1.5)	-2.5 (-3.4 to -1.7)	<.001	★★☆☆☆	
Maldives (MDV)	2.06 (1.26 to 2.76)	1.26 (0.792 to 1.75)	1.4 (0.8 to 1.8)	0.4 (0.3 to 0.5)	-4.8 (-6.4 to -2.3)	<.001	★★☆☆☆	
Mali (MLI)	337 (210 to 505)	516 (367 to 730)	5.0 (3.4 to 7.3)	4.1 (2.8 to 6.4)	-0.8 (-2.3 to 0.9)	<.001	★☆☆☆☆	
Malta (MLT)	6.33 (4.67 to 7.85)	5.36 (3.95 to 7.3)	1.8 (1.3 to 2.2)	1.1 (0.8 to 1.5)	-1.9 (-3.0 to -0.7)	<.001	★★★★★	
Marshall Islands (MHL)	1.92 (0.977 to 2.65)	2.13 (1.12 to 3.24)	5.2 (2.7 to 6.9)	3.1 (1.7 to 4.7)	-1.9 (-3.3 to -0.6)	<.001	☆☆☆☆☆	
Mauritania (MRT)	52.7 (37.3 to 78.5)	85 (49.6 to 134)	3.7 (2.7 to 5.3)	2.7 (1.7 to 4.4)	-1.3 (-3.2 to 0.6)	<.001	☆☆☆☆☆	
Mauritius (MUS)	7.09 (4.45 to 11.2)	5.51 (3.8 to 9.99)	0.7 (0.5 to 1.1)	0.4 (0.3 to 0.7)	-2.2 (-3.6 to -1.0)	<.001	★★★★☆	
Mexico (MEX)	11 700 (7480 to 14 800)	15 400 (8680 to 18 900)	15.9 (9.9 to 20.1)	11.8 (6.7 to 14.6)	-1.2 (-1.8 to -0.7)	.07	★★★★☆	
Moldova (MDA)	102 (63.6 to 154)	40.2 (29.7 to 62.2)	2.4 (1.5 to 3.6)	0.9 (0.6 to 1.3)	-3.9 (-5.5 to -2.2)	<.001	★★★★★	
Mongolia (MNG)	32.9 (21.9 to 46.8)	35.5 (23.8 to 47.7)	1.8 (1.2 to 2.6)	1.1 (0.8 to 1.5)	-1.8 (-3.5 to -0.2)	<.001	★★☆☆☆	
Montenegro (MNE)	39.9 (34.2 to 51)	35.6 (28.7 to 45.4)	6.5 (5.5 to 8.2)	5.1 (4.2 to 6.5)	-0.9 (-1.7 to -0.0)	<.001	★★☆☆☆	
Morocco (MAR)	240 (148 to 380)	327 (219 to 480)	1.1 (0.7 to 1.7)	1.0 (0.6 to 1.4)	-0.5 (-2.5 to 1.0)	<.01	★☆☆☆☆	
Mozambique (MOZ)	420 (288 to 539)	797 (419 to 1100)	4.5 (3.3 to 5.6)	3.7 (2.1 to 5.1)	-0.8 (-2.0 to 0.5)	<.001	★☆☆☆☆	
Myanmar (MMR)	961 (662 to 1250)	591 (411 to 898)	2.6 (1.9 to 3.2)	1.1 (0.8 to 1.7)	-3.2 (-4.7 to -1.5)	<.001	★☆☆☆☆	
Namibia (NAM)	69.1 (35.7 to 98.3)	84.2 (49.3 to 126)	6.5 (3.6 to 9.0)	3.9 (2.4 to 5.6)	-2.0 (-3.6 to -0.4)	<.001	☆☆☆☆☆	
Nepal (NPL)	386 (211 to 632)	364 (211 to 576)	2.4 (1.4 to 4.0)	1.3 (0.8 to 2.1)	-2.2 (-3.8 to -0.4)	<.001	★☆☆☆☆	

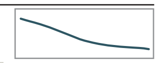
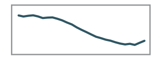
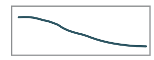
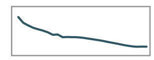
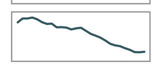
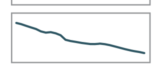
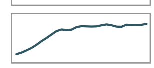
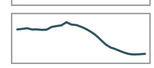
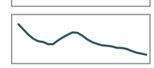
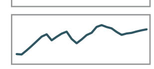
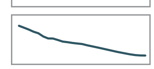
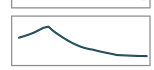
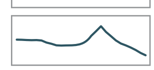
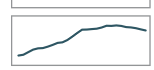
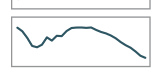
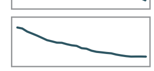
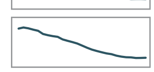
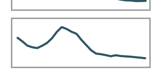
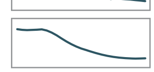
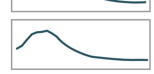
See caption for Figure 1.

Figure 6. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 25 Countries and Territories (Netherlands to Saint Vincent and the Grenadines)

Location	No. of Deaths (95% Uncertainty Interval) 1990	No. of Deaths (95% Uncertainty Interval) 2016	Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval) 1990	Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval) 2016	% Change (95% Uncertainty Interval), 1990-2016	2-Sided P Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
Netherlands (NLD)	132 (93.5 to 160)	126 (70.6 to 157)	0.8 (0.6 to 1.0)	0.6 (0.3 to 0.7)	-1.2 (-2.8 to -0.3)	<.001	★★★★☆	
New Zealand (NZL)	99.1 (66.6 to 114)	54.7 (41.3 to 78.7)	2.8 (1.9 to 3.3)	1.1 (0.8 to 1.5)	-3.8 (-4.6 to -2.2)	<.001	★★★★★	
Nicaragua (NIC)	267 (186 to 323)	382 (259 to 511)	7.4 (5.2 to 9.0)	6.1 (4.2 to 8.1)	-0.8 (-1.7 to 0.3)	<.001	★★★☆☆	
Niger (NER)	338 (213 to 532)	691 (494 to 961)	5.2 (3.7 to 7.6)	5.1 (3.5 to 7.4)	-0.1 (-1.6 to 1.5)	<.01	★☆☆☆☆	
Nigeria (NGA)	1820 (1120 to 2630)	2280 (1480 to 3610)	2.7 (1.7 to 4.5)	1.8 (1.2 to 3.0)	-1.7 (-3.3 to -0.1)	<.001	★☆☆☆☆	
North Korea (PRK)	109 (85.9 to 148)	130 (81.7 to 243)	0.6 (0.5 to 0.8)	0.5 (0.3 to 0.9)	-0.6 (-2.3 to 1.0)	<.001	☆☆☆☆☆	
Northern Mariana Islands (MNP)	1.62 (1.05 to 2.27)	3.15 (2.08 to 4.65)	4.0 (2.8 to 5.3)	2.8 (2.0 to 3.8)	-1.5 (-2.9 to 0.0)	<.001	★★★☆☆	
Norway (NOR)	204 (134 to 251)	92.6 (63.9 to 138)	4.4 (2.9 to 5.4)	1.5 (1.0 to 2.2)	-4.3 (-5.7 to -2.4)	<.001	★★★★★	
Oman (OMN)	5.33 (3.15 to 9.5)	9.77 (6.84 to 15.4)	0.4 (0.3 to 0.7)	0.2 (0.2 to 0.3)	-2.4 (-4.3 to -0.2)	<.001	★★☆☆☆	
Pakistan (PAK)	1430 (863 to 1930)	2780 (1410 to 4280)	1.6 (1.0 to 2.1)	1.5 (0.8 to 2.3)	-0.3 (-1.7 to 1.2)	<.01	★☆☆☆☆	
Palestine (PSE)	35.6 (25.8 to 50.9)	121 (68.2 to 158)	2.1 (1.6 to 3.0)	2.8 (1.7 to 3.5)	1.0 (-0.7 to 2.3)	<.001	★★☆☆☆	
Panama (PAN)	177 (109 to 252)	450 (165 to 660)	7.5 (4.8 to 11.1)	11.0 (4.1 to 16.1)	1.3 (-1.0 to 3.2)	<.001	★★★★☆	
Papua New Guinea (PNG)	250 (139 to 388)	315 (190 to 483)	7.2 (4.1 to 11.5)	4.5 (2.8 to 6.9)	-1.8 (-2.9 to -0.7)	<.001	★☆☆☆☆	
Paraguay (PRY)	290 (242 to 429)	716 (566 to 965)	7.9 (6.7 to 11.5)	10.7 (8.5 to 14.3)	1.2 (-0.0 to 2.0)	.03	★★★☆☆	
Peru (PER)	818 (637 to 1170)	925 (610 to 1240)	4.1 (3.2 to 5.7)	2.9 (1.9 to 3.9)	-1.3 (-3.5 to 0.2)	<.001	★★★☆☆	
Philippines (PHL)	3730 (2440 to 5990)	8020 (3280 to 11000)	7.2 (4.5 to 11.2)	8.3 (3.4 to 11.4)	0.5 (-1.4 to 1.9)	<.01	★★★★☆	
Poland (POL)	438 (345 to 598)	217 (180 to 317)	1.1 (0.9 to 1.5)	0.5 (0.4 to 0.7)	-3.5 (-4.5 to -2.4)	<.001	★★★★☆	
Portugal (PRT)	320 (263 to 438)	248 (158 to 297)	3.0 (2.5 to 4.2)	1.8 (1.2 to 2.1)	-2.1 (-3.8 to -1.3)	<.001	★★★★☆	
Puerto Rico (PRI)	687 (466 to 856)	637 (371 to 833)	19.4 (13.3 to 24.3)	17.1 (9.8 to 22.4)	-0.6 (-1.6 to 0.4)	<.001	★★★★☆	
Qatar (QAT)	5.77 (3.26 to 8.17)	8.36 (5.02 to 15.4)	1.3 (0.7 to 1.8)	0.4 (0.2 to 0.6)	-5.0 (-7.1 to -1.9)	<.001	★★☆☆☆	
Romania (ROU)	156 (122 to 201)	61 (49.4 to 87.7)	0.7 (0.5 to 0.8)	0.3 (0.2 to 0.4)	-3.2 (-4.1 to -2.2)	<.001	★★★★☆	
Russian Federation (RUS)	4970 (3450 to 8320)	4380 (2690 to 7890)	3.2 (2.3 to 5.4)	2.6 (1.6 to 4.8)	-0.8 (-2.6 to 0.8)	<.001	★★★★★	
Rwanda (RWA)	170 (117 to 244)	195 (136 to 302)	3.8 (2.5 to 5.8)	2.2 (1.6 to 3.6)	-2.0 (-3.5 to -0.5)	<.001	★☆☆☆☆	
Saint Lucia (LCA)	8 (5.82 to 14.5)	18 (9.13 to 23.4)	6.4 (4.7 to 11.8)	9.2 (4.7 to 12.0)	1.4 (-1.3 to 3.3)	<.001	★★★★☆	
Saint Vincent and the Grenadines (VCT)	5.56 (4.02 to 10.5)	11.9 (6.08 to 15.7)	5.5 (4.1 to 10.2)	10.3 (5.3 to 13.6)	2.4 (-0.6 to 4.2)	<.001	★★★★☆	

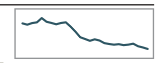
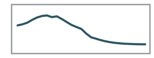
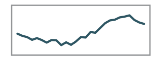
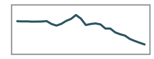
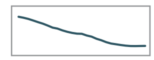
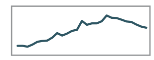
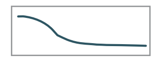
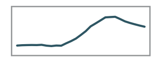
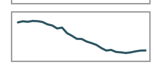
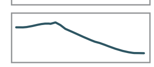
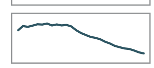
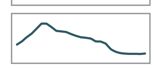
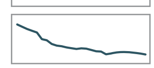
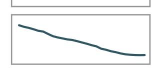
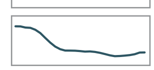
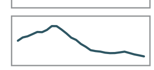
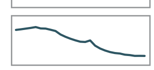
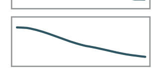
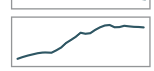
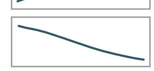
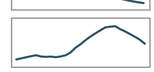
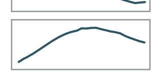
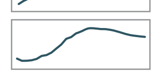
See caption for Figure 1.

Figure 7. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 25 Countries and Territories (Samoa to Tajikistan)

Location	No. of Deaths (95% Uncertainty Interval)		Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval)		% Change (95% Uncertainty Interval), 1990-2016	2-Sided *P* Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
	1990	2016	1990	2016				
Samoa (WSM)	5.44 (3.01 to 8.62)	3.94 (2.46 to 6.08)	4.1 (2.3 to 6.3)	2.4 (1.5 to 3.7)	-2.0 (-3.2 to -0.9)	<.001	☆☆☆☆☆	
Sao Tome and Principe (STP)	5.19 (3.91 to 6.76)	7.41 (4.13 to 10.1)	5.1 (3.9 to 6.7)	4.4 (2.6 to 5.9)	-0.6 (-2.1 to 0.8)	<.001	★☆☆☆☆	
Saudi Arabia (SAU)	363 (228 to 684)	274 (147 to 357)	2.6 (1.6 to 5.1)	1.0 (0.5 to 1.2)	-3.8 (-6.6 to -2.0)	<.001	★★☆☆☆	
Senegal (SEN)	218 (168 to 284)	413 (309 to 534)	4.3 (3.3 to 5.7)	4.0 (2.9 to 5.3)	-0.3 (-1.3 to 0.6)	.71	★☆☆☆☆	
Serbia (SRB)	550 (409 to 672)	397 (328 to 519)	5.7 (4.2 to 6.9)	3.9 (3.3 to 5.1)	-1.4 (-2.2 to -0.6)	<.001	★★★☆☆	
Seychelles (SYC)	2.93 (1.67 to 3.75)	2.17 (1.4 to 3.31)	4.9 (2.8 to 6.2)	2.1 (1.4 to 3.2)	-3.2 (-4.5 to -1.5)	<.001	★★★☆☆	
Sierra Leone (SLE)	127 (87.7 to 172)	181 (133 to 233)	4.1 (3.1 to 5.5)	3.8 (2.8 to 4.8)	-0.3 (-1.6 to 0.8)	.18	★☆☆☆☆	
Singapore (SGP)	12.6 (9.6 to 16)	6.77 (5.09 to 10.2)	0.5 (0.4 to 0.6)	0.1 (0.1 to 0.2)	-4.5 (-5.7 to -3.2)	<.001	★★★★★	
Slovakia (SVK)	166 (118 to 196)	107 (82.1 to 137)	3.1 (2.2 to 3.7)	1.6 (1.3 to 2.1)	-2.5 (-3.5 to -1.4)	<.001	★★★☆☆	
Slovenia (SVN)	68.8 (50.7 to 94.1)	51.4 (32.3 to 71.1)	3.2 (2.3 to 4.3)	1.8 (1.2 to 2.6)	-2.1 (-3.7 to -0.8)	<.001	★★★★☆	
Solomon Islands (SLB)	14.3 (8.17 to 21.6)	21.6 (12.4 to 32.4)	6.3 (3.7 to 9.3)	4.3 (2.5 to 6.4)	-1.5 (-2.6 to -0.4)	<.001	☆☆☆☆☆	
Somalia (SOM)	162 (109 to 229)	338 (217 to 468)	3.8 (2.6 to 5.2)	4.6 (3.0 to 6.3)	0.8 (-0.8 to 1.9)	<.001	☆☆☆☆☆	
South Africa (ZAF)	4460 (2070 to 5910)	3740 (2480 to 5340)	12.8 (6.1 to 16.9)	6.9 (4.7 to 9.8)	-2.3 (-3.6 to -0.4)	<.001	★★☆☆☆	
South Korea (KOR)	186 (129 to 404)	252 (140 to 341)	0.5 (0.4 to 1.0)	0.4 (0.2 to 0.5)	-1.0 (-5.1 to 0.8)	<.001	★★★☆☆	
South Sudan (SSD)	122 (70.7 to 205)	323 (200 to 480)	3.2 (1.8 to 5.5)	3.6 (2.3 to 5.5)	0.5 (-1.1 to 2.1)	<.001	☆☆☆☆☆	
Spain (ESP)	517 (428 to 680)	330 (233 to 423)	1.2 (1.0 to 1.7)	0.6 (0.4 to 0.7)	-3.1 (-4.3 to -2.1)	<.001	★★★★☆	
Sri Lanka (LKA)	839 (447 to 1100)	388 (258 to 584)	4.8 (2.7 to 6.2)	1.9 (1.2 to 2.8)	-3.7 (-5.2 to -1.7)	<.001	★★★☆☆	
Sudan (SDN)	336 (192 to 497)	633 (412 to 891)	2.0 (1.2 to 2.9)	1.8 (1.2 to 2.4)	-0.5 (-2.5 to 1.0)	.18	☆☆☆☆☆	
Suriname (SUR)	14.3 (11.5 to 22.7)	27.8 (18 to 34.3)	3.6 (2.9 to 5.7)	5.0 (3.3 to 6.2)	1.3 (-0.8 to 2.5)	<.001	★★★☆☆	
Swaziland (SWZ)	40 (21.6 to 58)	59.1 (32.7 to 88.2)	6.6 (3.7 to 9.2)	5.1 (2.8 to 7.5)	-1.0 (-2.7 to 0.8)	.04	★☆☆☆☆	
Sweden (SWE)	248 (165 to 281)	165 (108 to 208)	2.5 (1.7 to 2.8)	1.3 (0.9 to 1.6)	-2.5 (-3.4 to -1.7)	<.001	★★★★★	
Switzerland (CHE)	543 (381 to 702)	308 (199 to 482)	7.1 (5.0 to 9.2)	2.8 (1.8 to 4.4)	-3.7 (-5.5 to -1.8)	<.001	★★★★☆	
Syria (SYR)	201 (152 to 266)	292 (169 to 390)	2.2 (1.7 to 2.8)	1.8 (1.1 to 2.4)	-0.8 (-2.6 to 0.5)	<.001	★★★☆☆	
Taiwan (TWN)	193 (79.9 to 292)	86.5 (62.1 to 112)	1.0 (0.5 to 1.4)	0.3 (0.2 to 0.4)	-4.4 (-6.0 to -2.3)	<.001	★★★☆☆	
Tajikistan (TJK)	111 (66.8 to 153)	105 (74.9 to 149)	2.6 (1.6 to 3.6)	1.3 (1.0 to 1.8)	-2.6 (-4.0 to -0.6)	<.001	★★★☆☆	

See caption for Figure 1.

Figure 8. Number of Firearm Deaths and Age-Standardized Rate of Deaths in 1990 and 2016 and the Annualized Rate of Change 1990-2016 in Age-Standardized Rate as a Percent for 25 Countries and Territories (Tanzania to Zimbabwe)

Location	No. of Deaths (95% Uncertainty Interval)		Age-Standardized Mortality Rate per 100 000 (95% Uncertainty Interval)		% Change (95% Uncertainty Interval), 1990-2016	2-Sided *P* Value (Null = Zero Change in Mean Estimates), 1990-2016	Star Rating for % of Well-Certified Deaths	Scale-Less Illustration of Trend of Mean Estimates of Age-Standardized Mortality Rate, 1990-2016
	1990	2016	1990	2016				
Tanzania (TZA)	576 (424 to 829)	1140 (803 to 1620)	3.2 (2.4 to 4.6)	2.8 (2.1 to 4.0)	-0.5 (-1.5 to 0.8)	<.001	★☆☆☆☆	
Thailand (THA)	5240 (2970 to 6650)	3830 (2590 to 4740)	9.2 (5.3 to 11.4)	5.2 (3.5 to 6.4)	-2.2 (-3.2 to -1.0)	<.001	★★★☆☆	
The Bahamas (BHS)	31.3 (22.5 to 48.7)	58.1 (26.5 to 81.9)	11.6 (8.4 to 18.7)	13.6 (6.2 to 19.2)	0.5 (-1.9 to 2.6)	<.001	★★★★☆	
The Gambia (GMB)	19.6 (11.8 to 46.8)	36.2 (21.6 to 89.2)	3.1 (1.8 to 6.8)	2.7 (1.6 to 5.7)	-0.5 (-1.8 to 0.7)	<.001	★☆☆☆☆	
Timor-Leste (TLS)	17.7 (11.6 to 24.9)	11.5 (5.84 to 21.5)	2.6 (1.8 to 3.6)	1.2 (0.6 to 2.2)	-3.2 (-5.7 to -1.0)	<.001	☆☆☆☆☆	
Togo (TGO)	123 (93.4 to 174)	283 (204 to 371)	4.5 (3.5 to 6.3)	5.0 (3.6 to 6.4)	0.4 (-1.2 to 1.6)	<.001	☆☆☆☆☆	
Tonga (TON)	3.39 (1.67 to 5.12)	1.51 (0.923 to 2.68)	4.1 (2.1 to 6.1)	1.6 (1.0 to 2.8)	-3.6 (-5.6 to -0.2)	<.001	★☆☆☆☆	
Trinidad and Tobago (TTO)	82.3 (56.6 to 139)	183 (70.9 to 259)	6.7 (4.7 to 11.4)	12.7 (5.0 to 17.9)	2.3 (-0.6 to 4.5)	<.001	★★★★★	
Tunisia (TUN)	82.3 (61.2 to 114)	93.1 (65.9 to 133)	1.1 (0.8 to 1.5)	0.8 (0.6 to 1.1)	-1.3 (-2.8 to -0.0)	<.001	★☆☆☆☆	
Turkey (TUR)	2790 (2040 to 3480)	2430 (1520 to 3170)	5.7 (4.1 to 7.1)	3.0 (1.9 to 3.8)	-2.5 (-3.8 to -1.3)	<.001	★★★☆☆	
Turkmenistan (TKM)	77.1 (38.3 to 106)	77.5 (48.1 to 144)	2.4 (1.2 to 3.3)	1.3 (0.8 to 2.4)	-2.3 (-4.0 to 0.2)	<.001	★★★★☆	
Uganda (UGA)	418 (270 to 620)	853 (495 to 1160)	4.0 (2.3 to 7.0)	3.1 (1.8 to 4.5)	-0.9 (-2.6 to 0.7)	<.001	★☆☆☆☆	
Ukraine (UKR)	1260 (917 to 1810)	847 (544 to 1380)	2.4 (1.7 to 3.4)	1.6 (1.0 to 2.7)	-1.5 (-3.1 to -0.1)	<.001	★★★★★	
United Arab Emirates (ARE)	32.9 (19.4 to 52.3)	135 (79.4 to 208)	1.7 (1.1 to 2.7)	1.2 (0.7 to 1.7)	-1.5 (-3.4 to 0.6)	<.001	★☆☆☆☆	
United Kingdom (GBR)	444 (286 to 485)	248 (191 to 307)	0.7 (0.5 to 0.8)	0.3 (0.2 to 0.4)	-3.1 (-3.5 to -1.7)	<.001	★★★★★	
United States (USA)	35 800 (27 700 to 38 600)	37 200 (29 000 to 41 200)	13.6 (10.6 to 14.7)	10.6 (8.3 to 11.7)	-0.9 (-1.1 to -0.7)	<.001	★★★★★	
Uruguay (URY)	372 (313 to 436)	357 (264 to 422)	11.9 (10.0 to 13.9)	9.5 (7.0 to 11.3)	-0.8 (-1.8 to -0.1)	<.001	★★★★☆	
Uzbekistan (UZB)	280 (136 to 389)	186 (138 to 300)	1.7 (0.9 to 2.4)	0.6 (0.5 to 1.0)	-3.7 (-5.5 to -0.5)	<.001	★★★★☆	
Vanuatu (VUT)	5.23 (2.83 to 8.03)	6.65 (3.81 to 10)	4.8 (2.6 to 7.3)	2.8 (1.7 to 4.2)	-2.0 (-3.2 to -0.9)	<.001	☆☆☆☆☆	
Venezuela (VEN)	3220 (2550 to 4860)	12 800 (7220 to 18 300)	17.1 (13.3 to 27.8)	38.7 (21.9 to 54.9)	3.1 (0.7 to 5.2)	<.001	★★★★☆	
Vietnam (VNM)	573 (393 to 778)	520 (369 to 699)	1.0 (0.7 to 1.3)	0.5 (0.4 to 0.7)	-2.4 (-3.8 to -1.1)	<.001	★☆☆☆☆	
Virgin Islands, U.S. (VIR)	19 (15 to 26)	22.6 (14.7 to 29.1)	18.6 (14.7 to 25.3)	21.3 (13.1 to 27.8)	0.5 (-1.5 to 1.9)	<.001	★★★☆☆	
Yemen (YEM)	335 (192 to 481)	670 (433 to 984)	3.5 (2.1 to 4.9)	2.7 (1.8 to 3.9)	-1.0 (-2.6 to 0.3)	<.001	☆☆☆☆☆	
Zambia (ZMB)	166 (120 to 227)	512 (325 to 724)	2.9 (2.1 to 4.0)	4.3 (2.8 to 5.9)	1.4 (-0.7 to 3.2)	<.001	★☆☆☆☆	
Zimbabwe (ZWE)	159 (78.6 to 271)	632 (427 to 978)	3.1 (1.7 to 4.8)	6.3 (4.5 to 8.2)	2.8 (0.9 to 5.2)	<.001	★★☆☆☆	

See caption for Figure 1.

Brazil and the United States (32.0% [95% UI, 27.4%-34.6%]). Nationally, age-standardized rates of firearm injury deaths in 2016 ranged from a low of 0.1 deaths (95% UI, 0.1-0.2) per 100 000 persons in Singapore to 39.2 deaths (95% UI, 27.5-47.4) per 100 000 persons in El Salvador.

Globally, the annualized rate of decrease of 0.9% (95% UI, 0.5%-1.3%) in the rate of aggregate firearm injury deaths reflected variability between locations over time and by firearm subcause (**Figure 9**). Several countries with high age-standardized rates of firearm injury deaths in 1990 were also among the locations with large annualized rates of decrease between 1990 and 2016. These locations included Greenland, which had the highest age-standardized rate of firearm injury deaths in 1990 and an estimated annualized decrease in those rates of 3.2% (95% UI, 1.5%-4.6%) between 1990 and 2016, and Colombia (ranked second globally in age-standardized rate of firearm injury deaths in 1990), where age-standardized rates decreased by 3.0% (95% UI, 2.3%-3.6%) annually over the same time period. Aggregate firearm injury death rates decreased between 1990 and 2016 in most countries; however, rates increased in 41 countries, of which 3 were significant changes (20 of these increases were in the GBD super region of Latin America and the Caribbean [data are reported alphabetically by country or territory]; Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8). In Latin America and the Caribbean, there was no significant change in some locations with high age-standardized rates of firearm injury deaths in 1990, including Honduras (mean change, −0.2% [95% UI, −2.0% to 1.6%]; Figure 4), El Salvador (mean change, −0.5% [95% UI, −1.6% to 0.4%]; Figure 3), and Guatemala (mean change, 1.7% [95% UI, −1.0% to 4.2%]; Figure 4). Previous shifts in the aggregate firearm mortality rate in these countries were not reflected by the mean rate of change from 1990 to 2016, evident in the poor linear fit of the trend data (R^2, 0.00 for Honduras; R^2, 0.23 for El Salvador; and R^2, 0.70 for Guatemala) and visual inspection of sparklines (Figure 3 and Figure 4).

Patterns by Age and Sex

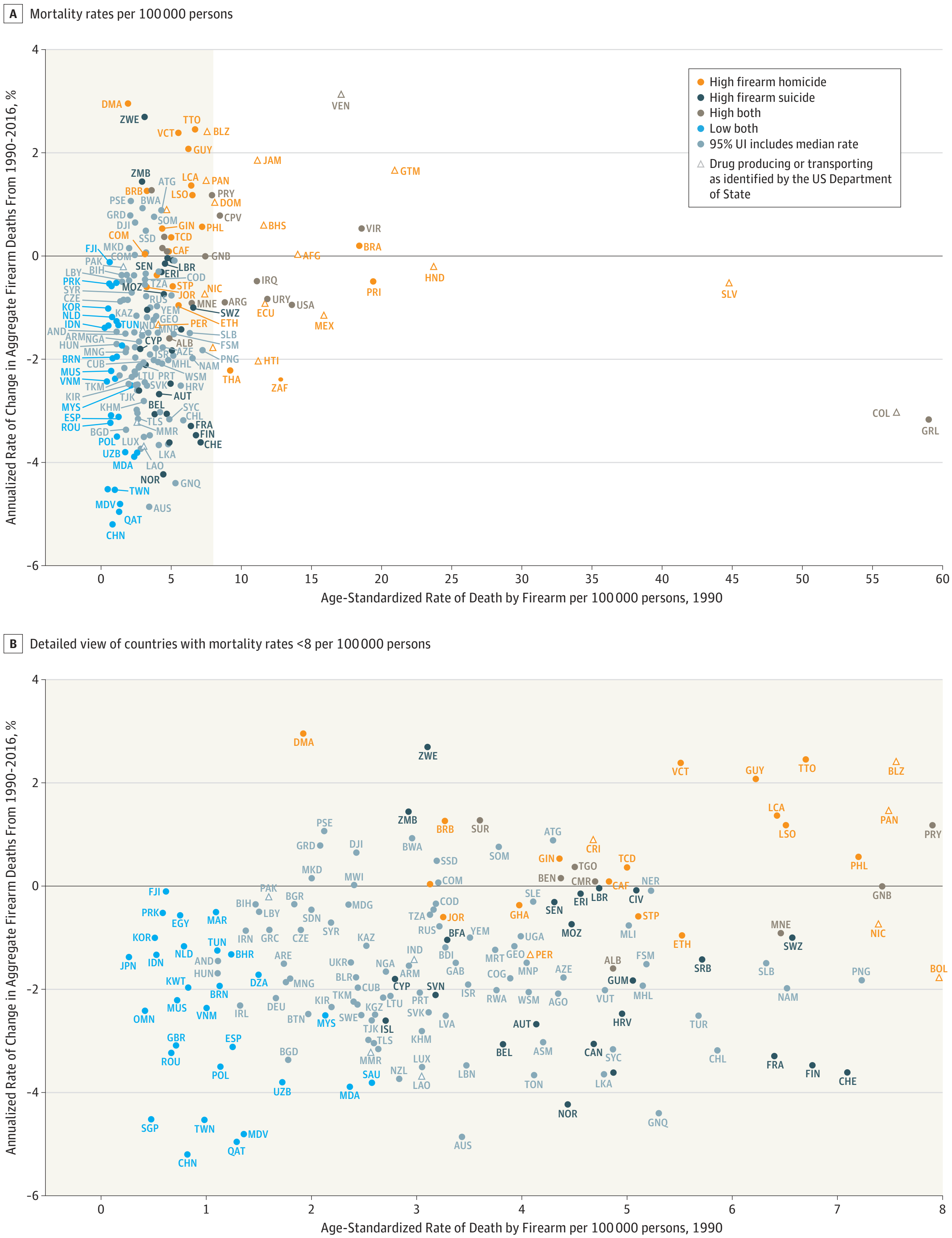
Globally, aggregate firearm injury deaths were higher for men than for women in each 5-year age bracket in 2016 (**Figure 10**), with most of these firearm injury deaths occurring for both sexes among 20- to 24-year-olds (estimated deaths among men, 34 700 [95% UI, 24 900-39 700]; indicating an age-specific mortality rate of 11.2 deaths [95% UI, 8.1-12.8] per 100 000 persons) and (estimated deaths among women, 3580 [95% UI, 2810-4210]); indicating an age-specific mortality rate of 1.2 deaths [95% UI, 1.0-1.4] per 100 000 persons). The relative proportions of firearm injury deaths by subcause varied with age and sex (Figure 10). Globally, among children aged 0 to 14 years, there were an estimated 7220 deaths (95% UI, 5690-8200) from a firearm-related injury in 2016, a rate of 0.4 deaths (95% UI, 0.3-0.4) per 100 000 persons, and there were 2.4 times more firearm deaths for boys than girls in this age group (eTable 12 and eTable 13 in the Supplement). As a component of deaths for children aged 0 to 14 years, firearm injury deaths constituted more than 1% of child deaths from all causes in 12 countries. The highest such fractions were in Greenland (2.6% [95% UI, 1.4%-4.1%]) and El Salvador (3.4% [95% UI, 2.2%-4.9%]) (eFigure 2 in the Supplement).

National Variation in Firearm Injury Deaths by Subcause

In 2016, unintentional firearm injuries represented a small fraction of all firearm injuries (an estimated 9.1% [95% UI, 7.7%-11.7%]; global absolute value, 22 900 deaths [95% UI, 18 200-24 800]; Figure 1) but with variability in relative contribution of these deaths at the national level (eTable 14 in the Supplement). In contrast, suicide by firearm resulted in an estimated 67 500 deaths (95% UI, 55 400-84 100) worldwide in 2016, with a global age-standardized rate of suicide by firearm of 0.9 deaths (95% UI, 0.8-1.1) per 100 000 persons (eTable 14 in the Supplement). Age-standardized rates for firearm suicides were highest in Greenland at 22.0 deaths (95% UI, 15.9-32.6) per 100 000 persons (absolute value, 11 deaths [95% UI, 8-16]) in 2016, and in the United States at a rate of 6.4 deaths (95% UI, 5.0-7.5) per 100 000 persons (absolute value, 23 800 deaths [95% UI, 18 500-27 900]) in 2016 (eTable 14 in the Supplement) and lowest in Singapore at a rate of 0.1 deaths (95% UI, 0.0-0.1) per 100 000 persons. In 2016, firearm suicides in the United States represented 35.3% (95% UI, 29.1%-40.3%) of global firearm suicides; in that year, 4.3% of the global population was in the United States.[15] Globally, rates of firearm suicide decreased between 1990 and 2016 at an annualized rate of 1.6% (95% UI, 1.1%-2.0%) with the fastest decreases in the Philippines (6.0% [95% UI, 0.6%-8.3%]) and Australia (5.2% [95% UI, 2.2%-6.2%]). However at a national scale, statistically significant decreases were estimated in fewer than half (71 of 195) of countries and territories in this study. The highest statistically significant annualized increase in firearm suicide rate between 1990 and 2016 was estimated for Jamaica (4.5% [95% UI, 0.4%-6.6%]). Uncertainty intervals for a number of other large increases included zero, such as the annualized rate of change estimated for Zimbabwe (2.2% [95% UI, −0.3% to 5.1%]) and Bosnia and Herzegovina (2.0% [95% UI, −3.6% to 4.8%]) (eTable 14 in the Supplement), where nonlinearities in trends over the period 1990 to 2016 were also evident.

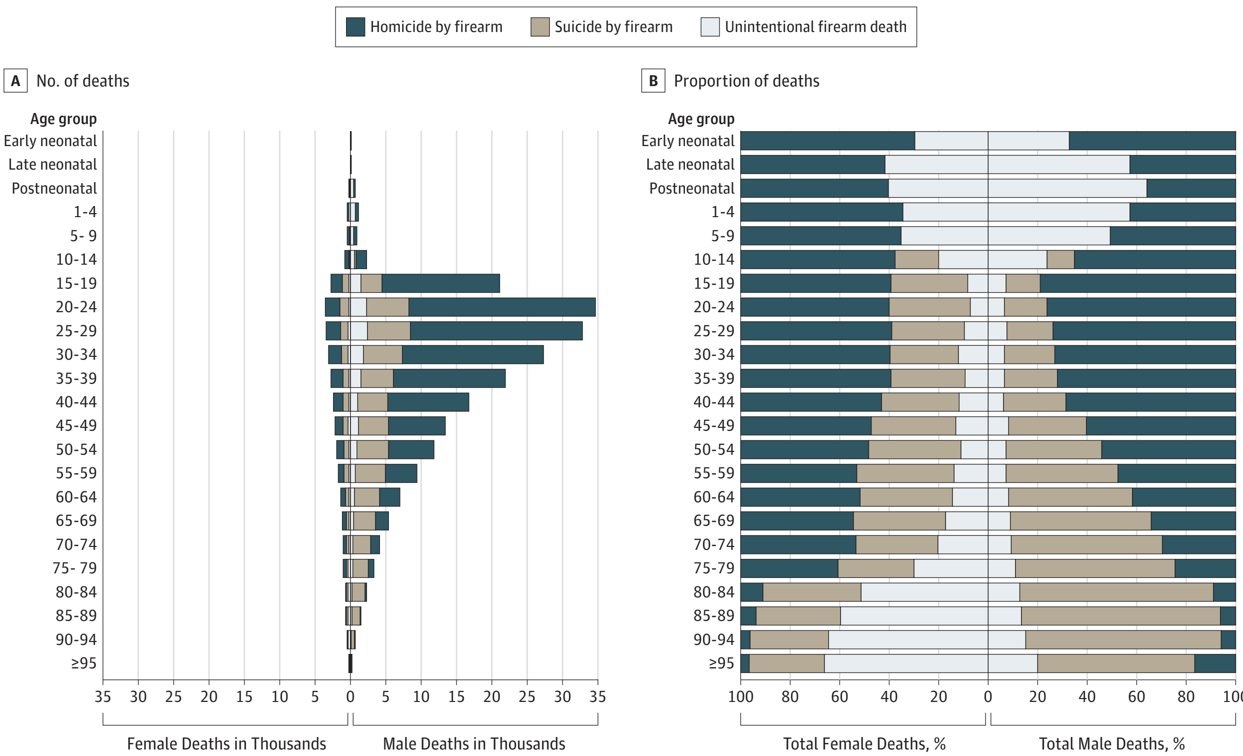
Globally, the majority of firearm injury deaths were homicides (an estimated 64.0% [95% UI, 54.2%-68.0%]; absolute value, 161 000 deaths [95% UI, 107 000-182 000]) (eTable 14 in the Supplement), and firearms were the lethal means in more than 50% of all homicides in 49 of 195 countries in 2016 (eTable 15 in the Supplement). In 2016, the highest national age-standardized rate of death from physical violence by firearm occurred in El Salvador (38.9 deaths [95% UI, 27.2-47.1] per 100 000 persons; eTable 14 in the Supplement), and the lowest firearm homicide rate in 2016 was estimated for Singapore (0.0 deaths [95% UI, 0.0-0.1] per 100 000 persons; eTable 14 in the Supplement). Over the period 1990 to 2016, there was no statistically significant annualized change in the global age-standardized firearm homicide rate (−0.2% [95% UI, −0.8% to 0.2%]); this mean change across the full time series encompasses

Figure 9. Age-Standardized Firearm Death Rate for 1990 and Annualized Rate of Change 1990-2016



Profiles of firearm mortality were defined in relation to the 2016 global median value of the age-standardized rate of firearm homicide (0.99 per 100 000 persons) or firearm suicide (0.72 per 100 000 persons). High firearm homicide and suicide indicate an age-standardized rate (95% uncertainty interval [UI]) greater than the global median; high both, the estimated age-standardized rates for firearm suicide and firearm homicide (and 95% UIs) are greater than the global median; and low both, the estimated age-standardized rates for firearm suicide and firearm homicide (and 95% UIs) are lower than the global median. For 3-letter country codes, see Figures 1 through 8.

Figure 10. Global Number and Proportion of Firearm Injury Deaths in 2016 by Age, Sex, and Firearm Subcause



The early neonatal period is defined as 0 to 6 days, late neonatal as 7 to 27 days, and postneonatal as 28 to 364 days.

previous increases in the global firearm homicide rate (Figure 1). Underlying the global mean, considerable heterogeneity was estimated at the national level. The largest annualized increase was estimated in Zimbabwe (4.2% [95% UI, 1.7%-6.9%]) (eTable 14 in the Supplement). Uncertainty intervals for a number of other large increases included zero, such as the annualized rate of change estimated in Botswana (5.8% [95% UI, −1.5% to 10.1%]) and Sudan (4.9% [95% UI, −0.9% to 7.4%]), where both nonlinearity in trend data and data completeness were complicating factors. The largest annualized decreases in firearm homicide rates over this time period were estimated in Estonia (6.2% [95% UI, 1.5%-8.6%]) and Taiwan (5.9% [95% UI, 1.8%-8.1%]).

Firearm Mortality Profiles

There were 17 countries where rates of both firearm homicide and firearm suicide were estimated to be greater than both median values for these rates (**Figure 11**) including the United States (firearm homicide rate, 4.0 deaths [95% UI, 2.1-4.8] per 100 000 persons; firearm suicide rate, 6.4 deaths [95% UI, 5.0-7.5] per 100 000 persons), Uruguay (firearm homicide rate, 2.9 deaths [95% UI, 1.2-4.0] per 100 000 persons; firearm suicide rate, 4.2 deaths [95% UI, 3.0-5.5] per 100 000 persons), and Argentina (firearm homicide rate, 3.3 deaths [95% UI, 2.0-4.9] per 100 000 persons; firearm suicide rate, 2.7 deaths [95% UI, 2.1-3.8] per 100 000 persons). Rates of both firearm suicide and firearm homicide were significantly less than the median rate in 29 countries including Singapore (firearm homicide rate, 0.0 deaths [95% UI, 0.0-0.1] per 100 000 persons; firearm suicide rate, 0.1 deaths [95% UI, 0.0-0.1] per 100 000 persons), Japan (firearm homicide rate, 0.0 deaths [95% UI, 0.0-0.1] per 100 000 persons; firearm suicide rate, 0.1 deaths [95% UI, 0.1-0.1] per 100 000 persons), and China (firearm homicide rate, 0.1 deaths [95% UI, 0.0-0.1] per 100 000 persons; firearm suicide rate, 0.1 deaths [95% UI, 0.1-0.1] per 100 000 persons). More broadly, deaths from suicide by firearm were the largest fraction of all firearm injuries in 67 of 195 countries in 2016 (eTable 15 in the Supplement); most of these countries were in the GBD regions of Western Europe, high-income North America, Australasia, and Eastern Europe. Homicides were estimated as the dominant fraction of all firearm injuries in 113 countries in 2016.

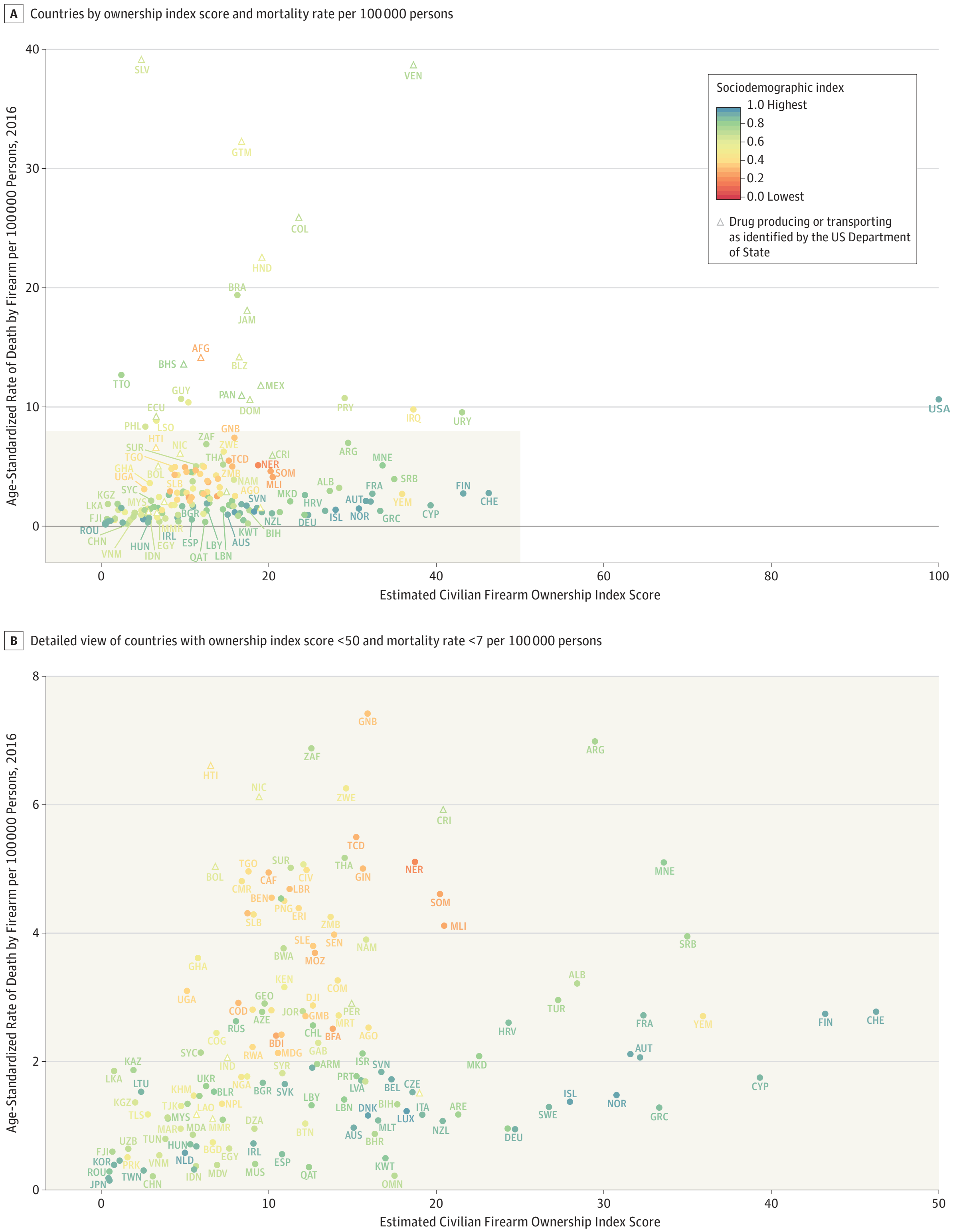
Relationship Between Firearm Access and Firearm Injury Deaths

Evaluated against a combined proxy measure of firearm access, rates of firearm injury death were estimated to be larger where the firearm access proxy was also large (**Figure 12**)—a relationship exemplified by locations such as the United States (firearm access index, 100; 10.6 deaths [95% UI, 8.3-11.7] per 100 000 persons) and Venezuela (firearm access index, 40.8; 38.7 deaths [95% UI, 21.9-54.9] per 100 000 persons), where estimated access to firearms was

Figure 11. Age-Standardized Rate per 100 000 Persons of Firearm Homicide and Firearm Suicide, 2016

Profiles of firearm mortality were defined in relation to the 2016 global median value of the age-standardized rate of firearm homicide or firearm suicide. High firearm homicide and suicide indicate an age-standardized rate (95% uncertainty interval [UI]) greater than the global median; high both, the estimated age-standardized rates for firearm suicide and firearm homicide (and 95% UIs) are greater than the global median; and low both, the estimated age-standardized rates for firearm suicide and firearm homicide (and 95% UIs) are lower than the global median. For 3-letter country codes, see Figures 1 through 8.

Figure 12. Estimated Firearm Ownership and the Age-Standardized Rate per 100 000 Persons of Firearm Injury Deaths, 2016



Estimated firearm ownership is represented by an index that combined 2007 Small Arms Survey estimates (derived from firearm registry data), survey data, and expert estimation (see eTable 4 in the Supplement) with the estimated proportion of firearm suicides by location by rescaling each estimate of firearm ownership for a location from 0 to 100 and then averaging these values. The maximum value of this combined metric is a mean score of 100 (United States), while the minimum value is 0.3 (Japan) (eTable 5 in the Supplement). The sociodemographic index is a composite measure of income per capita, fertility, and education level. For 3-letter country codes, see Figures 1 through 8.

high compared with other countries. The inclusion of countries identified by the US State Department as major illicit drug-producing or drug-transporting countries[16] as a factor reduced unexplained variation in a multiple linear regression and was positively associated with firearm homicides ($P < .001$; $R^2 = 0.35$) (eAppendix section 3.5 and eTable 6A in the Supplement) but not firearm suicides ($P = .41$; $R^2 = 0.21$) (eTable 6B in the Supplement). Similarly, the inclusion of each location's SDI level (a composite measure of years of education, per capita income, and fertility rate) improved model fit and was negatively associated with firearm homicides ($P < .001$; $R^2 = 0.35$) (eTable 6A in the Supplement) but not firearm suicides ($P < .18$; $R^2 = 0.21$) (eTable 6B in the Supplement).

Discussion

This modeling study, which used a combination of deidentified aggregated data from vital registration, verbal autopsy, census and survey, and police records estimated the global burden of firearm deaths in 2016 (251 000), the majority of which were firearm homicides (161 000; 64%). Despite an overall decrease in rates of firearm injury deaths since 1990, there was variation among countries and across demographic subgroups.

As with many components of health, illness, and injury, the burden of mortality from firearms is not distributed symmetrically between the sexes or by age. Males are at higher risk of unintentional death while playing with firearms at a young age, of being involved in homicide involving firearms during adolescence and young adulthood, and of the greater use of firearms as a means in suicide throughout adulthood.[17] Although men are most often the targets of firearm violence, they are also the most likely perpetrators, often in the context of domestic and relationship violence.[18] The gendered nature of firearm violence across causes highlights the need for targeted forms of intervention that address cultural components of firearm use by and against men.

Comparisons of levels and trends in firearm injury deaths are complicated by differences in the factors underlying firearm violence, hindering efforts to find relationships between countries that could suggest effective public health responses. Nonetheless, where firearm mortality dominantly occurs as interpersonal violence, different intervention strategies will likely be necessary in contrast to countries where most firearm mortality occurs as firearm suicide. Identifying countries with similar profiles of firearm violence can provide opportunities to examine how risk factors, histories, cultures, economies, or legal frameworks may have produced similar outcomes.

Although public perception is frequently focused on the use of firearms in homicides, particularly mass shootings,[19] suicides involving firearms greatly outnumber firearm homicides in many countries. Among these countries, the presence of firearms in the home has been directly linked to their greater use as a means of suicide,[20] as well as to increases in unintentional firearm injury deaths.[21] Readily available firearms facilitate unplanned suicide attempts[17] and increase the probability of an injury being lethal. Self-directed attempts at harm are more frequently fatal than other firearm-involved violence, resulting in death for as much as 91% of attempts for suicide by firearm, 19% for physical violence by firearm, and 5% for unintentional firearm injuries[22]—and greater than other methods commonly used in suicide attempts.[23] Efforts to reduce the number of firearms in homes and supporting secure storage of existing firearms can reduce unintentional death, particularly for children,[24] while limiting immediate access to a means of harm that generally does not allow opportunity for second thoughts.

Access to firearms is not the sole factor determining means of suicide, and some component of the relationship between firearm availability and firearm suicide may be a reflection of regional and local variation in the cultural acceptability of suicide by different methods and for each sex,[25] as well as the availability of those means. The low availability of firearms or low access to firearms by civilian populations and strong regulatory frameworks,[26] together with differing cultural norms around suicide, are all possible explanations for this pattern. Understanding of the interaction between culture and opportunity can provide critical context for preventive strategies involving means restriction in the case of firearm suicide as well as firearm homicide.

High levels of firearm homicide in a belt extending from Mexico to Brazil (and including the Caribbean) have been associated with drug cartels,[27] the manufacture and sale of firearms and their illegal trade from the United States,[28] and with postconflict movement of firearms into civilian populations in some countries.[29] The stock of legal firearms in many of these countries is comparatively small. A recent survey of gun ownership in Mexico identified only 3% of urban households reporting firearm ownership, and the majority (80%) of these reported owning just 1 firearm.[30] Difficulties with accounting for illegal firearm ownership[31] and the effect of trafficking in firearms on rates of violence in countries with otherwise strong firearm control legislation, may explain some of the variability found in the relationship between firearm availability and associated mortality, particularly for firearm homicide. At the same time, the availability of firearms and the role played by illicit trade are only one dimension of the complex problem of firearm-related violence in the region; multiple structural factors have also been identified as contributors including poverty, social inequalities or rapid social change, alcohol and drug use, and young population age structure.[6,29] Violence at the intersection of these cultural factors, together with a high general availability of firearms, combine to produce high rates of mortality through the lethality inherent in the use of firearms.

Both suicide and homicide are defined as intentional behaviors, and thus it should be possible to develop strategies to reduce these forms of violence. A recent review of firearm legislation in the United States by Lee and colleagues[32] highlights the association of laws that strengthen background checks or that require a permit to purchase a firearm with reductions in firearm homicide rates, and this general principle is supported by more stringent programs to restrict the use of firearms by civilian populations in other settings.[33] The Australian National Firearms Agreement, enacted following the 1996 Port Arthur massacre, has been closely linked with declines in firearm deaths in Australia, particularly firearm suicides and an absence of mass shootings.[34] The patterns documented in South Africa and Brazil also support a link between regulatory restrictions on firearm access and subsequent reductions in firearm death rates. In South Africa, rates of violent death decreased following the Firearm Control Act of 2000[35]; it is estimated that this legislation may have prevented more than 4500 deaths across 5 South African cities between 2001 and 2005.[36] In Brazil, where much of the stock of civilian firearms are likely unregistered, large decreases in firearm homicides (since the year 2000 in the state of São Paulo) and firearm suicides in the state of Rio de Janeiro have been linked to more effective policing, firearm buy-back programs, and enforcement of firearm control legislation passed in 2003.[37] The hypothesis that differences in levels of violence between countries reflect the availability of firearms and the extent of firearm control at a national level is consistent with these findings, although more disaggregated data are needed to transfer the analysis to other settings.

Limitations

This study has several limitations. Evaluating the burden of firearm deaths on a global scale was constrained by the limitations that apply to the GBD 2016 study generally[8] and also by limitations specific to evaluating firearm-related deaths. First, as in prior GBD studies, the accuracy of the estimates depends on the availability of data for each age-sex-year-location. Due to delays in data reporting, estimates for more recent years rely on additional data and trends from prior years. For many countries, data sources are sparse, and the GBD estimates rely heavily on covariate selection in the models and also borrow strength from regional patterns. Second, the GBD study attempts to evaluate and adjust for variation in data quality and completeness using data-standardization techniques, but the resulting estimates are inherently subject to bias from incomplete data sampling in some locations (eAppendix section 2.2 and eTable 2 in the Supplement). Many countries, particularly locations in sub-Saharan Africa, southeast Asia, and the region of North Africa and the Middle East, have limited vital registration data, and the quality of the available data were not evenly distributed. Estimates for countries with low star ratings (as described in Methods) have uncertain validity because using combinations of available sources and estimates for missing data results in a more comprehensive set of estimates but also limits precision and accuracy. The star system is a general assessment of the quality of vital registration and does not necessarily indicate that the quality of the cause of death by firearm is high. Third, due to the complexities involved in the statistical modeling, as well as computational limitations, the incorporation of uncertainty from the redistribution of insufficiently specific or implausible cause-of-death codes has not yet been possible in the GBD 2016. Fourth, method-specific suicide and homicide data were reported by only a subset of countries, and estimates of firearm suicide and homicide were thus based on fewer data than estimates for all suicides and homicides; therefore, underestimation may have occurred in data-poor regions. Fifth, in many locations, the incidence of firearm injury was very low, requiring statistical smoothing to ensure zeroes in vital registration data were incorporated into estimates. Sixth, the study assumes that where a specific cause of death is listed on the death certificate, that death was coded and diagnosed correctly. GBD 2016 does not correct for any systematic bias in coding firearm injury deaths, with the exception of a correction for misdiagnosis of injury deaths in South Africa vital registration data, where a detailed study was available to guide the correction (eAppendix section 2.2.4 in the Supplement). Seventh, unintentional firearm injury deaths, for children in particular, may be misclassified[38]; in other instances, homicides and suicides may be misclassified as unintentional firearm injury deaths, for cases in which there are strong cultural pressures to mitigate legal implications of homicide or to avoid stigma associated with suicide,[39] particularly when intent is not clear. Eighth, the development of a combination proxy measure, which introduced additional uncertainty, was necessary because of a lack of direct measures of firearm ownership in most countries and also because of limitations associated with existing estimates or proxies. Ninth, beyond the scarcity of reliable data on firearm ownership, the role of social or cultural factors that determine willingness to use firearms for suicide, and the extent to which homicide rates may be driven by illegal firearms and not legal ownership, are probable contributors to global variation in firearm-related mortality that were not directly incorporated into these estimates. Tenth, nonlinearities in the trend of data are frequently present, particularly as longer time series of data are analyzed. Annualized rates of change, as reported in the present study, are a simple summary measure that facilitate comparisons across the large number of countries in GBD 2016. Interpreting annual rate of change represents a mean rate of change through time and may provide a misleading presentation of uniform change. This study also reports the annualized rate of change for the most recent decade of data (2006 to 2016) in addition to the rate of change over the entire time series from 1990 to 2016, the linear fit to those data, and annual estimates of levels and rates by location in comprehensive data tables and an online results tool.

Conclusions

This study estimated between 195 000 and 276 000 firearm injury deaths globally in 2016, the majority of which were firearm homicides. Despite an overall decrease in rates of firearm injury death since 1990, there was variation among countries and across demographic subgroups.

ARTICLE INFORMATION

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