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## Injury Deaths Among U.S. Females: CDC Resources and Programs

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### Abstract

Injury death rates are lower for women than for men at all ages, but we have a long way to go in understanding the circumstances of injury fatalities among females. This article presents resources that can be used to examine the most recent data on injury fatalities among females and highlights activities of CDC's Injury Center. The National Center for Injury Prevention and Control's (NCIPC's) Web-based Injury Statistics Query and Reporting System, an online surveillance database, can be used to examine injury deaths. We present examples that show the 2015 number of female fatal injuries by age group and injury cause and method, as well as a 2008–2014 county-level map of female fatal injury rates. In 2015, there were 68,572 injury fatalities of females of age 1 year, equivalent to 1 death every 7 minutes. Injuries were the leading cause of death for females of ages 1–41 years and the sixth-ranked cause of female death overall. Falls were the leading cause of injury death overall (and for women 70 years), unintentional poisonings were second, and motor vehicle traffic injuries were third. NCIPC funds national organizations, state health agencies, and other groups to develop, implement, and promote effective injury and violence prevention and control practices. Five key programs are discussed. Presenting data on injury fatalities is an essential element in identifying meaningful prevention efforts. Further investigation of the causes and impact of female injury fatalities can refine the public health approach to reduce this injury burden.

### Keywords

accidents; age distribution; female; population surveillance; women's health; wounds and injuries

### Introduction

Gender differences in injury risk factors, injury severity, and resulting population injury burden and costs have been documented for multiple specific injury causes; most recently

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suicide, prescription drug overdose, athletic injuries, motor vehicle accidents, and older adult falls.<sup>1-7</sup> Although it appears that a robust literature exists that examines fall and violence-related injuries specifically among women, more often gender is only included in statistical models to examine injury incidence, without delving further into the precipitating circumstances and impact of injuries among girls and women.

This column updates data on fatal injuries among females originally presented in a 2004 study that described the burden of unintentional injuries among U.S. adult women and highlighted selected public health activities at that time that aimed to reduce the burden of injuries.<sup>8</sup> The current column presents data on all leading causes of injury death among women and girls and describes selected current injury prevention work at the U.S. CDC's National Center for Injury Prevention and Control (NCIPC).

### CDC's WISQARS™

All data presented here were generated from CDC's Web-based Injury Statistics Query and Reporting System (WISQARS; [www.cdc.gov/injury/wisqars](http://www.cdc.gov/injury/wisqars)). WISQARS is a public online database that reports recent surveillance data on U.S. fatal and nonfatal injuries, violent deaths, and the estimated cost of injuries based on data from a variety of sources.<sup>9</sup> WISQARS reports deaths according to cause (mechanism; *e.g.*, motor vehicle traffic and poisoning), intent (manner; *e.g.*, unintentional or violence related), and method (*e.g.*, poisoning or firearm) of injury by state, race, Hispanic origin, sex, and age. WISQARS mortality data originate from the National Center for Health Statistics' National Vital Statistics System data files. WISQARS calculates age-adjusted injury rates by the direct method, standardized to the total U.S. population.

Injury cause and intent in the source data are based on *International Statistical Classification of Diseases and Related Health Problems—10th Revision* external cause-of-injury codes. The adverse effects category includes adverse effects of medical care or drugs. Deaths are reported in 10-year-age groups, with the exception of females of unknown age and those <1 year, which are excluded. Injury deaths among infants account for <5% of all deaths in that age group, of which 87.7% are suffocation.<sup>9</sup> Differentiating between sudden infant death syndrome, unknown cause of mortality, and accidental sleep-related suffocation can be challenging and has been discussed elsewhere.<sup>10</sup> Furthermore, unintentional and violence-related injuries among infants have been discussed separately.<sup>11,12</sup>

### Causes of Injury Deaths by Age

Injury and violence-related deaths were the leading cause of death for females of ages 1–41 years and the sixth-ranked cause of female death overall.<sup>9</sup> The WISQARS site can generate four different chart types of the leading causes of death: all deaths, all injuries, unintentional injuries only, and violence-related injuries only. Report options include year (1999–2015), race, Hispanic origin, gender, and age group.

As an example, we reproduced hereunder the most recent annual data, 2015 (Table 1). Squares in Table 1 are broken by cause of death, as well as method for homicide and suicide deaths, with shading to highlight the manner of injury: unintentional injuries (white),

violence or self-harm-related injury (black), or undetermined or adverse effects (gray). In 2015, 68,572 girls age 1 year and women died from injury-related causes, equivalent to 1 every 7 minutes. By manner of death, 53,112 females died from unintentional injuries, 10,199 from suicide, and 3399 from homicide. Visualization of crude death rates from leading causes of injury for females by age group highlights trends in the leading causes of injury burden across the female lifespan (Fig. 1).

Falls were the leading cause of injury death among females overall, and the leading cause of injury deaths among women age 70 years and older (Table 1). Falls were identified as the cause of death for 16,497 women and girls in 2015, or nearly one-quarter of all female injury deaths. Fall-related crude death rates rise dramatically among older females (Fig. 1). Nearly 90% of all fatal falls among females were in the 70 years or older age group.

Unintentional poisonings were the second leading cause of injury death overall (23.4%) (Table 1). The crude death rate from unintentional poisoning among women was highest for women ages 50–59 years (Fig. 1). Motor vehicle traffic injuries were the leading cause of U.S. female injury deaths among those aged 1–19 years and the third leading cause of injury death among females of all ages (10,478 deaths) (Table 1). The crude death rate among women from motor vehicle traffic injuries rose for women to ages 20–29 years, then dropped, and peaked after age 70 years (Fig. 1).

Suicide- and homicide-related deaths are broken out by method on the WISQARS Leading Causes site. Suicides involving poisonings were the fifth leading cause of death (Table 1), accounting for 3409 deaths. Suicide by suffocation (including hanging and strangulation) was the second leading cause of injury death among children and adolescents ages 10–19 years, and the third leading cause for women ages 20–29 years (Table 1). Note that all methods of suicide totaled would rank as the fourth leading cause of injury death among females overall (10,199 deaths; totaling 14.9% of all injury-related deaths among females). Adding all methods of suicide together would make that manner the leading cause of injury death for women ages 60–69 years (1373 deaths) and the second leading cause of injury death for women ages 30–59 years. All suicide deaths are combined in Figure 1, which shows a rise in rates until 50–59 years of age and a decline thereafter.

## Geography of U.S. Female Injury Deaths

The WISQARS site can also generate maps at the state or county level for fatal injuries using combined years. Report options include race, Hispanic origin, sex, age, and several color schemes. Injury-related crude death rates among females vary considerably by region of the country (Fig. 2). Areas with a lower female injury-related death rate include most of New England, the northern Midwestern states, as well as southern Florida, Texas, and California [lowest county = Starr (Texas; 15.77 crude rate)]. Higher female injury-related death rates predominate in the southern middle of the country as well as some western and Midwest states [highest county = Daniels (Montana; 104.98 crude rate)].

## Selected Activities of the NCIPC

NCIPC works to prevent injuries and violence through science and action. It achieves this mission through research, surveillance, implementation of evidence-based strategies, capacity building, and public health messaging. As the lead U.S. federal agency for nonoccupational injury prevention, NCIPC staff work closely in partnership with other federal agencies, national, state, and local organizations, and state and local health departments. In 2012, NCIPC celebrated its 20th anniversary as a federal leader in injury and violence prevention.<sup>13</sup>

NCIPC funds national organizations, state health agencies, and other groups to develop, implement, and promote effective injury and violence prevention and control practices. The activities of NCIPC take a comprehensive approach that works to make the lives of all safer. For this column, we focus on five NCIPC programs that place value on state partnerships, have the potential to uniquely influence the lives of women, and as a group demonstrate the broad swath of programmatic activities at the center.

### The Core State Violence and Injury Prevention Program

The State Violence and Injury Prevention Program strengthens states' capacity to collect and use data to better understand the local injury environment and challenges, plan injury prevention and control efforts, and carry out and evaluate life-saving interventions for their residents. The program currently supports 23 state health departments to implement, evaluate, and disseminate strategies that address the most pressing injury and violence issues, including child abuse and neglect, traumatic brain injury, motor vehicle crash injury and death, and intimate partner and sexual violence ([www.cdc.gov/injury/stateprograms](http://www.cdc.gov/injury/stateprograms)).

### Injury Control Research Centers

Injury Control Research Centers (ICRCs) study ways to prevent injuries and violence and work with community partners to put research findings into action. The ICRC program forms a national network of 10 comprehensive academic research centers that focus on three core functions—research, training, and outreach. ICRCs research focuses on issues of local and national importance, including motor vehicle injuries, interpersonal violence and suicide, opioid overdoses, older adult falls, and traumatic brain injuries. ICRCs also work with states and communities to ensure research is put into action to prevent injuries and violence. Finally, ICRCs play a critical role training and developing the current and next generation of researchers and public health professionals. This helps ensure there is an adequate supply of qualified practitioners and researchers to advance prevention research, address new problems, and reach new populations across the nation ([www.cdc.gov/injury/erpo/icrc](http://www.cdc.gov/injury/erpo/icrc)).

### Rape Prevention and Education

Rape Prevention and Education (RPE) provides funding to state health departments in all U.S. states, the District of Columbia, Puerto Rico, Guam, the U.S. Virgin Islands, and the Commonwealth of Northern Mariana Islands. RPE grantees work collaboratively with diverse stakeholders, including state sexual violence coalitions, educational institutions, law

enforcement entities, rape crisis centers, community organizations, and others to guide implementation of their state sexual violence prevention plans. These collaborations have strengthened states' sexual violence prevention systems, leveraging resources and enhancing prevention opportunities ([www.cdc.gov/violenceprevention/rpe/states.html](http://www.cdc.gov/violenceprevention/rpe/states.html)).

### **Domestic Violence Prevention Enhancements and Leadership Through Alliances, Focusing on Outcomes for Communities United with States**

Domestic Violence Prevention Enhancements and Leadership Through Alliances, Focusing on Outcomes for Communities United with States (DELTA FOCUS) supports prevention of intimate partner violence.<sup>14</sup> Grantees employ strategies that address the structural determinants of health and intimate partner violence. This work may involve issues related to education, employment, reducing gender bias, and more. DELTA FOCUS funds 10 state domestic violence coalitions and each supports one or two coordinated community response teams to implement strategies at the local level ([www.cdc.gov/violenceprevention/deltafocus](http://www.cdc.gov/violenceprevention/deltafocus)).

### **Prescription drug overdose: Prevention for states**

Prevention for states (PFS) is a program that provides state health departments with resources and support needed to advance interventions that combat the ongoing prescription drug overdose epidemic. NCIPC works with states that collaborate with key partners to maximize efforts and address issues that impact prescribing and drug overdoses. Examples of states' activities include making prescription drug monitoring programs easier to use and access, making prescription data timelier, and improving opioid-prescribing interventions for insurers and health systems ([www.cdc.gov/drugoverdose/states/state\\_prevention.html](http://www.cdc.gov/drugoverdose/states/state_prevention.html)).

## **Conclusions**

Previous work documents that motor vehicle traffic-related deaths were the leading cause of injury mortality for women.<sup>8,15,16</sup> Efforts to prevent these deaths have resulted in substantially fewer deaths among women in 2015. Motor vehicle crash-related injuries were one of CDC's Winnable Battles, and the goal to reduce fatalities caused by motor vehicle crashes showed progress despite a slight increase in deaths in 2015.<sup>17</sup>

Drug overdoses, however, have increased dramatically and have overtaken motor vehicle traffic-related deaths as the leading cause of injury death for most age groups.<sup>1</sup> The majority (93%) of female poisoning-related deaths in 2015 involved drugs.<sup>9</sup> Since 2007, more women have died annually from drug overdoses than from motor vehicle traffic injuries,<sup>1</sup> and in 2015, more than five times as many women died as a result of a drug overdose (19,447) as were victims of homicide (3519).<sup>9</sup> Risky prescribing of controlled substances, drug overdose deaths, and drug misuse- and abuse-related emergency department visits among women have risen despite numerous recommendations over the past decade for more cautious use of opioid pain medications and efforts to curb abuse and prevent deaths.<sup>1,18</sup> A recent CDC Grand Rounds focused on the unique challenges of opioid use disorder among women ([www.cdc.gov/cdcgrandrounds/archives/2017/january2017.htm](http://www.cdc.gov/cdcgrandrounds/archives/2017/january2017.htm)).

Another related area of concern is the rise in suicide deaths among women since 1999.<sup>9,19</sup> Men are more likely than women to die from suicide; however, women are more likely to express suicidal thoughts and to make nonfatal attempts than men.<sup>9,20</sup> In the past, suicide was addressed by providing mental health services to people who were already experiencing or showing signs of suicidal thoughts or behavior. Although such services are critical, preventing suicide at a national level will require approaches that go beyond mental health issues to address broader family, community, and societal issues.<sup>21</sup>

Injury-related deaths constitute a tremendous health burden among U.S. women and girls. Understanding the distribution and burden of injury by gender and including gender in statistical models are important, but are just one step in a process. Researchers must analyze and present data in meaningful ways, and study results need to be incorporated into training, curricula, and the practice of public health.<sup>22,23</sup> Beyond the type of data presented here, we know little about the circumstances of many of these injuries, especially for younger and middle-aged women. The burden of injury fatalities is an essential element in identifying meaningful prevention efforts, but further investigation of the causes and impact of female injury fatalities can refine the public health approach to reduce this injury burden. Addressing injuries among females requires a strong framework for research, dissemination, and prevention, each grounded in the current context of U.S. women's lives.

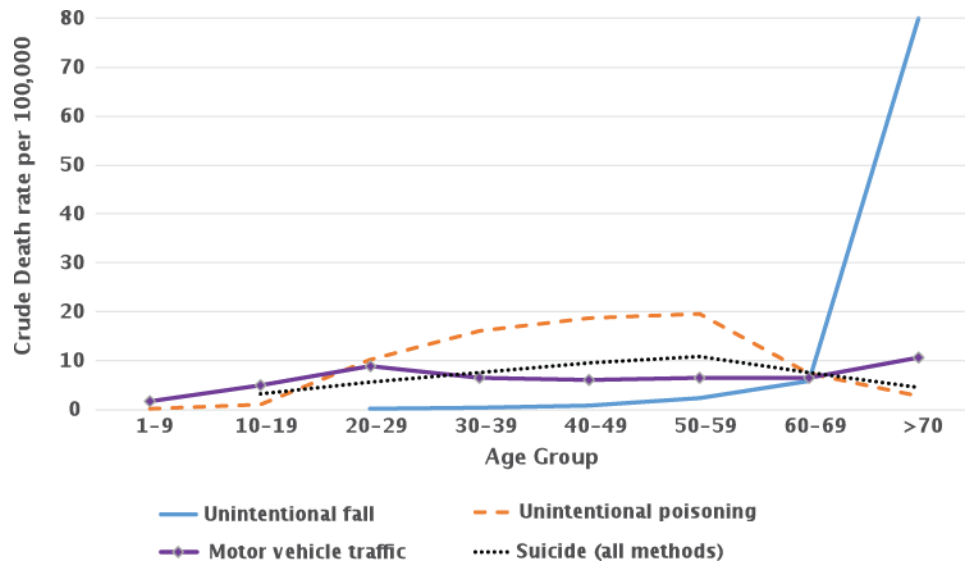
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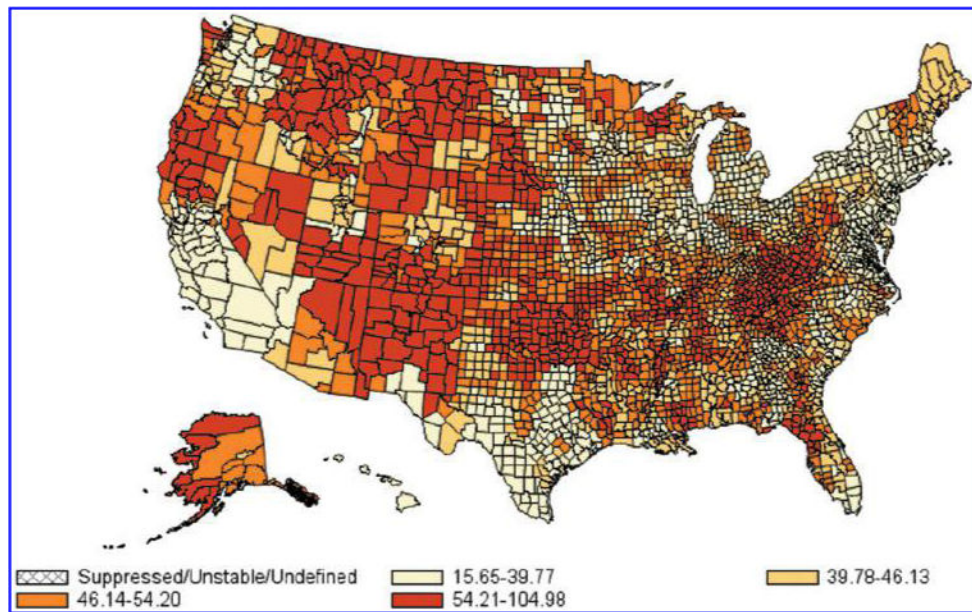


**FIG. 1.**

Crude death rates\* from leading causes of injury deaths for U.S. females by age group and manner, 2015.

\*Crude rates for unintentional falls for females <20 years and for suicide for girls <10 years because there were fewer than 20 cases. Data source: WISQARS (Web-based Injury Statistics Query and Reporting System) [www.cdc.gov/ncipc/wisqars/default.htm](http://www.cdc.gov/ncipc/wisqars/default.htm)





**FIG. 2.**

Crude injury death rates\* per 100,000 U.S. female population, 2008–2014.

\*Smoothed crude death rates per 100,000 population for females  $\geq 1$  year of age. Annualized crude death rate for United States: 38.22; annualized age-adjusted rate for United States: 34.6. Rates have been geospatially smoothed. Produced by the Statistics, Programming, and Economics Branch, National Center for Injury Prevention and Control, CDC. Data source: NCHS National Vital Statistics System. Downloaded from <https://wisqars.cdc.gov:8443/cdcMapFramework>

**Table 1** Number of Deaths from the 10 Leading Causes of Injury Deaths Among U.S. Females by Age Group, Manner, and Method, 2015

Rank	1-9 years	10-19 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70+ years	Total No. (% of total)
1	MV traffic 306	MV traffic 1010	Poisoning 2261	Poisoning 3368	Poisoning 3886	Poisoning 4421	Poisoning 1358	Fall 14,556	Fall 16,497 (24.1)
2	Drowning 155	Suicide suffocation 379	MV traffic 1948	MV traffic 1392	MV traffic 1236	MV traffic 1466	MV traffic 1184	Unspecified 2878	Poisoning 16,036 (23.4)
3	Fire/burn 82	Poisoning 229	Suicide suffocation 535	Suicide firearm 510	Suicide poisoning 760	Suicide poisoning 1022	Fall 1067	MV traffic 1936	MV traffic 10,478 (15.3)
4	Homicide unspecified 70	Homicide firearm 193	Homicide firearm 512	Suicide suffocation 506	Suicide firearm 573	Suicide firearm 742	Suicide poisoning 546	Suffocation 1646	Unspecified 3570 (5.2)
5	Suffocation 61	Suicide firearm 144	Suicide firearm 377	Suicide poisoning 444	Suicide suffocation 478	Fall 544	Suicide firearm 465	Adverse effects 747	Suicide poisoning 3409 (5.0)
6	Homicide firearm 49	Suicide poisoning 92	Suicide poisoning 240	Homicide firearm 406	Undetermined poisoning 335	Suicide suffocation 466	Suffocation 350	Poisoning 489	Suicide firearm 3108 (4.5)
7	Pedestrian 35	Drowning 49	Undetermined poisoning 148	Undetermined poisoning 288	Homicide firearm 323	Undetermined poisoning 367	Unspecified 292	Fire/burn 396	Suicide suffocation 2721 (4.0)
8	Homicide (other) 28	Other land transport 32	Homicide cut/pierce 95	Drowning 109	Fall 190	Suffocation 232	Adverse effects 254	Suicide poisoning 305	Suffocation 2502 (3.6)
9	Poisoning 24	Undetermined poisoning 23	Drowning 80	Homicide cut/pierce 84	Suffocation 107	Homicide firearm 209	Suicide suffocation 217	Suicide firearm 297	Homicide firearm 1945 (2.8)
10	(tie)Struck by or against; natural environmental 23/23	Suicide (other) 23	Homicide unspecified 75	Homicide unspecified 72	Unspecified 94	Unspecified 184	Fire/burn 207	Other (NEC) 265	Undetermined poisoning 1366 (2.0)
Other injury deaths	156	269	612	674	832	1130	727	602	All other 6940 (10.1)
Total injury deaths	1012	2443	6883	7853	8814	10,783	6667	24,117	68,572 (100) <sup>a</sup>

<sup>a</sup> Does not include females <1 year of age (n = 694) or females with unknown age (n = 5).

Cell shading: White, unintentional injuries; Black, violence or self-harm-related injury; Gray, undetermined or adverse effects.

Data source: WISQARS (Web-based Injury Statistics Query and Reporting System) [www.cdc.gov/ncepc/wisqars/default.htm](http://www.cdc.gov/ncepc/wisqars/default.htm)

MV, motor vehicle; NEC, not elsewhere classifiable.

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