



ARIZONA DEPARTMENT OF HEALTH SERVICES

SUICIDE AND SELF-INFLICTED INJURY IN ARIZONA 2008 - 2018

ARIZONA DEPARTMENT OF HEALTH SERVICES
150 N. 18TH AVENUE
PHOENIX, ARIZONA 85007

Executive Summary

Suicide

According to the Centers for Disease Control and Prevention, suicide was the 10th leading cause of death in the United States in 2017. Nationally, nearly 47,000 persons took their lives in 2017 (a national suicide rate of 14.0 per 100,000 persons in the US). In Arizona that same year, suicide was the 8th leading cause of death, with 1,304 certified deaths attributed to suicide among Arizona residents. The adjusted rate of suicide among Arizona residents in 2017 was 18.0 per 100,000 population. The Arizona 2017 suicide rate was 29 percent above the national rate of suicide that year.

In Arizona, as in the US, suicide rates have been rising. From 2008 to 2017, the state age-adjusted rate increased 21.6 percent while the national age-adjusted rate increased by 20.7 percent.

In 2018, suicide remained the 8th leading cause of death, claiming the lives of 1,432 Arizona residents, and contributing substantially to premature mortality with a total of 39,860 years of potential life lost (YPLL), next to unintentional injuries (98,081), malignant neoplasms (83,979), and diseases of the heart (57,395).

In 2018, based on age-adjusted death rate, suicide was the 6th leading cause of death among males (31.5 per 100,000 residents) but ranked 11th among females (7.4 per 100,000 residents). The majority of suicide fatalities occurred at home. Firearm, strangulation/hanging, and poisoning by drugs were the most common mechanisms of suicide in Arizona. In 2018, 55.9 percent of suicides were completed by use of firearms compared to 26.2 percent by means of strangulation and/or hanging. Arizonans aged 10-14 years had the lowest suicide mortality rates, while residents aged 45-54 years, 55-64 years, and those aged 65 and over have experienced higher rates of suicide death among all age groups.

American Indians and White non-Hispanics, regardless of gender, have consistently experienced the highest age-adjusted suicide death rates compared to the other racial/ethnic groups in Arizona. In 2018, American Indians had the highest age-adjusted suicide rate (36.5 suicides per 100,000) among racial/ethnic groups, followed by White non-Hispanics (23.7/100,000), while Asians recorded the lowest age-adjusted suicide rate (7.3/100,000). Trends in suicide rates from 2008 to 2018 demonstrate excessive mortality among White males in comparison to all the other groups in each year, except 2013, and 2016 to 2018.

Suicide mortality rates vary significantly across counties in Arizona. In 2018, Gila (60.5/100,000), La Paz (50.0/100,000), Navajo (48.8/100,000), Apache (41.8/100,000), Coconino (32.2/100,000), and Mohave (30.6/100,000) counties recorded the highest suicide death rates in the state, while Graham residents experienced the lowest suicide rates in the state. Urban /rural differences are also apparent, as rural residents were nearly two times more likely to die from suicide than urban residents.

Among Arizona youths, residents aged 20-24 bear more of the burden of suicide mortality than those less than 20 years of age. In 2018, the relative risk of suicide was 6.4 times greater for Arizonans aged 20-24 years compared to their counterparts aged 10-15 years.

Between 2008 and 2018, there were 2,863 certified veteran suicides. Since 2008, both the number of veteran suicides per year, and the rate of suicide per 100,000 Arizona veterans, have increased. Veteran suicide rates in Arizona (including both residents and non-residents who died by suicide in Arizona) are elevated when compared with those in the Arizona general population, and with those among Arizona non-veterans. The rate of suicide among Arizona resident veterans, when compared to the rate among Arizona resident non-veterans, also demonstrates a sustained pattern of elevated risk. In 2018, the age adjusted rate of suicide among Arizona resident veterans was 2.3 times higher than their non-veteran counterparts. White non-Hispanic Arizona veterans had a higher risk of mortality by suicide than the other racial/ethnic groups. Arizona veterans residing in Gila county had the highest rate of mortality due to suicide (109.8 per 100,000) followed by those living in Mohave county (107.6 per 100,000) and Pima county (60.4 per 100,000). From 2008 to 2018, firearms were consistently the leading mechanism of suicide mortality among veteran residents of Arizona. Non-opioid prescription drugs and poly-drug (more than one drug at once) were the most commonly found substances in suicide cases among Arizona veterans where drug poisoning was the mechanism used.

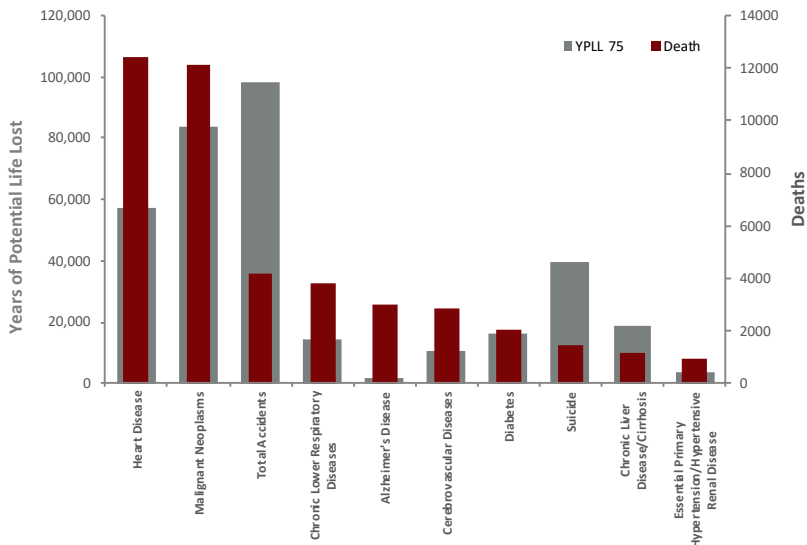
Self-Inflicted Injury

Self-inflicted injuries result from actions of individuals trying to deliberately harm themselves (i.e. behavior with no suicide intent) or kill themselves (i.e. suicide attempt). In 2018, there were 11,811 hospital discharges (4,040 hospitalizations and 7,771 emergency room visits) due to self-inflicted injuries. Self-inflicted injury-related hospital discharges were higher among females than males. For every self-inflicted injury among males, there were nearly two among females.

Among racial/ethnic groups, American Indians experienced the highest rates of hospital discharges (231.8/100,000) due to self-inflicted injury. Poisoning by drugs was the main mechanism of self-inflicted injury in 2018, accounting for 55.1 percent of all self-inflicted injury-related hospital discharges. Health care cost analysis of self-inflicted injury during the period of 2008-2018 shows the magnitude of the economic burden of self-inflicted injury-related hospital discharges on the Arizona health care system. In 2018, self-inflicted injury-related hospital discharge costs were estimated at \$254 million, a two-fold increase from 2008.

A. Suicide: An Overview

Figure 1A
Top 10 leading causes of death and years of potential life lost (YPLL) before age 75 among Arizona residents, 2018

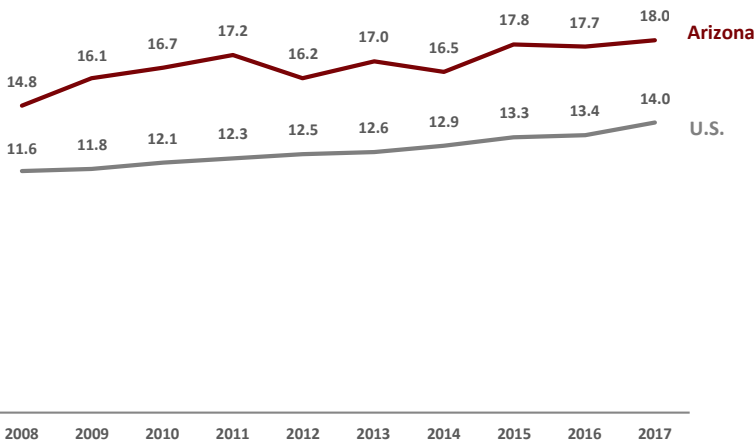


Note: Leading cause of deaths ranking is based on the number of deaths .

Ranking of cause of death is essential in understanding the magnitude of disease/injury in a population. Years of potential life lost (YPLL), a measure of premature mortality, estimates the average years a person would have lived if they had not died prematurely. Reducing YPLL is an important public health goal since it emphasizes preventable death of younger persons.

In 2018, of the 59,206 deaths among Arizona residents, 1,432 deaths or 2.4 percent of all deaths were due to suicide. Suicide ranked 8th among the leading causes of death, but contributed substantially to premature mortality with a total YPLL of 39,860 behind unintentional injuries (98,081), malignant neoplasms (83,979), and diseases of the heart (57,395).

Figure 2A
Age-adjusted suicide mortality rates,^a Arizona versus United States, 2008-2017^b

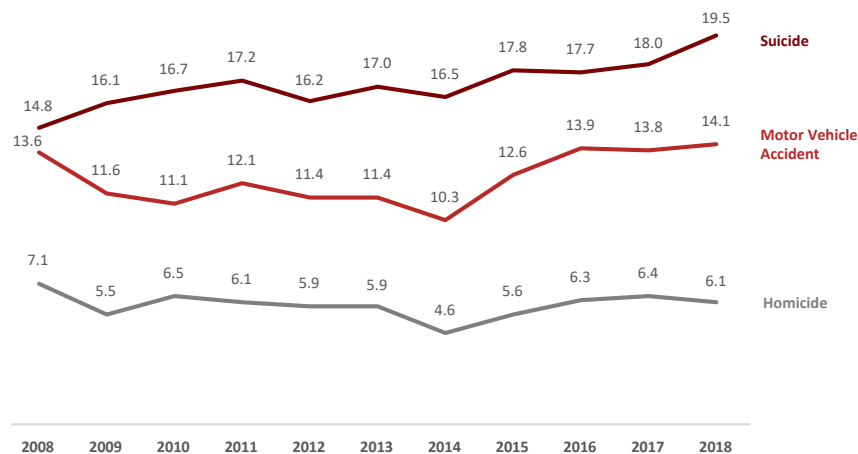


Suicide mortality has been on the rise both statewide and nationally. From 2008 to 2017, the overall US rate increased 20.7 percent, while the Arizona rate increased 21.4 percent during the same period.

Arizona suicide mortality rates have been generally higher than national rates. In 2017, the suicide rate among Arizona residents (18.0/100,000) was 28.8 percent higher than the national rate (14.0/100,000).

Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.
^b 2018 National data not currently available

Figure 3A
Age-adjusted mortality rates^a for suicide, motor vehicle accident, and homicide: Arizona, 2008-2018



Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

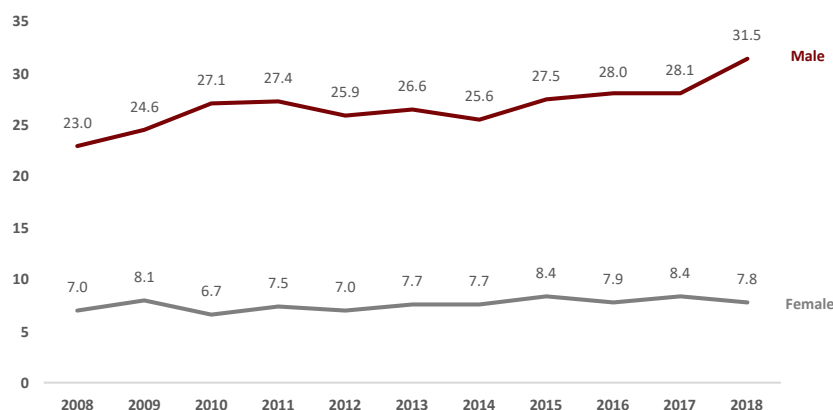
In 2018, more Arizonans died of suicide (n=1,432) than motor vehicle crashes (n=1,032) and homicides (n=416), making suicide the leading cause of violent death in Arizona for that year.

Prior to 2008, suicide rates were consistently higher than homicide rates, but interestingly were lower than motor vehicle traffic mortality rates.

Largely due to declines in motor vehicle traffic death rates, the suicide rate surpassed, and has remained higher than the rate of motor vehicle traffic death.

In 2018, 19.5 out of 100,000 Arizonans died of suicide, compared to 14.1 per 100,000 who died in a motor vehicle accident, and 6.1 per 100,000 who died from homicide.

Figure 4A
Age-adjusted mortality rates^a for suicide by gender and year: Arizona, 2008-2018



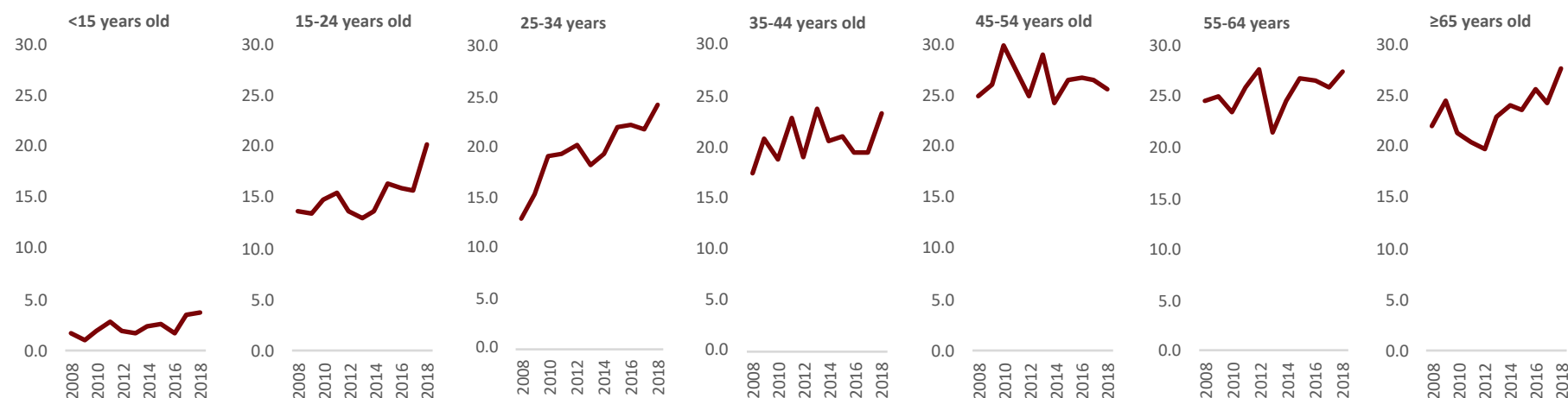
Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

Historically, suicide mortality in Arizona has been consistently higher among males than females. The general trend during the period under study shows an excess of male suicide mortality compared to female suicide death. From 2008 to 2018, on average, for each female suicide, there were nearly four male suicides.

The relative risk of suicide (i.e. male to female ratio) has increased from 3.3 in 2008 to 4.0 in 2018. This demonstrates that suicide rates have increased for both genders from 2008 to 2018, but more so for males (37.0 percent increase) than females (11.4 percent).

In 2018, more males (1,146) than females (286) lost their lives to suicide, making suicide the sixth leading cause of death among males and the 11th leading cause among females. During the same year, the male suicide death rate (31.5/100,000) was four times higher than the female rate (7.8/100,000).

Figure 5A
Age-specific suicide mortality rates^a by age group:
Arizona, 2008-2018



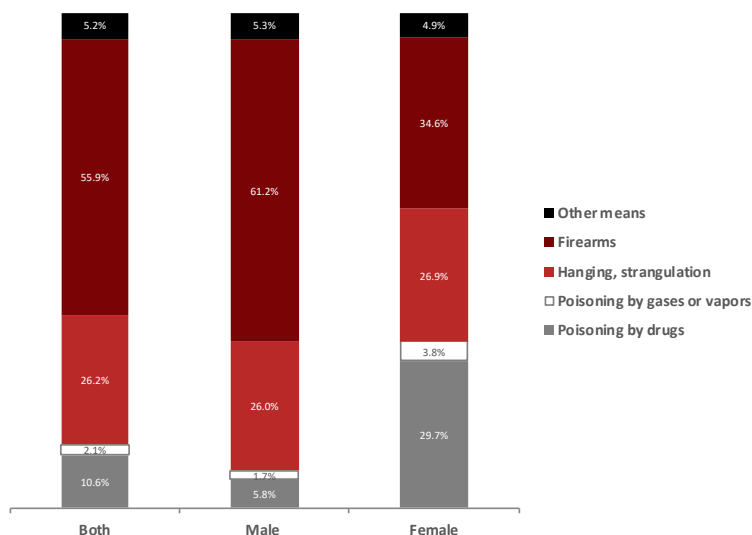
Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

In Arizona, residents aged 10-14 years had the lowest suicide mortality rates while residents aged 45-54 years, 55-64 years, and those aged 65 and over had higher rates of suicide death among all age groups.

From 2008 to 2018, suicide death rates have been rising for all age groups. Children under age 15 have seen a 2-fold increase in suicide rate, followed closely by adults aged 25-34 (1.9 fold). All the remaining groups experienced an increase of 1.5 or less.

Detailed information on counts and suicide rates during the period 2008-2018 is provided in Table 1 (**Appendix**).

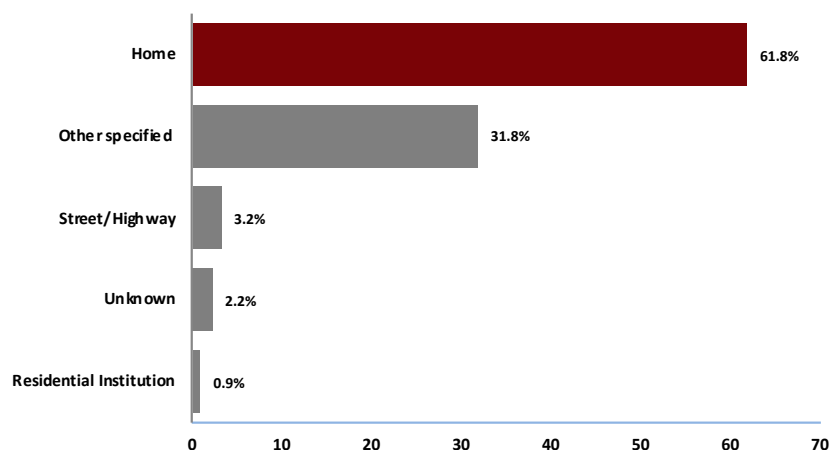
Figure 6A
Mechanisms of suicide mortality by gender:
Arizona, 2018



In 2018, firearm, suffocation/hanging and poisoning by drugs were the most common mechanisms of suicide in Arizona. Of the 1,432 suicide deaths reported among Arizona residents, over 55.9 percent of suicides were completed by use of firearm (n=800) compared to 26.2 percent by means of strangulation and/or hanging (n=375), and 10.6 percent by means of drugs (n=152).

In 2018, firearm was the leading mechanism of suicide among both Arizona males and females. However, the use of firearms was greater among male suicides (61.2 percent) than female suicides (34.6 percent). There are significant gender differences in the other most common methods of suicide. Females tend to more frequently use methods such as poisoning by drugs (29.7 percent) and hanging or strangulation (26.9 percent) than males.

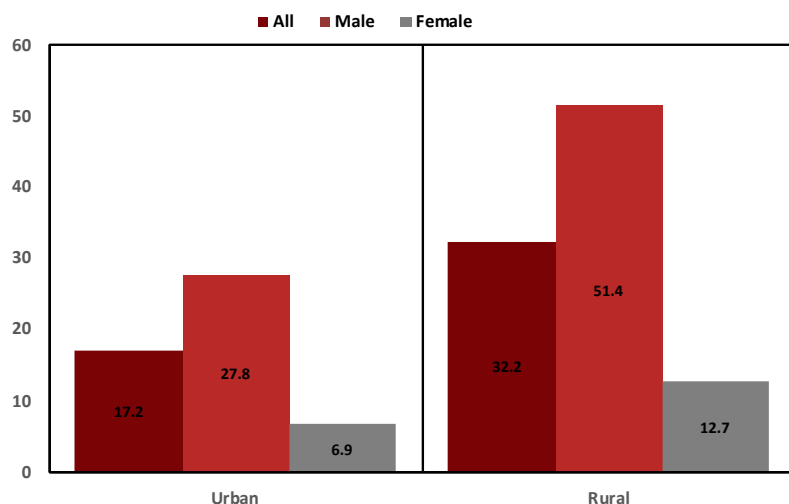
Figure 7A
Suicide death by place of occurrence: Arizona, 2018



The place where the event that caused the death occurred is recorded on the death certificate to provide context to mortality from external causes such as suicide. In 2018, of the 1,432 suicide deaths recorded among Arizona residents, 61.8 percent occurred at home.

Approximately one-third of suicide fatalities were classified under the category "Other specified" which includes areas such as farms, fields, sports and athletics spaces, and schools.

Figure 8A
Age-adjusted mortality rates^a of suicide by urban/rural areas: Arizona, 2018

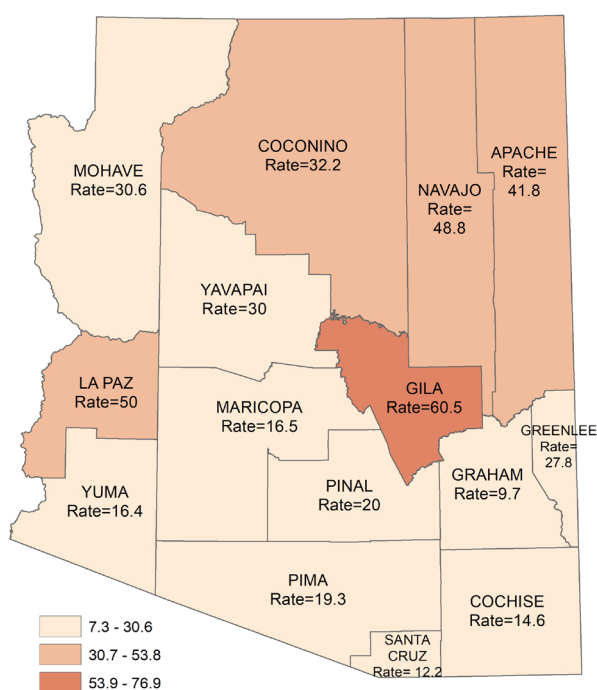


Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

In Arizona, suicide mortality rates are generally higher in rural settings than urban areas. In 2018, rural residents died of suicide at increasingly higher rates (32.2/100,000 population), nearly two-fold greater than their urban counterparts (17.2/100,000 population).

Across the board, rural males experienced the highest rate of suicide death (51.4/100,000 population), while urban females had the lowest suicide mortality rates (6.9/100,000).

Figure 9A
Age-adjusted mortality rates^a of suicide by county of residence: Arizona, 2018

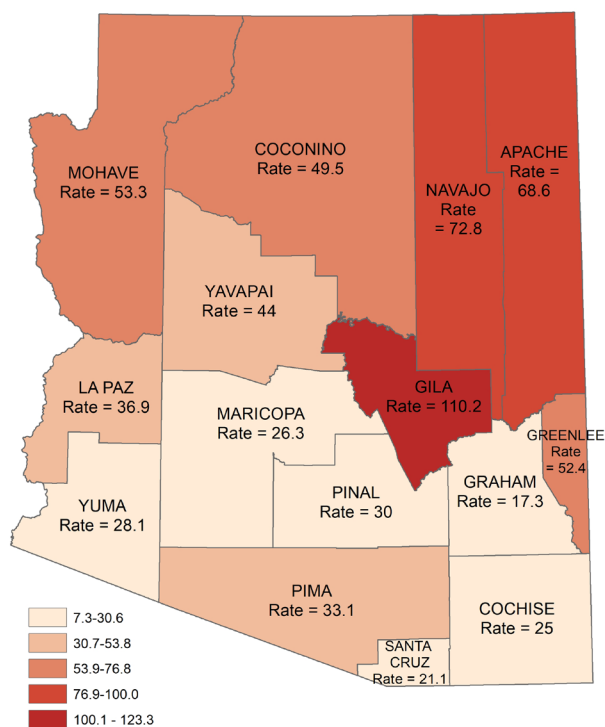


Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

Suicide mortality rates vary significantly between counties in Arizona.

In 2018, only 6 out of 15 counties recorded age-adjusted suicide death rates lower than the state rate of 19.5 per 100,000 population. Gila (60.5/100,000), La Paz (50.0/100,000), Navajo (48.8/100,000), Apache (41.8/100,000), Coconino (32.2/100,000), Mohave (30.6/100,000) Counties recorded the highest suicide death rates compared to the rest of the state. Graham residents experienced the lowest suicide rates in the state.

Figure 10A
Age-adjusted mortality rates^a of Male suicide by
county of residence: Arizona, 2018



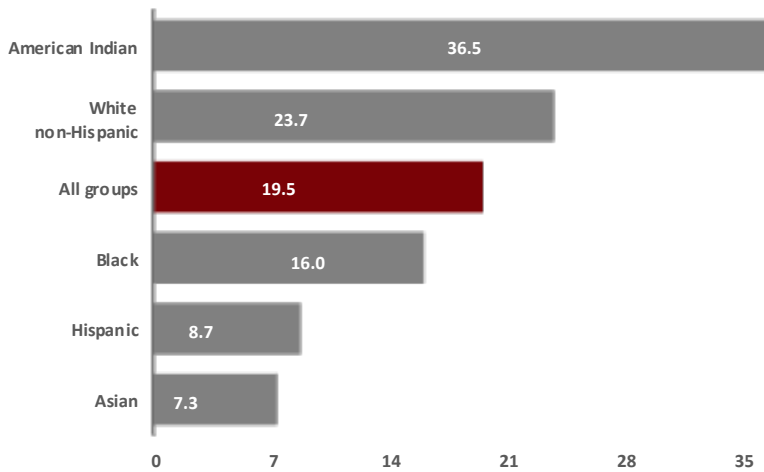
Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

In Arizona, males have been found to have an excessively higher rate of suicide compared to females. We were particularly interested in identifying significant patterns in male suicide in Arizona by county of residence.

County analysis reveals that in 2018 male suicide rates were the highest in Gila (110.2 per 100,000 population), Navajo (72.8 per 100,000 population), Apache (68.6 per 100,000 population), Mohave (53.3 per 100,000 population), Greenlee (52.4 per 100,000 population), and Coconino (49.5 per 100,000 population). The lowest suicide rate recorded in 2018 was in Santa Cruz with an age-adjusted rate of 21.1 per 100,000 population.

B. Suicide: Race/Ethnicity Disparities

Figure 1B
Age-adjusted mortality rates^a of suicide by race/ethnicity: Arizona, 2018



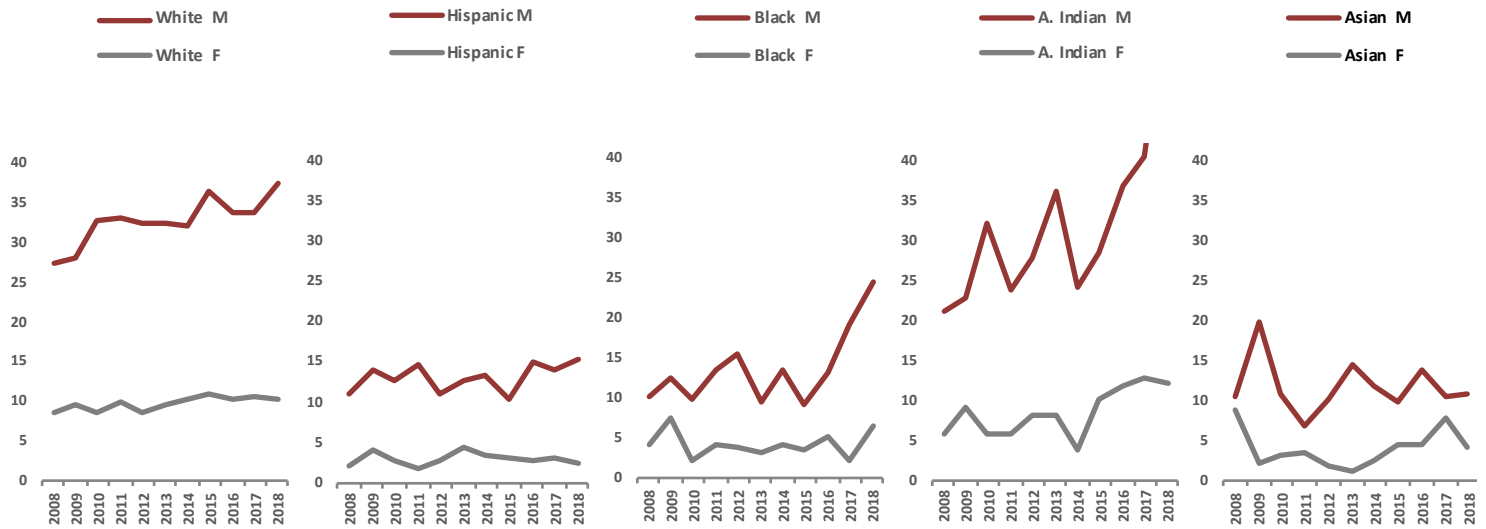
Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

As in mortality from any cause, race/ethnicity disparities are apparent in suicide mortality.

In 2018, suicide death rates for American Indians (36.5 suicides per 100,000 population) were the highest of any racial and ethnic group in Arizona. A similarly high rate is observed among White non-Hispanics with a suicide mortality rate of 23.7 deaths per 100,000 population.

In contrast, Asians recorded the lowest age-adjusted suicide rate (7.3/100,000).

Figure 2B
Age-adjusted mortality rates^a of suicide by
race/ethnicity and gender: Arizona, 2008-2018



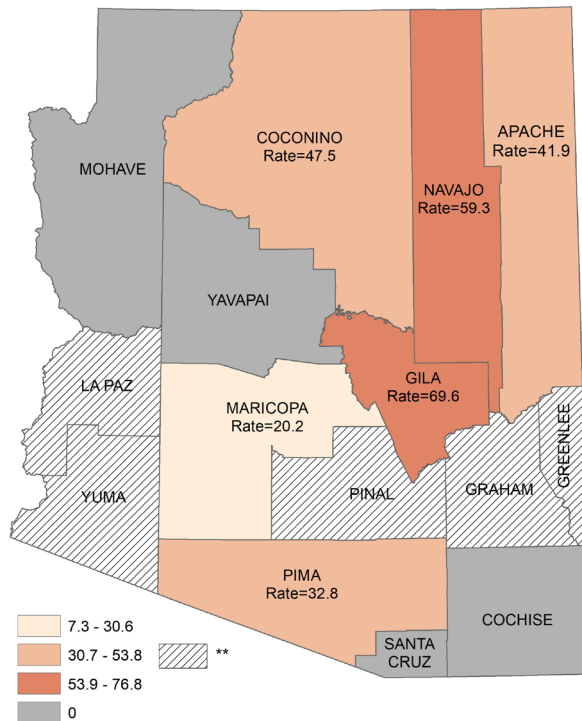
Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

White non-Hispanics and Native Americans, regardless of gender, have consistently experienced the highest age-adjusted suicide death rates compared to the other racial/ethnic groups in Arizona. During 2008-2018, the highest suicide death rates were recorded among White males, except in 2013, and 2016-2018 when the highest rates were observed among Native American males (Figure 2B).

From 2008-2018, suicide mortality rates have been rising among most of the race/ethnic groups and increases were observed for both males and females. Further details on the historical suicide counts and age-adjusted mortality rates by race/ethnicity and gender are provided on Table 2 and Table 3, respectively (**Appendix**).

Between 2008 and 2018, American Indians have recorded the greatest increase in suicide mortality rates among all the groups. During the same period, suicide mortality rates among this group have increased by near three-fold among males, and by two-fold among females.

Figure 3B
Age-adjusted mortality rates^a of suicide among
American Indians by county of residence,
Arizona, 2018



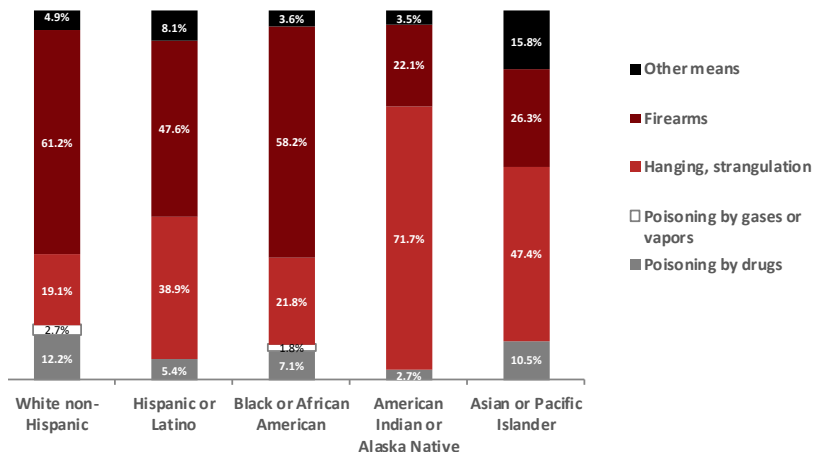
Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard;

** Rate suppressed due to non-zero suicide count less than 6.

The geographic distribution of suicide rates in Arizona was particularly important to analyze among American Indians to understand the magnitude and variations of the issue among this racial/ethnic group.

In 2018, American Indians living in Gila county had the highest rate of suicide, at 69.6 deaths per 100,000 population, followed by those residing in Navajo county (59.5 per 100,000), Coconino (47.5 per 100,000) and Apache (41.0 per 100,000).

Figure 4B
Mechanisms of suicide mortality by race/ethnicity:
Arizona, 2018



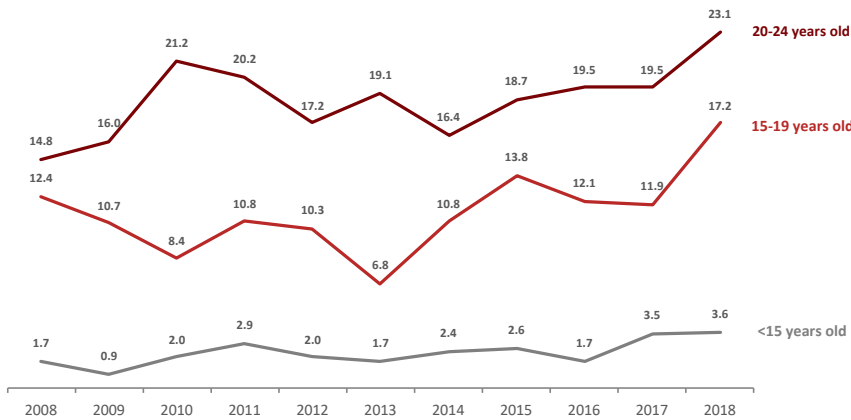
In 2018, of all the suicides recorded, most involved the use of firearms (55.9 percent) and suffocation (hanging or strangulation) methods (26.2 percent).

Firearms were the most common method of suicide among White non-Hispanics, Black or African Americans, and Hispanic or Latinos, while strikingly, strangulation was the leading mechanism of suicide among American Indians and Asians or Pacific Islanders.

White non-Hispanics account for the greater proportion of suicide deaths where poisoning by drugs was involved.

C. Youth Suicide

Figure 1C
Age-specific suicide mortality rates^a among youth
aged 10-24 years: Arizona, 2008-2018



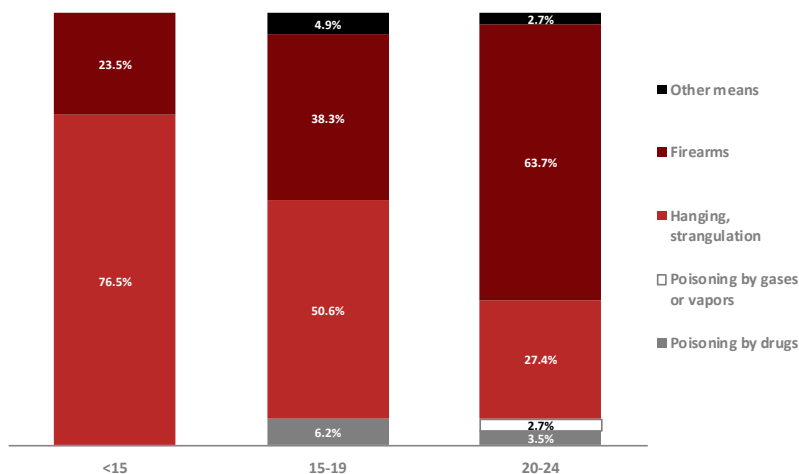
Note: ^a Number of deaths per 100,000 population in a specified age group.

From 2008-2018, residents aged 20-24 years had consistently higher rates of suicides than their younger counterparts.

In 2018, the relative risk of suicide among Arizonans aged 20-24 years was 6.4 times greater than the suicide death rate of those aged 10-15 years, but 1.3 times higher than Arizonans aged 15-19 years.

Compared to older Arizonans (aged 20 years or older), suicide death rates of those under 20 years of age, remained the lowest.

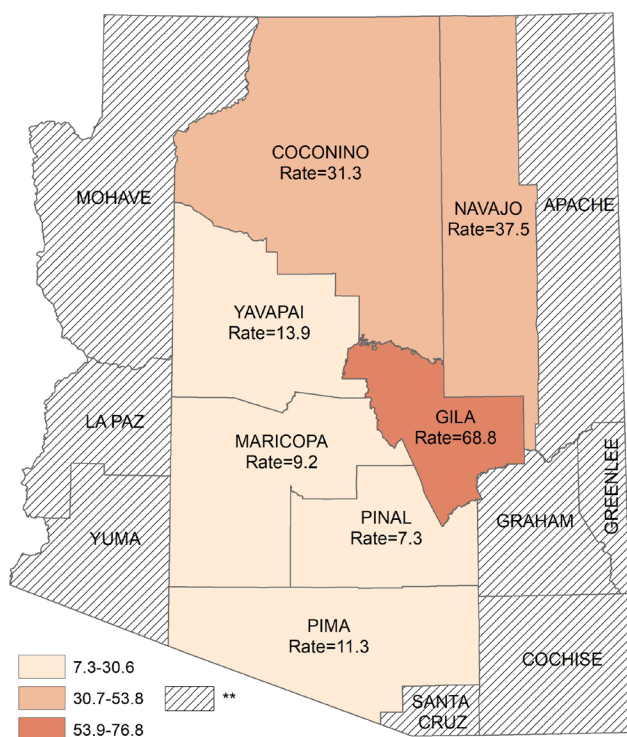
Figure 2C
Mechanisms of suicide mortality among youth aged
10-24: Arizona, 2018



Methods of suicide in Arizona differ by age groups among youth. In 2018, hanging or strangulation was the leading mechanism of suicide among Arizona children under age 15, while 23.5 percent occurred by means of firearms.

Among youth aged 15-19 years, hanging or strangulation was also the leading mechanism of suicide, while among those aged 20-24 years firearms were used more frequently.

Figure 3C
Age-specific suicide mortality rates^a among youth
aged 10-24 years by county of residence, Arizona, 2018



Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard;

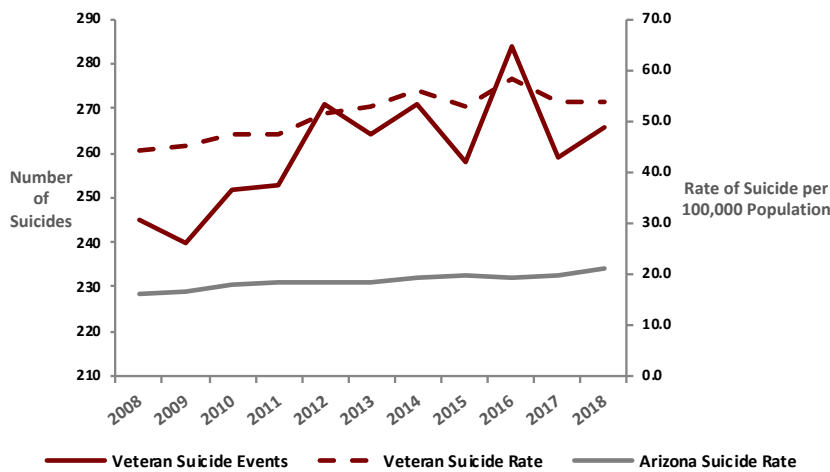
** Rate suppressed due to non-zero suicide count less than 6.

Detailed analysis of youth suicide in 2018 demonstrates large differences of suicide mortality risk by county of residence.

In 2018, the risk of suicide mortality among Arizona youth was disproportionately higher in Gila county than any other county in the state. There were 68.8 suicide deaths per 100,000 among young Arizonans residing in Gila, 37.5 suicide deaths per 100,000 among those living in Navajo county and 31.3 suicide deaths per 100,000 in Coconino county for that same age group.

D. Veteran Suicide

Figure 1D
Number of suicides and rates of suicide among Veterans^a in Arizona: 2008-2018

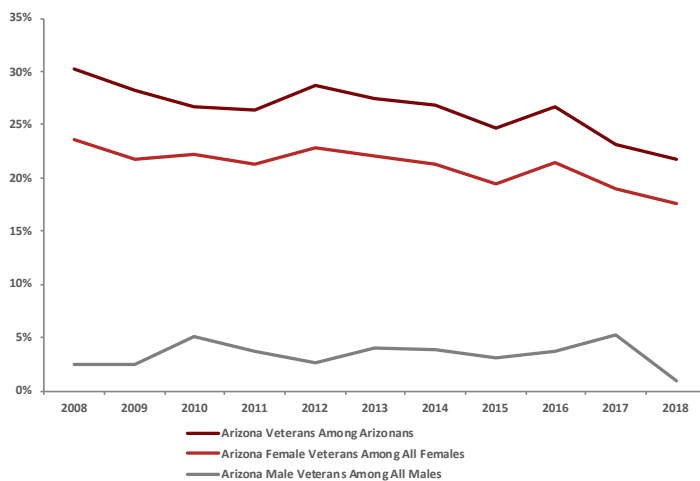


Note: ^a Count include both residents and non-residents.

Veteran suicide rates in Arizona (including both residents and non-residents who died by suicide in Arizona) are elevated when compared with those in the Arizona general population. Detailed information on suicide counts and rates during the period 2008-2018 is provided on Table 4 (Appendix).

Between 2008 and 2018 there were 2,863 certified veteran suicides recorded in Arizona. During the same period, the number of veteran suicides has increased by 8.6 percent, while suicide rate among this group has witnessed a 20.4 percent surge.

Figure 2D
Proportion of Arizona veteran suicides among all suicides^a occurring in Arizona, 2008-2018

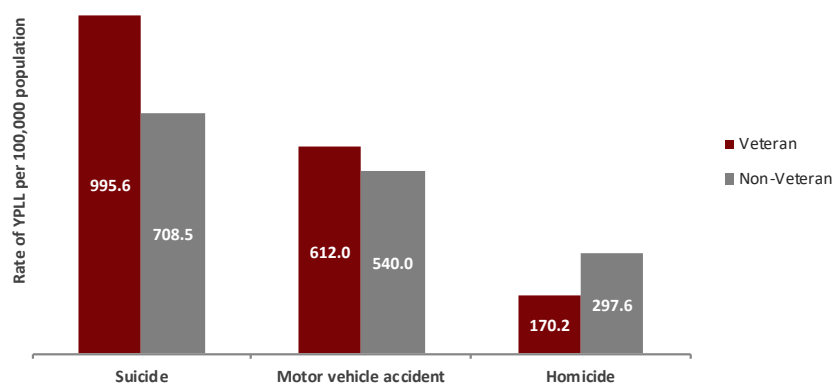


Note: ^a Count include both residents and non-residents.

While estimates of the Arizona veteran population differ, the proportion of veteran suicides among all Arizona suicides has declined. According to the American Community Survey (U.S. Census Bureau), the population of Arizona veterans has declined from 551,053 (8.5% of Arizona population) in 2008 to 496,239 (6.9% of Arizona population) in 2018.

The rising rate of Arizona veteran suicides is accelerated by both an increase in the number of Arizona veteran suicides, and a declining overall population of Arizona resident veterans. The increasing number of Arizona veteran suicides is reflective of similar, larger increases in the total number of Arizona suicides, explaining the slowly declining proportion of Veteran suicides among all Arizona suicides.

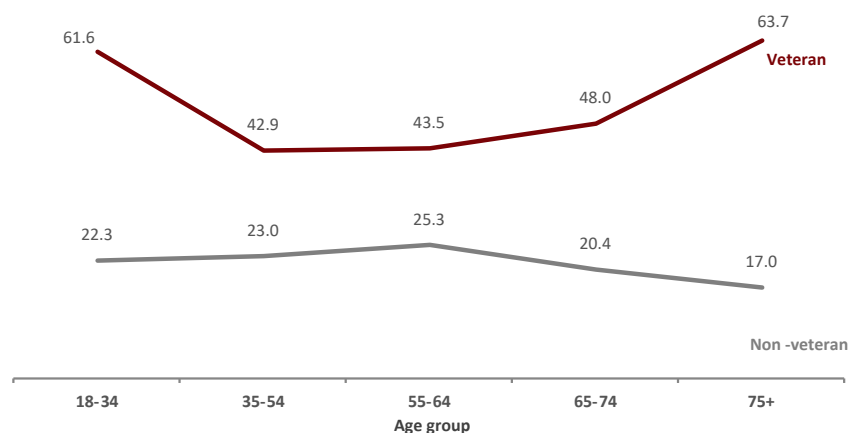
Figure 3D
Years of potential life lost due to suicide by veteran status: Arizona, 2018



Years of potential life lost (YPLL) measures the importance of premature mortality. Figure 3D shows the burden of premature death due to suicide by veteran status, in juxtaposition to other violent deaths. In 2018, suicides accounted for more premature deaths than motor vehicle accidents and homicides. The rates of YPLL due to suicide were the highest of all violent deaths, regardless of veteran status.

A detailed comparison by veteran status, confirmed that suicide represents a serious public health problem among veterans. The 2018 rate of premature mortality due to suicide among veterans (995.6 YPLL per 100,000 veterans 18 years or older) was 40.5 percent higher than that of civilians (708.5 YPLL per 100,000 per 100,000 non-veterans 18 years or older).

Figure 4D
Age-specific mortality rates^a due to suicide by veteran status: Arizona, 2018



Across the life span, the risk of mortality due to suicide is generally higher among veterans than non-veterans.

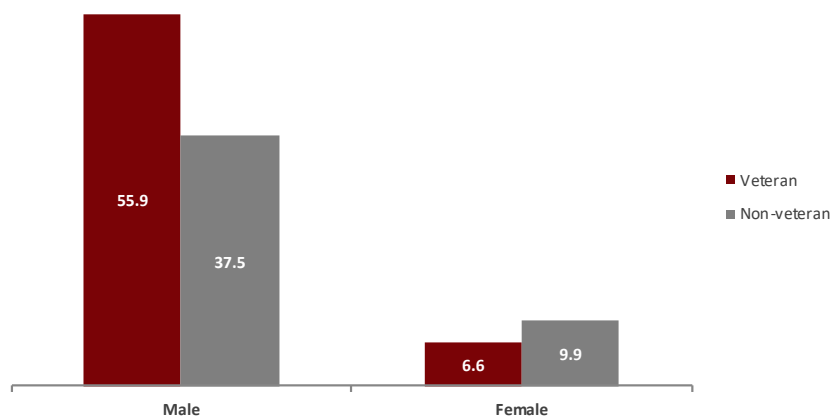
In 2018, the relative risk of suicide was 3 times higher among veterans aged 18-34 years compared with the same age group among non-veterans.

The relative risk of suicide was on average 1.8 for those aged 35-54 years and 55-64 years, then increased to 2.4 among those aged 65-74 years and 3.7 among those aged 75 years or older.

In 2018, the oldest veterans (75 years or older) had the highest risk of suicide (63.7 per 100,000), whereas the highest risk of suicide among non-veterans was for those aged 55-64 years (25.3 per 100,000).

Note: ^a Number of deaths per 100,000 population in a specified age group.

Figure 5D
Mortality rates^a due to suicide by gender and veteran status: Arizona, 2018



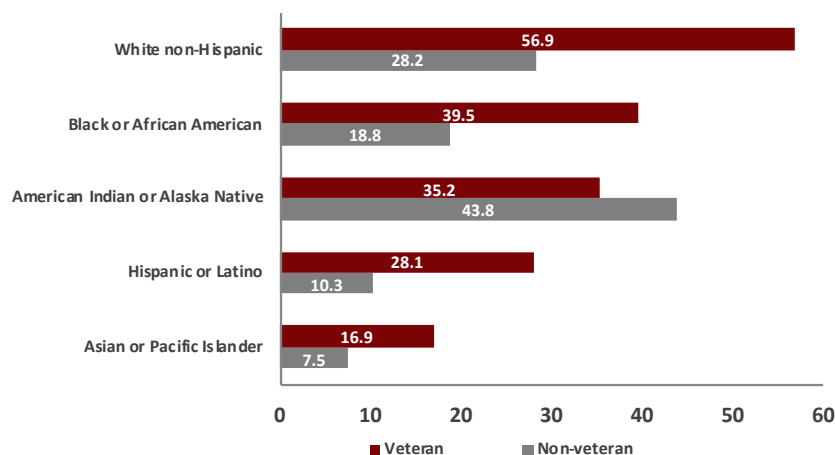
Note: ^a Number of deaths per 100,000 population aged 18 years or older.

Various analyses on gender disparities in suicide mortality show higher a death rate among males than females.

Comparison based on veteran status, underlines the elevated rate of male suicide among Arizona residents, veterans, and civilians alike.

In 2018, males recorded the highest percentage of all suicide fatalities, approximately 99 percent among veterans and 76 percent among civilians. Male veterans experienced markedly higher mortality than did male civilians. Suicide mortality rate for male veterans (55.9 per 100,000) was 49 percent higher than that of their non-veteran counterparts (37.5 per 100,000).

Figure 6D
Mortality rates^a due to suicide by race/ethnicity and veteran status: Arizona, 2018

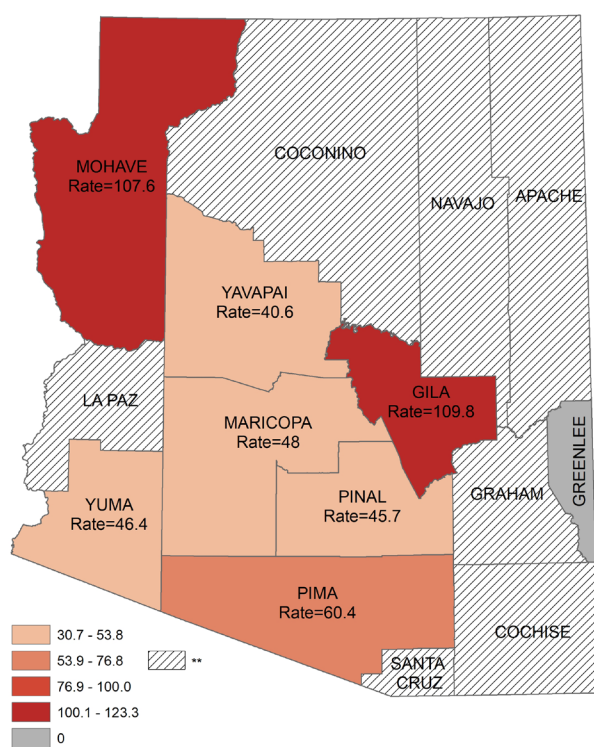


Note: ^a Number of deaths per 100,000 population aged 18 years or older.

Race/ethnicity analysis among Arizona resident veterans shows consistent disparities in mortality rates. In 2018, across all racial/ethnic groups, veterans had higher suicide death rates than non-veterans, except among American Indians, where civilian mortality rates due to suicide were higher than that of veterans.

Analyzing racial/ethnic inequalities in suicide rates among veteran suicides demonstrate that White non-Hispanic veterans were more likely than any other racial ethnic groups to die by suicide.

Figure 7D
Age-adjusted mortality rates^a of suicide among
Arizona resident veterans by county of residence:
2008-2018

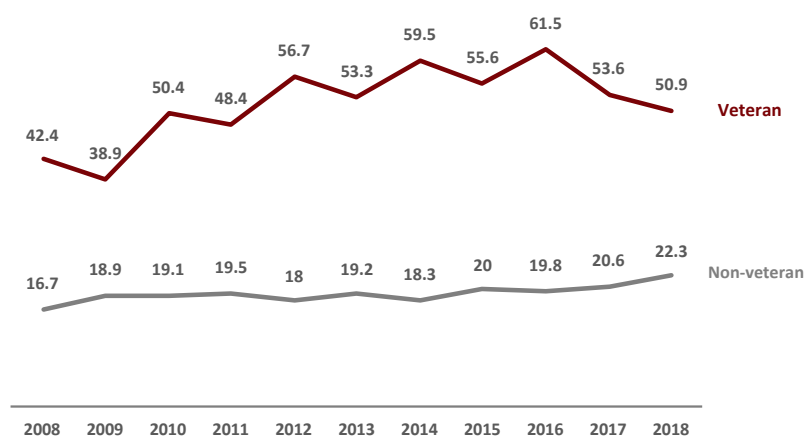


Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard;

** Rate suppressed due to non-zero suicide count less than 6.

Geographic distribution of suicide death among veterans revealed counties with the greatest burden of suicide mortality among veterans. Arizona veterans residing in Gila county had the highest rate of mortality due to suicide (109.8 per 100,000) followed by those living in Mohave county (107.6 per 100,000) and Pima county (60.4 per 100,000).

Figure 8D
Age-adjusted mortality rates^a of suicide by veteran
status: Arizona, 2008-2018

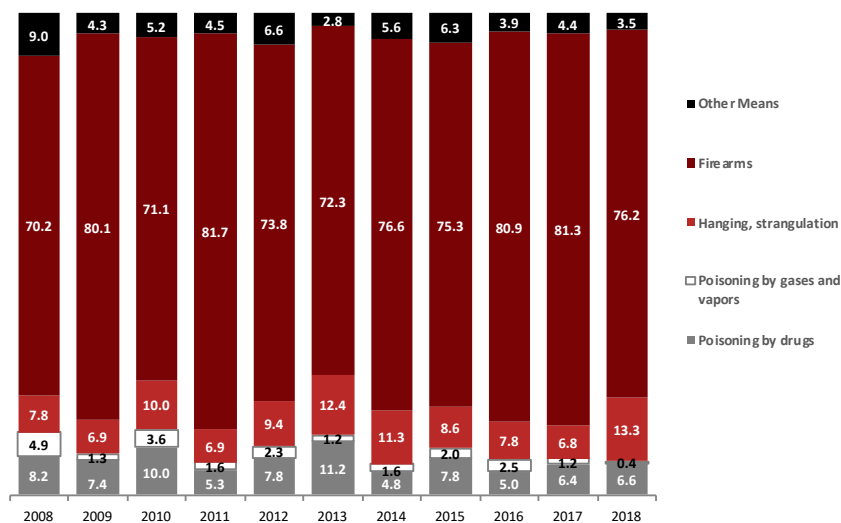


Suicide mortality by veteran status among Arizona residents was examined to assess the extent of differences in suicide risk among veterans and non-veterans during the 11-year period from 2008-2018.

In each year since 2008, the age-adjusted veteran suicide rate was consistently two to three times higher than that of their civilian counterparts.

Note: ^a Number of deaths among persons aged 18 years or older per 100,000 population age-adjusted to the 2000 U.S. standard.

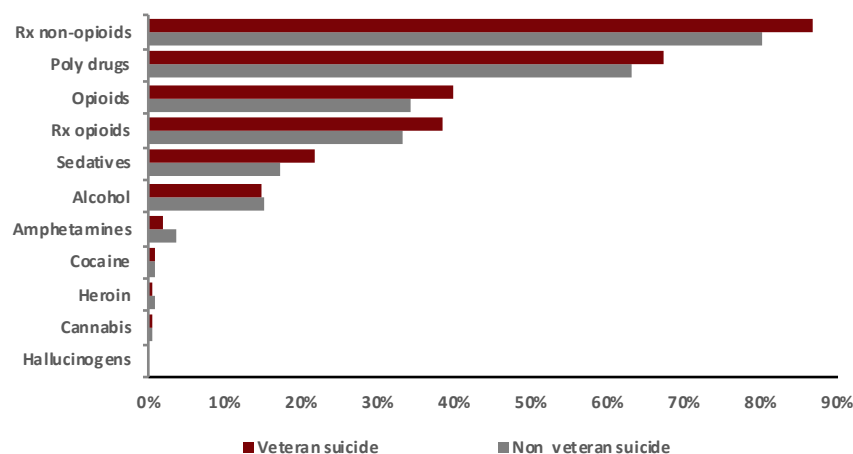
Figure 9D
Mechanism of suicide mortality among veterans:
Arizona, 2008-2018



From 2008 to 2018, firearms were consistently the leading mechanism of suicide mortality among veteran residents of Arizona. The use of firearms in suicide was at its peak in 2011 as a firearm was the mechanism for 81.7 percent of suicides.

During the 11-year study period, the proportion of suicides by means of hanging or strangulation was largest in 2018, while the share of suicide deaths involving drug poisoning was at its largest in 2013.

Figure 10D
Substance use in suicide mortality by veteran status:
Arizona, 2008-2018



A closer look at substance use and suicide from 2008 to 2018, revealed the common types of substances involved in suicide among Arizona resident veterans. These include alcohol, amphetamines, cannabis, cocaine, hallucinogens, heroin, opioids, prescription opioids, prescription medications, and sedatives.

From 2008 to 2018, the analysis shows that non-opioid prescription drugs and poly-drug were on average the largest categories observed in suicide cases among Arizona veterans and non-veterans alike.

Opioids and prescription opioids were present in 39.8 percent and 38.6 percent of veteran suicide deaths, respectively.

Figure 11D
Distribution of veteran suicide deaths by occupation:
Arizona, 2008-2018



Veteran suicide mortality was analyzed by occupation to provide insight on its burden in the workplace. Combined 2008-2018 veteran suicide deaths were used to examine the distribution of veteran suicides by broad occupation categories.

Of all veteran suicides recorded during the 11-year study period, the highest percentage of veterans who died by suicide were in the professional management/ supervision/ direction category (11.2 percent), followed by building remodeling/construction industry (8.9 percent), technical/engineering/electronic (7.7 percent), and industrial/manufacturing (7.1 percent). During the same period, the lowest percentages of suicides among veterans were in religious worker/minister group (0.2 percent) and mining/minerals group (0.2 percent).

Veteran suicide risk assessment

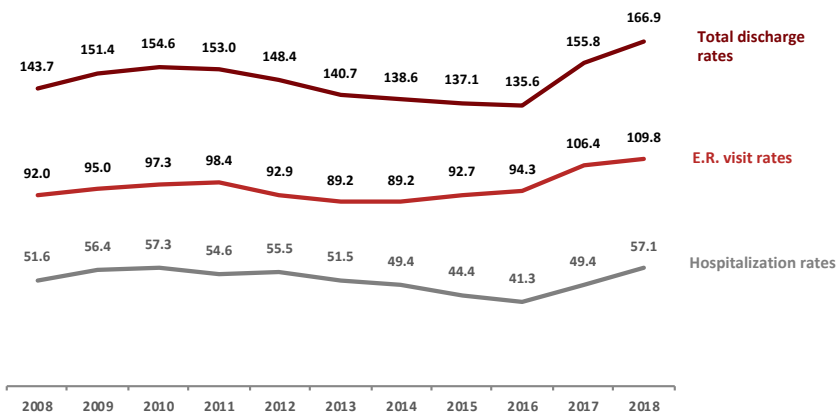
Using multiple linear regression, an analysis of risk factors of suicide among veterans was attempted to predict veteran suicide mortality using variables such as population density, educational attainment rate, unemployment rate, poverty rate, disability status, percent of white non-Hispanics, and percent of American Indians within the state. It was particularly interesting to look at population density as a possible risk factor in order to inform suicide prevention services within the state.

The findings of the analysis revealed that veteran suicide rate is associated with disability status. The risk of suicide is significantly higher when disability is present.

All the remaining variables did not appear to explain veteran suicide mortality as their effects were not statistically significant.

E. Self-inflicted Injuries

Figure 1E
Hospital discharge rates^a due to self-inflicted injury by type of encounter^b: Arizona 2008-2018



Note: ^aRate per 100,000 population. ^b On October 1, 2015, a new revision of the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding Systems (ICD-10-CM/PCS) was implemented in replacement of the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) for reporting medical diagnoses in healthcare settings. The transition to ICD-CM has some impact on comparability of hospital discharges data and continuity of statistical trends. Any comparison of hospital discharge events between 2015 and previous years should take into account the differences between the classification systems.

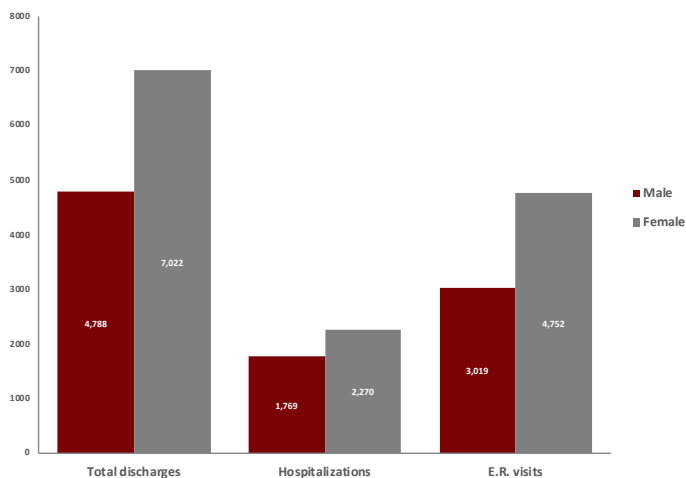
Self-inflicted injuries result from actions of individuals trying to deliberately harm themselves (i.e. behavior with no suicide intent) or kill themselves (i.e. suicide attempt).

In 2018, there were 11,811 hospital discharges (4,040 inpatient stays and 7,771 emergency room visits) due to self-inflicted injuries. Compared to the number of Arizonans who died from suicide (n=1,432) in 2018, this translates to 1 suicide for every 8 self-inflicted injuries.

Trends in annual rates of hospital discharges due to self-inflicted injury have been increasing. Between 2008 and 2018, there was an increase of 16 percent in total self-inflicted injury-related hospital discharge rates, with a 10.1 percent increase in hospitalization rates and 19.3 percent increase in E.R. visit rates due to self-inflicted injury.

Rates of self-inflicted injury-related hospital discharges throughout 2008-2018, do not mirror rates of suicide mortality during the same period.

Figure 2E
Hospital discharge rates^a due to self-inflicted injury by gender: Arizona 2018



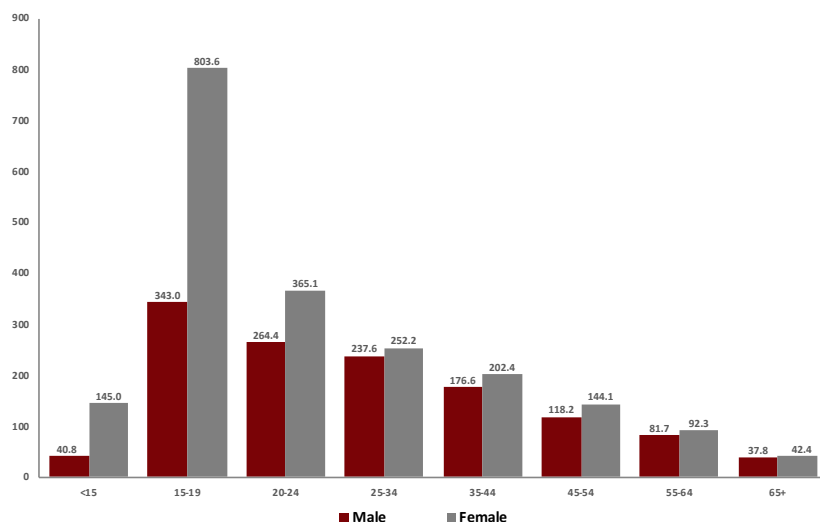
Note: ^aRate per 100,000 population.

Gender-specific analysis of self-inflicted injury revealed differences in the frequency of hospital encounters. In 2018, self-inflicted injury resulting in hospital stays or E.R. visits were remarkably higher among Arizona females than their male counterparts. Out of 11,810 total hospital discharges, 59.5 percent were recorded among female residents.

Arizona females comprised 56.2 percent of hospitalizations due to self-inflicted injuries, a proportion that is 1.3 times higher than that of Arizona males.

Similarly, the frequency of E.R. visits was almost twice as great for female residents (61.2 percent) than male residents (38.8 percent).

Figure 3E
Hospital discharge rates^a due to self-inflicted injury by age and gender: Arizona, 2018



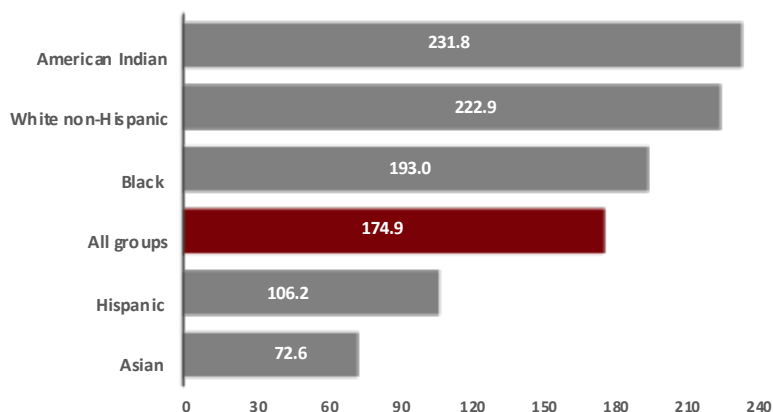
Note: ^a Rate per 100,000 population.

In 2018, the rates of hospital discharges due to self-inflicted injuries were consistently greater in Arizona females than their male counterparts throughout the life span, except for residents aged 65 years or older.

For both genders, the rate of hospital discharges due to self-inflicted injury noticeably peaked at ages 15-19 years and 20-24 years.

However, gender disparity in hospital utilization resulting from self-inflicted injury was most striking among Arizonans aged less than 15 years. The gender gap for that age group can be translated to a ratio of 4 female self-inflicted injury hospital discharges for every male self-inflicted injury hospital discharge.

Figure 4E
Age-adjusted hospital discharge rates^a due to self-inflicted injury by race/ethnicity: Arizona, 2018



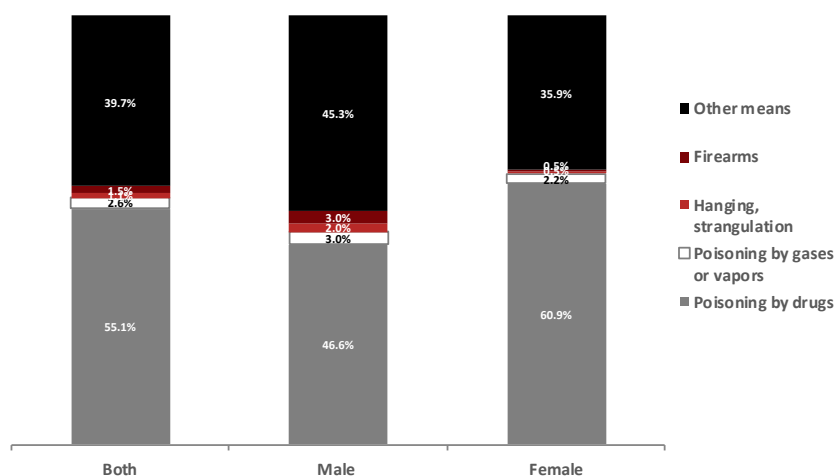
Note: ^a Number of deaths per 100,000 population age-adjusted to the 2000 U.S. standard.

In 2018, self-inflicted injury hospital discharge was higher among American Indians (231.8 discharges per 100,000 population) than any racial/ethnic groups in Arizona.

Similarly, white non-Hispanics and Blacks exhibited higher rates of self-inflicted injury-related hospital discharge, compared to other racial/ethnic groups.

In contrast, Asians recorded the lowest self-inflicted injury-related hospital discharge rate (72.6/100,000).

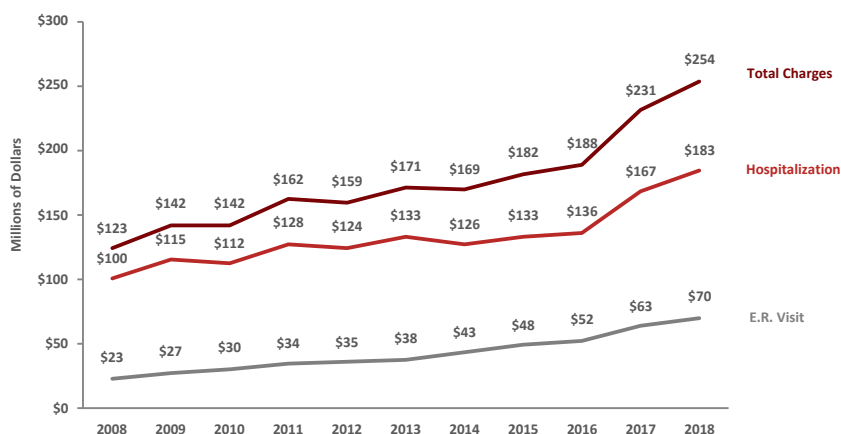
Figure 5E
Percentage of hospital discharges due to self-inflicted injury by mechanism: Arizona, 2018



In 2018, poisoning by drugs was the leading mechanism of self-inflicted injury, accounting for 55.1 percent of all self-inflicted injury-related hospital discharges in Arizona. For both genders, poisoning by drugs was involved in most self-inflicted injury-related hospital discharges. Collectively, the proportions of hospital discharges due to self-inflicted injuries involving other means - including but not limited to drowning, jumping from high place, crashing of a motor vehicle and stabbing - were also noticeably high.

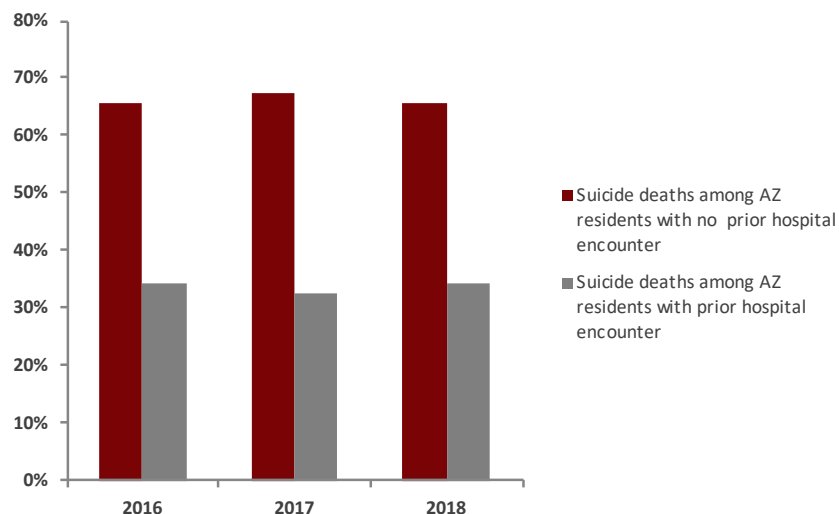
Expectedly, firearms and hanging - the most lethal methods of suicide - were the least likely to be involved in the total number of hospital discharges resulting in self-inflicted injuries. Distinctively, males recorded the highest proportion of self-inflicted injury-related hospital discharges involving firearms (3.0 percent) and strangulation (2.0 percent).

Figure 6E
Total charges for hospital discharges due to self-inflicted injury by type of encounter: Arizona, 2008-2018



In 2018, the annual reported charges of self-inflicted injury-related hospital discharges were estimated to be \$254 million, with 72.3 percent of these costs attributable to hospitalizations. Trend analysis shows an increase in the total estimated health care costs of self-inflicted injury. From 2008 to 2018, the burden of health care costs has increased by approximately two-fold. E.R. visit charges due to self-inflicted injury have increased the most during 2008-2018 (3-fold increase) compared to the hospitalization charges resulting from self-inflicted injury (1.8-fold increase).

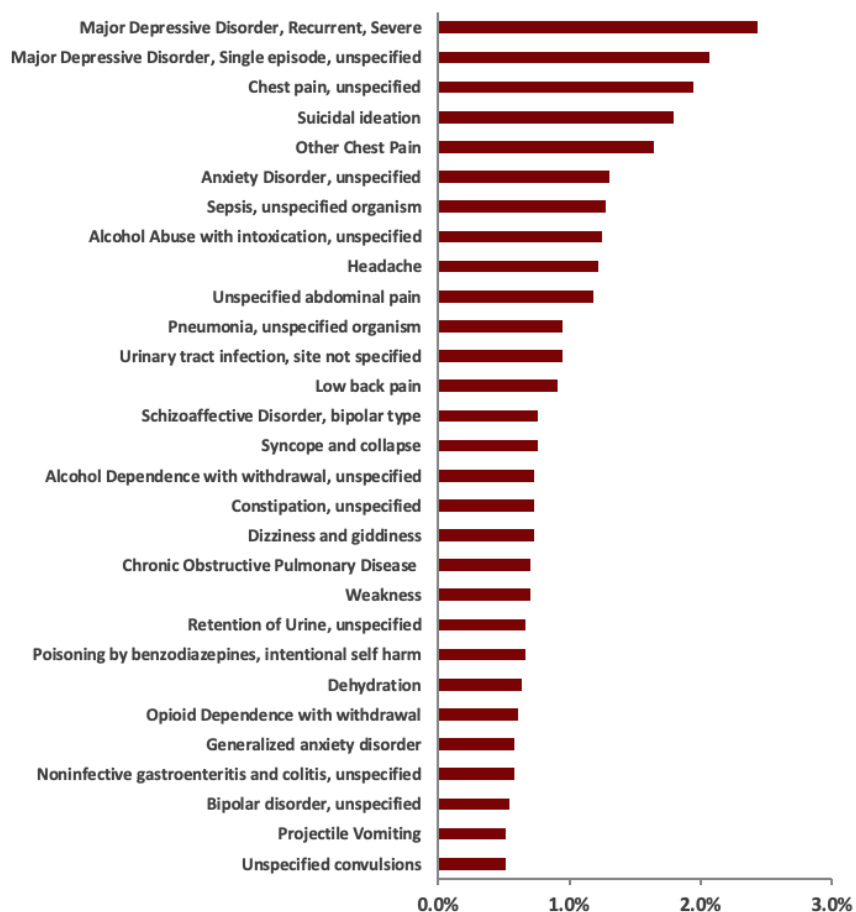
Figure 7E
Suicide mortality by recent medical history: Arizona, 2016-2018



An analysis of the medical history of Arizona residents who died by suicide was conducted from 2016 to 2018.

In each year during the study period, the highest proportion of residents who died by suicide was observed among those with no prior hospital encounter in the past 6 months preceding death. These results may be linked to the limitations of the hospital discharge data (HDD). The HDD lacks information on patients' encounters to non-hospital providers such as physicians and ambulatory surgery. Because of this, morbidity burden may be underestimated. Further, only hospitals that operate under a license issued by the Arizona Department of Health Services are required to participate in the discharge reporting system. Thus, the HDD may be incomplete due to non-inclusion in the data collection of Veterans Affairs hospitals, department of defense healthcare services, and medical facilities located on tribal lands. Noticeably, these non-reporting facilities are dedicated for use by the very groups with the highest suicide rates. The lack of discharge data from these medical facilities limits the significance of the current analysis.

Figure 8E
Most frequent diagnoses among Arizona residents
who died by suicide: Arizona, 2016-2018



A pooled analysis of data from 2016 to 2018, shows that among Arizona residents with prior medical encounters, depression appeared to be the most common reason for hospitalization and/or ER visits before their suicide. Depression, either chronic or episodic, is a serious mood disorder, which interferes with all areas of a person's life. Chest pain followed by suicidal ideation, other chest pain, anxiety disorder, sepsis, alcohol abuse, headache and unspecified abdominal pain was among the 10 most common diagnoses among Arizona who died by suicide.

Appendix

TABLE 1
NUMBER OF SUICIDES AND SUICIDE MORTALITY RATES BY AGE
GROUP AND YEAR, ARIZONA RESIDENTS, 2006-2018

	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
<15*	11	2.4	5	1.1	8	1.7	4	0.9	9	2.0	13	2.9	9	2.0	8	1.7	11	2.4	12	2.6	9	1.7	16	3.5	17	3.6
15-24	149	16.8	127	14.3	123	13.6	122	13.4	133	14.7	140	15.4	126	13.7	121	12.9	129	13.7	155	16.4	151	15.9	160	15.8	194	20.2
15-19	57	13.0	38	8.5	56	12.4	49	10.7	39	8.4	50	10.8	48	10.3	32	6.8	49	10.8	63	13.8	56	12.1	62	11.9	81	17.2
20-24	92	20.6	89	20.0	67	14.8	73	16.0	94	21.2	90	20.2	78	17.2	89	19.1	80	16.4	92	18.7	95	19.5	98	19.5	113	23.1
25-34	131	14.5	179	19.2	122	12.8	147	15.3	164	19.1	167	19.3	175	20.2	158	18.2	171	19.3	199	22.1	204	22.3	236	21.8	233	24.2
35-44	165	19.1	164	18.6	157	17.5	188	20.7	154	18.7	190	22.9	157	18.9	198	23.7	171	20.5	176	21.0	164	19.5	180	19.3	201	23.2
45-54	170	21.5	213	25.6	209	24.8	222	26.1	251	29.8	230	27.1	208	24.9	242	29.0	204	24.2	224	26.6	225	26.7	189	26.5	218	25.5
55-64	125	20.4	137	21.1	162	24.7	167	25.1	171	23.5	190	26.0	208	27.8	164	21.6	192	24.6	213	26.7	216	26.5	224	25.9	234	27.4
65+	196	24.5	161	19.3	187	22.0	209	24.4	188	21.3	182	20.5	187	19.9	224	22.8	246	24.0	254	23.6	287	25.6	299	24.3	335	27.6
65-74	88	20.3	81	19.1	85	19.7	89	20.4	74	14.9	83	16.6	94	17.4	112	19.8	137	23.1	138	22.1	153	23.4	150	22.3	186	26.3
75-84	71	26.3	59	19.5	72	23.5	88	28.4	84	29.9	63	22.3	62	21.1	82	27.2	77	24.7	81	25.0	92	27.3	99	26.0	108	29.4
85+	37	38.6	21	19.4	30	27.2	32	28.8	30	29.0	36	34.6	31	28.6	30	26.7	32	26.7	35	27.9	42	32.1	50	30.5	41	29.7
	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate	Count	Age-adjusted Rate
TOTAL ^b	948	15.2	986	15.3	968	13.4	1,060	16.1	1,070	16.7	1,113	17.3	1,070	16.5	1,116	17.0	1,124	16.9	1,233	18.2	1,256	18.4	1,304	18.0	1,432	19.5

TABLE 2
SUICIDE COUNTS BY RACE/ETHNICITY AND GENDER,
ARIZONA, 1998-2018

	All groups			White non-Hispanic			Hispanic or Latino			Black or African American			American Indian or Alaska Native			Asian or Pacific Islander		
	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F
1992	621	512	109	508	409	99	66	59	7	11	10	1	32	30	2	4	4	0
1993	717	581	135	580	463	116	78	68	10	13	10	3	43	38	5	3	2	1
1994	752	607	145	588	467	121	92	81	11	16	14	2	46	39	7	10	6	4
1995	788	619	169	648	502	146	82	69	13	16	13	3	39	34	5	3	1	2
1996	721	584	137	580	460	120	86	79	7	11	10	1	38	29	9	6	6	0
1997	732	592	139	587	466	121	81	76	5	17	13	4	36	29	7	11	8	3
1998	802	635	167	644	495	149	99	93	6	10	7	3	40	33	7	9	7	2
1999	760	595	165	594	459	135	101	82	19	18	18		41	32	9	6	4	2
2000	756	608	148	604	471	133	94	84	10	10	10	0	41	36	5	7	7	0
2001	600	485	115	462	367	95	73	64	9	15	13	2	43	36	7	6	5	1
2002	855	692	163	684	542	142	103	89	14	12	12	0	50	43	7	5	5	0
2003	807	647	160	624	499	125	105	84	21	23	19	4	47	41	6	6	2	4
2004	854	674	180	662	511	151	120	105	15	20	17	3	47	37	10	4	3	1
2005	915	723	192	694	542	152	147	126	21	7	5	2	56	45	11	11	5	6
2006	948	743	205	735	562	173	128	113	15	21	18	3	49	40	9	13	9	4
2007	986	773	213	774	599	175	150	123	27	15	13	2	35	28	7	11	9	2
2008	968	737	231	772	580	192	105	90	15	20	15	5	53	41	12	16	9	7
2009	1,060	792	268	811	602	209	144	114	30	27	18	9	56	38	18	15	13	2
2010	1,070	846	224	832	651	181	125	103	22	18	15	3	57	48	9	14	10	4
2011	1,113	866	247	873	666	207	135	117	18	24	18	6	56	45	11	10	7	3
2012	1,070†	837	230†	849	665	184	122	94	28	30†	22	*	60	46	14	10†	10	*
2013	1,120†	860	260†	863	667	196	151	110	41	20†	15	*	69	55	14	10†	13	*
2014	1,120†	857	270†	883	663	220	138	110	28	31	24	7	53	45	8	20†	15	*
2015	1,233	941	292	1,002	770	232	133	101	32	22	16	6	58	42	16	18	12	6
2016	1,256	976	280	955	739	216	173	143	30	28	20	8	75	56	19	25	18	7
2017	1,300†	1000	300†	973	738	235	177	144	33	30†	30	*	78	58	20	23	13	10
2018	1432	1,146	286	1049	825	224	185	159	26	55	44	11	113	94	19	19	13	6

Notes: * Cell suppressed due to non-zero count less than 6; † Sum rounded to nearest tens unit due to non-zero addend less than 6.

TABLE 3
AGE-ADJUSTED^a MORTALITY RATES OF SUICIDE BY RACE/ETHNICITY
AND GENDER, ARIZONA, 1998-2018

	All groups			White non-Hispanic			Hispanic or Latino			Black or African American			American Indian or Alaska Native			Asian or Pacific Islander		
	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F
1990	19.0	32.6	6.5	20.9	36.1	7.2	9.4	16.6	2.8	12.5	17.2	7.7	20.1	39.1	2.6	7.9	4.6	10.1
1991	18.0	30.8	6.4	19.1	32.8	6.7	12.1	20.3	4.6	17.8	23.6	12.3	18.9	35.1	4.0	2.5	5.5	0.0
1992	17.3	29.0	6.5	18.8	31.1	7.5	10.4	19.2	2.6	10.3	17.8	2.4	19.6	34.7	5.6	4.8	10.5	0.0
1993	18.9	32.2	6.9	21.2	35.7	8.2	8.8	14.9	2.4	8.0	12.4	3.0	21.7	39.1	5.5	5.2	7.7	3.2
1994	19.4	32.2	7.4	21.2	34.9	8.3	11.1	19.6	2.2	8.7	13.9	2.9	20.8	33.0	8.8	16.7	18.9	15.4
1995	19.5	31.1	8.6	22.2	35.1	10.2	9.7	15.8	3.4	14.4	24.6	5.8	16.3	30.0	3.5	4.1	5.0	4.0
1996	16.9	28.4	6.2	19.1	31.8	7.5	9.0	16.2	1.8	7.3	11.7	2.2	15.9	25.6	6.8	4.7	9.9	0.0
1997	17.2	28.7	6.3	19.4	31.8	7.7	8.8	16.3	1.3	12.3	21.5	3.5	18.7	30.5	7.4	11.0	18.2	5.7
1998	17.5	28.7	7.1	20.1	32.2	8.9	9.5	18.4	0.8	6.5	8.7	3.9	16.1	28.1	5.0	6.8	9.1	3.9
1999	15.7	25.5	6.5	16.7	27.1	7.0	10.5	17.8	3.7	12.8	26.1	0.0	16.6	27.6	6.4	6.4	10.3	3.4
2000	14.6	24.7	5.2	16.7	27.6	6.8	7.2	12.7	1.4	6.5	12.2	0.0	16.2	29.7	3.7	5.7	12.3	0.0
2001	14.9	24.6	5.6	12.8	21.0	5.1	5.9	9.9	1.6	9.2	15.2	2.4	15.4	26.4	5.2	9.4	15.4	4.7
2002	15.9	26.4	6.0	18.3	30.0	7.4	8.3	14.2	2.5	6.2	11.4	0.0	17.9	31.7	4.9	4.1	9.1	0.0
2003	14.6	24.0	5.8	16.4	27.1	6.4	8.2	11.8	4.2	11.3	16.6	4.8	15.2	27.4	3.6	6.0	7.0	5.9
2004	14.9	24.1	6.3	16.6	26.4	7.5	9.8	17.5	2.2	12.1	17.3	5.1	17.0	28.5	6.5	4.0	7.0	2.7
2005	15.4	24.9	6.5	16.6	26.7	7.3	10.5	17.8	3.0	3.3	4.7	1.8	17.5	28.7	6.8	11.7	8.9	14.1
2006	15.4	24.7	6.6	17.8	27.9	8.5	8.2	14.2	2.0	8.3	13.9	2.3	13.7	23.4	4.5	8.4	13.2	4.3
2007	15.4	24.4	6.7	18.7	29.4	8.3	9.2	14.7	3.6	6.2	10.1	1.7	9.8	16.3	3.6	6.1	9.2	2.4
2008	14.8	23.0	7.0	17.6	27.3	8.5	6.5	10.8	1.9	7.5	10.3	4.2	13.5	21.2	5.9	9.9	10.7	8.8
2009	16.1	24.6	8.1	18.4	28.0	9.5	9.0	14.0	3.9	10.5	12.7	7.7	15.9	22.9	9.3	9.9	19.9	2.3
2010	16.7	27.1	6.7	20.6	32.8	8.7	7.4	12.5	2.6	6.4	9.9	2.2	18.7	32.3	5.7	6.8	11.0	3.2
2011	17.2	27.4	7.5	22.0	33.1	10.1	8.1	14.8	1.8	9.1	13.7	4.3	14.9	24.0	5.8	5.3	6.9	3.5
2012	16.2	25.9	7.0	20.2	32.2	8.7	6.8	11.1	2.9	10.0	15.5	4.0	17.9	27.9	8.1	5.7	10.2	1.8
2013	17.0	26.6	7.7	20.8	32.4	9.6	8.4	12.8	4.2	6.7	9.7	3.1	21.9	36.1	8.1	7.0	14.5	1.1
2014	16.5	25.6	7.7	21.0	31.9	10.4	8.3	13.4	3.4	9.0	13.6	4.2	13.9	24.3	3.7	7.0	12.0	2.7
2015	17.8	27.5	8.4	23.6	36.4	11.1	6.7	10.4	3.2	6.6	9.2	3.7	19.0	28.4	10.0	7.0	9.9	4.5
2016	17.7	28.0	7.9	21.7	33.6	10.2	8.8	15.0	2.9	9.0	13.1	5.2	24.2	36.7	11.9	9.3	14.0	4.7
2017	18.0	28.1	8.4	22.1	33.8	10.8	8.5	14.1	3.0	10.5	19.1	2.3	26.2	40.4	12.7	9.3	10.6	7.8
2018	19.5	31.5	7.8	23.7	37.5	10.2	8.7	15.2	2.4	16.0	24.6	6.6	36.5	61.8	12.3	7.3	11.0	4.1

Note: ^a Adjusted to the 2000 standard U.S. population.

TABLE 4
RATES AND COUNTS^a OF SUICIDES RECORDED IN ARIZONA BY
VETERAN STATUS, 2006-2018

Year	Overall State Suicide Rate	Overall State Suicide Count	Veteran Suicide Rate	Veteran Suicide Count	Non-Veteran Suicide Rate	Non-Veteran Suicide Count
2008	15.9	1,041	44.5	245	13.3	796
2009	16.8	1,107	45.1	240	14.3	867
2010	17.8	1,136	47.6	252	15.1	884
2011	18.5	1,192	47.4	253	15.9	939
2012	18.3	1,191	51.5	271	15.4	920
2013	18.2	1,197	52.9	264	15.3	933
2014	19.1	1,274	56.1	271	16.2	1,003
2015	19.7	1,329	52.8	258	17.1	1,071
2016	19.4	1,325	58.5	284	16.4	1,041
2017	19.6	1,364	53.9	259	17.0	1,105
2018	21.3	1,510	53.6	266	18.9	1,244

Note: ^a Statistics compiled on the basis of where the deaths actually occurred; Counts include residents and non-residents.