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Suicide in Colorado, 2016-2020: A Summary from the Colorado Violent Death Reporting System

Christine Demont, MPH, Kelsey Orten, MPH, Kirk Bol, MSPH

Introduction

Suicide is a major public health problem that negatively impacts families, communities and society as a whole. Colorado continues to have one of the highest suicide rates in the nation, ranking in the top ten for at least eight consecutive years.[1] The suicide rate in Colorado was over 1.5 times higher than the national rate in 2020. From 2016 to 2020, suicide deaths in Colorado outnumbered deaths by motor vehicle collision, unintentional poisoning, falls or homicide.[2] In 2021, suicide was the eighth leading cause of death in Colorado. Suicide not only adversely affects the communities and families and friends of the person who died, it also creates a burden on the state and its financial and administrative resources. The most recent data from 2020 estimate that each suicide death in Colorado costs $5,132 on average in direct costs (health care etc.) and $10.63 million in indirect costs.[3]

To help inform suicide prevention efforts, the Colorado Department of Public Health and Environment (CDPHE) collects demographic information and associated risk factor data, and tracks the circumstantial information surrounding each suicide death. This report provides descriptive information for the years 2016 to 2020 and includes summaries of demographic characteristics of suicide victims, injury characteristics, contributing circumstances, and post-mortem toxicology results. The goal of sharing these data is to provide a more complete picture of the populations that may be at greater risk for suicide in Colorado in order to aid ongoing suicide prevention and intervention programs.

Methods

Data for this report come from the Colorado Violent Death Reporting System (CoVDRS), as well as death certificate-based data from CDPHE's Vital Statistics Program in which CoVDRS is located. The CoVDRS is an enhanced public health surveillance system designed to obtain a complete census of all violent deaths occurring in Colorado.[4] A violent death includes any death by suicide, homicide, unintentional firearm discharge, legal intervention, as well as certain deaths of undetermined intent when the death may have been the result of violence. Colorado is one of 52 states and US territories currently participating in the broader National Violent Death Reporting System (NVDRS), which is maintained and funded by the Centers for Disease Control and Prevention (CDC).[5] The NVDRS is the centralized database consisting of de-identified violent death data collected from multiple sources including death certificates, coroner/medical examiner reports, and law enforcement investigations. These data include enhanced demographics, injury specifics, method of injury, contributing circumstances and toxicology information.

This report reflects suicide deaths among Colorado residents from 2016 to 2020, with the latter representing the most recent complete year of data from CoVDRS. Deaths are identified as a suicide based on death certificate-based manner of death and underlying cause of death coding using the International Classification of Diseases, 10th Revision (ICD-10) schema (X60–X84 and Y87.0).[6] In addition to death certificate data, the CoVDRS also obtains data from coroner/medical examiner investigation and autopsy reports, and the law enforcement investigation reports. A full description of the data collection processes of the NVDRS is provided elsewhere.[7] It is important to note that Vital Statistics Program data (death certificates) include those Colorado residents who die out of state, whereas the CoVDRS only includes those deaths that occur in Colorado. Therefore, there will be slight differences between data sources within this report. Footnotes presented with figures denote the source of the data presented.

Suicide deaths were described by year, geographic region of residence, age, sex, race/ethnicity, marital status, lethal means of suicide (including substances that caused death), veteran status, industry, and associated precipitating

circumstances. Sex of individuals is coded using what is documented on the death certificate which is captured using two categories: female and male. Not shared in this report is information on sexual orientation or transgendered individuals. While research shows that one's sexual orientation and gender identity can have an effect on suicide risk,[8,9] there are high levels of missing data in the CoVDRS that make getting an accurate picture difficult. For this report, race and ethnicity is represented in five categories; non-Hispanic White, Hispanic White, Black/African American, American Indian/Alaska Native, and Asian/Pacific Islander. The CoVDRS and death certificates collect data on race and ethnicity (Hispanic origin) separately. For the purposes of this report, Black/African American, Asian/Pacific Islander, and American Indian/Alaskan Native include both those Hispanic and non-Hispanic individuals in those race groups.

When looking at geographic data, counties are presented by Health Statistics Region (HSR),[10] a method often used to examine regional differences for various health indicators within Colorado. The breakdown of counties by HSR can be found in Appendix 1. Additionally, counties of residence are categorized as urban, rural, or frontier, according to the Colorado Office of Rural Health.[11] Both geographic locations are based on the decedent's county of residence, and not the county where death occurred. For this report, lethal means are reported as one of four possible categories: firearm, hanging/ asphyxiation/suffocation (including oxygen displacement via gas), poisoning (including illicit and prescription drugs as well as carbon monoxide), and other (including sharp force injuries and intentional falls from heights). Data presented on the specific substances used in poisoning suicides represent the total number of *substances* present that caused death and not the number of individuals. Veteran status information represents those who ever served in the U.S. Armed forces, whether active duty or previously serving.

Suicide deaths are presented as frequencies, percentages, as well as age-specific and age-adjusted mortality rates per 100,000 population, with a ninety-five percent (95%) confidence interval. Population estimates for most rates provided in the report come from the State Demography Office, Colorado Department of Local Affairs. Population estimates for suicide rates by marital status, veteran status, and industry group were obtained from the American Community Survey (ACS), U.S. Census Bureau.[12]

Results

Suicide Rates – State of Colorado

Between 2016 and 2020, there were 6,202 suicide deaths among Colorado residents, with an age-adjusted rate of 21.09 deaths per 100,000 population. While the number of suicide deaths increased over the five-year time period, there was no statistically significant increase in the rate. There were an additional 229 suicide deaths in Colorado that were not Colorado residents, averaging to 46 non-resident suicide deaths per year.

Table 1. Age-adjusted suicide rates (per 100,000 population) by year, Colorado residents, 2016-2020

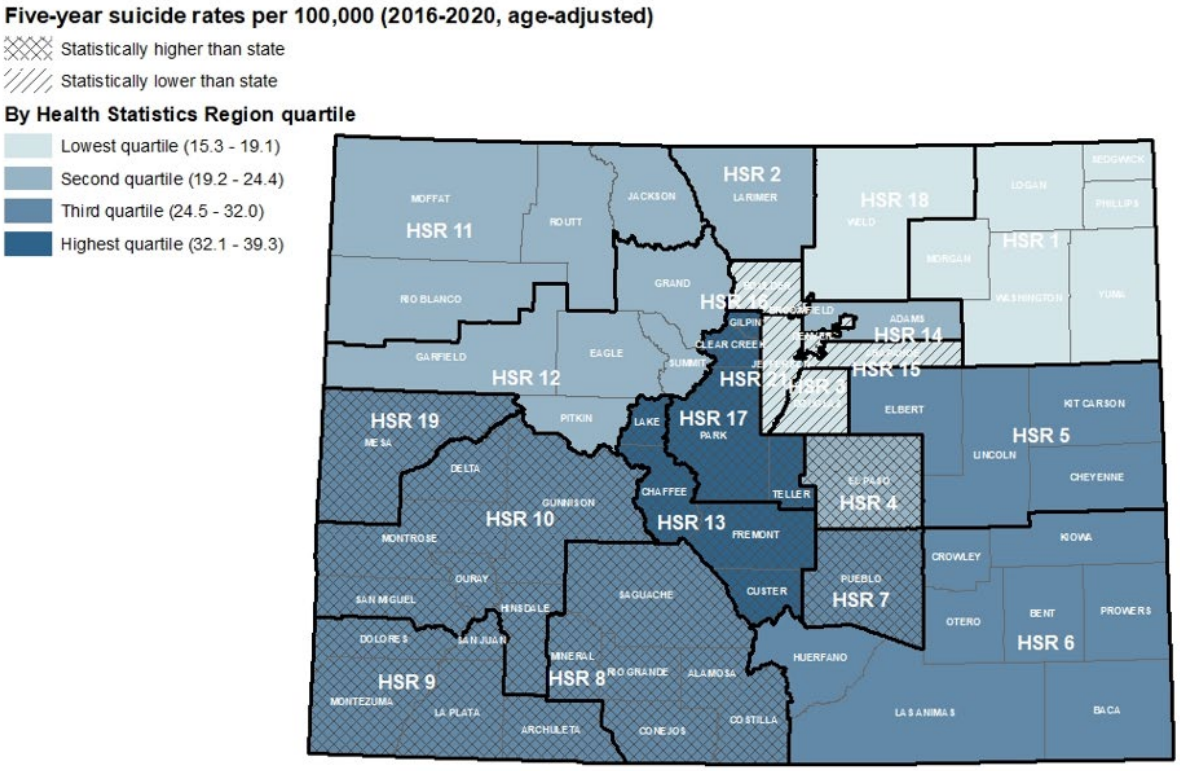
Year	Deaths	Age-adjusted rate	LCL	UCL
Total (2016-2020)	6,202	21.09	20.56	21.62
2016	1,156	20.23	19.05	21.41
2017	1,175	20.19	19.02	21.36
2018	1,271	21.64	20.43	22.85
2019	1,306	21.93	20.72	23.13
2020	1,294	21.57	20.38	22.76

Source: Colorado Vital Statistics Program (death certificate data alone), Colorado Department of Public Health and Environment.
Rates are per 100,000 population. LCL and UCL represent the respective lower and upper bounds of the 95% confidence interval.

Region of Residence

Figure 1 presents the age-adjusted suicide rate by Health Statistics Region (HSR) of residence. The regions were developed by state and local public health professionals using statistical and demographic criteria to provide more reliable estimates and address confidentiality concerns related to small numbers of events in less populated areas of the state.[13] Suicide rates were calculated for each HSR and were ranked using quartiles, while indicators of statistical significance compare the suicide rate for the region to the state suicide rate. HSR's 19, 17, 13, 10, 9, 8, 7, and 4 had suicide rates statistically higher compared to the state rate. HSR's 21, 20, 16, 15, and 3 had suicide rates statistically lower than that of the state.

Figure 1. Age adjusted suicide rates per 100,000 population, Colorado Residents, 2016-2020



Source: Colorado Vital Statistics Program, Colorado Department of Public Health and Environment.

Age-adjusted suicide rates by county of residence type are presented in Table 2. Residence type is determined by the decedents' residences and are classified as urban, rural, or frontier using the Colorado Rural Health Center designations.[14] Counties that have at least one city over 50,000 residents are classified as urban. Frontier is a subset of rural, and are counties that have a population density of six or fewer people per square mile. Residents living in urban counties had the highest number of suicide deaths but the age-adjusted rate was lower compared to rural or frontier counties.

Table 2. Age-adjusted suicide rates (per 100,000 population) by county of residence type, Colorado residents, 2016-2020

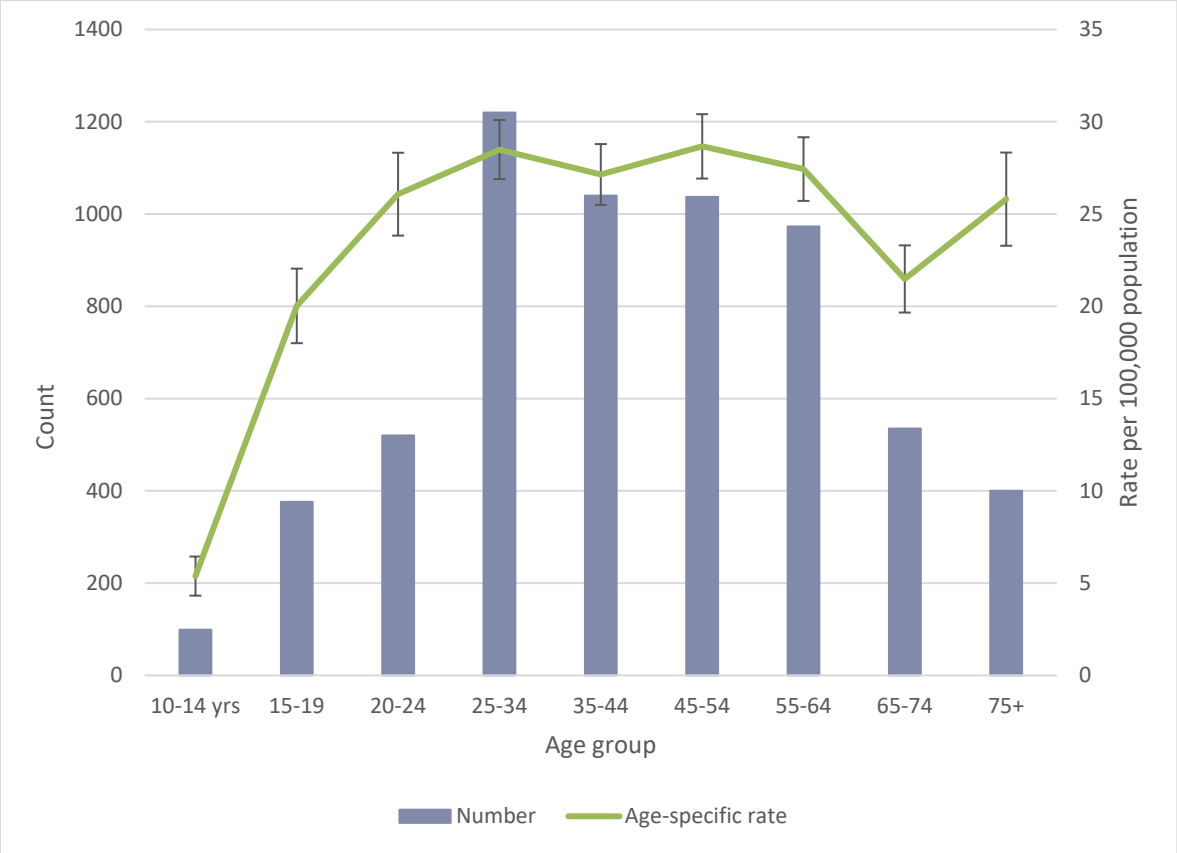
County of residence type	Deaths	Age-adjusted rate	LCL	UCL
Frontier	200	30.31	25.94	34.67
Rural	768	25.00	23.18	26.82
Urban	5,177	20.22	19.66	20.78

Source: Colorado Vital Statistics Program (death certificate data alone), Colorado Department of Public Health and Environment.

Age

Figure 2 displays age-specific suicide counts and rates among Colorado residents by age group. All age groups had deaths by suicide, including the 10-14 year age group, indicating suicide is a risk for all ages. The 25-34 and 45-54 year age groups had the highest suicide rates compared to the other age groups but there were no statistical significant differences among these groups compared to the 35-44, 55-64, or 75 and older age groups.

Figure 2. Age-specific suicide rates per 100,000 population and counts, Colorado residents, 2016-2020

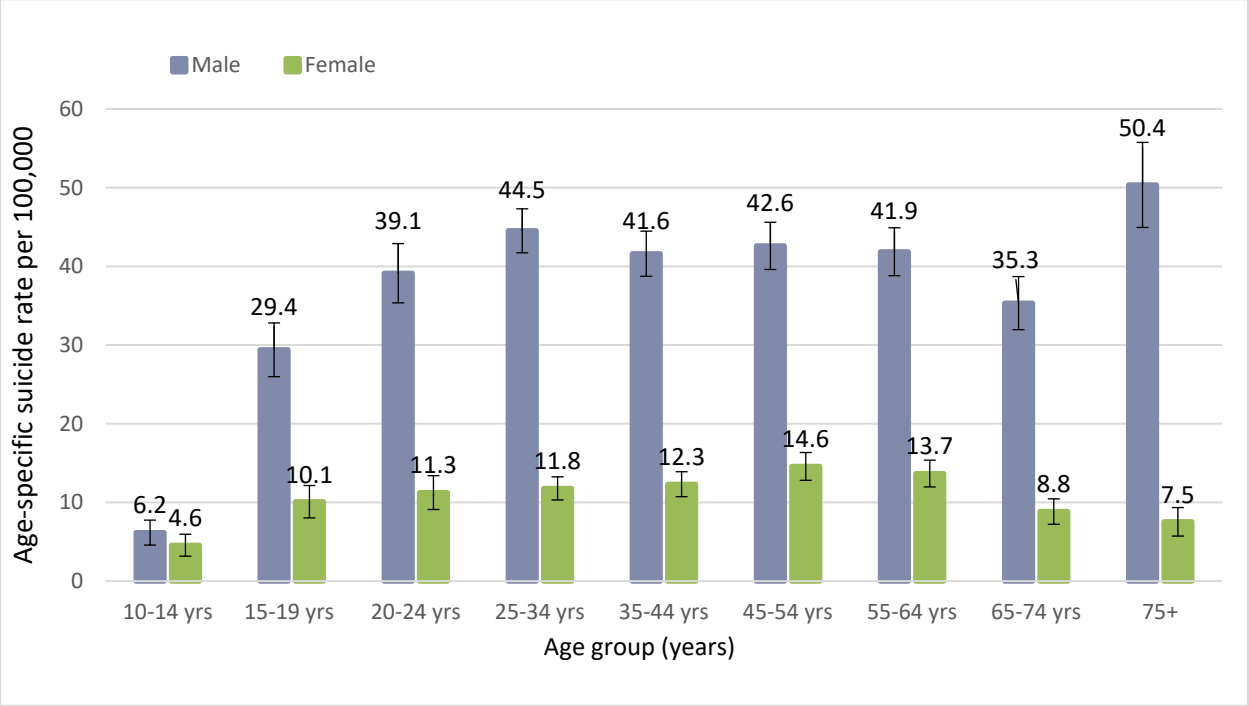


Source: Colorado Vital Statistics Program (death certificate data alone), Colorado Department of Public Health and Environment.

Age and Sex

There are differences in suicide rates by age group and by sex. Figure 3 shows age-specific suicide rates by sex among Colorado residents. During the 2016 to 2020 time period, males had higher suicide rates compared to females in every age group. Men ages 75 and older had a suicide rate almost seven times higher compared to females in the same age group (50.4 and 7.5, respectively).

Figure 3. Age specific suicide rates by sex, Colorado residents, 2016-2020

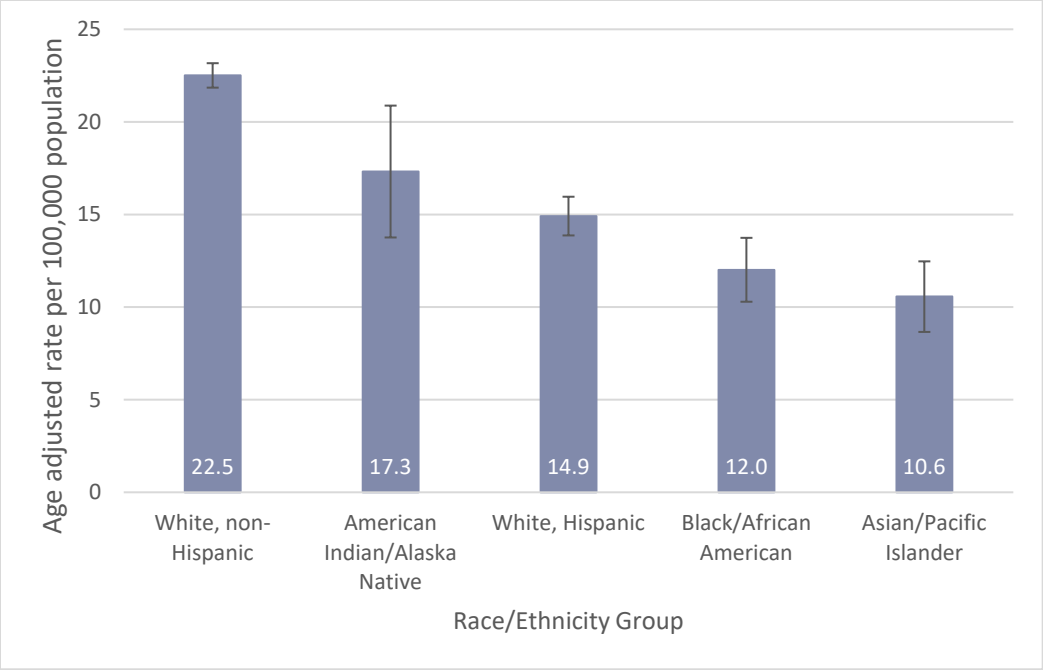


Source: Colorado Vital Statistics Program (death certificate data alone), Colorado Department of Public Health and Environment.

Race and Ethnicity

Figure 4 displays suicide rates by race and ethnicity. CDPHE acknowledges that generations-long social, economic, and environmental inequities contribute to adverse health outcomes including suicide. These inequities affect communities differently and have a greater influence on health outcomes than either individual choices or one's ability to access health care. The White, non-Hispanic population had the highest suicide rate and the American Indian/Alaska Native population had the second highest suicide rate (22.5 and 17.3 respectively). Research has demonstrated that the American Indian/Alaska Native population have been misidentified and misclassified and therefore, rates may be underestimated.[15]

Figure 4. Age-adjusted suicide rates (per 100,000 population) by race/ethnicity, Colorado residents, 2016-2020

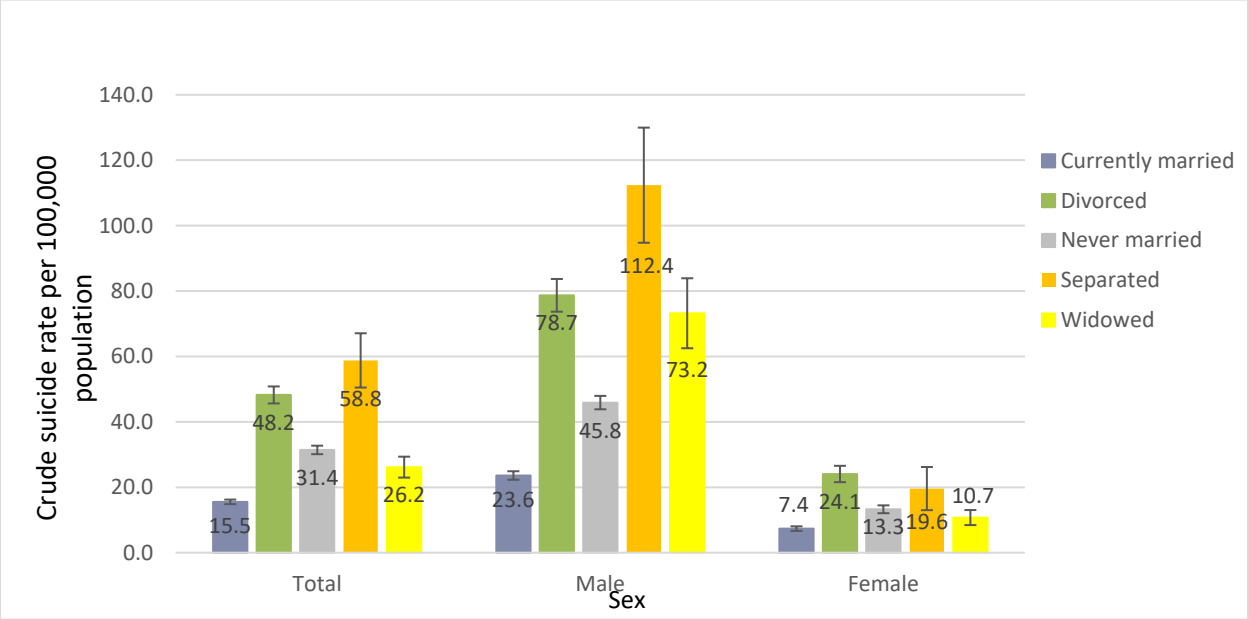


Source: Colorado Vital Statistics Program (Death certificate data alone), Colorado Department of Public Health and Environment.

Marital Status

Suicide rates also differed by sex and marital status (Figure 5). Among decedents aged 15 years or older, separated and divorced decedents had the highest age-adjusted suicide rates compared to those never married, currently married, or widowed. When looking at marital status by sex, males who were separated had the highest suicide rate at almost five times higher than the suicide rate among males currently married. Females who were divorced had the highest suicide rate among females by marital status which was three times higher than females currently married.

Figure 5. Suicide rates (per 100,000 population) by sex and marital status, ages 15 and above, Colorado residents, 2016-2020

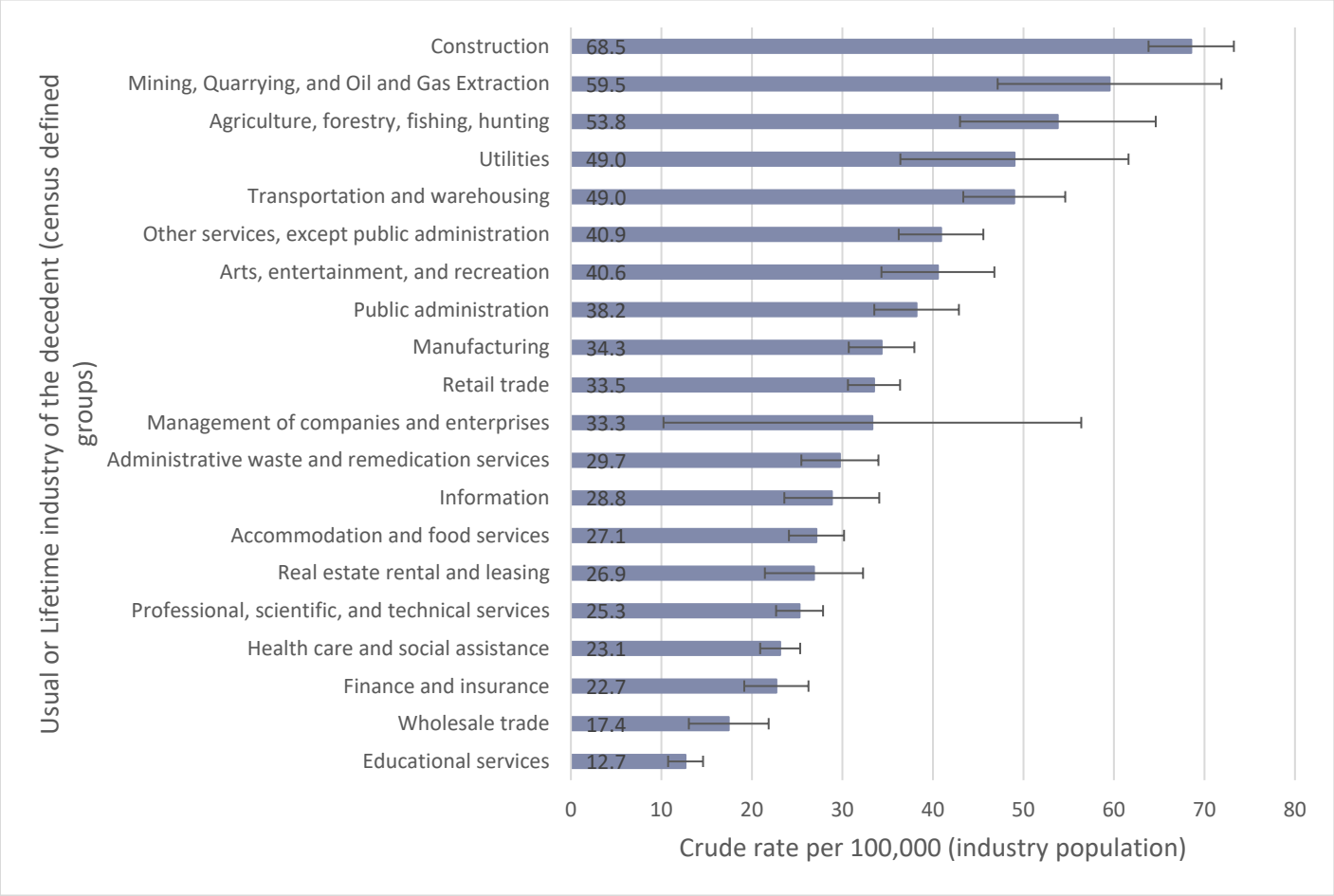


Source: Colorado Vital Statistics Program (Death certificate data alone), Colorado Department of Public Health and Environment.

Usual Industry

Figure 6 displays suicide rates by usual industry of the decedent. Industry information comes from the reported 'usual industry' on the death certificate which represents the lifetime career or job of the decedent.[16] It may or may not be the job held by the decedent at the time of death. There were an additional 709 suicide deaths whose usual industry was documented as 'non-paid workers or non-workers' which includes students, homemakers, unemployed persons, those simply described as 'retired', etc. The industries with the highest suicide rates included construction (68.5), mining, quarrying, and oil and gas extraction (59.5), and agriculture, forestry, fishing, and hunting (53.8).

Figure 6. Suicide rates (per 100,000 population) by *Usual Industry* of the decedent, Colorado Residents ages 16 and above, 2016-2020

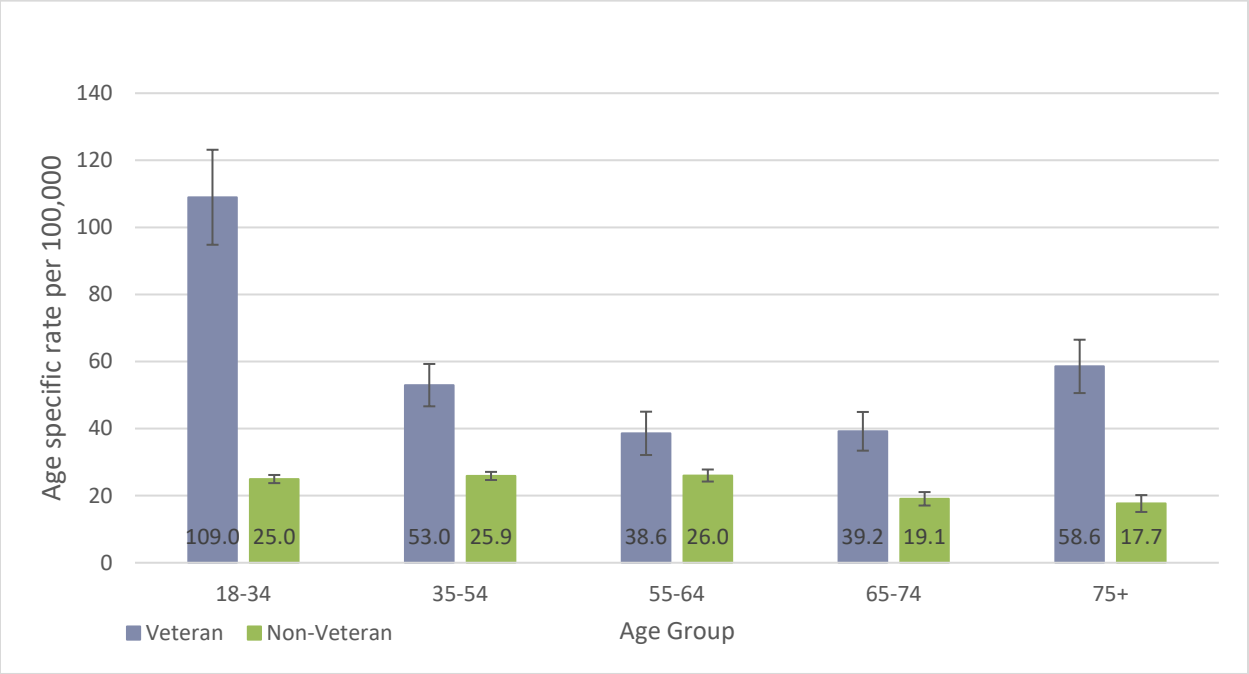


Source: Colorado Vital Statistics Program (Death certificate data alone), Colorado Department of Public Health and Environment.

Veteran Status

There were 1,019 Colorado suicide decedents who had ever served in the U.S. Armed Forces between 2016 and 2020 representing 16.8 percent of all suicide deaths. The age-specific suicide rates were higher among veterans in every age group compared to non-veterans (Figure 7). The 18-34 age group of veteran suicide decedents had the highest suicide rate among all veteran and non-veteran age groups.

Figure 7. Age-specific suicide rates (per 100,000 population) by Veteran status (including active duty), Colorado Residents ages 16 and above, 2016-2020



Source: Colorado Vital Statistics Program (Death certificate data alone), Colorado Department of Public Health and Environment.

Injury Location

The CoVDRS collects detailed information on the location type where the decedent fatally injured themselves (Table 3). The majority of suicide decedents fatally injured themselves at a residence (house, apartment, including driveway, porch, yard, etc.), (74.3%). The next most common places included a natural area such as a field, river, beach or woods (5.5%) followed by a motor vehicle (4.9%).

Table 3. Suicide deaths by location of injury, Colorado residents, 2016-2020

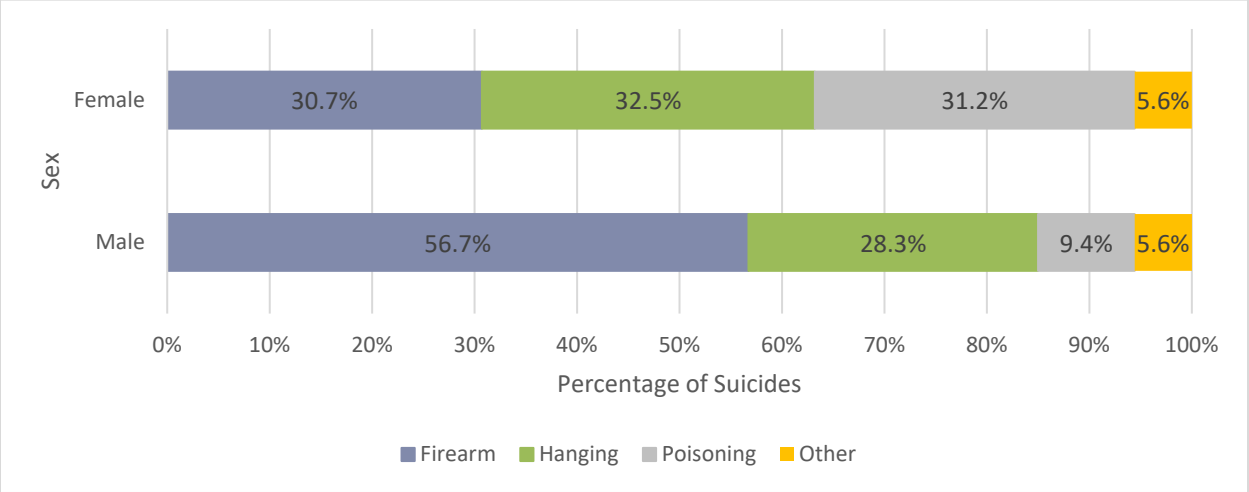
Injury Location	Deaths	Percent
House, apartment, rooming house, including driveway, porch, yard, garage	4,530	74.34
Natural area (e.g., field, river, beaches, woods)	333	5.46
Motor vehicle, regardless of where motor vehicle is located; includes motor homes	296	4.86
Street/road, sidewalk, alley	179	2.94
Hotel/motel	134	2.20
Park, playground, public use area	110	1.81
Parking lot/public parking garage	102	1.67
Jail, prison, detention facility	81	1.33
Other	328	5.36

Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.

Method of Injury

Firearms were the most common method of fatal injury among all suicide deaths (50.8%, n=3,093) during the years 2016-2020. The second and third most common methods included hanging/strangulation/suffocation (29.2%, n=1,782) followed by poisoning (14.4%, n=879). Figure 8 shows suicide deaths by method used to inflict injury and sex. Males (56.7%) used a firearm to inflict the fatal injury as the most common method and at a higher percentage compared to females (30.7%). Females used hanging/strangulation/suffocation (32.5%) and poisoning (31.2%) more than males (28.3% and 9.4%, respectively).

Figure 8. Suicide deaths by method used to inflict the fatal injury and sex, Colorado residents, 2016-2020

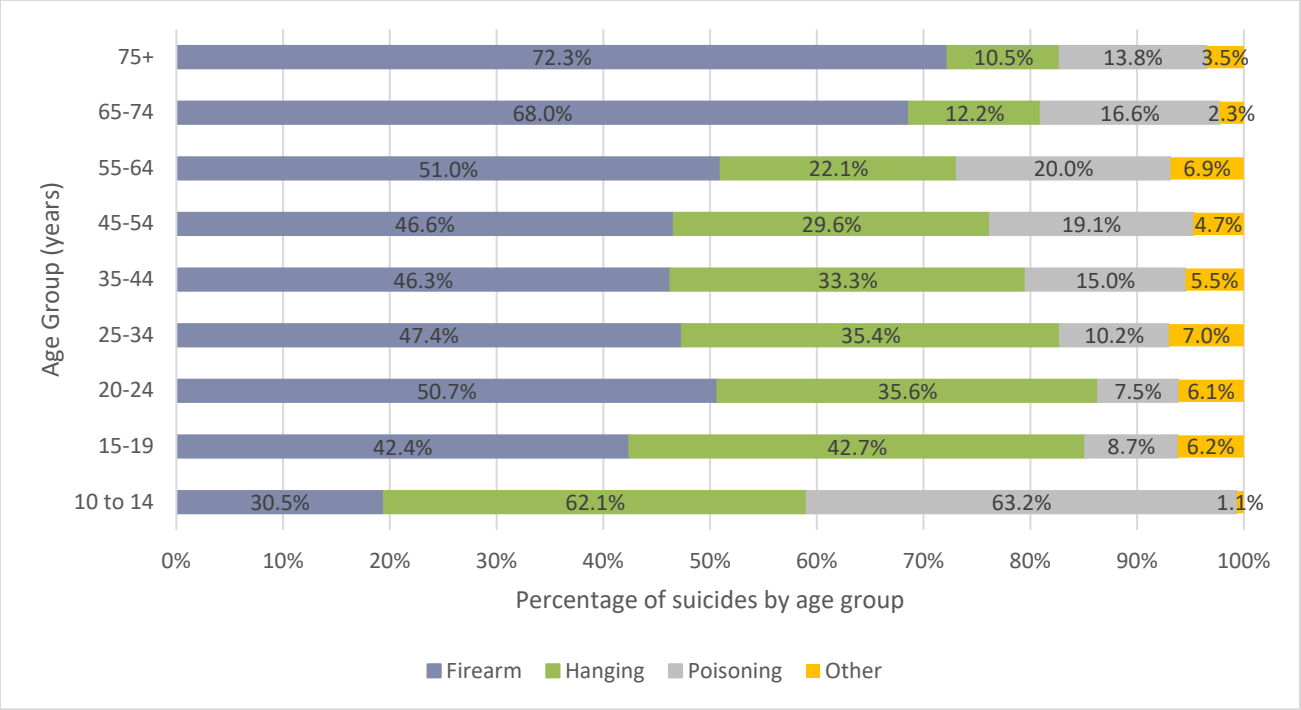


Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.

Method of Injury and Age

Figure 9 displays method of injury by age group. Firearm was the most common method among the older age groups but the least common among the 10-14 year age group. Hanging/strangulation/suffocation and poisoning were more common methods to inflict the fatal injury among the 10-14 year age group.

Figure 9. Suicide deaths by method of injury and age group, Colorado residents, 2016-2020



Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.

Circumstances

The CoVDRS collects detailed information on circumstances that were associated with each suicide. Most of the suicide deaths (97%) had at least one circumstance recorded during the years 2016-2020 (Table 4). More than one-half of decedents had a history of suicidal thoughts or plans (51.9%) and over one-third left a suicide note (36.8%), though these categories, like all circumstances, are not mutually exclusive. Also during this five-year time period, 29.7% disclosed their intent to die by suicide and 27.8% had a previous suicide attempt. Nearly one-half of decedents (49.3%) were experiencing a current depressed mood close to the time of their death, as noted by family, friends, or acquaintances. Having a crisis in the last two weeks and intimate partner problem were also noted in 40.7% and 38.9% of suicide deaths, respectively. There were 63 suicide deaths that followed a perpetrated homicide, often referred to as a homicide/suicide incident (data not shown). A full explanation of circumstances and the coding guidance can be found in the NVDRS Web Coding Manual.[17]

Table 4. Suicide deaths by circumstances that contributed to death, Colorado Residents, 2016-2020

Circumstances	Deaths	% of suicides with known circumstances
Suicides with 1+ known circumstance	5,928	97.28
History of suicidal thoughts or plans	3,079	51.94
Current depressed mood	2,923	49.31
Crisis in last two weeks	2,413	40.71
Intimate partner problem	2,305	38.88
Left a suicide note	2,179	36.76
Physical health problem	1,924	32.46
Disclosed intent to commit suicide	1,758	29.66
History of previous suicide attempts	1,648	27.80
Death preceded by argument	1,385	23.36
Family relationship problem	1,347	22.72
Job problem	1,099	18.54
Contributing criminal legal problem	930	15.69
Financial problem	911	15.37
Recent non-suicide death of friend or family	670	11.30
Recent suicide of friend or family	472	7.96
Eviction or loss of home	439	7.41
Civil legal problem	429	7.24
Precipitated by another crime	317	5.35
Perpetrator of violence in the past 30 days	225	3.80
History of abuse as a child	220	3.71
School problem	204	3.44
Anniversary of traumatic event	97	1.64
Other crime in progress	80	1.35
Victim of violence in the past 30 days	71	1.20
Death preceded by physical fight	71	1.20

Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.

Table 5 shows circumstances specific to mental health and substance abuse circumstances. More than one half of suicide victims had a current diagnosis of a mental health issue (54.8%). Depression was the most common diagnosis (41.2%) followed by anxiety (14.1%) and bipolar disorder (9.4%). About one-third of decedents had a problem with alcohol (32.4%) and nearly one-quarter had a problem with a substance other than alcohol (24.0%). Regarding treatment, 46.9% had ever been treated for a mental health or substance use problem, although less than one third (30.6%) were currently being treated for a mental health or substance abuse problem at the time of their death.

Table 5. Suicide deaths by mental health and substance abuse circumstances, Colorado Residence 2016-2020

Circumstances	Deaths	% of suicides with known circumstances
Suicides with 1+ known circumstance	5,928	97.28
Current mental health diagnosis	3,249	54.81
Diagnosis of Depression	2,444	41.23
Diagnosis of Anxiety	835	14.09
Diagnosis of Bipolar Disorder	555	9.36
Diagnosis of Post-Traumatic Stress Disorder	312	5.26
Diagnosis of Schizophrenia	142	2.40
Diagnosis of Attention Deficit/Hyperactivity Disorder	110	1.86
Diagnosis of Dementia	23	0.39
Diagnosis of Obsessive-compulsive disorder	20	0.34
Diagnosis of Eating Disorder	18	0.30
Diagnosis of Autism Spectrum	6	0.10
Other Mental Health Diagnosis	231	3.90
History of non-suicidal self-harm/injury	119	2.01
Treatment circumstances		
Ever treated for mental health or substance abuse problem	2,780	46.90
Current mental health or substance abuse treatment	1,813	30.58
Substance abuse/misuse circumstances		
Problem with alcohol	1,919	32.37
Problem with substance other than alcohol	1,420	23.95

Source: Colorado Vital Statistics Program (Death certificate data alone), Colorado Department of Public Health and Environment.

Toxicology

Toxicology results were available for 80.2% of suicide decedents during the years 2016-2020. It is important to note that the number of suicide deaths missing toxicology may be due to toxicology information not being provided to the CoVDRS or that toxicology testing was not performed on the decedent. Alcohol was the most common substance found in decedents (38.6%) followed by marijuana (22.5%). Opioids and Benzodiazepines were present in 17.4% and 14.2% of decedents, respectively. The substance categories displayed can include both prescription and illicit drugs. Additional information on coding of substances in toxicology can be found in the NVDRS Web Coding Manual.[16]

Table 6. Suicides by toxicology at death, Colorado Residents, 2016-2020

Toxicology	N	% of suicides with known toxicology
Toxicology available	4,889	80.23
Alcohol present	1,886	38.58
Marijuana present	1,098	22.46
Opioid present	848	17.35
Benzodiazepine present	694	14.20
Antidepressant present	649	13.27
Amphetamine present	544	11.13
Anticonvulsant present	258	5.28
Cocaine present	226	4.62
Antipsychotic present	145	2.97
Muscle relaxant present	96	1.96
Barbiturates present	60	1.23

Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.

Discussion

Suicide is a leading cause of death in Colorado and continued to be a leading cause from 2016 to 2020. Differences were observed in both the numbers and rates of suicide deaths among Colorado's diverse populations during the 2016 to 2020 time period. Suicide counts and rates varied by age, sex, geographic region, race/ethnic population, method of fatal injury, veteran status, marital status, and industry.

Precipitating circumstances prior to death and toxicology results among suicide victims also revealed important information about the risk factors associated with suicide. By getting a more complete picture of the circumstances that precipitated the suicide, including mental health conditions and substance use/misuse, this will provide useful information for suicide intervention efforts. The findings presented in this report contain the most currently available data on suicide trends, demographics, and surrounding circumstances among Colorado residents and can contribute to current suicide prevention strategies in Colorado communities.

There are multidisciplinary community organizations working to prevent suicide in the state of Colorado. The Office of Suicide Prevention at CDPHE leads many collaborative partnerships and has several coordinated suicide prevention initiatives across the state of Colorado.[4] Further information on the suicide prevention initiatives and CDPHE's Office of Suicide Prevention can be found online at https://cdphe.colorado.gov/suicide-prevention.[18] Also available through that webpage is the interactive Colorado Suicide Dashboard, with data available on suicide deaths detailed demographic characteristics, cause of death, circumstances and toxicology that can be queried at the state and county level.

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Appendix 1 Health Statistics Regions by Counties

HSR 1: Logan, Morgan, Phillips, Sedgwick, Washington, and Yuma Counties
HSR 2: Larimer County
HSR 3: Douglas County
HSR 4: El Paso County
HSR 5: Cheyenne, Elbert, Kit Carson, and Lincoln Counties
HSR 6: Baca, Bent, Crowley, Huerfano, Kiowa, Las Animas, Otero, and Prowers Counties
HSR 7: Pueblo County
HSR 8: Alamosa, Conejos, Costilla, Mineral, Rio Grande, and Saguache Counties
HSR 9: Archuleta, Dolores, La Plata, Montezuma, and San Juan Counties
HSR 10: Delta, Gunnison, Hinsdale, Montrose, Ouray, and San Miguel Counties
HSR 11: Jackson, Moffat, Rio Blanco, and Routt Counties
HSR 12: Eagle, Garfield, Grand, Pitkin, and Summit Counties
HSR 13: Chaffee, Custer, Fremont, and Lake Counties
HSR 14: Adams County
HSR 15: Arapahoe County
HSR 16: Boulder and Broomfield Counties
HSR 17: Clear Creek, Gilpin, Park, and Teller Counties
HSR 18: Weld County
HSR 19: Mesa County
HSR 20: Denver County
HSR 21: Jefferson County