



- Health Surveys & Evaluation Branch
- Public Health Informatics Branch
- Registries and Vital Statistics Branch

## Homicide in Colorado, 2004-2014: A Summary from the Colorado Violent Death Reporting System

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### Introduction

Homicide is a significant public health concern that affects people of all backgrounds and circumstances, and demands continued attention in Colorado and across the country. In the United States, homicide consistently ranks among the top five leading causes of death for ages 1 to 44 and contributes an estimated annual total of \$9 billion in lost productivity and medical costs.<sup>1,2</sup> The homicide rate in the United States (5.6 deaths per 100,000 population) is seven times higher than in other high-income countries and when considering homicides by firearm only, it rises to 25 times higher.<sup>3</sup> That being said, over the past decade, the homicide rate has decreased in the United States and in Colorado. Although there has been a decrease in homicide deaths year to year, the decline appears to be slowing, causing homicide to remain a target of public health prevention efforts.<sup>2</sup>

In an attempt to decrease the burden of homicide and inform potential prevention strategies, the Colorado Violent Death Reporting System (CoVDRS) was implemented at the Colorado Department of Public Health and Environment (CDPHE) in 2004. The CoVDRS is a public health surveillance system designed to obtain a complete census of all violent deaths occurring in Colorado, to collect demographic information and associated risk factor data, and to track the circumstantial information surrounding each death. A violent death includes any death by suicide, homicide, unintentional firearm death, legal intervention, as well as selected deaths of undetermined intent when the death may have been the result of violence. Colorado is one of 42 states 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). The NVDRS is the centralized database consisting of de-identified violent death data submitted by all participating states. The CoVDRS collects and inputs data from multiple sources including death certificates, coroner/medical examiner reports, and law



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enforcement investigations. Data collected are maintained in a single electronic database for analysis and reporting.

This report provides descriptive information using CoVDRS surveillance data from 2004 to 2014 and includes summaries of demographic characteristics and trends of both homicide victims and suspects in Colorado. Life and situational circumstances most frequently associated with homicide death will also be presented. The purpose of this report is to increase homicide awareness, to explore homicide trends in recent years, and to gain a better understanding of the populations that may be at greater risk for homicide in Colorado. Primary prevention strategies for homicide remain a public health priority, especially among groups who are at increased risk. The information presented in this report may be used to promote prevention and intervention efforts by agencies interested in decreasing homicide and its impact on the communities they serve.

## Methods

Data for this report were obtained from the NVDRS database and include deaths resulting from homicide among Colorado residents from 2004 to 2014. Deaths were selected for inclusion in the CoVDRS based on either the indication of homicide as the manner of death on the death certificate or the presence of International Classification of Diseases, 10th Revision (ICD-10) coding for homicide as underlying cause of death (X85-X99, Y00-Y09, and Y87.1).<sup>4</sup> A full description of the data collection processes of the NVDRS is provided elsewhere.<sup>5</sup> For the purposes of this report, legal intervention deaths, homicide deaths that occurred in Colorado among non-Colorado residents, and Colorado residents who died by homicide in other states were excluded. Circumstances associated with most homicide deaths were obtained through information contained in the death certificates, coroner and medical examiner investigation and autopsy reports, and associated law enforcement investigation reports.

Homicide deaths were analyzed by year of death, geographic region of residence, age, gender, race/ethnicity, community poverty level, method of injury leading to death, victim circumstances, suspect circumstances, and toxicology. For this report, lethal means are reported as one of six possible categories: firearm, sharp instrument, blunt instrument, personal weapons, strangulation/suffocation, and other (includes poisoning and intentional neglect). Homicide deaths are

presented as number of cases for a given category, percent of the total number of deaths for a given category, or as a mortality rate (frequency of death per 100,000 population) with the 95 percent confidence interval.

Population estimates used in computing mortality rates use 2014-based estimates from the State Demography Office, Colorado Department of Local Affairs. Age-adjusted homicide rates were calculated using the direct method and standardized according to the 2000 United States standard population. Race/ethnicity rates and counts were calculated for one of five racial/ethnic categories; White Non-Hispanic, White Hispanic, Black/African American, Asian/Pacific Islander, and American Indian.

Poverty is estimated using area-based poverty status. Area-based poverty status is measured by calculating the percent of the population in each decedent's census tract of residence that is living at or below the federal poverty level.<sup>6</sup> These population data come from the 2010-2014 five-year American Community Survey estimates, made available by the U.S. Census Bureau. The poverty level categories used in this report include 0-9.9 percent of the population in a decedent's community living at or below the federal poverty level, 10-19.9 percent, 20-29.9 percent and 30 percent or greater.

To calculate homicide rates and frequencies by geographic location within the state, counties in Colorado were categorized by Health Statistics Region (HSR), a method often used to examine regional differences for various health indicators within Colorado. Results are generally presented with 95 percent confidence intervals. Differences between rates are described as "significant" if the confidence intervals of two rates being compared do not overlap, or the p-value of a formal comparison test is less than 0.05.

## Results

### Homicide Deaths

#### *Homicide Rates - State of Colorado.*

Between 2004 and 2014, there were a total of 1,984 homicide deaths among Colorado residents (3.6 deaths per 100,000 population). During this period, the number and age-adjusted rate of homicide deaths decreased, with a statistically significant difference between 2004 and 2014 (Table 1). Each year on average there were eight non-resident homicide deaths in Colorado (data not shown).

**Table 1. Homicide deaths and age-adjusted rates, Colorado residents (2004-2014).**

Year	N	Age-adjusted rate (95% CI)
2004	213	4.5 (3.9-5.1)
2005	181	3.8 (3.3-4.4)
2006	172	3.5 (3.0-4.1)
2007	173	3.5 (3.0-4.0)
2008	187	3.7 (3.2-4.3)
2009	183	3.7 (3.1-4.2)
2010	167	3.3 (2.8-3.8)
2011	187	3.6 (3.1-4.2)
2012	189	3.6 (3.1-4.2)
2013	170	3.3 (2.8-3.8)
2014	162	3.1 (2.6-3.6)

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

Rates are per 100,000 population.

*Types of Homicide*

Table 2 presents the incident types of the 1,984 homicide deaths of Colorado residents. The majority of Colorado homicides are incidents with a single victim, but approximately 7 percent are cases with multiple homicide victims, and 8 percent are cases of murder/suicide, where the suspect died by suicide (n=139 suicide deaths related to murder/suicide, not included in counts or percentages).

**Table 2. Homicide deaths by incident type, Colorado residents (2004-2014).**

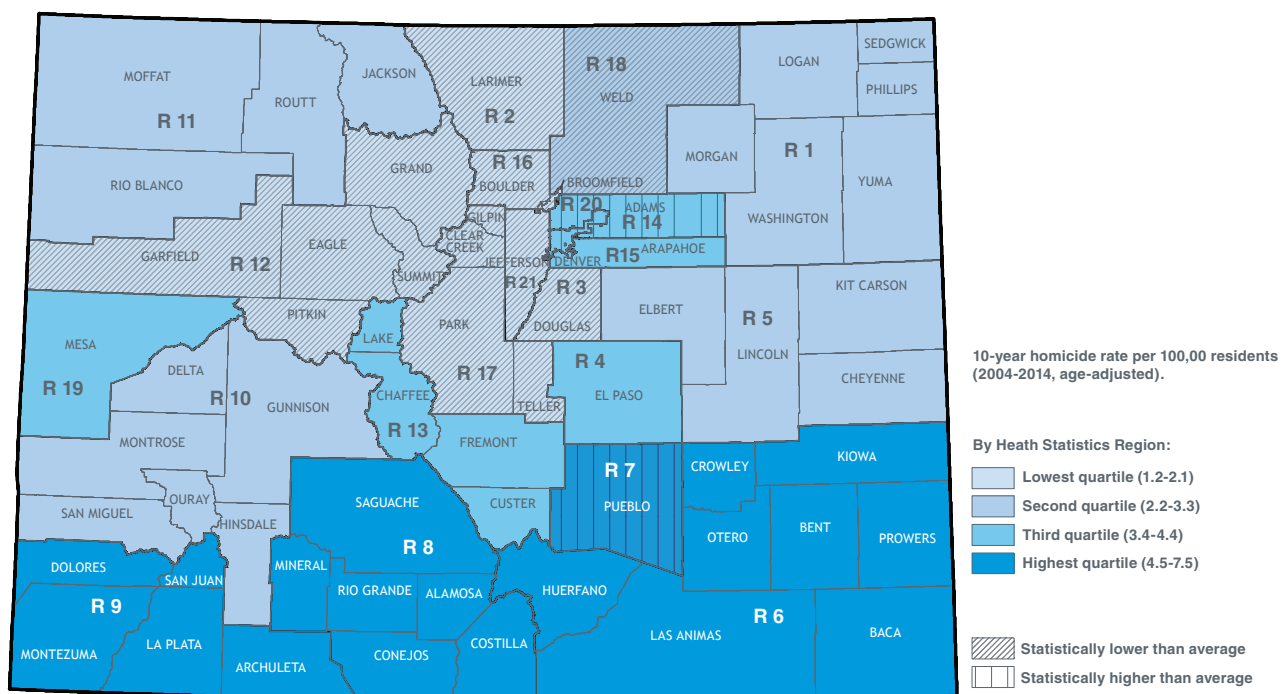
Incident Type	%	N
Single homicide	84.9	1,685
Multiple Homicide	7.1	141
Homicide(s) followed by suicide	8.0	158
Total	100.0	1,984

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

*Homicide Rates - Region of Residence.*

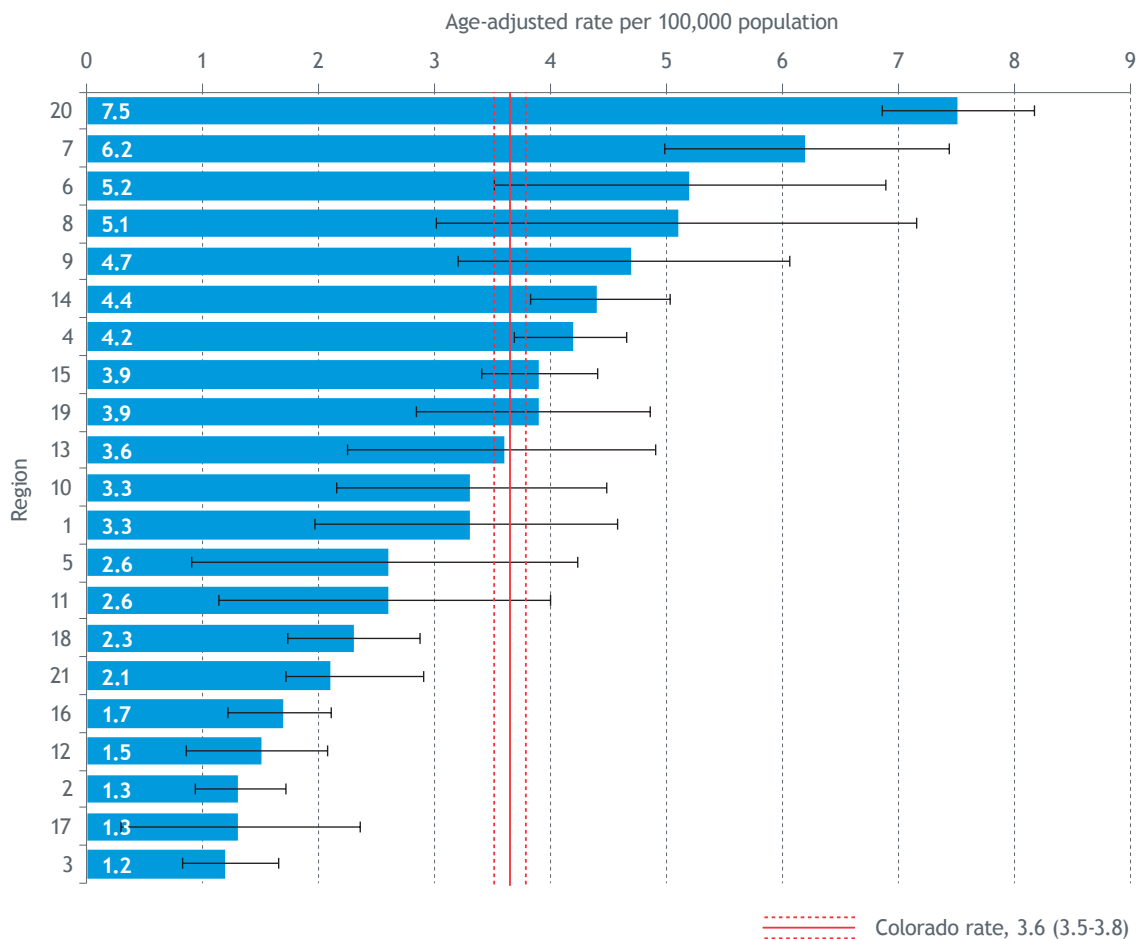
Figure 1 shows a map of the age-adjusted homicide rates across the state of Colorado by Health Statistics Region (HSR) for 2004 to 2014 (combined). Homicide rates by region are grouped by quartile and further identified by whether they are significantly higher or lower than the statewide homicide rate (3.6 deaths per 100,000 population). Regions 7 (Pueblo county), 20 (Denver county), and 14 (Adams county) experienced age-adjusted homicide rates higher than the state. Areas that have age-adjusted homicide rates that are lower than the state include regions 2, 3, 12, 16, 17, 18 and 21. Figure 2 presents the same results in chart form.

**Figure 1. Map of age-adjusted homicide rate by Health Statistics Region, Colorado residents (2004-2014).**



Source: Violent Death Reporting System, Colorado Department of Public Health and Environment. Rates are per 100,000 population.

Figure 2. Age-adjusted homicide rates rank by Health Statistics Region, Colorado residents (2004-2014).



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

Error bars and dashed lines represent 95% confidence intervals.

Rates are per 100,000 population.

For more information about Colorado’s Health Statistics Regions, please visit [www.chd.dphe.state.co.us/HealthIndicators/home/index](http://www.chd.dphe.state.co.us/HealthIndicators/home/index).

## Homicide Demographics

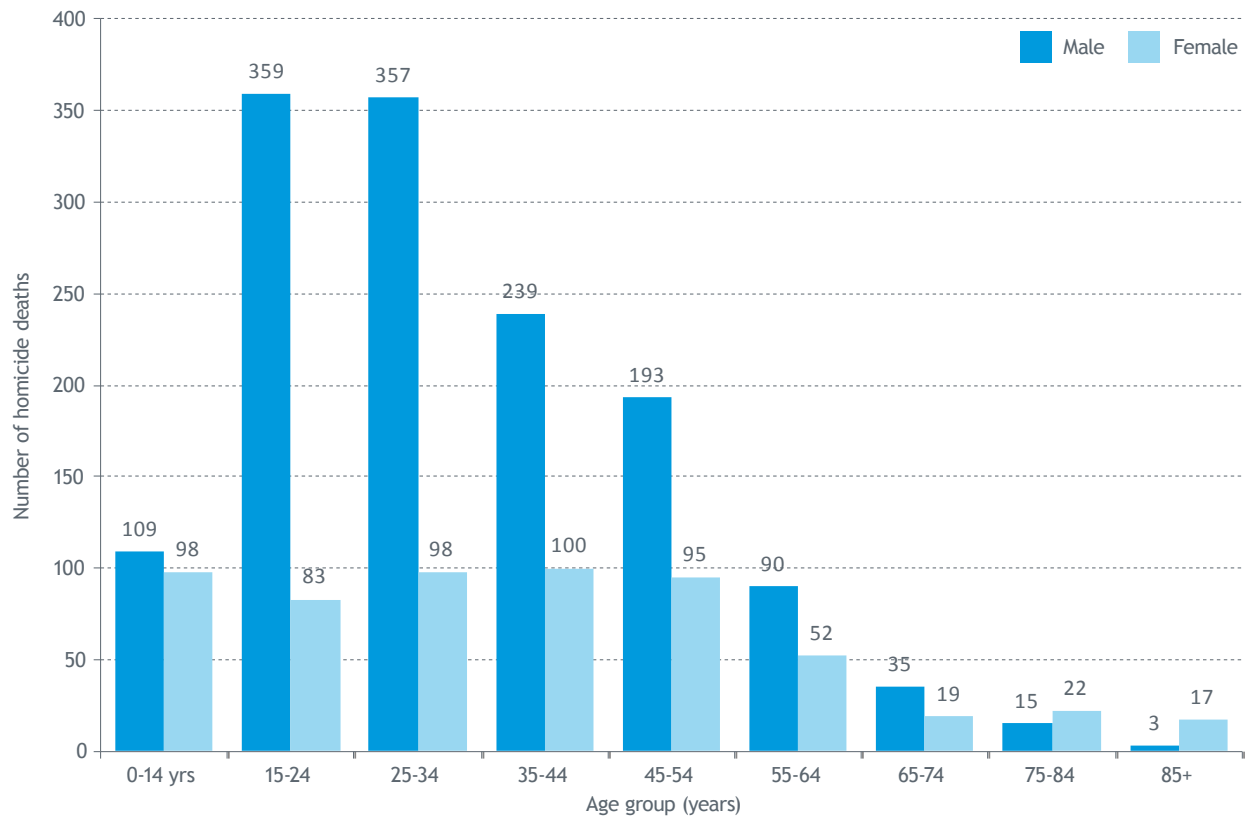
### Age and Gender Counts

Figure 3 shows the total number of homicide deaths in Colorado among residents by age and gender. Between 2004 and 2014, the number of male homicides was nearly two and one-half times the total number of female homicides (1,400 and 584 deaths, respectively). For males, the highest number of deaths occurred in the 15-24 and 25-34 year age groups (359 and 357 deaths, respectively). These deaths make up more than one-third of all Colorado homicides.

### Age Rates

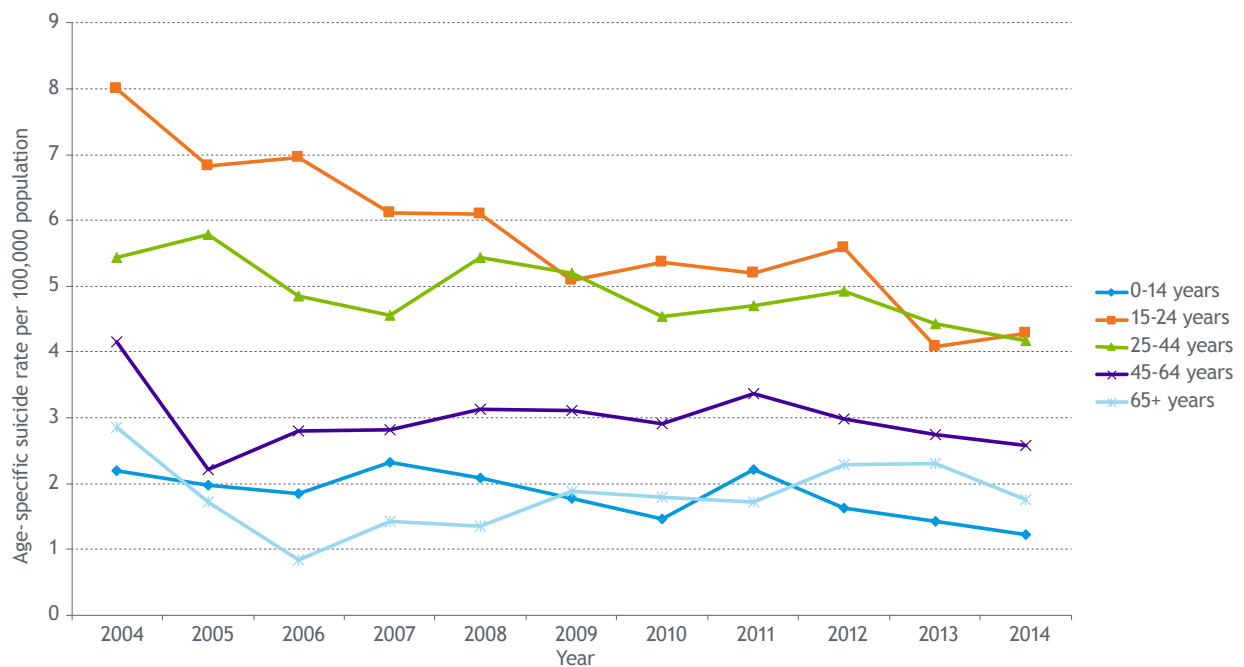
Figure 4 presents trends in homicide rates by age group. Overall the figure reveals the steadily decreasing trend of homicide rates in Colorado. Additionally it demonstrates the persistent higher rates of homicide among 15-24 and 25-44 year-olds.

Figure 3. Homicide deaths by age and gender, Colorado residents (2004-2014).



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

Figure 4. Age-specific homicide rates, Colorado residents (2004-2014).



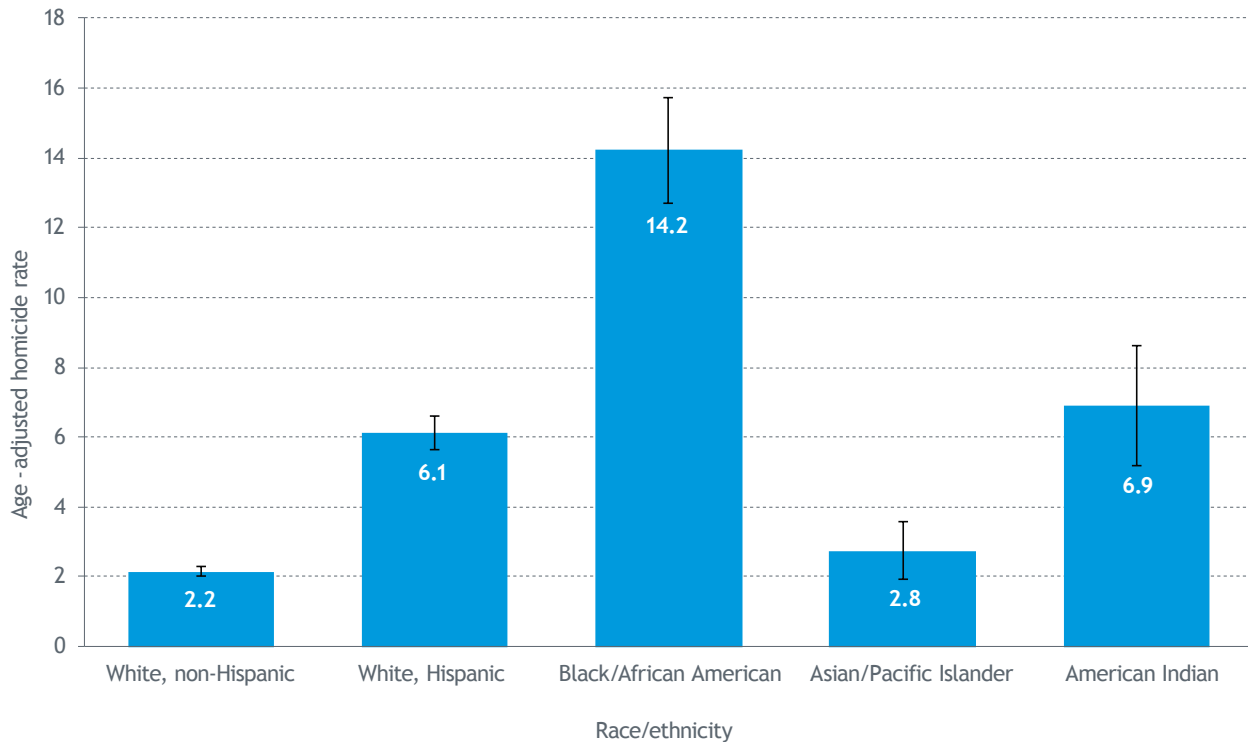
Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment. Rates are per 100,000 population.

### Race/Ethnicity Rates

Figure 5 reveals that between 2004-2014, Black/African Americans experienced the highest rate of homicide with a rate of 14.2 deaths per 100,000 population. The rate of homicide among the Black/African American population is more than twice that of the next closest race/ethnicity (American Indian), and more than six times that of White, non-Hispanics. Both American Indian and White, Hispanic

populations had significantly higher rates than White, non-Hispanics as well. When incorporating age and gender into these data we see that Black/African American males ages 25-34 (46.9 per 100,000 [95% confidence interval/CI: 37.4-56.4]) and ages 15-24 (43.1 per 100,000 [CI: 34.2-52.01]) had rates more than 10 times greater than their White non-Hispanic age group counterparts (3.8 per 100,000 [CI: 3.0-4.5], 3.6 per 100,000 [CI: 2.8-4.2]) respectively) (data not shown).

Figure 5. Age-adjusted homicide rates by race/ethnicity, Colorado residents (2004-2014).



Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment. Error bars represent the 95% confidence interval. Rates are per 100,000 population.

### Poverty Rates

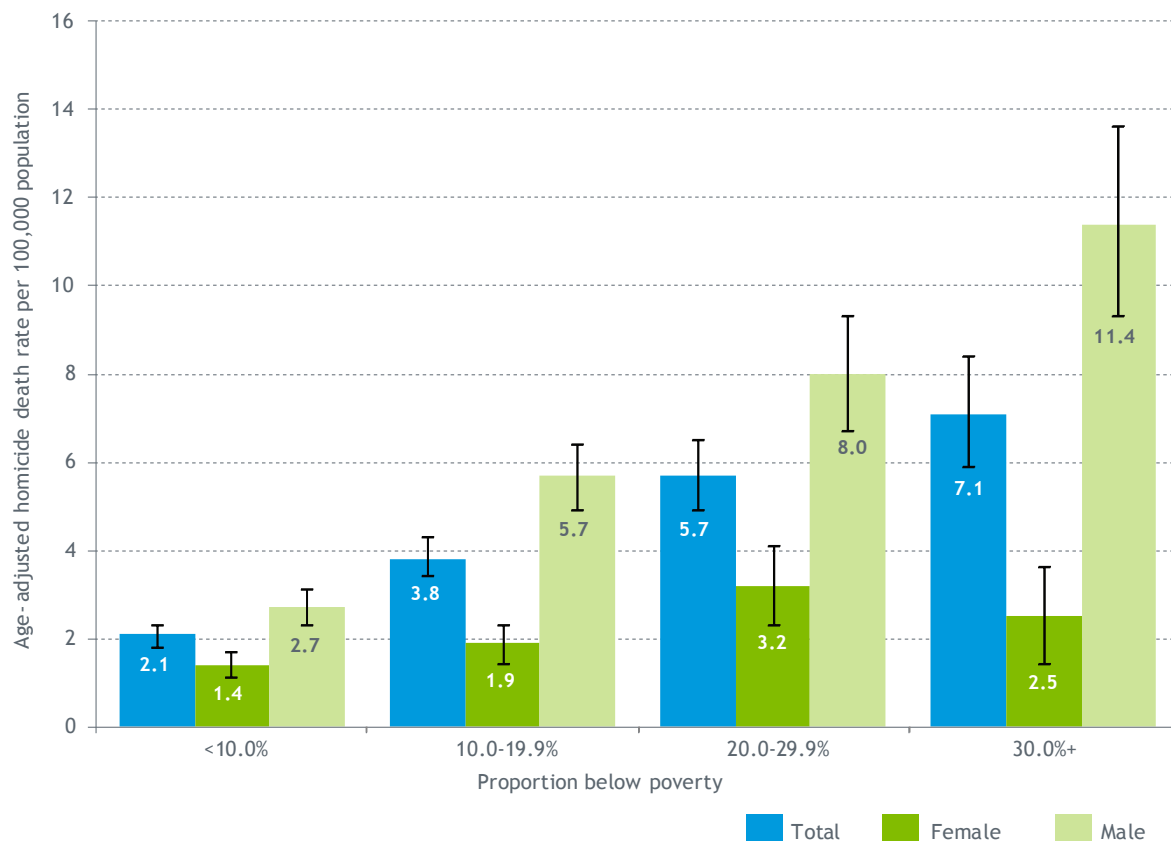
Figure 6 shows the area-based poverty estimates for Colorado resident homicide victims. Area-based poverty status represents the percentage of the population living at or below the federal poverty level within a residence census tract. The figure reveals that as the proportion of a community that lives below the poverty level increases, the age-adjusted homicide rate also significantly increases. This relationship is more pronounced in the male population.

### Homicide Methods

#### Methods by Age

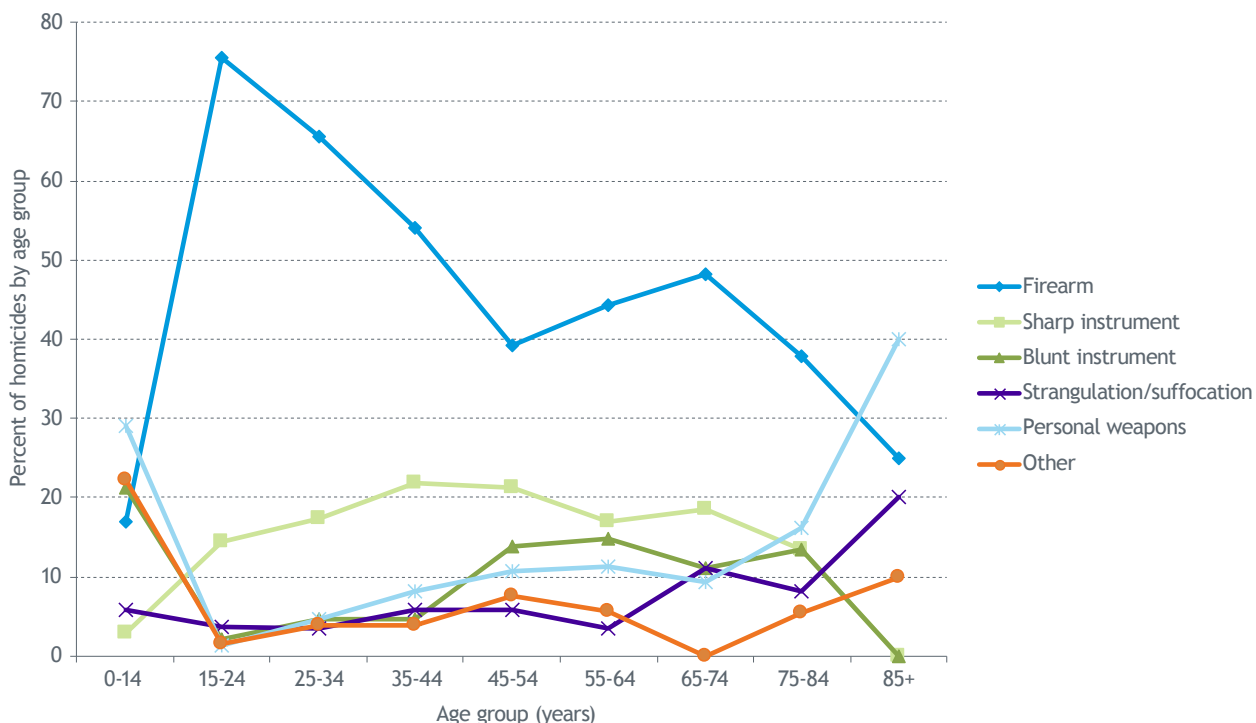
Figure 7 presents homicides by method of injury. The most common cause of death for every group except 85+ was firearm, which was used in 54 percent of all homicides (data not shown). Additionally, between the ages of 15-34, more than 60 percent of the homicide deaths were caused by firearm, which was particularly high in the younger ages. Personal weapon injuries are highest in the very young (ages 0-14) and the very old (ages 75 and up) (these include such weapons as fist, feet, and hands, in actions such as punching, kicking, or hitting).

Figure 6. Homicide rates by area-based poverty category, Colorado residents (2010-2014).



Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.  
 Error bars represent the 95% confidence interval.  
 Rates are per 100,000 population.

Figure 7. Homicide methods by age group, Colorado residents (2004-2014).



Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.  
 "Other" method includes a poisoning, intentional neglect, or other/unspecified methods.

## Homicide Circumstances

### Victim Circumstances

Table 3 outlines the 15 circumstances most frequently associated with homicide deaths in Colorado. Eighty-one percent of homicide cases had some sort of circumstance known about the incident per information pulled from coroner/medical examiner reports and law enforcement investigations. The most frequent circumstance associated with Colorado homicide deaths was evidence of a recent verbal argument that was contributory to the violent death (56.3%). Nearly one-third of homicides were related to another criminal activity (28.4%). Additionally, a notable portion of these homicide deaths were related to intimate partner violence (17.6%).

**Table 3. Homicide deaths by circumstance, Colorado residents (2004-2014).**

Circumstance	N	%
Homicides with 1+ known circumstance	1,607	81.0
	n	%*
Argument preceded violent death	904	56.3
Death precipitated by another crime	457	28.4
Intimate partner violence	283	17.6
First crime in progress	220	13.7
Drug involvement	219	13.6
Gang involvement	171	10.6
Random violence	134	8.3
Jealousy or lovers triangle	120	7.5
Family relationship problem	105	6.5
Alcohol problem	101	6.3
Other substance abuse problem	98	6.1
Crisis in last two weeks	92	5.7
Death precipitated by a physical fight	89	5.5
Justifiable self-defense	81	5.0
Brawl (3 or more people in a physical fight)	76	4.7

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

\*Percent of total cases with at least one circumstance known.

### Victim Circumstances by Race

Given the pronounced differences in homicide rates by victim’s race/ethnicity, it’s also important to look at circumstances stratified similarly (Table 4). The percentages are computed using only cases where at least one circumstance was known. The proportions of homicides with circumstances known vary based on racial group with Black/African American homicides having the most circumstance data (87.6%) and the American Indian homicides having the least (68.3%). **The highlighted cells represent the three most common circumstances for the specific racial group, which reveal differences between groups.** The most notable difference includes increased gang-involved incidents with Black/African American and White, Hispanic homicides. Other notable differences include increased prevalence of random violence, drug involvement, and drive-by shootings in Black/African American homicide victims when compared to the White, non-Hispanic victims.



Table 4. Homicide deaths by circumstance and race/ethnicity, Colorado residents (2004-2014).

Circumstance	White, non-Hispanic		White, Hispanic		Black/African American		American Indian	
	N	%	N	%	N	%	N	%
Homicides with 1+ known circumstance	689	81.5	523	78.7	317	87.6	43	68.3
	n	%*	n	%*	n	%*	n	%*
Argument preceded violent death	380	55.2	306	58.5	172	54.3	24	55.8
Death precipitated by another crime	214	31.1	139	26.6	87	27.4	7	16.3
Intimate partner violence	159	23.1	78	14.9	30	9.5	9	20.9
First crime in progress	98	14.2	65	12.4	49	15.5	3	7.0
Drug involvement	78	11.3	69	13.2	65	20.5	3	7.0
Gang involvement	16	2.3	78	14.9	72	22.7	**	**
Random violence	36	5.2	53	10.1	40	12.6	3	7.0
Jealousy or lovers triangle	56	8.1	44	8.4	14	4.4	6	14.0
Family relationship problem	57	8.3	32	6.1	10	3.2	4	9.3
Alcohol problem	65	9.4	24	4.6	7	2.2	4	9.3
Other substance abuse problem	54	7.8	28	5.4	15	4.7	**	**
Crisis in last two weeks	49	7.1	31	5.9	10	3.2	**	**
Death precipitated by a physical fight	40	5.8	28	5.4	14	4.4	3	7.0
Justifiable self-defense	35	5.1	28	5.4	15	4.7	**	**
Brawl (3+ people in a physical fight)	19	2.8	37	7.1	16	5.1	3	7.0
Victim used a weapon	25	3.6	22	4.2	26	8.2	**	**
Victim of violence in the past 30 days	37	5.4	18	3.4	9	2.8	6	14.0
Victim was a bystander	21	3.1	33	6.3	12	3.8	**	**
Current mental health diagnosis	39	5.7	8	1.5	5	1.6	**	**
Drive-by shooting	7	1.0	25	4.8	21	6.6	**	**

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

\*Percent of total cases with at least one circumstance known.

\*\*Counts and proportions based on fewer than three events are suppressed.

#### Victim Circumstances and Crime

Table 5 presents the types of crime related to cases where criminal activity was noted as being contributory to the homicide death of the victim. Among homicide studies for this report, nearly one quarter (28.4%) had documentation of another crime that was contributory to the homicide death. The most prevalent types of crimes were burglary, robbery, or theft. It also can be seen that nearly one-third of these homicide deaths were related to a case of assault, either fatal or non-fatal.

Table 5. Homicide deaths by criminal activity, Colorado residents (2004-2014).

Nature of Crime	N	%
Homicides precipitated by criminal activity	457	23.0
	n	%*
Burglary, robbery, or theft	191	41.8
Assault or homicide	147	32.2
Other crime	116	25.4
Drug trade	53	11.6
Rape or sexual assault	36	7.9
Unknown crime	11	2.4

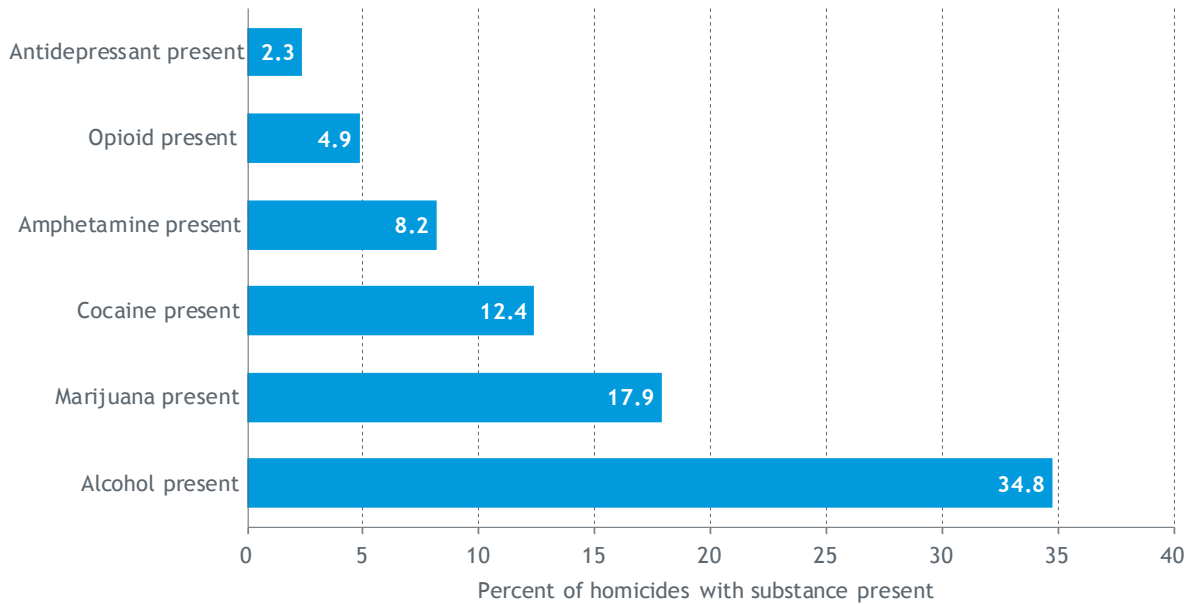
Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.

\*Percent of total cases precipitated by another crime.

*Toxicology*

Figure 8 presents documented toxicological results associated with these homicide deaths – what substances were present in the victim’s system at the time of death. Among homicide deaths for which toxicology results were available (1,930, or 97.1% of all cases), alcohol (34.8%) was the most frequently identified substance, followed by marijuana (17.9%) and cocaine (12.4%). Other substances noted were presented in fewer than 10 percent of homicide deaths.

**Figure 8. Homicide deaths by presence of substances, Colorado residents (2004-2014).**



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

\*Percent of total cases with toxicology results known.

*Suspect Circumstances*

Table 6 presents the circumstances related to the suspect associated with the homicide. The percentages were calculated from the cases where any information is known about the suspect, including basic demographics. Eleven and one-half percent of suspects were also victims in the incident, which could mean they were killed by another person, or died by suicide shortly after the initial homicide of the victim. Notably over 10 percent of our suspects were caregivers for their victims at one point in time, and the majority of those victims were under age 14 (86.6%) (data not shown).

**Table 6. Homicide deaths by suspect circumstance, Colorado residents (2004-2014).**

Circumstances	N	%
Any Information known about suspect	1,535	77.4
	n	% *
Suspect is also a victim in the incident	176	11.5
Suspect was a caregiver of the victim	157	10.2
History of abuse of victim by suspect	153	10.0
Suspect attempted suicide after the incident(fatal or non-fatal)	77	5.0
Suspect has a history of mental illness	35	2.3

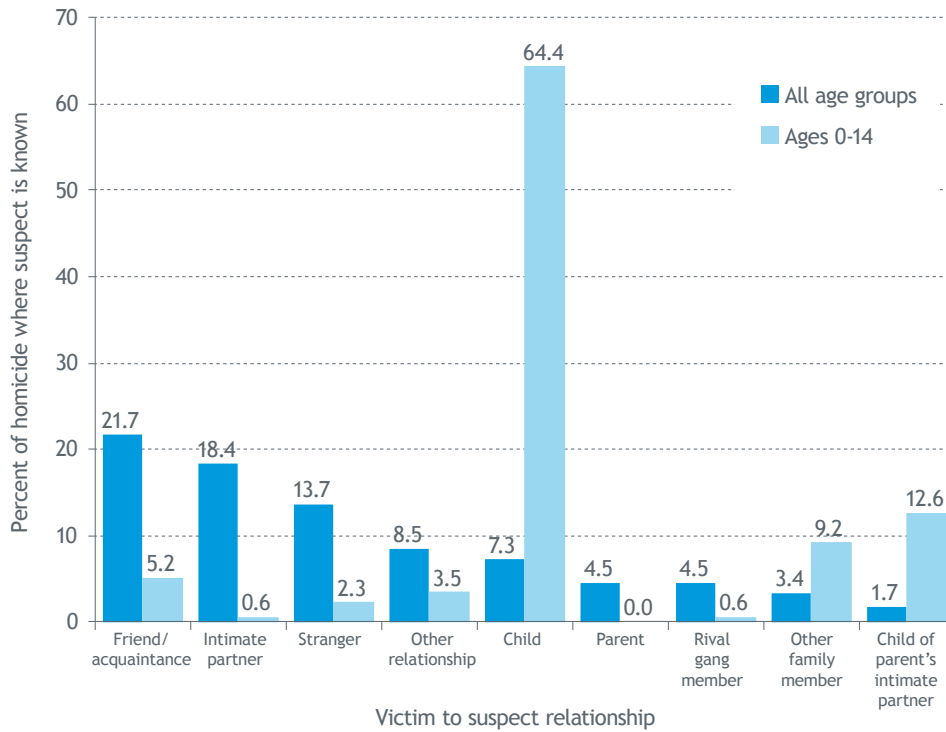
Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment.

\*Percent of cases where any information is known about the suspect.

## Victim to Suspect Relationship and Age

Figure 9 presents how the victim knew the suspect, or the relationship between victim and suspect (e.g. ‘child’ represents the victim as the child of the suspect) and age. As there can be multiple suspects in these cases, the figures below represent the number of suspects rather than number of victims. The most prevalent relationship for all ages, was friend or acquaintance (21.7%), followed by previous or current intimate partner (18.4%) and then stranger (13.7%). For children ages 0-14, the most prevalent relationship was child (64.4%), and child of parent’s intimate partner (12.6%).

Figure 9. Homicides by victim to suspect relationship and age (2004-2014).



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

\*Percent of total cases with suspect information known.

## Discussion

Throughout the past 11 years the rate and count of homicides in Colorado have been on a general downward trend. Additionally, the rate of homicide in Colorado is consistently less than that of the national rate.<sup>5</sup> While these are promising findings about homicide in Colorado, other characteristics are more troubling. To begin with, residential level of poverty significantly increased the rate of homicide in communities, which speaks to the role of environment as a social determinant of health. Additionally there are consistently more male homicide victims, and the highest burden of these deaths is among young-adult and working-age males. There also persists significant variation in the rates of homicide based on race and ethnicity. There are particularly increased rates among

Black/African American, White Hispanic, and American Indian populations. Previous research has repeatedly shown increased rates of both homicide victimization and perpetration in young minority males.<sup>6</sup> In the Black/African American population we see homicide death rates more than ten times that of their White, Non-Hispanic counterparts in some age groups. Such disparities yield staggering years of potential life lost among these populations, and significant losses to their communities.<sup>7</sup>

When examining methods of homicide, we found that firearms are the weapon used for more than half of Colorado homicides. Additionally, young to working-age (age 15-44) homicide victims were more often killed with a firearm when compared to other age groups. It further shapes the conversation that these young and working-age

males are not only dying more often, but also dying predominantly via firearm injury.

Looking at the circumstance and toxicology data, there are several unique findings. More than one-third of homicide victims had alcohol in their system at the time of death. Furthermore, out of homicide deaths where criminal activity was part of the incident, burglary, theft, and robbery were the most common types. Finally in over half of the homicide deaths, there was a verbal argument that escalated to a violent death.

Delving deeper into the circumstance data by racial group, there are apparent differences in the types of circumstances that contributed to the violent death of different racial groups. These data are prime examples of health inequity, where economic, environmental, and social factors are differentially affecting the morbidity and mortality of communities. These inequities are a product of historical discrimination, non-inclusive policies, and the continual perpetuation of diminished opportunity for communities of color. These upstream factors contribute directly to the increased risk of a homicide death, and a plethora of other negative health outcomes.<sup>8</sup> These factors often play a much larger role than any individual characteristic ever could, and therefore many of the observed risk factors for homicide and violence are better defined by community-level characteristics.


Research has found some promising community-level interventions to reduce homicide and violence. A strategy known as Business Improvement Districts (BID) is designed to use the investments of local property and business owners to improve the safety, economics, and image of impoverished communities. The implementation of these BIDs has shown an 8 percent reduction in violent crimes, and a 12 percent reduction in robberies,<sup>9</sup> – crimes that, as seen in Colorado data, can be contributory in homicides. There are also several movements in larger cities that aim to change the social norms around firearm use and violence in the community and specifically younger males. Cure Violence,<sup>10,11</sup> Baltimore Safe Streets,<sup>12</sup> and Chicago Cease Fire,<sup>13</sup> are all programs that target violence *hot spots*, and intervene with community members to promote alternatives to violence, mediate issues, change the norms, and increase the perceived costs to committing violence. Formal evaluations of Safe Streets Baltimore and Chicago Cease Fire have both shown statistically significant reduction in homicides.<sup>14</sup>

Another element of homicide in Colorado is child homicide. In 86.2 percent of homicides where the victim was under age 15, the suspect was a parent or family member of some kind. The homicide rate for those ages 0-14 has stayed relatively stable, while most other age groups have declined over the 11-year period. The prevention of these child homicides largely fall under the issue of child maltreatment and abuse. Research indicates that an effective method to prevent multiple forms of violence, including child maltreatment, is to target both risk and protective factors, on different socioecologic levels (individual, interpersonal, organizational, community, and society).<sup>15</sup> Some examples of shared risk factors include: parental characteristics such as young age, family social isolation, and concentrated neighborhood disadvantage.<sup>16</sup> Some examples of shared protective factors include: parental employment, access to health care and social services, and families with community engagement and social connectedness.<sup>16</sup>

CDPHE's Violence and Injury Prevention program has prioritized this framework, and created the following prioritized concepts: Connectedness (family, school and community), Positive Social Norms, Good Behavioral Health, Economic Stability, and Resilience (individual, familial and community). Initiatives and recommendations related to these concepts range from societal policies that support free full-day kindergarten and paid parental leave,<sup>17</sup> to interpersonal home visitation programs, and even individual cognitive behavioral therapy. These are just a few examples of the types of multidisciplinary initiatives that span socioecological levels, and aim to prevent child maltreatment and homicide, in addition to other forms of injury and violence in Colorado.

Similarly on a national scale, the CDC has created the Essentials for Childhood framework,<sup>18</sup> designed specifically to prevent child maltreatment at the community level. Building on the concepts of shared risk and protective factors, this framework offers technical tools on how to successfully create safe environments for children, and the CDC provides support and funding for several states (including Colorado) with this work. It is designed to be a tool to reduce the burden of child abuse and maltreatment, and create communities in which every child can thrive.

These highlighted community-based prevention programs and the data concerning the circumstances, demographics

and recent trends among Colorado residents represent the most recent information on the topic of homicide. The results of these analyses aim to serve the efforts of local, state, and nonprofit agencies toward homicide prevention by providing a better understanding of the populations at greatest risk for homicide death. This report also aims to promote conversations about health equity in our communities as well as the promotion of evidence-based programs that improve the physical and mental health of the entire population. 

## Acknowledgements

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