CHILD FATALITY PREVENTION SYSTEM: MOTOR VEHICLE AND OTHER TRANSPORTATION DEATH DATA, 2016 - 2020

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Introduction

The Child Fatality Prevention System (CFPS) is a statewide network that focuses on preventing child deaths. Housed at the Colorado Department of Public Health and Environment (CDPHE), CFPS consists of local review teams, a State Review Team, and the CFPS state support team at CDPHE. Local teams and the CFPS State Review Team include community members and field experts. These teams complete case reviews of infant, child, and youth deaths in Colorado to describe trends and patterns and create strategies to prevent future deaths. As part of the case review process, CFPS partners develop and share out recommendations for how to prevent child deaths annually.

The system reviews all deaths that occur in Colorado among infants, children, and youth under age 18. CFPS does not review deaths of Colorado residents that occur out of state. This is different from other reports of child death data and other Colorado government data sources. As a result, the data presented in this data brief might not match other statistics reported at both the state and national levels.

This data brief provides an overview of motor vehicle and other transportation death data from CFPS. Additional CFPS data are available at:
www.cochildfatalityprevention.com/p/reports.html.

> For purposes of this brief, *inequities* are defined as systemic, avoidable, and unjust factors that prevent people from reaching their highest level of health. *Disparities* are differences in health outcomes between people related to social or demographic factors such as race, ethnicity, gender, sexual orientation, or geographic region. Measuring disparities helps measure our progress toward achieving equity.[1,2]

The impact of policies and systems on child deaths

Generations of social, economic, and environmental inequities contribute to the deaths of infants, children, and youth.[3] People exposed to these factors (outlined in the table below) experience additional harm, resulting in higher rates of death. When interpreting the data, it is critical to not lose sight of these systemic, avoidable, and unjust factors. Researchers work towards understanding how geography, race, ethnicity, sexual orientation, and gender identity correlate with health. It is critical that data systems like CFPS identify and understand the life-long inequities that persist across groups in order to eliminate them. When limitations in the data system exist due to how data are collected, or because data are not collected, CFPS strives to provide additional context and research about how inequities impact child deaths. By changing policies and systems that create and perpetuate inequities, CFPS can reduce the number of child deaths that occur in Colorado. Examples of these inequities include, but are not limited to:

RURAL AND FRONTIER GEOGRAPHY	RACE AND ETHNICITY	SEXUAL ORIENTATION AND GENDER IDENTITY
Limited access to Level 1 trauma centers and mental and behavioral health services.[4] Increased stigma associated with mental illness and seeking help.[5] Longer response times by emergency medical services.[6]	Racism, discrimination, and historical trauma.[9,10] Limited access to high-quality education,[11] employment opportunities,[12] healthy foods,[13] culturally traditional foods,[14] and health care.[15] Chronic stress.[16]	Discrimination, stigma, and bias.[20] Rejection from family, friends, and community.[21] Non-inclusive school curricula and anti-harassment policies.[22] Insufficient access to LGBTQ+-informed health care.[23]
→ **These and other factors contribute to higher death rates in rural areas, including suicide[7] and passenger vehicle deaths.[8]**	→ **These factors result in lasting health impacts for people of color that include infant mortality,[17] high rates of homicide and gun violence,[18] and increased motor vehicle deaths.[19]**	→ **This chronic social stress that LGBTQ+ children and youth experience influences health across the lifespan, including higher rates of suicide[24] and substance use.[25]**

Overview of Motor Vehicle and Other Transportation Deaths

From 2016 through 2020, there were 242 motor vehicle and other transportation deaths among infants, children, and youth ages 0-17 in Colorado. Motor vehicle and other transportation deaths include deaths of drivers and passengers of motor vehicles; bicyclists and pedestrians struck by a motor vehicle; and motorcycle, airplane, all-terrain vehicle (ATV) and farm equipment crashes or events. Figure 1 displays the total number of motor vehicle and other transportation deaths occurring from 2016-2020. The number of deaths ranged from a low of 41 in 2019 to a high of 59 in 2017 and averaged about 48 deaths per year for the five-year period.

Figure 1. Motor vehicle and other transportation deaths occurring among those under age 18 in Colorado by year, 2016-2020 (n=242)
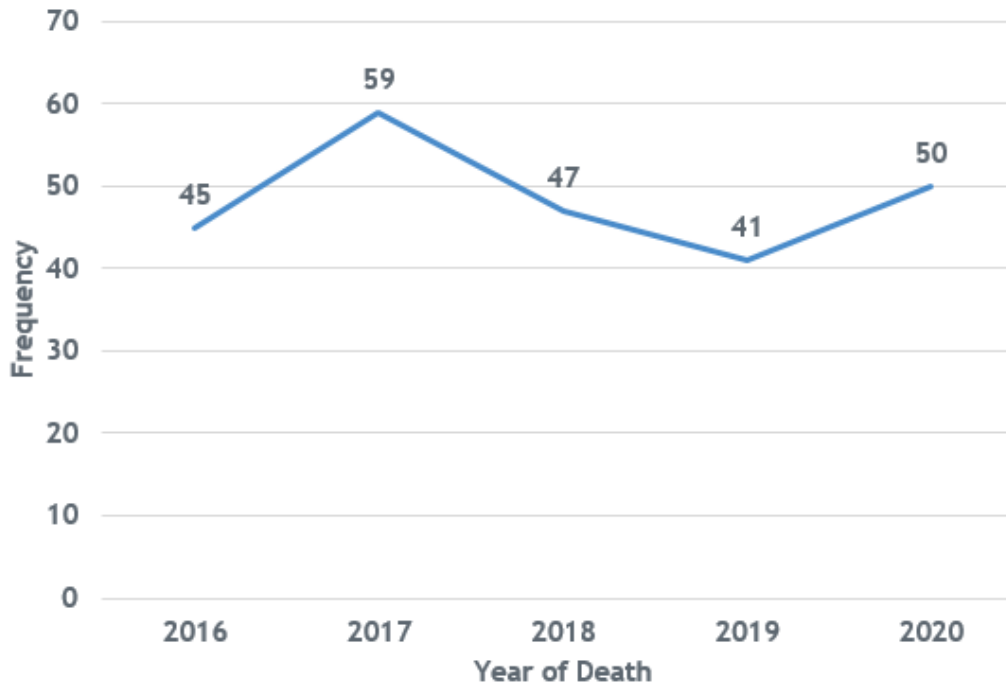

Figure 2 demonstrates that 72.3% (n=175) of young people who died in motor vehicle and other transportation deaths were occupants of passenger vehicles, 16.1% (n=39) were pedestrians, 4.1% (n=10) were involved in ATV crashes, and 2.9% (n=7) were involved in bicycle crashes. With passenger vehicle deaths making up the majority of all transportation deaths, the rest of this data brief will focus specifically on passenger vehicle deaths.

Figure 2. Motor vehicle and other transportation deaths occurring among those under age 18 in Colorado by leading types, 2016-2020 (n=242)
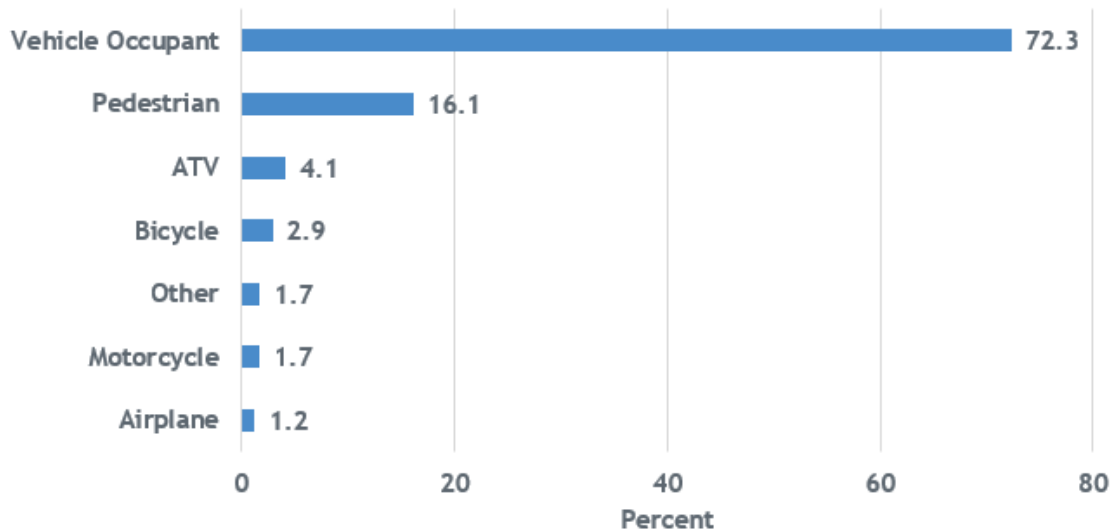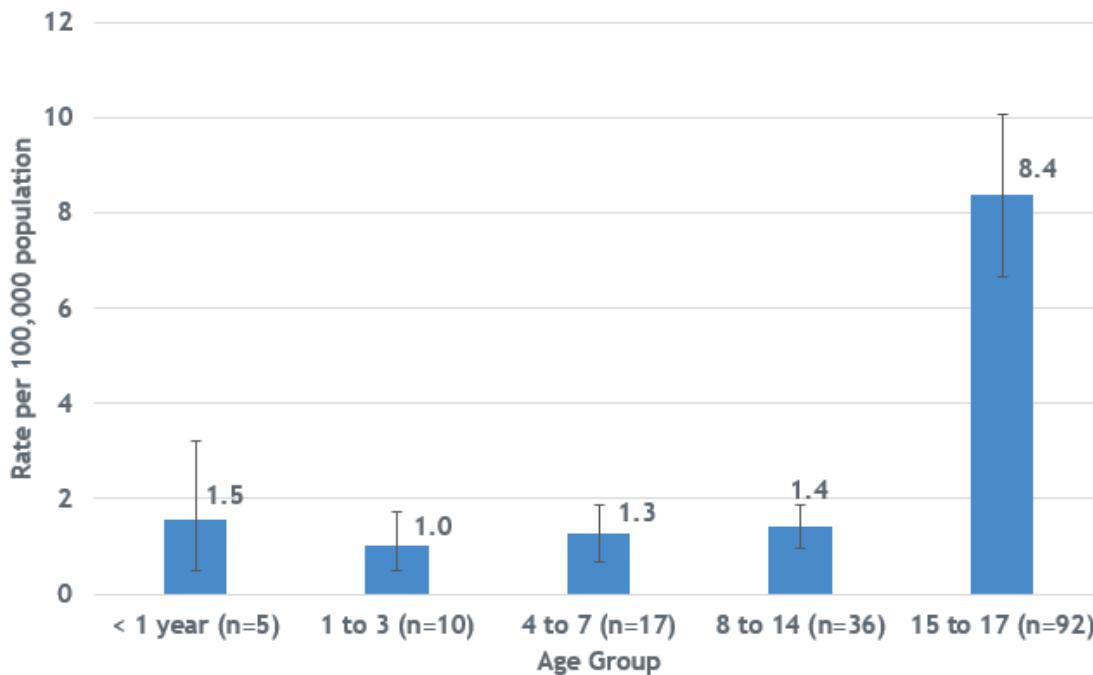
Passenger Vehicle Deaths

From 2016-2020, 175 infants, children, and youth died in Colorado as a result of passenger vehicle crashes. The overall rate of passenger vehicle deaths for the period was 2.5 per 100,000 population, slightly higher than the national rate of passenger vehicle deaths over the same period (2.3 per 100,000 population).[26,27]

Demographic Characteristics

Age

Of the 175 deaths, 78.3% (n=137) occurred among those ages 8-17. Figure 3 displays the age-specific rates of passenger vehicle deaths occurring among Colorado residents. The age-specific rate of passenger vehicle deaths was highest among those ages 15-17 at 8.4 deaths per 100,000 population. This is significantly higher than for all other age groups.

Figure 3. Age-specific rates of passenger vehicle deaths occurring in Colorado among Colorado residents under age 18 by age group, 2016-2020 (n=160)

*Error bars represent 95% confidence limits for rates.

Sex

Males represented 57.1% (n=100) of all passenger vehicle deaths. While males (2.9 per 100,000 population) have a higher rate than females (2.1 per 100,000 population), this difference was not statistically significant.

Sexual Orientation and Gender Identity

> **Defining Key Terminology**
> - <u>Sex assigned at birth</u>: The sex that the medical community labels a person at birth based on observable medical factors (e.g., appearance of genitals, informed assumptions about future sexual function and fertility, presumed course of hormone exposure to the brain).[28] Most people are assigned male or female, and this is what is put on their birth certificate. Although this is a culturally significant practice, there is broad scientific consensus that the male/female categories used in this practice do not accurately represent human biology.[29,30] When someone's sexual and reproductive anatomy, genetics, or hormone development do not fit the typical definitions of female or male, they may be described as intersex.
>
> - <u>Gender identity</u>: A person's innate, deeply felt sense of identifying as a man, as a woman, or gender-nonbinary, regardless of the sex assigned at birth. Gender identity is distinct from sexual orientation. The term "cisgender" means someone's gender identity is the same as their sex assigned at birth. "Transgender" refers to a gender identity that is different from the sex assigned at birth.
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> - <u>Gender expression</u>: A person's characteristics and behaviors that are socially defined as either masculine or feminine, such as dress, grooming, and mannerisms. Social or cultural norms can vary widely and some characteristics accepted as masculine, feminine, or gender-neutral in one culture may be different in another.
>
> - <u>Sexual orientation</u>: A person's physical or emotional attraction to people of the same, neither, both, and/or opposite gender. "Heterosexual," "bisexual," and "homosexual" are all sexual orientations. A person's sexual orientation is distinct from a person's gender identity and expression.
>
> - <u>LGBTQ+</u>: An umbrella term that collectively refers to people who are lesbian, gay, bisexual, transgender, queer, and questioning. The '+' represents those who are part of the community, but for whom LGBTQ does not accurately capture or reflect their identity (e.g., intersex, asexual, pansexual, agender, bigender, and genderqueer).

LGBTQ+ youth are systematically impacted by the stigma that stems from heterosexism and transphobia in families, schools, communities, and policies.[31] These systems of oppression are upheld by a society that privileges being heterosexual and cisgender as normative, while other sexual orientations and gender identities are devalued.[32] This structural stigma constrains LGBTQ+ children and youth, placing them at the margins, and making them more likely to experience poor health and wellbeing.[33]

LGBTQ+ people experience discrimination, bias, rejection from family, friends, and community, limited access to LGBTQ+ informed and affirming health care, and high rates of

victimization such as sexual violence.[34,35] Lack of supportive environments in schools and communities (i.e., Gender and Sexuality Alliances, access to all gender restrooms, inclusive school curricula and policies) also play a role in the structural stigma experienced by LGBTQ+ young people.

Research is beginning to illuminate the connection between structural stigma, discrimination, and death. A recent study shows that exposure to structural stigma is associated with greater risk of death among adults who had a same-sex partner in the last year.[36] LGBTQ+ young people have increased risky driving behaviors, such as drinking and driving and not wearing a safety belt, which impact risk of motor vehicle crashes and death.[37,38] However, research finds that risky behaviors including not wearing a seatbelt are lessened when young people feel supported at school and home.[39]

In order to better understand these disparities and address the unique needs of LGBTQ+ people, it is critical to gather complete and standardized data about sexual orientation and gender identity (SOGI). Unlike other demographic information, children and young people are rarely—if ever—asked about their gender identity or sexual orientation as a part of demographic information for their schooling or medical treatment. As such, records used to identify other demographic information during CFPS case reviews often do not contain SOGI data.

While CFPS does attempt to collect SOGI information, there are notable challenges for CFPS and other mortality data systems to accurately capture this information. As a result, little is known about causes of death in LGBTQ+ people. This has long hindered efforts to understand and prevent these deaths. There are multiple factors that directly affect collection of SOGI data at the time of death. The ability of medicolegal death investigators to collect SOGI information is reliant on the knowledge of friends or family of the young person, who are the key reporting sources for coroner and law enforcement investigators. In many cases, the young person who died may have identified as LGBTQ+ but were not open about their identity. Friends and family of the young person who died may also not be willing to share SOGI information with investigators due to SOGI-related stigma. These challenges are amplified by a lack of training for death investigators in eliciting SOGI information from friends and family in an accurate and sensitive way.[40,41]

It is worth noting that during the time period when deaths that occurred from 2016-2020 were being reviewed, questions asking about sexual orientation and gender identity were inconsistently available in the National Fatality Review-Case Reporting System (NFR-CRS), the data tool that CFPS uses. In April 2018, existing sexual orientation and gender identity questions were removed from the NFR-CRS. CFPS added Colorado-specific sexual orientation and gender identity questions in April 2019, and in April 2020, the National Center for Fatality Review and Prevention added sexual orientation and gender identity questions back into the NFR-CRS for all states. In addition, the NFR-CRS added a life stressors section in its newest update, which will improve CFPS's ability to understand how stress caused by discrimination

due to sexual orientation and/or gender identity contributes to deaths among children and youth.

In an effort to reduce barriers in collecting this information, local child fatality prevention review teams receive guidance and technical assistance on how to discuss sexual orientation and gender identity during fatality reviews.

Although CFPS faces challenges in collecting data about sexual orientation and gender identity, there are other data sources in Colorado to provide information about risky driving behaviors by sexual orientation and gender identity. The Healthy Kids Colorado Survey (HKCS) is Colorado's only comprehensive survey on the health and well-being of young people. The purpose of HKCS is to better understand youth health and the factors that help young people make healthy choices.[42] The HKCS asks high school students to self-identify as lesbian, gay, bisexual, or heterosexual, and if they self-identify as transgender or cisgender, or not sure for each category.

Similar to national data, HKCS data show that substance use while driving is a bigger risk and concern for LGBTQ+ youth in Colorado when compared to heterosexual and cisgender youth (Figure 4).[43] For more information about HKCS and additional motor vehicle safety data, please visit cdphe.colorado.gov/healthy-kids-colorado-survey-data-tables-and-reports.

Figure 4. High school students in Colorado who drove a vehicle when they had been using marijuana in the last month by sexual orientation and gender identity, 2019
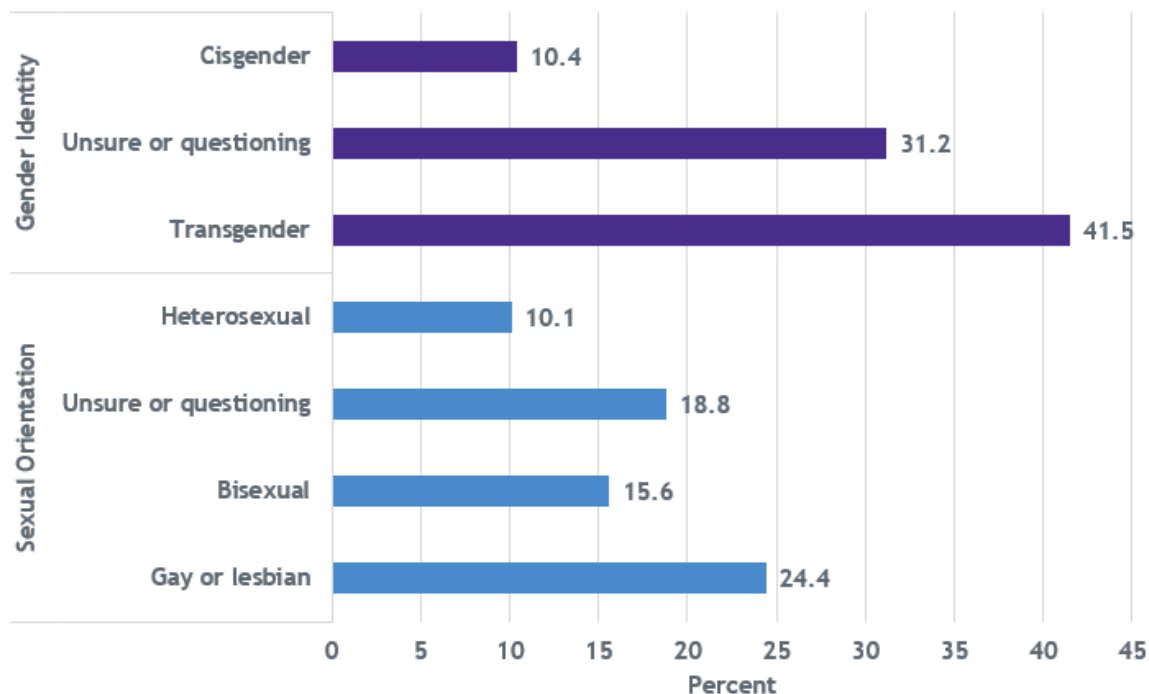
Data source: Healthy Kids Colorado Survey 2019, Colorado Department of Public Health and Environment.

Race and Ethnicity

> **A note about terminology:** Hispanic ethnicity as collected on the Colorado death certificate includes those that identify as Mexican, Mexican American, Chicano, Chicana, Puerto Rican, Dominican, Cuban, Central American, South American, Latin American, Spanish, and other Latin or Hispanic descent.[44] Additionally, "Latinx" and "Chicanx" are increasingly used gender inclusive terms, respecting those with a non-binary gender identity.[45,46] To ensure clarity, this report uses "Hispanic" throughout the data section to reflect how CFPS data are collected from the death certificate and to align with terminology used in cited literature and research.[47]

Between 2016 and 2020, the majority of infants, children, and youth who died in passenger vehicle crashes were non-Hispanic white (44.6%, n=78), 42.3% (n=74) were of Hispanic origin, 6.9% (n=12) were non-Hispanic Black, 2.3% (n=4) were non-Hispanic Asian or Pacific Islander, and 1.7% (n=3) where non-Hispanic American Indian or Alaska Native.

Colorado observed a significant disparity in the rate of passenger vehicle deaths by race and ethnicity (Figure 5). The rate for Hispanic infants, children, and youth (3.6 per 100,000 population) was significantly higher than non-Hispanic white (1.9 per 100,000 population) for the period.

Figure 5. Rates of passenger vehicle deaths occurring in Colorado among Colorado residents under age 18 by race and ethnicity, 2016-2020 (n=160)
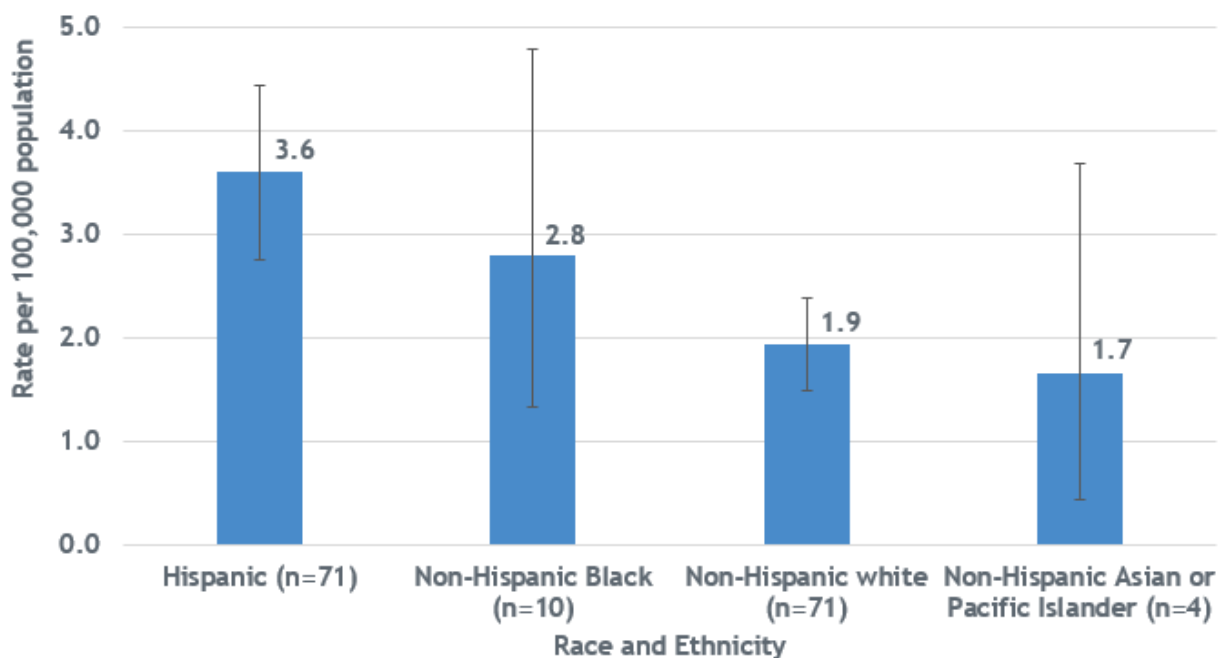
*Error bars represent 95% confidence limits for rates.

This significant disparity expands when examined by both ethnicity and sex, where Hispanic males die in passenger vehicle crashes at a rate of 4.6 per 100,000 population, compared to 1.9 per 100,000 non-Hispanic white males. This is consistent with both historical and current national trends in which Hispanic male youth are disproportionately represented among motor vehicle crash injury and death statistics.[48]

In 1956, the Federal Aid Highway Act allocated billions of dollars to interstate highway construction, delivering the safest and most modern mode of interstate and local travel at the time. It also provided employment opportunities for people out of work.[49] Many have since argued the legislation was hastily planned and implemented, and the government built the roads primarily for the convenience of non-Hispanic white commuters.[50,51] The government built these massive highways through or near racially and ethnically segregated, urban communities. This resulted in disinvestment in neighborhood infrastructure, lower property values, increased poverty, inadequate access to high-quality education, and more dangerous environments for living, driving, and walking.[52]

Physical and built environmental factors also perpetuate disparities in these deaths. For example, investments in road safety engineering are less likely to occur in segregated and low income communities.[53] Persisting social and systemic inequities increase the likelihood that those living in racially segregated neighborhoods without infrastructure investment will continue to experience disparate impacts.

Data from the American Community Survey from 2020 shows that 14.8% of Hispanic Coloradoans live below the poverty level, compared to 7.7% of non-Hispanic white Coloradans.[54] This structural injustice may contribute to the deadly motor vehicle crash disparity. For instance, research suggests that even though motor vehicle deaths have decreased nationally, the decreases have largely benefited more affluent and well-educated communities. These are communities where people are more likely to own vehicles with higher crash test ratings and advanced safety features.[55]

Additionally, differences in child restraint use (seat belts and booster and car seats) may contribute to disparities. Families of color are less likely than the general population to use proper safety restraints.[56] Within the CFPS data set, among the Hispanic infants, children, and youth who died in passenger vehicle crashes in Colorado during this period, 70.3% (n=52) were improperly restrained, compared to 57.7% (n=45) of non-Hispanic whites. This is consistent with state and national trends in which Hispanic infants, children, and youth had a significantly higher proportion of unrestrained deaths compared with non-Hispanic white children.[57,58]

Although most caregivers are aware of the need to use proper safety restraints for children, research suggests that Hispanic caregivers may be less likely to use safety restraints in certain situations. Such situations include being on a short drive or in a rush, having an inadequate number of restraints, and if someone was holding the infant or child.[59] Based on this data,

child safety restraint education and distribution programs should collaborate with communities of color on the best methods to increase safety belt use.

Geography

To calculate statistics by geographic location within the state, counties in Colorado are categorized as urban, rural, or frontier, according to standards applied by the Colorado Rural Health Center.[60] All counties that are not designated as parts of Metropolitan Areas are considered rural. Frontier counties are further classified as those with a population density of six or fewer persons per square mile. It is worth noting that these county designations are limited in that they do not account for the geographic nuance experienced by several large counties in Colorado (e.g., Arapahoe, El Paso, Larimer, Mesa) that have both populous urban centers and broad rural areas.

Between 2016 and 2020, the majority of Colorado residents under age 18 who died in passenger vehicle crashes in Colorado resided in an urban county (73.1%, n=117), while 18.1% (n=29) lived in a rural county, and 8.8% (n=14) lived in a frontier county. The rate of passenger vehicle deaths among infants, children, and youth living in a frontier county (10.4 per 100,000 population) was nearly five-times higher as those living in an urban county (2.1 per 100,000 population) and over two-times higher as those living in a rural county (4.9 per 100,000 population). Readers should interpret this data with caution, as the frontier rate represents very few deaths, decreasing the stability of the rate.

This rate data is consistent with national data showing higher passenger vehicle death rates in rural areas.[61] Families living in rural and frontier counties experience limited access to Level 1 trauma centers and longer response times by emergency medical services to the scene of a reported trauma,[62] which impacts emergency response to motor vehicle crashes. In Colorado from 2018-2019, the average EMS response time to the scene of a passenger vehicle crash where there were reported injuries was nearly 2.5x longer in frontier counties (17 minutes) and 1.7x longer in rural counties (12 minutes), when compared to urban counties (7 minutes).[63]

Additionally, national studies show that self-reported seat belt use is lowest in the most rural counties and that the proportion of unrestrained occupants at the time of a fatal crash increases as rurality increases.[64]

Passenger Vehicle Death Causes

For 163 of the 175 infants, children, and youth who died in passenger vehicle crashes, review teams determined a driver was responsible for causing the crash. In these instances, CFPS was able to collect data on the causes of the crash. This data comes from a law enforcement officer or the motor vehicle crash report. Recklessness (58.9%, n=96), speeding over the limit

(49.7%, n=81), and drug or alcohol use (39.9%, n=65) were the most frequently reported causes of deadly crashes. Additional reported causes include driver inexperience (33.7%, n=55), vehicle rollover (32.5%, n=53), and distracted driving (23.9%, n=39). These causes are not mutually exclusive, as more than one cause can be determined as contributing to a crash.

Restraint Use

Increasing safety belt and restraint use is the single most effective way to save lives and reduce injuries due to crashes on Colorado roadways. Studies demonstrate that seat belts reduce serious injuries and death in crashes by about 50%.[65] Colorado's child passenger safety law requires:
- Children to be in a rear-facing car seat until 1 year of age;
- Children ages 1-3 to be secured in a rear or forward-facing car seat, depending upon their height and weight;
- Children ages 4-7 to be secured in a forward-facing car seat or booster seat, depending upon their height and weight;
- Children ages 8-16 to correctly use a booster seat or lap and shoulder seat belt.

Of the 175 infants, children, and youth who died in Colorado in passenger vehicle crashes from 2016-2020, 34.3% (n=60) were in an age-appropriate restraint, meaning that there was a car seat, booster seat, or seat belt present in the vehicle (depending on their age), regardless of if it was being used correctly or incorrectly. Of those, 83.3% (n=50) were properly restrained, meaning that the age-appropriate restraint was present *and* being used correctly. A total of 28.6% (n=50) of all infants, children, and youth who died in passenger vehicle crashes were properly restrained, 62.9% (n=110) were improperly restrained, and restraint information was missing or unknown for 8.5% (n=15).

Figure 6 displays the proportion of infants, children, and youth who died improperly restrained by age group. The highest proportions of improperly restrained infants, children, and youth in passenger vehicle crashes were less than age 1 (66.7%, n=4) and 15-17 years old (70.1%, n=68). Since Colorado law requires all children and young people to be properly restrained, there is a need for increased education, policies, and other systems change that increases seat belt use among infants, children, and youth of all ages.

Figure 6. Proportion of passenger vehicle deaths occurring among those under age 18 in Colorado who were improperly restrained by age group, 2016-2020 (n=175)
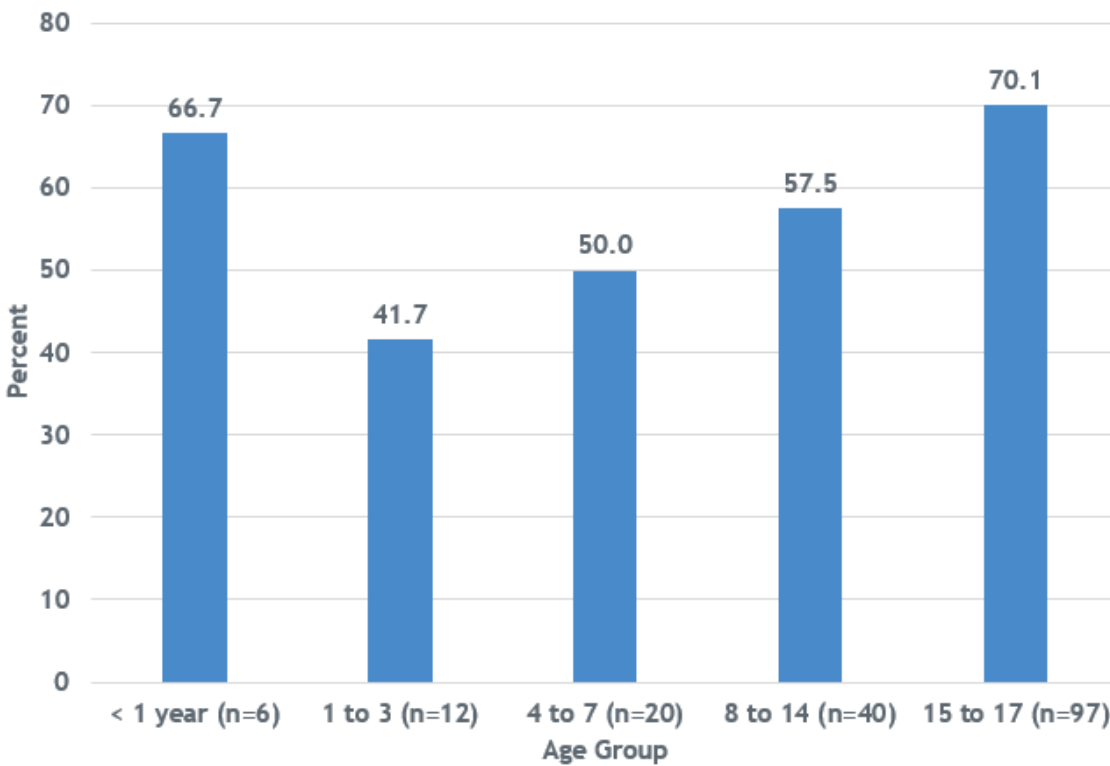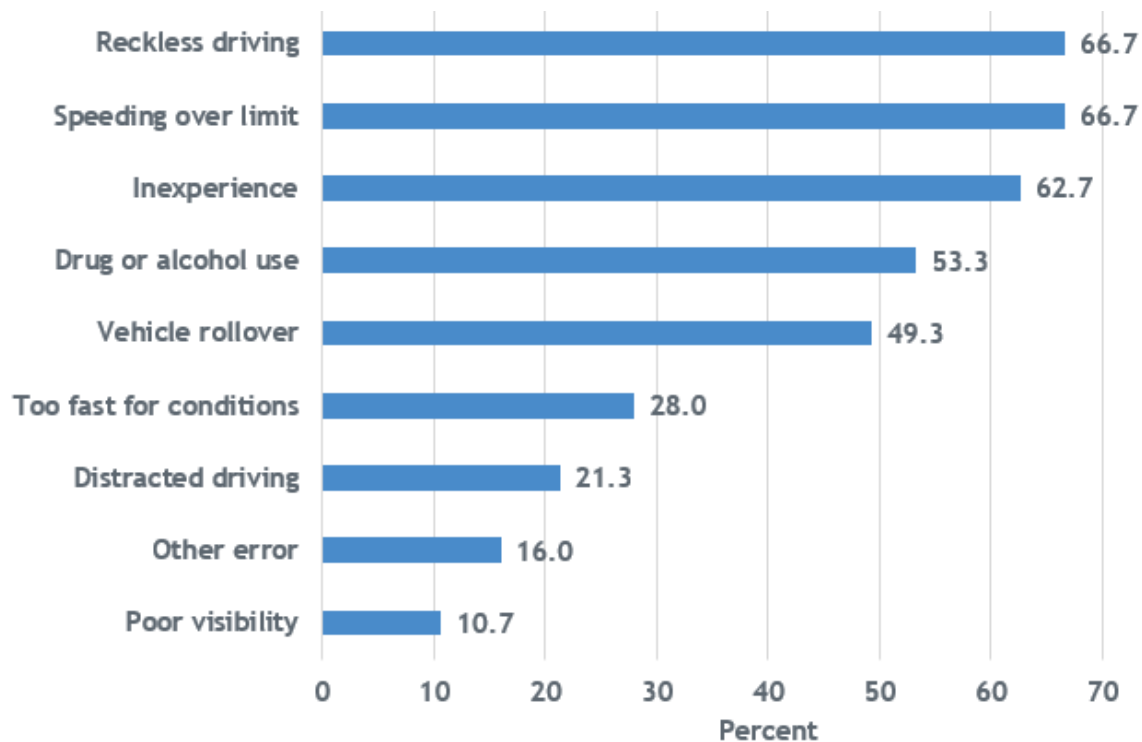

Young Drivers

From 2016-2020 there were 81 infants, children, or youth who died in passenger vehicle crashes involving 82 young drivers under age 19. Those who died in these crashes were most often a passenger involved in a crash with a young driver (51.8%, n=42) or the young driver themselves (48.2%, n=39). The proportion of young drivers who died improperly restrained (64.1%, n=25) was less than the proportion of their passengers who died improperly restrained (78.6%, n=33). Nearly all of these passengers were youth ages 10-17 (95.1%, n=39).

Seventy-five of the 82 young drivers (91.5%) in these deadly crashes were responsible for causing the crash. Figure 7 demonstrates the leading circumstances contributing to crashes where young drivers were responsible for causing the crash. Recklessness (66.7%, n=50), speeding over the limit (66.7%, n=50), and driver inexperience (62.7%, n=47) were the leading circumstances in crashes where the youth was at fault. Drug or alcohol impairment was a circumstance contributing to the crash in 53.3% (n=40) of the cases.

Figure 7. Leading circumstances contributing to passenger vehicle deaths among those under age 18 in Colorado where a young driver was responsible, 2016-2020 (n=75)

CFPS data suggests that young drivers in Colorado are not getting the support they need to prevent motor vehicle crashes. There is a need for strengthened Graduated Driver Licensing (GDL) state laws to protect young drivers and their passengers with corresponding widespread education and enforcement. While CFPS does ask and attempts to collect information about license type for drivers involved in deadly crashes, this data is largely incomplete. Information on driver's license type is missing or unknown for about 50% of young drivers that were involved in passenger vehicle crashes.

Research also suggests that problems in school, such as truancy, are related to increased engagement in risky driving behaviors.[66] Of the 39 young drivers who died in Colorado in passenger vehicle crashes from 2016-2020, 20.5% (n=8) had experienced problems in school. Leading known school issues include: truancy (62.5%, n=5), behavioral problems (50.0%, n=4), academic problems (37.5%, n=3), and suspensions (37.5%, n=3) were the leading problems.

Conclusion

From 2016 to 2020, motor vehicle and other transportation deaths were the fourth leading cause of death reviewed by CFPS among those under age 18 in Colorado. Nearly three-quarters of those who died were occupants of passenger vehicles. The highest rates of passenger vehicle death were observed among youth ages 15-17 and among Hispanic infants, children, and youth. Passenger vehicle deaths were most often precipitated by recklessness and speeding, and the majority of young people who died were improperly restrained. Upstream prevention strategies that address social and structural inequities can reduce motor vehicle and other transportation deaths among infants, children, and youth. To learn more about the prevention strategies recommended by CFPS, view the 2022 Legislative Report (www.cochildfatalityprevention.com/p/reports.html). To learn even more about the inequities that contribute to child deaths, view the CFPS report "*The Role of Policies and Systems in Child Deaths in Colorado*."

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