

## Nontraffic Transportation Injuries in California, 2021

Most transportation injuries in California are due to motor vehicle collisions on public streets and roads. Transportation injuries in nontraffic settings also present a significant burden. In 2021, they accounted for 8% of transportation-related deaths (420 out of 5,287) and 21% of transportation-related non-fatal hospitalizations and ED visits (75,166 out of 366,239). Nontraffic transportation injuries include the following types:

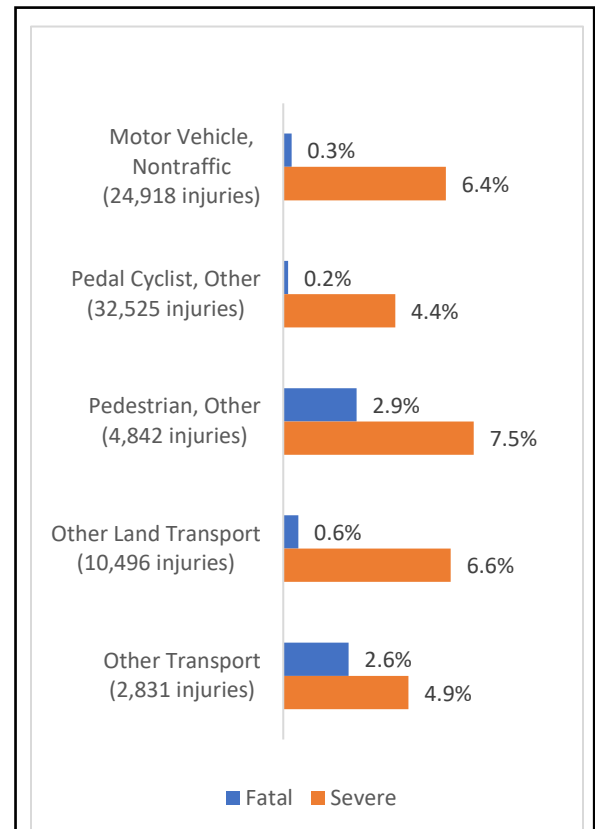
**Motor Vehicle, Nontraffic:** Injuries to motor vehicle drivers or occupants outside of public rights of way, such as driveways, parking lots, or off-road settings. Many of these injuries involve dirt bike or all-terrain vehicles. In 2021, there were 24,918 of these injuries in California, 83 (0.3%) of which were fatal and 1,598 (6.4%) of which were non-fatal but severe (Figure 1).

**Pedal Cyclist, Other:** Injuries to bicycle or other pedal cycle riders not involving a motor vehicle or involving a motor vehicle outside of a public right of way. Many of these injuries are from bike crashes involving a single cyclist. In 2021, there were 32,525 of these injuries, 62 (0.2%) of which were fatal and 1,437 (4.4%) of which were non-fatal but severe.

**Pedestrian, Other:** Injuries to pedestrians hit by vehicles, including trains, not traveling on public rights of way. In 2021, there were 4,842 of these injuries, 140 (2.9%) of which were fatal and 364 (7.5%) of which were non-fatal but severe.

**Other Land Transport:** Injuries to individuals traveling on other land vehicles, such as animals or trains. In 2021, there were 10,496 of these injuries, 62 (0.6%) of which were fatal and 694 (6.6%) of which were non-fatal but severe.

**Other Transport:** Injuries primarily involving air or watercraft. In 2021, there were 2,831 of these injuries, 73 (2.6%) of which were fatal and 140 (4.9%) of which were non-fatal but severe.

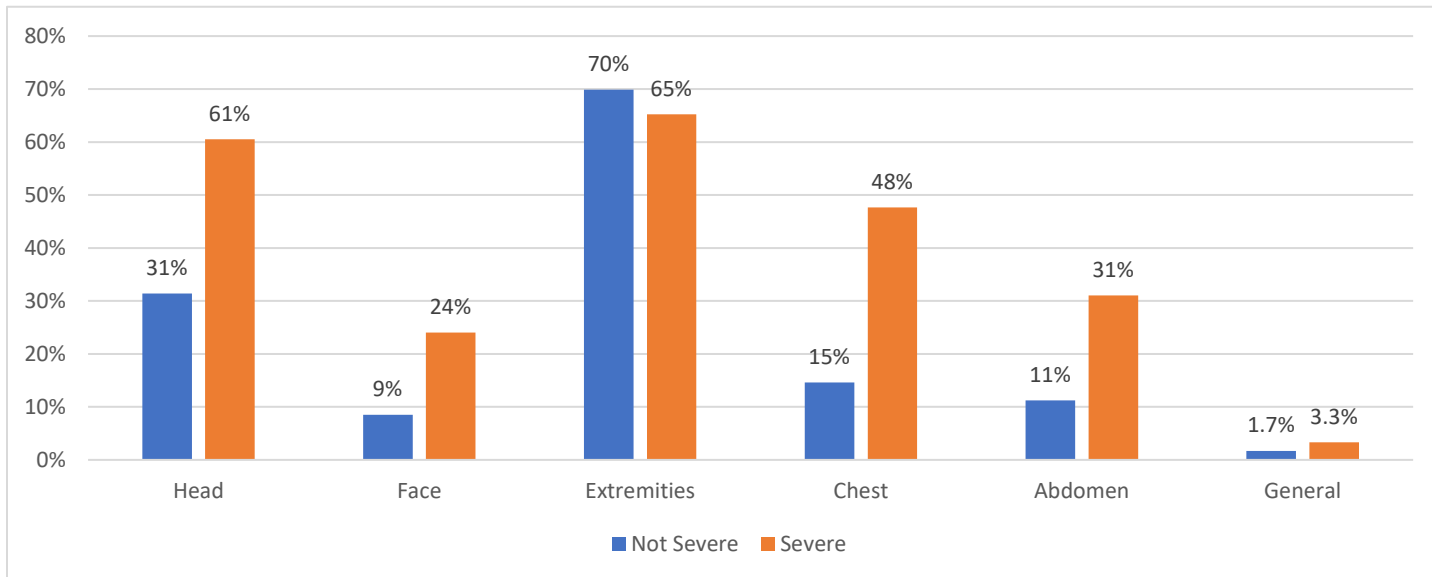


**Figure 1: Proportion of fatal and severe injuries by nontraffic transportation type in California, 2021**

“Pedal Cyclist, Other” injuries were the most common type of nontraffic transportation injury in California in 2021 but had the lowest proportion of fatal and non-fatal severe injuries. “Pedestrian, Other” injuries had the greatest proportion of fatal and non-fatal severe injuries.

## Bodily location of injury

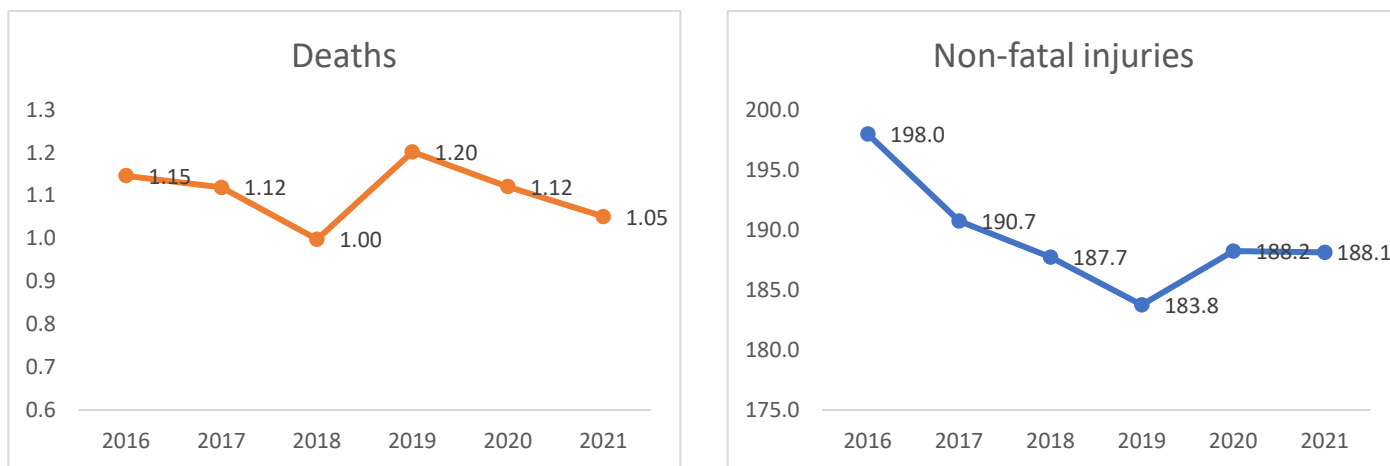
Among non-fatal nontraffic transportation injury patients treated at a hospital or ED, injuries to the extremities were most common, followed by injuries to the head, chest, abdomen, face, and general body. Severe injuries were less likely to include an injury to the extremities (65% versus 70%, Figure 2) and more likely to include an injury to all other parts of the body.



**Figure 2: Proportion of non-fatal nontraffic transportation injury patients with an injury diagnosis in specified bodily location, by severity, 2021**

## Trends in nontraffic injuries

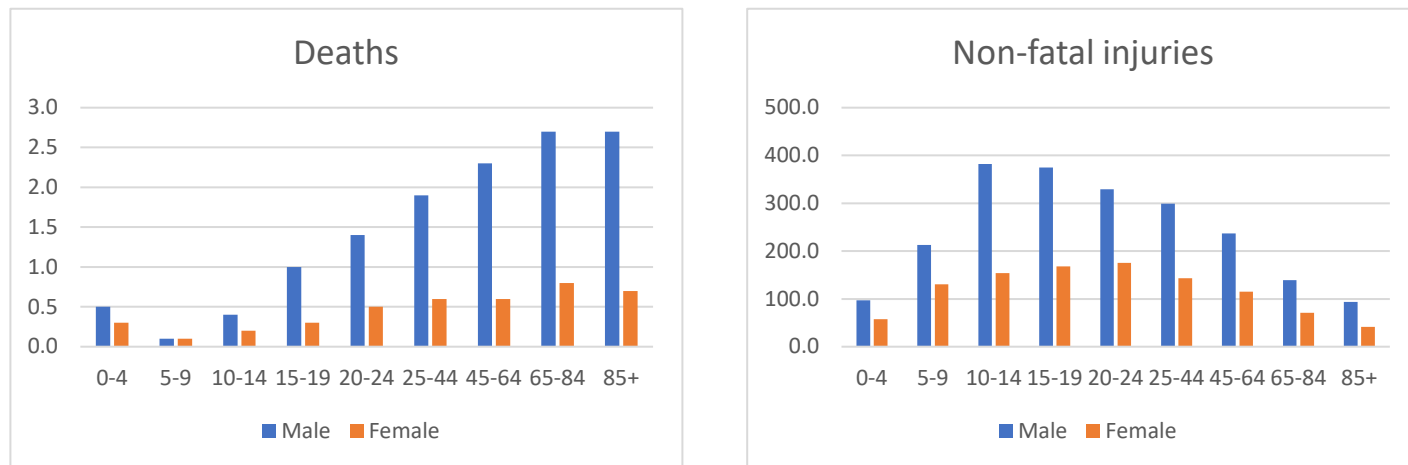
Rates of nontraffic transportation injury deaths peaked in 2019, then declined in 2020 and 2021 (Figure 3). Conversely, non-fatal nontraffic injury rates increased from 2019 to 2020, following a 3-year decline.



**Figure 3: Rate of fatal and non-fatal nontraffic transportation injuries per 100,000 population, 2016-2021**

## Nontraffic injury risk by age and sex

From 2016 to 2021, rates of nontraffic transportation injury deaths were lowest among children aged 5-9, then steadily increased through the lifespan to ages 65-84 years (Figure 4). Conversely, rates of non-fatal nontraffic transportation injuries peak in adolescence for males and early adulthood for females. Rates were greater for males compared to females across the lifespan.



**Figure 4: Rate of fatal and non-fatal nontraffic transportation injuries per 100,000 population by age (years) and sex, 2016-2021**

## Summary

In 2021, 420 Californians died and another 75,166 were treated at a hospital or ED for transportation injuries in nontraffic settings – that’s an average of more than 1 death and 200 nonfatal injuries per day. Nontraffic includes a variety of settings that either do not involve a motor vehicle (e.g., bike only collision, train-pedestrian collision), or involve a motor vehicle operating outside a public street (e.g., parking lot, driveway, or off-road area). In these settings, injuries to cyclists are most common and injuries to pedestrians are most commonly severe. Severe injuries are more likely to include injuries to the head, face, chest, abdomen, and general body. Some non-fatal injuries, such as traumatic brain injury, and can result in lifelong disability.<sup>1</sup>

Since 2019, nontraffic transportation injury fatality rates in California declined while nonfatal injury rates increased. This trend is the opposite of what has been observed for motor vehicle traffic injuries.<sup>2</sup> The Covid-19 pandemic had both immediate and long-lasting impacts on travel and recreation behaviors that could have contributed to these changes, including a shift from commuting and an increase in use of bicycles and other recreational vehicles.<sup>3</sup>

Risk of nonfatal nontraffic transportation injury is greatest among young adults and males, which may reflect an increased exposure to nontraffic settings and risk-taking behaviors.<sup>4</sup> Risk of fatal nontraffic transportation injuries are greatest among older adults and slightly elevated among young children, which may reflect greater fragility (susceptibility to injuries when crashes occur) and frailty (chance of dying from a specific injury).<sup>5</sup>

Nontraffic transportation injuries cover a wide variety of travel modes (car, all-terrain vehicle, bicycle, pedestrian, horse, aircraft, watercraft, etc.) and locations (driveways, parking lots, trails, private land, etc.). This report only offers a broad overview of these injuries, which are often overshadowed by more common

motor vehicle traffic injuries. Understanding the trends, risk factors, and medical outcomes for injuries due to specific travel modes and/or locations requires more focused analysis, which is beyond the scope of this report.

## Prevention strategies

Nontraffic transportation injuries encompass a diverse range of travel modes and environments, and specific prevention strategies may apply in each setting. However, there are also universal strategies for both primary prevention of crashes, as well as reducing the risk of a severe injury if a crash does occur.

Primary prevention strategies apply to those in control of their vehicle – including pedestrians. Crashes can be caused by operator inexperience, inattention, alcohol use, and excessive speed. All travelers should stay aware of their environments even when travelling in presumably safer places like driveways, parking lots, and trails. Because of fewer traffic controls in these settings, travelers may need to react quickly to other travelers, which is much easier at lower speeds and when not impaired or distracted. Those traveling for recreational purposes, where speed may add to the excitement, must temper their desire for excitement with their ability to maintain control of their vehicle.

Prevention of a fatal or severe injury should a crash occur includes use of proper restraints, including safety belts, child safety seats, and booster seats in passenger vehicles. Helmets should be worn by motorcyclists, cyclists, off-road vehicle riders, animal riders, and other travelers where the head is exposed to potential impact. Helmets should be certified by a recognized safety testing agency and fit properly. Additional safety equipment to protect the chest and abdomen may also help prevent a severe injury. Nontraffic injuries involve a range of travel modes, and travelers should take the time to understand and acquire the appropriate safety equipment for their chosen mode.

These precautions should be applied universally, but especially when younger children and older adults are present, as they are more vulnerable to serious injury or death when involved in a crash.

## Technical notes

Nontraffic injuries were identified from CDPH California Comprehensive Death File (CCMDF) and the California Department of Health Care Access and Information patient discharge data and emergency department data. Nontraffic injuries were defined using ICD-10 and ICD-10-CM codes corresponding to the following injury mechanisms: Motor Vehicle, Nontraffic; Pedal Cyclist, Other; Pedestrian, Other; Other Land Transport; and Other Transport.

Injury year was based on the time of death, hospital discharge, or ED service date. Victim age was based on the time of death, hospital admittance, or ED service date. Sex was recorded by the coroner/medical examiner or medical provider.

All rates in this report are crude incidence rates calculated as injuries per 100,000 person-years using population data from the California Department of Finance's Report P-3: Complete State and County Projections Dataset (Baseline 2019 Population Projections; Vintage 2020 Release).

Severe non-fatal injuries are defined as those with an Injury Severity Score (ISS) >15.<sup>6</sup> The ISS reflects the overall severity of traumatic injuries and is calculated from the Abbreviated Injury Scale (AIS) for each injury diagnosis. The AIS is anatomically based and classifies each injury diagnosis by body region and according to its relative importance (i.e., threat to life, tissue damage, complexity of treatment and impairment) on a 6-point

scale (1 = minor, 2 = moderate, 3 = serious, 4 = severe, 5 = critical, and 6 = unsurvivable). The ISS is the sum of the squares of the three body regions with the greatest AIS scores. For this report, ISS was calculated in R using the International Classification of Diseases Programs for Injury Categorization (ICDPIC) program.<sup>7</sup>

For more detailed documentation of California injury data, visit CDPH's injury data website, [EpiCenter](#). EpiCenter also allows users to query and analyze California deaths, hospitalizations, and ED visits due to injuries of all types.

## References

- <sup>1</sup> Centers for Disease Control and Prevention. *Moderate to Severe Traumatic Brain Injury is a Lifelong Condition*. Accessed September 26, 2023 from [www.cdc.gov/traumaticbraininjury/pdf/moderate\\_to\\_severe\\_tbi\\_lifelong-a.pdf](http://www.cdc.gov/traumaticbraininjury/pdf/moderate_to_severe_tbi_lifelong-a.pdf).
- <sup>2</sup> Hughes JE, Kaffine D, & Kaffine L. (2023). Decline in Traffic Congestion Increased Crash Severity in the Wake of COVID-19. *Transportation Research Record*. 2677(4):892-903. <https://doi.org/10.1177/03611981221103239>.
- <sup>3</sup> Blumberg, MP, Gittelman, MA, & Pomerantz, WJ. (2023). Pediatric outdoor recreational injuries: another hidden concern during the COVID-19 pandemic. *Injury Epidemiology*. 10(Suppl 1):29. <https://doi.org/10.1186/s40621-023-00445-6>.
- <sup>4</sup> Byrnes, JP, Miller, DC, & Schafer, WD. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, 125(3), 367–383. <https://doi.org/10.1037/0033-2909.125.3.367>.
- <sup>5</sup> Kahane CJ. (2013). Injury Vulnerability and Effectiveness of Occupant Protection Technologies for Older Occupants and Women. National Highway Traffic Safety Administration Technical Report. [Report No. DOT HS 811 766](#).
- <sup>6</sup> VanDerHeyden, N & Cox. (2008). Trauma Scoring. *Current Therapy of Trauma and Surgical Critical Care*, pp. 26-32. <https://doi.org/10.1016/B978-0-323-04418-9.50010-2>.
- <sup>7</sup> Greene, NH, Kernic, MA, Vavilala, MS, & Rivara, FP. (2015). Validation of ICDPIC software injury severity scores using a large regional trauma registry. *Injury Prevention*, 21(5), 325–330. <https://doi.org/10.1136/injuryprev-2014-041524>.

### About the Crash Medical Outcomes Data (CMOD) Project

The CMOD Project integrates medical and crash data on traffic injuries. Working with a variety of partners, CMOD leverages existing data sources to create actionable information to help prevent crash-related injuries and deaths.

The Crash Medical Outcomes Data (CMOD) Project is funded by a grant from the California Office of Traffic Safety, through the National Highway Traffic Safety Administration (NHTSA).

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