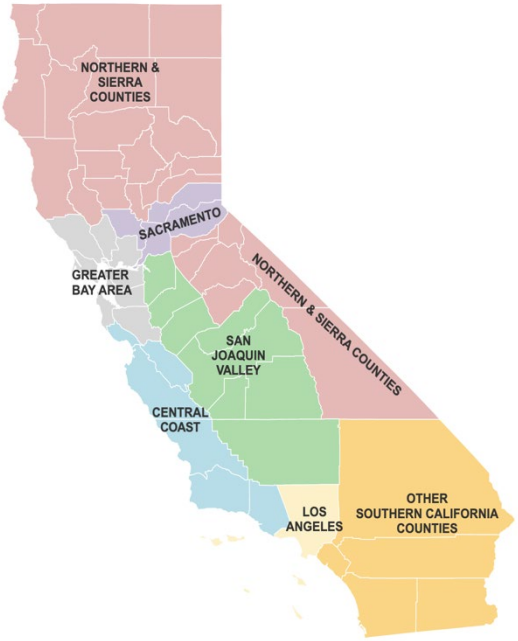
Fatal and Non-Fatal Traffic Crash Injuries among Young Motor Vehicle Occupants Ages 18-24 Years in California, 2021

According to the Centers for Disease Control and Prevention (CDC), motor-vehicle traffic (MVT) crashes were the second leading cause of unintentional injury death among young adults ages 18-24 in 2020.[1] Driver inexperience among adolescents and young adults is a leading contributor to the high rate of MVT crashes.[2] Crash risk increases for young drivers when they drive with teenage passengers in comparison to when they drive alone or with adults.[3] There are also well documented differences in the rates of traffic crashes and traffic crash related injuries and fatalities between males and females. Overall, males have a higher risk of traffic crashes and fatalities when compared to females.[4] Among young drivers, these differences may be due to younger males engaging in more risky driving behaviors, such as speeding and alcohol-impaired driving.[5]

This data brief describes MVT crash non-fatal injuries[6] (i.e., injuries that led to emergency department visits or hospitalizations[7]) and deaths[8] in 2021 among 18 to 24-year-olds in California, with the goal of determining if disparities exist in fatal and non-fatal injuries based on age and gender of the occupant. The focus is on 18 to 24-year-olds because of their high risk for motor vehicle crash injuries and death. Comparisons are made between males and females to establish whether previously documented risk for males is observed.[4] In addition, data on non-fatal and fatal injuries in male and female 18 to 24-year-olds are presented within different regions within California; this enables comparison of the risk of injury in these areas so that prevention efforts can be focused in regions with high risk of injury. Geographic regions developed by the UCLA Center for Health Policy Research were used to analyze MVT crash fatal and non-fatal injuries to avoid the need to suppress/de-identify data from less populous counties.

California Regions and Counties



Counties Within Each Region

Central Coast: Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, and Ventura

Greater Bay Area: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma

Los Angeles: Los Angeles

Northern and Sierra Counties: Alpine, Amador, Butte, Calaveras, Colusa, Del Norte, Glenn, Humboldt, Inyo, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Plumas, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, Tuolumne, and Yuba

Sacramento: El Dorado, Placer, Sacramento, and Yolo

San Joaquin Valley: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare

Other Southern California: Imperial, Orange, Riverside, San Bernardino, and San Diego

Statewide MVT Crash Non-Fatal and Fatal Injuries in California, 2021

Table 1. Emergency Department (ED) Visits, Hospitalizations, and Deaths among 18 to 24-Year-Old Motor Vehicle Occupants by Sex in California, 2021

SEX	ED VISITS	%	HOSPITALIZATIONS	%	DEATHS	%
Male	21,263	45.9	1,818	57.4	387	70.7
Female	25,111	54.1	1,351	42.6	160	29.3
STATE TOTAL	**46,374**		**3,169**		**547**	

- In 2021, Californians aged 18 to 24 years accounted for 16.8% of all motor vehicle occupant injuries and 19.0% of fatalities, even though this group made up only 10.3**%** of the state's population.
- Males had fewer ED visits than females, but more hospitalizations and deaths (Table 1). Generally, an ED visit is for a "treat and release" injury that is less severe than an injury that requires hospitalization.

Non-Fatal Injuries

Table 2. ED Visits among 18 to 24-Year-Old Motor Vehicle Occupants by Sex and Region in California, 2021

REGION	MALE	FEMALE	REGION TOTAL	RATE
Central Coast	1,057 (46.69%)	1,207 (53.31%)	2,264	827.0
Greater Bay Area	3,229 (46.42%)	3,727 (53.58%)	6,956	1,023.4
Los Angeles	5,286 (45.27%)	6,390 (54.73%)	11,676	1,137.1
Northern & Sierra	817 (49.40%)	837 (50.60%)	1,654	1,147.2
Sacramento	1,519 (45.05%)	1,853 (54.95%)	3,372	1,279.6
San Joaquin Valley	3,396 (45.49%)	4,069 (54.51%)	7,465	1,486.2
Other Southern California	5,818 (45.56%)	6,953 (54.44%)	12,771	1,063.2
Unhoused	141 (65.28%)	75 (34.72%)	216	*[9]
STATE TOTAL	**21,263 (45.85%)**	**25,111 (54.15%)**	**46,374**	**1,133.5**

Emergency Department Visits

- Among Californians in 2021, there were 46,374 ED visits by 18 to 24-year-old motor vehicle occupants for motor vehicle traffic injuries. This is 20.8% of all motor vehicle traffic occupant injuries treated at the ED in 2021.
- Across regions, females had a slightly higher percentage of ED visits compared to males (Table 2).
- Overall, the highest crude incidence rate of ED visits for this age group was found in the San Joaquin Valley (1,486.2 per 100,000) and the lowest was found in the Central Coast (827.0 per 100,000) (Table 2).

Table 3. Hospitalizations among 18 to 24-Year-Old Motor Vehicle Occupants by Sex and Region in California, 2021

REGION	MALE	FEMALE	REGION TOTAL	RATE
Central Coast	109 (68.55%)	50 (31.45%)	159	58.1
Greater Bay Area	227 (59.42%)	155 (40.58%)	382	56.2
Los Angeles	424 (55.06%)	346 (44.94%)	770	75.0
Northern & Sierra	78 (66.67%)	39 (33.33%)	117	81.1
Sacramento	129 (58.64%)	91 (41.36%)	220	83.5
San Joaquin Valley	246 (56.68%)	188 (43.32%)	434	86.4
Other Southern California	575 (55.93%)	453 (44.07%)	1,028	85.6
Unhoused	30 (50.85%)	29 (49.15%)	59	*
STATE TOTAL	**1,818 (57.37%)**	**1,351 (42.63%)**	**3,169**	**77.5**

*Suppressed because there is no method to calculate the rate for the Unhoused population

Hospitalizations

- In California in 2021 there were 3,169 hospitalizations of 18 to 24-year-old motor vehicle occupants for MVT-related injuries, which is approximately 16.8% of all MVT-occupant injuries that required hospitalization in 2021.
- Across regions, males had a higher percentage of hospitalizations compared to females (Table 3).
- The highest percentage of hospitalizations among males was in the Central Coast region (68.55%) and the lowest percentage among males was in the Los Angeles region (55.06%) (Table 3).

- Overall, the highest crude incidence rate of hospitalizations for this age group was found in the San Joaquin Valley region (86.4 per 100,000) and the lowest was found in the Greater Bay Area (56.2 per 100,000) (Table 3).

Fatal Injuries

Table 4. Deaths among 18 to 24-Year-Old Motor Vehicle Occupants by Sex and Region in California, 2021

REGION	MALE	FEMALE	REGION TOTAL	RATE
Central Coast	19 (63.3%)	11 (36.7%)	30	11.0
Greater Bay Area	38 (66.7%)	19 (33.3%)	57	8.4
Los Angeles	85 (72.6%)	32 (27.4%)	117	11.4
Northern & Sierra	28 (80.0%)	7 (20.0%)	35	24.3
Sacramento	28 (73.7%)	10 (26.3%)	38	14.4
San Joaquin Valley	92 (79.3%)	24 (20.7%)	116	23.1
Other Southern California	97 (63.0%)	57 (37.0%)	154	12.8
STATE TOTAL	**387 (70.7%)**	**160 (29.3%)**	**547**	**13.4**

- In California in 2021, there were 547 total MVT occupant deaths among 18 to 24-year-olds, which represents 19.0% of the total MVT occupant fatalities in that year.
- Across all regions, males had substantially higher percentages of deaths compared to females (Table 4).
- The percentage of male MVT occupant deaths was the highest in the Northern & Sierra region (80.0%) and the lowest was in the Other Southern California region (63.0%) (Table 4).

Summary

The purpose of this data brief is to describe fatal and non-fatal MVT crash injuries among 18 to 24-year-olds in California in 2021. Statewide, 18 to 24-year-olds represented 20.8% of all MVT crash victims with injuries that were treated at EDs, 16.8% of victims that were treated at hospitals, and 19.0% of all MVT crash fatalities. Given that 18 to 24-year-olds made up approximately 10.3% of California's population in 2021, these percentages reveal that a disparity exists for this age group, who are at risk of MVT crash injuries.

Comparisons between males and females were also made. Although females throughout the state visited the ED at a higher percentage than males, males were hospitalized at a higher percentage than females. This suggests that, when female occupants experience MVT crashes, their injuries may be less severe and only warrant an ED visit where they are treated and released rather than a hospitalization. Males also had a higher percentage of deaths than females statewide. These findings reflect the established patterns in the literature regarding increased risk of motor vehicle crash injuries for males.[4] Overall, young males appear at greater risk than females for severe MVT crashes that result in hospitalization or death.

Variation in MVT crash injury among 18 to 24-year-olds across geographic region in California were explored. In 2021, the San Joaquin Valley region had the highest burden of motor vehicle occupant injuries – measured by emergency department visits and hospitalizations – when compared to other regions in the state. The Northern and Sierra region had the fourth highest crude incidence rate of hospitalizations (81.1 per 100,000) and the third highest crude incidence rate of emergency department visits (1,147.2 per 100,000). The San Joaquin Valley region had the highest crude incidence rate of emergency department visits (1,486.2 per 100,000) and the highest crude incidence rate of hospitalizations (86.4 per 100,000). Conversely, the Greater Bay Area and Central Coast regions had the lowest crude incidence rates of emergency department visits and hospitalizations in the state. These findings confirm that potential health disparities may exist based on geography. For example, the 2022 County Health Rankings rank counties in California by their health outcomes and health factors.[10] For health outcomes and health factors, the majority of the counties in the Northern and Sierra region and the San Joaquin Valley region are ranked in the lowest two quartiles of the state, while the majority of the counties in the Greater Bay Area and Central Coast regions are ranked in the top two quartiles of the state for health outcomes and health factors.[10] Educating young drivers and using evidence-based prevention strategies, including those described in the "Prevention Strategies" section below, are key to reducing fatalities and injuries in areas with higher fatality and injury rates, specifically the Northern and Sierra and San Joaquin Valley regions.

Prevention Strategies

Motor vehicle crash injuries continue to be a leading cause of death among young adults ages 18-24 years old. Preventing transportation-related injuries and fatalities is a complex undertaking that requires ongoing collaboration across multiple disciplines. The State of California's Strategic Highway Safety Plan has a Speed Management/Aggressive Driving High Priority Challenge Area. A key strategy involves training and education. Statewide training is provided to assist field personnel with combating illegal street racing and sideshows. Educational materials on the safety hazards, traffic violations, and penalties are distributed as part of the outreach to the public. In addition, various entities within the State of California (e.g., SafeTREC, Caltrans, the Office of Traffic Safety, the Department of Motor Vehicles, and the California Highway Patrol) are working collaboratively to advance a Safe System approach to comprehensively address the state's most serious transportation safety needs, including the needs of young drivers and motor vehicle occupants. The Safe System Approach aims to eliminate fatal and serious injuries for all road users through safer roads, safer speeds, safer vehicles, safer road users, and improved post-crash care. These layers of protection and shared responsibility promote a holistic approach. Comprehensive prevention is strongest when it encapsulates all the elements of the Safe System approach, as well as an equity lens that recognizes and upholds the needs of those experiencing the greatest disparities in serious transportation injuries.

This brief also presents differences in young driver injury disparities by regions in California, which may prove particularly useful to California's regional Metropolitan Planning Organizations (MPO) and Regional Transportation Planning Authorities (RTPA), who are charged with long-range regional transportation safety planning and other responsibilities. MPOs and RTPAs may benefit from having stratified hospitalization data to complement local law enforcement data that is traditionally used for transportation safety planning.

Prevention strategies that recognize and seek to address differences in traffic injury burden by sex/gender norms may prove impactful in reducing the disparities noted in this brief. Safe State Alliance's Strategies to Address Shared Risk and Protective Factors for Driver Safety provides evidenced-based programs and policies to prevent MVT fatalities and injuries.

Graduated Driver Licensing (GDL) has been shown to be an appropriate and beneficial policy for this group of drivers.[11] A specific behavioral change strategy and intervention for higher risk injury groups including 18 to 24-year-olds is the modification of Graduated Driving Licensing policies that includes a distracted driving component. Additional resources are listed below.

Impact Teen Drivers is a non-profit organization that provides comprehensive, evidence-based educational programming aimed at increasing safer driver behaviors, which can in turn reduce the risk of crashes.

The Children's Hospital of Philadelphia, Center for Injury Research and Prevention Research's Teen Driving Safety Research Team has created free evidence-based teen driver safety tools for teens, parents, educators, advocates, policymakers, and pediatricians.

The Centers for Disease Control and Prevention offer the following resources on the Preventing Injury/Transportation Safety section on their website. Specifically, there are two resources for teen drivers:

- Parents Are the Key
- Keep Teen Drivers Safe

The Graduated Driver Licensing Planning Guide helps new drivers gain and acquire skills under low-risk conditions. Additional information on Graduated Driver Licensing can be found using the resources below:

- Research In Action
- Inexperienced Drivers

Limitations

Analysis in this brief does not account for potential differences in vehicle miles traveled (VMT) by sex and region. VMT is an important indicator that represents one's increased exposure for transportation injury risk given the greater number of chances for injury. Examining crash outcomes while taking VMT into consideration may noticeably alter the distribution ratios by both sex and region noted above.

The data presented in this brief do not allow for differentiation of the young motor vehicle occupant's role: driver or passenger. Therefore, some of the cases included in this analysis could be passengers who were driving with adults or drivers aged 18 to 24 with other younger passengers.

Technical Notes

The data for this report were obtained by using the 2021 Emergency Department Data, 2021 Patient Discharge Data, and the 2021 California Comprehensive Death File (CCMDF) loaded onto the CDPH Epicenter.

The number of emergency department visits and hospitalizations were calculated by including all types of injury intents, "Transportation: MVT-Occupant" as the injury mechanism, and ages 18-24. The number of deaths were calculated by including all types of injury intents, "Transportation: MVT-Occupant" and "Transportation: MVT-Unspecified" as the injury mechanisms, and ages 18-24. All rates in this report are crude incidence rates calculated using the Epicenter. Used to assess the risk of injury, crude incidence rates, expressed as injuries per 100,000 person-years, are calculated using population projections from the California Department of Finance's Report P-3: Complete State and County Projections Dataset (Baseline 2019 Population Projections; Vintage 2020 Release).

ED visits, hospitalizations, and deaths for those of Other/Unknown sex were excluded from Tables 1 through 4.

Endnotes

[1] WISQARS Leading Causes of Death Reports. Centers for Disease Control and Prevention, February 20, 2020. http://wisqars.cdc.gov/fatal-leading.
[2] Yellman MA, Bryan L, Sauber-Schatz EK, Brener N. Transportation Risk Behaviors Among High School Students — Youth Risk Behavior Survey, United States, 2019. MMWR Suppl 2020; 69 (Suppl-1):77–83. DOI: http://dx.doi.org/10.15585/mmwr.su6901a9
[3] Tefft BC, Williams AF, Grabowski JG. Teen Driver Risk in Relation to Age and Number of Passengers, United States, 2007–2010. Traffic Injury Prevention 2013;14:283-292. DOI: http://dx.doi.org/10.1080/15389588.2012.708887
[4] Fatality Facts 2021: Males and Females. Insurance Institute for Highway Safety. https://www.iihs.org/topics/fatality-statistics/detail/males-and-females#age-differences.
[5] Cullen P, Moller H, Woodward M, Senserrick T, Boufous S, Rogers K, Brown J, and Ivers R. Are there sex differences in crash and crash-related injury between men and women? A 13-year cohort study of young drivers in Australia. SSM – Population Health 2020;14:100816. DOI: https://doi.org/10.1016/j.ssmph.2021.100816
[6] The non-fatal injuries included in this data brief were defined as those with an initial encounter only in the principal external cause of injury with a principal diagnosis code.
[7] Emergency Department and Patient Discharge data: California Department of Healthcare Access and Information (HCAI), 2021
[8] Vital Statistics data: California Comprehensive Master Death File (CCMDF), CDPH, 2021
[9] This cell is suppressed because there is no method to calculate the rate for the Unhoused population.
[10] The exception is Monterey County's health factor ranking, which is 38 and places it in the third quartile.
[11] Curry, AE. Is Graduated Driver Licensing Appropriate for Older Novice Drivers? Children's Hospital of Philadelphia, Center for Injury research & Prevention, August 17, 2021. https://injury.research.chop.edu/blog/posts/graduated-driver-licensing-appropriate-older-novice-drivers.

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).
For more information on CMOD, please contact IVPB@cdph.ca.gov.

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