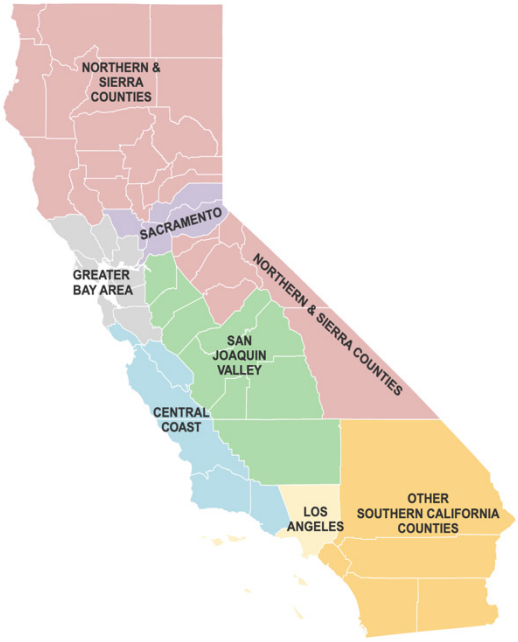
Traffic Crash Injuries among Young Motor Vehicle Occupants Ages 15-24 Years in California, 2020

According to the Centers for Disease Control and Prevention (CDC), motor-vehicle traffic (MVT) crashes are the leading cause of unintentional injury death and the second leading cause of non-fatal unintentional injury among adolescents and young adults ages 15-24.[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 (ED) visits or hospitalizations[7]) and deaths[8] in 2020 among 15 to 24-year-olds in California, with the goal to determine if disparities exist in serious transportation injuries. Generally, an ED visit is for a "treat and release" injury that is less severe than an injury that requires hospitalization. The focus is on 15 to 24-year-olds because of their high risk for motor vehicle crash injuries and death. MVT non-fatal crash injuries and deaths by sex and regions of the state are also described to offer added data analysis for consideration by transportation safety partners across California's diverse regions. Geographic regions developed by the UCLA Center for Health Policy Research were used rather than individual counties to analyze MVT crash non-fatal injuries and deaths to avoid identification of individuals 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, 2020

Table 1. ED Visits, Hospitalizations, and Deaths among 15-24 Year Old Motor Vehicle Occupants by Sex in California, 2020

SEX	ED VISITS	%	HOSPITALIZATIONS	%	DEATHS	%
Male	19,705	45.7	1,746	57.3	146	71.0
Female	23,390	54.3	1,303	42.7	61	29.0
Total	43,095		3,049		207	

- In 2020, Californians aged 15 to 24 years accounted for 23% of all motor vehicle occupant injuries and fatalities even though this group made up only 14% of the state's population.
- Males had fewer ED visits than females, but more hospitalizations and deaths (Table 1).

Non-Fatal Injuries

Table 2. ED Visits and Age-Adjusted Rates* among 15-24 Year Old Motor Vehicle Occupants by Sex and Region in California, 2020

REGIONS	ED VISITS			
	MALE	FEMALE	TOTAL	RATE
Central Coast	965 (46.5%)	1,110 (53.5%)	2,075	540
Greater Bay Area	3,091 (46.6%)	3,538 (53.4%)	6,629	674
Los Angeles	4,610 (44.0%)	5,861 (56.0%)	10,471	709
Northern & Sierra	821 (47.2%)	917 (52.8%)	1,738	864
Sacramento	1,460 (43.5%)	1,897 (56.5%)	3,357	925
San Joaquin Valley	3,418 (47.1%)	3,841 (52.9%)	7,259	1,015
Other Southern California	5,340 (46.2%)	6,226 (53.8%)	11,566	675

*Age-Adjusted rates were calculated per 100,000.

Emergency Department Visits

- Among Californians in 2020, there were 43,095 ED visits by 15 to 24-year-old motor vehicle occupants for motor vehicle traffic injuries. This is 25% of all motor vehicle traffic occupant injuries treated at the ED.
- Across regions, females had a higher percentage of ED visits compared to males (Table 1 & 2).
- The highest percentage of ED visits among females was in the Sacramento region (56.5%) and the lowest percentage among females was in the Northern and Sierra region (52.8%) (Table 2).
- Overall, the highest age-adjusted rate of ED visits for this age group was found in the San Joaquin Valley (1,015 per 100,000) and the lowest was found in the Central Coast (540 per 100,000) (Table 2).

Table 3. Hospitalizations and Age-Adjusted Rates* among 15-24 Year Old Motor Vehicle Occupants by Sex and Region in California, 2020

REGIONS	HOSPITALIZATIONS			
	MALE	FEMALE	TOTAL	RATE
Central Coast	77 (63.6%)	44 (36.4%)	121	32
Greater Bay Area	218 (56.8%)	166 (43.2%)	384	39
Los Angeles	386 (56.2%)	301 (43.8%)	687	47
Northern & Sierra	89 (59.3%)	61 (40.7%)	150	75
Sacramento	126 (59.2%)	87 (40.8%)	213	59
San Joaquin Valley	260 (55.2%)	211 (44.8%)	471	66
Other Southern California	590 (57.7%)	433 (42.3%)	1,023	60

*Age-Adjusted rates were calculated per 100,000.

Hospitalizations

- In California in 2020 there were 3,049 hospitalizations of 15 to 24-year-old motor vehicle occupants for MVT-related injuries, which is approximately 20% of all MVT-occupant injuries that required hospitalization.
- 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 (63.6%) and the lowest percentage among males was in the San Joaquin Valley region (55.2%) (Table 3).
- Overall, the highest age-adjusted rate of hospitalizations for this age group was found in the Northern & Sierra region (75 per 100,000) and the lowest was in the Central Coast (32 per 100,000) (Table 3).

Fatal Injuries

Table 4. MVT Occupant Deaths and Death Rates* among 15-24 Year Old Motor Vehicle Occupants by Sex and Region in California, 2020

REGIONS	DEATHS			
	MALE	FEMALE	TOTAL	RATE
Central Coast	67%	33%	*	*
Greater Bay Area	60%	40%	20	2
Los Angeles	70%	30%	81	5
Northern & Sierra	63%	38%	*	*
Sacramento	0	0	0	0
San Joaquin Valley	59%	41%	17	2
Other Southern California	78%	22%	72	4

*Rates are crude rates. Percentages are reported due to small cell size, and in some cases totals and rates are suppressed.

- In 2020, there were no MVT occupant deaths reported among 15 to 24 year old in the Sacramento region (Table 4).
- Across regions, males had a higher percentage of deaths compared to females (Table 4).

- The percentage of male MVT occupant deaths was the highest in the Other Southern California region (78%) and the lowest was in the San Joaquin Valley (59%) (Table 4).

Summary

The purpose of this data brief is to describe MVT crash non-fatal injuries and deaths among 15 to 24-year-olds in California in 2020. Females visited the ED at a higher percentage than males, but males were hospitalized at a higher percentage than females. Males also had a higher percentage of deaths than females. These findings reflect the established patterns in the literature regarding the burden of motor vehicle crash injuries for adolescent and young adult males.

- Statewide, a higher percentage of females visited the ED compared to males.
- There was a higher percentage of male hospitalizations across all seven regions. The highest percentage of male hospitalizations was in the Central Coast (63.6%), and the lowest percentage of male hospitalizations was in the San Joaquin Valley (55.2%).
- The highest percentage of deaths for males was reported in the Other Southern California region (78%) and the lowest percentage of deaths for males was in the San Joaquin Valley (59%), except for the Sacramento region which had no reported MVT Occupant deaths in 2020.

The Northern and Sierra region and the San Joaquin Valley region have 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 has the highest rate of hospitalizations (75 per 100,000) and the third highest rate of emergency department visits (866 per 100,000). The San Joaquin Valley region has the highest rate of emergency department visits (1,015 per 100,000) and the second highest rate of hospitalizations (66 per 100,000). Conversely, the Greater Bay Area and Central Coast regions have the lowest rates of emergency department visits and hospitalizations in the state. These findings confirm the patterns in the existing literature about regional inequality in California. For example, the 2022 County Health Rankings rank counties in California by their health outcomes and health factors[9]. 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 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]

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 15 to 24 with other younger passengers.

Prevention Strategies

Motor vehicle crash injuries continue to be a leading cause of death among adolescents and young adults ages 15-24 years old. Preventing transportation-related injuries and fatalities is a complex undertaking that requires ongoing collaboration across multiple disciplines. Through its Strategic Highway Safety Plan (https://dot.ca.gov/programs/safety-programs/shsp), State of California partners are working collaboratively to advance a Safe Systems approach to comprehensively address the state's most serious transportation safety needs, including the needs of Young Drivers. The Safe System Approach (https://safety.fhwa.dot.gov/zerodeaths/zero_deaths_vision.cfm) 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* (https://www.safestates.org/page/SRPFDriving) provides evidenced-based programs and policies to prevent MVT fatalities and injuries, including specific suggestions for traffic injury prevention strategies for higher risk injury groups including 15-24 year olds and males. Additional resources are listed below.

Impact Teen Drivers (https://www.impactteendrivers.org) 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's Teen Driving Safety Research Team (https://injury.research.chop.edu/teen-driving-safety-tools) 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: (https://www.cdc.gov/transportationsafety/). Specifically, there are two resources for teen drivers:

- **Parents are the Key**, https://www.cdc.gov/parentsarethekey/
- **Keep Teen Drivers Safe,** https://www.cdc.gov/injury/features/teen-drivers/index.html

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.

Endnotes

[1] https://wisqars.cdc.gov/nonfatal-leading, accessed May 6, 2022.

[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] Mateos-Granados J, Martin-delosReyes LM, Rivera-Izquierdo M, Jimenez-Mejias E, Martinez-Ruiz V, and Lardelli-Claret P. Sex Differences in the Amount and Patterns of Car-Driving Exposure in Spain, 2014 to 2017: An Application of a Quasi-Induced Exposure Approach. *Int. J. Environ. Res. Public Health* 2021;18:13255. DOI:https://doi.org/10.3390/ijerph182413255

[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. Records with a missing/unknown value for sex were removed.

[7] Emergency Department and Patient Discharge data: California Department of Healthcare Access and Information (HCAI), 2020

[8] Vital Statistics data: California Comprehensive Master Death File (CCMDF), CDPH, 2020

[9] University of Wisconsin Population Health Institute. County Health Rankings California State Report 2022.

[10] The exception is Monterey's health factor ranking, which is 38 and places it in the third quartile.