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San Francisco Severe Traffic Injury Trends: 2015-2022

December 2024

Produced by the San Francisco Department of Public Health

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Executive Summary

Vision Zero is San Francisco's initiative to eliminate traffic fatalities and reduce severe traffic-related injury on San Francisco's streets. The Department of Public Health's (SFDPH) Vision Zero team monitors severe injuries utilizing trauma registry data from Zuckerberg San Francisco General Hospital – our City's Level I Trauma Center where the most severely injured patients are seen and treated, and where injury severity is clinically assessed by medical professionals. SFDPH tracks in our Transportation Injury Surveillance System (TISS) both ***severe injuries*** as well as ***critical injuries*** - a subset of patients that are the most severely injured. TISS is our best and most reliable data source for monitoring and reporting out on severe injuries in our transportation system. SFDPH supplements these data with data collected from police traffic collision reports (see Appendix A), which has historically been the primary data source for severe injury in San Francisco.

The data presented in this report inform City and community understanding of those most severely injured because of traffic collisions on San Francisco streets – and how that picture is shifting over time, including since the adoption of Vision Zero in 2014. Vision Zero SF (VZSF) monitors and reports fatality data, which is more readily available, separately monthly.[1] The 2023 End of Year Fatality Report[2] was released Summer 2024 and serves as a primary record of Vision Zero progress. Severe injury data helps us to further assess and refine Vision Zero progress, and guide injury prevention initiatives.

This report includes crash data from 2020 during the pandemic of the coronavirus disease (COVID-19). SFDPH issued its first Stay at Home Order on Tuesday, March 17, 2020, and officially ended its COVID-19 public health emergency on February 23, 2023. Given the unprecedented social and economic disruption caused by the COVID-19 pandemic, caution should be used when comparing 2020 crash data to previous years as both significant increases and decreases in injuries may be attributable to short-term effects of the pandemic on transportation patterns. In addition, traffic patterns continue to adjust because of varying adoptions of remote work, which has an as yet uncertain effect on traffic safety.

This eight-year dataset will enable more in-depth analyses of location, crash characteristics, socio-demographic information, and travel mode. Next steps include using these data to update the city's Vision Zero High Injury Network.[3]

[1] Available at: https://app.powerbigov.us/view?r=eyJrIjoiZDFhN2E3YjctMGNjNi00ZDZmLTgzMDAtNzYxYjRlODJkNzA3IiwidCI6IjIyZDVjMmNmLWNlM2UtNDQzZC05YTdmLWRmY2MwMjMxZjczZiJ9

[2] https://www.visionzerosf.org/wp-content/uploads/2023/05/Vision-Zero-2022-End-of-Year-Traffic-Fatality-Report-FINAL-PUBLIC.pdf

[3] Available at: https://sfgov.maps.arcgis.com/apps/webappviewer/index.html?id=b2743a3fc0b14dd9814cf6668fc34773

Monitoring Severe and Critical Injuries in Our Transportation System Using Zuckerberg SF General Hospital and Trauma Center (ZSFG) Data

Who is Treated for Severe Injury at ZSFG?

- People walking comprised approximately one-quarter of severe and around one-third of critical injuries in 2021 and 2022 (Table 3, Table 4).
- Motor vehicle injury made up 28% of severe injuries and 21% of critical injuries in 2022.
- Although there was a noticeable decrease in 2021, people biking continue to comprise approximately one-fifth of severe and critical injuries in 2021 and 2022 (Figure 11, Table 3, Table 4).
- People on motorcycles continue to represent an increased proportion of severe injuries in 2021 (28%) and 2022 (26%) compared to previous years; this trend is also evident in the proportion of critical injuries (28% and 25%, respectively) (Figure 13, Table 3, Table 4).
- People biking and motorcycling continue to have a notably higher burden of injury relative to the proportion of trips they represent on SF streets**.**

What Are Trends in ZSFG Severe and Critical Injury by Travel Mode?

Overall (See Figure 1, Page 8)

- **Severe injuries:** Overall, between 2015 and 2022, severe injury trends are on a slight downward trend since 2015, with a small jump up in 2021 as people returned to work post shelter in place.
- **Critical injuries:** ZSFG counts of critically (most severely) injured patients have held relatively stable since 2015.

People Walking (See Figure 9, Page 16)

- Severe injuries among pedestrians have decreased since 2019 and have not returned to pre-pandemic levels (See Figure 9).
- The proportion of pedestrians **severely injured** on our streets have decreased from a pre-pandemic average of approximately 32% to approximately 27% since 2020 (Table 3).
- Between 2018 and 2019, there was a slight uptick from our Vision Zero baseline in **critical injuries** among pedestrians, but since 2020, critical injury trends among pedestrians have returned to an annual count similar to the 2015 baseline (Figure 9).
- The proportion of pedestrians **critically injured** post pandemic (since 2020) is down approximately 7% from pre-pandemic proportions (32% vs 39%, respectively) (Table 4).

People on Stand-up Powered Micro-Mobility Devices (See Figure 10, Page 16)

- **Severe injuries** to people riding stand-up powered micro-mobility devices, which includes electric scooters, have been trending upward since 2019, with eight severe injuries each in 2021 and 2022.
- **Critical injuries** to people riding stand-up powered micro-mobility devices peaked with four people critically injured in 2020 and 2021, decreasing to three victims in 2022.

People on Bikes (See Figure 11, Page 17)

- In 2019 an unusually high proportion of injured cyclists were discharged from the emergency department at ZSFGH relative to other years.
- Unlike people walking and people in motor vehicles, there was no noticeable decrease in injuries to people on bikes in 2020 during the COVID-19 pandemic.
- While the proportion of overall injuries among cyclists has changed little (<1%) pre-pandemic compared to post-pandemic, the raw count of **severe injuries** among cyclists steadily decreased between 2020 (n=115) and 2022 (n=89) while the raw count of critical injuries are slightly up in 2022 (n=28) compared to 2020 (n=24) (Table 3, Table 4, Figure 11).

People in Motor Vehicles (See Figure 12, Page 17)

- The proportion of **critical injuries** to people in motor vehicles treated at ZSFG increased slightly pre- to post-pandemic by about 4% (pre: 21%; post: 25%). Severe injuries changed by less than 1% (Table 3, Table 4).
- Among motor vehicle travelers, following the retriage changes initiated by EMSA in 2014, the annual number of severe injuries among motor vehicle travelers has held relatively stable around an average of 156/year (Figure 12) with a couple of exceptions:
    - In 2017, the number of severe injuries among motor vehicle travelers rose above average, up to n=189 motor vehicle traffic injuries in that year.
    - In 2020, the total number of annual severe injuries among motor vehicle occupants dipped below average, down to n=137 motor vehicle traffic injuries in that year.
- **Critical injuries** to people in motor vehicles have slowly been trending up since 2015. The pre-pandemic average number of motor vehicle critical injuries was approximately 24 per year, and the post-pandemic average is approximately 32 motor vehicle injuries per year. It is important to note that hospital data includes people injured on freeways (Figure 12).

People on Motorcycles (See Figure 13, Page 18)

- **Severe injuries** to people riding motorcycles have been trending upward since 2015 with minor fluctuations, with the highest number of injuries seen in 2021.
- **Critical injuries** to people riding motorcycles remained relatively stable between 2015 and 2020, then trended upward between 2021 and 2022. It is important to note that hospital data includes people injured on freeways.

Detailed Findings: 2015-2022 Severe and Critical Traffic Injury Trends

Methodology

This report relies on data from Zuckerberg San Francisco General Hospital and Trauma Center (ZSFG)'s trauma registry to monitor severe injury trends for Vision Zero. Strengths of this data system include clinical assessment of injury severity, and that ZSFG is the City's only Level I Trauma Center, where the most severe injuries in the city are treated. SFPD data was historically the only data source used to track severe injury and is summarized in Appendix A for comparison.

While including both SFPD and ZSFG data account for all crashes to which SFPD responds and crashes that involved injury were the injured parties were transported to ZSFG, on some occasions the initial injury assessments are revised at the hospital after a person is assessed by a trained health professional. Thus, this data set may lack some post-crash injury information among an injured traveler who was treated at another health system in the city (e.g., Kaiser, Sutter Health, etc) or who may have been more mildly injured in a collision but who neither called 911 nor received emergency care.

Injury severity in hospital data is categorized using a clinical injury severity scale (ISS) ranging from 1-75, as well as whether someone required hospital admission for treatment. This analysis presents severe injuries from hospital data coded as *critical* (ISS greater than 15) and/or *severe* (all traffic injuries resulting in hospital admission).[4] **For hospital data, critical injury is included in severe injury counts and statistics.** Note that fatal injuries are not included in this analysis and are detailed in annual fatality reporting.[5]

Interpretation Notes

Given the unprecedented disruption the COVID-19 pandemic had in the year 2020, this report will exercise caution in making direct comparisons of 2020 to previous years. This report recommends providing additional context or caveats whenever 2020 data is used in comparison to previous or subsequent years of data and that the knock-on effects of the pandemic continue to influence severe traffic injury risk in ways that researchers are only beginning to understand.

[4] Note: Severe injury reporting excludes deaths that occur within 30 days of injury which are tracked separately for Vision Zero fatality monitoring. Distinct from fatality monitoring for Vision Zero SF, severe hospital injuries in this analysis *include* those sustained on freeways, not-at-grade MUNI, BART and Caltrain infrastructure and in the Presidio. Fatality data do not. Protocol available at: https://www.sfdph.org/dph/files/EHSdocs/PHES/VisionZero/Vision_Zero_Traffic_Fatality_Protocol.pdf

[5] Vision Zero Traffic Fatality 2023 End of Year Report available at: https://www.visionzerosf.org/wp-content/uploads/2024/07/Vision-Zero-2023-End-of-Year-Traffic-Fatality-Report_Final.pdf

Additionally, a shift to the International Classification of Diseases medical coding system (ICD-10) beginning with 2017 data affects the categorization of traffic mode, and there has been significantly better granularity regarding identifying injuries due to riders of stand-up powered micro-mobility devices like electric scooters each year since 2018.

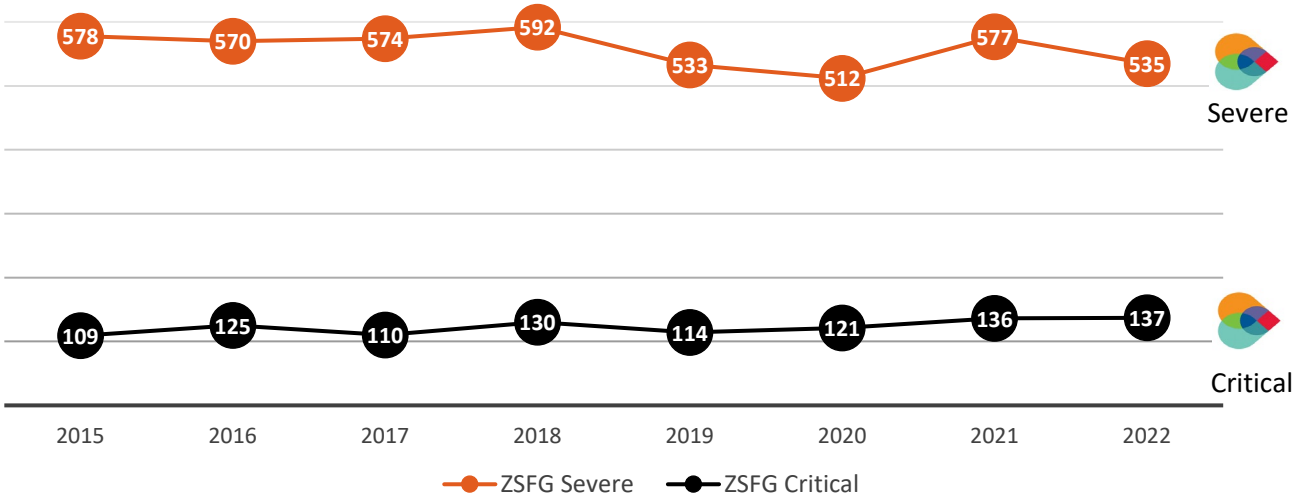
Of note, hospital data includes people injured on SF freeways, making it distinct from VZSF fatality data which exclude people killed in freeway crashes (in addition to other factors, summarized in footnote 5).

At the end of 2013, the San Francisco Emergency Medical Services Agency (SF EMSA) issued retriage guidelines to ensure the most severely injured people were treated at ZSFG, even if they initially reported to another hospital. This change increases inclusion of the most severely injured in the ZSFG hospital data – and contributes to the increased but stable number of severe injuries observed from 2015 forward, relative to earlier years. Due to this change, counts of severe and critical injuries in years prior to 2015 are not consistent with current practices and therefore not shown in the following figures and tables. Severe and critical injury counts prior to 2015 (Figure 15) are provided in Appendix B of this report.

Overall Trend Over Time of Severe and Critical Injuries

Overall injury trends reflect relatively stable counts of critically injured and slightly declining counts of severely injured patients in recent years. However, this consistency is not true of each individual travel mode, as explored in Figures 8 through 12.

Figure 1: Total Traffic Injury Counts by Year



Note: ZSFG severe injury numbers *include* ZSFG critical injury counts.

Demographic Composition of Severe and Critical Injuries

The next section will go in-depth with the demographic composition of the victims who experienced severe and critical injuries from 2015 to 2022.

Severe and Critical Injuries by Age

The age of the victim is known to be a significant factor related to how likely it is that the person experiences severe injuries from physical trauma. Generally, when controlling for the speed and type of the collision, youth and seniors are at greater risk of severe injuries compared to working age adults.[6] Table 1 shows that the mean age is higher than the median age across all years for severe injuries, which implies that the distribution of those injured who are aged 40 years and older are skewed towards seniors.

Among critical injuries (Table 2), the youngest victims are generally of middle school age (Note: 2018 had a much younger minimum age). Similarly to the severe injuries, the mean age is generally higher than the median age for most years, suggesting that those critically injured on our streets due to traffic collisions were also skewed towards older adults and seniors.

Table 1: Age Statistics of Severely Injured Traffic Victims

YEAR	N	MEAN AGE	MEDIAN AGE	MIN AGE	MAX AGE
2015	578	43.6	41.0	3	91
2016	570	45.2	44.0	6	96
2017	574	43.9	41.5	3	96
2018	592	44.5	44.0	0	96
2019	533	45.5	43.0	0	95
2020	512	42.8	40.0	0	92
2021	577	46.0	43.0	5	96
2022	535	46.5	45.0	2	94

Table 2: Age Statistics of Critically Injured Traffic Victims

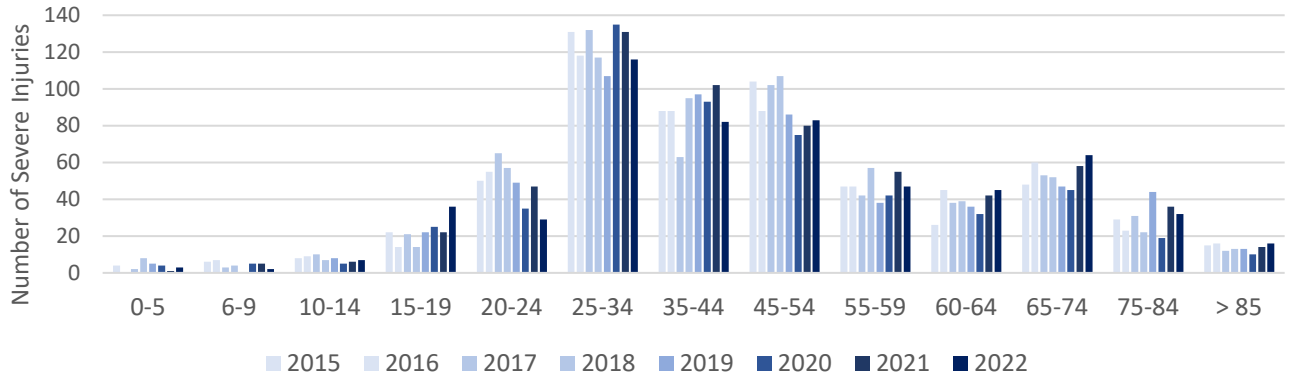
YEAR	N	MEAN AGE	MEDIAN AGE	MIN AGE	MAX AGE
2015	109	46.6	45.0	12	91
2016	123*	43.4	42.0	8	92
2017	110	44.2	45.5	11	87
2018	130	46.7	47.5	2	91
2019	114	44.6	40.5	11	91
2020	121	42.2	37.0	11	92
2021	136	47.5	45.5	9	90
2022	137	48.4	47.0	14	89

*A quality assurance check adjusted this number down by 2; N was 125 in previous reports.

[6] Saadé J, Cuny S, Labrousse M, Song E, Chauvel C, Chrétien P. Pedestrian Injuries and Vehicles-related Risk Factors in Car-to-pedestrian Frontal Collisions. In: 2020 IRCOBI Conference Proceedings.

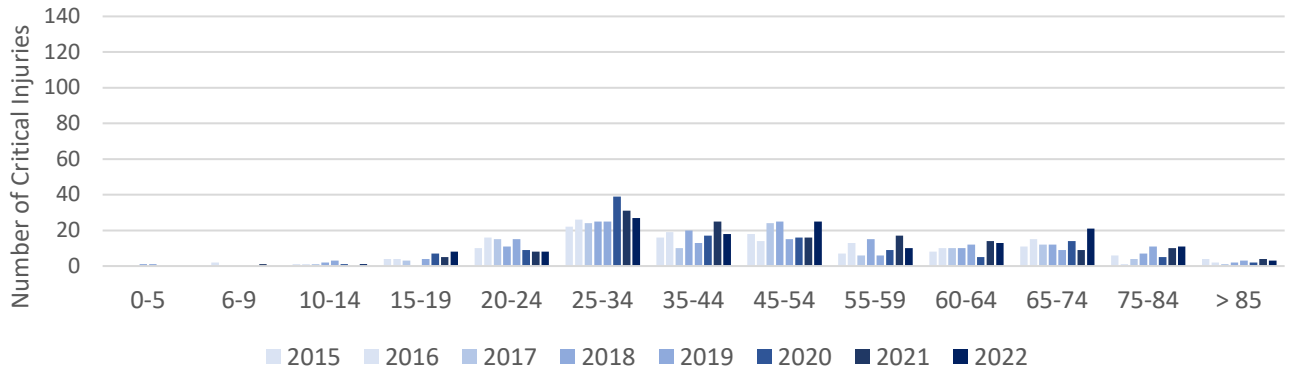
Figure 2 and Figure 3 depict the prevalence of severe and critical injuries, respectively, for each age group over time.

Figure 2: Severe Injuries by Age Group over time



Between 2021 and 2022, severe injuries increased among youth aged 15-19 years old, adults (45-54 years old), and generally among seniors (aged 60+). However, during this same time period, severe injuries decreased among adults (aged 20-44 years old), as well as among adults 55-59 years old. Consistent with the existing literature and prior research, data here reveal that between 2021 and 2022, severe injuries most notably increased year over year among older teens and seniors aged 60+.

Figure 3: Critical Injuries by Age Group over time



Trends among critical injuries are similar to those seen among severe injuries. Critical injuries in general among adults (aged 25-34 years) and older adults (aged 65-74 and 75-84 years) have increased since 2015. In contrast, severe injuries among 20-24 year olds have decreased over time.

Severe and Critical Injuries by Race and Age

Figure 4 and Figure 5 depict the median age stratified by race/ethnicity among severely and critically injured traffic victims, respectively. The median age of severe injury victims among the Asian population is generally older (≥ 50 years) across time compared to the other race/ethnicity groups in San Francisco. Meanwhile, the median age of severe injuries was lowest (<40 years) for Hispanic/Latino and Native Hawaiian victims from 2015 to 2022.

Figure 4: Median Age Among Severe Injuries by Race

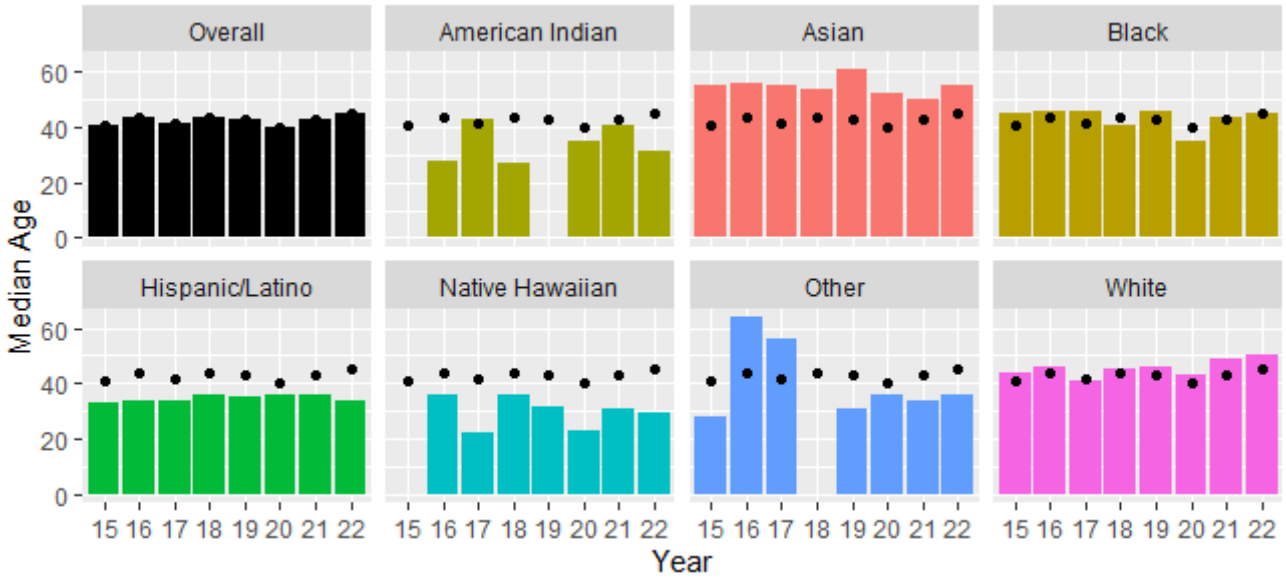
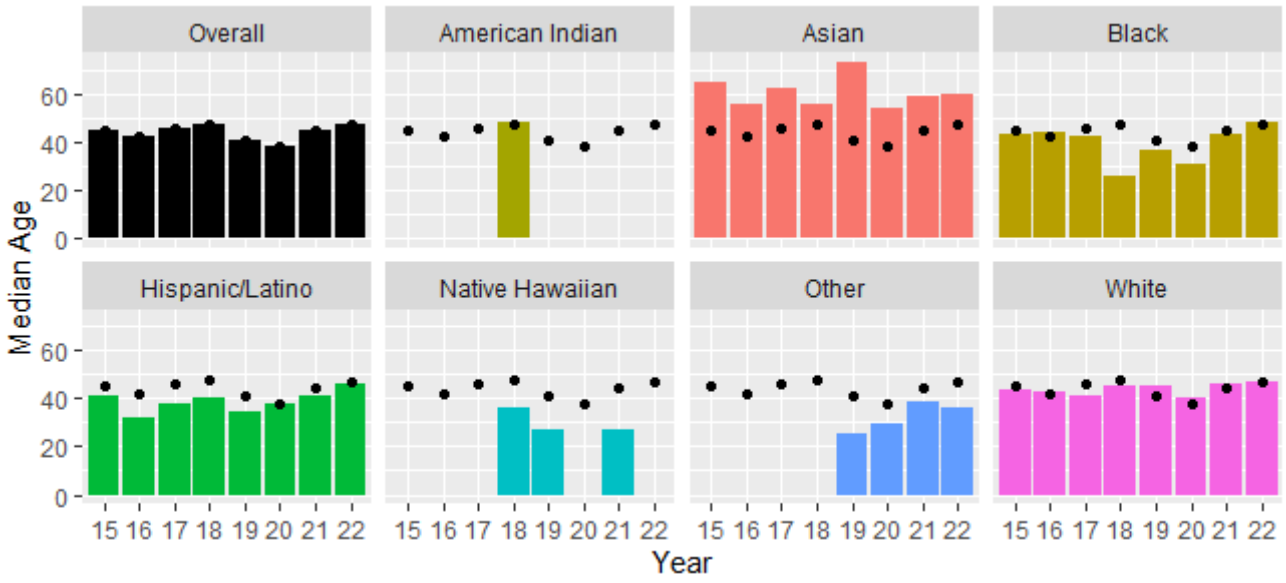


Figure 5: Median Age Among Critical Injuries by Race



Compared to people who were severely injured, there is more age variability observed among those who were critically injured due to a smaller sample size. For Black or African American, Native Hawaiian, and White populations, critical injuries tend to be among those younger than is seen among the severe injuries. For the Asian and Hispanic/Latino populations, critical injuries are older than severe injuries. The median age trend for Asians who were critically injured was the highest among all the other race groups (Figure 5).

Severe and Critical Injuries by Race and Ethnicity

There were disparities between different racial/ethnic groups which have persisted across the years. In general, severe (Figure 6) and critical (Figure 7) injuries were more prevalent among Whites, followed by Hispanic/Latinos, Asians, and Black or African Americans. Of note, Black or African Americans were overrepresented among people who were severely or critically injured. That is, while Black or African Americans account for less than 5% of San Francisco's population, approximately 14% of victims who were severely and critically injured were Black or African Americans. Similarly, Hispanic/Latinos and Native Hawaiians were also overrepresented among people who were severely and critically injured, while Asians, on the other hand, were underrepresented relative to their proportion of the San Francisco population.

Figure 6: Average Severe Injuries by Race/Ethnicity from 2015 to 2022

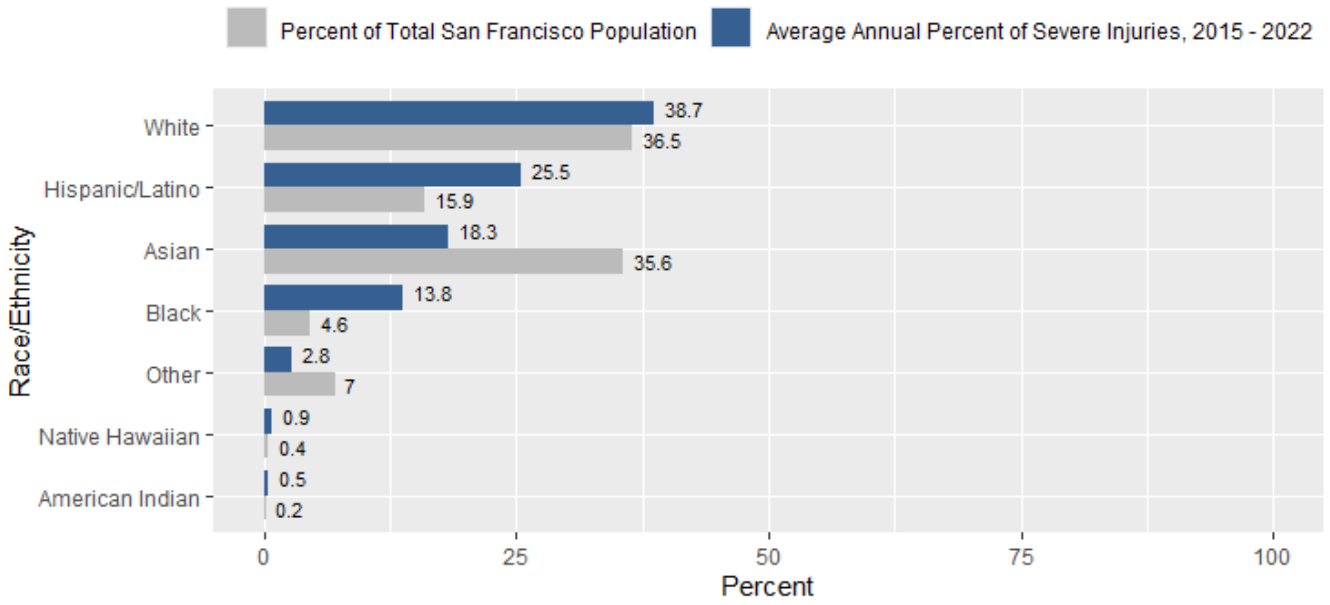
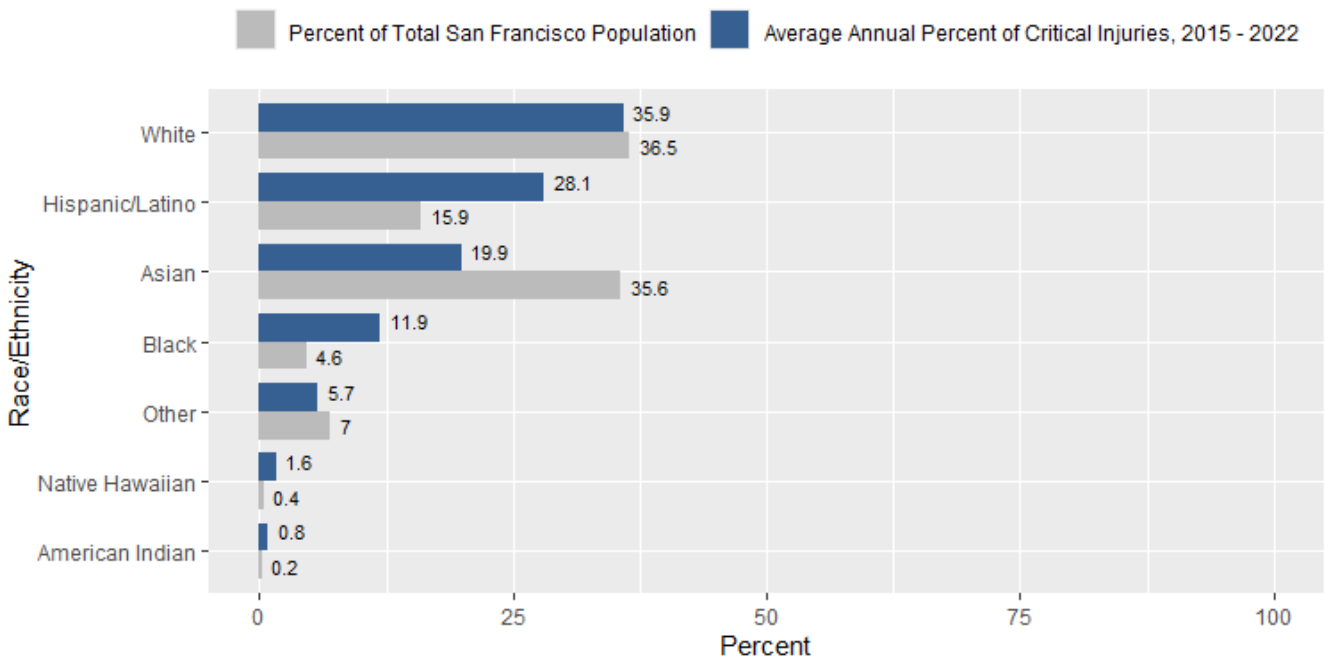


Figure 7: Critical Injuries by Race Ethnicity

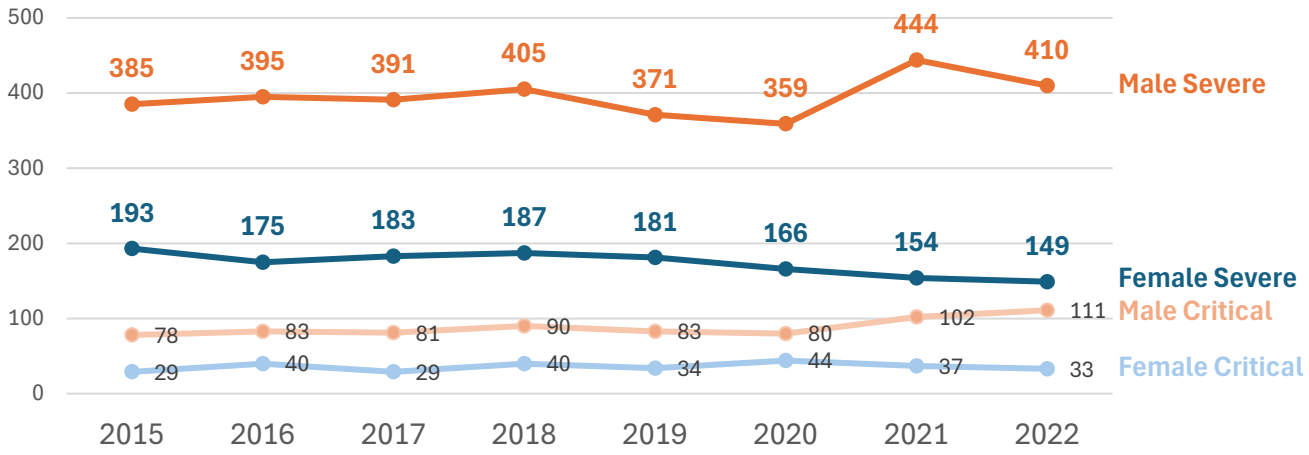


Severe and Critical Injuries by Gender

Overall, severe injuries were more common among males than females and nonbinary people. Specifically, the number of males who were severely injured was nearly 3 times higher than the number of females severely injured in 2021. In 2015, there were nearly 200 females who were severely injured. The number of severely injured females has been steadily decreasing through 2022. In contrast, the number of severely injured males remained nearly twice as high as female severe injury counts between 2015 and 2018, and despite small decreases in 2019 and 2020, severely injured males reached a record high in 2021 (n=444). These gender trends are similar for critical injuries as well. That is, the number of critically injured males remained more than twice as high as severely injured females between 2015 and 2022. There were no severe or critical injuries reported among non-binary individuals until 2021 (n=1) and then again in 2022 (n=3). Given the small sample size of non-binary individuals, these injuries are not graphed in Figure 8 below.

As seen in Figure 8, males are overrepresented in both severe and critical injuries from traffic collisions compared to female individuals.

Figure 8: Gender Composition of Severe and Critical Injuries



While the number of critical injuries remained relatively stable among males from 2015 to 2020, the number of critical injuries increased sharply by over 27% between 2020 and 2021 and finally peaked in 2022 (n=111). The number of critically injured females fluctuated between 2015 and 2022 and remained approximately 40% lower on average compared to the counts seen among males.

Severe Injury by Mode of Travel

The data from ZSFG suggest that people walking (pedestrians) are the mode of transportation most at risk for severe injuries related to traffic crashes. Severe injuries to people walking decreased approximately 26% between 2019 and 2020 (likely due to fewer people being on the roads due to COVID shelter in place orders in Spring 2020); however, this decrease in severe injuries among pedestrians has remained relatively stable between 2020 and 2022 (Figure 9). The eight-year severe injury average between 2015 and 2022 is about 170 severe injuries per year. Critical injuries among pedestrians increased approximately 62% between 2017 and 2018 but then trended slightly downward through 2021, increasing 10% in 2022 to just below the 8-year average of 44 critical injuries per year.

The decline in severe and critical injuries in 2020 was likely attributable to lower pedestrian volumes on our city streets due to the shelter in place orders during the COVID-19 pandemic.

Figure 9: Pedestrian Traffic Injury Counts by Year

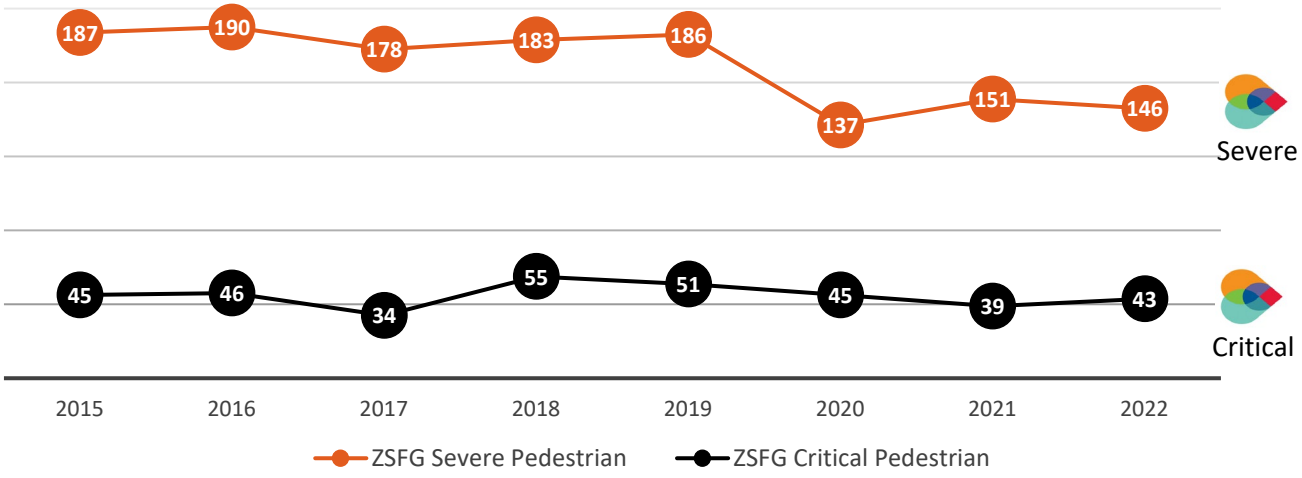
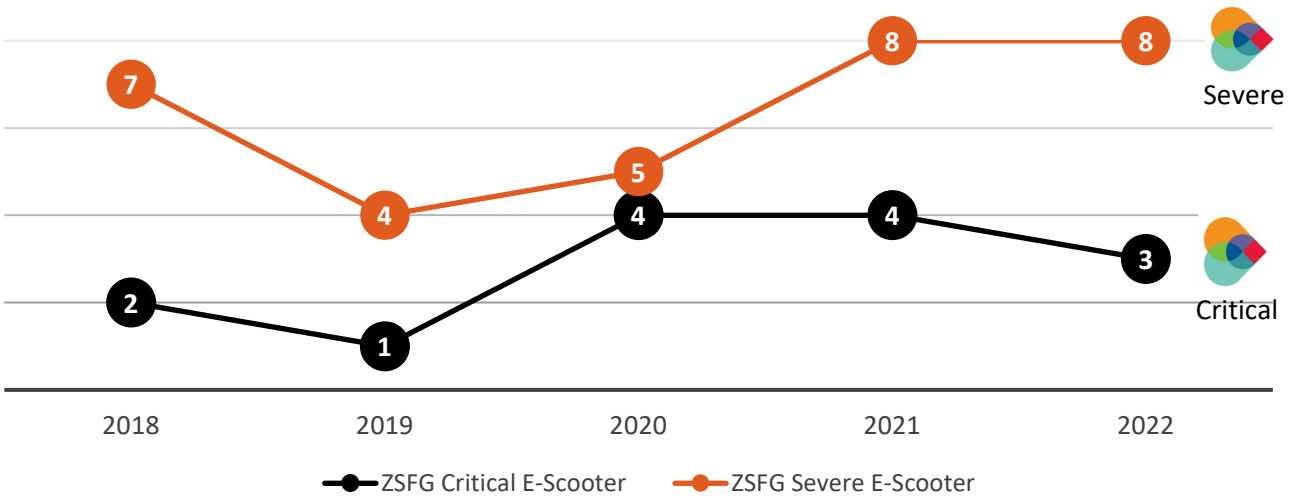


Figure 10: Stand-up Powered Micro-mobility Device Rider Traffic Injuries



In 2018, ZSFG began tracking injuries associated with use of standing electric scooters, following increased use of the devices.[7] E-scooter injuries are presently included within the pedestrian category of injury surveillance, whether the injured party was a person on foot or an e-scooter rider. A detailed analysis of preliminary data from e-scooter companies, police reports and ZSFG tracking conducted during the 2018 powered scooter pilot is available.[8]

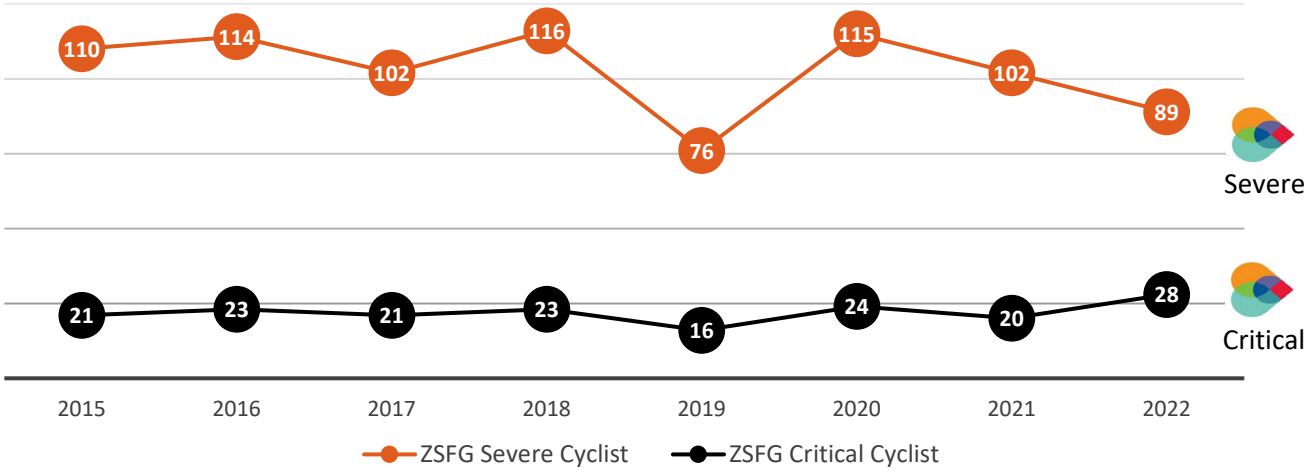
Year 2020 data showed five severe (requiring hospital admission) e-scooter related injuries, and among them, four (80%) were critical injuries. These data do not include fatal injuries; however, it is of note that for the first time since the city began tracking e-scooter injuries and fatalities in San Francisco, two e-scooter riders died in San Francisco in 2020. Taken together, these data may suggest that this emerging mode could be particularly vulnerable to traffic injury. However, the scooter sample size is still very small and thus interpretations should be made with caution.

Severe electric scooter injuries peaked in 2021 (n=8) and remained at the same level in 2022. Meanwhile, critical e-scooter injuries peaked in 2020 and 2021 (n=4) then decreased to three in 2022.

[7] Vision Zero SF Injury Prevention Research Collaborative. 2019. A Methodology for Emerging Mobility Injury Monitoring in San Francisco, California Utilizing Hospital Trauma Records: Version 2.0. San Francisco, CA. Available at: https://www.sfdph.org/dph/EH/PHES/PHES/TransportationandHealth.asp

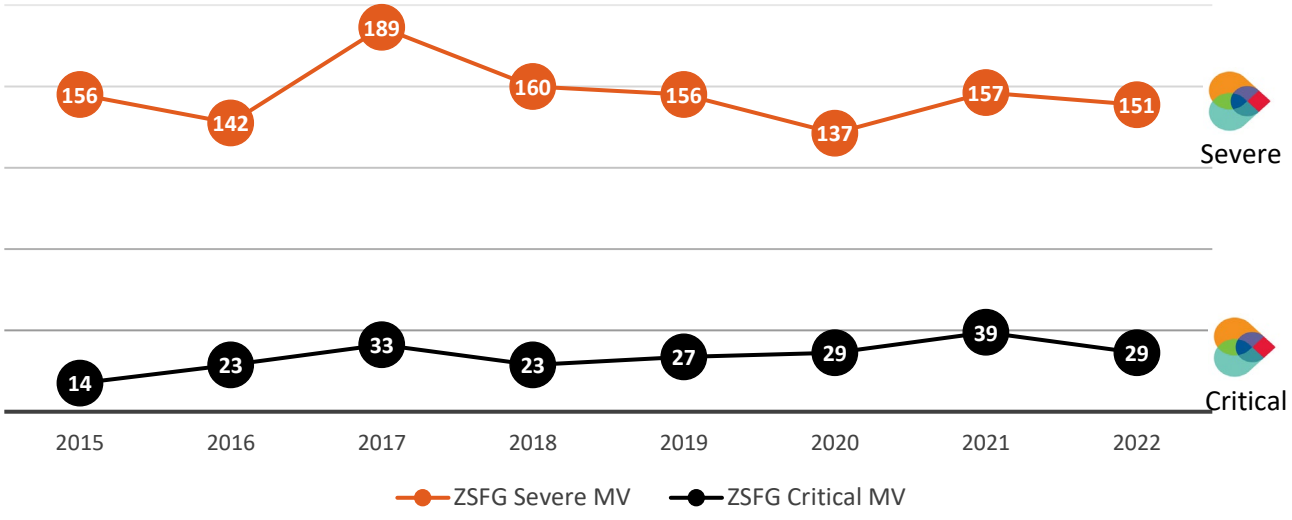
[8] Vision Zero SF Injury Prevention Research Collaborative. (2019, April). *E-Scooter Collision and Injury Analysis*. San Francisco, CA. Available at: https://www.sfdph.org/dph/files/EHSdocs/PHES/VisionZero/E-Scooter_Collision_Injury_2019.pdf

Figure 11: Bicycle Traffic Injury Counts by Year



Overall, people riding bicycles remain vulnerable road users who are over-represented in severe injury data relative to their proportion of trips on San Francisco streets. As shown in Figure 11, severe and critical cyclist injury counts dropped notably in 2019, but then bounced back up in 2020. Since 2020, severe injuries have trended downward, while critical injuries have trended slightly upward. The average annual severe injury counts for cyclists is 103 and is 22 for the annual average of critical injury counts.

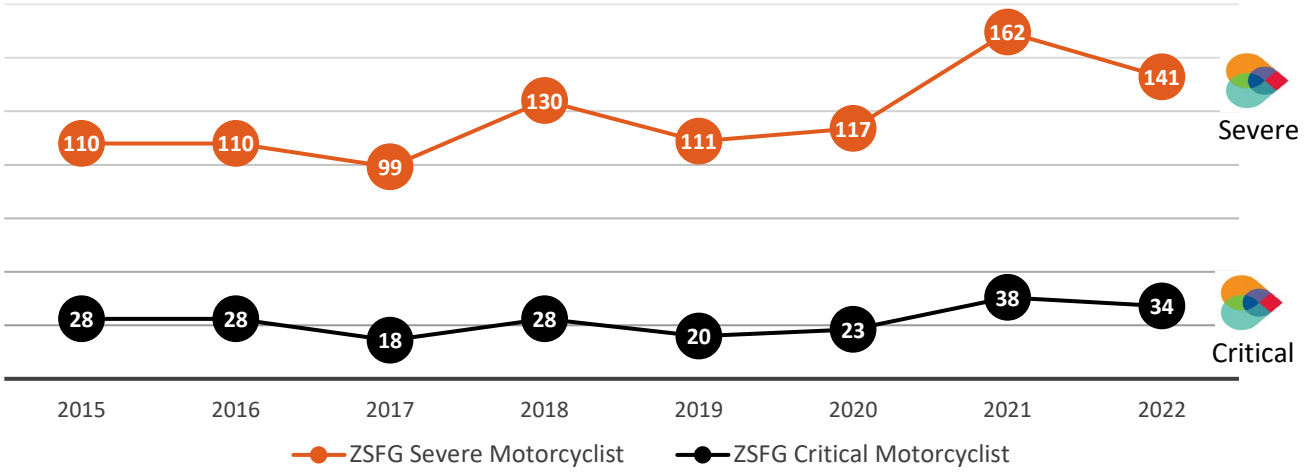
Figure 12: Motor Vehicle (MV) Traffic Injury Counts by Year



Counts of severe motor vehicle injuries have fluctuated over time. Severe motor vehicle injury has been on the decline since 2017. In contrast, critical motor vehicle injuries have increased slightly between 2018 and 2021. A note that this injury report includes injuries that occurred on freeways.

Similar to the pedestrian trend described above between 2019 and 2020, severe injuries to motor vehicle occupants decreased approximately 12% between 2019 and 2020. This is likely due to decreases in the number of people commuting into San Francisco by vehicle during the shelter in place period of the COVID-19 pandemic in 2020.

Figure 13: Motorcycle Traffic Injury Counts by Year



While more recent counts of critical and severe injuries to people riding motorcycles fell below 2021's historic highs, motorcyclists remain a vulnerable road user group.

Similar to cyclists, there was an increase in the number of severe injuries among motorcyclists during the 2020 COVID-19 pandemic shelter in place period. It is an open question whether this may have been due to less passenger vehicle volume and the potential for higher speeds on uncongested streets.

Table 3: Counts and Proportions of Severe Injuries by Travel Mode - Hospital Data (2015 - 2022)

YEAR	PEDESTRIAN	CYCLIST	MOTORCYCLIST	MOTOR VEHICLE OCCUPANT	OTHER/ UNKNOWN	TOTAL
2015	187 (32.4%)	110 (19.0%)	110 (19.0%)	156 (27.0%)	15 (2.6%)	578 (100%)
2016	190 (33.3%)	114 (20.0%)	110 (19.3%)	142 (25.0%)	14 (2.4%)	570 (100%)
2017	178 (31.0%)	102 (17.8%)	99 (17.2%)	189 (33.0%)	6 (1.0%)	574 (100%)
2018	183 (30.9%)	116 (19.6%)	130 (22.0%)	160 (27.0%)	3 (0.5%)	592 (100%)
2019	186 (34.9%)	76 (13.9%)	111 (20.8%)	156 (29.3%)	4 (0.8%)	533 (100%)
2020	137 (26.8%)	115 (22.5%)	117 (22.9%)	137 (26.8%)	6 (1.2%)	512 (100%)
2021	151 (26.2%)	102 (17.7%)	162 (28.1%)	157 (27.2%)	5 (0.9%)	577 (100%)
2022	146 (27.3%)	89 (16.6%)	141 (26.4%)	151 (28.2%)	8 (1.5%)	535 (100%)

Among the severe injuries examined from ZSFG hospital data, a majority of the time since 2015 pedestrian injuries rank as the most prevalent mode of injury with an 8-year average around 30%. Severe injuries to cyclists have fluctuated over time, dropping about 6% between 2018 and 2019, then peaking in 2020 at 22.5% before decreasing again to just under 17% in 2022. Between 2017 and 2022 the proportion of severe injuries attributable to motorcycle crashes increased and remained significantly above the 8-year average of 18.5%. The motor vehicle occupant proportion of severe injury remained consistently above 25% from 2015 to 2022.

Table 4: Counts and Proportions of Critical Injuries by Travel Mode – Hospital Data (2015 - 2022)

YEAR	PEDESTRIAN	CYCLIST	MOTORCYCLIST	MOTOR VEHICLE OCCUPANT	OTHER/ UNKNOWN	TOTAL
2015	45 (41.3%)	21 (19.6%)	28 (25.7%)	14 (12.8%)	1 (0.9%)	109 (100%)
2016	46 (36.8%)	23 (18.4%)	28 (22.4%)	23 (18.4%)	5 (4.0%)	125 (100%)
2017	34 (30.9%)	21 (19.1%)	18 (16.4%)	33 (30.0%)	4 (3.6%)	110 (100%)
2018	55 (42.3%)	23 (17.7%)	28 (21.5%)	23 (17.7%)	1 (0.8%)	130 (100%)
2019	51 (44.7%)	16 (14.0%)	20 (17.5%)	27 (23.7%)	0 (0.0%)	114 (100%)
2020	45 (37.2%)	24 (19.8%)	23 (19.0%)	29 (24.0%)	0 (0.0%)	121 (100%)
2021	39 (28.7%)	20 (14.7%)	38 (27.9%)	39 (28.7%)	0 (0.0%)	136 (100%)
2022	43 (31.4%)	28 (20.4%)	34 (24.8%)	29 (21.2%)	3 (2.2%)	137 (100%)

Among the critical injuries examined from ZSFG hospital data, pedestrian injuries ranked as the most prevalent mode of critical injury with an 8-year average around 45%. The proportion of critical pedestrian injuries decreased between 2015 and 2017, then peaked in 2019 close to 45% of all critical injuries that year and then decreased again through 2021. Regardless of year, pedestrian injury stands out as the leading mode of critical injury.

The proportion of critical injuries occurring among people riding bicycles has been relatively level over the past few years, close to or less than 20%. Critical injuries among motor vehicle occupants were somewhat variable between 2015 and 2018, reaching an 8-year high of 30% in 2017, then leveling out around 25% without major fluctuations from 2019 to 2022.

Discussion

San Francisco continues to invest significant resources to eliminate traffic deaths and reduce severe injuries on San Francisco streets. This work is described in the **Vision Zero Action Strategy** – which includes: data-driven, strategic actions city agencies are advancing; evidence-based, high-impact transformative policies to address vehicle speeds and miles travelled that require local legislative authority; complementary city goals to increase walking, biking, and improved transit while reducing driving and vehicle miles travelled; and the critical importance of equity and ensuring a safe transportation system for even the most vulnerable communities to realize Vision Zero.

Vehicle speed is a fundamental predictor of crash survival and injury severity – and is thus a focus of Vision Zero efforts to slow speeds, save lives and prevent severe injury. Seniors are more vulnerable at any given speed. San Francisco city staff and state representatives continue to push for revisions to statewide traffic laws that will allow local jurisdictions more control over lowering speed limits on high injury streets and busy commercial districts.

San Francisco has a dynamic transportation environment that includes several additional factors that can impact the number and type of severe injuries sustained on the transportation system. These factors include:

- **The COVID-19 pandemic and potential for permanent of work-from-home or flex work schedules**: San Francisco's high proportion of tech and white-collar jobs has allowed a greater number of employees to work remotely compared to other similar sized cities and drastically changed commute patterns and travel mode preferences since the pandemic began. Commute and visitor trips within San Francisco continue to be affected by the pandemic in 2021, as evidenced by BART[9] and MUNI[10] ridership remain significantly lower compared to 2019. Although 2020 had reductions in the number of severe in critical injuries seen at ZSFG for people walking and people in motor vehicles, it remains to be seen how the changes in city street activity impact long term injury trends when the economy fully reopens, and the pandemic finally subsides.

- **Increases in population, employment, and vehicle miles travelled**: Although the COVID-19 pandemic has temporarily changed previous trends in population and employment growth in San Francisco, the Association of Bay Area Governments Regional Housing Needs Allocation

[9] https://www.bart.gov/news/articles/2023/news20230729
[10] https://www.sfmta.com/press-releases/press-release-muni-ridership-rises-25-2023

mandates the city plan for approximately 82,000 additional housing units between 2023 and 2031. This population growth could increase daily vehicle miles travelled (VMT), strengthen the need for traffic congestion pricing, and encourage the usage of alternative modes of transportation including walking, cycling, transportation network (Uber/Lyft), taxis, and ridesharing with electric scooters and mopeds.

- **Aging population**: One in four San Francisco residents are seniors according to the Department of Aging and Adult Services – a population particularly vulnerable to severe injury when injured in a crash. The Bay Area's senior population is forecasted to grow from almost one in seven residents currently to over one in four residents according to Plan Bay Area 2050.[11]

- **Increasing homelessness**: 2022's biannual Point-in-Time Count showed a 3% decrease in people living on the streets compared to 2019, which was 17% higher than in 2017.[12] While the 2024 Point-in-Time Count has not been released at the time of this publication, the City's unhoused population has inarguably increased since 2022, which means more people are living where exposure to traffic and potential traffic injury is highest, while facing the increased physical and mental health issues experienced by people without housing.

This context highlights the continued importance of targeted and coordinated Vision Zero SF initiatives to save lives and prevent severe injuries on San Francisco's transportation system.

Next Steps

SFPD and ZSFG injury assessments represent overlapping populations and do not compare severity between data sources. Some of the injured people in police data are also captured in hospital injury data, while some injured people are included in police or hospital data only. To address this issue SFDPH maintains the San Francisco's Transportation-related Injury Surveillance System which found that ~60% of records classified as severe appeared both in police and hospital data, with notably differences in proportion captured in hospital-only data based on travel mode. The linked data from 2017-2021 has become the primary data source to analyze severe injury trends and was used to update San Francisco's Vision Zero High Injury Network in 2022. In 2025, SFDPH will complete another linkage of 2020-2022 data.

Data linkage will facilitate analyses at the intersection level and offer more comprehensive data on crash and socio-demographic factors. There will be further investigation into the factors contributing to increases in severe motorcycle injuries, as well as those contributing to increases in critical pedestrian injuries following recent declines.

[11] Plan Bay Area 2050: Regional Growth Forecast Methodology. Dec 2019. https://www.planbayarea.org/sites/default/files/pdfs_referenced/Item-07C_PBA50_Attachment-A_Regional-Growth-Forecast-Methodologyv2.pdf

[12] https://hsh.sfgov.org/wp-content/uploads/2022/08/2022-PIT-Count-Report-San-Francisco-Updated-8.19.22.pdf

Appendix A: San Francisco Police Department (SFPD) Data

VZSF relies on ZSFG hospital data for severe injury monitoring due to the aforementioned strengths, including clinical assessment of injury severity and more complete assessment of severe injuries based on data from the City's only Level I Trauma Center.

This Appendix summarizes SFPD-reported severe injury data, which was historically the primary source of severe injury data reported to the public and used by City staff. Excluding fatal injuries, police data offer three categories of injury severity, assessed at the injury scene: Severe Injury, Other Visible Injury, and Complaint of Pain.

Severe injury is defined in the CHP 555 Traffic Collision Manual.[13]

An injury, other than a fatal injury, that including the following:

1. Broken or fractured bones.
2. Dislocated or distorted limbs
3. Severe lacerations
4. Skull, spin, chest, or abdominal injuries that go beyond "Other Visible Injuries"
5. Unconsciousness at or when taken from the collision scene
6. Severe burns

Notably, a memo released to SFPD officers in December 2014 advised head injuries to be classified as severe to avoid under-reporting of traumatic brain injury. This guidance likely partially accounts for the increase in severe injuries recorded in police data from 2015 onward.

Who is Severely Injured?

Among severely injured people in police data, proportions of people injured while engaged in various travel modes are generally comparable to hospital data. Consistent with ZSFG data, pedestrians are the group of road users most affected by severe injury.

Severe Injury Trends

Overall severe injury trends in police data are comparable to that in hospital data, as are trends for people walking, cycling, and motorcycling. Notably injuries to motor vehicle occupants rose 36% in police data from 2017 to 2019. By contrast, numbers declined for both severe and critical injuries in ZSFG data for the same period and mode.

[13] California Highway Patrol Collision Investigation Manual HPM 110.5 Available at: https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/ca_chp555_manual_2_2003_ch1-13.pdf

Figure 14: Total Police Severe Counts and Hospital Severe/Critical Counts - Police & Hospital Data

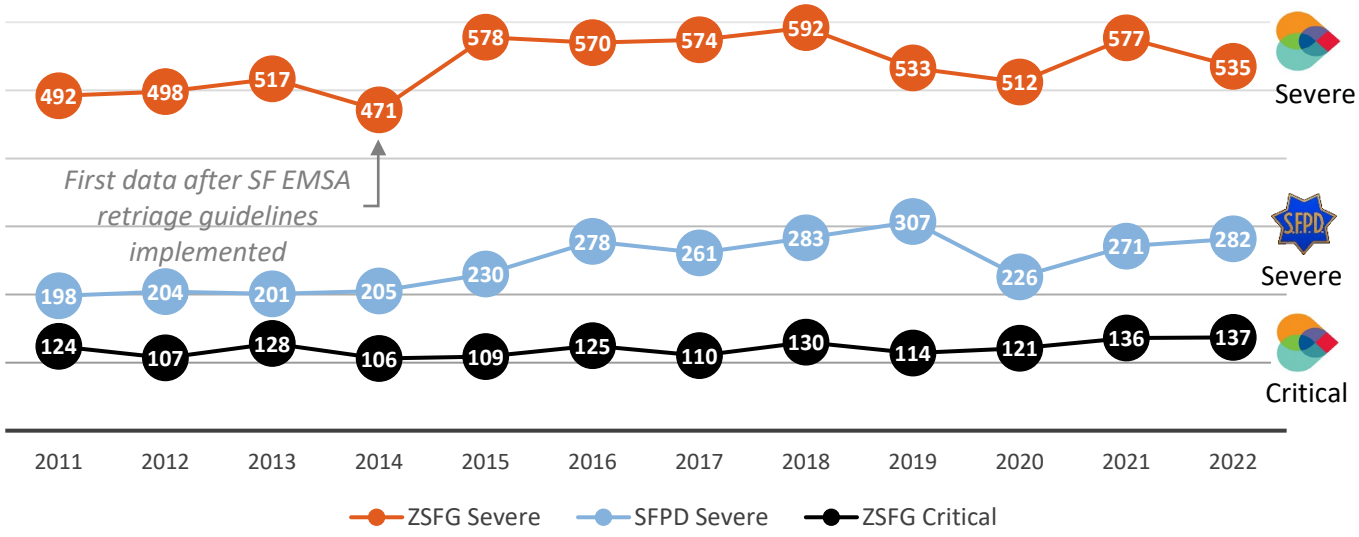


Table 5: Counts and Proportions of Severe Injuries by Travel Mode - Police Data (2015 - 2022)

YEAR	PEDESTRIAN	CYCLIST	MOTORCYCLIST	MOTOR VEHICLE OCCUPANT	OTHER/ UNKNOWN	TOTAL
2015	87 (37.8%)	51 (22.2%)	45 (19.6%)	47 (20.4%)	0 (0.0%)	230 (100%)
2016	118 (42.4%)	40 (14.4%)	56 (20.1%)	64 (23.0%)	0 (0.0%)	278 (100%)
2017	112 (42.9%)	46 (17.6%)	48 (18.4%)	53 (20.3%)	2 (0.8%)	261 (100%)
2018	110 (38.9%)	55 (19.4%)	45 (15.9%)	69 (24.4%)	4 (1.4%)	283 (100%)
2019	117 (38.1%)	53 (17.3%)	46 (15.0%)	77 (25.1%)	14 (4.6%)	307 (100%)
2020	92 (40.7%)	34 (15.0%)	35 (15.5%)	53 (23.5%)	12 (5.3%)	226 (100%)
2021	85 (31.4%)	49 (18.1%)	40 (14.8%)	77 (28.4%)	20 (7.4%)	271 (100%)
2022	93 (33.0%)	54 (19.1%)	28 (9.9%)	84 (29.8%)	23 (8.2%)	282 (100%)

Among police-designated severe injuries, pedestrian injury perennially ranked as the most prevalent mode of injury – comprising 33% of police recorded severe injuries in 2022. The disproportionate burden of injury to cyclists compared to motor vehicles observed in hospital data was also seen in police data, as these road users made up 19% of severe injury reports in 2022 yet represent relatively smaller proportions of trips in San Francisco. Severe injuries among motorcyclists have decreased in recent years, from 20% in 2016 to 15% in 2019 through 2021, and ultimately to 10% in 2022.

SFPD data show increased motor vehicle injury collisions from 2021 to 2022, while hospital data show declines in motor vehicle severe and critical injuries in the same time period. Contributing factors to

these differing trends will be investigated in more detail when the Transportation-related Injury Surveillance System linkage of police and hospital data is completed in 2025.

Public Data

While granular hospital data are not distributable to the public, police crash report data released quarterly and can be explored via https://data.sfgov.org/Public-Safety/Traffic-Crashes-Resulting-in-Injury/ubvf-ztfx/about_data.

Appendix B: Severe Injury Statistics from 2011 to 2022

San Francisco Emergency Medical Services Agency (SF EMSA) issued retriage guidelines in late 2013 to ensure the most severely injured people were treated at ZSFG, even if they initially reported to another hospital. People with severe injury receive the highest level of medical care when treated in a trauma center. The protocol change in the SF EMSA retriage guidelines facilitates the rapid transfer of severely injured trauma patients from non-trauma hospitals to the trauma center with unconditional acceptance. This change helps increase the inclusion of the most severely injured in the ZSFG hospital data – and also likely contributed to the increased but stable number of severe injuries observed from 2015 forward, relative to earlier years. The data presented below includes hospital data prior to the SF EMSA's retriage guidelines from 2011-2013.

Figure 15: Total Traffic Injury Counts by Year (2011 - 2022)

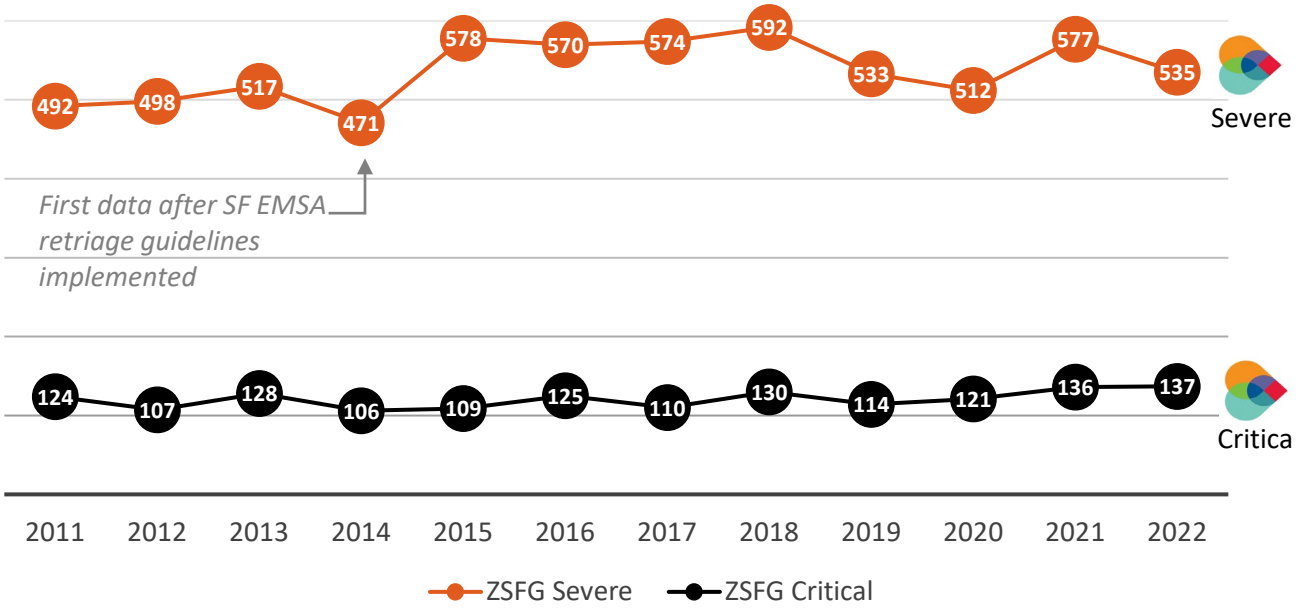


Figure 16: Pedestrian Traffic Injury Counts by Year (2011 - 2022)

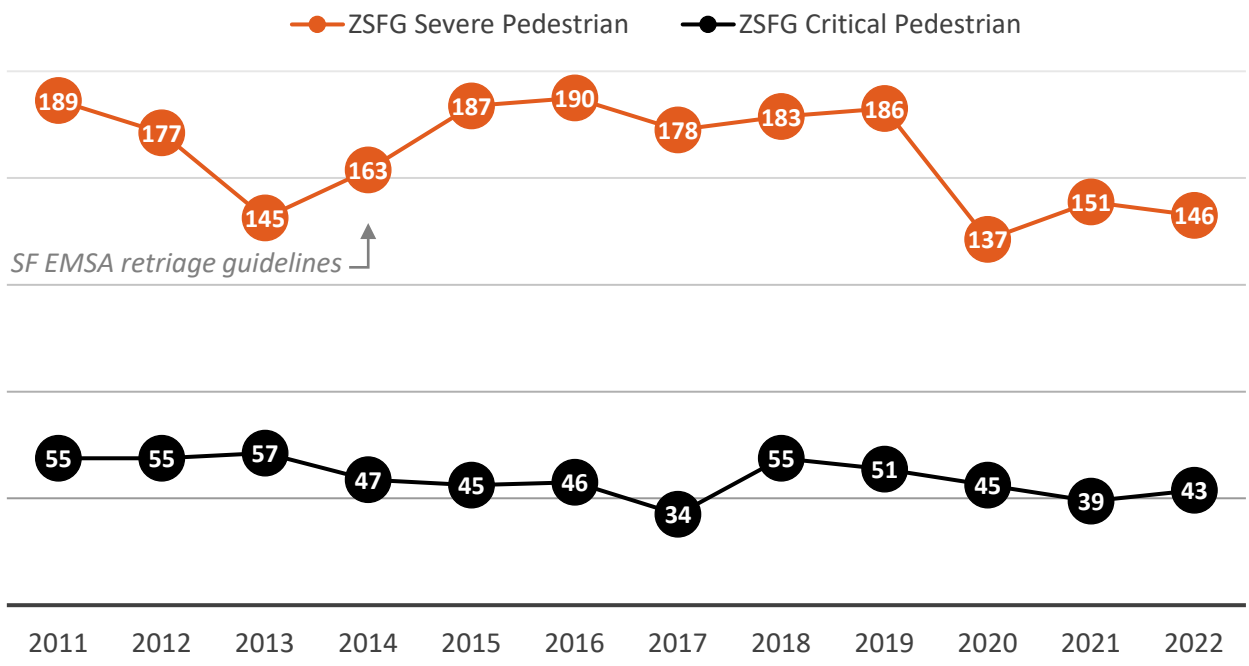


Figure 17: Bicycle Traffic Injury Counts by Year (2011 - 2022)

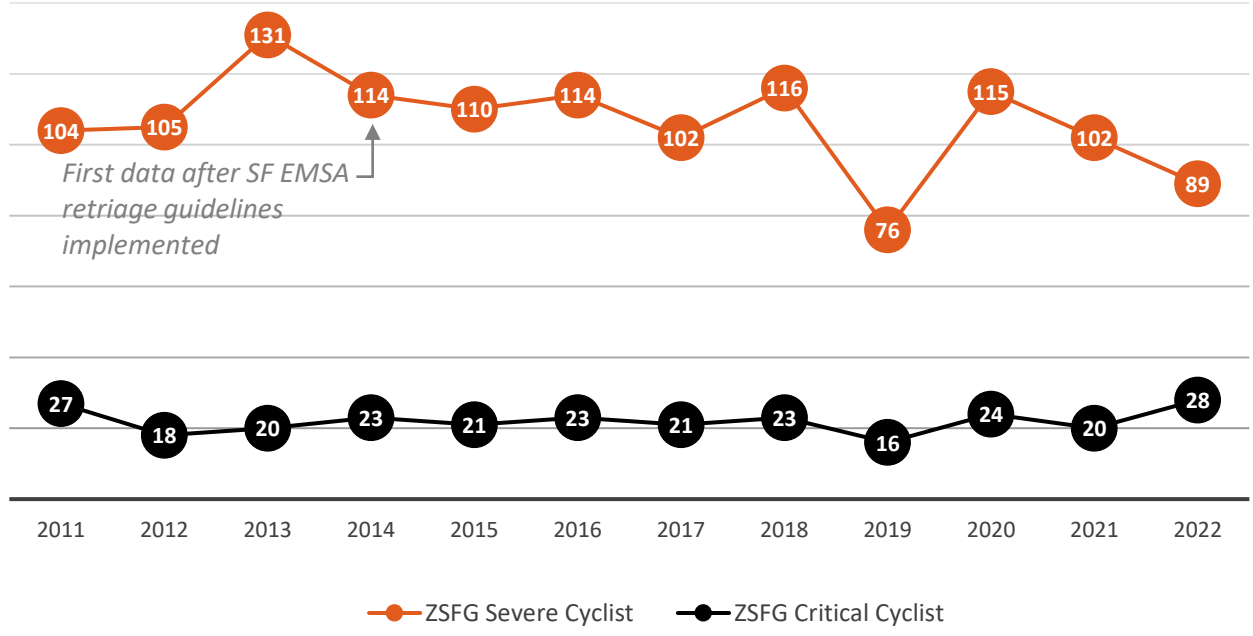


Figure 18: Motor Vehicle Traffic Injury Counts by Year (2011 - 2022)

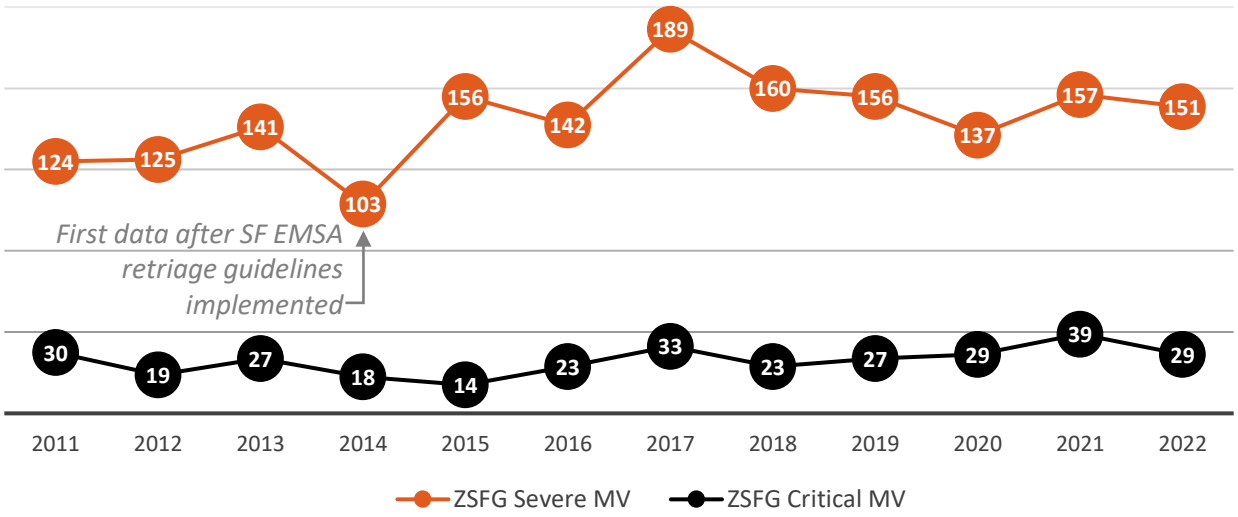


Figure 19: Motorcycle Traffic Injury Counts by Year (2011 - 2022)

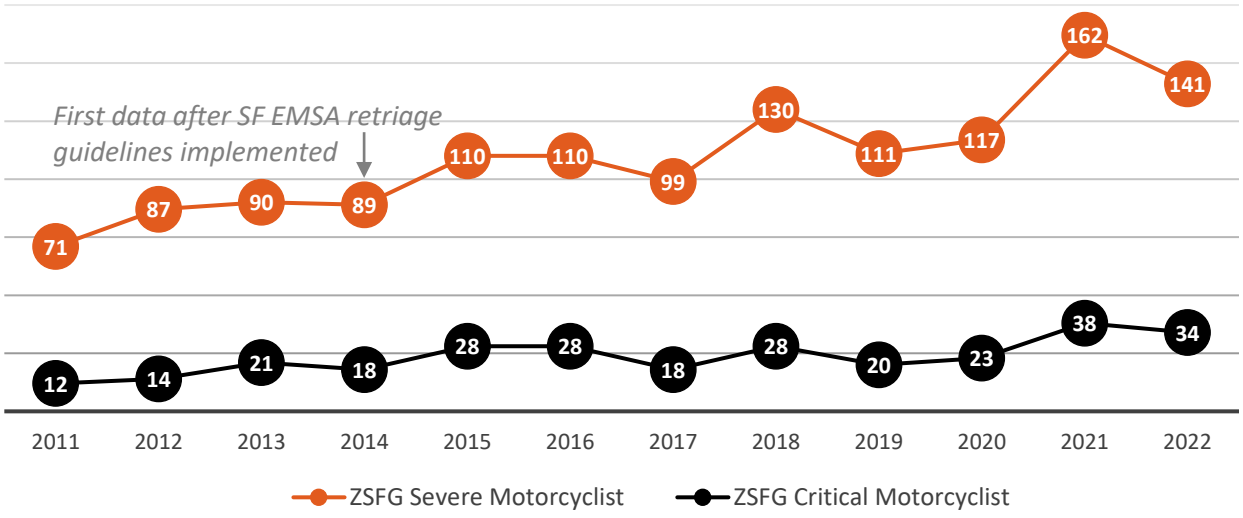


Table 6: Counts and Proportions of Severe Injuries by Travel Mode - Hospital Data (2015 - 2022)

YEAR	PEDESTRIAN	CYCLIST	MOTORCYCLIST	MOTOR VEHICLE OCCUPANT	OTHER/ UNKNOWN	TOTAL
2015	187 (32.4%)	110 (19.0%)	110 (19.0%)	156 (27.0%)	15 (2.6%)	578 (100%)
2016	190 (33.3%)	114 (20.0%)	110 (19.3%)	142 (25.0%)	14 (2.4%)	570 (100%)
2017	178 (31.0%)	102 (17.8%)	99 (17.2%)	189 (33.0%)	6 (1.0%)	574 (100%)
2018	183 (30.9%)	116 (19.6%)	130 (22.0%)	160 (27.0%)	3 (0.5%)	592 (100%)
2019	186 (34.9%)	76 (13.9%)	111 (20.8%)	156 (29.3%)	4 (0.8%)	533 (100%)
2020	137 (26.8%)	115 (22.5%)	117 (22.9%)	137 (26.8%)	6 (1.2%)	512 (100%)
2021	151 (26.2%)	102 (17.7%)	162 (28.1%)	157 (27.2%)	5 (0.9%)	577 (100%)
2022	146 (27.3%)	89 (16.6%)	141 (26.4%)	151 (28.2%)	8 (1.5%)	535 (100%)

Table 7: Counts and Proportions of Critical Injuries by Travel Mode - Hospital Data (2051 - 2022)

YEAR	PEDESTRIAN	CYCLIST	MOTORCYCLIST	MOTOR VEHICLE OCCUPANT	OTHER/ UNKNOWN	TOTAL
2015	45 (41.3%)	21 (19.6%)	28 (25.7%)	14 (12.8%)	1 (0.9%)	109 (100%)
2016	46 (36.8%)	23 (18.4%)	28 (22.4%)	23 (18.4%)	5 (4.0%)	125 (100%)
2017	34 (30.9%)	21 (19.1%)	18 (16.4%)	33 (30.0%)	4 (3.6%)	110 (100%)
2018	55 (42.3%)	23 (17.7%)	28 (21.5%)	23 (17.7%)	1 (0.8%)	130 (100%)
2019	51 (44.7%)	16 (14.0%)	20 (17.5%)	27 (23.7%)	0 (0%)	114 (100%)
2020	45 (37.2%)	24 (19.8%)	23 (19.0%)	29 (24.0%)	0 (0%)	121 (100%)
2021	39 (28.7%)	20 (14.7%)	38 (27.9%)	39 (28.7%)	0 (0%)	136 (100%)
2022	43 (31.4%)	28 (20.4%)	34 (24.8%)	29 (21.2%)	3 (2.2%)	137 (100%)