

MVC Burden on Washington's Trauma System

Motor vehicle crashes (MVC) pose a risk to the safety of Washington residents. This report focuses on the environmental conditions of the MVC collected by the Washington State Department of Transportation (WSDOT) and the seriously injured patients in the Washington State Trauma Registry (WTR).



TRAFFIC RECORDS INTEGRATION PROGRAM



WSDOT: WSDOT collects and maintains comprehensive crash data to improve road safety and transportation planning across the state. This data includes detailed records of traffic crashes, including factors such as location, road characteristics, and the involvement of drivers and motor vehicles. Law enforcement agencies submit crash reports, which WSDOT compiles into a centralized database.

DOH Trauma: The Washington State Department of Health (DOH) Trauma Registry captures information on seriously injured patients treated at Washington's designated trauma centers. The registry includes patient demographics, injury characteristics, treatment information, and clinical outcomes. The WTR provides detailed injury severity and outcome data that supplement MVC records and support analyses of crash-related trauma.

Data Parameters

This report utilizes [Traffic Records Integration Program \(TRIP\)](#) data — the TRIP is an effort to develop and maintain a data repository for public health and safety research to further the goals of [Vision Zero 2030](#) to achieve zero fatalities or serious injuries on our roads.

- While the TRIP repository maintains data from different agencies, this report utilizes WSDOT's crash data linked to the subsequent DOH Trauma data.
- WSDOT processes only statutorily "reportable" crashes (as defined by [RCW 46.52.030](#)), so many statewide crashes — especially those on private property, in parking lots, or reported without law enforcement — are excluded.
- Only crashes that occurred between January 1, 2016 to December 31, 2022 are utilized in this report, due to partial WEMIS coverage, which also appears to have been in a "phase-in" step as it is not until about 2020 that EMS records begin to stabilize. Although, WEMIS is not utilized in this report, it is included in the series of reports completed by the TRIP team.
- The present data is driver based involved in a crash with an associated trauma care record. One crash could involve multiple different drivers. Additionally, individual drivers could be represented as many times as they were involved in a crash within the noted timeframe.
- This one-page report utilized demographic values collected by both WSDOT (age and sex) and DOH (race).

Limitations

This report identifies a few major limitations. There are likely more that could impact work that utilizes this data. Known limitations include:

- Analyses are descriptive and non-generalizable. Any inferences and implications are limited, and results are modest. Further analyses must be completed for causal relationships to be determined.
- Trauma data may have variable documentation, coding practices, and reporting across facilities which may affect the completeness and consistency of injury estimates.
- Trauma data are linked on personally identifiable information (PII) and injury date equal to the crash date, which may miss delayed crash-related cases and include unrelated injury incidents.
- COVID-19 impacts (2020-2022) may skew trends.
- In terms of demographic assessment, these results must be interpreted with caution. Race information in administrative data may be incomplete or misclassified, which can affect the reliability and validity of analyses. Only records for individuals with clearly defined, unduplicated race, sex, and age were utilized to ensure data quality, so results may be underreported.
- There are many factors that contribute to accuracy of data reporting, and the data might not accurately represent the true picture of those being involved in a crash and receiving trauma care
- For more information, please review the [TRIP Data Handbook](#)

Demographics

Between January 1, 2016 and December 31, 2022 there were 29,546 crashes with a subsequent serious injury recorded in Washington State. There were 30,952 individual drivers included in the sample, indicating that one crash could have multiple drivers who received subsequent trauma care (Table 1). The average age of a driver at the time of the crash was 42 years old (M = 42.3, SD = 18.5). Female drivers comprised nearly twice as many serious-injury crash records as male drivers.

When evaluating race, the majority of drivers were White. Drivers identifying as Black or African American, Asian, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander collectively accounted for approximately one-tenth of the sample.

Only a small proportion of drivers were younger than Washington's legal licensing age ([RCW 46.20.025](#)). Among licensed age groups, drivers aged 26–35 years represented the largest proportion of drivers involved in serious-injury crashes.

For context, Washington's population is almost evenly distributed in terms of sex. The majority of the population were white (81.0%), while the BIPOC (Black, Indigenous, and/or People of Color) community represented slightly less than one-fifth of Washington state's population. In Washington, about 21%–23% of the population is under 18; 10%–11% is aged 18–25; 15%–16% is 26–35; 12%–13% is 36–45; and the largest share, roughly 38%–42%, is aged 46 and older.

Table 1. Demographics of Drivers involved in a Crash

	N	%
Sex		
Female	19,831	66.4
Male	10,031	33.6
Race		
Not recorded/applicable	23,195	78.2
White	2,475	8.3
Hispanic or Latino	1,819	6.1
Black or African American	984	3.3
Asian	539	1.8
Multi/Other Race	357	1.2
American Indian or Alaska Native	306	1.0
Age Category		
14 and younger	55	0.2
15 to 18	1,569	5.1
19 to 25	5,508	17.8
26 to 35	6,475	20.9
36 to 45	4,898	15.8
46 to 55	4,316	13.9
56 to 65	3,952	12.8
66 and older	4,179	13.5

Notes: Percentages are based on row totals. Percentages may not equal 100 due to rounding. Sex is missing 1,090 entries, race is missing 1,277, and age had no missing values.

Outcomes

Across Washington's 39 counties, there was an average of 794 drivers in a crash who received subsequent trauma care per county, ranging from 6,066 drivers in King county to 25 in Columbia county (Table 2). Among the counties shown in Table 2, the majority locale was urban in nine counties and rural in nine counties. The proportion of drivers in a crash classified as urban varied across counties, ranging from 52.0% in Benton County to 87.6% in King County, additionally, the rural counties also had a wide variety, ranging from 55.0% in Cowlitz County to 86.8% in Grant County. These differences describe the distribution of trauma-related crashes across county and locale and should not be interpreted as differences in crash risk without accounting for population, roadway exposure, and other relevant factors.

Additionally, the plurality of drivers in a crash who received subsequent trauma care, occurred on dry, straight and level road, on clear days in daylight (24.8%) and 64.0% of those crashes were categorized as Urban when noted. These findings likely reflect increased roadway exposure rather than increased roadway risk. Favorable conditions are not necessarily safe; instead, crash frequency is influenced by the density of drivers and changes in behavior. More individuals (and therefore more vehicles) are likely to be on the road during dry, clear days, raising the likelihood of crashes despite otherwise optimal conditions. Adverse roadway, weather, and lighting conditions are often associated with increased crash risk. However, the plurality of drivers in a crash that lead to critical injury severity (i.e. injury severity scores 25 and greater) identified under trauma care occurred under favorable conditions; on dry, straight and level roads, on clear days in daylight. Most travel occurs during favorable conditions, increasing the volume of potential crashes and, consequently, a demand for specialized trauma care. These findings underscore the importance of accounting for exposure when interpreting environmental risk factors in crash analyses.

Injury severity distributions were further examined across the five most frequent reported injury locations (i.e. ICD10 1 codes) and compared with the overall injury severity distribution (Figure 2). Overall, 67.3% of trauma patients sustained mild injuries, followed by 20.2% with moderate, 7.9% with severe, and 4.6% with critical injuries. Although mild injury predominated across all injury locations, the severity distribution varied by body region. Neck injuries had the highest proportion of mild injuries (89.9%) and the lowest proportions of severe (2.2%) and critical (1.3%) injuries. Shoulder and upper arm injuries also exhibited a greater proportion of mild injuries (76.4%) than observed in the overall study population. In contrast, head injuries had the lowest proportion of mild injuries (64.0%) and the highest proportions of severe (9.4%) and critical (6.2%) injuries among the five most common injury locations. Thoracic injuries closely mirrored the overall injury severity distribution, while injuries involving the abdomen, lower back, lumbar spine, pelvis, and external genitals also exhibited severity patterns across the overall study population.

The distribution of drivers in a crash who received subsequent trauma care also varied by time of day. The greatest number occurred during the evening (7,949), followed by the afternoon (7,392), while overnight hours accounted for the fewest drivers in a crash who received subsequent trauma care (7,392). However, nighttime and overnight exhibited a greater concentration of serious injuries. Severe or critical injuries represented 14.9% of nighttime drivers in a crash who received subsequent trauma care and 14.3% during overnight, compared with 11.0% of the afternoon and 11.2% of morning time. These findings suggest that although drivers in a crash who received subsequent trauma care were more frequent during the afternoon and evening, drivers in a crash who received subsequent trauma care during later hours were more likely to result in injuries at the higher end of the severity spectrum.

Linking transportation and trauma registry data offers a more comprehensive understanding of crash-related injuries than either data source alone. By describing the location and severity of injuries sustained in serious motor vehicle crashes, these findings establish a baseline for future analyses and can help inform injury prevention strategies, trauma system planning, and roadway safety initiatives throughout Washington State.



Table 2. Top 18 counties with crashes leading to a Trauma response and the majority locale

	N	%	Locale (%)
King	6,066	19.6	Urban (87.6)
Pierce	4,781	15.4	Urban (85.8)
Snohomish	2,988	9.7	Urban (75.4)
Spokane	2,828	9.1	Urban (62.0)
Clark	1,778	5.7	Urban (63.1)
Yakima	1,377	4.4	Urban (58.3)
Kitsap	1,051	3.4	Urban (75.1)
Whatcom	931	3.0	Rural (64.8)
Skagit	922	3.0	Rural (79.3)
Benton	905	2.9	Urban (52.0)
Grant	884	2.9	Rural (69.5)
Lewis	690	2.2	Rural (77.7)
Cowlitz	651	2.1	Rural (55.0)
Thurston	463	1.5	Urban (59.8)
Walla Walla	422	1.4	Rural (86.8)
Franklin	396	1.3	Rural (69.0)
Clallam	383	1.2	Rural (69.5)
Adams	339	1.1	Rural (74.0)

Notes: County percentages are based on column totals while locale percentages are based on row totals. It is important to note that 9,860 (31.9%) total records were missing for locale distinction. County counts should be interpreted with caution as these frequencies may be influenced by population density.

Figure 2. Injury severity score distribution by top injury location

