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Consumer Product Safety Commission

2025 Report of Deaths and Injuries Involving Off-Highway Vehicles with More than Two Wheels

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Chao Zhang
Directorate for Epidemiology
Division of Hazard Analysis
U.S. Consumer Product Safety Commission
4330 East West Highway
Bethesda, MD 20814

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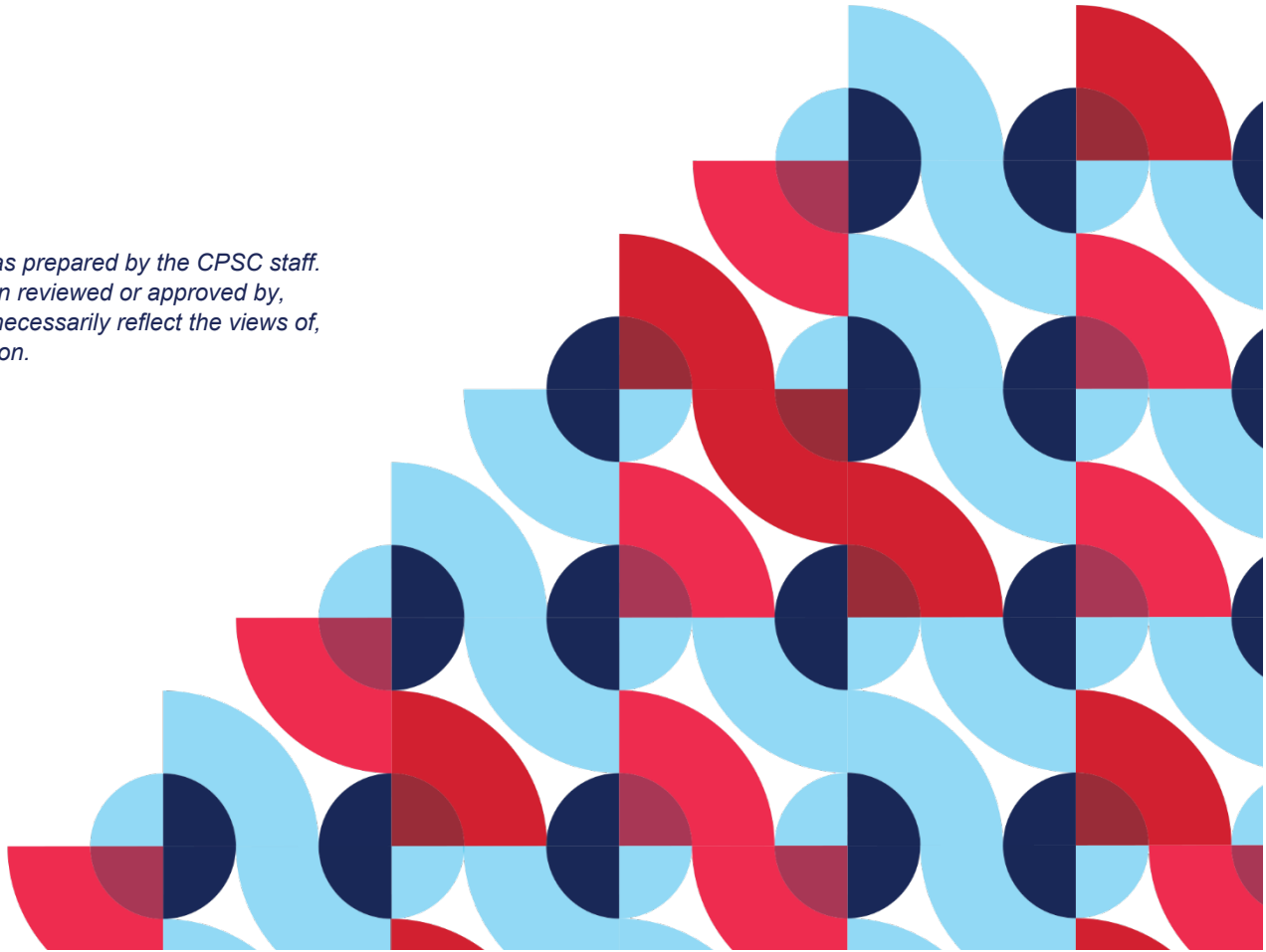

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Executive Summary

Reported Off-Highway Vehicle-Related Fatalities

- As of September 2025, staff of the U.S. Consumer Product Safety Commission (CPSC) considers the years 2020–2022 to be the most recent complete (or nearly complete) three-year period of reported fatalities associated with Off-Highway Vehicles (OHVs). CPSC staff is aware of 2,685 deaths associated with OHVs that resulted from 2,606 incidents between 2020 through 2022.

- Of those 2,685 reported OHV-related deaths, CPSC staff associates 1,759 with all-terrain vehicles (ATVs), 707 with recreational off-highway vehicles (ROVs), and 53 with utility terrain vehicles (UTVs). For the remaining 166 deaths, staff concluded the vehicle involved was either an ROV or a UTV but does not know the correct classification between these vehicle types.

- Reported fatalities were distributed among these age groups as follows: under 12 (6%), 12–15 (9%), 16–24 (15%), 25–34 (15%), 35–44 (14%), 45–54 (12%), and 55+ (29%).[1]

- Most of the 2,685 decedents were male (81%); 19% were female.[2]

- The most common fatality hazards associated with OHV-related deaths were overturns and collisions with another vehicle or a stationary object (like a tree). OHV occupants were frequently ejected in these types of deadly incidents.

Off-Highway Vehicle-Related Emergency Department-Treated Injury Estimates

- Over the 5-year period from 2020 through 2024, there were an estimated 578,700 emergency department-treated injuries in the United States that were associated with OHVs. This corresponds to an annual average of around 115,700 emergency department-treated injuries over the period.

- From 2020 to 2024—the most recent years for which nearly complete data are available—the estimated yearly rate of emergency department-treated, OHV-related injuries ranged from around 32–38 injuries per 100,000 people.

- Estimated injuries were distributed among these age groups as follows: under 12 (13%), 12–15 (14%), 16–24 (21%), 25–34 (18%), 35–44 (14%), 45–54 (9%), and 55+ (11%). Of these, the age groups from ages 12 through 34 were overrepresented compared to their share of the U.S. population.

[1] There were 19 deaths among the 2,685 total where the victim's age was unknown.
[2] There were 10 deaths among the 2,685 total where the victim's sex was unknown.

In the most recent year's (2024) estimate for emergency department-treated injuries associated with OHVs, for all ages:

- The most common diagnoses were fractures (28%), contusions/abrasions (19%), and internal organ injuries (13%).
- The most common primary injured body parts were the head and neck (33%), the arms (shoulders to fingertips, 24%), the torso (20%), and the legs (20%).
- Most of the injured were males (68%); about one-third (32%) were females.
- Most of those injured were treated and released (77%) or hospitalized (20%).

2024 Special Study on OHV-Related Emergency Department-Treated Injuries

- By following up on OHV-related injury cases in CPSC's National Electronic Injury Surveillance System (NEISS) database from 2024 through a special study, staff were able to obtain complete responses that provided additional information for 195 injury cases.
- Based on the information provided by the injury victims in this special study, staff computed a more refined injury estimate of 109,200 for 2024, compared to 113,000 in the original NEISS sample, which is based on information from the hospital medical record.
- ROVs and UTVs accounted for 31 percent of estimated injuries after the additional investigation possible from the special study, compared to 15 percent of injuries based on NEISS product code classification (which is based on clinical notes in the medical record).
- The OHV overturned in 68 percent of injuries, and the victim was ejected in 83 percent of injuries.
- The OHV driver was involved in 73 percent of injuries in the special study; the remaining injuries were to passengers (23%) and bystanders (4%).
- When helmet usage was known, the victim reported wearing a helmet in 23 percent of injuries.
- Most (60%) injuries occurred on flat terrain, and 85 percent of injuries occurred on dry terrain.

Introduction

This report presents information collected by CPSC staff on deaths and injuries associated with the use of off-highway vehicles with more than two wheels. These OHVs comprise three categories: All-Terrain Vehicles (ATVs), Recreational Off-Highway Vehicles (ROVs), or Utility Terrain Vehicles (UTVs). These three classifications of OHVs are described in further detail below.

This report defines ATVs as off-road, motorized vehicles with three or more low-pressure tires, a straddle seat for the operator, and handlebars for steering control. ROVs and UTVs have many similarities; they are both off-road vehicles with four or more tires. They differ from ATVs in that both ROVs and UTVs have non-straddle, or "side-by-side" seating, and automotive-type controls for steering, throttle, and braking (i.e., a steering wheel and pedals).[3]

This report defines ROVs as motorized vehicles designed for off-highway use with the following features: four or more pneumatic tires designed for off-highway use; bench or bucket seats for two or more occupants; automotive-type controls for steering, throttle, and braking; and a maximum vehicle speed exceeding 30 miles per hour (mph). ROVs are also equipped with rollover protective structures (ROPS), seatbelts, and other restraints—like doors, nets, and shoulder barriers—to help protect its occupants. (ROV Notice of Proposed Rulemaking, 79 Fed. Reg. 68,964, November 19, 2014). This report defines UTVs very similarly to ROVs; however, their maximum speed does not exceed 25-30 mph, and compared to ROVs, they are generally equipped with larger cargo beds and may not always be equipped with ROPS, seatbelts, and other safety restraints.[4]

In the late 1980s, the major ATV distributors agreed to stop distributing three-wheel ATVs. More recently, the Consumer Product Safety Improvement Act of 2008 enacted a statutory prohibition on the importation and distribution of new three-wheel ATVs in the United States. 15 U.S.C. § 2089(c). Some ATVs, ROVs, and UTVs are sold with more than four wheels (either 5 or 6), but they have always held a very small proportion of the overall OHV market share. As such, almost all ATVs, ROVs, and UTVs currently in use are four-wheeled vehicles.

The purpose of this report is to present information regarding deaths and injuries involving the various types of OHVs (ATVs, ROVs, and UTVs). National estimates of U.S. hospital emergency department-treated injuries related to OHVs have been computed for the years 2020 through 2024. In addition, results from the special study mentioned in previous annual reports are presented for the year 2024. This report does *not* cover deaths and injuries related to all vehicles with off-road capability. For example, dune buggies, sand rails, golf carts, licensed

[3] Definition from ANSI/ROHVA 1 *American National Standard for Recreational Off-Highway Vehicles*.

[4] According to SAE J2258 *Light Utility Vehicles*, utility vehicles with a maximum speed of 10 mph or less and a lateral stability of at least 20 degrees are not required to be equipped with an occupant protection system (OPS), which includes an occupant protective structure and seat belt assembly. Vehicles with a maximum speed greater than 20 mph and lateral stability less than 30 degrees must be equipped with an OPS. For vehicles with a maximum speed between 10 mph and 20 mph, the requirement for an OPS is determined on a sliding scale, based on the vehicle's lateral stability between 20 and 30 degrees.

motor vehicles (i.e., sport utility vehicles, jeeps), and two-wheeled OHVs (i.e., dirt bikes, off-road motorcycles) are all excluded from the analyses and discussion that follow.[5]

Off-Highway Vehicle Fatalities[6]

This section provides an overview of OHV-related incidents that resulted in one or more fatalities between 2020 and 2022—the most recent 3-year period where the data are considered complete, or nearly complete. Data are obtained from the Consumer Product Safety Risk Management System (CPSRMS).[7] Among the various types of reports included in CPSRMS are death certificates from the 50 states and the territories. Since, for these data, there was generally a lag of 2 to 3 years between date of death and the date that the incident was reported to CPSC, staff considers the latest 3 years of data (2023–2025) to be incomplete, and thus, staff excluded those years from this report.

Because CPSRMS data are anecdotal, and because CPSC continues to review incoming reports for the relevant period, the number of fatal incidents and deaths given here represent those reported to CPSC as of September 2025. Additional incidents may be recognized in the future.

Reported Deaths

As of September 2025, CPSC staff received reports of 2,606 fatal off-highway vehicle-related incidents that occurred during the 3-year period between 2020 and 2022, which resulted in 2,685 deaths. In rare cases, due to the delayed occurrence of death from injuries sustained during an OHV-related incident, the year of death may be later than the year in which the incident occurred. Since some incidents involve multiple fatalities, the total number of fatal *incidents* is less than the total number of *deaths*. Table 1 presents the current count of reported fatal OHV-related incidents by vehicle classification,[8] as detailed in the Introduction.

[5] All incidents involving collisions or other interactions with OHVs, as defined above, are included, regardless of the type of the other vehicle involved.

[6] Staff includes in this report all reported fatal incidents involving a collision of an OHV (ATV, ROV, or UTV), even if the occupant(s) of the OHV survived, if at least one person, such as a pedestrian, bystander, or occupant of another type of vehicle (e.g., bicycle, dirt bike), suffered fatal injury. Several single fatality incidents reported collision of both an ATV and ROV, but staff allocated these incidents only to the classification corresponding to the type of vehicle occupied by the deceased, to ensure mutual exclusivity and correct incident totals.

[7] Fatal injury cases from the National Electronic Injury Surveillance System (NEISS) are also included in the CPSRMS database. See Appendix A for more information on reporting sources for fatal incidents included in CPSRMS.

[8] Staff classified fatalities reported as an "ATV," absent further information collection, as ATVs—although staff is aware that this descriptor, as mentioned in death certificates, Medical Examiners and Coroners Project (MECAP) reports or other sources, is not always accurate. Thus, some of the "ATV" fatalities classified in this report may have actually involved other type(s) of OHVs, including, in rare cases, OHVs out of the scope of this report. Most of the incidents classified specifically as ROVs, UTVs, or "Unknown (ROV or UTV)" were so classified with the benefit of an in-depth investigation (IDI) and review in collaboration with CPSC engineering staff. Some combination of incident information collected, such as VIN, vehicle make and model, photographs, or other descriptions supported these determinations.

The distribution of vehicle classifications for 2020 and 2021 has changed from the prior report to account for updated vehicle information collected from in-depth investigations (IDIs) conducted by CPSC staff and unique incident reports received since September 2024.[9]

Since last year's report, 24 new OHV-related fatalities occurring in 2020 and 30 new OHV-related fatalities occurring in 2021 have been reported in CPSRMS. Two fatal incidents in both 2020 and four fatal incidents in 2021 were later determined to have been counted twice through duplicate reports and have now been corrected. Ten fatal incidents in 2021 were later determined, through IDIs by CPSC staff, to have involved vehicles not in the scope of this report, a heavily modified OHV, or an inoperable ATV being towed.

As IDIs to determine vehicle classification for 2022 are ongoing, the distribution of reported fatal incidents in Table 1 and reported fatalities in Table 3 by vehicle classification for 2022 may change in future reports; however, the total number of reported fatal incidents and reported fatalities for 2022 in these two tables is considered accurate as of September 2025.

Table 1: Reported Fatal Incidents Associated with Off-Highway Vehicles by Vehicle Classification and Incident Year, 2020–2022

	Vehicle Classification				
Year	**ATV**	**ROV**	**UTV**	**Unknown (ROV or UTV)**	**Total Fatal OHV Incidents**
2020	635	271	23	55	**984**
2021	549	233	17	41	**840**
2022	539	169	11	63	**782**
Total	**1,723**	**673**	**51**	**159**	**2,606**

Source: CPSRMS.

As mentioned, a single OHV-related incident may result in multiple fatalities. This was the case for at least 76 of the 2,606 reported fatal incidents (3%), of which 73 were double fatalities and 3 were triple fatalities. Table 2 presents the distribution of reported incidents involving multiple fatalities by vehicle classification for the entire 3-year period.

[9] See *2024 Report of Deaths and Injuries Involving Off-Highway Vehicles with More than Two Wheels*.

Table 2: Incidents Associated with OHVs Involving Multiple Reported Fatalities by Vehicle Classification and Number of Deaths Per Incident, 2020–2022

	Vehicle Classification				
Number of Fatalities Per Incident	**ATV**	**ROV**	**UTV**	**Unknown (ROV or UTV)**	**Total Multiple Fatality Incidents**
2 (Double Fatality)	34	30	2	7	**73**
3 (Triple Fatality)	1	2	0	0	**3**
Total	**35**	**32**	**2**	**7**	**76**

Source: CPSRMS.

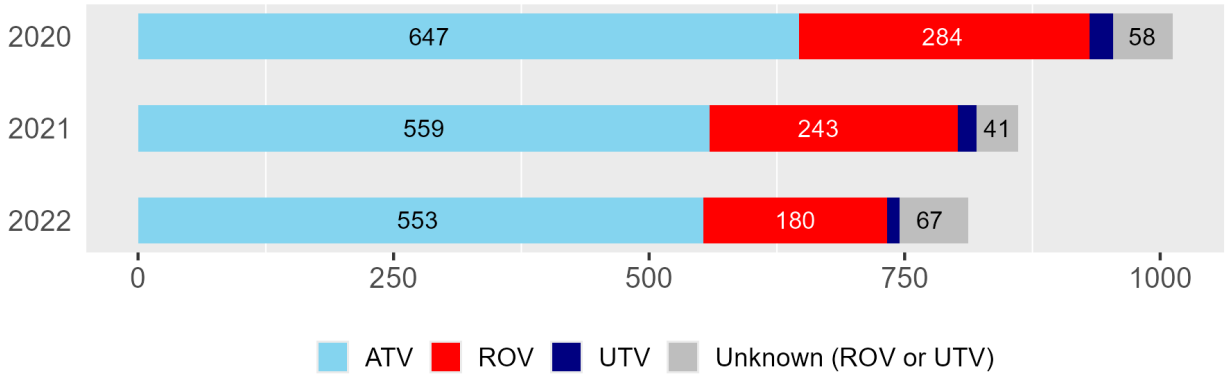
Table 3 and Figure 1 present the breakdown of reported OHV-related *fatalities* by incident year and vehicle classification, accounting for the multiple-fatality incidents presented in Table 2.

Table 3: Reported Total Deaths Associated with Off-Highway Vehicles by Vehicle Classification and Incident Year, 2020–2022

	Vehicle Classification				
Year	**ATV**	**ROV**	**UTV**	**Unknown (ROV or UTV)**	**Total Deaths**
2020	647	284	23	58	**1,012**
2021	559	243	18	41	**861**
2022	553	180	12	67	**812**
Total	**1,759**	**707**	**53**	**166**	**2,685**

Source: CPSRMS.

Figure 1: Reported OHV-Related Fatalities by Vehicle Classification and Incident Year, 2020–2022



Source: CPSRMS.

Reported Deaths by Incident State

Table 4 lists both the total number of fatal incidents and total deaths due to OHV-related incidents, as well as the percentage of OHV-related fatalities during the 3-year period (2020–2022) attributed to each state. States are listed in descending order of the number of reported deaths. The states with the highest number of reported deaths during the 3-year period were California (166), Pennsylvania (140), Georgia (136), Kentucky (136), and West Virginia (115). Together, these five states accounted for 693 fatalities from 671 incidents, or around 26 percent of the total 2,685 fatalities from 2,606 incidents. As of September 2025, no fatal incidents occurring between 2020 and 2022 were reported from the District of Columbia or any U.S. territories besides the U.S. Virgin Islands; as such, these locations are not included in either Table 4 or Figure 2.

Table 4: Reported OHV-Related Fatal Incidents and Total Deaths by Incident State, 2020–2022

State	Fatal Incidents	Total Deaths	Percent of All Deaths
California	156	166	6.2%
Pennsylvania	138	140	5.2%
Georgia	132	136	5.1%
Kentucky	132	136	5.1%
West Virginia	113	115	4.3%
Florida	111	113	4.2%
Arizona	99	102	3.8%
Tennessee	93	95	3.5%
Minnesota	91	91	3.4%
North Carolina	85	89	3.3%
Texas	85	89	3.3%
Ohio	86	88	3.3%
Oklahoma	79	82	3.1%
Mississippi	76	79	2.9%
Missouri	73	74	2.8%
Alabama	73	73	2.7%
New York	66	69	2.6%
Louisiana	64	67	2.5%
Colorado	55	59	2.2%
South Carolina	53	55	2.0%
Virginia	49	49	1.9%
Iowa	48	49	1.8%
Idaho	46	46	1.7%
Oregon	45	45	1.7%
Wisconsin	43	45	1.7%
Montana	41	45	1.7%
Indiana	43	43	1.6%
Michigan	42	42	1.6%
Kansas	39	39	1.5%
Illinois	36	38	1.4%
Arkansas	35	37	1.4%
Wyoming	33	35	1.3%
Alaska	31	31	1.2%
Utah	24	24	0.9%
Maine	23	23	0.9%
Nevada	21	22	0.8%
New Mexico	21	21	0.8%
Nebraska	18	18	0.7%
Maryland	16	17	0.6%
South Dakota	16	17	0.6%
Washington	14	16	0.6%
Vermont	14	15	0.6%
North Dakota	14	14	0.5%
New Jersey	12	12	0.4%
New Hampshire	9	11	0.4%
Connecticut	6	6	0.2%
Massachusetts	3	3	0.1%
Delaware	1	1	<0.1%
Hawaii	1	1	<0.1%
Rhode Island	1	1	<0.1%
U.S. Virgin Islands	1	1	<0.1%

Source: CPSRMS.
States are listed in descending order of total reported deaths between 2020 and 2022 from OHV-related incidents. Percentages may not sum to 100% due to rounding.

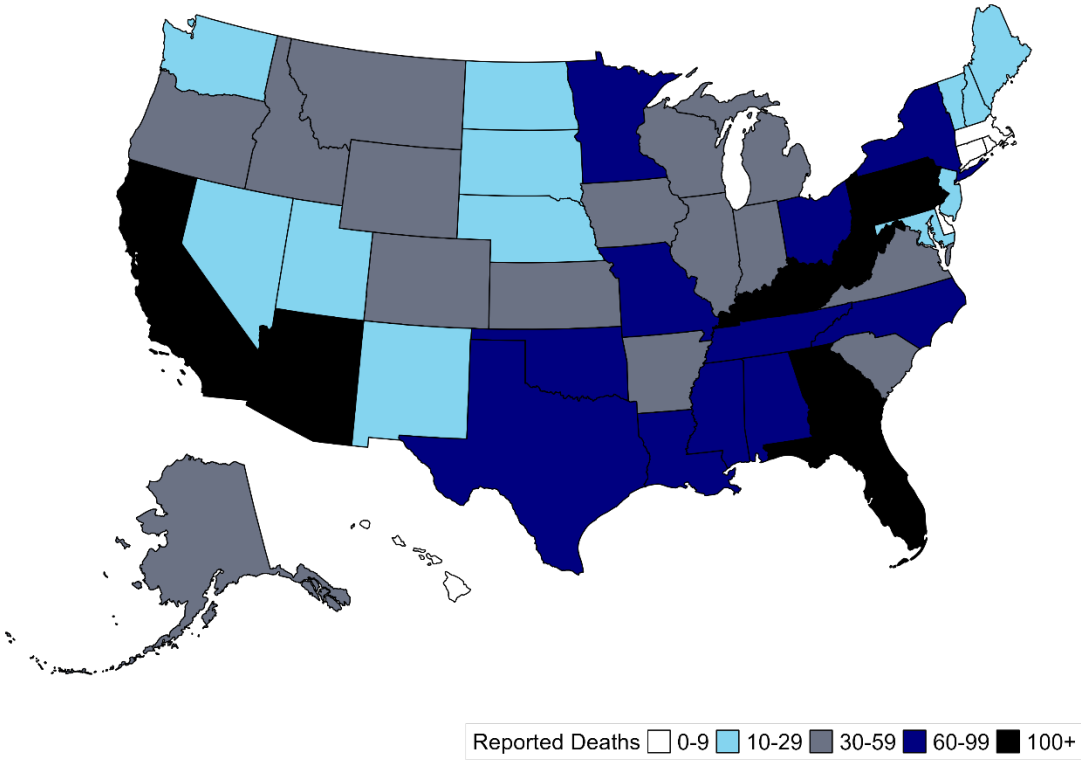
When reviewing state-level fatal incidents and death counts between 2020 and 2022, staff notes the following:

- Consistent with previous CPSC annual reports on both ATV-related and OHV-related deaths and injuries, the counts provided in Table 4 are *not* adjusted for state-level demographic characteristics (i.e., total population, age distribution), due to the anecdotal nature of CPSRMS data. Over half of OHV fatality-related source documents received by CPSC are death certificates, and their reporting rates and reporting lag (sometimes multiple years after the incident date) varies by year for each state. For 2020–2022, CPSC has received limited or no death certificate data from a handful of states.

- Consistent with CPSC annual reports on OHV-related deaths and injuries published since December 2020, the counts provided in Table 4 reflect the state and year in which the *incident* occurred, rather than the state and year in which the *death(s)* occurred.

Figure 2 is a choropleth map of the total number of reported OHV-related deaths in each state between 2020 and 2022.

Figure 2: Reported OHV-Related Fatalities by Incident State, 2020–2022



Source: CPSRMS.
Not shown: U.S. Virgin Islands (1 fatality between 2020–2022).

Reported Deaths of Children Compared with All Ages

Review of fatalities from OHV-related incidents found that 394 (15%) of the 2,685 decedents between 2020 and 2022 were under the age of 16, and 157 (6%) were under the age of 12. Among the decedents younger than 16, 40 percent were younger than 12. Table 5 provides a breakdown of the total number of reported fatalities by year for both the Under 16 and Under 12 age groups, as well as the corresponding percentages to the total number of reported fatalities for the overall period and each year. The yearly percentage of child decedents under the age of 16 who were also under the age of 12 is also provided.

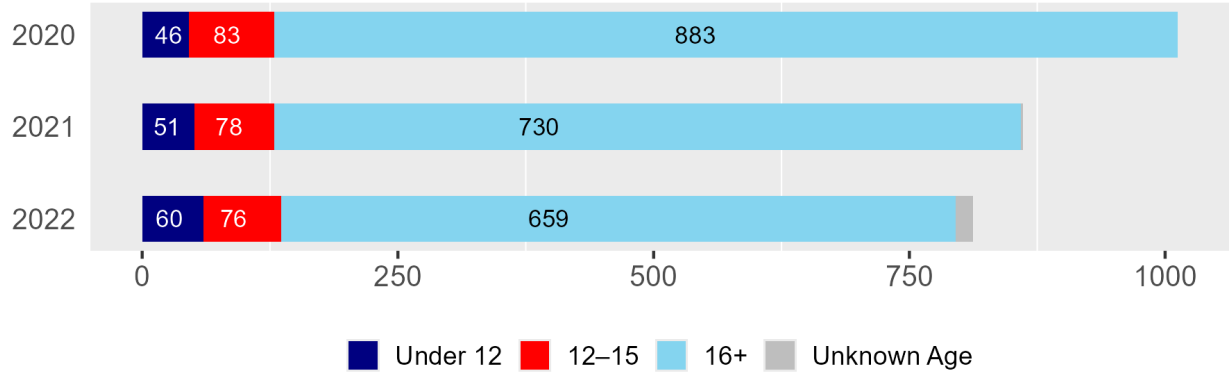
Table 5: Reported OHV-Related Fatalities for All Ages and Children's Age Groups, 2020–2022

	All Ages	Under 16 Years of Age		Under 12 Years of Age		
Year	Deaths	Deaths	Percent of All Deaths	Deaths	Percent of All Ages	Percent of Deaths under 16
2020	1,012	129	13%	46	5%	36%
2021	862	129	15%	51	6%	40%
2022	812	136	17%	60	7%	44%
Total	**2,685**	**394**	**15%**	**157**	**6%**	**40%**

Source: CPSRMS.

Figure 3 displays the distribution of OHV-related fatalities by year, divided into the following mutually exclusive age groups: Under 12, 12–15, 16 or over, and decedents of unknown age.[10]

Figure 3: Reported OHV-Related Fatalities by Year & Children's Age Groups, 2020–2022



Source: CPSRMS.

[10] There were 2 and 17 decedents of unknown age in 2021 and 2022, respectively.

Reported Deaths of Various Age Groups

Table 6 presents the distribution of OHV-related fatalities by year, divided into mutually exclusive age groups. Figure 4 presents a comparison of the distribution of decedent age groups for the 3-year period with the estimated age distribution of the U.S. population in 2022.

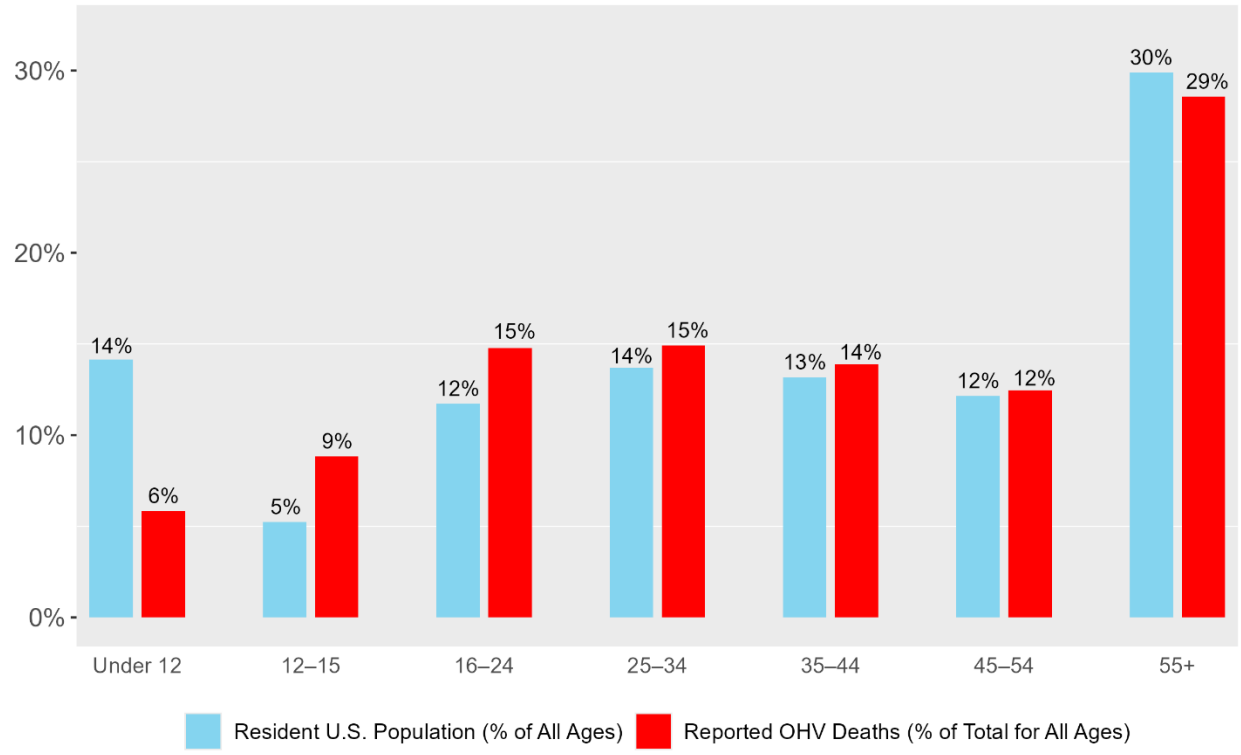
Comparing the age distributions for OHV-related fatalities and the U.S. population as a whole, the largest imbalances mostly appear in the younger age groups. Disproportionately fewer fatalities are reported among children under the age of 12, compared to their population share. The opposite observation can be made for the 12–15 and 16–24 age groups, albeit to a smaller degree. Staff does not know whether this is due to differences in OHV usage across age groups or other factors.

Table 6: Reported OHV-Related Fatalities by Age Group, 2020–2022

	Age Group (in years)								
Year	**Under 12**	**12–15**	**16–24**	**25–34**	**35–44**	**45–54**	**55+**	**Unknown**	**Total**
2020	46	83	147	172	146	127	291	*0*	**1,012**
2021	51	78	126	122	126	99	257	*2*	**861**
2022	60	76	124	107	100	109	219	*17*	**812**
Total	**157**	**237**	**397**	**401**	**372**	**335**	**767**	***19***	**2,685**
Percent of Total	6%	9%	15%	15%	14%	12%	29%	*<1%*	

Source: CPSRMS.
Percentages may not sum to 100% due to rounding.

Figure 4: Reported OHV-Related Fatalities Per Year by Age Group, 2020–2022



Source: CPSRMS and U.S. Census Bureau.[11]

Summary of Reported Deaths by Sex

Males were overrepresented in the reported OHV-related fatalities; between 2020 and 2022, for each year, around 80–82 percent of the decedents were male, whereas about 18–20 percent were female. In comparison, the U.S. population was estimated to be approximately 49–50 percent male and 50–51 percent female during the 3-year period.

Table 7 presents the distribution of decedents' sex by age group for the entire 3-year period. Males constitute a substantial majority of fatalities in all age groups, and the sex imbalance appears to increase for the older age groups, where almost 90 percent of decedents in the 55+ age group are male.

It should be reiterated that because CPSRMS data are anecdotal, the above distributions cannot be used to make inferences about *all* OHV-related fatalities in the United States.

[11] Resident U.S. Population percentages are based on the most recent U.S. population estimates published by the U.S. Census Bureau for July 1, 2022, accessible here.

Table 7: Reported OHV-Related Fatality Sex by Age Group, 2020–2022

	Age Group (in years)							
Sex	**Overall**	**Under 12**	**12–15**	**16–24**	**25–34**	**35–44**	**45–54**	**55+**
Female	**19%**	30%	34%	28%	20%	17%	15%	11%
Male	**81%**	70%	66%	72%	80%	83%	85%	89%

Source: CPSRMS.
There were 10 fatalities where the victim's age or sex was not listed; these fatalities were not counted in this table.

Observed OHV Hazard Patterns

Overturning is a common hazard present in incidents involving all types of OHVs. An overturning vehicle report may specify that the vehicle overturned forward, backward, sideways (also known as a rollover), or in an unknown direction. Forward and backward overturns often occur while ascending or descending steep terrain. On flat terrain, when an OHV operator attempts to make a sharp turn, the OHV may roll over (overturn sideways). This can occur due to a variety of factors, such as driving at a high rate of speed, change in the terrain surface type (i.e., from gravel to sand), or improper loading. However, rollovers can also occur on sloped or uneven terrain. Rollovers are especially consequential for ROVs; based on a 2020 review of 846 in-depth investigations (IDIs) of fatal ROV incidents,[12] more than 70 percent involved a rollover of the vehicle. About one-fifth of ROV fatalities in the same sample involved an attempt on *level* terrain to make a turn prior to rollover. Staff's review of OHV-related deaths data between 2020 and 2022 found that overturning was a primary hazard in about 42 percent of OHV-related fatalities, but this also includes incidents involving other events, like collisions, which may have preceded the OHV overturning.[13]

Collisions are the other most frequently observed hazard associated with OHV-related fatalities. Incidents generally involve collisions with stationary objects (e.g., trees, people, animals), or with vehicles, including other OHVs. Staff's review of OHV-related deaths data between 2020 and 2022 found that collisions were a primary hazard in around 27 percent of fatalities;[14] this figure includes collisions that may have resulted from other hazards. Around 53 percent of OHV collisions in the previously mentioned sample were with stationary objects, such as trees, guard rails, or mailboxes; around 43 percent occurred with other vehicles; the remaining collisions involved striking animals (2%) or pedestrians/bystanders (2%). Similarly, collisions are a common hazard in ROV/UTV fatalities. From the aforementioned review of 846 IDIs for fatal incidents from ROVs, staff noted collisions (of any type) in about 16 percent of fatalities.

[12] CPSC staff analyses conducted in support of ROV Termination Package, September 2020.
[13] Based on the primary hazard coding in the CPSRMS database for source documents (i.e., non-IDIs) related to OHV-related deaths between 2020 and 2022.
[14] This figure excludes incidents described generically as "collisions" or "crashes" where the object being struck is not identified.

Hazards associated with OHV-related fatalities are not mutually exclusive; the fatality reports may describe scenarios that involve both overturning and collision, as well as combinations of other hazards. Additionally, other fatality hazards observed by staff include ***drowning*** from falling into a body of water, ***fire*** (typically from an ROV), being ***ejected*** or falling without substantial preceding events (i.e., a collision or overturning), and ***impalement*** from sticks or other debris penetrating an ROV or UTV (usually through the floorboard from the vehicle's underside).

Ejection of the occupant(s) appears to occur in most OHV-related fatalities. For fatal incidents involving ATVs, which are not equipped with seatbelts or other restraints, the victims usually do not remain seated on the ATV after the incident. For ROV-related fatalities, the aforementioned staff assessment of 846 IDIs found that more than 80 percent of decedents were either fully or partially ejected from the ROV. In over 85 percent of these fatal ROV-related ejections, the decedent was reported to not be wearing a seatbelt at the time of the incident.

Lastly, information regarding alcohol consumption is often present in coroners' toxicology or police reports, which are obtained when available during the IDI process. Alcohol consumption by the OHV operator was noted in around 38 percent of fatal incidents. This can be considered a lower bound for the percentage of OHV incidents in which alcohol was a factor.[15]

[15] Based on analysis of all OHV-related fatal incidents between 2019 and 2021 with a completed IDI.

Off-Highway Vehicle-Related Emergency Department-Treated Injuries

The analyses in this section are based on NEISS data that were originally coded as involving an ATV, ROV, or UTV-related injury. Additionally, through inviting the injury victims involved in these OHV-related NEISS cases to participate in a follow-up survey, CPSC conducts a special study to ascertain the accuracy of these original product code assignments. Analysis of responses to the NEISS special study questionnaire, beginning on page 28, found that the medical record was in some instances inaccurate in coding the OHV involved when compared with the information provided to CPSC directly by the injury victims; accordingly, a more refined injury estimate for 2024 can be found in that section, whereas this section details the findings from the combined estimates of the original, more comprehensive NEISS sample.

In 2024, CPSC revised the NEISS sample to ensure it remains a nationally representative sample of hospitals. In order to make pre-2024 estimates comparable to 2024 estimates, adjusted weights have been retroactively applied to pre-2024 data. As such, estimates for 2023 and earlier presented here and in future reports will differ from those presented in prior reports. Additionally, as a result of this change in sampling methods, linear trend analyses for injury estimates, as presented in prior reports, are not currently available.

For the 5-year period from January 1, 2020, through December 31, 2024, there were an estimated 578,700 emergency department-treated injuries (an annual average of 115,700 injuries) involving off-highway vehicles in the scope of this report. These estimates are derived from NEISS injury cases that include at least one of the five product codes that are used to code ATVs, ROVs, and UTVs, as well as possibly other unspecified off-highway vehicles.

For this report, all references to “injuries” or “injury rates” should be understood as “estimated emergency department-treated injuries” or “estimated rate of emergency department-treated injuries” for the referenced population group, respectively. Additionally, all references to “combined estimates” should be interpreted as the sum of estimates for all five product codes based on original product code assignments in the NEISS sample (i.e., special study results are not considered).

Estimated Injuries by Product Code

Table 8 presents the distribution of injury estimates and corresponding NEISS sample sizes for the period 2020 through 2024, for each of the five product codes.

Table 8: Estimates of OHV-Related, Emergency Department-Treated Injuries by Product Codes, 2020–2024

Product Code	Product Code Description	Sample Size	5-Year Total (2020–2024)	Annual Average	Percent of Injuries
5044	Utility Vehicles (includes both ROVs and UTVs)	1,086	66,500	13,300	12%
3285	All-terrain vehicles (three-wheels only; exclusively off road)	105	5,000	1,000	<1%
3286	All-terrain vehicles (four wheels, excluding dune buggies; exclusively off road)	5,624	325,300	65,100	56%
3287	All-terrain vehicles (number of wheels not specified; excluding dune buggies; exclusively off-road)	4,737	181,000	36,200	31%
3296	All-terrain vehicles (more than four wheels; exclusively off-road)	25	**	**	<1%
Combined	**Total (All of the above)**	**11,577**	**578,700**	**115,700**	**100%**

Source: NEISS.
Note: Calculations are based on unrounded estimates; rows may not sum to total due to presented estimates being rounded to the nearest 100.
* Estimate fails to meet NEISS reporting criteria because the estimate is less than 1,200. The CVs (coefficients of variation) for the reportable estimates range between 13 percent and 22 percent. More information about NEISS reporting criteria and calculation/interpretation of CVs can be found in Appendix A.

Estimates derived from each individual product code represent only the proportion that staff was able to classify under that product code, based on available information; as such, those estimates should not be presumed to represent all injuries associated with the product codes' corresponding vehicle types. CPSC staff is confident, however, in characterizing OHV injuries by using *total* estimates derived from combining all vehicle types defined by these five product codes.

Prior studies and other sources, including IDIs of OHV fatalities by CPSC staff, suggest that ROVs and UTVs, which product code 5044 encompasses, may often be mistakenly classified as ATVs (i.e., product codes 3285, 3286, 3287 or 3296) in injury narratives. Between 2020 and 2024, around 9 percent of the OHV injury cases (and around 11 percent of the estimated injuries) were classified under product code 5044. The proportions of both the injury cases (sample size) and the overall injury estimate attributable to product code 5044 have continued to increase year-over-year, as seen below in Table 8a. It is unknown whether this is due to more

accurate classification of the vehicles involved in these injury cases, an actual increased frequency of injuries involving ROVs and UTVs, relative to ATVs, or both.

Table 8a: Estimates of OHV-Related, Emergency Department-Treated Injuries by Product Code 5044: Utility Vehicles (ROVs and UTVs), 2020–2024

Year	Sample Size	Injury Estimate	Percent of All Injuries
2020	140	8,100	6%
2021	197	11,500	10%
2022	226	14,100	13%
2023	256	16,200	14%
2024	267	16,600	15%
Total	**1,086**	**66,500**	**11%**

Source: NEISS.
Note: Calculations are based on unrounded estimates; rows may not sum to total due to presented estimates being rounded to the nearest 100. The coefficients of variation (CVs) for the injury estimates in this table range from around 19 percent to 31 percent. More information about calculation and interpretation of CVs can be found in Appendix A.

It may be the case that the number of injuries associated with UTVs and ROVs is still underestimated here; as such, the *actual* distribution of injuries involving these vehicle types should be considered unknown. To better understand any possible discrepancies between the distribution of injuries recorded in Table 8a and the *actual* distribution of injuries by vehicle type, CPSC staff began a follow-up special study in January 2022 that will continue through at least December 2025. Results of the special study for the 2024 injury estimates can be found later in the "Special Study" section on page 28. However, for years prior to 2022, without the benefit of this special study, staff is limited to providing injury estimates by the individual product codes, or as an overall combined estimate of all five OHV product codes.

Estimated Injuries for All Ages and Children's Age Groups

Table 9 presents the distribution by year of all estimated OHV-related injuries treated in U.S. hospital emergency departments between 2020 and 2024, along with individual annual distributions of such injuries among two children's age groups.

Table 9: Annual Estimates of OHV-Related, Emergency Department-Treated Injuries for All Ages and Children's Age Groups, 2020–2024

	All Ages	Under 16 Years of Age		Under 12 Years of Age		
Year	Estimated Treated Injuries	Estimated Treated Injuries	Percent of All Ages	Estimated Treated Injuries	Percent of All Ages	Percent of Children under 16
2020	126,700	34,300	27%	16,200	13%	47%
2021	120,300	34,200	28%	16,400	14%	48%
2022	106,300	28,600	27%	13,600	13%	47%
2023	112,500	30,300	27%	15,700	14%	52%
2024	113,000	32,100	28%	15,600	14%	49%
Total	**578,700**	**159,600**	**28%**	**77,400**	**13%**	**49%**

Source: NEISS.
Note: Calculations are based on unrounded estimates; rows may not sum to total due to presented estimates being rounded to the nearest 100. The coefficients of variation (CVs) for the injury estimates in this table range from around 13 percent to 21 percent. More information about calculation and interpretation of CVs can be found in Appendix A.

None of the year-to-year changes in estimated injuries were statistically significant, including the net difference between the total estimates in the start year (2020) and end year (2024) of the examined time frame (p-value = 0.39).

Between 2020 and 2024, children under 16 years represented around 28 percent of all estimated injuries, while children under 12 years made up around 13 percent of all estimated injuries and 49 percent of injuries for children under 16. For both the Under 16 and Under 12 children's age groups, none of the year-to-year changes in estimated injuries were found to be statistically significant.

Estimated Injuries by Various Age Groups

Table 10 presents a breakdown, by specific age groups, of the OHV-related, emergency department-treated injuries between 2020 and 2024.

Table 10: Annual Estimates of OHV-Related, Emergency Department-Treated Injuries by Age Group, 2020–2024

	Age Group (in years)							
Year	**Under 12**	**12–15**	**16–24**	**25–34**	**35–44**	**45–54**	**55+**	**Total**
2020	16,200	18,100	27,300	25,500	18,700	10,800	10,100	**126,700**
2021	16,400	17,900	25,400	19,800	17,900	9,100	13,800	**120,300**
2022	13,600	15,000	22,500	17,800	15,000	10,600	11,800	**106,300**
2023	15,700	14,600	25,300	19,400	14,300	10,300	12,900	**112,500**
2024	15,600	16,500	23,800	18,900	14,500	9,500	14,200	**113,000**
Total	**77,400**	**82,200**	**124,300**	**101,500**	**80,300**	**50,400**	**62,700**	**578,700**
Percent of Total	13%	14%	21%	18%	14%	9%	11%	
Percent of U.S. Population*	14%	5%	12%	14%	13%	12%	30%	

Source: NEISS.
* See Figure 4.
Note: Calculations are based on unrounded estimates; rows may not sum to total due to presented estimates being rounded to the nearest 100. Coefficients of variation (CVs) for the injury estimates in this table range from 13 percent to 22 percent. More information about calculation and interpretation of CVs can be found in Appendix A.

The following statistically significant changes were found in comparing the year-to-year injury estimates within each individual age group:

For the 25–34 age group:

- The 22 percent decrease between 2020 and 2021, from 25,500 to 19,800 (p-value < 0.01).

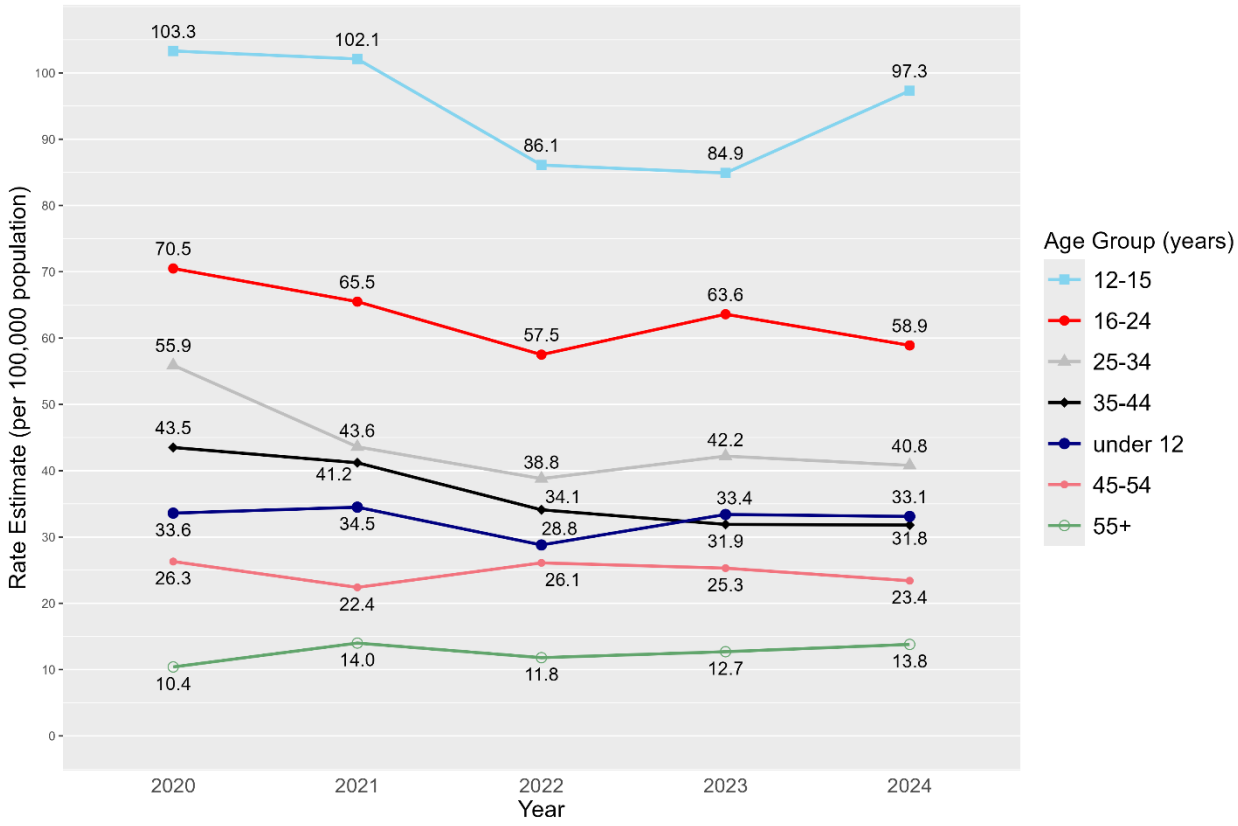
For the 55 and older age group:

- The 37 percent increase between 2020 and 2021, from 10,100 to 13,800 (p-value = 0.05).

Changes in the age demographics of the U.S. population over time likely affect the estimated number of injuries for the age groups above. According to data by the U.S. Census Bureau, between 2020 and 2024, the number of persons aged 55 years or older in the United States increased from an estimated 97.5 million to 102.8 million, the number of persons between ages 35 and 44 increased from an estimated 42.9 million to 45.5 million, the number of persons between ages 16 and 24 increased from an estimated 38.7 million to 40.4 million, and the number of persons under 12 decreased from 48.1 million to 47.1 million. The changes in population estimates for the other age groups were relatively small in magnitude.

Because of these population changes, it is useful to standardize injury estimates using an incidence rate. Figure 5 provides such a normalized comparison by population size of the injury estimates displayed in Table 10, by age group. Injury rates are expressed as injuries per 100,000 population, based on yearly population estimates published by the U.S. Census Bureau.[16] Younger age groups tended to have higher injury rates than the older age groups, with the clear exception being the under 12 age group. Notably, injury rates for every age group except the 55+ age group have declined since 2020; however, the elevated injury rates in 2020 could possibly be attributed to increased outdoor recreational activity during the height of the COVID-19 pandemic. Injury rate estimates for the overall population can be found in Table 11.

Figure 5: Annual OHV-Related Hospital Emergency Department-Treated Injury Rate Estimates by Age Group in Years, 2020–2024



Source: NEISS and U.S. Census Bureau.
Note: Injury rates expressed as estimated injuries per 100,000 estimated population on July 1 of each year. Estimated injury rates for the overall population by year are computed in Table 11.

Estimated Injuries by Sex

Table 11 provides the distribution of estimated OHV-related, emergency department-treated injuries by sex between 2020 and 2024. The distribution of injuries by sex during the 5-year period was roughly the same every year, with males constituting a disproportionately high proportion of overall injuries (68–69%). In comparison, for each year between 2020 and 2024,

[16] Datasets for population estimates published by the U.S. Census Bureau may be found here for 2020–2024.

males were roughly 49–50 percent of the estimated U.S. population, while females made up around 50–51 percent. Consequently, despite males having more than twice the estimated injury rate as females each year, the changes in their injury rates, relative to the overall injury rate, are very similar, as seen in Table 11.

Overall, males made up around 60–65 percent of injuries for the age groups under 35, and this imbalance was increasingly disproportionate for older age groups, with males consisting of around 75–80 percent of injuries for the age groups over 35.

Table 11: Annual Estimates of OHV-Related, Emergency Department-Treated Injuries by Sex, 2020–2024

Year	Overall		Male			Female		
	Estimated Treated Injuries	Estimated Overall Injury Rate	Estimated Treated Injuries	Percent of All Injuries	Estimated Injury Rate	Estimated Treated Injuries	Percent of All Injuries	Estimated Injury Rate
2020	126,700	38.2	87,200	69%	53.1	39,500	31%	23.6
2021	120,300	36.2	83,100	69%	50.6	37,200	31%	22.2
2022	106,300	31.8	73,400	69%	44.4	32,900	31%	19.5
2023	112,500	33.4	76,900	68%	46.1	35,600	32%	20.9
2024	113,000	33.2	77,100	68%	45.8	35,900	32%	20.9
Total	**578,700**		**397,700**	**69%**		**181,100**	**31%**	

Source: NEISS and U.S. Census Bureau.
Note: Calculations are based on unrounded estimates, but rows may not sum to total due to presented estimates being rounded to the nearest 100. Injury rates are expressed as estimated injuries per 100,000 estimated population for July 1 of each year. The coefficients of variation (CVs) for the injury estimates in this table range from 13 percent to 18 percent.

None of the year-to-year changes in estimated injuries for either sex were statistically significant, including the net differences between the total estimates in the start year (2020) and end year (2024) of the examined time frame.

Estimated Injuries by Disposition, Diagnosis, and Injured Body Part

Figure 6 provides an overview of the *total* estimated OHV-related injuries by disposition, diagnosis, and injured body part,[17] by specifically comparing the respective injury distributions for the latest year of the analysis (2024) with the average of the previous 4 years (2020–2023). The very small proportion of fatal cases that were used in the estimate for the "Other" disposition were also counted in the earlier "Off-Highway Vehicle Fatalities" section.

Of the 5-year estimated total of 578,700 emergency department-treated injuries, staff categorized the majority—approximately 78 percent of injuries between 2020 and 2023, and 77

[17] NEISS allows the coding of up to two diagnoses and body parts per injury case. For this analysis, only the primary diagnosis and primary injured body part listed were considered. A small proportion of cases were coded with more than one injury diagnosis or injured body part.

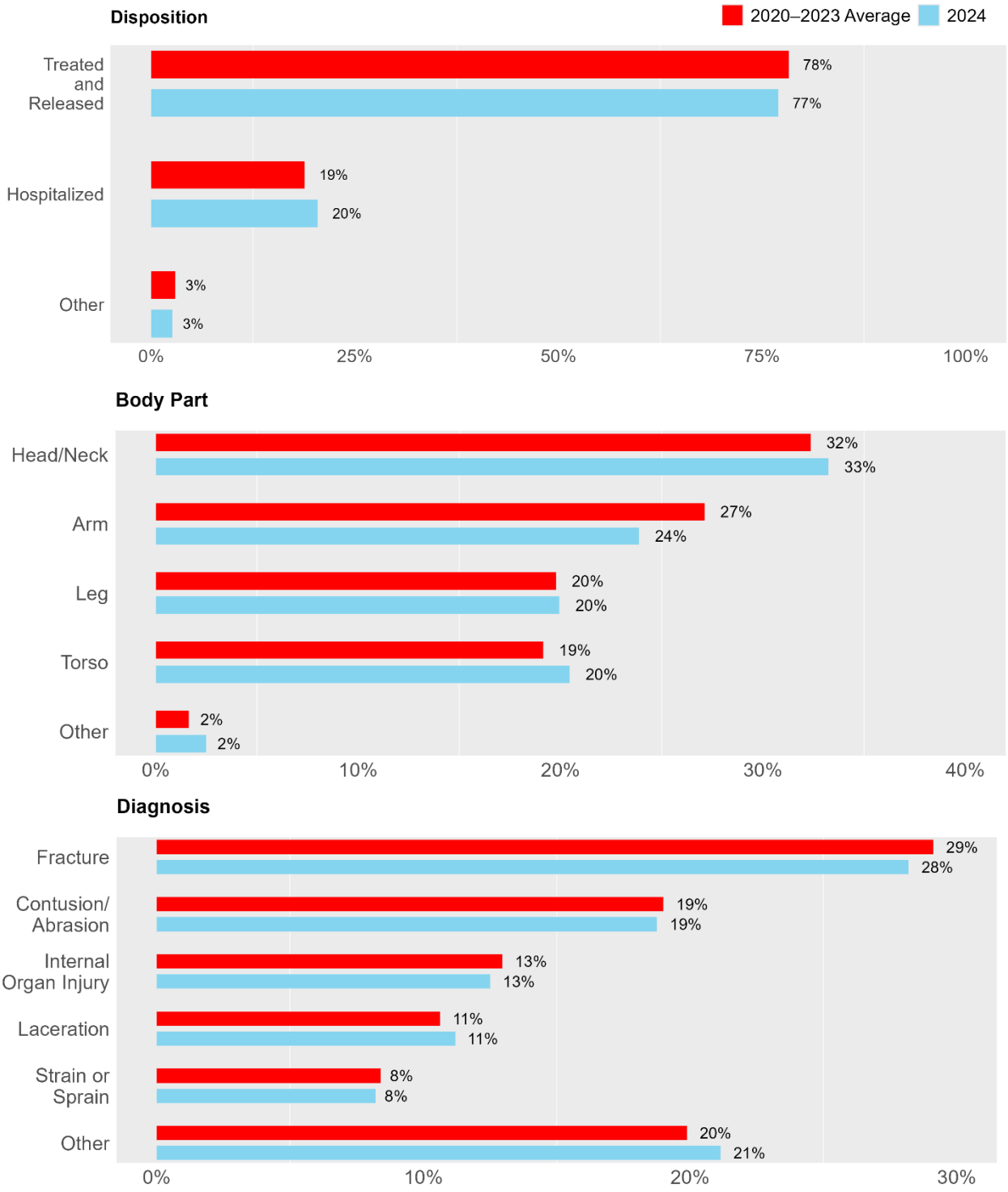
percent in 2024—as “treated and released.” Hospitalizations represented around 19 percent of estimated injuries between 2020 and 2023, and around 20 percent in 2024.[18] The remaining “Other” injuries were categorized as “held for observation,” “left without being seen,” or fatal injuries, and consisted of around 3 percent of estimated injuries for the 5-year period.

Staff categorized the various coded diagnoses into the following groups: fractures, contusions or abrasions, strains or sprains, internal organ injuries, lacerations or other injuries (including, but not limited to, concussions, dislocation, hematoma and general pain). In both periods, the most common diagnoses were fractures (29% from 2020–2023, 28% in 2024) and contusions/abrasions (19%).

Staff categorized the various body parts into the following areas: head and neck, arm, leg, torso and other (which made up less than 2 percent of overall estimated injuries). Most injuries for both periods were located in either the head and neck (32% from 2020–2023, 33% in 2024) or arms (27% from 2020–2023, 24% in 2024).

[18] Defined as injured patient being “treated and transferred to another hospital” or “treated and admitted for hospitalization (within same facility).”

Figure 6: OHV-Related, Emergency Department-Treated Injuries for All Ages, By Disposition, Diagnosis and Body Part – Comparison of 2020–2023 and 2024 Distributions



Source: NEISS.
Note: Percentages may not sum to 100% due to rounding.

Special Study for OHV-Related Injuries (2024)

While this annual report has historically provided annual distributions of OHV-related *fatalities* by vehicle type, OHV-related *injuries* have been presented as either a combined estimate or separate estimates by individual product codes. This is due to CPSC staff conducting IDIs for almost all OHV-related fatality reports in CPSRMS, while CPSC resources do not allow IDIs for all OHV-related injury cases in NEISS; completed IDIs often provide information on the OHV type, brand or model, which allows staff to verify the product involved as an ATV, ROV, UTV, or unknown (either an ROV or UTV).

Starting in January 2022, however, CPSC staff began a full-scale special study for OHV-related NEISS injury cases by inviting the injury victims to participate in a follow-up interview or online survey. This section presents results from the special study, which, as reported below, continued for OHV-related injury cases in NEISS treated in 2024.

The primary motivation of this ongoing special study is to better understand the true distribution of estimated injuries between ATVs, ROVs, and UTVs in NEISS. Historically, compared with the distribution of OHV-related *fatalities* by vehicle type from the anecdotal CPSRMS data, the distribution of OHV-related *injuries* is dominated by injuries coded by hospitals as involving ATVs. For example, while 34 percent of OHV-related fatalities reported to CPSC between 2020 and 2022 have so far been assessed by CPSC staff through IDIs to involve either an ROV or UTV, only 11 percent of OHV-related injuries between 2020 and 2024 were coded by the treating hospital as involving an ROV or UTV. Furthermore, historically, among completed IDIs involving an ROV or UTV, the vehicle involved in the fatal incident was described as an ATV in the original death certificate or fatality report around 75 percent of the time. This suggests that, without the benefit of a follow-up investigation, original vehicle classifications for either fatality reports or injury cases may be unreliable, and that “ATV” is frequently used as a catch-all term in incident narratives for OHVs with more than 2 wheels.

In the special study, assignments were created for 2,096 of the 2,126 OHV-related injury cases recorded in NEISS in 2024. The 25 NEISS cases that were coded with product code 3285 (ATV with 3 wheels) were excluded from assignment in the special study. This is because the purpose of the special study was to better understand the misclassification of ROVs or UTVs, which have 4 or more wheels, as ATVs (and possibly vice versa). Four NEISS cases in 2024 involved a fatality and could therefore not be assigned in the special study. One additional NEISS case was excluded from assignment due to technical issues. The 2,096 questionnaires administered to injury victims garnered 215 responses. Of the responses, 186 were determined to be sufficiently complete and in-scope; 9 were determined to be sufficiently complete but out-of-scope; and 20 were determined to be too incomplete to be included in the analyses.[19] No responses were received from the remaining 1,881 assignments. The analysis in this section is based on the 195 complete responses and applies to estimated injuries in 2024 only; the

[19] A response was considered to be incomplete if the submission did not provide any details that could be used by staff to determine vehicle classification, hazard pattern, or incident circumstances. Responses that provided some level of detail relevant to the information in Tables 13.1 through 13.18 were included in the analyses.

previous two annual reports in this series provided special study results for estimated injuries in 2022 and 2023, respectively.

Any references in this and later sections of the report to “NEISS product code” and “NEISS weight” should be assumed to be the *original* product code and weight associated with the injury case in NEISS, respectively, and not the verified product code and adjusted weight assigned after investigation.

Table 12.1 shows the number of injuries by verified product (from available information about the vehicle’s classification, brand, model or maximum speed provided by the respondent) the NEISS product code, based on the 195 completed special study responses.[20] All but one of the 118 responses verified to have involved ATVs had 4 wheels.

Table 12.1: NEISS Product Code vs. Verified Product from Special Study Responses (2024)

		NEISS Product Code*			
Verified Product	**Overall**	**3286** (4-wheel ATV)	**3287** (ATV, # of wheels unknown)	**3296** (4+ wheel ATV)	**5044** (ROV or UTV)
3-Wheeled ATV	**1**	0	1	0	0
4-Wheeled ATV	**117**	74	41	0	2
ROV	**47**	14	17	1	15
UTV	**7**	3	3	0	1
Unknown (ROV or UTV)	**8**	3	3	0	2
Unknown OHV**	**6**	3	3	0	0
Out-of-Scope ***	**9**	5	2	0	2
Total	**195**	**102**	**70**	**1**	**22**

Source: NEISS (2024).
* See Table 8 above for NEISS product code definitions.
** The specific type of OHV could not be determined from the survey responses.
*** Reported as either involving a motor vehicle or a non-OHV related injury.

Table 12.2 provides a comparison of the distribution of estimated injuries by vehicle classification from the original NEISS sample and special study. Due to small sample sizes resulting from the modest survey response rate, ROVs, UTVs, and “Unknown (ROV or UTV)” are combined into a single classification (ROV or UTV). The injury estimates from the special study are calculated from adjusted weights; more details on how the adjusted weights were derived can be found in Appendix B.

[20] See Questions Q10, Q11, Q13, Q20, Q21, Q24, Q25 and Q28 in Appendix B for specific phrasing of questions and possible responses.

Table 12.2: Distribution of Estimated Emergency Department-Treated Injuries by Vehicle Classification (2024)

	NEISS			Special Study		
Vehicle Classification	**Cases**	**Treated Injuries**	**%**	**Cases**	**Treated Injuries**	**%**
ATV with > 3 Wheels	978	59,400	53%	117	68,900	62%
ROV or UTV	267	16,600	15%	62	34,700	31%
Unknown (ATV, ROV or UTV)	852*	35,600	31%	6	4,000	4%
ATV with 3 Wheels	25**	****	1%	1	****	<1%
Out of Scope***	0	0	0%	9	3,800	3%
Fatal OHV Injury Cases	4**	****	<1%	N/A	N/A	N/A
Total	**2,126**	**113,000**	**100%**	**195**	**111,600**	**100%**

Source: NEISS (2024).
* Number of NEISS injury cases with product code 3287 (ATV, number of wheels not specified). However, special study responses (Table 12.1) indicate some proportion of these cases actually involved ROVs or UTVs.
** NEISS injury cases identified as under these categories were excluded from special study assignment.
*** Product is out of the scope of this report but under CPSC jurisdiction.
**** Estimate fails to meet NEISS reporting criteria because the estimate is less than 1,200.

Table 12.3 provides a breakdown of the calculation of a more refined injury estimate for 2024, using the information presented in Tables 13.1 and 13.2. The modified total of 109,200 represents all injuries involving ATVs with at least 3 wheels, ROVs, and UTVs. This new estimate is smaller than the original NEISS estimate of 113,000 as the special study revealed that a small proportion (3%) of injuries originally coded as involving an ATV, ROV or UTV actually involved a motor vehicle or an unspecified non-OHV. This method of computing a more refined injury estimate is only applicable to years with an accompanying special study (i.e., OHV reports covering NEISS years 2022 through 2024), and should not be generalized to previous years' estimates.

Table 12.3: Components of Refined Estimate of Emergency Department-Treated Injuries (2024)

Vehicle Classification	Estimate Source	Estimated Treated Injuries
ATV with > 3 Wheels	Special Study	68,900
ROV or UTV	Special Study	34,700
Unknown (ATV, ROV or UTV)	Special Study	4,000
ATV with 3 Wheels	Special Study	**
ATV with 3 Wheels	NEISS	1,200
Fatal OHV Injury Cases	NEISS	**
Total		**109,200**

Source: NEISS (2024).
See Appendix B for calculation details.
** Estimate fails to meet NEISS reporting criteria because the estimate is less than 1,200.

As the medical record in NEISS is generally vague regarding specific product and incident details, the special study questionnaire attempts to gather as much relevant information as possible regarding the OHV incidents, although all questions were optional. Distributions of certain factors and characteristics of the incidents, injuries, and victims involved were computed via adjusted weights and survey responses. Specific phrasing of these questions and their possible responses can be found in Appendix B. Staff excluded from Tables 13.4 through 13.18 the 9 completed responses that were out of scope, and the 1 response confirming the incident OHV was an ATV with 3 wheels, since the vehicles or products involved in these submissions are not in the scope of the special study. As such, the distributions in the below tables can only be generalized to non-fatal injuries related to ATVs, ROVs, and UTVs with either an unknown number of wheels or 4 or more wheels; there were an estimated 107,500 injuries from these OHVs in 2024.

Due to the logical flow of the survey, some questions were not presented to the respondent based on selection, or lack of selection, of certain answer choices to previous questions; for example, because an ATV by definition does not have seatbelts, questions regarding seatbelt usage were only presented to victims that identified the incident vehicle as an ROV or UTV. As such, questions where a substantial proportion of responses were missing are not presented below. In some cases, missing information can be derived from the incident narrative provided in the questionnaire, depending on how specific the description of events is (see Q36 in Appendix B). The total number of missing responses to the below questions, and the injury estimate associated with them, is provided in the “Unknown” row;[21] the percentage for this row

[21] Includes submissions where the narrative did not provide sufficient information in lieu of a missing response, or instances where a response is not applicable (e.g., the question about vehicle speed was not asked if the respondent indicated that the vehicle was not in operation at the time of the incident).

indicates the estimated percentage of injuries in 2024 that had an unknown or unspecified response to the corresponding question.

Table 12.4 presents the distribution of OHV-related injuries by whether the OHV was in operation when the injury occurred. Unsurprisingly, a large majority of OHV injuries (93% of known responses) occurred when the vehicle was in operation.

Table 12.4: Distribution of Emergency Department-Treated Injuries by Operation of OHV at Time of Injury (2024)

In Operation?	#	Estimated Treated Injuries	% of Known	% of Total
Yes	173	99,500	93%	93%
No	11	7,400	7%	7%
Unknown	*1*	*		*<1%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Estimates may not sum to totals due to rounding. Percentages may not sum to 100% due to rounding.
Based on responses to special study survey question Q35 (see Appendix B).
* Estimate fails to meet NEISS reporting criteria because the estimate is less than 1,200.

Table 12.5 presents the distribution of OHV-related injuries by the reported purpose of OHV use when the incident occurred. The majority of injuries (86% of known responses) occurred during recreational activities.

Table 12.5: Distribution of Emergency Department-Treated Injuries by Purpose of OHV Use at Time of Accident (2024)

Activity	#	Estimated Treated Injuries	% of Known	% of Total
Recreational	123	72,200	86%	67%
Occupational*	23	11,500	14%	11%
Unknown	*39*	*23,800*		*22%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Based on responses to special study survey question Q33 (see Appendix B).
*Includes farming, ranching, yard/garden work, household chores, or other business or occupational tasks.

Table 12.6 presents the distribution of OHV-related injuries by whether a collision occurred, and if so, what the OHV collided with. Among known responses, 37 percent of injuries involved some sort of collision with a stationary object, terrain, another vehicle, or a person/animal. Of the injuries involving a collision, around 64 percent involved a stationary object (e.g., a tree or fence) or terrain, compared to 23 percent with another vehicle (which could be either in motion or stationary) and 13 percent with a person or animal. It should be noted that, in many of the responses where the victim did not specify if a collision had occurred (Unknown), the incident

narrative provided by the victim suggested that the incident likely did not involve a collision. However, it is possible that narratives may not always provide a complete summary of the incident, and, furthermore, victims had different definitions for what constituted a collision. For example, some respondents reported hitting a road bump or patch of dirt as a collision, while others did not; such incidents were not counted as collisions with stationary objects or terrain.

Table 12.6: Distribution of Emergency Department-Treated Injuries by Collision (If Any) Type (2024)

Activity	#	Estimated Treated Injuries	% of Known	% of Total
Stationary Object / Terrain	39	18,500	24%	17%
Vehicle	12	6,700	9%	6%
Person or Animal	5	3,800	5%	4%
No Collision	87	49,400	63%	46%
Unknown	*42*	*29,100*		*27%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Estimates may not sum to totals due to rounding.
Based on responses to special study survey question Q41 (see Appendix B).

Table 12.7 presents the distribution of OHV-related injuries by whether the vehicle overturned during the incident. A majority of injuries (68% of known responses) involved the vehicle overturning.

Table 12.7: Distribution of Emergency Department-Treated Injuries by Occurrence of Overturning (2024)

Vehicle Overturned?	#	Estimated Treated Injuries	% of Known	% of Total
Yes	99	56,500	68%	53%
No	47	26,700	32%	25%
Unknown	*39*	*24,300*		*23%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Based on responses to special study survey question Q43 (see Appendix B).

Table 12.8 provides the distribution of OHV-related injuries by the number of passengers in the vehicle at the time of the incident. Around two-thirds of estimated injuries (66% of known responses) occurred where the driver was the only occupant, while one-third (34%) of estimated injuries occurred while the OHV had between 1 and 3 passengers. In comparison, the 2023 special study results estimated that 50 percent of injuries involved vehicles with only 1 occupant, and the other 50 percent involved vehicles with multiple occupants.

Table 12.8: Distribution of Emergency Department-Treated Injuries by Number of Passengers in Vehicle (2024)

Number of Passengers	#	Estimated Treated Injuries	% of Known	% of Total
No Passengers	116	65,000	66%	60%
One	38	24,200	25%	23%
Two	11	5,800	6%	5%
Three	6	3,300	3%	3%
Unknown	*14*	*9,100*		*8%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Estimates may not sum to totals due to rounding.
Based on responses to special study survey question Q46 (see Appendix B).

Table 12.9a presents the distribution of OHV-related injuries by the role of the victim in the incident. Most injuries (73% of known responses) were to the driver; this includes injuries where the driver was the only occupant in the vehicle.

Table 12.9a: Distribution of Emergency Department-Treated Injuries by Role of Victim (2024)

Role	#	Estimated Treated Injuries	% of Known	% of Total
Driver	123	67,800	73%	63%
Passenger	34	21,500	23%	20%
Bystander*	4	3,600	4%	3%
Unknown	*24*	*14,600*		*14%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Estimates may not sum to totals due to rounding.
Based on responses to special study survey question Q44 (see Appendix B).
* This also includes victims that were not riding on the incident OHV at the time of the injury (i.e., a dirt bike rider).

Table 12.9b presents the distribution of OHV-related injuries by the role of the victim in the incident for incidents involving at least a driver *and* a passenger. This distribution is derived from a subset of 55 special study responses in Table 12.8 that indicated at least 1 passenger being present in the vehicle at the time of the incident. For incidents involving a driver and at least 1 passenger, the passenger was more frequently the injury victim (67% of known responses).

Table 12.9b: Distribution of Emergency Department-Treated Injuries in OHVs with 1 or More Passengers (2024)

Role	#	Estimated Treated Injuries	% of Known	% of Total
Driver	16	9,600	33%	34%
Passenger	32	19,800	67%	60%
Unknown	*7*	*3,900*		*6%*
Total	**55**	**33,300**	**100%**	**100%**

Source: NEISS (2024).
Based on responses to special study survey questions Q44 and Q46 (see Appendix B).

Table 12.10 presents the distribution of OHV-related injuries by whether the victim was ejected from the OHV, either partially or fully. A large majority of injury victims (78% of known responses) were either partially or fully ejected from the vehicle.

Table 12.10: Distribution of Emergency Department-Treated Injuries by Ejection of Victim (2024)

Victim Ejected?	#	Estimated Treated Injuries	% of Known	% of Total
Yes	117	67,600	83%	63%
No	23	13,700	17%	24%
Unknown	*45*	*26,200*		*13%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Estimates may not sum to totals due to rounding.
Based on responses to special study survey questions Q52 and Q83 (see Appendix B).

Table 12.11 presents the distribution of OHV-related injuries by victim helmet usage. Among the known responses, the victim was reported to be wearing a helmet in 23 percent of injuries. It should be noted that the nature of the data do not allow an assessment of the frequency with which helmet use avoided injuries that required emergency department treatment.

Table 12.11: Distribution of Emergency Department-Treated Injuries by Victim Helmet Usage (2024)

Helmet Worn?	#	Estimated Treated Injuries	% of Known	% of Total
Yes	31	14,300	23%	13%
No	85	48,400	77%	45%
Unknown	*69*	*44,800*		*32%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Based on responses to special study survey questions Q70 and Q101 (see Appendix B).

Table 12.12 presents the distribution of OHV-related injuries by incident location. Among the known responses, injuries most commonly occurred in a field or yard (42%), non-paved surfaces or trails (23%), or paved surfaces or trails (21%).

Table 12.12: Distribution of Emergency Department-Treated Injuries by Location (2024)

Location	#	Estimated Treated Injuries	% of Known	% of Total
Non-Paved Surface or Trail	34	20,500	23%	19%
Field / Yard	69	37,700	42%	35%
Paved Surface or Trail	30	18,700	21%	17%
Woods	21	10,100	11%	9%
Off-Highway Vehicle Park	5	2,800	3%	3%
Unknown	*26*	*17,800*		*17%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Percentages may not sum to 100% due to rounding.
Based on responses to special study survey questions Q104 and Q105 (see Appendix B).

Table 12.13 presents the distribution of OHV-related injuries by the slope of the terrain on which the incident occurred. The majority of injuries (60% of known responses) occurred on flat terrain, while the remaining injuries (40% of known responses) occurred on either a gentle or steep slope. In comparison, the special study results from 2023 estimated that 77 percent of injuries occurred on flat terrain, with the remaining 23 percent occurring on sloped terrain.

Table 12.13: Distribution of Emergency Department-Treated Injuries by Terrain Slope (2024)

Terrain	#	Estimated Treated Injuries	% of Known	% of Total
Flat	91	54,800	60%	51%
Gentle Slope	42	20,600	23%	19%
Steep Slope	25	15,500	17%	14%
Unknown	*27*	*16,600*		*15%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Percentages may not sum to 100% due to rounding.
Based on responses to special study survey question Q106 (see Appendix B).

Table 12.14 presents the distribution of OHV-related injuries by the type of terrain on which the incident occurred. Grass was the most common terrain types for OHV injuries (31% of known responses), followed by dirt or mud (30%).

Table 12.14: Distribution of Emergency Department-Treated Injuries by Terrain Type (2024)

Terrain	#	Estimated Treated Injuries	% of Known	% of Total
Dirt or Mud	52	28,900	30%	27%
Grass	55	30,500	31%	28%
Gravel, Rock, or Sand	29	17,600	18%	16%
Pavement	28	17,300	18%	16%
Other	5	2,700	3%	3%
Unknown	*16*	*10,400*		*10%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Based on responses to special study survey question Q109 (see Appendix B).

Table 12.15 presents the distribution of OHV-related injuries by the condition of the terrain on which the incident occurred. A majority of injuries (85% of known responses) occurred on dry terrain.

Table 12.15: Distribution of Emergency Department-Treated Injuries by Terrain Condition (2024)

Terrain	#	Estimated Treated Injuries	% of Known	% of Total
Dry	141	81,200	85%	76%
Wet or Icy	22	13,900	15%	13%
Unknown	*22*	*12,400*		*12%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Percentages may not sum to 100% due to rounding.
Based on responses to special study survey question Q111 (see Appendix B).

Table 12.16 presents the distribution of OHV-related injuries by the speed that the OHV reportedly was traveling at (in mph) when the incident occurred. While the majority of special study respondents (66% of all responses) did not know or did not state the vehicle's speed, among the injuries represented by the known responses, almost two-thirds (64%) occurred while reportedly traveling below 25 mph.

Table 12.16: Distribution of Emergency Department-Treated Injuries by Vehicle Speed at Time of Incident (2024)

Speed (mph)	#	Estimated Treated Injuries	% of Known	% of Total
< 10	20	11,600	32%	11%
10 – 24	26	11,900	32%	11%
25+	22	13,300	36%	12%
Unknown	*117*	*70,800*		*66%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Based on responses to special study survey question Q116 (see Appendix B).

Table 12.17 presents the distribution of OHV-related injuries by if the OHV's lights were on at the time of the incident. Lights provide safety utility in both dimly lit (making it easier to see potential collision and overturning hazards) and well lit situations (making it easier to spot oncoming vehicles). A majority of injuries (68% of known responses) occurred when the lights reportedly were turned off. However, it is unknown what percentage of such injuries occurred during the day, as the special study did not include questions regarding the time at which the injury occurred.

Table 12.17: Distribution of Emergency Department-Treated Injuries by Use of Vehicle Lights (2024)

Lights On?	#	Estimated Treated Injuries	% of Known	% of Total
Yes	46	28,700	32%	27%
No*	107	61,000	68%	57%
Unknown	*32*	*17,700*		*16%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Estimates may not sum to totals due to rounding.
Based on responses to special study survey question Q117 (see Appendix B).
* Includes responses where the victim indicated that the vehicle was not equipped with lights.

Table 12.18 presents the distribution of OHV-related injuries by if the OHV driver was reported to have consumed alcohol prior to the incident. A majority of injury victims (95% of known responses) said in the survey that the driver had not consumed alcohol.

Table 12.18: Distribution of Emergency Department-Treated Injuries by Alcohol Consumption (2024)

Driver had alcohol?	#	Estimated Treated Injuries	% of Known	% of Total
Yes	7	4,900	5%	5%
No	156	88,100	95%	82%
Unknown	*22*	14,500		*14%*
Total	**185**	**107,500**	**100%**	**100%**

Source: NEISS (2024).
Based on responses to special study survey question Q119 (see Appendix B).

Discussion

OHV-Related Deaths and Injuries

It is unclear to what extent the COVID-19 pandemic impacted the reported death counts in 2020 and 2021, or the estimated emergency department-treated injuries between 2020 and 2023. Relative to 2019, there was a 33-percent increase in OHV-related fatalities occurring in 2020 that were reported to CPSC. However, due to the anecdotal nature of CPSRMS data, it is unknown if this difference can be attributed more to increased outdoor activity during the pandemic or to a greater volume of incident reports. Although OHV-related fatalities decreased 14 percent between 2020 and 2021 and another 6 percent between 2021 and 2022, fatality counts in 2022 are still 6 percent higher than in 2016, the year with the most OHV-related fatalities (763) prior to 2020.[22] Relative to 2018 and 2019, OHV-related injuries increased in 2020 and 2021, during the height of the pandemic, close to the annual estimates between 2015 and 2017 (119,100–126,800). However, estimated injuries decreased 12 percent between 2021 and 2022 to 106,300, similar to the annual estimates in 2018 and 2019, before again increasing slightly in 2023 and 2024. It is also unknown what impact the COVID-19 pandemic may have had on consumers' willingness to seek emergency department treatment for injuries, particularly less severe ones. In particular, across *all product categories*, CPSC staff found that estimated injuries declined by 22 percent between March and December 2020 relative to the same time period in 2019, and most of this decrease was likely due to fewer minor injuries being treated (Schroeder and Cowhig, 2021).

After reaching a high of 1,145,000 in 2004, ATV sales declined steadily until 2018, to an estimated 352,000 per year.[23] Only more recently have ATV sales increased (by around 6 percent between 2018 and 2019). Except from 2009 to 2010, during the financial crisis, combined ROV and UTV sales have increased steadily, from 38,000 in 1994, to 469,000 in 2019. Combined ROV and UTV sales first exceeded ATV sales in 2013, and they have done so every year since. In 2020, both ATVs and ROVs/UTVs experienced a significant, perhaps pandemic-related, increase in sales volume. Between 2019 and 2020, ATV sales increased 16 percent to 433,000 vehicles, while ROV/UTV sales increased 31 percent to 614,000 vehicles. As the lifespan and usage patterns of these products is not known, the effect of exposure (as a function of riders and miles and time) on deaths and injuries is unclear. However, it can be observed that the yearly proportion of reported deaths and estimated injuries (even without accounting for the special study refined estimates) attributed to ROVs and UTVs has increased steadily since 2015. Deaths from ROVs and UTVs accounted for 20 percent of OHV-related fatalities in 2015, and this proportion has increased every year, up to 35 percent in 2021 (the latest year with all IDIs completed). Similarly, product code 5044, which encompasses ROVs and UTVs, made up only around 3 percent of OHV-related injury cases between 2015 and 2019; in comparison, for the most recent 5-year period (2020–2024), around 11 percent of injuries were coded as ROVs or UTVs in NEISS.

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[22] CPSC first began tracking fatality counts for all OHVs in the scope of this report in 2015 (Topping, 2020 and Topping, 2021).

[23] Based on information provided by CPSC's Directorate for Economics. Figures include Motorcycle Industry Council (MIC) member and non-member production; previous years' analyses included only MIC member production.

The product code 3287 for ATVs with an unknown number of wheels accounts for 40 percent of all OHV-related injury cases, and 31 percent of OHV injury estimates from 2020 through 2024. Under the assumption that the vehicles in all of these injury cases are in fact ATVs, around 2 percent of the cases may be imputed as involving vehicles having 3, 5, or 6 wheels, while the remaining 98 percent of cases may be imputed as having involved 4-wheeled vehicles. This is based on the current distribution of the other ATV product codes among NEISS cases specifying the numbers of wheels as 3, 4, or more (3285, 3286, and 3296, respectively). However, historical knowledge and the special study results suggest that some minority proportion of these cases correspond to misclassified ROVs and UTVs. Similarly, the special study results indicate there are also some misclassifications among a minority proportion of cases coded as 4-wheeled ATVs (product code 3286).

Although staff can attempt to impute the number of wheels for vehicles coded under product code 3287 using currently available data, staff can only compute adjustments for misclassification errors between ATV and ROVs/UTVs based upon survey data. The reallocation of sample cases coded as ATV injuries into the smaller ROV/UTV product category could substantially increase the ROV/UTV injury estimates, as demonstrated in the special study results. However, any resulting “corrected” estimates for ROVs/UTVs would be especially sensitive to variations in the rate of reallocation computed from the survey data used. Staff is aware that the more an estimate relies upon correction/adjustment, the more the estimate can be influenced by any imperfections with the method used for the correction/adjustment.

Special Study

In the original NEISS sample for 2024, around 15 percent of OHV-related injuries were attributed to ROVs or UTVs, while the special study estimates that at least 31 percent of in-scope OHV-related injuries in 2024 could be attributed to ROVs or UTVs. This discrepancy is similar to the ones observed in the 2022 and 2023 special study results, where 28 and 33 percent of OHV-related injuries were attributed to ROVs and UTVs, respectively, compared to 14 and 15 percent in the original 2022 and 2023 NEISS samples, respectively. Although the special study results provided strong evidence that the NEISS injury estimate for ROVs and UTVs are a substantial underestimate, staff is unable to generalize this result to years prior to 2022. This is due to continuous changes in the distribution of the OHV-related product codes over the years, specifically the increases in injury cases and estimates with product code 5044, as shown in Table 8a. It is unknown whether this can be attributed to more accurate medical records, a greater frequency of ROV or UTV-related injuries, or a combination of these two factors.

The special study also provides further insight into how injury cases with product code 3287 (ATVs with an unspecified number of wheels) can be imputed amongst the four other OHV product codes in the scope of this report. In the section directly above, it was estimated based on original NEISS product codes that 98 percent of such cases could be imputed as 4-wheeled ATVs, while the remaining 2 percent could be imputed as ATVs with 3, 5 or 6 wheels. However, among the 70 special study injury cases in 2024 with product code 3287, 41 were determined to be 4-wheeled ATVs, 23 were determined to be ROVs or UTVs, and 3 were determined to be unknown OHVs. Given the limited sample size, staff cannot use these results to reliably impute

injury cases where the number of wheels on the vehicle was unknown. However, this finding does confirm, as mentioned above, that not all cases with product code 3287 are ATVs; in fact, such cases may involve not only ROVs or UTVs but may also involve a small proportion of vehicles not in the scope of this report. Similarly, while 74 of the 102 special study injury cases in 2024 with product code 3286 were verified to be correctly coded as 4-wheeled ATVs, of the remaining 28 cases, 20 were determined to be ROVs or UTVs.

The special study results from this year, and previous years, also revealed that a few injury cases originally classified under product code 5044 actually involved ATVs; this further suggests that, in the absence of a corresponding special study, OHV-related injuries in NEISS should be interpreted as a combined estimate of all five product codes. However, it is possible that these combined estimates may overrepresent the true number of OHV-related injuries, as a small proportion of special study responses between 2022 and 2024 indicated that the injury involved an OHV or other vehicle out of the scope of this report (e.g., a motor vehicle, dirt bike, or scooter). It should also be noted that while special study responses provide valuable insight into the context of an OHV-related injury, they are usually not as specific or thorough as IDIs conducted by CPSC staff. The responses are entirely dependent on the victim's narration of the sequence of events and details about their injuries and the OHV involved. In cases involving severe injuries resulting in loss of consciousness, victims were usually unable to recall the scenario surrounding the injury. And there may be aspects of the incidents, such as speed, helmet use, and alcohol consumption, that are broadly under- or over-reported in the special study survey. In contrast, IDIs for OHV-related fatalities can collect information from multiple sources, including police reports, coroner reports, incident photos or contact with next of kin. Lastly, the low response rate relative to the number of special study assignments does limit the reliability of the adjusted estimates due to heavily increased variance. Nevertheless, this annual report will continue to present ATV, ROV, and UTV injury estimates as combined OHV-related injury estimates based on NEISS product code classification, with separate analyses and refined estimates for years where special study data are available.

Appendix A: Deaths and Injuries Methodology

This appendix describes the methodologies used to count OHV-related deaths in CPSRMS and estimate injuries from NEISS, as well as other information used to develop the analyses in the report, excluding the special study.

OHV-Related Deaths

In-Scope OHV-Related Fatalities

All fatality data used for this report are received through the CPSRMS database. Sources that report information about OHV-related fatalities include state death certificates, Medical Examiners and Coroners Project (MECAP) reports, CPSC staff-conducted in-depth investigations (IDIs), and various news sources. NEISS injury cases resulting in fatality are also reported through CPSRMS.

A fatality in CPSRMS was considered an "in-scope, OHV-related fatality" for this report if it resulted from an unintentional incident involving an OHV (ATV, ROV, or UTV) that was in operation at the time of the incident. Because it is often not determinable whether a fatal OHV incident occurred during occupational or non-occupational use (and thus whether the incident is in-scope), staff included *fatalities* associated with occupational vehicles in both the death counts and injury estimates. Fatal unintentional incidents that were preceded by known medical events (e.g., stroke, seizure, syncopal episode) were ruled to be *not* in-scope; however, such descriptions in incident narratives were rare.

ICD-10 codes (V86.X) characterizing the external cause of death as "ATV-related" include fatalities resulting from all specialty motor vehicles intended primarily for off-road use (World Health Organization, 2007). Thus, this set of ICD-10 codes captures other types of off-highway vehicles as well, such as dune buggies, dirt bikes, ROVs and UTVs. Through IDIs, CPSC staff attempts to verify the involved vehicles were indeed ATVs (i.e., motorized vehicles intended for off-road use and having three, four, or more low-pressure tires, a straddle seat for the operator, and handlebars for steering control). A large majority of fatal OHV-related incidents have completed accompanying IDIs; however, for fatal incidents without an IDI or a terminated IDI, staff relies on primary sources, such as news clips or death certificates, to identify the vehicle(s) involved. It is uncommon, but certainly possible, that a future IDI for such incidents would determine that the involved vehicle(s) are not within the scope of this report (i.e., not an OHV with two or more wheels). As additional information becomes available, which either corroborates or contradicts the currently available information, staff will update the data presented in this report, accordingly.

In some instances, staff cannot determine the specific type of off-highway vehicle involved. This may be due to limited information in the original source, or unsuccessful attempts to conduct an IDI. These incidents are counted as ATV-related fatalities or unknown (either ROV-related or UTV-related, if the vehicle is classified as a "side-by-side" or "utility vehicle") fatalities, based on the vehicle type specified in the original source. However, given that ATV is frequently used as a catch-all term for ATVs, ROVs and UTVs in general, this assumption for this report, and

previous reports regarding ATVs and OHVs, may result in ATV-related deaths, as well as possibly OHV-related deaths in general, being overstated. This is because, in rare cases, an IDI may reveal that an incident involved an OHV that is not in the scope of this report. As such, for fatalities counted as ATV-related and without a completed IDI, it is possible that a very small proportion of them may have in fact involved a dirt bike, dune buggy, off-road motorcycle, etc.

CPSC staff frequently receive reports for the same incident from multiple different sources. In this case, these reports may match fatal incidents that were already counted in a previous annual report, or they may be reporting on fatal incidents that were counted for the first time in the current annual report. For example, CPSC may receive a report of a fatality from the Medical Examiners and Coroners Alert Project (MECAP) that was already entered into CPSRMS from a prior news media report. As a result, staff compares reports from all sources to identify and consolidate reports regarding identical incidents, such that each unique incident is only counted once.

OHV-Related Injury Estimates

Estimation of Emergency Department-Treated Injuries Associated with OHVs

All injury estimates in this report are derived from data collected through CPSC's NEISS database, a probability sample of U.S. hospitals with 24-hour emergency departments and with at least six beds (Schroeder and Ault, 2001a and 2001b). Thus, it is important to note that OHV-related injury estimates in the scope of this report only represent injuries that were treated in such emergency departments. OHV-related injuries that were not treated in such U.S. hospital emergency departments are not collected in the NEISS sample and are thus excluded from all estimates in this report. For example, comparatively minor injuries suffered during use of OHVs might not be treated in hospital emergency departments and therefore not be represented in NEISS data.

A NEISS case was determined to be an "in-scope, OHV-related injury" if the incident was unintended and involved non-occupational use of the OHV, regardless of whether the victim was operating the OHV at the time of the incident. For example, victims could and did include passengers and bystanders. It is important to note that NEISS does not collect occupational injuries; this distinction should be made when comparing the definition of "in-scope, OHV-related injuries" for NEISS cases to the above definition of "in-scope, OHV-related fatalities" for CPSRMS incidents.

Unlike OHV annual reports from prior years, adjustment factors were applied in this year's annual report to account for recent changes in NEISS sampling methods and to make older NEISS estimates comparable to 2024 estimates, following revision of the NEISS sample in 2024. Specifically, injury estimates for 2023 and prior years presented in previous reports were based on an outdated sampling frame, and updated estimates for those years are based on retroactively applied adjusted weights.

Coefficients of Variation and NEISS Reporting Criteria

The coefficient of variation (CV) is derived by dividing an estimate's standard deviation by the estimate itself and is expressed as a percentage. Schroeder and Ault (2001a) and Schroeder and Ault (2001b) detail the process of calculating NEISS estimates and their variances. A NEISS estimate is only reportable if the sample size of injury cases is at least 20, the estimate itself is at least 1,200, *and* the coefficient of variation for the estimate does not reach 34 percent.

Injury Rate Estimates

The injury rate estimates are expressed as per 100,000 population for the relevant subpopulation for the time frame of interest. For example, the injury rate estimates for age groups in a given year are calculated by dividing the total number of estimated OHV-related injuries for each age group by the U.S. Census Bureau's population estimate for the corresponding age group for that year. Data from the U.S. Census Bureau reflects population estimates for July 1 of each year.

Differences in Yearly Estimates

The statistical significance of changes in year-to-year injury estimates is assessed using a two-tailed z-test. As such, no specific direction of change (increase or decrease) is assumed when comparing estimated injuries between individual years.

Appendix B: Special Study Methodology

This appendix describes the methodologies used to analyze the 2023 special study responses, including the computation of adjusted weights and specific phrasing of survey questions and their possible responses.

Special Study

Adjustment of NEISS Weights

The responses from the completed special study submissions can be used to generalize the distributions of certain factors and characteristics of the incidents, injuries, and victims involved to those measured in the population of interest (i.e., non-fatal, emergency department-treated injuries in the United States involving an OHV with 4, 5, 6, or an unknown/unspecified number of wheels). However, given the high unit nonresponse (i.e., when an injury victim cannot be reached or refuses to participate) in the special study, it is likely that, at least for some response variables, the distribution of injuries captured by the completed special study submissions differs from that observed in the population.

A popular method to address unit nonresponse is raking, also commonly known as “iterative proportional fitting.” In this case, the raking algorithm can be used to iteratively adjust the NEISS weights of the completed special study responses so that the weighted distribution of selected response variables more closely aligns with those observed in their marginal totals in the population. More specifically, the weights of the 1,901 assignments with no response (including the 20 responses that were too incomplete to be used in the analysis) are distributed among the 195 assignments with completed responses. The population marginal totals were computed using the NEISS weights of the 2,096 cases assigned to the special study. Raking for this special study was conducted using a SAS raking macro (Izrael, Hoaglin and Battaglia, 2000).

The weighted distributions of most key variables specific to the NEISS sample (namely, injury disposition, hospital stratum,[24] and original product code assigned by hospital coders) were found to be similar between the 2024 NEISS sample and special study responses (i.e., limited non-response bias). As such, these variables were not used to adjust weights in the raking algorithm.

However, staff found there was some amount of unit nonresponse by patient variables such as age, sex, and other demographics. To account for this unit nonresponse via raking, these variables were used to rake the special study sample against the marginal population (2024 NEISS sample) totals. As age is continuous and other demographic variables have multiple response levels with limited data, the response values for such variables were collapsed into a more reasonable number of categories to facilitate running the raking algorithm. For example, age was dichotomized as “Under 35” and “35 or older”.

[24] Hospital size, defined as the total number of emergency room visits reported by the hospital, and categorized into children’s, small, medium, large, or very large (See Schroeder and Ault, 2001b).

Estimate Reporting Criteria

Standard NEISS reporting criteria (see Appendix A) requires an estimate to be computed from at least 20 injury cases. For special study estimates, due to the relatively low number of responses, this criterion is not considered. The low sample size of special study injury cases results in the post-stratified weights having a heavily inflated coefficient of variation (CV) that may exceed the maximum threshold of 0.33 from the standard NEISS reporting criteria. This criterion is thus also not considered when reporting special study estimates. However, consistent with standard NEISS reporting criteria, estimates under 1,200 are not shown.

Calculation of Refined Injury Estimate

As both fatalities and product code 3285 (ATVs with 3 wheels) are excluded from special study assignment—and thus the above weight adjustment calculation for ATV-related injury cases—the special study only represents injuries involving products originally coded as 3286, 3287, 3296 (ATVs with at least 4 wheels, or ATVs where number of wheels is unspecified) or 5044 (ROVs and UTVs). However, the special study responses may reveal one of three possibilities about the actual (verified) product involved:

- ***Scenario 1:*** *The verified product is an ATV, ROV, or UTV with at least 4 wheels.*
  In this case, the original product code may or may not have been correct, but the verified product is in-scope and can be classified into one of the four product codes represented in the special study assignment (3286, 3287, 3296, 5044).

- ***Scenario 2:*** *The verified product is an ATV with 3 wheels.*
  In this case, the original product code did not correctly classify the product but the product is still in the scope of this report; this injury case would not have been assigned to the special study if the medical record's product code was correct.

- ***Scenario 3:*** *The verified product is a vehicle (including an OHV) that is not in the scope of this report (e.g., dirt bike).*
  In this case, the sum of the adjusted weights of these responses is not counted in the overall estimate, as they do not represent ATV, ROV, or UTV injuries.

Since the special study can only provide an estimate of 3-wheeled ATV injuries when the original product code did not correctly classify the product (Scenario 2), staff must rely on the 2024 NEISS data with product code 3285 to compute the remaining estimate of injuries associated with 3-wheeled ATVs.

Thus, the refined estimate consists of the below 4 components:

$$\text{Estimate} = \sum^{A} W_{adj} + \sum^{B} W_{adj} + \sum^{C} W_{NEISS} - \sum^{D} W_{adj}\text{, where:}$$

A = Special study cases that were verified to be an ATV, ROV, or UTV with 4 or more wheels;

B = Special study cases that were verified to be an ATV with 3 wheels;

C = NEISS cases with product code 3285 or involving a fatal injury, and thus not assigned to the special study;

D = Special study cases that were verified to be an out-of-scope product;

W_{adj} = Adjusted weight computed for special study case;

W_{NEISS} = NEISS weight.

Specific Special Study Survey Questions

This section details the questions relied for the report (i.e., that were used to identify the vehicle type involved in the injury incident, and to create Tables 13.1 through 13.18). See notes under each table for specific question(s) analyzed to generate that table. Note that these questions were not necessarily presented to respondents in order by question number.

Q13. According to our records from the National Electronic Injury Surveillance System the injured person was seen on {injury date} in the emergency department at {hospital name} for an injury that involved an Off Road or All Terrain Vehicle. Is that correct?

o Yes
o No
o Don't know

Q14. What information is incorrect from the statement above?

▢ Different date
▢ Different hospital
▢ (I/the victim) did not receive treatment in a hospital emergency department for Off Road or All Terrain Vehicle injury

Q36. Please describe the sequence of events of the accident. *Note: Enter DK for "Don't know."*

Q10. As part of this study, we are trying to determine the types of vehicles involved in these accidents. An ATV is an off-road vehicle with at least 3 or 4 low-pressure tires, a seat designed to be straddled by the operator, and handlebars for steering. For this study, a vehicle is not considered an ATV if it has a steering wheel, bench or bucket seats, or seat belts. Was the vehicle involved in the accident an ATV?

o Yes
o No
o Don't know
o Refused

Q11. How many wheels did the ATV have? *Note: If "Other", please specify how many wheels.*

o Three
o Four
o Six
o Other _____
o Don't know
o Refused

Q13.2. Which company manufactured the ATV?

Q15. What is the model name and/or number of the ATV?

Q20. A utility vehicle or recreational off-highway vehicle, also called side-by-side, is a four- or more wheeled vehicle with bench or bucket seats equipped with seat belts, a steering wheel, and foot pedals. Recreational Off-highway Vehicles also have a rollover protective structure, also called a roll cage. A dune buggy, sand rail, and go cart are not considered utility vehicles or recreational off-highway vehicles. Was the vehicle involved in the accident a utility Vehicle or a Recreational Off-highway Vehicle? *Note: A UTV or ROV is sometimes called a side-by-side. If the vehicle was a side-by-side, mark "Yes".*

o Yes
o No
o Don't know
o Refused

Q21. What type of vehicle[25] was involved in the accident? *Note: Enter in "Other" responses into the text field.*

o Dirt bike
o Dune buggy
o Go cart
o Other _____
o Don't know
o Refused

Q23. Was the vehicle equipped with a rollover protective structure, like a roll bar or roll cage?

o Yes
o No
o Don't know
o Refused

Q24. Which company manufactured the (utility or Recreational Off-Highway) vehicle?

Q26. What is the model of the (utility or Recreational Off-Highway) vehicle?

[25] This question was only prompted when respondents stated that the involved vehicle was neither an ATV, ROV or UTV.

Q28. Can the vehicle obtain speeds greater than 30 miles per hour?

o Yes
o No
o Don't know
o Refused

Q35. Was the vehicle in operation when the accident occurred?

o Yes (The vehicle was being operated at the time of the accident.)
o No (The vehicle was in transport, being repaired, or otherwise not being operated at the time of the accident.)
o Don't know
o Refused

Q33. Which of the following choices best describes how the vehicle was being used at the time of the accident? Note: If "other", please specify the other type of activity in the provided text box.

o Recreational purposes
o Farming or ranching
o Other business or occupational tasks
o Household chores
o Yard or garden work
o Other _____
o Don't know
o Refused

Q41. What was hit or what hit the vehicle? Note: If "other", please enter the "other" answer into the provided text box.

o Car
o Truck or SUV
o Van
o UTV or ROV
o ATV
o Stationary object; for example, a tree, rock, building, etc.
o Other _____
o Don't know
o Refused

Q43. Did the vehicle overturn, even if only to one side?

o Yes
o No
o Don't know
o Refused

Q44. Were you/was your child (fill in the appropriate terminology) the... Note: If "other", please fill in the specified "other" response using the provided text box. Example: right front passenger, middle rear passenger, in cargo area, etc.

o Driver
o Passenger
o Bystander
o Other _____
o Don't know
o Refused

Q46. How many passengers, not including the driver, occupied the vehicle at the time of the accident?

o 0 (No passengers)
o 1
o 2
o 3
o 4
o 5
o 6
o More than 6
o Don't know
o Refused

Q52. Did the driver or any part of the driver's body leave the interior portion of the vehicle during the accident? *Note: In other words, was the driver ejected, either partially or fully? Partially or fully are answered as "yes".*

o Yes
o No
o Don't know
o Refused

Q83. Did the passenger or any part of the passenger's body leave the interior portion of the vehicle during the accident? *Note: In other words, was the passenger ejected, either partially or fully?*

o Yes
o No
o Don't know
o Refused

Q70. Was the driver wearing a helmet at the time of the accident?

o Yes
o No
o Don't know
o Refused

Q101. Was the passenger wearing a helmet at the time of the accident?

o Yes
o No
o Don't know
o Refused

Q104. Which of the following choices best describes the location of the accident?

o Paved road
o Non-paved road
o Paved surface that is not a road, like a driveway or a parking lot
o Field
o Yard
o Woods
o Off-highway vehicle park
o Other
o Don't know
o Refused

Q105. Please specify the "other" location.

Q106. Which of the following best describes the slope of the terrain being traveled?

o Flat
o Gentle slope
o Steep
o Don't know
o Refused

Q109. Which of the following choices best describes the surface of the terrain? *Note: If "other", please enter the response in the provided text box.*

o Pavement
o Gravel
o Dirt
o Sand
o Mud
o Grass
o Other _____
o Don't know
o Refused

Q111. Which of the following best describes the condition of the terrain? *Note: If "other", please enter the response in the provided text box.*

o Dry
o Wet
o Icy
o Snowy
o Other _____
o Don't know
o Refused

Q116. What would you estimate the speed of the vehicle at the time of the accident?

o Less than 5 miles per hour (mph)
o 5 to 9 mph
o 10 to 14 mph
o 15 to 19 mph
o 20 to 24 mph
o 25 or more mph
o Don't know
o Refused

Q117. Were any lights in use at the time of the accident?

o Yes
o No
o Vehicle not equipped with lights
o Don't know
o Refused

Q119. The answer to the following question will be kept confidential. Did the driver have any alcoholic beverages prior to the accident?

o Yes
o No
o Don't know
o Refused

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