U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS
Crash • Stats

NHTSA

DOT HS 813 405 | A Brief Statistical Summary | December 2022

Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories Through June 2022

Introduction and Summary

NHTSA will release the third quarter (Q3) early estimate report presenting the most recent estimates of traffic fatalities (20,095) and the fatality rate per 100 million VMT (1.27) for the first half ("H1") of 2022 (*Early Estimate of Motor Vehicle Traffic Fatalities for the First 9 Months (January – September) of 2022*, DOT HS 813 406). That Crash*Stats shows a marginal increase of about 0.1 percent as compared to 20,070 fatalities projected to have occurred in the first half of 2021, and the fatality rate is down from the projected fatality rate of 1.30 fatalities per 100 million VMT during the first half of 2021. This NHTSA report is being issued after conducting a special analysis of the fatalities and the fatality rates per 100 million VMT by key sub-categories through June 2022. The analysis is based on ratio-adjusted estimates of 2022 fatal crash data coded thus far into NHTSA's Fatality Analysis Reporting System (FARS), as described in the Data and Methodology section.

There is a mixture of increases and decreases across the sub-categories. For instance, the total fatalities (fatality counts) on rural roads increased from 8,110 in 2021 H1 to 8,539 in 2022 H1, a 5-percent increase. However, the total estimated unrestrained passenger vehicle occupant fatalities decreased by 7 percent from 2021 H1 to 2022 H1. The trends of traffic fatalities in the first half of 2022 as compared to the first half of 2021 in the key sub-categories are summarized as follows.

- on rural interstate roads (up 12%), rural collector/local (up 9%), and urban collector/local (down 10%);
- during daytime (up 2%), nighttime (down 2%);
- during the weekday (up 1%), weekend (down 2%);
- during out-of-state travel (down 10%);
- in older (vehicle age ≥ 10 years) passenger vehicles (down 7%);
- in vehicle rollover crashes (down 9%);
- ejected (down 7%);
- in single-vehicle crashes (up 1%);
- in roadway not departure crashes (up 1%);
- in speeding-related crashes (down 2%);
- in the <16 age group (down 10%), the 16-24 age group (down 8%), the 25-34 age group (down 3%), the 35-44 age group (up 3%), the 45-54 age group (up 1%), the 55-64 age group (up 4%), and the 65 and older age group (up 8%);
- males (up 1%) and females (down 1%);
- unrestrained occupants of passenger vehicles (down 7%);
- in police-reported alcohol involvement crashes (up less than 1%);
- drivers (down less than 1%) and passengers (down 6%);
- motorcyclist fatalities (up 5%);
- pedestrian fatalities (up 2%);
- pedalcyclist fatalities (up 8%); and
- in crashes involving at least one large truck (up 10%).

Additionally, the trend of the total fatality rate per 100 million VMT in 2022 H1 was strongly driven by the trends in the fatality rates per 100 million VMT on the rural arterial, rural local/collector/street roadways, and urban arterial.

Data and Methodology

NHTSA uses the Early Notification (EN) data and Monthly Fatality Counts (MFC) data for the early estimate of motor vehicle traffic fatalities every month. However, EN and MFCs do not include detailed crash characteristics and information necessary to compute fatality counts and fatality rates by sub-categories. NHTSA's FARS data include such detailed information but is incomplete at this point since not every case has been entered into FARS. This analysis adjusts fatal crash cases currently coded for 2022 into NHTSA's FARS and scales it up to the most recent estimates of fatality counts in the first half of 2022 (see cited 2022 first 9 months early estimates report above, DOT HS 813 406).

The estimates of fatalities by sub-categories are carried out in two steps. The first step is to inflate current 2022 total cases coded into NHTSA's FARS data (*FARS_22*) to the estimated total fatalities (*F_Est_22*) that are from the early estimated fatalities based on latest EN and MFC data. In general, the inflation rate (*IR*) is calculated by the formula here.

$$IR = \frac{F\_Est\_22}{FARS\_22}$$

Inflation rates are computed for each month (*m*) and region (*r*) for a total of 60 inflation rates (6 months x 10 regions).

$$IR_{mr} = \frac{F\_Est\_22_{mr}}{FARS\_22_{mr}}$$

Generally, the earlier the crash month the smaller the inflation rate as the data has relatively stabilized. In the second step, the inflation rate (IR_{mr}) is then used as the *weight* in the frequency calculation for the estimate of fatalities by each sub-category variable. For instance, to compute the estimated male fatalities in month *m* and region *r*, the count of male fatalities in FARS, *FARS_22* ($Gender_{male}$) $_{mr}$, is weighted by the inflation rate IR_{mr} as follows, *F_Est_22* ($Gender_{male}$) $_{mr}$ = *FARS_22* ($Gender_{male}$) $_{mr}$ × IR_{mr}. For a different interpretation, the estimated number of male fatalities in month *m* and region *r* can also be seen as the estimated fatalities in month *m* and region *r* multiplied by the fraction of male fatalities in FARS data (*FARS_22*) for month *m* and region *r*.

$$F_{Est\_22(Gender_{male})mr} = F\_Est\_22_{mr} \times \left(\frac{FARS\_22(Gender_{male})_{mr}}{FARS\_22_{mr}}\right)$$

The two metrics NHTSA mainly examined are the relative proportion of fatalities in each level of the sub-category variables (i.e., the *percentage distribution* of fatalities) or the *percentage* of the total fatalities, and the actual yearly fatality counts (fatalities) and the percentage change in fatalities from 2021 H1 to 2022 H1 for each level of the sub-category variables.

Estimated fatalities by sub-categories may vary due to the continuous updating of 2022 FARS data ($FARS\_22_{mr}$), especially for several sub-category variables (e.g., speeding, roadway departure, and police-reported alcohol involvement[1]) that may take extra time to report and code (see Limitations section). However since the results (the percentage distribution of fatalities or the percentage of the total fatalities) have been nearly identical in each of the three months prior to publication, the estimates are considered to be relatively stable.

Results

This report examines the same major factors that NHTSA previously reviewed and investigated in 2021 and the results were published in *Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories in 2021* (DOT HS 813 298). These key factors may be linked to changes in driving and travel pattern and transportation options owing to COVID-19 emergency measures.

The first half of 2022 study results and the comparisons with the ones during the first half of 2021 are presented below. The data results for 2021 are from the above-mentioned Crash•Stats (DOT HS 813 298), except for those entries that are related to the vehicle classifications. Beginning in 2021, NHTSA changed to vPIC-based vehicle classifications for data analysis and reporting. This report utilized the vPIC-based vehicle classifications for 2021 and 2022 data extractions and projections.

Fatalities

The findings for the trends of sub-category variables are based on the comparison of two metrics: the p*ercentage distribution* of fatalities or the *percentage* of total fatalities, between the same month of 2021 and 2022 (labeled by [21] and [22] in the comparison of 2-year results), and the estimated fatality counts (fatalities) and the percentage change in fatalities from 2021 H1 to 2022 H1 for each sub-category variable. They are summarized as follows (see Tables 1 and 2 and Figure 1 for details).

Roadway and Environmental Factors

- The proportion of estimated fatalities in *rural* areas increased from March to June (Figure 1). The greatest increase occurred in June (47% [22] *versus* 41% [21]) and May (44% [22] *versus* 42% [21]). Total estimated

[1] Further adjustments of these three factors for the later months have been made.

fatalities increased by 5 percent in *rural* areas from 2021 H1 to 2022 H1.

Specifically, as shown in Table 1, the share of estimated fatalities increased on *rural interstates* from January to March, and on *rural collector/local* roads in January and from March to June. Total estimated fatalities increased on *rural interstates* (up 12%), and *rural collector/local* roads (up 9%) from 2021 H1 to 2022 H1. Conversely, the estimated fatalities on urban collector/local roads decreased by 10 percent from 2021 H1 to 2022 H1.

- The proportion of estimated fatalities during *nighttime* (6 p.m. to 5:59 a.m.) decreased in January and from April to June (Figure 1). The greatest decrease occurred in May and June (52% [22] *versus* 54% [21]). Total estimated fatalities during *nighttime* decreased by 2 percent from 2021 H1 to 2022 H1. Note that the total estimated fatalities during *daytime* increased by 2 percent from 2021 H1 to 2022 H1.
- As displayed in Figure 1, the proportion of estimated fatalities occurring during the *weekend* (6 p.m. Friday to 5:59 a.m. Monday) greatly increased in April (45% [22] versus 40% [21]). In addition, the proportion of estimated fatalities occurred on *weekdays* (6 a.m. Monday to 5:59 p.m. Friday) greatly increased in May (58% [22] versus 54% [21]). Total estimated fatalities increased and decreased by 1 and 2 percent during the *weekdays* and the *weekends*, respectively, from 2021 H1 to 2022 H1.
- The proportion of estimated passenger vehicle occupant fatalities that occurred during *out-of-State* travel decreased in January and June (Figure 1). Total estimated passenger vehicle occupant fatalities that occurred during *out-of-State* travel decreased by 10 percent from 2021 H1 to 2022 H1 – potentially due to the fact that more people traveled long distances by air than by car during the 2022 H1 period as compared to the 2021 H1 period.

Vehicle-Related Characteristics

- The estimated passenger vehicle occupant fatalities decreased by 7 percent in *older vehicles* (vehicle age ≥ 10 years) from 2021 H1 to 2022 H1 (Figure 1). Note that the estimated passenger vehicle occupant fatalities in *newer vehicles* (vehicle age < 10 years) increased by 1 percent.
- The estimated vehicle occupant fatalities in *rollover* crashes decreased by 9 percent from 2021 H1 to 2022 H1 (Figure 1).
- As displayed in Figure 1, the estimated fatally injured vehicle occupants (excluding motorcycles) *who were ejected*, as a proportion of all fatalities, decreased from January to March and during May-June. Total estimated fatalities for vehicle occupants (excluding motorcycles) *who were ejected* decreased by 7 percent from 2021 H1 to 2022 H1. This might be largely due to a similar decrease in estimated *unrestrained* passenger vehicle occupant fatalities, as described in the person-related characteristics section.
- As shown in Table 1, total estimated fatalities in *single-vehicle* and *multi-vehicle* crashes increased and decreased by 1 and less than 1 percent, respectively, from 2021 H1 to 2022 H1.
- Total estimated fatalities in roadway departure/not departure crashes decreased and increased by less than 1 and 1 percent, respectively, from 2021 H1 to 2022 H1, as shown in Table 1.
- The *speeding-related* fatalities decreased by 2 percent from 2021 H1 to 2022 H1 (Table 2).

Person-Related Characteristics

- As shown in Table 1, total estimated traffic fatalities among *young* people (<16 to 34 years old) decreased from 2021 H1 to 2022 H1. However, total estimated fatalities increased by 3 percent for the *35-to-34* age group, by 1 percent for the *45-to-54* age group, by 4 percent for the *55-to-64* age group, and by 8 percent for people *65 and older* from 2021 H1 to 2022 H1.
- As displayed in Table 1, the total estimated *male* and *female* fatalities increased and decreased by 1 and 1 percent, respectively, from 2021 H1 to 2022 H1,
- As shown in Figure 1, total estimated *unrestrained* passenger vehicle occupant fatalities decreased by 7 percent from 2021 H1 to 2022 H1.
- As shown in Table 2, the estimated fatalities in *police-reported*, *alcohol-involved* crashes increased marginally by less than 1 percent from 2021 H1 to 2022 H1. This indicates that it is still higher as compared to the pre-pandemic levels of 2019.

  It should be pointed out that this measure is different from NHTSA's traditional reporting of alcohol-impaired-driving crashes, which are based on both reported and imputed blood alcohol concentrations (BACs) values. BAC values have a significant reporting lag and will be finalized later next year, which is why this analysis used police-reported alcohol involvement to get an indication of changes from 2021 H1 to 2022 H1.

Fatalities by Person Type and in Crashes Involving Large Trucks

As shown in Table 2, the following results for the percentage change of projected fatalities from 2021 H1 to 2022 H1 are observed:

- The total projected *driver* fatalities decreased by less than 1 percent.
- The total projected *passenger* fatalities decreased by 6 percent.
- Fatalities among *motorcyclists*, as a percentage of total fatalities, increased in February, and April to June. The total projected *motorcyclist* fatalities increased by 5 percent.
- Total projected *pedestrian* fatalities increased by 2 percent.
- Total projected *pedalcyclist* fatalities increased by 8 percent.
- Fatalities in crashes *involving at least one large truck* (gross vehicle weight rating of more than 10,000 lbs.), as a percentage of total fatalities, increased from January to March. Total estimated fatalities in crashes *involving at least one large truck*, increased by 10 percent. This estimate is based on involvement of large trucks, both in commercial and non-commercial use at the time of the crash.

Table 1: Relative Proportion of Fatalities by Roadway Function Class, Age Group, Gender, and Crash Type for 2021-2022

Fatalities		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% change
2021		3,130	2,585	3,220	3,570	3,775	3,790	3,875	4,040	3,865	4,085	3,555	3,425	20,070	
2022		3,220	3,025	3,360	3,200	3,660	3,630							20,095	0.1%
Roadway Function Class															
Rural Interstate	2021	4%	4%	5%	5%	5%	5%	5%	5%	5%	5%	6%	6%	938	
	2022	5%	5%	6%	5%	5%	5%							1,050	12%
Urban Interstate	2021	9%	8%	8%	8%	7%	7%	8%	9%	8%	8%	8%	8%	1,608	
	2022	10%	8%	8%	8%	7%	8%							1,638	2%
Rural Arterial	2021	19%	20%	18%	19%	19%	18%	18%	19%	19%	18%	17%	17%	3,761	
	2022	18%	20%	17%	20%	19%	19%							3,766	0%
Urban Arterial	2021	39%	39%	40%	37%	38%	38%	35%	36%	37%	37%	40%	39%	7,721	
	2022	39%	40%	40%	38%	36%	34%							7,551	-2%
Rural Local/Collector	2021	15%	17%	15%	16%	18%	18%	19%	18%	18%	18%	16%	17%	3,381	
	2022	16%	16%	17%	17%	20%	23%							3,681	9%
Urban Collector/Local	2021	13%	12%	13%	15%	13%	14%	14%	14%	13%	13%	13%	13%	2,662	
	2022	13%	11%	12%	12%	12%	12%							2,409	-10%
Age Group															
<16	2021	3%	3%	4%	3%	4%	4%	3%	3%	3%	3%	3%	3%	694	
	2022	2%	3%	3%	3%	3%	3%							625	-10%
16–24	2021	17%	18%	16%	16%	17%	17%	16%	15%	15%	16%	16%	15%	3,380	
	2022	15%	14%	16%	16%	16%	16%							3,119	-8%
25–34	2021	20%	19%	20%	20%	21%	21%	21%	20%	19%	19%	19%	18%	4,068	
	2022	19%	21%	19%	19%	20%	20%							3,953	-3%
35–44	2021	15%	14%	17%	16%	15%	16%	15%	16%	16%	16%	15%	16%	3,123	
	2022	18%	16%	16%	16%	15%	15%							3,207	3%
45–54	2021	13%	14%	13%	14%	13%	13%	14%	14%	15%	13%	14%	13%	2,711	
	2022	14%	14%	14%	13%	14%	13%							2,728	1%
55–64	2021	15%	15%	13%	14%	13%	13%	15%	14%	15%	14%	14%	15%	2,767	
	2022	14%	14%	13%	15%	15%	16%							2,886	4%
65+	2021	17%	17%	16%	17%	16%	17%	17%	18%	17%	19%	20%	20%	3,327	
	2022	18%	18%	19%	18%	17%	17%							3,578	8%
Gender															
Male	2021	70%	72%	71%	72%	72%	73%	73%	72%	73%	72%	72%	70%	14,417	
	2022	71%	71%	71%	73%	72%	74%							14,496	1%
Female	2021	30%	28%	29%	28%	28%	27%	27%	28%	27%	28%	28%	30%	5,652	
	2022	29%	29%	29%	27%	28%	26%							5,599	-1%
Crash Type 1: Single- vs. Multi-Vehicle															
Multi-Vehicle	2021	44%	45%	46%	47%	48%	47%	47%	47%	45%	43%	47%	46%	9,292	
	2022	44%	45%	46%	47%	48%	46%							9,254	0%
Single-Vehicle	2021	56%	55%	54%	53%	52%	53%	53%	53%	55%	57%	53%	54%	10,777	
	2022	56%	55%	54%	53%	52%	54%							10,841	1%
Crash Type 2: Roadway Departure Related															
Departure	2021	50%	51%	50%	51%	50%	47%	44%	45%	42%	42%	42%	48%	9,969	
	2022	49%	50%	49%	50%	49%	50%							9,930	0%
Not Departure	2021	50%	49%	50%	49%	50%	53%	56%	55%	58%	58%	58%	52%	10,101	
	2022	51%	50%	51%	50%	51%	50%							10,165	1%

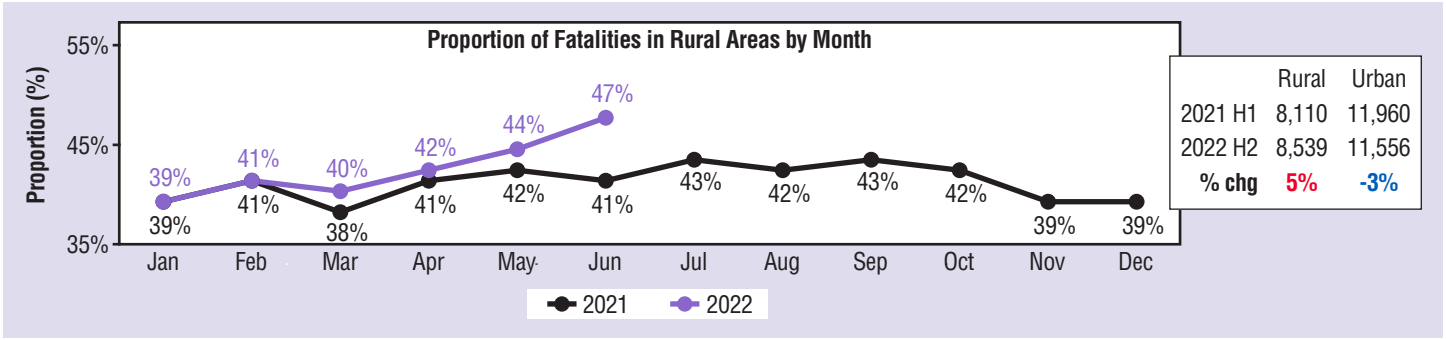
The last two columns contain fatalities and percentage change from 2021 H1 to 2022 H1. Unknown cases are proportionally distributed. Numbers in bold red/blue indicate the increase/decrease in the month (or the first half) of 2022 as compared to the same month (or the first half) of 2021 (in bold black). Source: 2021 and 2022 statistical projection.

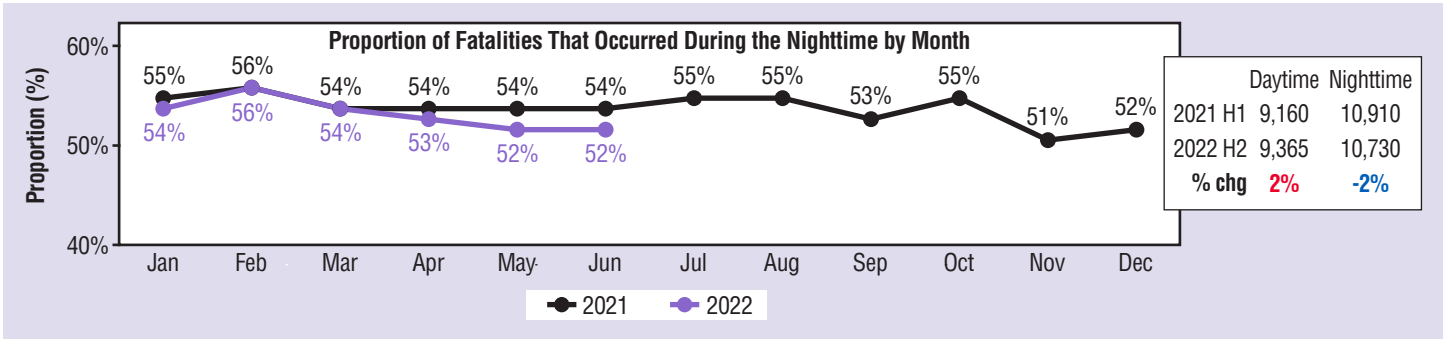
Table 2: Fatalities by Person Type, in Large Truck-/Speeding-/Police-Reported Alcohol-Related Crashes, as a Percentage of Total Fatalities for 2021-2022

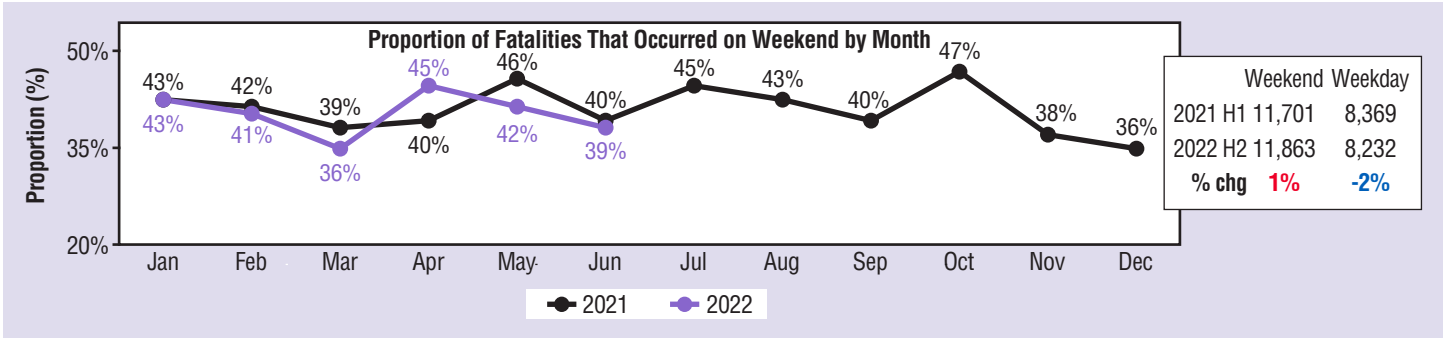
Fatalities		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% change
2021		**3,130**	**2,585**	**3,220**	**3,570**	**3,775**	**3,790**	**3,875**	**4,040**	**3,865**	**4,085**	**3,555**	**3,425**	**20,070**	
2022		**3,220**	**3,025**	**3,360**	**3,200**	**3,660**	**3,630**							**20,095**	**0.1%**
Driver	2021	**55%**	**55%**	**51%**	51%	**50%**	49%	48%	49%	48%	51%	53%	53%	**10,364**	
	2022	**56%**	**53%**	**52%**	51%	**49%**	49%							**10,325**	**0%**
Passenger	2021	15%	**16%**	**16%**	**16%**	16%	**16%**	16%	15%	14%	13%	15%	15%	**3,185**	
	2022	15%	**15%**	**14%**	**14%**	16%	**14%**							**3,000**	**-6%**
Motorcyclist	2021	6%	**7%**	**13%**	**15%**	**17%**	**19%**	18%	18%	19%	13%	9%	7%	**2,713**	
	2022	6%	**9%**	**12%**	**16%**	**20%**	**21%**							**2,835**	**5%**
Pedestrian	2021	21%	20%	**17%**	**16%**	13%	13%	14%	16%	16%	19%	21%	21%	**3,274**	
	2022	21%	20%	**19%**	**15%**	13%	13%							**3,340**	**2%**
Pedalcyclist	2021	2%	**2%**	2%	2%	2%	2%	3%	2%	3%	3%	2%	3%	**414**	
	2022	2%	**3%**	2%	2%	2%	2%							**448**	**8%**
Involving Large Trucks	2021	**12%**	**12%**	**12%**	14%	12%	14%	13%	13%	13%	12%	12%	14%	**2,559**	
	2022	**14%**	**14%**	**15%**	14%	12%	14%							**2,811**	**10%**
Speeding Related	2021	**30%**	**28%**	28%	**28%**	**29%**	**27%**	26%	27%	26%	24%	28%	28%	**5,708**	
	2022	**28%**	**27%**	28%	**27%**	**28%**	**28%**							**5,610**	**-2%**
Alcohol Involved	2021	20%	20%	20%	20%	**21%**	20%	20%	19%	18%	18%	17%	17%	**4,034**	
	2022	20%	20%	20%	20%	**20%**	20%							**4,050**	**0%**

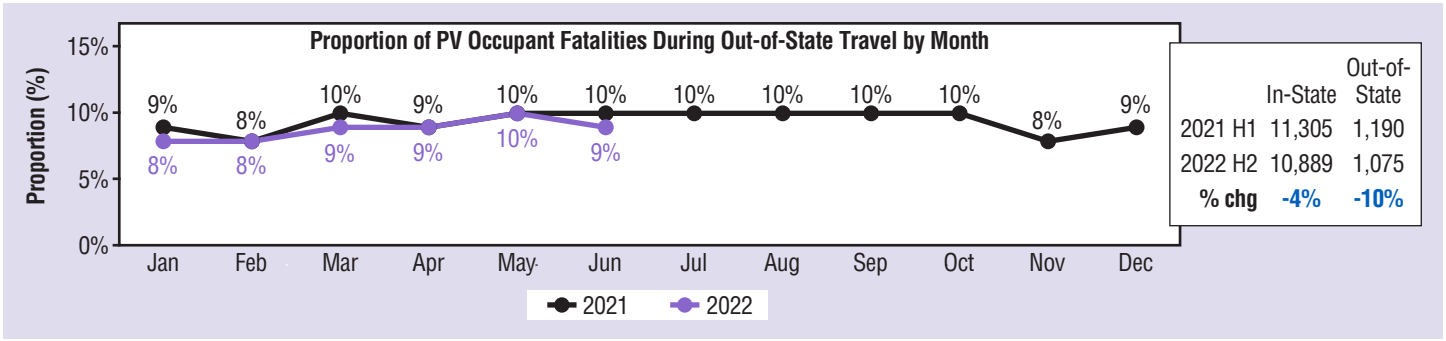
The last two columns contain fatalities and percentage change from 2021 H1 to 2022 H1. Unknown cases are proportionally distributed. Numbers in bold red/blue indicate the increase/decrease in the month (or the first half) of 2022 as compared to the same month (or the first half) of 2021 (in bold black). Source: 2021 and 2022 statistical projection.

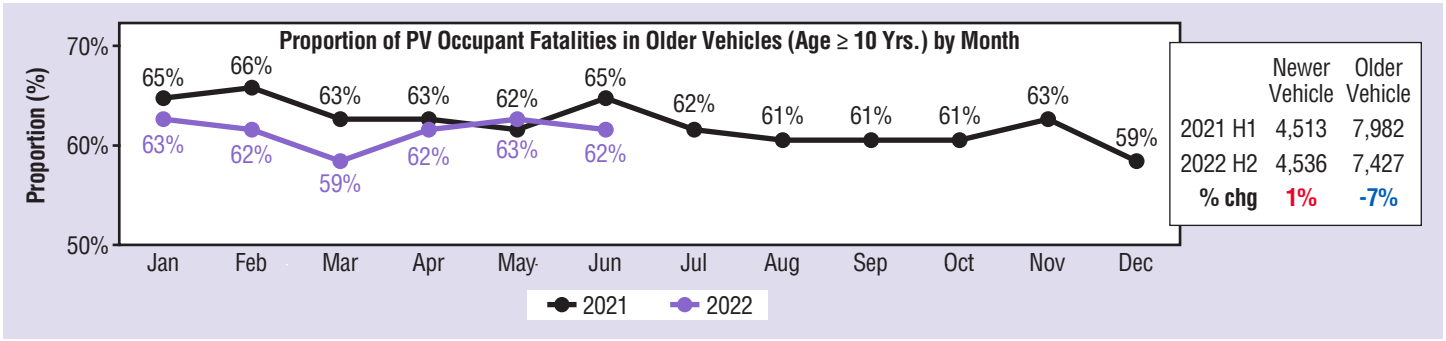
Figure 1: Relative Proportion of Total Fatalities by Land Use, Time of Day, Day of the Week, Vehicle Travel Pattern, Vehicle Age, Vehicle Occupant Fatalities by Rollover Occurrence and Ejection Status, and Passenger Vehicle Occupant Fatalities by Restraint Use for 2021-2022

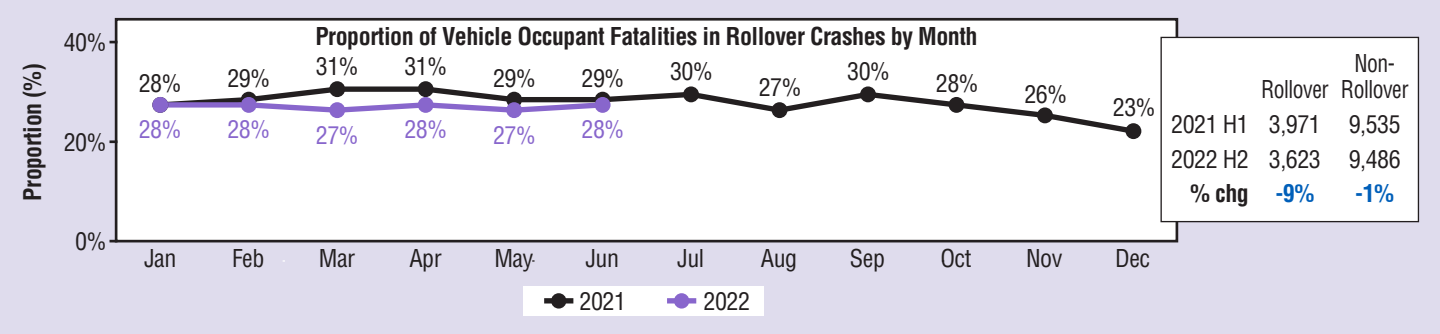


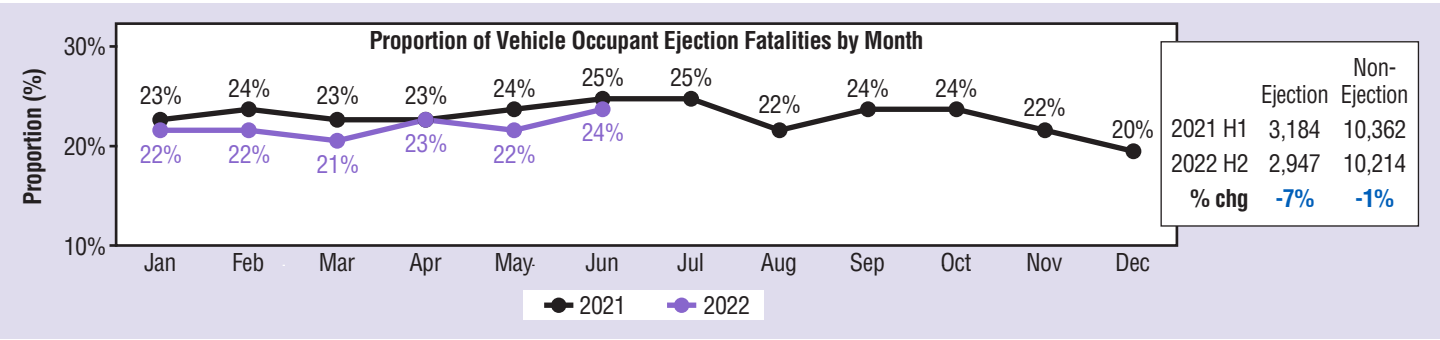


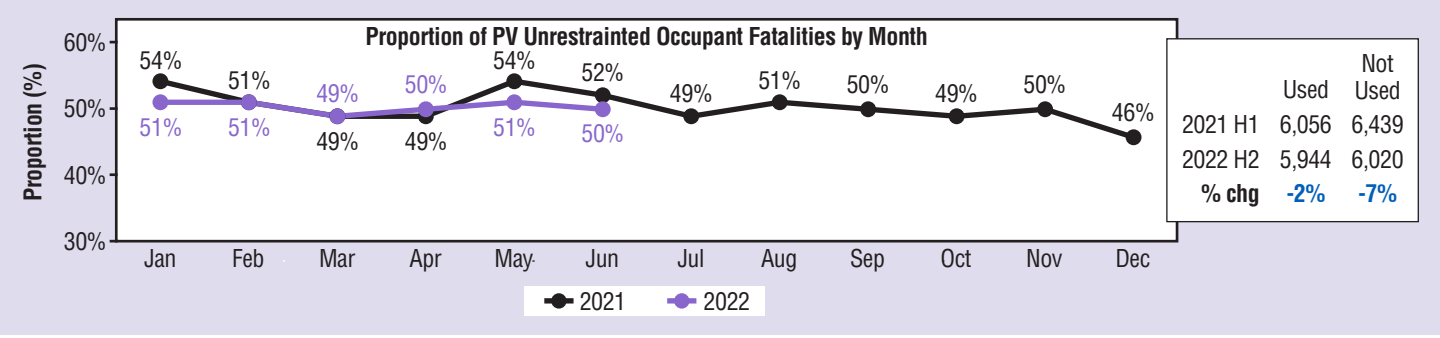










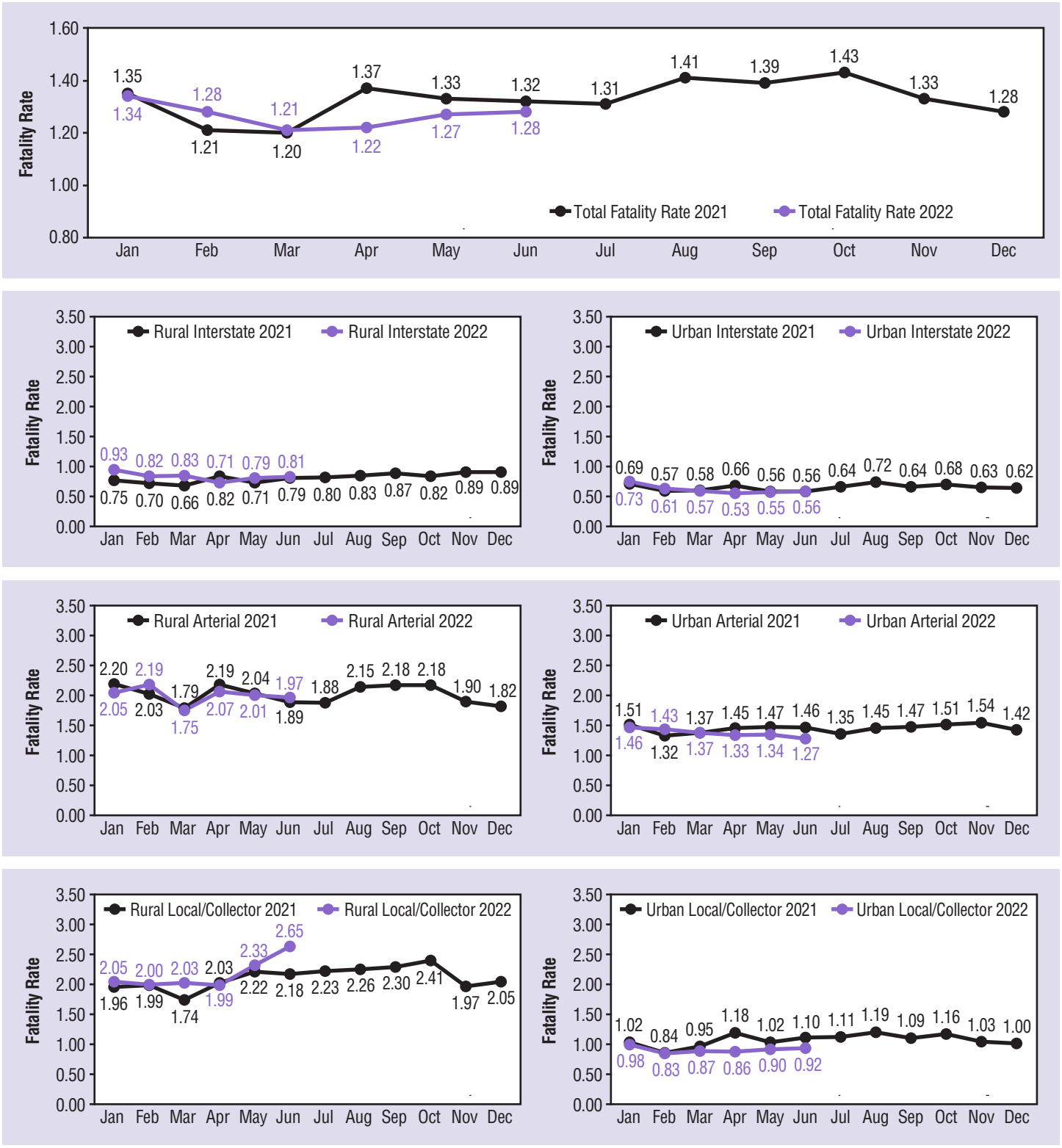


The text box in the chart contains fatality counts and the percentage change from 2021 H1 to 2022 H1. Unknown cases are proportionally distributed. Source: 2021 and 2022 statistical projection.

Fatality Rate

The total fatality rate per 100 million VMT is broken down by roadway function class: rural versus urban interstate, arterial, local/collector/street. The results shown in Figure 2 indicate that the trend of the total fatality rate per 100 million VMT from January to June 2022, is mainly driven by the fatality rate per 100 million VMT on the rural *arterial*, rural *local/collector/street* roadways, and urban *arterial*, based on the magnitude of the fatality rate by roadway function class. Overall, the estimated fatality rate for the first half of 2022 was 1.27 fatalities per 100 million VMT, down from the projected 1.30 fatalities per 100 million VMT during the first half of 2021.

Figure 2: Total Fatality Rate per 100 Million VMT and the Fatality Rate per 100 Million VMT by Roadway Function Class for 2021-2022



Note: Unknown cases are proportionally distributed.
Source: 2021 and 2022 statistical projection. FHWA December 2021 and September 2022 TVT for 2021 and 2022 VMT, respectively.

Limitations

In this study the fatal crashes currently coded for 2022 into NHTSA's FARS are used as a basis for constructing the gross estimates of traffic fatalities by sub-categories. The results from this analysis can be affected by two factors. First, any post COVID-19 pandemic-related lag to the fatal crash investigation and reporting are unknown and not captured in these projections. Second, the traditional FARS identification and reporting lag issue could also affect these estimates (e.g., the speeding-related, the roadway departure, and the police-reported alcohol involvement crashes reporting and coding). The estimates for the month and the sub-categories for particular regions with higher inflation rate (IR_{mr}) are more likely to affect the sensitivity of the overall projections. Also, these calculations assume that the cases not yet coded into 2022 FARS are similar in the sub-categories to those that are already in the 2022 FARS. In short, the estimated results are subject to change as more information gets coded into these cases as well as when more cases are entered into 2022 FARS ($FARS\_22_{mr}$). These results may also change as the annual report file for 2021 (replace $F\_Est\_21_{mr}$) are available later this year.

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For questions regarding the information presented in this report, please contact NCSARequests@dot.gov. This Crash•Stats and other general information on traffic safety can be found at https://crashstats.nhtsa.dot.gov/