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

Traffic Safety Facts
CRASH•STATS

DOT HS 813 581 A Brief Statistical Summary May 2024

Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories in 2023

Introduction and Summary

NHTSA has recently issued a projection report of traffic fatalities and the fatality rate per 100 million vehicle miles traveled (VMT) for 2023 (*Early Estimate of Motor Vehicle Traffic Fatalities in 2023*, Report No. DOT HS 813 561). That report shows an estimated 40,990 people died in motor vehicle traffic crashes during 2023, a decrease of about 3.6 percent as compared to 42,514 fatalities reported to have occurred in 2022. The estimated fatality rate for 2023 is 1.26 fatalities per 100 million VMT, down from the reported rate of 1.33 fatalities per 100 million VMT in 2022.

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 in 2023. The analysis is based on ratio-adjusted estimates of 2023 fatal crash data coded thus far into NHTSA's Fatality Analysis Reporting System (FARS), as described in the Data and Methodology section.

There are decreases across most of the sub-categories. The trends of traffic fatalities in 2023 as compared to 2022 in the key sub-categories are summarized as follows.

- on rural interstates (down 12%), urban interstates (down 9%), urban collectors/local roads (down 8%)
- at night (down 3%)
- during weekends (down 7%)
- during out-of-State travel (down 7%)
- in newer (vehicle age < 10 years) passenger vehicles (down 9%)
- in passenger vehicle rollover crashes (down 9%)
- ejected (down 10%)
- in single-vehicle crashes (down 5%)
- in roadway departure crashes (down 6%)
- in speeding-related crashes (down 4%)
- in the 15–24 age group (up 3%)
- males (down 3%) and females (down 5%)
- unrestrained occupants of passenger vehicles (down 9%)
- drivers (down 6%) and passengers (down 5%)
- passenger vehicle occupants (down 7%)
- motorcyclists (up 2%)
- pedestrians (down 2%)
- pedalcyclists (up 4%)

- in crashes involving at least one large truck (down 8%)

Additionally, the trend of the total fatality rate per 100 million VMT in 2023, as we have seen in recent years, was strongly driven by the trends in the fatality rates per 100 million VMT on rural arterials, rural local/collector/street roadways, and urban arterials.

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 data 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 includes 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 2023 into NHTSA's FARS and scales it up to the most recent estimates of fatality counts in 2023 (see cited 2023 early estimates report above, DOT HS 813 561).

The estimates of fatalities by sub-categories are carried out in two steps. The first step is to inflate current 2023 total cases coded into NHTSA's FARS data (FARS_23) to the estimated total fatalities (F_Est_23) 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.

$$IR = \frac{F\_Est\_23}{FARS\_23}$$

Inflation rates are computed for each month (m) and region (r) for a total of 120 inflation rates (12 months × 10 regions).

$$IR_{mr} = \frac{F\_Est\_23_{mr}}{FARS\_23_{mr}}$$

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, $FARS\_23\ (Sex_{male})_{mr}$, is weighted by the inflation rate IR_{mr} as follows, $F\_Est\_23\ (Sex_{male})_{mr} = FARS\_23\ (Sex_{male})_{mr} \times IR_{mr}$. 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 ($FARS\_23$) for month m and region r.

$$F\_Est\_23\ (Sex_{male})_{mr} = F\_Est\_23_{mr} \times \left(\frac{FARS\_23(Sex_{male})_{mr}}{FARS\_23_{mr}}\right)$$

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 2022 to 2023 for each level of the sub-category variables.

Estimated fatalities by sub-categories may vary due to the continuous updating of 2023 FARS data ($FARS\_23_{mr}$), especially for several sub-category variables (e.g., speeding, roadway departure, and rollover[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 3 months prior to publication, the estimates are relatively stable.

[1] Further adjustments of these three factors in this report have been made.

Results

This report examines the same major factors that NHTSA previously reviewed and investigated in 2022, and the results were published in *Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories in 2022* (DOT HS 813 448). These key factors may be linked to changes in driving behaviors, travel patterns, and transportation options owing to COVID-19 emergency measures.

The study results of projected fatalities for 2023 compared with the reported fatalities during 2022 are presented below. The data results for 2022 are from the FARS 2022 Annual Report File (ARF). Since the unknown values are proportionally imputed based on the distribution of observed counts (univariate imputation) in this study, the fatality counts for certain categories may not reflect the 2022 reported counts published in *Overview of Motor Vehicle Traffic Crashes in 2022*, April 2024, DOT HS 813 560.

Note that beginning in 2020, NHTSA changed to vPIC-based vehicle classifications for data extractions, analysis, projections, and reporting. Also, prior to 2022, motorized bicycles were collected as motor vehicles in FARS and their operators and passengers were captured as motorists. Beginning in 2022, FARS is no longer collecting motorized bicycles as motor vehicles. Consequently, operators and passengers of motorized bicycles will be captured as pedalcyclists when involved in a motor vehicle traffic crash. Single-vehicle crashes involving motorized bicycles will no longer be captured.

Fatalities

The findings for the trends of sub-category variables are based on the comparison of two metrics.

1. The *percentage distribution* of fatalities or the *percentage* of total fatalities, between the same month of 2022 and 2023 (labeled by [22] and [23] in the comparison of 2-year results).
2. The estimated fatality counts (fatalities) and the *percentage change* in fatalities from 2022 to 2023 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 in March and from June to August (Figure 1). The greatest increase occurred in March (42% [23] *versus* 38% [22]). Total estimated fatalities decreased by 2 and 5 percent in *rural* and *urban* areas, respectively, from 2022 to 2023.

  Specifically, as shown in Table 1, the total estimated fatalities on *rural interstate*, *urban interstate*, and *urban collector/local* roads decreased by 12 percent, 9 percent and 8 percent, respectively, from 2022 to 2023.
- The proportion of estimated fatalities during nighttime (6 p.m. to 5:59 a.m.) increased in April (56% [23] *versus* 53% [22]) (Figure 1). Total estimated fatalities during *nighttime* decreased by 3 percent from 2022 to 2023. Note that the total estimated fatalities during *daytime* also decreased by 4 percent from 2022 to 2023.
- As displayed in Figure 1, the proportion of estimated fatalities that occurred during *weekends* (6 p.m. Friday to 5:59 a.m. Monday) greatly increased in December (43% [23] versus 38% [22]). Total estimated fatalities decreased by 5 and 2 percent during the *weekdays* and the *weekends*, respectively, from 2022 to 2023.
- The proportion of estimated passenger vehicle (PV) occupant fatalities that occurred during *out-of-State* travel increased/decreased from January to March(Q1)/October to December(Q4), potentially indicating that a greater proportion of people traveled long distances by car/air during these months of 2023 compared to the same months of 2022. Total estimated passenger vehicle occupant fatalities that occurred during *out-of-State* travel decreased by 7 percent from 2022 to 2023.

Vehicle-Related Characteristics

- The estimated PV occupant fatalities decreased by 7 percent in *older vehicles* (vehicle age ≥ 10 years) from 2022 to 2023 (Figure 1). Note that the estimated PV occupant fatalities in *newer vehicles* (vehicle age < 10 years) decreased by 9 percent.

- The estimated PV occupant fatalities in *rollover* crashes decreased by 9 percent from 2022 to 2023 (Table 2).
- As displayed in Figure 1, the estimated fatally injured PV occupants *who were ejected*, as a proportion of all fatalities, decreased in months from January to March. Total estimated fatalities for PV occupants *who were ejected* decreased by 10 percent from 2022 to 2023. This is partially due to a similar decrease (9 percent) in estimated *unrestrained* PV occupant fatalities, as described in the person-related characteristics section.
- As shown in Table 1, total estimated fatalities in *single-vehicle* crashes decreased by 5 percent from 2022 to 2023. Note that the estimated fatalities in *multi-vehicle* crashes decreased only by 1 percent.
- Total estimated fatalities in *roadway departure/on roadway* crashes decreased by 6 and 1 percent, respectively, from 2022 to 2023, as shown in Table 1. Note that the *roadway departure/on roadway* crashes are highly correlated with above *single-vehicle/multi-vehicle* crashes.
- The *speeding-related* fatalities decreased by 4 percent from 2022 to 2023 (Table 2).

Person-Related Characteristics

- As shown in Table 1, total estimated traffic fatalities among people *younger than 15*, *25 to 64 years old*, and *65 and older* decreased from 2022 to 2023. However, total estimated fatalities increased by 3 percent for people *15 to 24 years old*, from 2022 to 2023.
- As displayed in Table 1, the total estimated *male* and *female* fatalities decreased by 3 and 5 percent, respectively, from 2022 to 2023.
- As shown in Figure 1, total estimated *unrestrained* PV occupant fatalities decreased by 9 percent from 2022 to 2023.

Fatalities by Person Type and in Crashes Involving Large Trucks

As shown in Table 2, the following results for the percentage change of estimated fatalities from 2022 to 2023 are observed:

- Total estimated *driver* fatalities decreased by 6 percent.
- Total estimated *passenger* fatalities decreased by 5 percent.
- Total estimated *PV occupant* fatalities decreased by 7 percent.
- Total estimated *motorcyclist* fatalities increased by 2 percent.
- Total estimated *pedestrian* fatalities decreased by 2 percent.
- Total estimated *pedalcyclist* fatalities increased by 4 percent.
- Total estimated fatalities in crashes *involving at least one large truck* decreased by 8 percent. A large truck is defined as any medium or heavy truck, excluding buses and motor homes, with a gross vehicle weight rating (GVWR) greater than 10,000 pounds. These large trucks include both commercial and non-commercial vehicles.

Table 1. Relative Proportion of Fatalities by Roadway Function Class, Age Group, Sex, and Crash Type for 2022–2023

Fatalities		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% change
2022		3,199	2,987	3,329	3,186	3,656	3,608	3,856	3,846	3,886	3,973	3,503	3,485	42,514	
2023		3,035	2,875	3,025	3,365	3,550	3,480	3,685	3,760	3,715	3,815	3,330	3,355	40,990	-4%
Roadway Function Class															
Rural Interstate	2022	6%	5%	6%	4%	5%	5%	5%	5%	4%	4%	4%	5%	2,055	
	2023	4%	5%	4%	5%	4%	4%	5%	6%	4%	4%	4%	4%	1,817	-12%
Urban Interstate	2022	9%	9%	9%	8%	8%	8%	8%	8%	8%	8%	9%	8%	3,541	
	2023	10%	8%	8%	9%	8%	8%	8%	8%	6%	9%	7%	6%	3,233	-9%
Rural Arterial	2022	18%	19%	16%	20%	18%	18%	17%	18%	20%	20%	19%	19%	7,829	
	2023	19%	17%	20%	18%	19%	19%	20%	19%	19%	19%	18%	20%	7,765	-1%
Urban Arterial	2022	40%	41%	40%	39%	38%	37%	37%	37%	37%	38%	39%	41%	16,393	
	2023	41%	41%	39%	38%	38%	37%	35%	37%	39%	38%	41%	42%	15,901	-3%
Rural Collector/Local	2022	15%	16%	16%	17%	18%	20%	20%	19%	19%	18%	16%	15%	7,426	
	2023	15%	16%	17%	18%	18%	21%	20%	20%	20%	18%	17%	15%	7,433	0%
Urban Collector/Local	2022	13%	11%	13%	12%	13%	13%	12%	13%	12%	12%	13%	12%	5,270	
	2023	11%	13%	12%	11%	13%	11%	12%	11%	12%	12%	12%	13%	4,841	-8%
Age Group															
<15	2022	2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	2%	1,134	
	2023	2%	2%	3%	3%	3%	2%	3%	2%	2%	2%	2%	2%	1,004	-11%
15–24	2022	15%	15%	17%	16%	16%	17%	16%	16%	15%	17%	16%	16%	6,785	
	2023	17%	16%	16%	19%	17%	19%	17%	19%	16%	17%	16%	17%	7,016	3%
25–34	2022	19%	21%	19%	19%	20%	20%	20%	19%	19%	18%	19%	18%	8,142	
	2023	19%	20%	19%	18%	19%	18%	19%	19%	18%	17%	18%	19%	7,587	-7%
35–44	2022	18%	16%	16%	16%	15%	15%	16%	16%	16%	15%	15%	16%	6,734	
	2023	16%	16%	15%	17%	16%	15%	16%	16%	17%	16%	15%	16%	6,475	-4%
45–54	2022	14%	14%	14%	13%	13%	13%	14%	13%	14%	13%	13%	12%	5,715	
	2023	12%	13%	13%	13%	13%	14%	13%	13%	13%	13%	12%	12%	5,284	-8%
55–64	2022	14%	14%	13%	15%	15%	15%	13%	14%	14%	14%	13%	14%	5,995	
	2023	14%	13%	14%	14%	14%	15%	14%	14%	14%	15%	15%	12%	5,663	-6%
65+	2022	18%	18%	19%	19%	18%	18%	17%	19%	19%	20%	21%	22%	8,009	
	2023	20%	20%	21%	17%	19%	18%	18%	18%	19%	19%	22%	22%	7,960	-1%
Sex															
Male	2022	71%	71%	71%	73%	72%	74%	73%	74%	73%	73%	71%	71%	30,747	
	2023	71%	72%	70%	72%	74%	75%	75%	75%	74%	72%	70%	71%	29,794	-3%
Female	2022	29%	29%	29%	27%	28%	26%	27%	26%	27%	27%	29%	29%	11,767	
	2023	29%	28%	30%	28%	26%	25%	25%	25%	26%	28%	30%	29%	11,196	-5%
Crash Type 1: Single- Versus Multi-Vehicle															
Multi-Vehicle	2022	44%	45%	46%	46%	48%	45%	46%	45%	47%	45%	45%	44%	19,344	
	2023	46%	46%	48%	48%	50%	47%	46%	47%	45%	45%	46%	46%	19,081	-1%
Single-Vehicle	2022	56%	55%	54%	54%	52%	55%	54%	55%	53%	55%	55%	56%	23,170	
	2023	54%	54%	52%	52%	50%	53%	54%	53%	55%	55%	54%	54%	21,909	-5%

Fatalities		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% change
Crash Type 2: Roadway-Departure-Related															
Departure	2022	48%	49%	48%	50%	47%	50%	49%	49%	46%	47%	47%	49%	20,514	
	2023	47%	46%	47%	47%	46%	48%	48%	47%	47%	47%	47%	47%	19,241	-6%
On Roadway	2022	52%	51%	52%	50%	53%	50%	51%	51%	54%	53%	53%	51%	22,000	
	2023	53%	54%	53%	53%	54%	52%	52%	53%	53%	53%	53%	53%	21,749	-1%

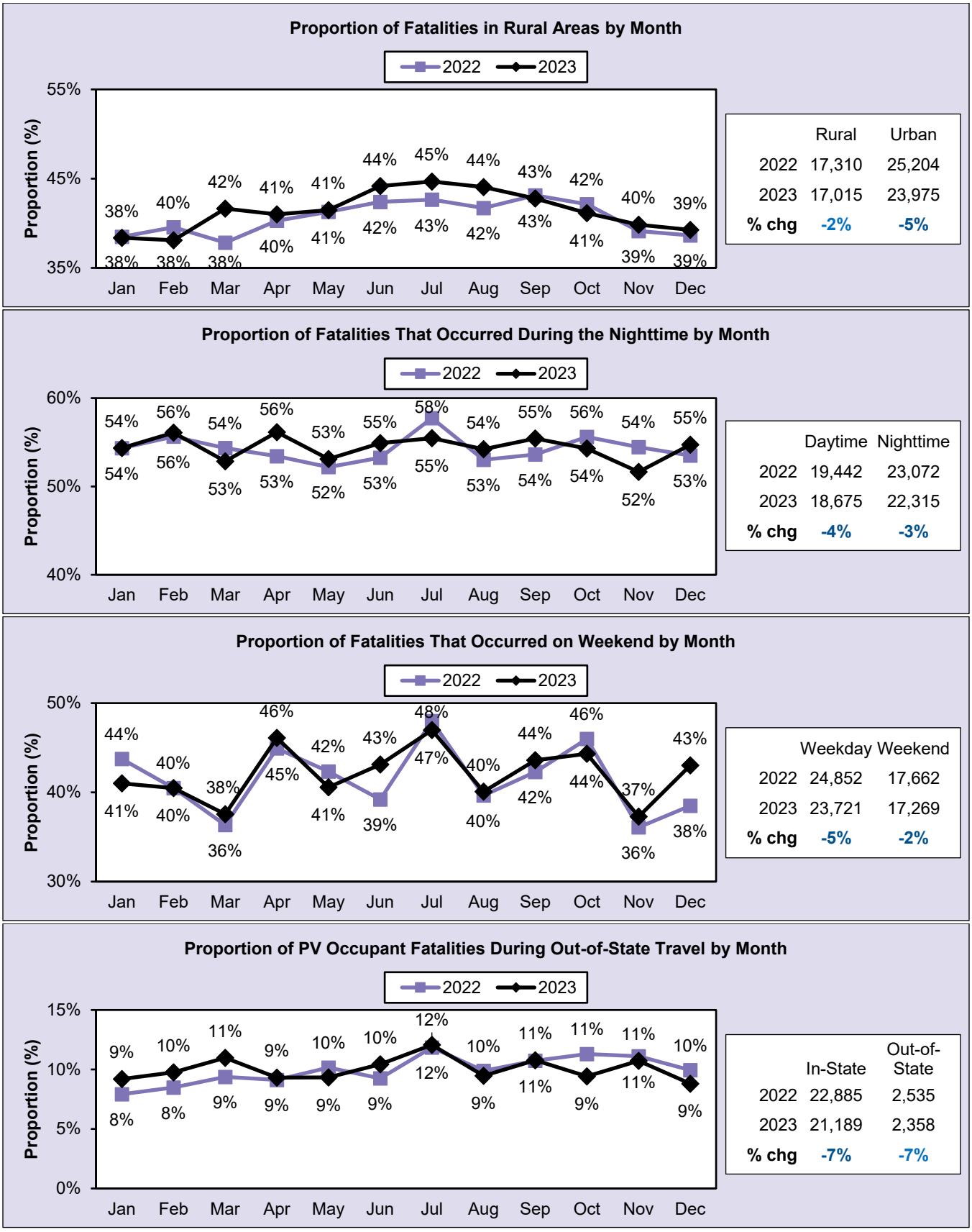
Notes: The last two columns contain fatalities and percentage change from 2022 to 2023. Unknown cases are proportionally imputed. Numbers in red/blue indicate the increase/decrease in the month (or the year) of 2023 as compared to the same month (or the year) of 2022 (in black).
Source: 2022 FARS ARF and 2023 statistical projections.

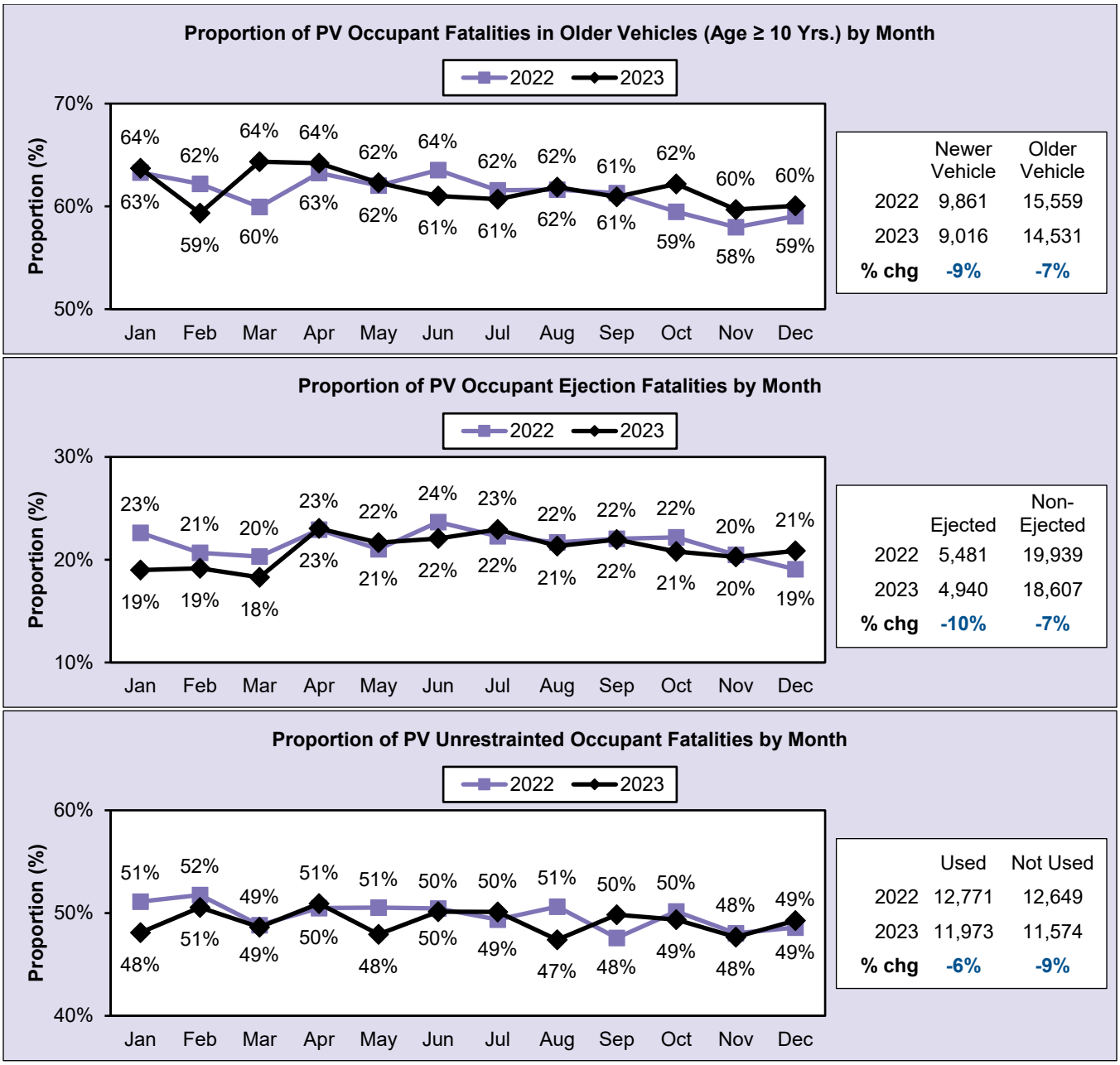
Table 2. Fatalities by Person Type, in Large-Truck-Related/Speeding-Related/PV Occupant in Rollover Crashes, as a Percentage of Total Fatalities for 2022–2023

Fatalities		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% change
2022		3,199	2,987	3,329	3,186	3,656	3,608	3,856	3,846	3,886	3,973	3,503	3,485	42,514	
2023		3,035	2,875	3,025	3,365	3,550	3,480	3,685	3,760	3,715	3,815	3,330	3,355	40,990	-4%
Driver	2022	55%	52%	51%	50%	47%	47%	46%	46%	46%	48%	51%	54%	20,908	
	2023	52%	50%	51%	48%	47%	48%	44%	46%	45%	47%	50%	52%	19,728	-6%
Passenger	2022	15%	15%	15%	14%	15%	14%	17%	14%	14%	14%	16%	16%	6,393	
	2023	16%	15%	16%	16%	16%	15%	16%	14%	13%	14%	13%	14%	6,066	-5%
PV Occupant	2022	67%	64%	61%	60%	58%	56%	57%	56%	56%	58%	62%	66%	25,420	
	2023	64%	62%	62%	60%	57%	57%	54%	53%	52%	55%	58%	59%	23,547	-7%
PV Occupant Rollover	2022	19%	18%	16%	18%	17%	18%	18%	16%	16%	17%	17%	17%	7,312	
	2023	17%	18%	15%	17%	16%	17%	16%	16%	16%	16%	16%	16%	6,676	-9%
Motorcyclist	2022	6%	9%	12%	17%	20%	22%	20%	19%	18%	14%	10%	6%	6,218	
	2023	7%	11%	12%	16%	20%	20%	21%	21%	20%	16%	11%	8%	6,364	2%
Pedestrian	2022	21%	20%	19%	16%	14%	14%	13%	17%	17%	20%	21%	22%	7,522	
	2023	22%	21%	19%	16%	14%	14%	14%	16%	17%	19%	22%	23%	7,337	-2%
Pedalcyclist	2022	2%	3%	2%	2%	3%	3%	3%	3%	3%	3%	2%	2%	1,105	
	2023	3%	2%	3%	2%	2%	2%	4%	3%	4%	3%	3%	3%	1,149	4%
Involving Large Trucks	2022	14%	15%	15%	14%	13%	14%	13%	13%	14%	14%	14%	14%	5,936	
	2023	14%	13%	14%	12%	13%	13%	12%	14%	13%	14%	13%	14%	5,439	-8%
Speeding Related	2022	29%	29%	30%	29%	30%	30%	29%	30%	26%	27%	27%	28%	12,151	
	2023	28%	28%	28%	29%	30%	28%	30%	28%	28%	28%	28%	28%	11,608	-4%

Notes: The last two columns contain fatalities and percentage change from 2022 to 2023. Unknown cases are proportionally imputed. Numbers in red/blue indicate the increase/decrease in the month (or the year) of 2023 as compared to the same month (or the year) of 2022 (in black).
Source: 2022 FARS ARF and 2023 statistical projections.

Figure 1. Relative Proportion of Total Fatalities by Rural/Urban, Time of Day, Day of the Week, and PV Occupant Fatalities by Vehicle Travel Pattern, Vehicle Age, Ejection Status, and Restraint Use for 2022–2023



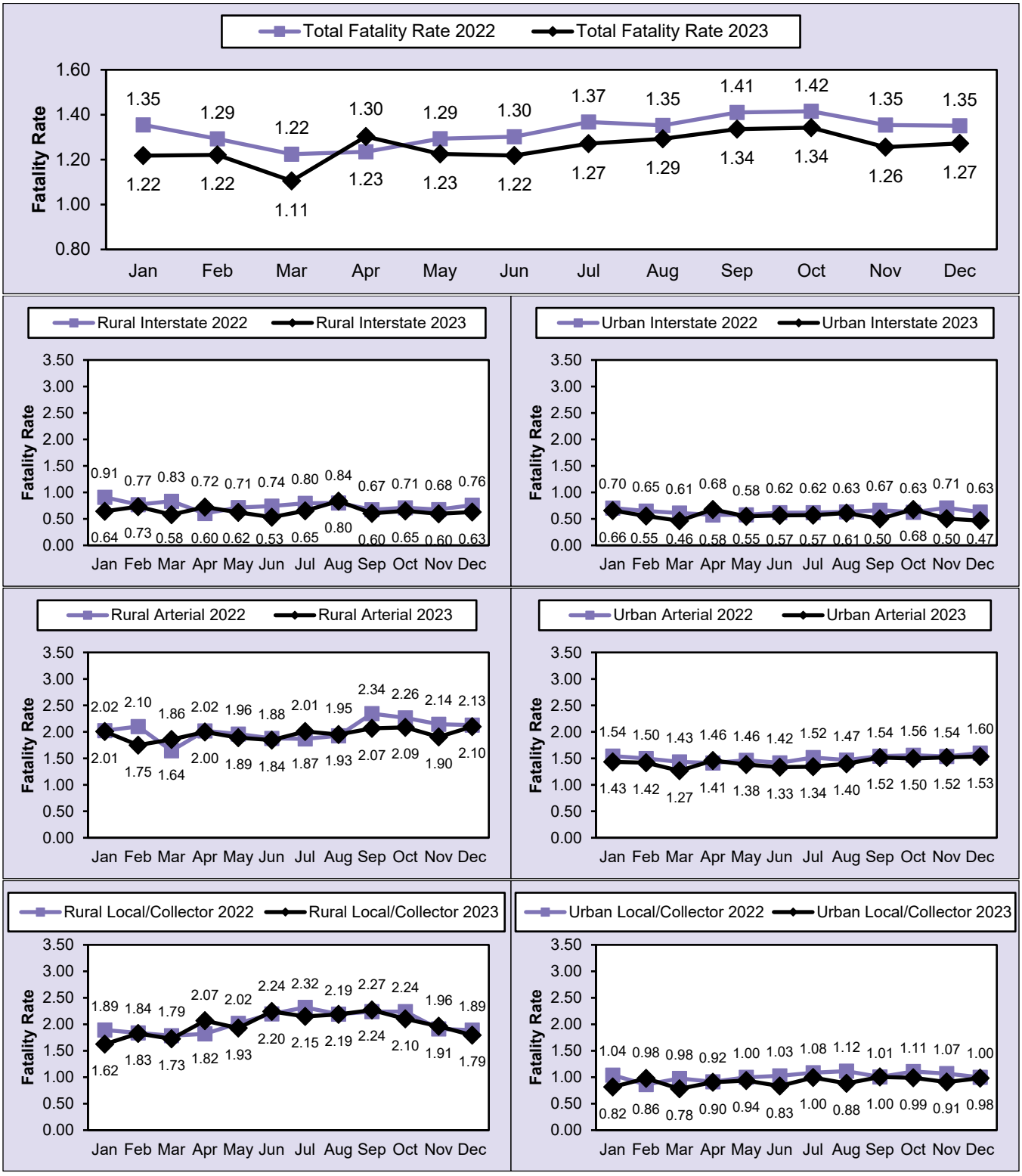


Notes: The text box in the chart contains fatality counts and the percentage change from 2022 to 2023. Unknown cases are proportionally imputed.
Source: 2022 FARS ARF and 2023 statistical projections.

Fatality Rate

The total fatality rate per 100 million VMT is broken down by roadway function class: rural versus urban interstates, arterials, local/collector/streets. The results shown in Figure 2 indicate that the trend of the total fatality rate per 100 million VMT in 2023, as we have seen in recent years, is mainly driven by the fatality rate per 100 million VMT on *rural arterials, rural local/collector/street roadways*, and *urban arterials*, based on the magnitude of the fatality rate by roadway function class. Overall, the estimated fatality rate for 2023 was 1.26 fatalities per 100 million VMT, down from the reported 1.33 fatalities per 100 million VMT during 2022.

Figure 2. Total Fatality Rate per 100 Million VMT and the Fatality Rate per 100 Million VMT by Roadway Function Class for 2022–2023



Note: Unknown cases are proportionally imputed.
Source: 2022 FARS ARF and 2023 statistical projections. FHWA December 2023 TVT for 2022 & 2023 VMT.

Limitations

In this study the fatal crashes currently coded for 2023 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 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 rollover crashes reporting and coding). The estimates for the month and the sub-categories for 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 2023 FARS are similar in the sub-categories to those that are already in the 2023 FARS. In short, the estimated results are subject to small changes as more information gets coded into these cases as well as when more cases are entered into 2023 FARS ($FARS\_23_{mr}$). These results may also change slightly as the Annual Report File for 2023 (then replace $F\_Est\_23_{mr}$) is available next 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/.