Kentucky Occupational Motor Vehicle Injury Surveillance Program

Background

In 2021, occupational motor vehicle crashes (OMVCs) were the leading cause of occupation-related fatalities in the US (33%) and in Kentucky (38%) (Bureau of Labor Statistics, 2022, 2023). To track occupational motor vehicle- (OMV-) related injuries in Kentucky, the Kentucky Injury Prevention and Research Center's Kentucky Occupational Safety and Health Surveillance (KOSHS) fundamental program developed two state-specific population-based, OMV-related occupational health indicators (OHIs): OHI #26 (OMV collision first reports of injury and claims filed with workers' claims by injury year) and OHI #27 (fatal and nonfatal OMV collision injuries) (Bunn et al., 2023).

These OHIs are developed using Workers' Compensation (WC) and Collision Reporting and Analysis System for Highways (CRASH) data sources, respectively. Because these OHIs are based on sole-source data elements, injury risk associated with OMV crashes is assumed to be underestimated, especially for occupations and industries such as farm workers, sales representatives, gig drivers (e.g., Uber or Lyft drivers), and highway incident managers that may be difficult to capture through these two surveillance sources. Heavy vehicles such as buses, semi-trucks, and dump trucks infer occupation relatedness, as these vehicle types are used less commonly for personal use. Conversely, when the units involved in occupation-related crashes are smaller passenger vehicles and pickup trucks, those crashes are more difficult to identify as OMVs given that the vehicle types are commonly used for personal use.

Considering these limitations, a critical shortcoming of OMV surveillance is the inability to identify OMV crashes involving light and medium vehicles (e.g., vans, passenger cars, small delivery trucks) through the existing population data sources and methods. To provide a more complete picture of the magnitude of the OMV crash burden, the Occupational Motor Vehicle Injury Surveillance (OMVIS) system in Kentucky was developed to utilize existing data from available data sources. The OMVIS system identifies the vehicle type based on the vehicle identification number (VIN), executes a probabilistic linkage of the CRASH database with other health-related databases, and employs a machine learning approach on crash record narratives for light vehicles to identify additional OMV crashes.

Beginning in 2020, response to the COVID-19 pandemic caused many changes in usual traffic patterns such as decreased overall vehicle miles traveled, a higher number of deliveries, and an increase in the frequency of the use of services that are typically provided with small and light vehicles (Bureau of Transportation Statistics, 2021). Therefore, the Kentucky CRASH dataset from 2019 was included to avoid bias and to establish pre-pandemic OMVC numbers that can be compared to pandemic and post-pandemic numbers.

KIPRC KENTUCKY INJURY PREVENTION AND RESEARCH CENTER

KOSHS KENTUCKY OCCUPATIONAL SAFETY AND HEALTH SURVEILLANCE

OMVIS Occupational Motor Vehicle Injury Surveillance

Kentucky Public Health Prevent. Promote. Protect.

Results

The development of the new OHIs to capture OMV crashes for light and medium vehicles combined with VIN identification, probabilistic linkage, and crash narrative data mining allowed for efficiently identifying OMV crashes. A five-year database was established to examine trends.

Using the VINs of the vehicles involved, each vehicle was classified based on the Federal Highway Administration Gross Vehicle Weight Rating (GVWR), which categorizes vehicles in eight weight classes. Classes 1 and 2 represent light vehicles with a GVWR of less than 10,000 pounds, classes 3 through 6 are identified as medium with GVWRs ranging from 10,001 to 26,000 pounds, and classes 7 and 8 comprise heavy vehicles with GVWRs of more than 26,000 pounds. Initially, only vehicles with a GVWR greater than 2 (i.e., the medium [3 to 6] and heavy [7 and 8] categories) were considered as involved in an OMV crash.

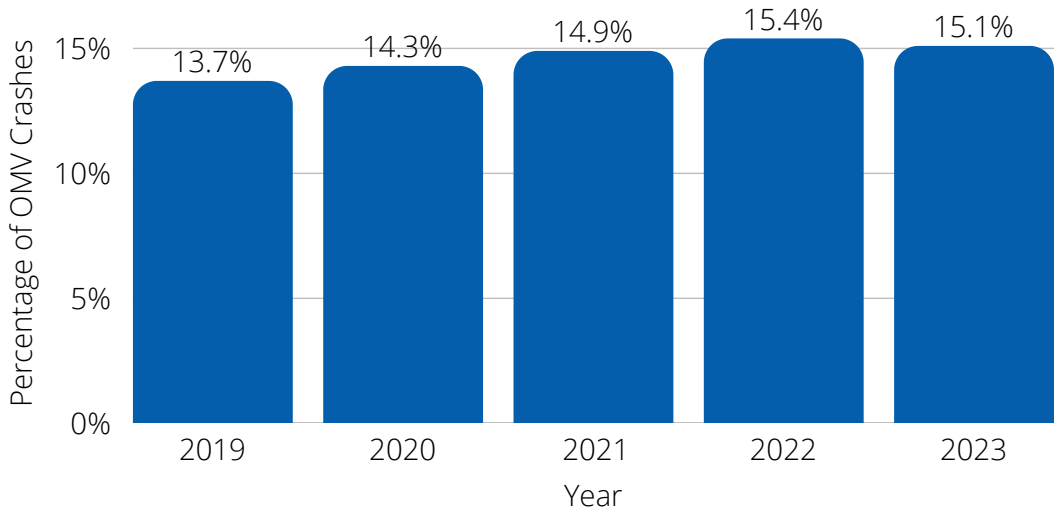
The next step involved the identification of additional medium-weight vehicles categorized in the CRASH database as Special Use Vehicles, since all of these involve a type of occupational vehicle (e.g., taxis, emergency vehicles, publicly owned vehicles, military vehicles, etc.). To identify additional crashes that could be considered as OMV, all crashes were then linked with four health-related databases: Workers' Compensation, outpatient hospital visit, inpatient hospitalization, and Emergency Medical Services records. An analysis was performed to filter and exclude those that were already identified in previous steps. The last effort to identify potential OMV crashes entailed examining crashes involving light vehicles using a machine learning mining of the crash narratives.

The results from this analysis are summarized in Table 1. The data show a reduction in 2020 for OMV crashes that mirrored the overall reduction of crashes (and traffic) in 2020 due to the pandemic. In subsequent years, OMV and non-OMV crashes showed a consistent increase. However, the comparison of the relative share of crashes between OMV and non-OMV reveals a different pattern. Figure 1 shows that OMV crashes made up a greater share of all crashes in 2020 than in 2019. This trend continued during the 2021-2023 period. The researchers speculate that this increase in OMV crashes in light and medium vehicles could be due to increased home deliveries during the early phases of the COVID-19 pandemic.

Table 1. Occupational Motor Vehicle Crashes in Kentucky, 2019–2023

Year	Vehicle Weight			Total OMV Crashes	Non-OMV Crashes
	Light	Medium	Heavy		
2019	6,637	5,592	8,887	21,116	133,527
2020	5,437	4,437	6,727	16,601	99,587
2021	5,775	5,546	8,017	19,338	110,205
2022	5,589	5,550	8,601	19,740	108,504
2023	5,937	5,967	8,540	20,444	114,733
Total	29,375	27,092	40,772	97,239	566,556

Figure 1. Percentage of Occupational Motor Vehicle Crashes in Kentucky, 2019-2023



The data in Table 1 also indicate that the magnitude of OMV crashes is greater than when only heavy vehicles were reported as OMV crashes. When light- and medium-weight vehicles are included, the total number of OMVCs for the five-year period is 97,239 (representing approximately 14.6% of total crashes), compared to the total for heavy vehicles of 40,772. It is apparent that the OMVIS database's combined approach of linking health-related crashes with crash data and conducting crash-narrative text mining improves the estimation of the true magnitude of OMV crashes. Table 2 shows the relative contribution of each database in the OMVIS database.

Table 2. Added Occupational Motor Vehicle Crashes in Kentucky through Probabilistic Linkage and Crash Narrative Text Mining, 2019-2023

Year	Database					Total
	Workers' Compensation	Inpatient Hospitalizations	Outpatient Hospitalizations	Emergency Medical Services	CRASH Test Mining	
2019	180	6	285	71	4,307	4,849
2020	122	7	206	15	3,673	4,023
2021	112	7	226	30	3,947	4,322
2022	121	13	208	36	3,769	4,147
2023	110	4	211	25	4,081	4,431
Total	645	37	1136	177	19,804	21,799

A review of fatal crashes in OMVIS was also undertaken to determine the number of OMV fatal crashes. Of the 3,253 fatal crashes from 2019 through 2023, 640 (19.7%) were identified as OMV. Just under 58% of these involved heavy vehicles. Table 3 presents the relative data by vehicle type.

Table 3. Fatal Occupational Motor Vehicle Crashes in Kentucky, 2019–2023

Year	Vehicle Type			Total
	Light	Medium	Heavy	Total
2019	22	34	72	128
2020	26	25	77	128
2021	29	27	86	142
2022	30	22	66	118
2023	24	30	70	124
Total	131	138	371	640