



## NIOSH Center for Motor Vehicle Safety

### Impact Stories: Evaluation of Strategic Plan for Research and Prevention, 2014-2018

This document includes examples of actions, findings, outputs, and impacts (intermediate outcomes) on selected populations at elevated motor vehicle crash and injury risk.

Use the following links to download each Impact Story separately:

- [Truck Drivers](#)
- [EMS Workers & Firefighters](#)
- [Law Enforcement Officers](#)
- [Oil & Gas Extraction Workers](#)
- [Light-Vehicle Drivers](#)



# Truck Drivers

NIOSH Motor Vehicle Safety Impact Story

Truck transportation is essential to the U.S. economy. Long-haul truck drivers work long hours and drive long distances, increasing their risk for crashes.



More than 1 in 3 long-haul truck drivers have experienced a serious truck crash during their career.<sup>1</sup>

## Key Actions:



- Collect body measurement data from more than 1,900 truck drivers across 15 states.
- Share data with 8 major truck manufacturers, parts suppliers, and software developers.



Partner with Virginia Tech Transportation Institute to study sleep patterns of 96 commercial truck drivers during non-work periods, and evaluate the influence on subsequent driving performance.



- Conduct a survey of 1,265 long-haul truck drivers from 32 truck stops across 48 states.
- Evaluate healthy food options, site safety, and exercise facilities at 16 of the 32 stops.

## Key Findings:

- Truck drivers are heavier—13.5 kg (29.8 lbs) for males and 15.4 kg (34 lbs) for females—than the general U.S. population, demonstrating the need for updated cab designs to improve trucker safety.
- Truck drivers with less sleep overall, sleep starting near the middle of a non-work period, and less sleep 1-5 a.m. had the highest rates of high-risk road events.
- 37% of long-haul truck drivers reported being noncompliant with hours-of-service rules at least some of the time.
- 67% of truck drivers reported having 2 or more health risk factors (e.g., hypertension, obesity, smoking, high cholesterol, no physical activity, 6 or fewer hours of sleep per 24-hour period).
- Most truck stops did not provide healthy food options, a safe walking area, or exercise facilities.



<sup>1</sup>CDC Vital Signs [Trucker Safety](#)



## Key Outputs:



- Anthropometric dataset of body dimensions of 1,900 truck drivers (See [Chapter IV](#))
- Multivariate anthropometric models to aid in the design of next generation commercial truck cabs (See [Chapter V](#))



- *Accident Analysis & Prevention* [article](#): The influence of daily sleep patterns of commercial truck drivers on driving performance
- *American Journal of Industrial Medicine* [article](#): Obesity and other risk factors: The national survey of U.S. long haul truck driver health and injury



*CDC Vital Signs* [report](#) based on survey results



## Key Impacts:

- NIOSH data helped project partners design the next generation of truck cabs to better accommodate the body dimensions of today's truck drivers.
- A software developer used NIOSH data to make a 3D digital driver model for truck-cab design software.
- One major trucking company and several insurance carriers used the results from the survey of long-haul truck drivers to justify the need for health and wellness programs.
- The Federal Motor Carrier Safety Administration cited NIOSH survey results in 2 commercial vehicle operator rules: *Minimum Training Requirements for Entry-level Commercial Motor Vehicle Operators* and *Driving of Commercial Vehicles: Use of Seatbelts*.

# EMS Workers & Firefighters

NIOSH Motor Vehicle Safety Impact Story

Emergency medical services (EMS) workers and firefighters are vital to disaster response. Their duties expose them to hazards that increase their risk for on-the-job injuries.



46% of all EMS provider fatalities between 2013-2017 were related to motor vehicle crashes.<sup>1</sup>

100 firefighters died as a result of motor vehicle crashes between 2008-2017.<sup>2</sup>

## Key Actions:



Partner with the Department of Homeland Security, other federal agencies, and manufacturers to crash-test ambulances and major components (e.g., patient cot).



Collaborate with the Office of Emergency Medical Services in the National Highway Traffic Safety Administration to describe nonfatal injuries and exposures to EMS providers.



- Work with industry to improve firefighter personal protective equipment (PPE) and fire apparatus design.
- Investigate fatal firefighter motor vehicle incidents.

## Key Findings:

- Ambulances fall outside most federal motor vehicle safety standards and, as a general rule, are not regulated by the federal government. Guidelines for ambulance design, purchasing, and licensing are the responsibility of individual states.
- Motor vehicle incidents led to about 2,000 injured EMS workers seeking emergency department treatment each year from July 2010 to June 2014. Most injured workers in the patient compartment were not wearing seat belts.
- Current seat belt designs do not accommodate some firefighters, especially if they wear turnout gear.
- Technically-sound design of PPE and fire apparatus requires scientific measurement of firefighters' body dimensions, not self-reported information.



<sup>1</sup>Bureau of Labor Statistics, Census of Fatal Occupational Injuries, [Query System](#)

<sup>2</sup>U.S. Fire Administration (2009-2018). Fire Fighter Fatalities in United States in



## Key Outputs:



- Ambulance [crash tests](#)
- Award-winning [video series](#), Improving EMS worker safety through ambulance design and testing



- *Prehospital Emergency Care* [article](#): Occupational injuries and exposures among emergency medical services workers
- EMS employer [fact sheet](#)



- Anthropometric (body measurement) [database](#) of U.S. firefighters published on NIOSH website
- *Applied Ergonomics* [article](#): Seat and seatbelt accommodation in fire apparatus: Anthropometric aspects

## Key Impacts:

- NIOSH and industry partners worked together to develop and validate 10 new test methods, each based on crash testing, to improve worker safety in an ambulance. The Society of Automotive Engineers published each test method.
- These test methods, their adoption into 3 national bumper-to-bumper standards, and the educational campaign driven by the NIOSH video series led to nationwide changes to ambulance design and purchasing specifications.
- The Volunteer Fire Insurance Services Company used NIOSH investigations in risk management training and educational material to educate fire departments on the pros and cons of volunteer firefighters responding in privately-owned vehicles.
- Vehicle and equipment designers are using NIOSH firefighter anthropometric data to design safer vehicles and turnout gear.

# Law Enforcement Officers

NIOSH Motor Vehicle Safety Impact Story

Law enforcement officers spend many hours behind the wheel, including responding to emergency calls, in high-speed pursuits, and conducting normal patrol duties.



564 officers died due to vehicle crashes, 31% of all line-of-duty deaths from 2005-2016.<sup>1</sup>

Of the 152 fatal crashes from 2012-2016, almost half were single-vehicle events.<sup>1</sup>

## Key Actions:



Evaluate the effectiveness of a departmental crash prevention program in reducing motor vehicle crashes and injuries.



Conduct statewide survey of officers and agency leaders to better understand motor vehicle crashes, seat belt use, and motor vehicle safety training.



Investigate crash-related officer fatalities to understand the circumstances and causes of these events.

## Key Findings:

- It is possible to reduce crashes and injuries by implementing and enforcing policies, education, and training. One agency's program led to a 14% decline in crash rate and 41% decline in injury rate for all law enforcement officers. Patrol officers, those spending the most amount of time in patrol cars, had the largest decreases in crashes and injuries.
- Nearly all officers believed that driver training is critical to their safety, but only half reported that academy-provided driver training prepared them to safely drive in the field, and only 29% reported having any type of motor vehicle annual in-service training.
- Most officer-involved motor vehicle crashes occurred during daylight (49%), in clear weather (70%), during non-emergency calls (64%), and at speeds lower than 50 mph (79%).

## Key Outputs:



- Officer Motor Vehicle Safety [webpage](#)
- Keep officers safe on the road [infographic](#)
- Officer Road Code [toolkit](#)



- [Findings](#) from a statewide survey of officers related to motor vehicle incidents
- Officer motor vehicle crash & struck-by fatality investigation [reports](#)



*Police Chief Magazine*  
[Research in Brief:](#)  
Officer-involved collisions:  
Magnitude, risk factors,  
and prevention

## Key Impacts:

- Research fostered a relationship between NIOSH and law enforcement bodies such as the Police Foundation, National Institute of Justice, Destination Zero, National Sheriffs' Association, Below 100, and International Association of Chiefs of Police.
- Crash investigations identified details about circumstances and contributing factors that can be used to support training programs and policy changes to promote safe driving among officers.
- According to a NIOSH Science Blog post about popular NIOSH information in [2018](#), an Instagram message about the Officer Road Code toolkit had the most likes (96) and most engagement (108) of any post since NIOSH opened the account in 2016. Engagement includes likes, comments, and saves.

# Oil & Gas Extraction Workers

NIOSH Motor Vehicle Safety Impact Story

Many oil and gas extraction (OGE) workers drive long distances from their homes, lodging sites, and equipment yards to reach well sites that are often in remote areas.



Motor vehicle crashes cause over 50% of work-related deaths in the oil and gas extraction industry.<sup>1</sup>

## Key Actions:



Analyze existing datasets to better understand factors involved in fatal motor vehicle crashes in the OGE industry.



Raise awareness of best practices for the OGE industry, including journey management, in-vehicle monitoring systems (IVMS), and fatigue risk management.



Coordinate a [working group](#) for developing products and discuss solutions to OGE motor vehicle safety issues.

## Key Findings:

- The motor vehicle fatality rate for the OGE industry is higher than all other industry sectors except for transportation and warehousing.
- Slightly more than half of fatalities were occupants of light-duty pickup trucks. Common factors noted in crash reports included speeding, weather conditions, and driver fatigue.
- IVMS are being used by large OGE companies in the United States and globally to reduce motor vehicle crash risk. This technology helps reduce risky driving behaviors through in-vehicle feedback and coaching by supervisors.





## Key Outputs:

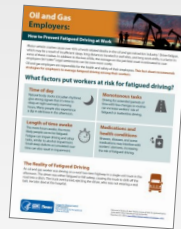


- *Morbidity and Mortality Weekly Report* [article](#): Occupational fatalities during the oil and gas boom
- *Society of Petroleum Engineers* [article](#): Journey management



Fatigued driving fact sheets for OGE:

- [Employers](#)
- [Workers](#)



Delivered over 40 presentations on motor vehicle safety to industry leaders at regional, national, and international events.

## Key Impacts:

- International Association of Oil and Gas Producers (IOGP) issued a new *Land Transportation Safety Recommended Practice: Implementing an In-Vehicle Monitoring Program — a Guide for the Oil and Gas Extraction Industry*. Developed by IOGP committee members, other industry stakeholders, and NIOSH, this collaborative product is internationally-used and recognized.
- Using best practices identified by NIOSH, Texas Mutual and the Texas Oil and Gas Association Oil and Gas Safety Roundtable developed an 8-module worker training program focused on motor vehicle safety.
- The Occupational Safety and Health Administration (OSHA) Oil and Gas Well Drilling and Servicing eTool contains a [transportation module](#) that incorporates best practices identified by NIOSH research. The eTool also uses case examples identified through the NIOSH Fatalities in Oil and Gas Extraction (FOG) [database](#).

# Light-Vehicle Drivers

NIOSH Motor Vehicle Safety Impact Story

Millions of workers drive light vehicles to meet with clients or customers.



58% of the workers who died in workplace motor vehicle crashes in 2016 were **not** in vehicle-operator jobs such as truck, bus, or taxi driver.<sup>1</sup>

## Key Actions:



- Identify crash risk factors and evaluate safety practices.
- Analyze fleet safety data from the Network of Employers for Traffic Safety (NETS).



Participate in the American National Standards Institute (ANSI)/American Society of Safety Professionals (ASSP) Z15 standards committee, NETS, and the Road to Zero Coalition.



Publish a quarterly eNewsletter, [Behind the Wheel at Work](#), to reach more than 25,000 subscribers with research updates, practical tips on workplace driving, and news about events.

## Key Findings:

- In-vehicle warning lights, combined with supervisory coaching, reduced risky driving behaviors by 43% among light-vehicle fleet drivers.
- Using only Fatality Analysis Reporting System (FARS) data, work-related crash fatalities are dominated by transportation workers and trucks. Adding cases identified by the Census of Fatal Occupational Injuries (CFOI) showed that fatal work-related crashes significantly impact workers across all industries and occupations.
- For 70 NETS companies, several practices were related to lower collision and injury rates, including mobile phone record checking, fatigue management practices, driver training, and an intensive collision review process.

## Key Outputs:



- *Journal of Safety Research* [article](#): Evaluation of an in-vehicle monitoring system (IVMS) to reduce risky driving behaviors
- *Accident Analysis & Prevention* [article](#): Work-related fatal motor vehicle traffic crashes: Matching of 2010 data from CFOI and FARS



Repackage research results for safety professionals:

- *Professional Safety* [article](#): Fleet safety: Developing & sustaining an effective program with ANSI/ASSE Z15.1
- Older drivers in the workplace [fact sheet](#)



- Preventing work-related motor vehicle crashes [fact sheet](#)
- Keep workers safe on the road [infographic](#)



## Key Impacts:

- NIOSH contributed technical expertise to the revised ANSI/ASSP Z15.1 standard, *Safe practices for motor vehicle operations*. This standard outlines requirements for managing fleets of all sizes, industries, and vehicle types.
- NIOSH contributed technical expertise to the ANSI/ASSP TR-Z15.3 technical report, *Management practices for the safe operation of partially- and fully-automated motor vehicles*.
- Analysis of NETS benchmarking data identified road safety practices that were significantly associated with lower collision and injury rates, providing member companies with important information to improve and/or reinforce practices.
- A large health care company developed safety campaigns to target issues identified by NIOSH. The company extended its IVMS program to newly-hired drivers based on NIOSH research that showed higher collision rates for drivers with the shortest tenure with the company.