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Motor vehicle fatalities among oil and gas extraction workers

Kyla D. Retzer[a,*], Ryan D. Hill[b,1], Stephanie G. Pratt[c,2]

[a] National Institute for Occupational Safety and Health, Oil and Gas Extraction Safety and Health Program, Alaska Pacific Office, 4230 University Dr., Ste. 310, Anchorage, AK 99508, United States
[b] National Institute for Occupational Safety and Health, Oil and Gas Extraction Safety and Health Program, Western States Office, P.O. Box 25226, Denver, CO 80225, United States
[c] National Institute for Occupational Safety and Health, Division of Safety Research, Center for Motor Vehicle Safety, 1095 Willowdale Road, Mail Stop H-1808, Morgantown, WV 26505, United States

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ABSTRACT

Motor vehicle crashes are the leading cause of work-related fatality in the U.S. as well as in the oil and gas extraction industry. This study describes the characteristics of motor vehicle-related fatalities in the oil and gas extraction industry using data from the U.S. Bureau of Labor Statistics' Census of Fatal Occupational Injuries. It compares the risk of dying in a motor vehicle crash in this industry to other major industries and among different types and sizes of oil and gas extraction companies. There were 202 oil and gas extraction workers who died in a work-related motor vehicle crash from 2003 to 2009. The motor vehicle fatality rate for workers in this industry was 8.5 times that of all private wage and salary workers (7.6 vs. 0.9, $p < .0001$). Workers from small oil and gas establishments (<20 workers) and workers from well-servicing companies were at greatest risk of dying in a motor vehicle crash. Pick-up trucks were the most frequent type of vehicle occupied by the fatally injured worker ($n = 104$, 51.5%). Safety belt non-use was identified in 38.1% ($n = 77$) of the cases. Increased focus on motor vehicle safety in this industry is needed, in particular among small establishments. Extraction workers who drive light duty vehicles need to be a specific focus.

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1. Introduction

Motor vehicle crashes on public highways are consistently the leading cause of work-related fatality in the U.S., accounting for 8173 fatalities during 2003–2008 (24% of all work-related fatalities for the period) and a rate of 0.94 deaths per 100,000 workers (CDC, 2011a). These events exact an economic burden in addition to a human toll. One study estimated that motor vehicle crash injuries occurring on and off the job cost employers nearly $60 billion USD annually from 1998 to 2000 (National Highway Traffic Safety Administration, 2003). On average, each fatality cost the employer over US$ 500,000 in direct and liability costs, and each nonfatal injury cost nearly US$ 74,000. For work-related crashes, the cost to businesses of non-use of safety belts was estimated to be over US$ 2 billion.

Previous reports show that compared to workers in all industries, workers in the oil and gas extraction industry experienced seven times the rate of work-related death due to all causes (CDC, 2008), and six times the rate of work-related motor vehicle-related death (5.7 deaths per 100,000 workers) (CDC, 2011a). Potential risk and exposure factors for fatal motor vehicle crashes in the oil and gas extraction industry include frequent travel between well sites, travel on rural roads which often lack firm shoulders and rumble strips, low levels of safety belt use, and long and irregular hours of work that contribute to driver fatigue. Oil and gas extraction workers often work up to 12-h shifts, and 7–14 days in a row (CDC, 2008).

The oil and gas extraction industry employed an estimated 434,488 people in the U.S. in 2010 (Bureau of Labor Statistics, 2011). While the number of oil and gas extraction workers fluctuates from year to year, there was a 48% overall increase in the number of workers from 2003 to 2010. Additional growth is expected in this industry, with shale gas production expected to increase by almost threefold by 2035 (U.S. Energy Information Administration, 2011). With this growth comes an increase in the number of workers and a need to address major causes of work-related injury and death. This study contributes to the literature by providing data on motor vehicle-related fatalities in the oil and gas extraction industry that are more detailed than published previously. Further, the study compares motor vehicle-related fatality rates for the oil and gas extraction industry with other industries and compares the risk of motor vehicle-related death by establishment type and size. This information will help to identify gaps in crash data and will

* Corresponding author. Tel.: +1 907 271 2388; fax: +1 907 271 2390.
E-mail addresses: kretzer@cdc.gov (K.D. Retzer), gii9@cdc.gov (R.D. Hill), sgp2@cdc.gov (S.G. Pratt).
[1] Tel.: +1 303 236 0502; fax: +1 303 236 6072.
[2] Tel.: +1 304 285 5992; fax: +1 304 285 5774.

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contribute to more targeted motor vehicle safety efforts in the oil and gas extraction industry.

2. Materials and methods

Work-related motor vehicle fatalities were identified using the Census of Fatal Occupational Injuries (CFOI), a cooperative program between the U.S. Bureau of Labor Statistics (BLS) and state governments.[3] CFOI is the most comprehensive surveillance system for work-related injury fatalities in the U.S. Multiple data sources are accessed to compile data, including death certificates, OSHA reports, workers' compensation reports, police reports, and media accounts. Cases are deemed to be work-related upon confirmation by two independent data sources.

The oil and gas extraction industry includes three types of companies: the oil and gas *operators* who control and manage leased areas, the *drilling contractors* who drill the wells, and the *well-servicing* companies who provide all other types of support operations that prepare a well for production and completion. For this study, the 2002 North American Industry Classification System (NAICS) was used to identify workers whose employers were classified by industry into the following three codes: Oil and Gas Extraction (211), Drilling Oil and Gas Wells (213111) and Support Activities for Oil and Gas Operations (213112). To be consistent with the terminology commonly used in the industry and previously published studies, employers categorized in NAICS 211 are referred to hereafter as "oil and gas operators," in NAICS 213111 as "drilling contractors" and in NACIS 213112 as "well-servicing companies." Data for other industries were grouped according to NAICS for comparison to the oil and gas extraction industry. All analyses were limited to data years 2003–2009, as NAICS categories are not comparable to the Standard Industrial Classification previously used by the BLS.

The CFOI uses the Occupational Injury and Illness Classification System (OIICS) to code characteristics of work-related fatalities (BLS, 2012). The CFOI data were subset to all cases coded per the 2007 OIICS as "highway accident" events (event code = 41). This encompasses all motor vehicle-related fatalities of vehicle occupants occurring on a public highway, street, or road or its shoulder and surrounding areas. It excludes motor vehicle fatalities that occurred on industrial, commercial, or residential premises, or that were the result of an assault or violent act. More detailed event codes within the "highway accident" category were examined. Also of interest were the source of injury (i.e., the type of vehicle occupied by the decedent), the decedent's status as a driver or passenger, the type of road on which the incident occurred, and the time of day. Motor vehicle fatalities that occurred during commuting to work are not included in CFOI.

The CFOI also provides data on the demographic and employment characteristics of the fatally injured worker, including occupation (categorized using the Standard Occupational Classification [SOC] scheme) (OMB, 2010), size of establishment,[4] years of service with the company, age group, gender, race, Hispanic origin, and the state in which the incident occurred. The narrative text field in CFOI was systematically examined for information on factors related to the driver, vehicle, or road environment, as well as the circumstances of the crash. Each narrative was reviewed manually by a single coder, as the factors identified were straightforward (e.g., safety belt worn) and did not require coder interpretation. The following factors were identified: safety belt use/non-use, occupant ejection, other drivers' error, speed, fell asleep, overcorrected and lost control, lost control at curve, weather, night time, debris/holes in roadway, collisions with livestock, and faulty vehicle parts (e.g., tire blowout, brake failure). In crashes where multiple factors were listed, each factor was counted once. It should be noted that the narrative text field in CFOI is based on information obtained from the source documents, and does not contain a high level of detail for all cases. More importantly, mention of a factor in the narrative field does not imply causation.

Ideally, fatality rates should be calculated based on vehicle miles traveled (VMT) or some other measure of exposure such as hours of driving. However, no such data exist for work-related driving in general or for the oil and gas extraction industry in particular. Therefore, as is customary for most analyses of work-related injuries and fatalities, rates (and accompanying risk ratios) were calculated based on average annual employment estimates. For this study, the source of employment estimates was the BLS' Quarterly Census of Employment and Wages (QCEW), the only source that provides estimates for the detailed NAICS codes that make up the oil and gas extraction industry (BLS, 2011). QCEW estimates are calculated from monthly employer reports and include all workers covered by state unemployment insurance laws. The QCEW does not include self-employed workers,[5] nor does it provide estimates by age, race or gender. To ensure consistency between the numerator (fatalities identified through CFOI) and denominator (QCEW employment estimates), the CFOI data were subset to include only fatalities to individuals employed in the private sector and working for wage or salary, thereby excluding the self-employed, employees who worked in a family business, volunteers, and government workers.

Rate ratios (RR) and 95% confidence intervals (CI) were calculated for comparisons of fatality rates for the oil and gas extraction industry and other major industry groups, for comparisons between the three component NAICS codes that make up the oil and gas extraction industry, and for comparisons between large, medium and small establishments within the oil and gas extraction industry. For the first comparison, all private wage and salary workers were used as the reference group because there is no industry group that could reasonably be compared to oil and gas extraction on the basis of operational characteristics or likely exposure to motor-vehicle related risks. For the other two comparisons, the group with the lowest rate was used as the reference group. All analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC, 2008).

3. Results

Between 2003 and 2009, 202 oil and gas extraction workers died as a result of a motor vehicle crash. Motor vehicle-related fatalities accounted for 28% of all oil and gas extraction work-related fatalities during this 7-year period and were the leading cause of death.

Decedents were predominantly white males and 21% were Hispanic ($n = 44$) (data not shown). Forty percent of the decedents were younger than 35 years of age (Table 1). Thirty-one percent of the deaths were to workers who had worked for their employer for 1 year or less ($n = 63$). Those workers fatally injured in a motor vehicle crash were most often employed as extraction workers

[3] This research was conducted with restricted access BLS data. The views expressed here do not necessarily reflect the views of the BLS.

[4] An establishment is defined as "an economic unit, such as a farm, mine, factory, or store that produces goods or provides services. It is typically at a single physical location and engaged in one, or predominantly one, type of economic activity for which a single industrial classification may be applied" (Bureau of Labor Statistics, 2011). As discussed in 4.8, there are potential inconsistencies in the use of this concept for the oil and gas extraction industry.

[5] Self-employed worker is defined as carrying on a business as a sole proprietor or an independent contractor.