Methods for State Occupational Epidemiology Surveillance of Work-Related Fatal Injuries

Data Collection, Classification, Reporting and Updates

Every year, two programs at the Wyoming Department of Workforce Services monitor and report work-related injury deaths that occurred in Wyoming: the State Occupational Epidemiology program and the federally-run Census of Fatal Occupational Injuries (CFOI). Often, the differences in program confidentiality restrictions and information access result in the two strategies producing different counts of workplace deaths. The two programs collect similar information but have two different goals: the federal CFOI program facilitates the collection of standardized data across states and the nation; while the State Occupational Epidemiology program provides more detailed reporting of workplace deaths that have occurred in the state.

More information and data from State Occupational Epidemiology: wyomingworkforce.org/data/epidemiology/
More information and data from the Census of Fatal Occupational Injuries: doe.state.wy.us/lmi/safety.htm

Introduction

This document reviews the fatality surveillance and reporting methods used by the State Occupational Epidemiology program at the Wyoming Department of Workforce Services. In general, the program follows very similar case ascertainment and classification strategies employed by the federal Census of Fatal Occupational Injuries (CFOI), using the following guidelines:

- Injury type and cause classification using the most recent version of the U.S. Department of Labor, Bureau of Labor Statistics, Occupational Injury and Illness Classification Manual (OIICS), which is currently version 2.01 last revised 01/2012.²
- Industry classification using the most recent version of the North American Industrial Classification System (NAICS).³

Using these guidelines, the state occupational fatality tracking system is able to compile an annual profile of work-related injury deaths that is similar to the federal CFOI. However, there are invariably differences in total
numbers, data elements, grouping schemes and case classification. Because access to the federal CFOI data is highly restricted, the state findings cannot be reconciled with the federal data.

The key concepts that govern the state occupational fatality tracking system are as follows:

- Fatalities which resulted from traumatic injury or acute exposure at work are included. Deaths caused by occupational illness or chronic exposure are generally excluded. Deaths at work caused by natural disease (e.g. heart attack, stroke) are also excluded, unless there was a component of acute injury or exposure. The federal CFOI follows these same inclusion/exclusion principles.
- Deaths that occurred out-of-state, but as the result of an in-state workplace injury or exposure, are included. It is unknown how the federal CFOI reports such cases.
- Industry classification for each fatality is assigned based on the industry within which the victim was working at the time of fatal injury. Rarely, this may differ from the industry in which they were directly employed. For example, a construction company employee killed while working on a contract job on a mining site would likely be assigned to the mining industry. It is unknown how the federal CFOI classifies such cases.

**Data Sources**

Occupational fatality cases are typically first identified through a review of death certificates from State Vital Records and also claims data from Wyoming Workers’ Compensation. Both data sources have record-level markers for identifying potential work-related deaths: the death certificate contains an indicator variable for “injury at work” and fatal workers’ compensation claims are typically flagged for fatality benefits to surviving family. Other sources of information that may be obtained for workplace deaths include:

- Wyoming OSHA and State Mines investigation reports
- Reports from other investigating agencies, such as the National Transportation Safety Board
- Motor vehicle crash reports filed with the Wyoming Highway Patrol
- Newsprint and online media reports
- Obituaries
- Postings on social media and online tribute sites
- Coroners’ reports
- Toxicology and autopsy reports

A minimum of two source documents are obtained for each case. Cases that cannot be substantiated with multiple source documents are not included in the state report. Source documents are obtained through a variety of mechanisms, including inter-agency data sharing agreements, state authority granted in statute, referral from other occupational health and safety programs, and web searches for publically accessible information.

**Inclusion Criteria**

• Fatalities for which traumatic injury or acute exposure during work was the primary cause of death are included.
  o Criteria from the CFOI Handbook of Methods are used to define fatal traumatic injury and acute exposure.¹

• There is no exact formula for identifying work-related motor vehicle crash fatalities. Workers in all industries travel with varying frequency, for various reasons, and with varying types of employer support, such as travel reimbursement, paid travel time, or travel in employer-owned fleet vehicles. Generally, a motor vehicle crash fatality is included if the vehicle occupied by the decedent was company-owned, the crash investigators annotated that the decedent was traveling for work at the time of the crash, and/or the fatality was reported to OSHA or Workers’ Compensation.
  o Workers fatally injured during a non-traditional commute in a personal vehicle (i.e., traveling with a work crew or over excessive distances) may be included, although these cases are very difficult to identify so are likely under-represented in state data.
  o The CFOI scope criteria are also used to help identify and define work-related travel and non-traditional commute status. ⁴ These guidelines state, “a worker is exempt from normal commute status if the following conditions are present:
    ▪ If the decedent was undertaking travel for work that falls outside the geographic or temporal routine.
    ▪ If the worker’s job location was variable because of the itinerant nature of their work and required the decedent to report to different locations on a regular basis. Examples include: construction job sites, home health aides, services to homes (maintenance, installation, etc.).
    ▪ If the decedent relied on employer-provided transportation to get to their job location.”
  o Workers traveling as part of a normal commute are not included in state occupational fatality tracking.

• Fatalities with latency between date of injury or acute exposure and the date of death are included if the traumatic injury or exposure was deemed the originating, underlying cause of death. However, latent deaths are inherently more difficult to identify in data sources available. Thus, these deaths are likely under-represented in these data.

• Fatalities that occurred out-of-state, but as a result of an in-state workplace injury or acute exposure incident, are included if identified. Critical injuries occurring in Wyoming may be stabilized and transported to a neighboring state trauma care center. Deaths that occur at an out-of-state center are certified in that state. These types of cases are essential for understanding fatal injury causes within the originating state.

• Deaths are included regardless of worker age or industry of employment or activity. Criteria from the CFOI Handbook of Methods are used to define the work relationships and type of workers included in state surveillance.

Exclusion Criteria
• Deaths caused by occupational illness or chronic exposure are excluded. The long-latency period for occupational illnesses as well as under-reporting issues makes it very difficult to identify and compile a complete roster of illness cases. Additionally, the data sources and methods used for traumatic injury
and acute exposure deaths differ from those that might be used to more reliably identify deaths with a long latency between exposure and diagnosis of illness.

- Deaths at work caused by natural disease (e.g. heart attack, stroke) are also excluded, unless there was a component of acute injury or exposure.
- Workers killed in motor vehicle crashes during traditional commutes in a personally owned vehicle are also excluded.

**Industry Classification**

Industry classification for each fatality is assigned according to the industry within which the victim was working at the time of fatal injury (industry of activity). In most cases, this is the same as the industry in which they were directly employed. Once the most detailed industry is assigned, down to the 6-digit NAICS code whenever possible, fatalities are grouped into one of the following major industry categories for reporting:

- Agriculture, Forestry, Fishing and Hunting (NAICS 11)
- Construction (NAICS 23)
- Manufacturing (NAICS 31-33)
- Mining (excluding oil and gas) (NAICS 21, excluding 211, 213111, 213112)
- Oil & Gas Extraction and Production (NAICS 211, 213111, 213112; Petroleum Refinery 32411; Pipeline Transportation 486; Cases within other industries when identified as directly connected to oil and gas activity.) (See Section Description Below)
- Transportation and Warehousing (NAICS 48-49, excluding Pipeline Transportation 486)
- Other (all other NAICS)

**Oil & Gas Extraction and Production: A State-Specific Industry Category**

Industry classification follows the most recent version of the North American Industrial Classification System (NAICS), with one exception: this tailored industry group called Oil & Gas Extraction and Production. This category primarily includes deaths among workers who were employed by oil and gas extraction industries (NAICS 211, 213111, and 213112), but it also includes victims within other industries when the worker’s employment was directly connected to oil and gas extraction or production. Workers employed in the Petroleum Refinery (NAICS 32411) and Pipeline Transportation (NAICS 486) industries are included, as well as select workers from other industries identified as directly engaged with oil and gas extraction or production activity.

This approach to enumerate oil and gas associated fatalities is used because oil and gas activities are significant components of Wyoming’s economy. The path of production from crude oil and gas to finished product is highly fragmented by up-, mid- and down-stream operations; multiple site locations for a single employer; and several layers of subcontracting. As such, efforts to enumerate fatalities within this broad and diverse industry require deviating from standard NAICS grouping. This approach also supports similar national efforts to enumerate fatalities connected to oil and gas activity. 5
There are numerous challenges and limitations in classifying industry, including possible misclassification in the data sources and lack of detailed information needed for accurate identification. Thus, industry assignments made by the state program may not match those done by the federal CFOI.

Causal Event & Exposure

Fatality cause categories are assigned in two tiers:

- A general category is assigned using the same event and exposure divisions presented in the federal CFOI data, using the Occupational Injury and Illness Classification Manual (OICCS).²
- A detailed sub-category is also assigned and reported, as able. The detailed sub-categories represent the most common occurrences observed in Wyoming occupational fatality data, grouped in a manner to facilitate interpretation for prevention efforts. Some general cause categories are not split into detailed sub-categories due to numbers in the general category that are too small to split, or due to the data lacking any natural trend that would facilitate creation of detailed categories.

General fatality cause categories with corresponding detailed cause categories:

<table>
<thead>
<tr>
<th>General Event/Exposure Cause Category</th>
<th>Detailed Event/Exposure Cause Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with Objects and Equipment</td>
<td>None</td>
</tr>
<tr>
<td>Exposure to Harmful Substances or Environments</td>
<td>Drowning</td>
</tr>
<tr>
<td></td>
<td>Exposure to Harmful Substances</td>
</tr>
<tr>
<td></td>
<td>Exposure to Harmful Environments</td>
</tr>
<tr>
<td>Falls, Slips, Trips</td>
<td>Falls, Slips, Trips (from height)</td>
</tr>
<tr>
<td></td>
<td>Falls, Slips, Trips (same level)</td>
</tr>
<tr>
<td>Fires &amp; Explosions</td>
<td>None</td>
</tr>
<tr>
<td>Motor Vehicle Crashes¹</td>
<td>Motor Vehicle Crash (Aircraft &amp; Railroad)</td>
</tr>
<tr>
<td></td>
<td>Motor Vehicle Crash (Roadway Travel)</td>
</tr>
<tr>
<td></td>
<td>Motor Vehicle Crash (Pedestrian/Worksite)</td>
</tr>
<tr>
<td>Violence or Injury by Persons or Animals</td>
<td>Violence or Injury by Animal</td>
</tr>
<tr>
<td></td>
<td>Violence or Injury by Person (Intentional)</td>
</tr>
<tr>
<td></td>
<td>Suicide at Work</td>
</tr>
<tr>
<td>Overexertion and Bodily Reaction</td>
<td>None</td>
</tr>
</tbody>
</table>

Additional detail regarding motor vehicle crashes:

The circumstances of motor vehicle crashes are highly variable, involving different types of vehicles in motion, drivers, passengers, pedestrians, and various types of personal protective equipment and restraints. The following provides additional insight into how sub-categories are assigned:

¹ The term “Motor Vehicle Crashes” corresponds to the Occupational Injury and Illness Classification Manual (OICCS) cause division “Transportation Incidents.”² The term “Motor Vehicle Crash” is used to alleviate any confusion about or misinterpretation of data points representing transportation incidents and those representing transportation industry workers.
• Motor Vehicle Crash (Aircraft/Railroad) includes victims who were fatally injured in a crash while operating or riding in aircraft or railcar.
• Motor Vehicle Crash (Roadway Travel) includes drivers and passengers of vehicles who were fatally injured in a crash while traveling on a public roadway.
• Motor Vehicle Crash (Pedestrian/Worksite) includes victims who were struck by a moving or rolling vehicle on a road-side or on a job site. This category also includes drivers and passengers of vehicles that crashed on a worksite or on private property. The vehicles involved could be an automobile, ATV, UTV, or other moving vehicle or equipment.
• Workers fatally injured by a vehicle or parts of a vehicle that fell or was lowered onto them are captured under the category of Contact with Objects and Equipment.

**Lead Investigating Agency**

When a workplace death occurs, multiple agencies (local, state and/or federal) may invoke authority for an on-scene or in-depth investigation. For the purpose of state occupational epidemiology tracking, lead investigating agency was assigned based on a hierarchical framework to prioritize identifying state regulatory agency involvement:

- The category of **Wyoming OSHA or State Mines** was assigned if one of these programs conducted an on-scene investigation. These are the primary state programs with regulatory authority over workplace safety, and they typically do not share authority over the same workplace deaths.
- The category of **Wyoming Highway Patrol (WHP)** was assigned for any motor vehicle crash for which the crash was investigated by local or state law enforcement and recorded with the WHP, and WY OSHA did not investigate. It is possible that law enforcement and OSHA would investigate a road-side or pedestrian-related occupational fatality – in that instance, the death would be noted as an OSHA-investigated case.
- The category of **Local Authorities** was assigned when the death was investigated and recorded only by the local coroner’s office (through vital records) and/or the local law enforcement agency.
- The category of **Other** typically applies to cases where a federal regulatory agency investigated without any state agency involvement, such as deaths investigated by the Federal Aviation Administration. These deaths were also likely investigated by local authorities.

Note that Wyoming OSHA typically does not have or does not exercise jurisdiction to conduct an on-scene or in-depth investigation of the following types of fatalities:

- Mine site incidents covered by the State Mine Inspector and/or the federal Mine Safety and Health Administration (MSHA)
- Roadway travel motor vehicle crashes
- Incidents occurring within agricultural industries when there are fewer than 10 employees
- Deaths of sole business owners/operators with no employees
- Fatal injuries for which there was greater than 30 days between the injury incident and death
- Suicides that occurred at work
Case Descriptions
The State Occupational Epidemiology program provides brief case descriptions for each occupational fatality using following general structure:

Occupation. Brief summary of event. Possible contributing factors, if known or applicable, such as use of safety equipment, weather, worker experience or training, or equipment malfunction or misuse. Significant observations from any official investigations by state or federal regulating agencies.

Comparable case descriptions are not published by the federal CFOI program. Fatality case descriptions for years 2012-2016 were completed prior to the development of these methods, including the case description framework, thus the case descriptions may not follow the same construct and may not contain as much information. However, case narratives may be updated after their initial completion in subsequent annual reports.

Data Reporting
Since 2012, the State Occupational Epidemiology program has been publishing an annual report of work-related fatal injuries and exposures. This effort will continue to provide the aggregate, multi-year summary of workplace fatalities identified by the state, as well as the compilation of occupational fatality case descriptions, which are not available through any other information source.

Data Updates
Efforts to identify and classify fatal occupational injuries and exposures in Wyoming are ongoing, and case data may be updated after its initial completion, when new information becomes available, when an error in classification is discovered, or when a change in grouping and coding is necessary to more accurately represent the profile of incidents that have occurred in Wyoming. For these reasons, the most current annual fatality report of the State Occupational Epidemiology program represents the most accurate state-compiled record of incidents and should not be compared to prior years’ reports.

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5 Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Fatalities in the Oil and Gas Extraction Industry (FOG). Available: www.cdc.gov/niosh/topics/fog/default.html