



# Patterns of underlying causes of work-related traumatic fatalities – Comparison between small and larger companies in British Columbia



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## ABSTRACT

There are consistent reports of discrepancies in injury and fatality rates between small and larger businesses. This study sought to identify patterns of safety behavior that might explain the differences. We mined the database of the Workers' Compensation Board of British Columbia for data on all traumatic fatalities for the period 2003–2007. We also reviewed reports from investigators, coroners, and employers to determine underlying patterns of cause of fatalities in different industries and to assess differences between small and larger businesses. Fatality rates were 9.7 for small businesses and 2.7 for larger businesses. Factors for which there were significant differences by employer size were: fatalities within one month of employment, fatality rates in primary industries and transportation, vehicular incident fatality rates, and seat belt use. Small businesses in British Columbia have a significantly higher traumatic fatality rate than do larger businesses. Prevention strategies are needed to address training and supervision of new workers in small businesses.

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## 1. Introduction

Prevention of fatalities is one of the primary goals of occupational health and safety programs. Understanding the causes of fatalities can lead to better-focused injury prevention strategies that will also address serious injury and overall injury rates. An extensive study by the Kauffman-Rand Institute found that, although small businesses have lower reported injury rates than larger businesses, they have higher fatality rates than larger businesses in the same industry (Mendeloff et al., 2006). Other studies of specific industries including landscaping and retail support this finding (Buckley et al., 2008; Peek-Asa et al., 1999). There is therefore a need to explore prevention strategies for smaller businesses. The present study compares patterns of underlying causes of work-related traumatic fatalities between small and larger companies using data from a large data set from the government-mandated Workers' Compensation Board of BC (WCB, operating as WorkSafeBC).

British Columbia (B.C.) is a maritime and mountainous province in western Canada with a population of 4 million. Since 1917, all businesses in B.C. that have workers have been required to participate in injury and death indemnity coverage provided by the WCB. The origin and fundamental value of workers' compensation in Canada rests on the principle of mutual protection arising from the historic compromise in which workers relinquished their right to sue their employer, and in return, employers agreed to fund a no-fault insurance system. This no-fault insurance system automatically covers workers regardless of whether their employer pays the insurance premiums. Self-employed individuals can voluntarily participate.

The system has a one-year time limit for accepting all claims. However, policies allow for exceptions based on the merits and evidence available of individual claims in favor of allowing a claim. For fatality claims, there may be under-reporting of occupational disease related claims. Thus, since the present paper exclusively studies traumatic fatalities, the injury data is strong. Overall, this no-fault, universal coverage, system provides a single data collection process, the Operational Data Warehouse (ODW), which includes all workers and therefore provides denominator data as well as injury data. The ODW integrates data from multiple source databases to transform and summarize injury and employer data

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to enable better analysis and decision making related to injury prevention. The data from several sources are linked through metadata. This eliminates undercounting (Rosenman et al., 2006) and the need for complex and inaccurate processes, such as that described by Cohen et al. (2006).

In an unpublished study using WCB data for the same period as the current study (2003–2007), the traumatic fatality rate among workers in small businesses (those that employed fewer than 20 person-years) was 9.7 per 100,000 person-years, compared to 2.7 per 100,000 person-years for larger businesses (those that employed 20 or more person-years) and 4.6 per 100,000 person-years in all businesses in B.C. When the comparison was between businesses in similar industries, the fatality rate was up to 5 times higher, even though small businesses had lower overall injury rates than their larger counterparts (2.5 vs. 3.2 per 100 person-years) and their serious injury rate (ICD-9) was only 2.5 times higher.

It seems likely that the difference between the relative fatality rates and the overall injury rates might reflect five factors that could affect reported serious injury and fatality rates. First, the overall injury rate among employees in small businesses may appear lower than for larger businesses because the workers in small businesses may discount minor or soft tissue injuries. Second, small businesses may under-report their payroll for a variety of reasons, including that they tend to employ more seasonal or part-time employees and they may find it cumbersome or difficult to track the overall payroll. Third, small businesses may be subcontracted by larger businesses in similar classification units (CUs) to perform tasks that carry a higher risk of injury. Fourth, small businesses may not have the necessary time, budget, knowledge, or expertise to look into health and safety issues compared to larger businesses where there are economies of scale that extend to safety programs. Fifth, small businesses hire fewer workers overall and more part-time workers, making it difficult to provide effective training and supervision. Between 2003 and 2007 there was an average of 167,041 small businesses (92% of all) in B.C.; they employed 27% of the person-years, compared with 70,609 of larger businesses (8% of all), which employed 73% of the person-years (1% of the largest businesses employ approximately 50% of the total number of person-years).

The present study describes the outcomes of a review of traumatic fatality claims accepted by WCB over the period 2003–2007. The specific aim of the study was to try to clarify the potential role of each of the underlying factors (although we realized that some would be nearly impossible to determine) and to identify patterns among the fatalities that would facilitate the development of effective injury/fatality prevention programs.

## 2. Material and methods

The ODW was used to obtain all fatalities for the period 2003–2007. All non-traumatic fatalities, such as neoplasms, were eliminated. Fatalities for which the coding did not clearly indicate whether the cause was traumatic (for example, heart attacks) were retained until further information could be obtained to clarify the cause, but were excluded if the cause proved not to be traumatic. Data fields included were: injury date; year of injury; classification unit (CU, an industry designation unique to B.C., adapted from best practices across jurisdictions including NAICS, other provinces and states as well as industry consultation and customized to reflect the current economies in B.C.); business size as person-years (a number calculated on the basis of payroll and average annual income for employees in that CU); claim cost (both projected and paid to date); work days lost; age; gender; injury description, including coding for nature of injury and body part injured; occupation code (Standard Occupation Classification System, SOC); and accident type (both coded and text). An additional data set of the

number of person-years employed, separated by CU and business size, was obtained for the same period.

Using the claim number of each of the traumatic fatality claims, the source databases were manually searched for detailed information. These source databases were primarily the Claims Management System (CMS), which contains electronic copies of all documents in the claim file, including physician reports, and Firm-File, which contains documents such as the investigators' reports. The source databases were searched for information related to the fatal accident, the employee, and the employer. Specific information sought for the fatal accident was whether there were written work procedures and adequate supervision, and whether the worker had been wearing or using personal protective equipment appropriate to the task. Specific information sought for the employee was: duration with the employer, duration employed in this job, experience at this job, whether the incident occurred at a familiar worksite (whether the worksite was regular or variable), and whether drugs or alcohol were contributing factors identified at autopsy. Specific information sought for the employer was how long the employer had been registered with WCB as time between first registration and fatality (whether registration followed rather than preceded the incident).

Data that were fairly consistently available from these sources included an employer report and the WCB account status of the employer. The employer report usually included the duration the worker was employed with this employer (start date) and the duration the worker was employed in this job (although this was sometimes interpreted by the employer as the specific location when the worksite was variable). The WCB account status for the employer provided the date the employer registered with the WCB. Data inconsistently available from these sources included the notice of incident report; subsequent communication with the employer; the coroner's report, which usually provided detailed information about the incident; information on the cause of the incident; recommendations for prevention of similar incidents, including written work procedures, use of seat belts in motor vehicle crashes, use of personal protective equipment, and drug and alcohol levels, with commentary on whether they were contributing factors.

Data were analyzed using Student's *t*-test and the chi-square test, for parametric and non-parametric data, as appropriate. Results were deemed significant if alpha were less than 0.05 for a two-tailed test. Odds ratios with confidence intervals were calculated to compare risk of fatality in small vs. larger businesses, and to assess cannabis use among loggers relative to other occupations.

## 3. Results

There were 299,805 claims: 67,595 in small businesses, 83,390 in medium-sized businesses, and 143,351 in large businesses. The size of some employers was not known, leading to the discrepancy between the sum of small, medium, and large, and the total. Overall, there were significant gaps in the data, with no relevant detailed data available on approximately 15–20% of claims. A total of 435 traumatic fatalities were reviewed for the 5-year period. 251 were in small businesses and 184 in larger businesses. Of the 435 claims reviewed, 13 proved not to be traumatic after further investigation, leaving 243 in small businesses and 179 in larger businesses. 93% of these fatalities were male. The total number of fatalities varied from year to year (mean 84, standard deviation 15, range 66–107) but the percentage of fatalities attributed to small and larger businesses was stable ( $58 \pm 3$ , range 55–62%).

There were no significant differences in mean age of the claimant ( $44.9 \pm 13.7$  in small businesses vs.  $44.5 \pm 13.8$  in larger businesses) by either gender or business size (Fig. 1).

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