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Estimating fatality rates in occupational light vehicle users using vehicle registration and crash data

Abstract

Objective: To estimate occupational light vehicle (OLV) fatality numbers using vehicle registration and crash data and compare these with previous estimates based on workers’ compensation data.

Method: New South Wales (NSW) Roads and Traffic Authority (RTA) vehicle registration and crash data were obtained for 2004. NSW is the only Australian jurisdiction with mandatory work-use vehicle registration, which was used as a proxy for work-relatedness. OLV fatality rates based on registration data as the denominator were calculated and comparisons made with published 2003/04 fatalities based on workers’ compensation data.

Results: Thirty-four NSW RTA OLV-user fatalities were identified, a rate of 4.5 deaths per 100,000 organisationally registered OLV, whereas the Australian Safety and Compensation Council (ASCC), reported 28 OLV deaths Australia-wide.

Conclusions: More OLV user fatalities were identified from vehicle registration-based data than those based on workers’ compensation estimates and the data are likely to provide an improved estimate of fatalities specific to OLV use.

Implications: OLV-use is an important cause of traumatic fatalities that would be better identified through the use of vehicle-registration data, which provides a stronger evidence base from which to develop policy responses.

Key words: light vehicles, occupational driving, work fatalities, non-traditional work arrangements.

Motor vehicle crashes (MVC) are the most common cause of work-related death in most western countries but occupational road-trauma is difficult to isolate from the total road-injury burden. Previous work-driving fatality-rate estimates have used data that usually exclude casual or self-employed workers (around 20% of the workforce), and combine workplace and on-the-road injuries into one work-activity category. Occupational light vehicle (OLV)-use is undertaken across industries and occupations, often as a secondary work task to enable the primary occupational role. OLV-users include taxi-drivers, tradespersons, salespersons, and other workers moving between work locations. As a result, it is difficult to identify both the number of OLV-users and fatalities occurring during the OLV component of their work using workers’ compensation data.

NSW is the only Australian jurisdiction with mandatory work-use vehicle registration, which can be used as a proxy for OLV work-relatedness. Workers’ compensation and OLV crash data both include employee fatalities across all industries and occupations, but fatality rates based on workers’ compensation data use labour force data from all industry and occupation regardless of whether the individuals within those sectors actually use OLV in the course of their work. OLV-based data enables both the identification of OLV crashes and provides a denominator from which to calculate fatality rates related to the OLV-use component of the work, regardless of workers’ employment arrangement, occupation or industry.

This study aimed to estimate OLV-user fatalities based on vehicle registration and crash data in NSW, the largest state in Australia, and to compare this estimate with previous estimates derived using workers’ compensation data.

Methods

Fatality data sources

Vehicle registration and linked crash data for 2004 were obtained from the NSW Roads and Traffic Authority (RTA). RTA data includes all NSW light-vehicles (LV) registered for public road use. Registration in work-related categories is mandatory for all LV used substantially for work purposes including cars, utilities, vans, tray-trucks and small buses. NSW was the only Australian jurisdiction with work-registration categories, which could be used...
as a proxy for work-relatedness. OLV crash (fatality) data was from all 12 months of 2004 while the OLV registration (population) data was reported at June 2003.

The OLV population (n=646,201) was extracted from the NSW LV registrations at June 30, 2003 (n=3,529,761). Those vehicles with non-work-related usage (n=2,878,205); a seating capacity of 13 or more (n=4,276); plant or mobile home shapes (n=27), or with incomplete data (n=1,052), were excluded (total n=2,883,560). OLV were further categorised into organisationally registered vehicles (n=466,170) or those registered by self employed or sole-traders, hereafter referred to as sole-traders, (n=180,031).

OLV with at least one fatality were identified from all crashes occurring in the period January–December (inclusive) 2004, using the same criteria as described above for estimating the OLV-user population. The RTA linked each crashed OLV to its registration data using unique common identifiers and advised that the match between fatal crashed registrations and crash data was likely to be close to 100%.

Although comparing crash data from 2004 with registration data from 2003 meant that we were unable to match all individual LVs in the crash data with LVs in the registration datasets, as LV registrations increased by only 2.9% between June 2003 and June 04, most of the 2004 crashed OLV will probably have been included in the 2003 OLV registrations and it is therefore an acceptable denominator for the purposes of calculations for fatality rates and likely to be only a minor source of error.6

RTA crash fatalities must be reported to police if they occurred on a NSW public road, involved at least one moving vehicle and one fatality. RTA defines a fatality as “a person who dies within 30 days of the accident where death is attributable to injuries sustained during the road-vehicle accident”.12 For this study an OLV-user fatality is each OLV-user killed, excluding bystanders and those killed in non-OLV. Registration-based fatality rates were calculated using OLV registrations, a proxy for the OLV population, as the denominator, and crash-data fatalities as the numerator.

Available workers’ compensation data vehicle-based fatality estimates were identified from two sources for comparison purposes. The NSW Workers’ Compensation Statistical Bulletin 2003/04 included successful compensation claims where death occurred following an on-duty road-traffic-crash, during the 12 months of the 2003/04 financial year.11 The Australian Safety and Compensation Council (ASCC) 2003/04 Online Statistics Interactive National Workers’ Compensation Statistics Database collates fatality claims data supplied by all Australian workers’ compensation authorities. These exclude fatalities without claims accepted as work-related and workers not covered by covered by workers’ compensation schemes such as the self-employed.13 ASCC fatality-rate estimates used denominator data from Australian Bureau of Statistics Labor Force Surveys, August 2003 to May 2004.14

This study was approved by the Monash University Standing Committee on Ethics in Research involving Humans (SCERH #2003/562)

Results

Data from the NSW RTA revealed 34 OLV fatalities including commuting and other on-road claims. Twenty-one fatalities (62%) were in organisationally registered OLV. The other 13 (38%) were in sole-trader, rather than incorporated company registrations. Using the OLV registrations as a proxy for the OLV-user population (denominator) we calculated a rate of 5.3 fatalities per 100,000 registered OLV, and by work arrangement type a rate of 4.5 fatalities per 100,000 organisationally registered vehicles and 7.2 fatalities per 100,000 sole-trader registrations.

In NSW in 2003/04, 65 compensated road related fatalities were reported from all vehicle types, with 62% (n=40) during commuting rather than work.13 However, Boufous and Williamson (2009) found that 75% of NSW employees compensated for work-road related serious crashes (for all vehicle types) between January 1998 and December 2002 were commuting and commuters were 28% more likely to be involved in serious crashes than drivers injured while on duty.13 This suggests that the fatality rates we have calculated using registration and crash data are likely to be overestimates. Therefore, we have adjusted these estimates to account for over-estimation due to commuting fatalities by using 25% of organisational-OLV fatalities as the numerator (n=5.25) with the organisationally registered OLV population denominator (n=466,170). (Sole trader vehicles were excluded as they are unlikely to be used by employees). This gave an estimated annual rate of 1.12 deaths per 100,000 registrations for organisationally registered OLV while working, excluding commuting.

Table 1 compares our results with other Australian sources of work-related MVC fatality outcomes for 2003/04. No workers’ compensation data differentiating vehicle types were found for individual Australian jurisdictions, and the ASCC data source provided Australia-wide data. NSW Workcover reported 25 compensated fatality claims across all light and heavy vehicle-types in that state, excluding commuting and all non-work-road claims.13 The ASCC reported 28 compensated light vehicle-related fatalities for the whole of Australia, including off-road and off-duty deaths and excluding commuters, and a rate of 0.3 fatalities per 100,000 labour force.12

Discussion

We have shown that linked vehicle registration and crash data can be used to identify OLV fatalities and to estimate a rate based on OLV registrations, which we believe is a more appropriate denominator than total labour force data, as it better defines the ‘at risk’ population. Driscoll (2003) previously estimated that 34% of Australian work vehicle-crash deaths were not captured by OHS or compensation authorities, but our results suggest that OLV fatality estimation may be substantially poorer than this for OLV-users.15 Even within insurance schemes that include all injured workers in all work arrangements (e.g. New Zealand) combined OHS, compensation and coronial data are likely to underestimate the true extent of work-road related fatalities.16
OLV fatality numerator estimates using the RTA crash data are considerably greater than that for all compensated vehicle-related deaths in NSW. However, an adjusted estimate of 5.25 organisationally registered OLV fatalities in NSW could be considered to be an underestimation when compared to the ASCC estimate of 28 Australia-wide fatalities, NSW having around one-third of the Australian population. Comparisons of work-related driving fatality numbers between Australian jurisdictions are complicated because of varied definitions of work and commuting and that in some states, OLV-related crashes are recorded within road safety data, while in other States they are recorded within OHS data. There are several reasons for the apparent disparity between the OLV fatalities estimated using vehicle registration data and those in workers’ compensation sources. No source described only occupationally-related LV fatalities while on public roads. Only the ASCC Australia-wide and RTA NSW data identify LV types. The ASCC data excludes sole-traders and includes off-road claims, while the RTA covers only on-road fatalities including work- and commuting-use. The majority of employees are likely to commute using privately registered vehicles and sole-traders are less likely than employees to commute to work but confirmation of individual vehicle activity is not possible using de-identified registration data. This is one reason for the disparity in rates, which we found when comparing estimates based on compensation data with those based on registration data.

Comparisons of rates using different denominators as proxies for all OLV users, i.e. total labour force compared to OLV registrations, have inherent limitations. OLV crash data is likely to include some non-work vehicle-use but it does not include the many privately registered vehicles likely to be used for occasional business purposes. No Australian estimates are available of this group of work-road users but Stradling, 2001, found that 20% of British motorists drove their own vehicle every working day to exclude commuting are likely to be an improvement on using for work purposes. No Australian estimates are available of this many privately registered vehicles likely to be used for occasional road-use component of work. However, they are limited as their denominator is OLV rather than actual workers using the OLV. Some vehicles such as taxis may be used by several drivers over one day and others such as those in company car-pools may only be used on a more occasional basis.

Estimates using labor-force based denominators, which include large numbers of workers not using OLV, are likely to underestimate the rate compared to a rate calculated using a more closely defined ‘at risk’ population. No information regarding any corrections for fatality estimates are available in the ASCC database explanatory notes. However, using the ASCC-reported 28 fatalities and the entire Australian labour force denominator of employed persons (9,656,600 in December 2003), a rate of 0.28 fatalities per 100,000 labour force can be calculated, suggesting that no denominator corrections were applied by the ASCC. The spread of compensated OLV user fatalities has been previously identified across non-transport related occupational sectors. This suggests equivalent corrections would be difficult without the ability to identify the actual number of OLV users within each sector of the total labour force. Denominator choice is very important in estimating the fatality rate and we believe that our results are the first attempt to estimate rates based on a more appropriate ‘at-risk’ population of OLV-users rather than the total labour force.

Privacy concerns prevented identification of particular crashed vehicles within the population data, necessitating the use of the 2003 registration dataset as the proxy OLV population. As discussed earlier this was the most applicable denominator available in the registration data and likely to be only a minor source of error.

OLV-user fatality estimates could be improved by the use of vehicle crash data and the use of vehicle-registration data as a proxy for the OLV-user population as a denominator and the addition of vehicle-use categories to all light-vehicle registrations.

Table 1: Work-related MVC selected data source, characteristics, comparisons and fatality outcomes in Australia 2003/04.

<table>
<thead>
<tr>
<th>Organisation (acronym)</th>
<th>Organisation (full name)</th>
<th>NSW RTA(^a)</th>
<th>NSW CSB(^b)</th>
<th>ASCC online database(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New South Wales Roads and Traffic Authority</td>
<td></td>
<td></td>
<td>Australian Safety and Compensation Council</td>
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<tr>
<td>OLV Type Specific Yes/No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
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<tr>
<td>12 month period</td>
<td>2004 (Full year)</td>
<td>2003-04 (July-June)</td>
<td>2003-04 (July-June)</td>
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<tr>
<td>Compensation Claims Only</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Yes/No</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Includes Commuting Yes/No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Includes Off Road Yes/No</td>
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<td>Employers &amp; sole traders</td>
<td>Employees only</td>
<td>Employees only</td>
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<tr>
<td>Population</td>
<td>OLV Registrations</td>
<td>NSW labor force data</td>
<td>Australian labor force data</td>
<td></td>
</tr>
<tr>
<td>Fatalities Reported</td>
<td>34</td>
<td>25</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Fatality rate</td>
<td>1.1/100,000 organisational registrations</td>
<td>No rate reported</td>
<td>0.3/100,000</td>
<td></td>
</tr>
</tbody>
</table>

Sources:

c) ASCC Online Statistics Interactive National Workers’ Compensation Statistics Databases
Additionally, the introduction of standard journey-purpose questions across compensation, coronial and crash investigations would greatly enhance all occupational motor-vehicle crash data collection. In combination with more traditionally used OHS data, this would provide a more sound evidence base from which to develop expanded policy and practice responses to this leading source of work-related fatalities.

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Disclaimer

Rwth Stuckey is employed part-time at the Transport Accident Commission (TAC) as the staff Occupational Health and Safety Adviser. She is also a member of the National Fleet Safety Working Party. The views expressed in this article are those of the authors and not necessarily those of the TAC or the Fleet Safety Working Party.

References