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National Transport and Logistics Industry Health and Wellbeing Study

**Work-Related Injury and Disease In
Australian Transport Sector Workers**

**April
2018**

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This research report was prepared by Dr Ting Xia, Dr Ross Iles and Professor Alex Collie from Insurance Work and Health Group, Faculty of Medicine, Nursing and Health Sciences at Monash University; Dr Sharon Newnam from the Monash University Accident Research Centre; and Professor Dan Lubman from Turning Point.

For further information relating to this report or the Transport and Logistics Industry Health and Wellbeing Study please contact the research team via the email address: med-IWHGroup@monash.edu.

This report may be cited as: Xia, T., Iles, R., Newnam, S., Lubman, D., & Collie, A. National Transport and Logistics Industry Health and Wellbeing Study Report No 1: Work-related injury and disease in Australian transport sector workers. Insurance Work and Health Group, Faculty of Medicine Nursing and Health Sciences, Monash University (2018).

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Acknowledgements

The Transport and Logistics Industry Health and Wellbeing Study is supported by Linfox Logistics Pty Ltd and the Transport Workers Union. The authors gratefully acknowledge the expert input from Professor Shantha Rajaratnam of the Monash School of Psychological Sciences and Ms Dianne Beck for preparing the data.

This report uses data supplied by Safe Work Australia and has been compiled in collaboration with state, territory and Commonwealth workers' compensation regulators. The views expressed are the responsibility of the author(s) and are not necessarily the views of Safe Work Australia or the state, territory and Commonwealth workers' compensation regulators. We gratefully acknowledge data provision and input from these organisations.

Executive Summary

The Australian transport and logistics industry is a diverse industry encompassing drivers, logistics, storage and warehousing workers, managers and executives. Transport workers are subject to a unique set of health risks in their working environment, including sedentary jobs, long working hours and shift work, isolation, fatigue and sleep deprivation among others.

The Transport Industry Health and Wellbeing Study is a national, multi-year research project being conducted by Monash University. This report, the first in a series from the study, presents findings from analysis of national workers' compensation claims data, in order to:

1. Describe the nature, extent and impact of work-related injury and disease in Australian transport and logistics workers.
2. Determine if the incidence and impact of work-related injury and disease in these workers is changing over time.
3. Compare work-related injury and disease in transport workers to other workers in Australia.

Of the 3.5 million total accepted workers' compensation claims in Australia during the period 2004 to 2015, a total of 249 thousand claims (or 7.2%) were from people employed in the 'Transport, postal and warehousing' industry. Truck drivers accounted for over 120 thousand claims, including nearly 60 thousand from drivers employed in industries other than transport. Delivery drivers, bus drivers and rail drivers were other substantial occupational groups, in addition to workers in non-driving occupations (total 151 thousand claims).

The rate of claims was up to five times higher in transport worker groups than in other workers. Rail drivers recorded a rate of 99 claims for every 1000 workers per year, followed by truck drivers at 70.3 per 1000 workers per year. This compares to a rate of 21.2 for all other workers.

Musculoskeletal conditions were the most common condition in all of the transport worker groups. Delivery drivers and bus drivers had the highest proportion of musculoskeletal condition claims. Truck drivers have the highest relative risk of fracture, with an incidence about 380% higher than all other workers. Rail drivers were at a 33 fold greater risk of making a workers compensation claim for a mental health condition than other workers.

Vehicle incidents accounted for between 6% and 23% of claims depending on occupation. More common mechanisms of injury and illness were musculoskeletal stress (body stressing), falls and trips, and being hit by objects.

There was wide variation in duration of time loss to injury and illness between occupation categories. The longest duration was in automobile drivers at 24 working days per claim, followed by truck drivers at 17 working days, and then delivery drivers. The occupation with the shortest duration of time lost was rail drivers at 6 working days.

These data demonstrate that workers in the transport sector are at increased risk of work-related injury and disease than workers in other occupations. Some groups of transport workers have substantially longer periods of time off work after injury than workers in other occupations. The findings provide insights that can support injury and illness prevention and rehabilitation and return to work programs in the industry. For example, targeting prevention programs to groups at greatest risk (e.g., rail drivers) or large cohorts at high risk (e.g., truck drivers) may have the greatest potential impact on health and productivity across the industry. Similarly, designing prevention programs to address the mechanisms of injury and illness accounting for the greatest proportion of work-related injury and disease (e.g., body stressing, falls and trips) may deliver a larger improvement than focussing on less common mechanisms.

This study provides an initial overview of work-related injury and illness in Australian transport sector workers over a twelve year time frame, at a population level. Future reports from the Transport Industry Health and Wellbeing Study will focus in more detail on specific occupational groups and on specific health risk factors, and will include data from health and survey datasets. Our objective is to build an evidence base that can support the development of programs to improve the health of Australia's transport workforce.

Overview of the Project

Rationale

The transport and logistics industry is one of the highest risk industries for work-related injury and disease in Australia. The industry has a rate of work-related fatality nearly five times the national average of other industries, and a rate of serious workers' compensation claims (resulting in five or more days lost time) double that of other industries ^[1]. SafeWork Australia reports that there are around 5,100 accepted serious injury claims in the road transport industry per annum ^[2]. This amounts to approximately fourteen serious injury claims each day. It is a diverse industry encompassing drivers, logistics, storage and warehousing workers, managers and executives ^[3]. The industry has grown by 16% over the period 2003 to 2016. The current Australian work health and safety strategy identifies road transport as one of seven priority industry segments ^[4].

Transport workers are subject to a unique set of health risks in their working environment, including sedentary jobs, long working hours and shift work, isolation, fatigue and sleep deprivation among others ^[5, 6]. This has been the focus of significant attention internationally with a major international symposium dedicated to the issue ^[7]. However there is limited published academic research evidence within Australia on the health and wellbeing of transport workers. There are also unique aspects of the Australian transport industry and society that mean these international findings, while useful, are unlikely to be directly transferrable. For example Australian regulatory and commercial models are different, as are our geography, healthcare systems, workers' compensation systems and social structure.

The Transport Industry Health and Wellbeing Study is a national, multi-year research project being conducted by Monash University. The study aims to develop evidence on the health status of transport workers and factors affecting health. This evidence will be combined with industry knowledge to co-develop programs, policy and practices that can improve health and well-being amongst workers in the industry. For further information about the study please contact the research team (see contact details on [Page 2](#)).

Objectives

This report presents findings from analysis of national workers' compensation claims data. The specific objectives of these analyses were:

1. To describe the nature, extent and impact of work-related injury and disease in Australian transport and logistics workers.
2. To determine if the incidence and impact of work-related injury and disease in these workers is changing over time.
3. To compare work-related injury and disease in transport workers to other workers in Australia.

Methods

Data Sources

The primary data source for this report is the National Dataset for Compensation-based Statistics (NDS) ^[8]. The NDS is compiled from workers' compensation claims data from all nine of the major state, territory and Commonwealth workers' compensation systems. As such the database covers compensable injury and disease but does not include information on non-compensable conditions. The database contains information on the injured worker, their employer, job characteristics, injury or disease details, and claims outcomes. The data are administrative, meaning they are collected primarily for administrative purposes such as claims determination and service delivery planning.

To calculate rates of accepted claims, we also accessed data on the number of workers covered by workers' compensation. This was derived from Labour Force data by the Australian Bureau of Statistics (ABS) and provided by Safe Work Australia.

Ethics approval for use of NDS claims data was received from Monash University Human Research Ethics Committee (approval number 2017-10758-14006).

Data Preparation

After receiving the NDS data, the research team applied a range of quality assurance, data cleaning, data linkage and variable definition steps. These have been described elsewhere ^[9].

For this report, data from accepted claims made in the financial years 2004-2015 were extracted from the NDS. All years refer to the last year of a financial year unless stated otherwise (e.g., 2014 refers to 2013/14). Cases were removed from the analysis if they were missing occupation or industry codes, or contained unlikely age ranges (< 15 years and > 100 years). A total of 3428 cases were excluded.

We used standardised industry ^[3] and occupation coding systems in the NDS to identify six mutually exclusive groups of transport workers, as well as two comparison groups of other workers [Table 1]. Groups of drivers were differentiated from other workers in the transport industry who were not drivers. We also recognize that drivers may be employed across industries other than the transport industry (e.g., truck drivers in the construction industry) and so these groups were not restricted to the transport industry ^[10]. More than 90% of workers in the transport sector are male. Male workers have a different pattern of injury and disease risk and outcomes than female workers, and so one comparison group was other male dominated occupations, defined as occupations where more than 80% of claims were from men.

TABLE 1 DEFINITION OF OCCUPATION GROUPS AND COMPARISON GROUPS

Group	Definition using occupation and industry coding
Truck Drivers	ANZSCO 3-digit code 733 across all industries
Bus Drivers	ANZSCO 4-digit code 7312 across all industries
Delivery Drivers	ANZSCO 3-digit code 732 across all industries
Automobile Drivers	ANZSCO 4-digit code 7311 across all industries
Rail Drivers	ANZSCO 4-digit code 7313 across all industries
Other workers (non-drivers) in the Transport Industry	The following ANZSCO codes in ANZSIC industry group I (transport): Managers (ANZSCO 1-digit code 1); Professionals (ANZSCO 1-digit code 2); Technicians and trades workers (ANZSCO 1-digit code 3); Community and personal service workers (ANZSCO 1-digit code 4); Clerical and administrative workers (ANZSCO 1-digit code 5); Sales workers (ANZSCO 1-digit code 6); Labourers (ANZSCO 1-digit code 8); Machine and stationary plant operators (ANZSCO 2-digit code 71); Mobile plant operators (ANZSCO 2-digit code 72); Storepersons (ANZSCO 2-digit code 74)
Other male dominated occupations	The following ANZSCO codes in all ANZSIC industry groups except I (transport): Farmers and Farm Managers (ANZSCO 2-digit code 12); Engineering, ICT and Science Technicians (ANZSCO 2-digit code 31); Automotive and Engineering Trades Workers (ANZSCO 2-digit code 32); Construction Trades Workers (ANZSCO 2-digit code 33); Electrotechnology and Telecommunications Trades Workers (ANZSCO 2-digit code 34); Skilled Animal and Horticultural Workers (ANZSCO 2-digit code 36); Other Technicians and Trades Workers (ANZSCO 2-digit code 39); Protective Service Workers (ANZSCO 2-digit code 44); Other Machine and Stationary Plant Operators (ANZSCO 2-digit code 71); Other Mobile Plant Operators (ANZSCO 2-digit code 72); Other Storepersons (ANZSCO 2-digit code 74); Construction and Mining Labourers (ANZSCO 2-digit code 82); Factory Process Workers (ANZSCO 2-digit code 83); Farm, Forestry and Garden Workers (ANZSCO 2-digit code 84)
All other occupations	All other workers not captured by the other categories.

To account for coding differences between the workers' compensation systems, types of work-related injury and disease were categorized using a modified version of the Type of Occurrence Classification System (TOOCS) version 3, as per prior studies ^[11]. This approach produces six major categories including Fractures, Musculoskeletal Conditions (MSK), neurological conditions, mental health conditions, other traumatic injury, other diseases, as well as a category of other claims [\[Appendix I\]](#).

Analysis Strategy

First, descriptive analysis was performed to summarize the counts (N) of accepted claims by occupation, injury/illness type and mechanism of injury/illness in the occupation groups. Trends in claim counts between 2004 and 2015 were also plotted. For claims resulting in time loss (at least one hour of paid income compensation), the duration of time lost was calculated by dividing the total number of compensated hours by the average weekly number of hours worked prior to claim, as per the method previously described ^[9]. Time loss calculations were limited to data up to the end of the 2012 financial year to allow for a minimum follow-up period of 3 years for all claims and were limited to a maximum duration of cumulative time loss to 260 weeks. Claim rates were calculated using labour force estimates as the denominator, and expressed as the number of claims per 1000 covered workers. We note that this does not account fully for exposure as workers may work a range of hours, and working hours may vary by occupation and other factors. However nationally consistent data on working hours was not available for this study.

Second, inferential analysis was conducted to statistically determine differences in the counts, rates and duration between occupation groups, and over time. Given the count nature of the data, a Poisson distribution was assumed. Negative binomial regression was used to estimate incidence rate ratios (IRRs) and 95% confidence intervals (95% CI) for the comparison of claim rates across occupational groups. IRRs were calculated using all accepted claim data over the study period, and adjusted for year of injury and age. A regression model adjusted for age and year of injury was conducted to investigate the differences in the IRR of a particular type of injury across occupation groups. We were not able to identify reliable denominators for the 'Non-drivers in transport sector' group and this group was excluded from this part of analysis. Quantile regression was used to explore the difference in median duration of time loss due to work-related injury and illness across occupation groups.

All analyses were conducted using Stata IC/14 ^[12], and the Microsoft Power BI was used for data visualisation.

Results

Volume of Work-Related Injury and Disease

Figure 1 shows the total number of accepted worker's compensation claims by industry over the study period of 2004 to 2015. Of the 3.5 million total accepted claims in Australia during that period, a total of 249 thousand claims (or 7.2% of all claims) were from people employed in the 'Transport, postal and warehousing' industry (the red component). The largest industry by volume of claims was manufacturing with 18.4% of all claims, followed by healthcare and social assistance (12.1%) and construction (9.4%).

Figure 1 Total number of accepted worker's compensation claims by industry

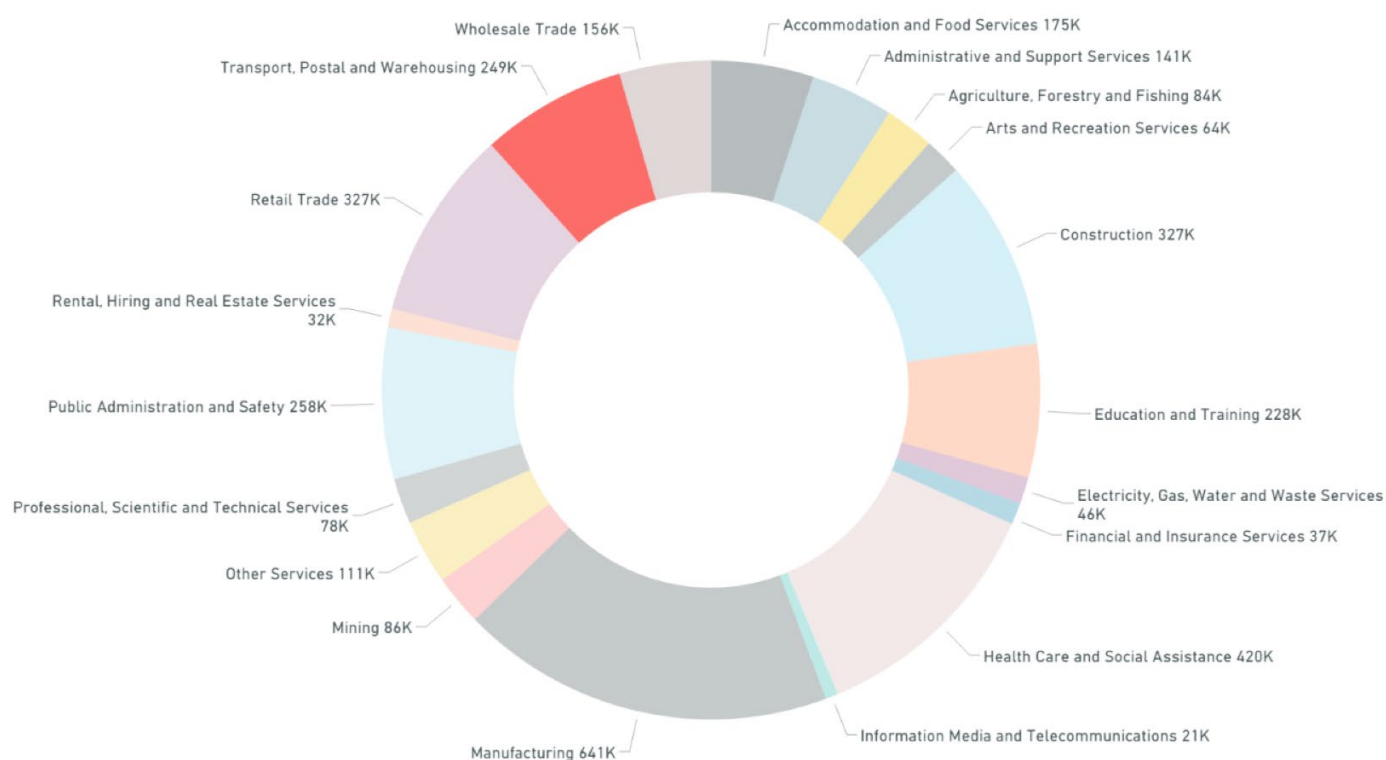
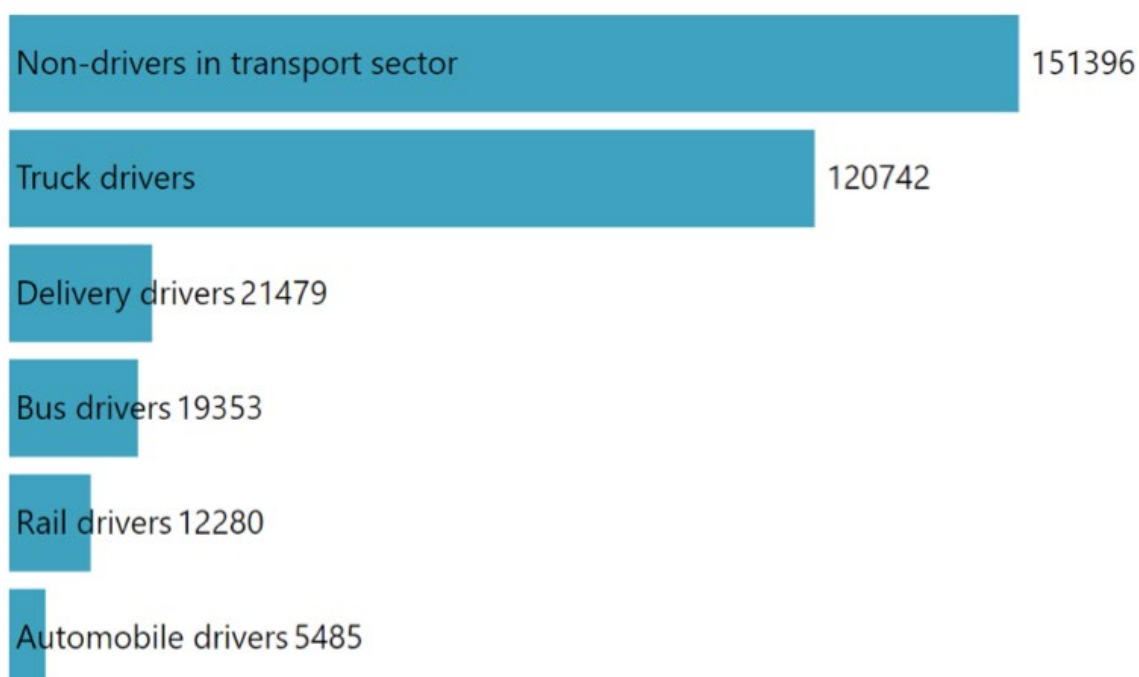


Figure 2 Total number of accepted worker's compensation claims in different occupations



The total number of accepted claims in different transport workers is described in [Figure 2](#). Non-drivers in transport sector attributed the most claims (151,396, 56.1% of total claims in transport sector). The next most highly represented group were truck drivers (120,742) followed by delivery drivers (21,479). Rail drivers and automobile drivers (e.g. chauffeur and taxi driver) made fewer claims compared with other transport workers (12,280 and 5,485 respectively). We note that not all transport workers are employed in the transport industry ^[10]. For example, the total number of truck driver claims is comprised of approximately half from the transport industry with the remainder from other industries including construction, manufacturing and mining.

Figure 3 Trends in the number of accepted worker's compensation claims by occupation relative to 2004

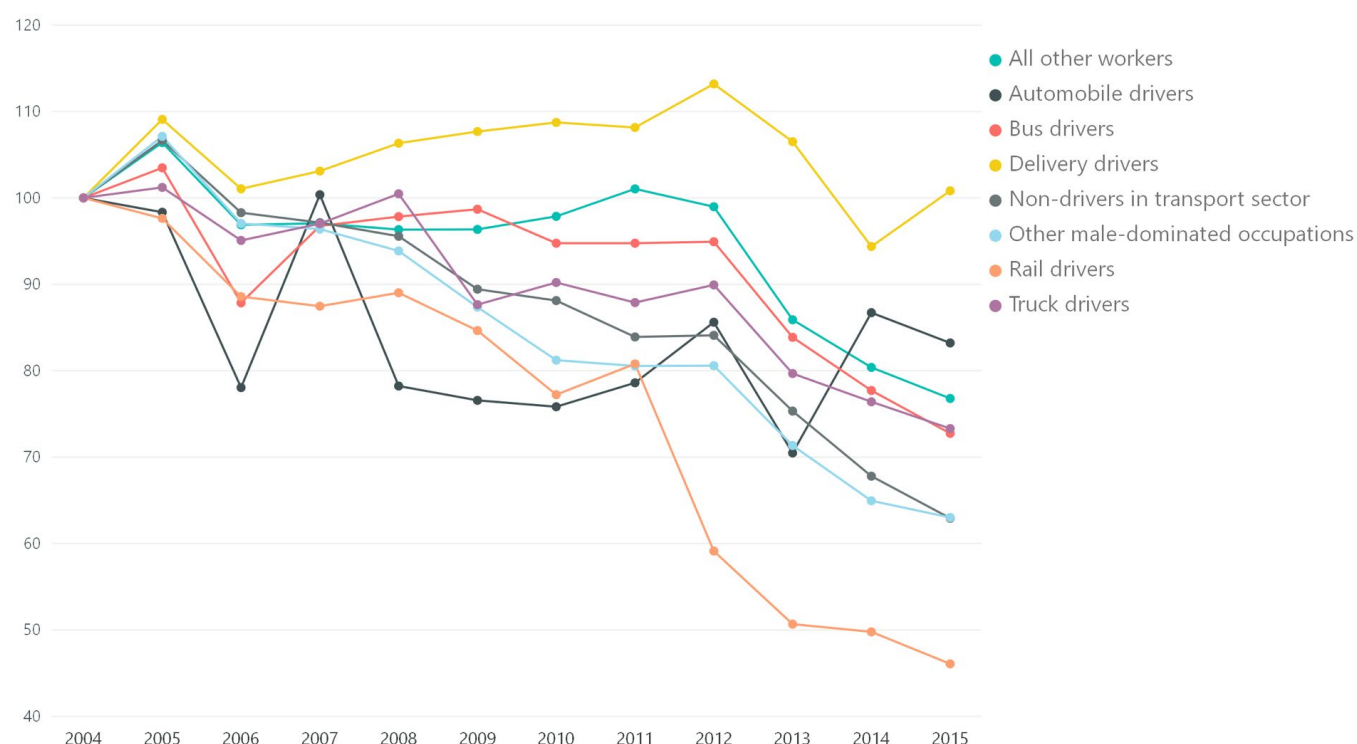


Figure 3 shows the trends in the number of accepted claims in the different occupation categories, indexed to the 2004 baseline. These trend lines can be interpreted as the number of new accepted claims in each occupation for each year, as a percentage of the 2004 figure.

In general, there was a decreasing trend, indicating that fewer claims were being accepted across all occupational groups over the time period of the study, with the exception of delivery drivers (yellow line) where the claim volume remained relatively steady. There were nearly 30% fewer accepted claims from truck drivers (purple line) and bus drivers (red line) in the 2015 year compared with the baseline year. In addition, the number of accepted claims in rail drivers fell substantially, with a decrease of over 50% in 2015 compared with the baseline year. These changes were larger than those observed in the 'all other workers' category (green line) but smaller than those observed in the 'other male dominated occupations' category, with the exceptions of rail drivers (black line).

For most categories of workers, the largest change is observed between the 2012 and 2013 years. This coincides with the introduction of major amendments to the workers' compensation legislation in the state of New South Wales, the largest state by population, labour force size and volume of workers' compensation claims. The 2012 NSW changes restricted access to workers' compensation for occupational diseases, journey claims (travel to and from work) and psychological injury. This is likely to have a substantial effect on the national time series data and thus the reductions shown in Figure 3 should not be considered solely a consequence of improvements in occupational health and safety practices.

Figure 4 Age distribution of injured workers by occupation groups

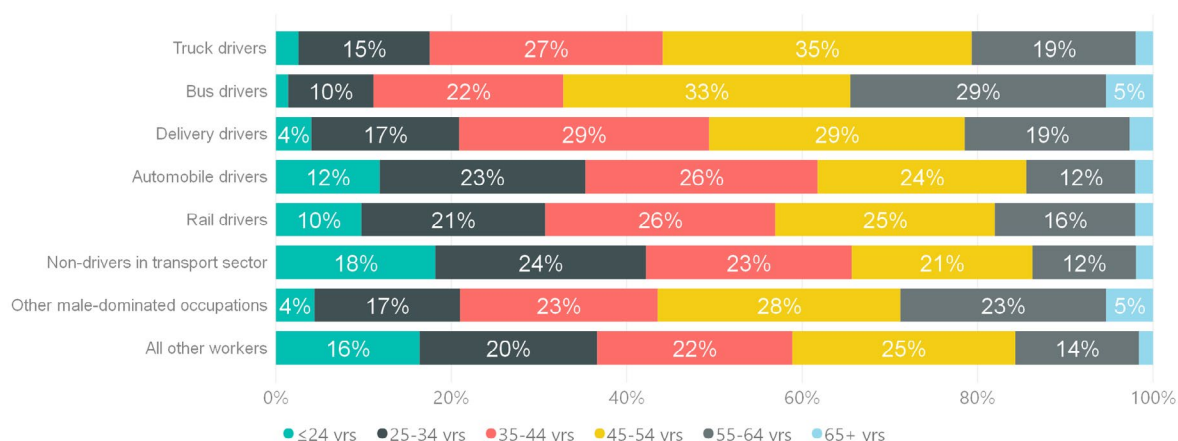


Figure 4 compares the age distribution of injured workers in the different occupation groups. Bus drivers had the greatest proportion of claims from workers aged 45 years or over (62.7% of total claims in this group), followed by truck drivers (55% of total claims). More than 50% of all claims also came from workers 45 years and older in the 'delivery drivers' and the comparison group of other male dominated occupations. The non-drivers, automobile drivers and all other workers groups had the youngest age profiles, with more than 55% of claims arising from workers aged under 45 years.

Incidence of Work-Related Injury and Disease

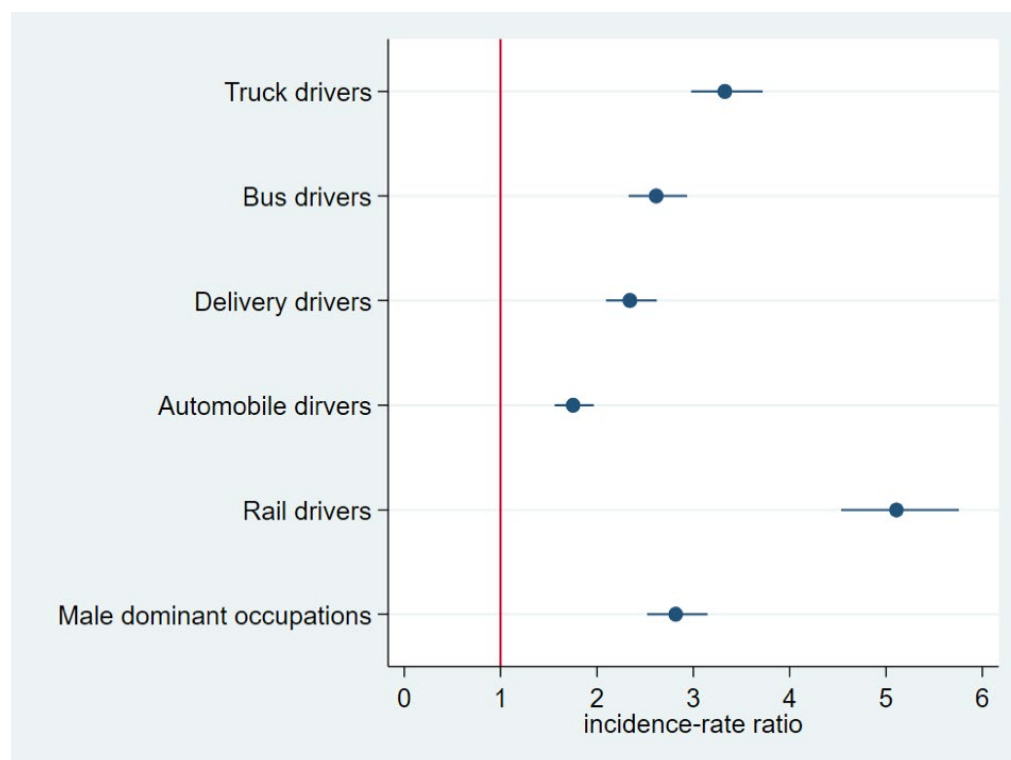
The rate of accepted worker's compensation claims per 1000 workers per year in each of the occupation groups is shown in Figure 5. Rail drivers recorded a rate of 99 claims for every 1000 workers per year. This is nearly five times higher than the comparable rate in the all other workers category and 40% greater than the rate in the other male dominated occupations group.

Truck drivers also recorded an elevated rate, at 70.3 claims per 1000 workers per year. Delivery and bus drivers recorded rates that were below those in the other male occupations group, but still approximately 2.5 times higher than all other workers.

Figure 5 Approximate rate of accepted workers' compensation claims per 1000 workers per year

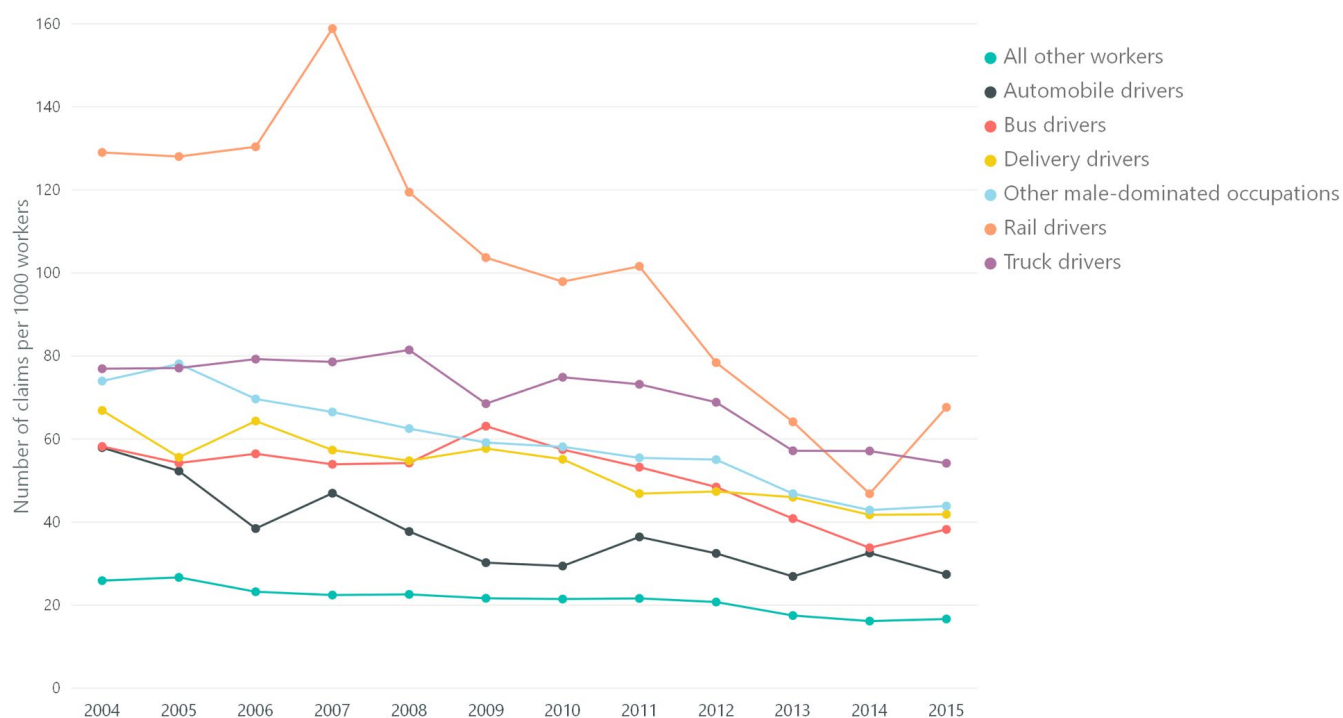


Figure 6 Adjusted IRRs for risk of workers' compensation claims by occupational groups (1=all other workers)



The incidence rate ratio (95% confidence intervals) of having an accepted workers' compensation claim is shown in Figure 6. This analysis statistically adjusts for age and year of injury, and compares the occupation groups to the group of all other workers (red vertical line). The findings confirm the descriptive statistics presented in Figure 5, and show that all of the groups are at greater risk of work-related injury and disease than the comparator group of all other workers, with rail drivers at the greatest relative risk (IRR: 5.10, 95%CI: 4.53-5.76), followed by truck drivers (IRR:3.33, 95%CI: 2.97-3.72).

Figure 7 Trends of number of claims per 1000 workers by occupational groups

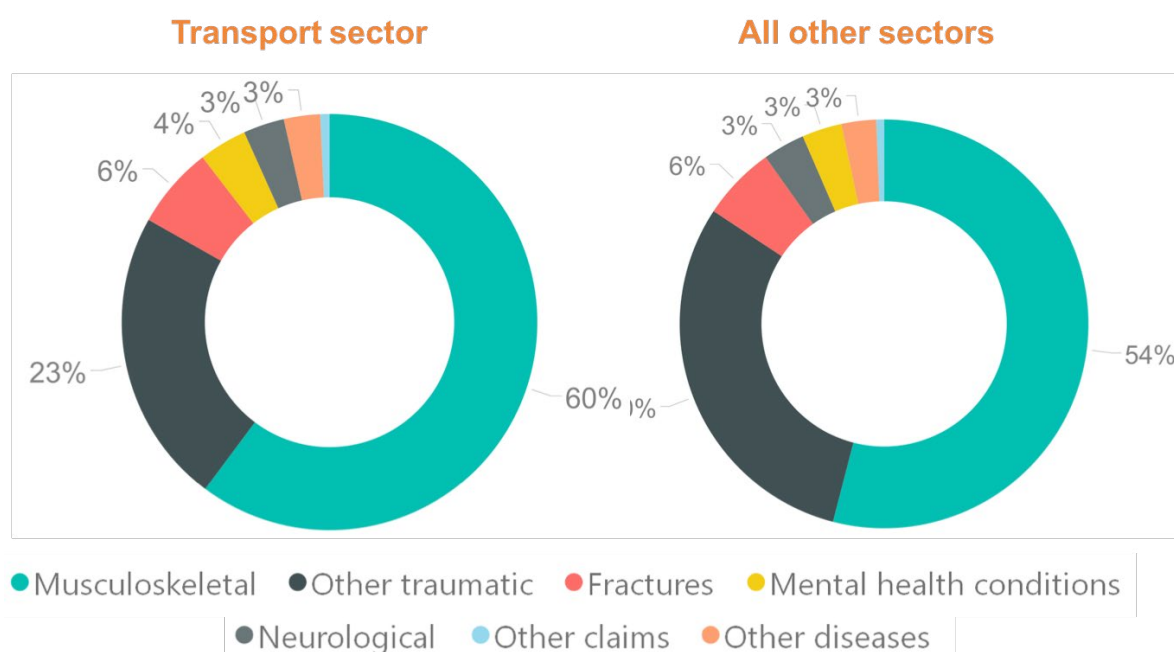


Amongst truck drivers, the rate of accepted claims per 1000 workers increased from 77 per 1000 workers in 2004 to a peak of 81 per 1000 workers in 2008 and then gradually decreased to 54 per 1000 workers in 2015 [Figure 7]. The corresponding rate in delivery drivers over the time period were 67/1000 workers in 2004, which then dropped to 42/1000 workers in 2015. Rail drivers recorded the highest rate at 129/1000 workers in 2004, and the rate decreased by approximately 50% to 67/1000 workers in 2015. The volatility in the trend for rail drivers is probably due to the relatively small number of people employed in this occupation group.

Nature of Work-Related Injury and Disease

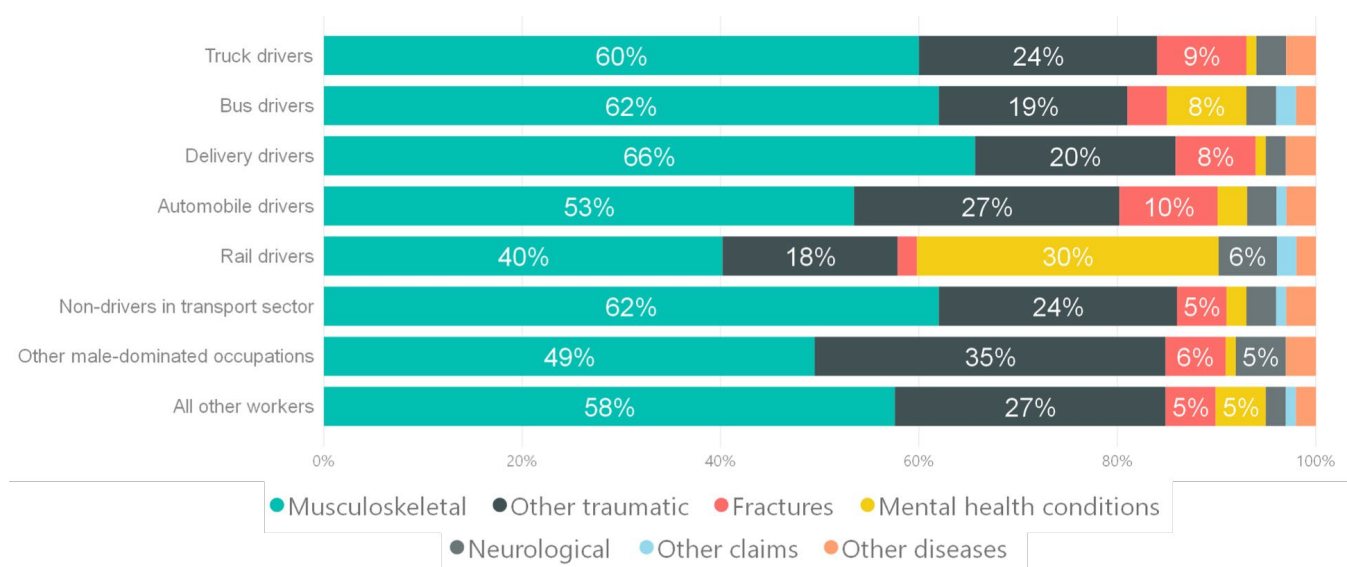
The proportion of all claims attributable to each major injury and disease category is shown in Figure 8, for both the transport sector (left) and all other sectors (right). Musculoskeletal conditions were the most common condition, accounting for 60.2% of all claims in transport sector workers compared with 54.0% in all other sectors. This broad category includes injury to the upper and lower body and limbs, and includes conditions such as non-specific low back pain, neck pain and carpal tunnel syndrome. Fractures and mental health conditions were also slightly more common in transport sector than in other sectors. The transport sector recorded a lower proportion of other traumatic conditions (23.0% vs 30.3%) than workers in all other sectors.

Figure 8 Types of injury and disease



Musculoskeletal conditions were the most common condition in all of the eight occupation groups in this study [Figure 9]. Delivery drivers and bus drivers had the highest proportion of musculoskeletal condition claims. Truck drivers and automobile drivers had a higher proportion of fracture claims (red sections) than the other occupational groups. Rail drivers had a noticeably larger proportion of mental health condition claims (yellow section) than other occupational groups, followed by bus drivers. Claims for other traumatic injury (black section) were more common for workers in other male-dominated occupations than in the transport sector groups.

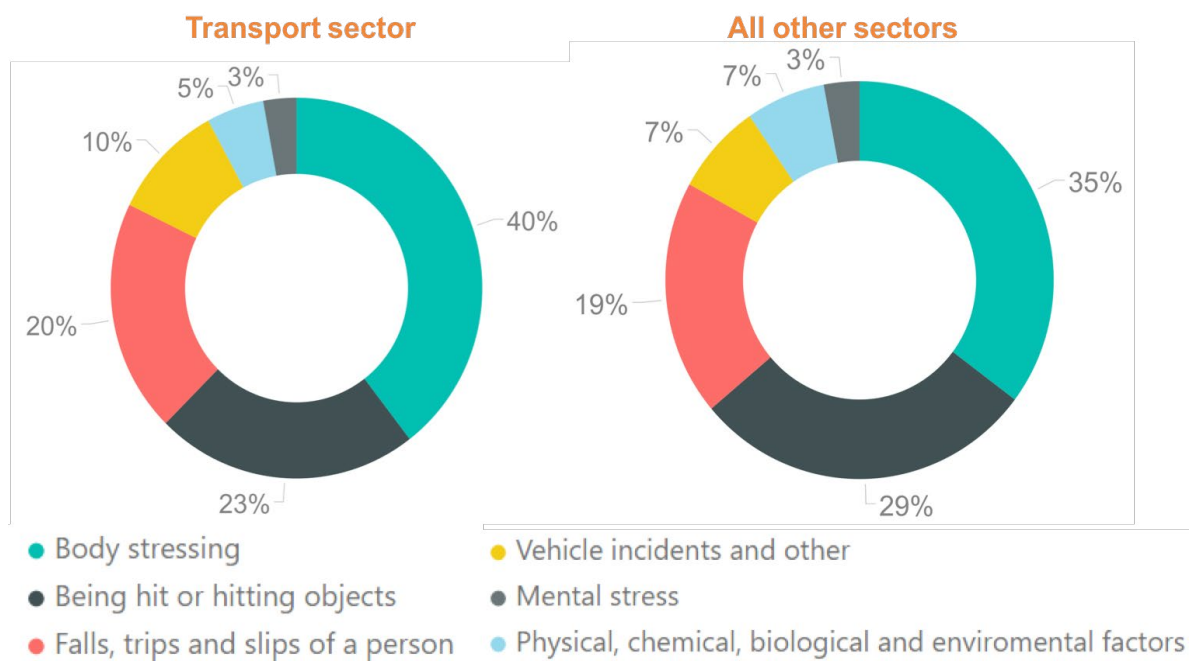
Figure 9 Types of injury and disease by occupation group



Mechanism of Work-Related Injury and Disease

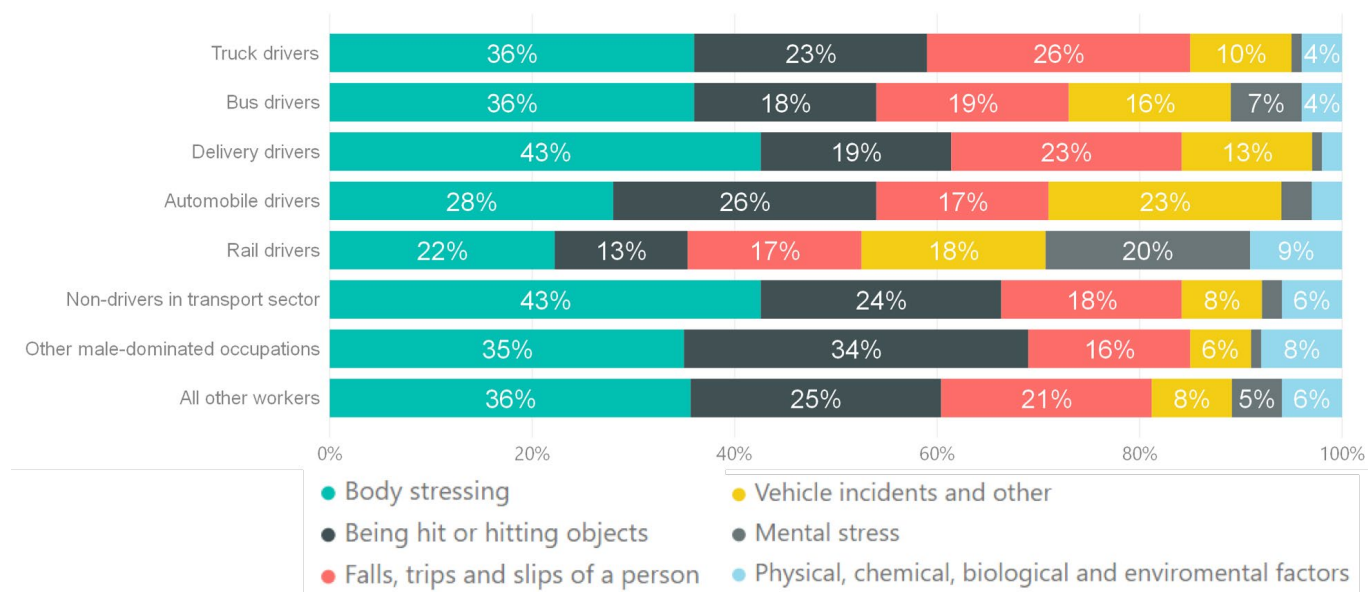
The most common mechanisms of injury are described in Figure 10 for both transport workers (left) and workers in all other sectors (right). Injuries resulting from body stressing (green sections) were most common, accounting for about 40% of all claims for workers in the transport sector and 35% of all claims for workers in all other sectors. Vehicle incidents (yellow sections) were more common for workers in the transport sector, accounting for 9.9% of claims compared with 7.4% in all other sectors. Injuries arising from being hit or hitting objects (black sections) were less common in workers in the transport sector than other sectors. Mental stress was the least common mechanism of condition among both groups.

Figure 10 Mechanisms of injury and disease



When examining mechanism by occupation group [Figure 11], the proportion of claims due to body stressing (green sections) was higher in delivery drivers and non-drivers, while claims due to being hit or hitting objectives (black sections) were more common in workers in other male-dominated occupations. For truck drivers, body stressing was the most common mechanism of condition and falls, trips and slips was the second most common mechanism. Claims due to mental stress accounted for 20% of all claims for rail drivers, which was significantly higher than other occupational groups.

Figure 11 Mechanism of injury and disease by occupation group



The incidence rate ratio of each type of injury for each occupational group is shown in [Figure 12](#). This analysis compares each occupation group to the comparison group of all other workers, and statistically adjusts for age and injury year.

The transport occupations are generally at greater risk of work-related injury and disease than the all other occupation category, with statistically significant differences in incidence identified across all six major types of injury and disease.

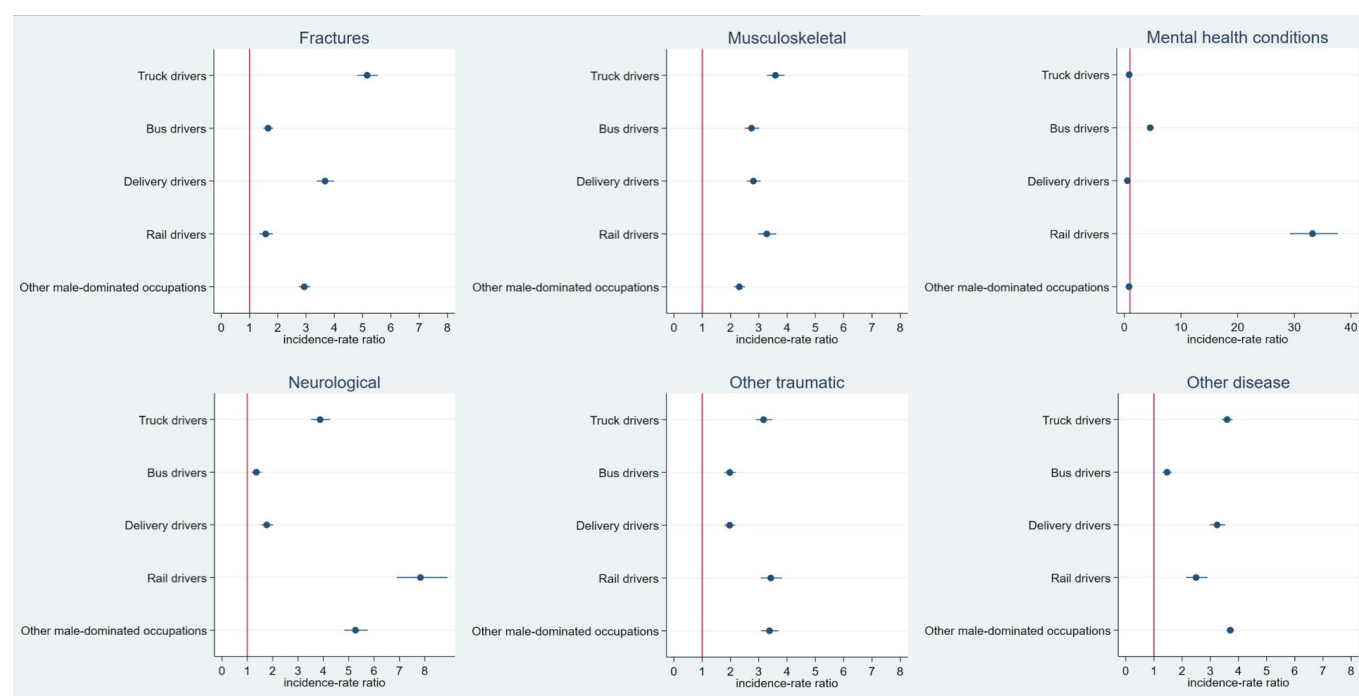
Truck drivers have the highest relative risk of fracture, with an incidence rate 5 times higher than all other workers (IRR: 5.15, 95%CI: 4.83 to 5.54). Truck drivers are also at highest relative risk of musculoskeletal disorders, with a 3.5 times increased risk relative to all other workers (IRR: 3.58, 95%CI: 3.28 to 3.90).

Rail drivers were at a 33 fold greater risk of making a workers compensation claim for a mental health condition than other workers (IRR: 33.2, 95%CI: 29.24 to 37.70). Bus drivers also had a significantly elevated risk of mental health conditions (IRR: 4.56, 95%CI: 3.99 to 5.19). Truck drivers were not observed to be at elevated risk of mental health conditions (IRR: 0.84, 95%CI: 0.74-0.96).

For neurological condition claims, a nearly 8 fold increased risk was observed among rail drivers, a more than 5 fold increased risk among workers in other male-dominated occupations, and a near 4 fold increased risk among truck drivers compared with all other workers.

Furthermore, rail drivers and truck drivers also had more than 3 times the risk of making other traumatic condition claims compared to all other workers

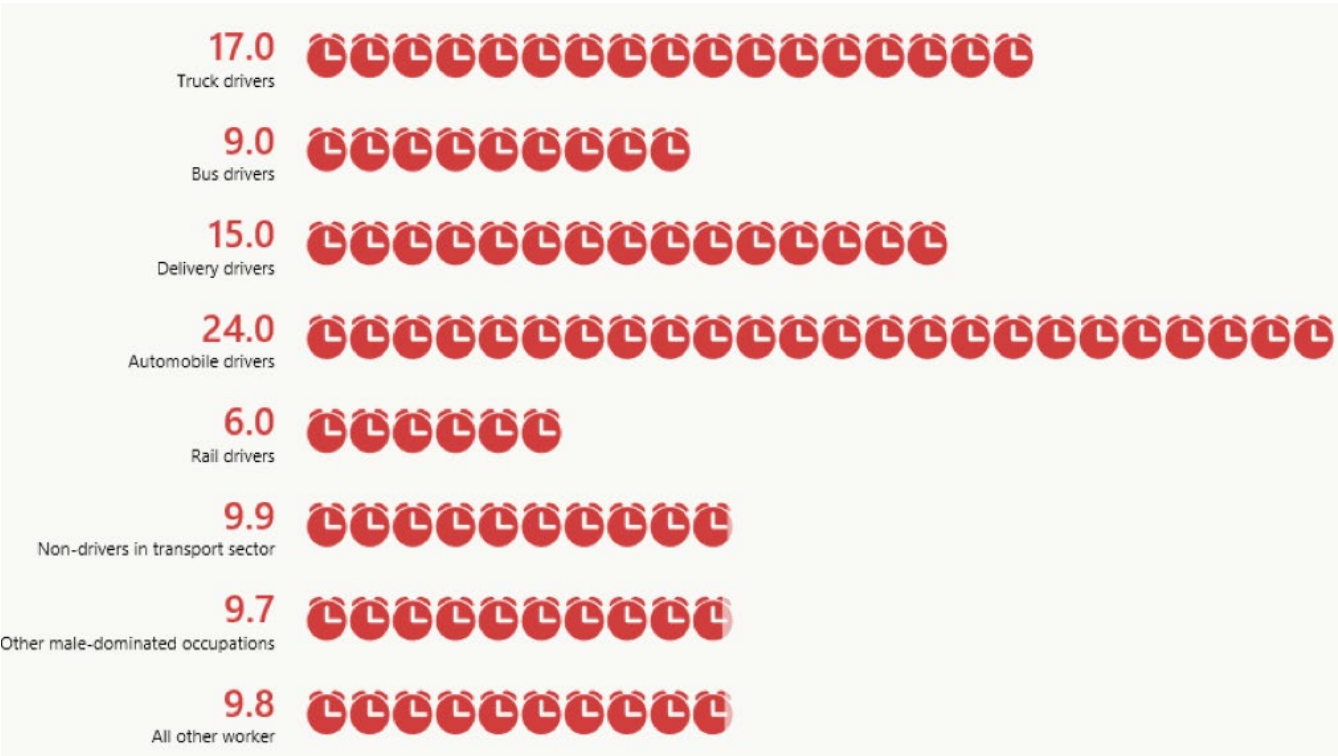
Figure 12 Work-related injury and disease risk estimates stratified by occupational group (1=all other workers)



Duration of Time Off Work

The median duration of compensated time lost (in working days) for all accepted claims in the occupation groups is shown in Figure 13. The time period was chosen to enable a minimum 3 year follow-up period for all claims, during which days off work were counted as the outcome. The figure shows the wide variation in duration of time loss between occupation categories. The longest duration is in automobile drivers at 24 working days, followed by truck drivers at 17 working days, and then delivery drivers. The occupation with the shortest duration was rail drivers at 6 working days.

Figure 13 Median duration of compensated time loss (per worker) in working days by occupation group



**TABLE 2 QUANTILE REGRESSION ANALYSIS OF DURATION OF COMPENSATED TIME LOSS
(IN WEEKS) BY OCCUPATION GROUP**

Occupations	Median	IQR (p25,p75)	Coef	95% CI
All other worker	2.0	0.6, 8.1	ref	
Truck drivers	3.4	1.0, 12.4	1.44	1.39, 1.49
Bus drivers	1.8	0.6, 7.8	-0.16	-0.28, -0.05
Delivery drivers	3.0	1.0, 11.4	1.04	0.92, 1.15
Automobile drivers	4.8	1.3, 19.0	2.84	2.60, 3.07
Rail drivers	1.2	0.5, 3.3	-0.76	-0.91, -0.62
Non-drivers in transport sector	2.0	0.6, 7.6	0.01	-0.04, 0.06
Other male-dominated occupations	2.0	0.6, 7.6	-0.02	-0.04, 0.00

Table 2 provides further detail. This table shows a skewed distribution with median durations between 1 and 5 weeks but significant proportions of claims having much longer durations, as indicated by the 75% confidence intervals exceeding 10 weeks for multiple occupations. The table also further demonstrates the results of quantile regression analysis for median duration of compensated time lost. Compared with all other workers (2.0 weeks, IQR: 0.6-8.1), automobile drivers and truck drivers had significantly longer median duration of time loss at 4.8 weeks (IQR: 1.3-19, Coef: 2.84, 95%CI: 2.60 to 3.07), and 3.4 weeks (IQR: 1.0-12.4, Coef: 1.44, 95%CI: 1.38 to 1.48), respectively. Rail drivers had the shortest median time loss (1.2 weeks, IQR: 0.53-3.28) and this was statistically significantly less than other occupations.

Summary and Conclusions

This report presents findings from analysis of national workers' compensation claims data in transport sector workers over a twelve year time period. The report describes substantial differences between transport sector occupations in the volume, incidence, nature, mechanism, trend and duration of work-related injury and disease claims across Australia over a twelve year time frame (2004-2015).

Combined, the data demonstrate that workers in the transport sector are at increased risk of work-related injury and disease than workers in other occupations. Workers in the comparison group of male dominated occupations are also at increased risk. Rail drivers and truck drivers are the two groups at greatest risk. However rail drivers represent one of the smallest groups of injured workers while truck drivers are one of the largest, and have 10 times the volume of claims than rail drivers.

The risk appears to be changing. The number of accepted workers' compensation claims has reduced over the study period in all groups with the exception of delivery drivers. The rate of claims has reduced more quickly in most categories due to the growth in the number of workers in the industry. However these apparent improvements should not be attributed solely to improvements in occupational health and safety given substantial changes in access to workers compensation in the largest jurisdiction in 2012 ^[13].

Compared with all other workers, the national-level median duration of time loss due to work-related injury and illness was longer in automobile drivers and truck drivers. Truck drivers lost nearly twice the amount of time from work after injury compared with both all other workers, and workers in male dominated occupations. Automobile drivers lost approximately 2.5 times the amount of time. There were no significant differences in the median duration of time loss between transport workers and other male dominated occupations. Although rail drivers had the highest rate of mental health conditions, their median duration of time loss was significantly shorter than other occupations in this study.

Musculoskeletal conditions are the most common type of condition across all the occupation categories, followed by minor traumatic injury. However this study demonstrates differential patterns of work-related injury and disease among occupational cohorts, and suggests some opportunities for intervention. Truck drivers may face some unique occupational conditions that put them at higher risk of musculoskeletal injury than other male-dominated occupations. For instance, excessive pushing and pulling, climbing on/off a vehicle, opening and closing doors or levers on a vehicle are all ways that truck drivers can experience musculoskeletal injury on their job ^[14]. Truck driver falls due to entering and exiting the trailer cab and freight-moving injuries has been ranked among the top injuries for both short-haul and long-haul trucking in another U.S. study ^[15]. Further analysis of specific mechanisms will enable us to determine if these are disproportionately contributing to the elevated rate of musculoskeletal condition claims relative to other occupations. Truck drivers were also found to be at higher risk of fracture and other traumatic injuries than other drivers and all other workers. This is possibly due to trucks being disproportionately involved in casualty crashes. It is estimated that approximately 16% of road crash fatalities and 4% of injuries involve heavy vehicles ^[16].

There is substantial focus currently on fatigue management interventions in truck drivers to reduce crash risk. These findings suggest that other occupational interventions may also help to reduce injury in truck drivers, and that these could include, for example, review and revision of policies and procedures for manual handling, or re-design of entry and exit from trailer cabs.

Rail drivers are a well-defined occupational group who are at significantly elevated risk of psychological injury claims. This is consistent with other recent Australian research showing that road and rail drivers was also found to be at higher risk for suicide than workers in the other male occupations ^[17], and an international study which found that alcohol abuse, major depressive episode, anxiety symptoms and 'burnout' presented in higher rates in public transportation drivers than in the general population (Ruiz-Grosso^[18]). Previous studies have associated emotional demands, turnover, and lack of job security with higher risk of work-related mental health conditions ^[19]. In addition, international studies have shown that public transport workers face a much higher risk of workplace violence due to low levels of guardianship, overcrowding, proximity to passengers, cash handling and service delays ^[20, 21]. These factors may partially explain the current finding of increased risk of mental health claims in rail and bus drivers, however other factors are also likely to be at play, including exposure to traumatic incidents on the job.

We also observed that injured Australian transport workers, especially truck and bus drivers, are more likely to be older than injured workers in other occupations. This is consistent with shifts within the ageing of the transport industry workforce observed over the past two decades. In 1995 nearly 40% of the workforce was less than 35 years old. The equivalent statistic in 2015 was 28% ^[22], with nearly half of the workforce now aged between 45 and 64 years old compared to 33% in 1995 ^[22]. Reports suggest one in five working truck drivers is at or near retirement age ^[23], and that this is contributing to a shortage of labour supply in truck driving. Ageing brings additional risk for work-related injury and disease ^[24,25]. Despite this, we observed significantly increased risk for work-related injury and disease even after statistically adjusting for age, suggesting that other factors are also conferring higher risk in transport workers. Occupational safety and health interventions focused on ageing workers may be suitable for trial within transport sector workers.

STRENGTHS AND LIMITATIONS

The database used in this study involves population coverage of compensable work-related injury and disease at a national level. The longitudinal nature of the data also provides the opportunity to explore trends and changes over time. Use of standardized coding system also allows comparisons within and across occupational, industry categories and across injury types.

However, the data does have some limitations. By providing detailed analyses of injuries by transport sector, occupation and injury type, some of the results presented are from relatively small groups (e.g., 5485 total claims in automobile drivers), so caution should be taken when interpreting time series findings. The major limitation of the NDS is that it does not include cases of injury and disease that are not work-related. Similarly, some workers with work-related conditions may choose not to make workers' compensation claims, or may not be eligible. In addition, according to ABS, nearly 14% of transport workers are categorised as independent contractors ^[26]. Sole traders (such as owner-drivers) are typically excluded from coverage under Australian workers' compensation arrangements and this represents another gap in the database. These limitations mean that efforts to analyse alternative data sources, and to collect health data from cohorts of transport workers will provide valuable additions to knowledge and enable a more detailed understanding of the health and wellbeing of workers in the transport and logistics industry. This is a focus for future phases of this study and will be the subject of future reports.

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Appendix I

TABLE 3 INJURY TYPE CATEGORIES AND CORRESPONDING TOOCS GROUP

Type of condition	TOOCS Major Group
Fractures	B: Fractures
Musculoskeletal	F: Traumatic Joint/Ligament and Muscle/Tendon Injury
	H: Musculoskeletal and Connective Tissue Diseases
Neurological	A: Intracranial Injuries
	E: Injury to Nerves and Spinal Cord
	L: Nervous System and Sense Organ Diseases
Mental Health Conditions	I: Mental Diseases
Other Traumatic	C: Wounds, Lacerations, Amputations and Internal Organ Damage
	D: Burn
	G: Other Injuries
Other Diseases	J: Digestive System Diseases
	K: Skin and Sub-cutaneous Tissue Diseases
	M: Respiratory System Diseases
	N: Circulatory System Diseases
	O: Infectious and Parasitic Diseases
	P: Neoplasms (Cancer)
	Q: Other Diseases
Other Claims	R: Other Claims