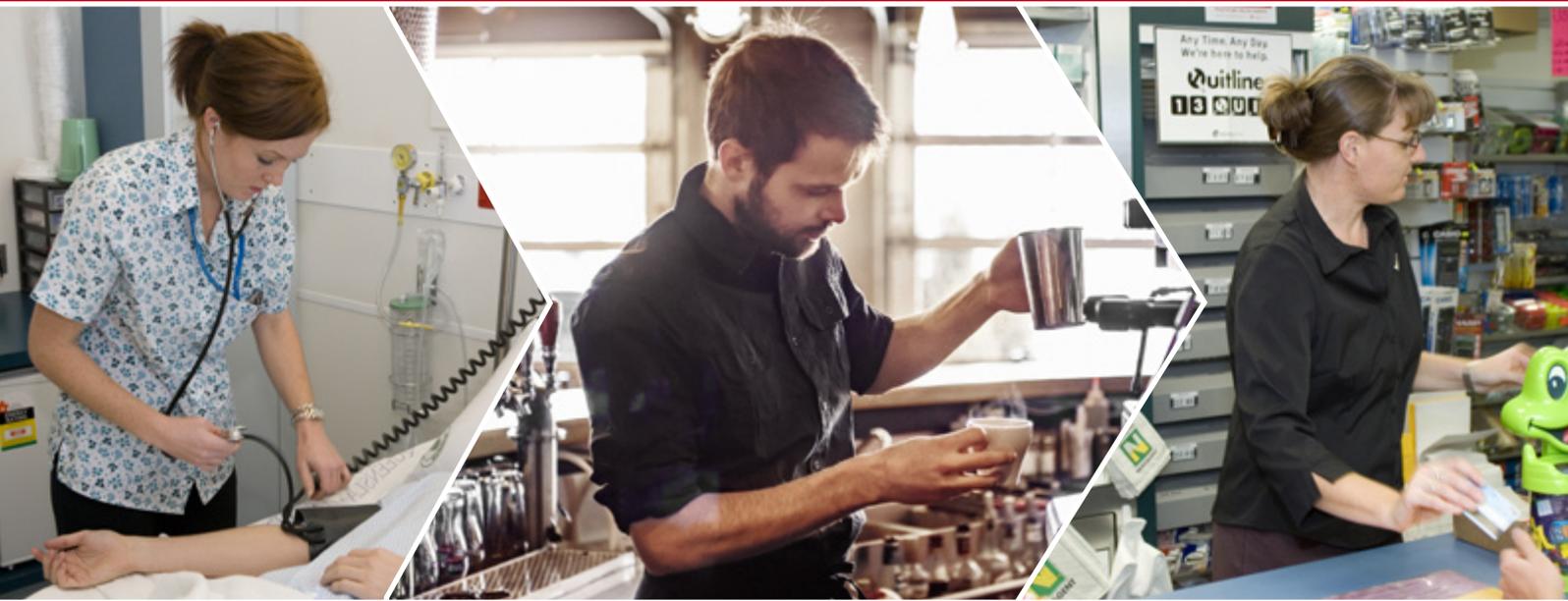


A Comparison of Work-Related Injuries Among Shiftworkers and Non-Shiftworkers



2016

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Abbreviations and symbols

ABS	Australian Bureau of Statistics
MPHS	Multi-Purpose Household Survey
RSE	relative standard error
WRIS	Work-Related Injuries Survey
*	estimate should be interpreted with caution because the relative standard error is between 25 per cent and 50 per cent

Summary of results

Data from a nationally representative survey that was administered in 2013–14 shows that the injury rate for shiftworkers is significantly higher than the injury rate for non-shiftworkers. The injury rate for shiftworkers (49.9 injured workers per million hours worked) was more than two times higher than the injury rate for non-shiftworkers (23.2). Although shiftworkers accounted for only 16 per cent of hours worked, they accounted for 30 per cent of injured workers.

Not all groups of shiftworkers have significantly higher injury rates. Shiftworkers who are machinery operators and drivers have a significantly lower injury rate than their non-shiftworker counterparts. There are no significant differences in the injury rates of shiftworkers and non-shiftworkers in the following groups:

- Occupation: clerical and administrative workers.
- Industries: retail trade; transport, postal and warehousing; and health care and social assistance.
- Jurisdiction: Western Australia.

Shiftworkers in the following groups have significantly higher injury rates than their non-shiftworker counterparts:

- Occupations: labourers; community and personal service workers; technicians and trades workers; and professionals.
- Industries: manufacturing; accommodation and food services; and public administration and safety.
- Jurisdictions: Tasmania; South Australia; Victoria; New South Wales; and Queensland.
- Work-time status: full-time workers; and part-time workers.
- Sex: female workers; and male workers.
- Age groups: under 25 years; 25 to 54 years; and 55 years and above.

Compared with non-shiftworkers, a significantly higher percentage of shiftworkers:

- experience burn injuries, and
- do not apply for workers' compensation because they feel it is inconvenient or requires too much paperwork.

There are no significant differences between shiftworkers and non-shiftworkers in terms of:

- the way in which work-related injuries occur
- the amount of time lost from work due to work-related injuries
- the duration of employment in the job where injuries occur
- whether they apply for workers' compensation, and
- whether they receive or do not receive financial assistance for medical expenses or lost income.

There are no significant differences in the injury rates of:

- full-time shiftworkers and part-time shiftworkers
- female shiftworkers and male shiftworkers, and
- shiftworkers aged under 25 years, 25 to 54 years and 55 years and above.

Introduction

Research has shown that shiftworkers have higher injury rates and this is confirmed by the findings of this report. The aim of this report is to determine whether the elevated risk of shiftwork affects all groups of shiftworkers or only particular groups of shiftworkers. This will be achieved by using statistics from a nationally representative survey to compare specific groups of shiftworkers to their non-shiftworker counterparts. This report also analyses the characteristics and outcomes of work-related injuries to determine whether there are significant differences between shiftworkers and non-shiftworkers.

Source of data

The statistics in this report are from the Work-Related Injuries Survey (WRIS) that was administered by the Australian Bureau of Statistics (ABS) in 2013–14. The nationally representative survey sampled people aged 15 years and above who had engaged in work in the preceding 12 months. The ABS completed 27 300 interviews for the WRIS and it weighted the results to reflect the Australian population. The statistics in this report come from data that was accessed through the ABS' microdata service.

The statistics on shiftworkers are of survey respondents who stated that they experienced their most recent work-related injury while doing shiftwork. The ABS defines shiftwork as “a system of working whereby the daily hours of operation at the place of employment are split into at least two set work periods (shifts) for different groups of workers” (ABS 2012).

Relative standard error

A standard error is a measure of the variation that occurs when a sample, rather than an entire population, is surveyed. It indicates the extent to which an estimate of a sample varies from the true parameter of the population from which it is drawn. When a standard error is expressed as a percentage of the estimate to which it relates, it is known as a relative standard error (RSE). In this report, estimates with an RSE between 25 per cent and 50 per cent are annotated with one asterisk (*) and should be interpreted with caution. Estimates with an RSE above 50 per cent are considered too unreliable and are not presented in this report.

Tests of statistical significance

Conventional tests of statistical significance were not suitable because the results of the survey were weighted by the ABS and Safe Work Australia did not have access to the unweighted results. Therefore, this report relies on 84 per cent confidence intervals (indicated by error bars in figures) to determine whether differences between groups of workers are statistically significant.

Eighty-four per cent confidence intervals were chosen because tests have shown that the overlap or non-overlap of 84 per cent confidence intervals closely mimics the results of conventional statistical tests at a significance level of 0.05 (Hettmansperger and McKean 2011; MacGregor Fors and Payton 2013; Payton et al. 2003). In this report, differences between groups are statistically significant if 84 per cent confidence intervals do not overlap. This means there is a high probability that observed differences are due to the characteristics of the groups rather than chance variations. Differences between groups are not statistically significant if 84 per cent confidence intervals overlap. This means there is a high probability that observed differences are due to chance variations.

Injury rates

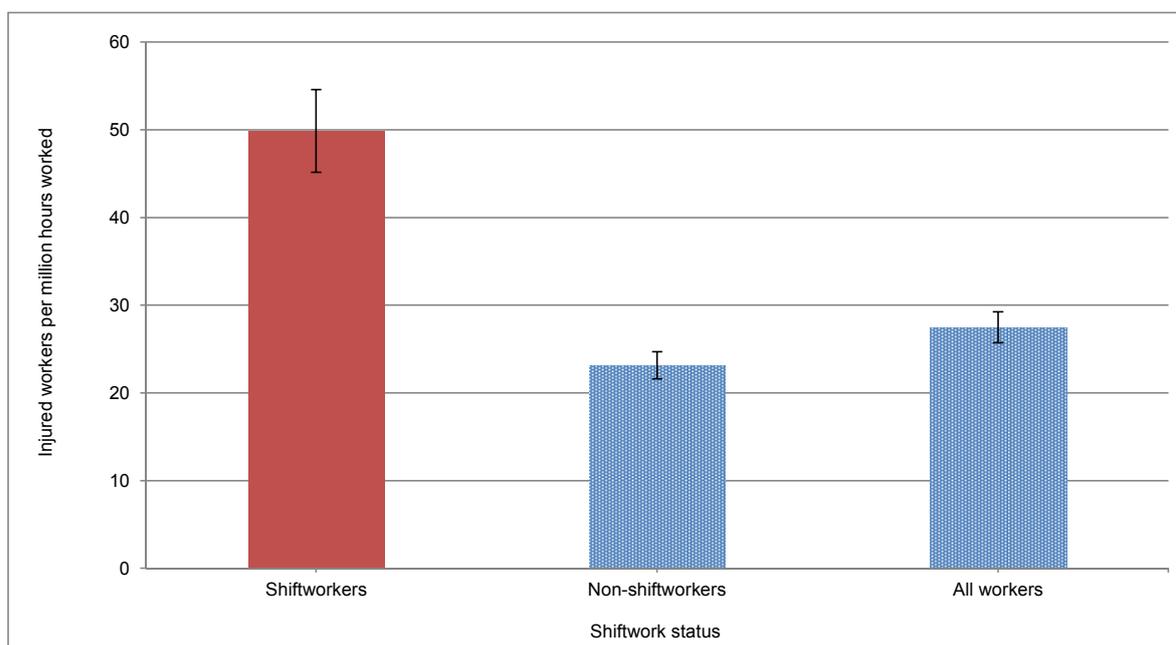
Injury rates can be based on the number of hours worked or the number of workers employed. All the injury rates in this report are based on the number of hours worked because an hour-based rate is a more precise and accurate measure of work health and safety. It is important to account for the number of hours worked because there are considerable differences in the number of hours worked by different groups of workers. The differences in the number of hours worked mean that workers' exposure to work-related risks vary greatly. An hour-based injury rate accounts for these differences and allows different groups of workers to be accurately compared.

Impact of shiftwork on work-related injuries

Of the 531 800 workers who experienced a work-related injury in 2013–14, 157 600 were shiftworkers and 374 200 were non-shiftworkers. The injury rate for shiftworkers (49.9 injured workers per million hours worked) was more than two times higher than the injury rate for non-shiftworkers (23.2). Although shiftworkers accounted for only 16 per cent of hours worked, they accounted for 30 per cent of injured workers.

To determine whether there is a significant difference in the injury rates of shiftworkers and non-shiftworkers, 84 per cent confidence intervals were calculated and are represented by the error bars in figure 1. The results show that the injury rate for shiftworkers (interval of 45.2 to 54.6) is significantly higher than the injury rate for non-shiftworkers (interval of 21.6 to 24.7) and all workers (interval of 25.0 to 29.3).

Figure 1: Injury rates and 84 per cent confidence intervals by shiftwork status, 2013–14



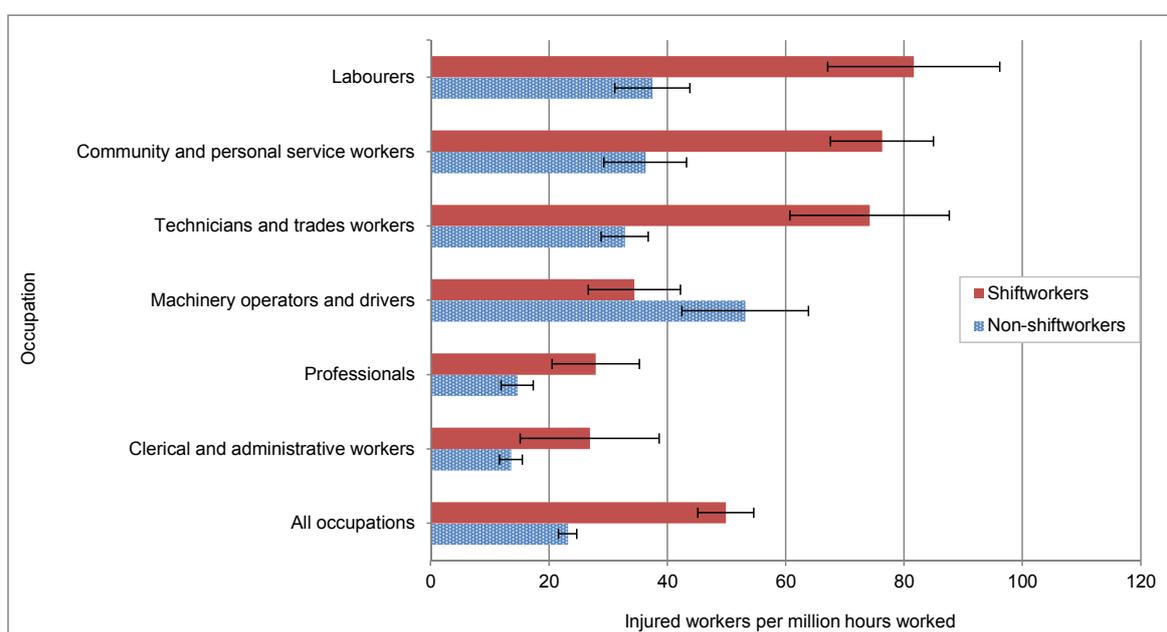
The significantly higher rate of injury among shiftworkers is unsurprising because the risks associated with shiftwork are well documented in research. In terms of work-related injuries, the most commonly cited risk factor is fatigue due to insufficient sleep, disrupted sleep patterns or extended working hours. Studies have found that shiftworkers are at higher risk of workplace accidents and near-misses (Rajaratnam et al. 2013). In addition, it has been shown that the risk of a workplace accident increases over consecutive shifts and the increased risk is considerably higher among those who work consecutive night shifts (Folkard and Tucker 2003). Epidemiological evidence indicates that shiftworkers are also at elevated risk of chronic diseases like breast cancer and cardiovascular diseases (Wang et al. 2011). Chronic diseases are not covered in this report because the primary subject of the WRIS was work-related injuries.

Differences between groups of shiftworkers

Occupation

Although shiftworkers have a significantly higher injury rate, the results in figure 2 show that shiftworkers who are machinery operators and drivers have a significantly lower injury rate than their non-shiftworker counterparts. This makes this occupation unique because there is no other occupation in which shiftworkers have significantly lower injury rates than non-shiftworkers. Among clerical and administrative workers, there are no significant differences in the injury rates of shiftworkers and non-shiftworkers. In all other occupations, shiftworkers have significantly higher injury rates than non-shiftworkers.

Figure 2: Injury rates and 84 per cent confidence intervals by shiftwork status and occupation, 2013–14



Occupations with relative standard errors above 50 per cent are excluded, but are included in “all occupations”.

Table 1 provides a breakdown of shiftworkers in the six occupations above, which collectively accounted for 81 per cent of shiftworkers in 2013–14. Around one in five (22 per cent) shiftworkers were community and personal service workers, and they included carers and aides (29 per cent), hospitality workers (27 per cent), and protective service workers (27 per cent). Seventeen per cent of shiftworkers were professionals and the majority (70 per cent) were health professionals.

Table 1: Percentage of shiftworkers in Australia by occupation, 2013–14

Occupation	Percentage of shiftworkers
Community and personal service workers	21.8%
Carers and aides	28.5%
Hospitality workers	27.3%
Protective service workers	27.2%
Health and welfare support workers	9.8%
Sports and personal service workers	7.2%
Professionals	16.9%
Health professionals	70.1%
Design, engineering, science and transport professionals	13.0%

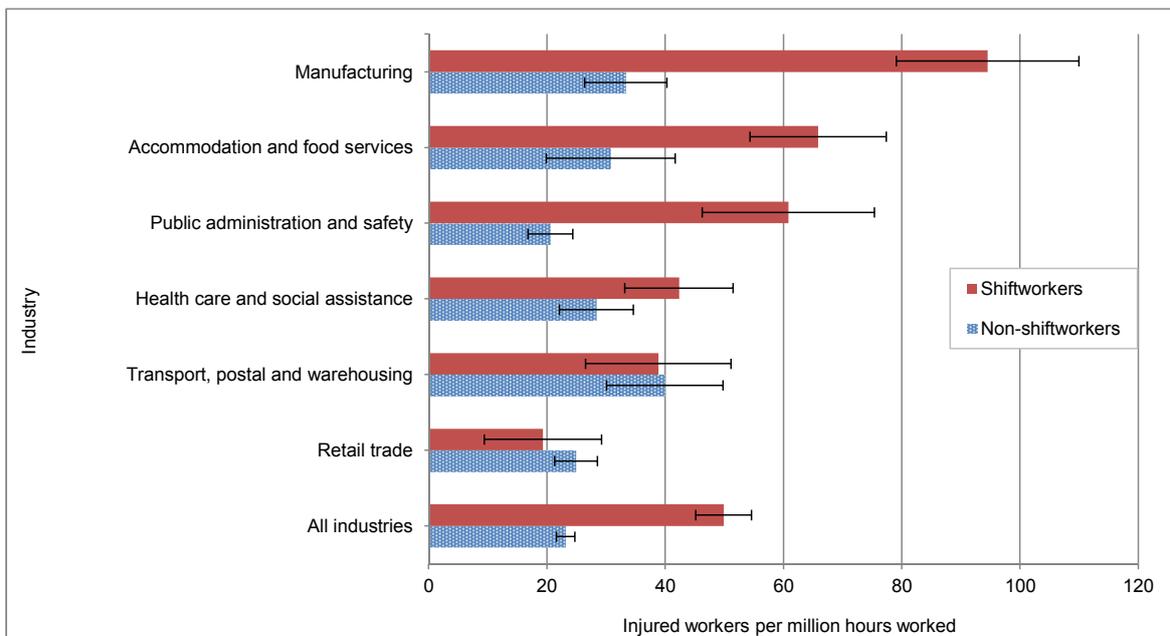
Occupation	Percentage of shiftworkers
Legal, social and welfare professionals	4.3%
Labourers	12.9%
Food preparation assistants	31.8%
Cleaners and laundry workers	22.5%
Factory process workers	16.6%
Machinery operators and drivers	11.6%
Road and rail drivers	38.7%
Machine and stationary plant operators	37.1%
Mobile plant operators	13.8%
Storepersons	10.4%
Technicians and trades workers	11.1%
Food trades workers	26.7%
Automotive and engineering trades workers	21.6%
Electrotechnology and telecommunications trades workers	15.5%
Engineering, ICT and science technicians	10.9%
Clerical and administrative workers	6.3%
Other occupations	19.4%
Total	100.0%

Industry

Although shiftworkers have a significantly higher injury rate, the results in figure 3 show that there are no significant differences between shiftworkers and non-shiftworkers in three industries: retail trade; transport, postal and warehousing; and health care and social assistance.

The results in figure 3 also show that shiftworkers have significantly higher injury rates in three industries: manufacturing; accommodation and food services; and public administration and safety.

Figure 3: Injury rates and 84 per cent confidence intervals by shiftwork status and industry, 2013–14



Industries with relative standard errors above 50 per cent are excluded, but are included in “all industries”.

Table 2 provides a breakdown of shiftworkers in the six industries above, which collectively employed 77 per cent of shiftworkers in 2013–14. Almost a quarter (23 per cent) of shiftworkers worked in the health care and social assistance industry and most worked in hospitals (46 per cent) and residential care services (25 per cent). Almost one in five shiftworkers (18 per cent) worked in the accommodation and food services industry and the majority (72 per cent) worked in cafes, restaurants and takeaway food services. The retail trade industry employed 13 per cent of shiftworkers and just under half (45 per cent) worked in supermarkets and grocery stores.

Table 2: Percentage of shiftworkers in Australia by industry, 2013–14

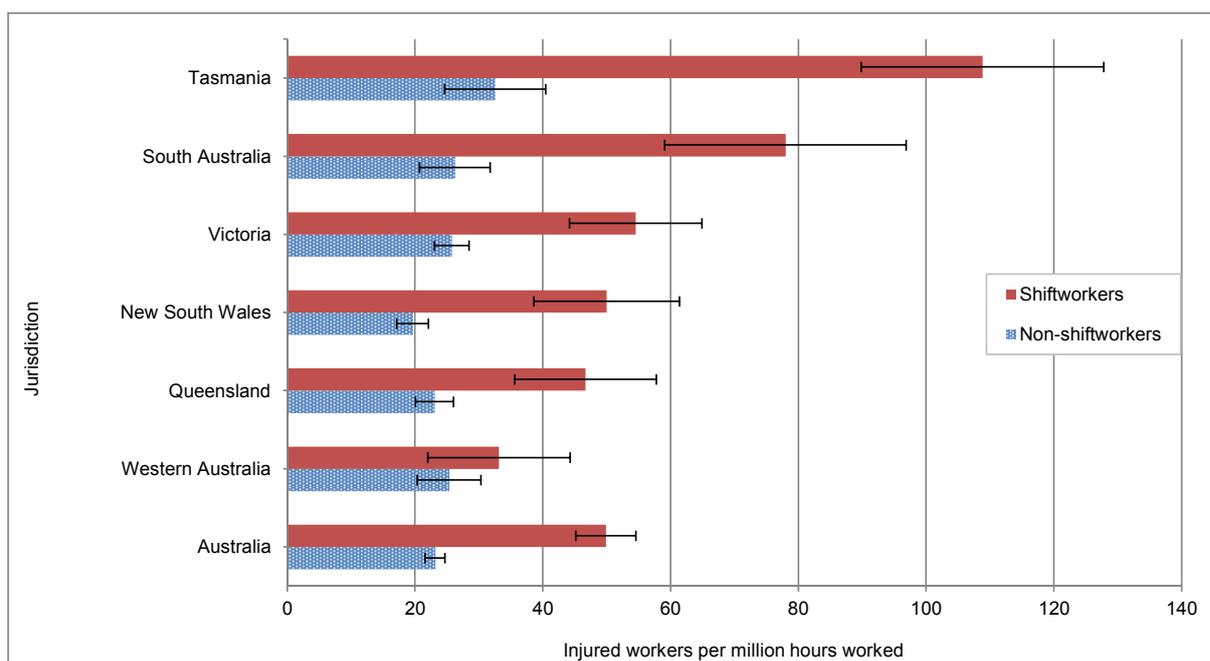
Industry	Percentage of shiftworkers
Health care and social assistance	22.7%
Hospitals	45.9%
Residential care services	25.0%
Medical services	4.5%
Medical and other health care services	4.2%
Accommodation and food services	18.0%
Cafes, restaurants and takeaway food services	71.5%
Clubs (hospitality)	12.1%
Pubs, taverns and bars	10.8%
Accommodation	5.6%
Retail trade	13.2%
Supermarket and grocery stores	44.9%
Clothing, footwear and personal accessory retailing	9.9%
Transport, postal and warehousing	9.2%
Road passenger transport	19.9%
Air and space transport	19.6%
Postal and courier pick-up and delivery services	14.4%
Rail transport	8.5%
Public administration and safety	7.9%
Public order and safety services	76.5%
State government administration	10.0%
Manufacturing	6.1%
Other industries	22.8%
Total	100.0%

Jurisdiction

Although shiftworkers have a significantly higher injury rate, the findings in figure 4 show that there are no significant differences between shiftworkers and non-shiftworkers in Western Australia. This makes Western Australia unique because shiftworkers in other Australian jurisdictions have significantly higher injury rates than non-shiftworkers.

The results in figure 4 also show that the injury rate for shiftworkers in Tasmania is significantly higher than the injury rates for shiftworkers in all other jurisdictions except South Australia.

Figure 4: Injury rates and 84 per cent confidence intervals by shiftwork status and jurisdiction, 2013–14



Australian Capital Territory and Northern Territory are excluded due to high relative standard errors. They are included in “Australia”.

Further analysis was undertaken to determine why there are no significant differences between shiftworkers and non-shiftworkers in Western Australia. One factor is that Western Australia has the lowest percentage of shiftworkers who are employed in high-risk industries. High-risk industries are the three industries in which shiftworkers have significantly higher injury rates than non-shiftworkers (i.e. manufacturing, accommodation and food services, and public administration and safety). As shown in table 3, the percentage of shiftworkers in high-risk industries is 24 per cent in Western Australia, while it ranges from 31 per cent to 37 per cent in other Australian jurisdictions.

Table 3: Percentage of shiftworkers by jurisdiction and risk status, 2013–14

Risk status	Western Australia	Victoria	Queensland	Tasmania	New South Wales	South Australia
Shiftworkers in high-risk industries	24%	31%	32%	35%	35%	37%
Shiftworkers in low-risk industries	44%	50%	42%	43%	45%	49%
Shiftworkers in other industries	32%	19%	26%	22%	20%	14%
Total	100%	100%	100%	100%	100%	100%

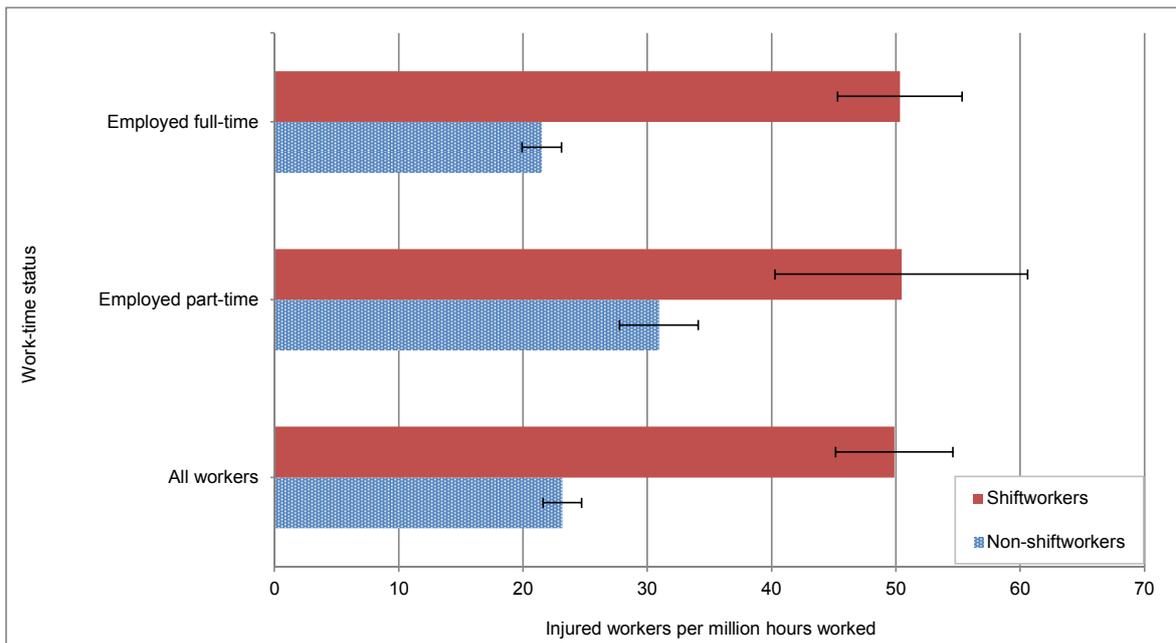
High-risk industries: industries in which shiftworkers have significantly higher injury rates than non-shiftworkers (i.e. manufacturing, accommodation and food services, and public administration and safety). Low-risk industries: industries in which there are no significant differences in injury rates of shiftworkers and non-shiftworkers (i.e. health care and social assistance, transport, postal and warehousing, and retail trade).

Full-time and part-time status

The ABS defines part-time workers as those “who usually worked less than 35 hours a week in all jobs” (ABS 2012). The results in figure 5 show that full-time shiftworkers and part-time shiftworkers have significantly higher injury rates than their non-shiftworker counterparts. This indicates that both full-time shiftworkers and part-time shiftworkers are affected by the risks associated with shiftwork.

The results in figure 5 also show that there are no significant differences in the injury rates of full-time shiftworkers and part-time shiftworkers. This indicates that full-time shiftworkers and part-time shiftworkers face similar levels of risk at work.

Figure 5: Injury rates and 84 per cent confidence intervals by shiftwork status and work-time status, 2013–14

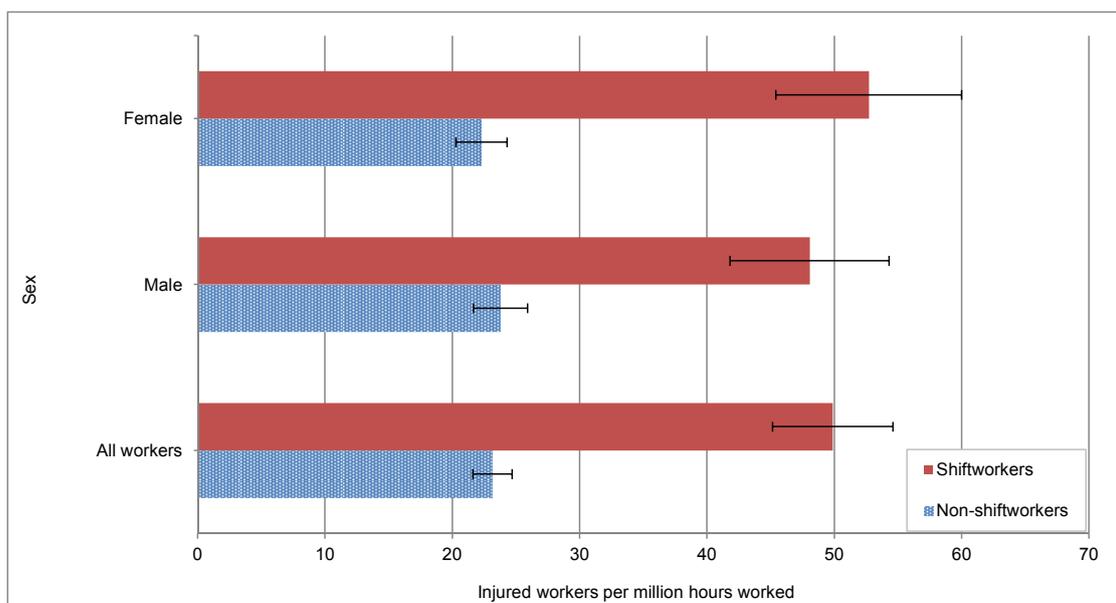


Sex

The results in figure 6 show that female shiftworkers and male shiftworkers have significantly higher injury rates than their non-shiftworker counterparts. This indicates that both female shiftworkers and male shiftworkers are affected by the risks associated with shiftwork.

The results in figure 6 also show that there are no significant differences in the injury rates of female shiftworkers and male shiftworkers. This indicates that female shiftworkers and male shiftworkers face similar levels of risk at work.

Figure 6: Injury rates and 84 per cent confidence intervals by shiftwork status and sex, 2013–14

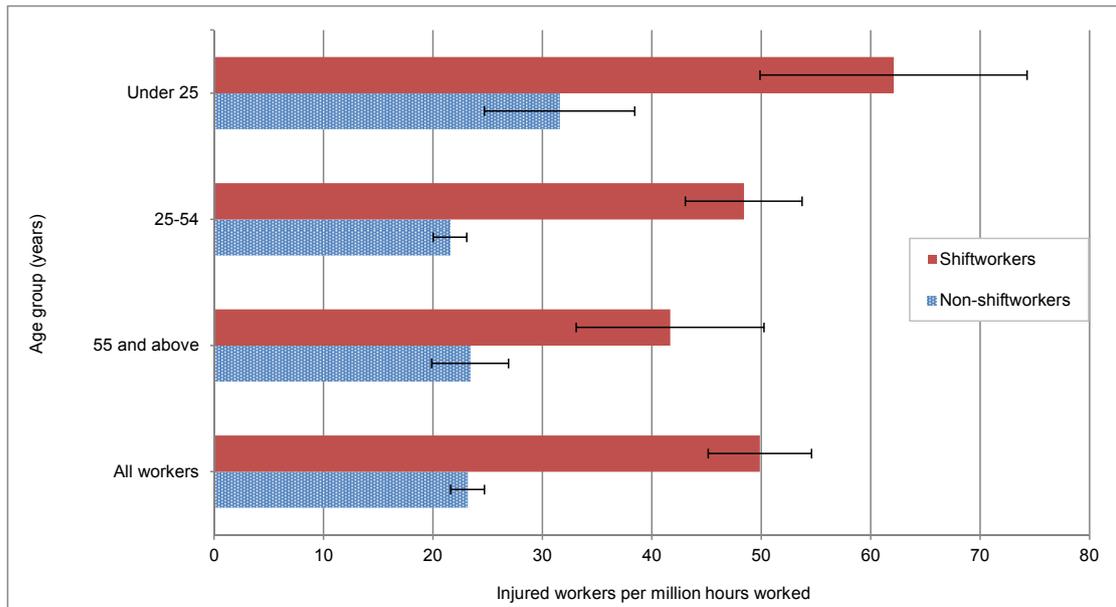


Age group

In order to develop more reliable statistics, shiftworkers were grouped into three broad age groups: under 25 years; 25 to 54 years; and 55 years and above. The results in figure 7 show that shiftworkers in each age group have significantly higher injury rates than their non-shiftworker counterparts. This indicates that shiftworkers in the three age groups are affected by the risks associated with shiftwork.

The results in figure 7 also show that there are no significant differences in the injury rates of shiftworkers in the three age groups. This indicates that shiftworkers in the three age groups face similar levels of risk at work.

Figure 7: Injury rates and 84 per cent confidence intervals by shiftwork status and age group, 2013–14



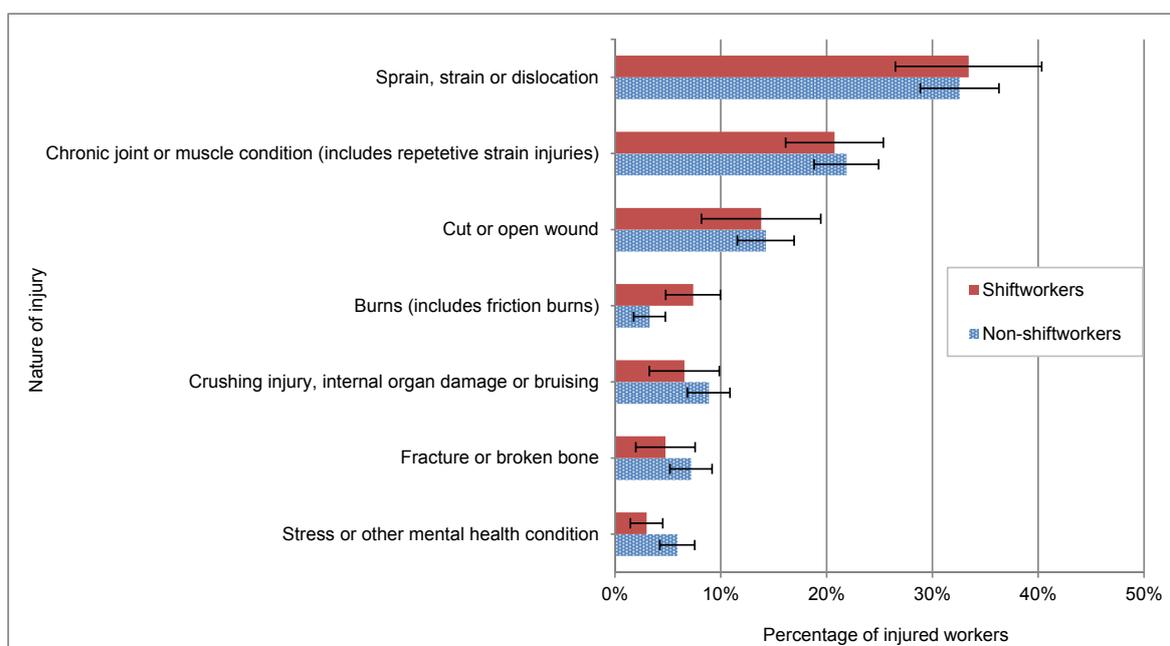
Characteristics and outcomes of work-related injuries

Nature of injury

The most common injuries among shiftworkers were sprains, strains or dislocations (33 per cent) and chronic joint or muscle conditions (21 per cent). Other injuries experienced by shiftworkers were: cuts or open wounds (*14 per cent); burns (*7 per cent); crushing injuries, internal organ damage or bruising (*7 per cent); fractures or broken bones (*5 per cent); and stress or other mental health conditions (*3 per cent).

The 84 per cent confidence intervals in figure 8 show that a significantly higher percentage of shiftworkers experience burn injuries. This is largely because there are occupations in which shiftwork is more common and the jobs undertaken by workers involve exposure to heat-related hazards (examples of these occupations are chefs, kitchenhands, baristas, waiters, firefighters). Due to this combination of factors, a higher percentage of shiftworkers are exposed to heat-related hazards. For other types of injuries, there are no significant differences between shiftworkers and non-shiftworkers.

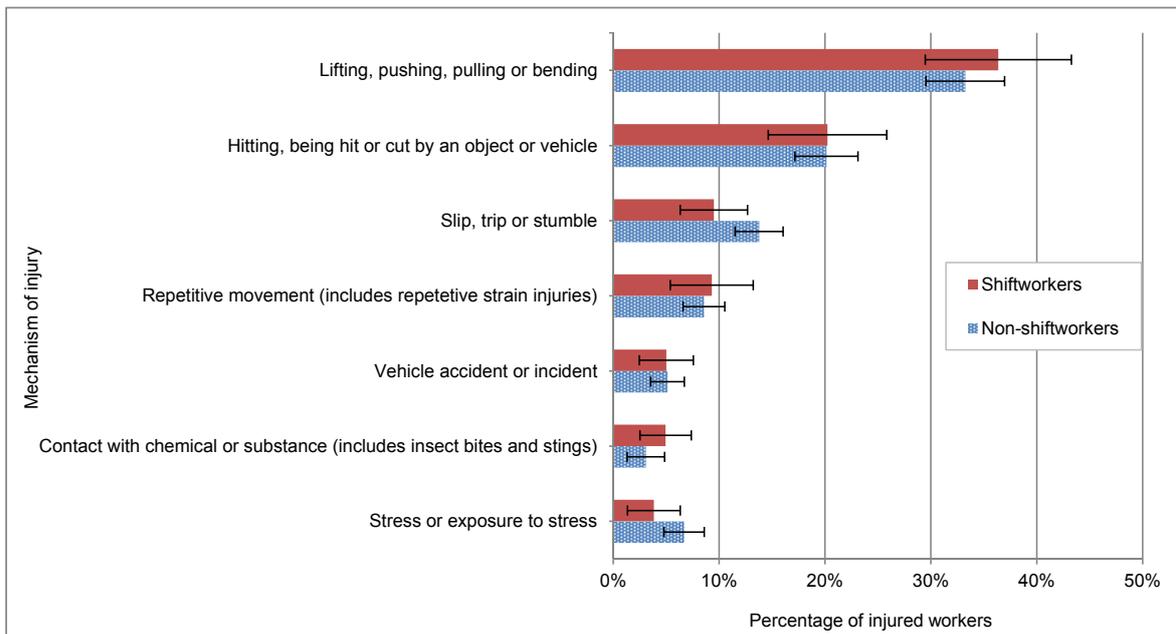
Figure 8: Percentages and 84 per cent confidence intervals of injured workers by shiftwork status and nature of injury, 2013–14



Mechanism of injury

The most common mechanisms of injury among shiftworkers were lifting, pushing, pulling or bending (36 per cent), and hitting, being hit or cut by an object or vehicle (20 per cent). Other mechanisms of injury among shiftworkers were: slip, trip or stumble (10 per cent); repetitive movement (*9 per cent); vehicle accident or incident (*5 per cent); contact with chemical or substance (*5 per cent); and stress or exposure to stress (*4 per cent). The 84 per cent confidence intervals in figure 9 show that there are no significant differences between shiftworkers and non-shiftworkers in terms of mechanisms of injury.

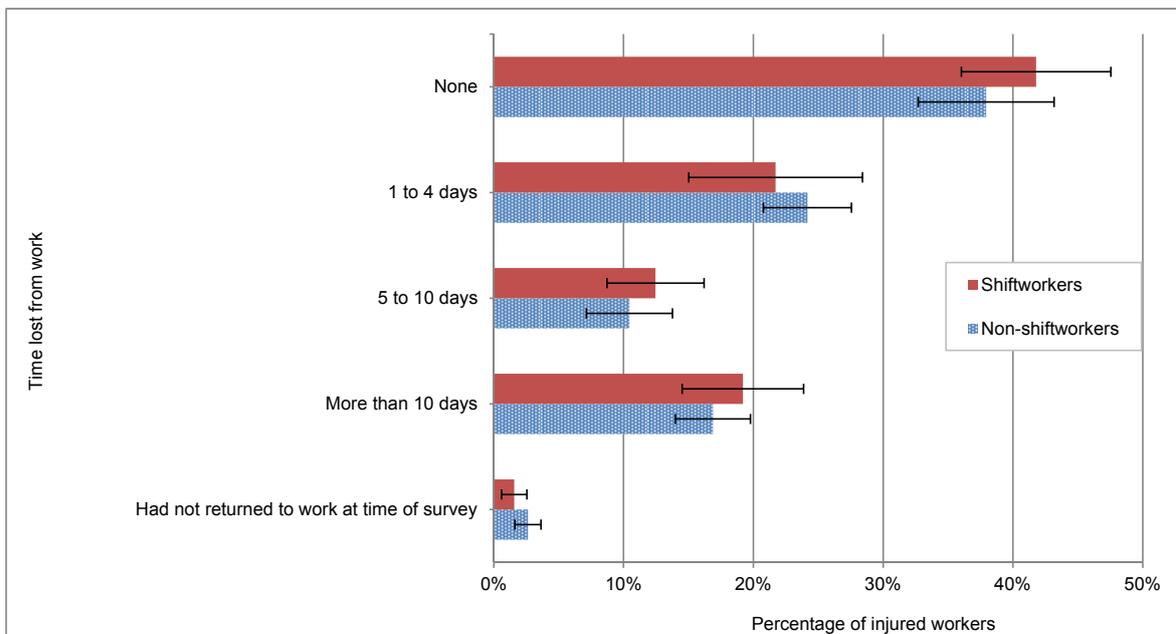
Figure 9: Percentages and 84 per cent confidence intervals of injured workers by shiftwork status and mechanism of injury, 2013–14



Time lost from work

Forty-two per cent of shiftworkers did not lose any time from work due to their injury. Other absence periods for shiftworkers were: one to four days (22 per cent); five to 10 days (13 per cent); and more than 10 days (19 per cent). The 84 per cent confidence intervals in figure 10 show that there are no significant differences between shiftworkers and non-shiftworkers in terms of time lost from work.

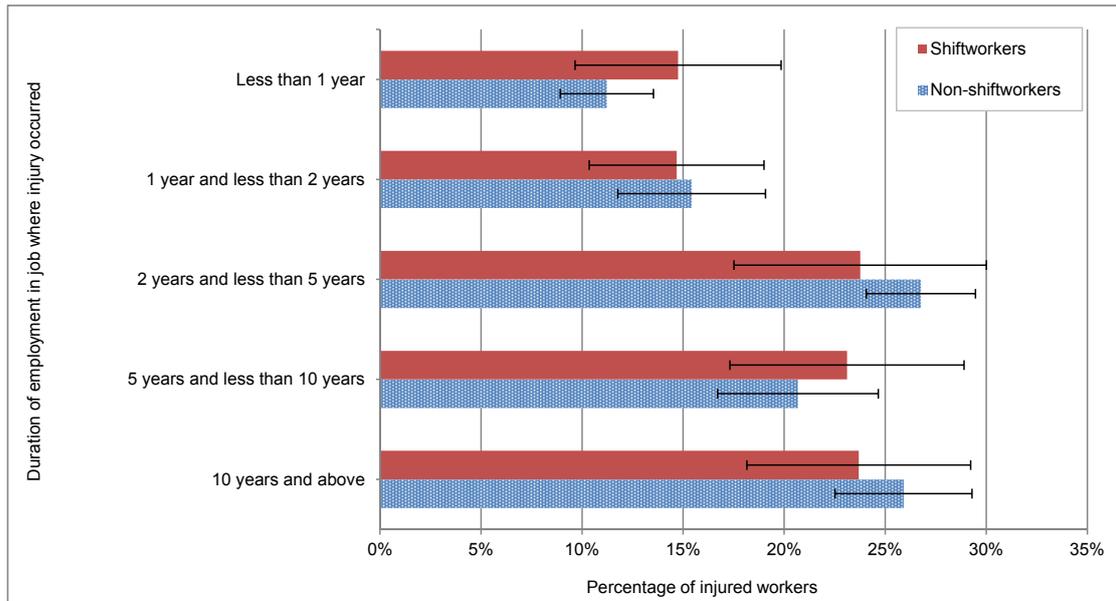
Figure 10: Percentages and 84 per cent confidence intervals of injured workers by shiftwork status and time lost from work, 2013–14



Duration of employment in job where injury occurred

Shiftworkers who experienced a work-related injury had been employed in the job where the injury occurred for varying periods of time. The majority (71 per cent) had been employed for over two years, while 29 per cent had been employed for less than two years. A more detailed breakdown of employment periods is provided in figure 11. The 84 per cent confidence intervals in figure 11 show that there are no significant differences between shiftworkers and non-shiftworkers in terms of the duration of employment in the job where the injury occurred.

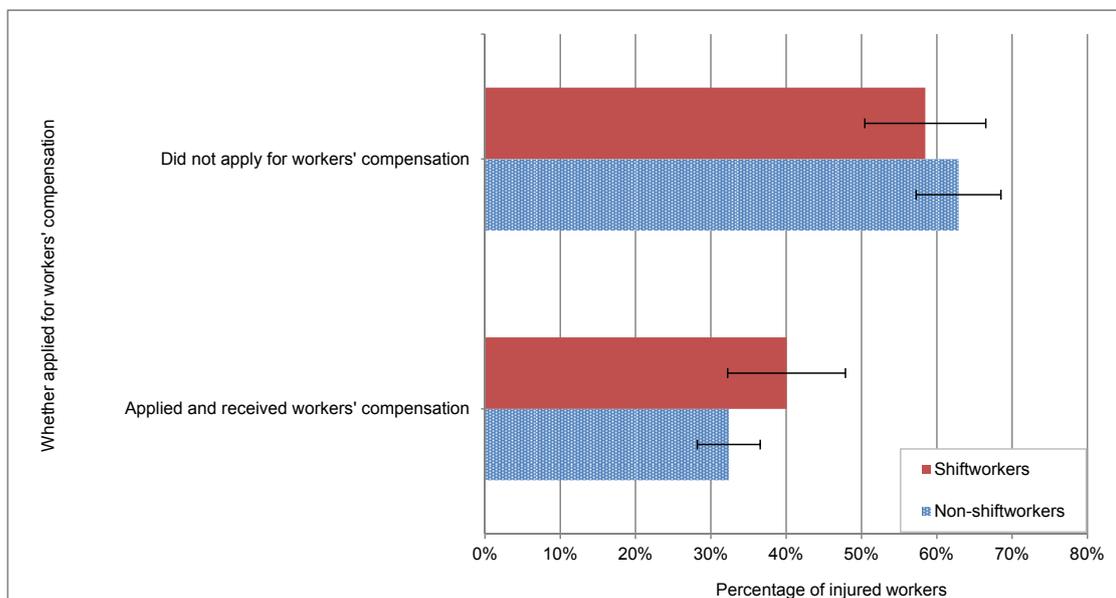
Figure 11: Percentages and 84 per cent confidence intervals of injured workers by shiftwork status and duration of employment in job where injury occurred, 2013–14



Whether applied for workers' compensation

The majority (59 per cent) of shiftworkers did not apply for workers' compensation, while 40 per cent applied and received workers' compensation. The 84 per cent confidence intervals in figure 12 show that there are no significant differences between shiftworkers and non-shiftworkers in terms of applying for and receiving workers' compensation, and not applying for workers' compensation.

Figure 12: Percentages and 84 per cent confidence intervals of injured workers by shiftwork status and whether applied for workers' compensation, 2013–14

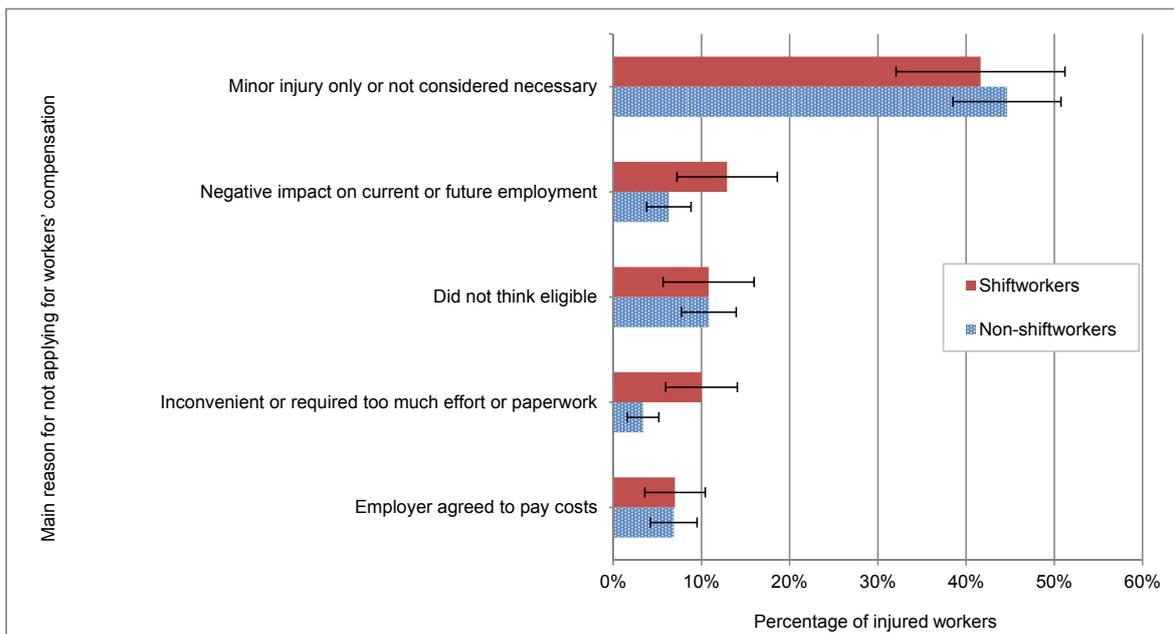


Reasons for not applying for workers' compensation

Of the shiftworkers who did not apply for workers compensation, 42 per cent did not apply as they felt the injury was minor or they did not consider it necessary to apply. Other shiftworkers gave the following reasons for not applying for workers' compensation: negative impact on current or future employment (*13 per cent); did not think eligible (*11 per cent); inconvenient or required too much effort or paperwork (*10 per cent); and employer agreed to pay costs (*7 per cent).

The 84 per cent confidence intervals in figure 13 show that a significantly higher percentage of shiftworkers do not apply for workers' compensation because they feel it is inconvenient or requires too much paperwork. With regard to the other reasons for not applying for workers' compensation, there are no significant differences between shiftworkers and non-shiftworkers.

Figure 13: Percentages and 84 per cent confidence intervals of injured workers by shiftwork status and main reason for not applying for workers' compensation, 2013–14

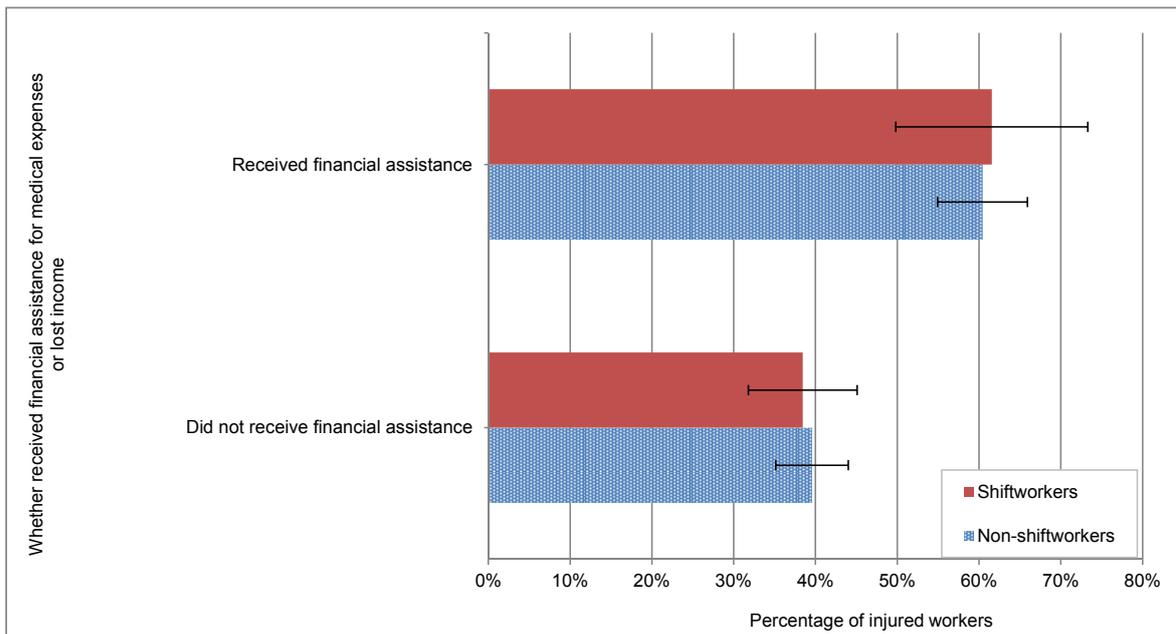


Whether received financial assistance

Survey respondents who experienced a work-related injury were asked whether they received financial assistance for medical expenses or lost income. Sources of financial assistance include workers' compensation, employers, Centrelink, Medicare, health insurance, income insurance, family and friends.

The majority (62 per cent) of shiftworkers received financial assistance, while 38 per cent did not receive financial assistance. The 84 per cent confidence intervals in figure 14 show that there are no significant differences between shiftworkers and non-shiftworkers in terms of whether they receive or do not receive financial assistance for medical expenses or lost income.

Figure 14: Percentages and 84 per cent confidence intervals of injured workers by shiftwork status and whether received financial assistance, 2013–14



Conclusion

Data from a nationally representative survey shows that the injury rate for shiftworkers is significantly higher than the injury rate for non-shiftworkers. However, there are groups of shiftworkers who have injury rates that are either significantly lower than those of their non-shiftworker counterparts or not significantly different from those of their non-shiftworker counterparts.

This finding suggests that there are protective factors among some groups of shiftworkers that reduce the prevalence or severity of risks associated with shiftwork. One possible protective factor is that shiftworkers in some groups undertake less risky types of work than shiftworkers in other groups. This is supported by the fact that Western Australia, which is the only Australian jurisdiction in which shiftworkers do not have significantly higher injury rates, has the lowest percentage of shiftworkers who are employed in high-risk industries.

In addition to undertaking less risky types of work, it is possible that some groups of shiftworkers have a lower degree of exposure to the risk factors associated with shiftwork (e.g. night shiftwork). It is important to accurately identify the factors that appear to protect some groups of shiftworkers and this is an area that merits further research. Findings from such research would be valuable in informing safety strategies that are more effective in reducing the significantly high injury rates among some groups of shiftworkers.

Explanatory notes

Explanatory notes on the methods of the WRIS were published by the ABS and are available on its website (<http://www.abs.gov.au/ausstats/abs@.nsf/lookup/6324.0explanatory%20notes1jul%202013%20to%20jun%202014?opendocument>). The explanatory notes below are in addition to those published by the ABS as they relate to the content that is specific to this report.

Confidence intervals

In this report, 84 per cent confidence intervals were calculated using RSEs that were published by the ABS. The RSEs and their associated estimates were used to calculate standard errors and the standard errors were used to calculate 84 per cent confidence intervals. Confidence intervals were not calculated for estimates that had RSEs above 50 per cent.

Industry

The industry of the injured worker was coded using the Australian and New Zealand Standard Industrial Classification, 2006 (ABS 2006b).

Injury rates

The number of injured workers per million hours worked was calculated using the following formula: number of injured workers / number of hours worked annually by workers x 1 000 000.

Estimates of hours worked were calculated using data from the Multi-Purpose Household Survey (MPHS) that the ABS administered together with the WRIS in 2013–14. The MPHS is a broader survey that is used to develop statistics on the Australian workforce.

Respondents to the MPHS were asked to indicate the number of hours they usually work per week in all jobs. For each respondent, an estimate of the number of hours worked in 2013–14 was calculated by multiplying the number of hours usually worked per week by 48 (expected number of working weeks in a financial year after annual leave). For each group of workers, estimates of hours worked in 2013–14 were calculated by aggregating the hours worked by each worker in the group.

Mechanism of injury

The mechanism of injury classification was based on the Type of Occurrence Classification System (ASCC 2008) that was developed by Safe Work Australia for coding workers' compensation claims.

Nature of injury

The nature of injury classification was based on the Type of Occurrence Classification System (ASCC 2008) that was developed by Safe Work Australia for coding workers' compensation claims.

Occupation

The occupation of the injured worker was coded using the Australian and New Zealand Standard Classification of Occupations, First Edition (ABS 2006a).

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