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WORKPLACE SAFETY AND THE FUTURE OF WORK IN NZ

SUPPLEMENTARY REPORT

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DISCLAIMER

The results in this paper are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI) managed by Statistics New Zealand.

The opinions, findings, recommendations and conclusions expressed in this paper are those of the authors are not Statistics NZ.

Access to anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business or organisation and the results in this paper have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz.

The results are based in part on tax data supplied by Inland Revenue to Statistics NZ under the Tax Administration Act 1994. This tax data must be used for statistical purposes, and no individual information may be published or disclosed in any other form, or provided to Inland Revenue for administrative or regulatory purposes.

Any person who has had access to the unit-record data has certified that they have been shown, have read, and have understood section 81 of the Tax Administration Act 1994, which relates to secrecy. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support
Inland Revenue's core operational requirements.

All observation counts have been randomly rounded to base 3 in accordance with Statistics NZ confidentiality rules. Cells marked with 'S' have been supressed for confidentiality reasons.

1 Introduction

What are the possible implications of future-of-work trends for workplace health and safety (WHS)? Despite presenting a potentially significant challenge, the possible implications for WHS of future-of-work trends have so far received scant attention. Moreover, NZ-specific insights are needed since while NZ faces the same general future-of-work trends as other developed countries, some of the specifics as well as the regulatory context differ. As an initial step to fill this information gap, Hennecke et al. (2021) examines the empirical relationship between future-of-work trends and workplace safety outcomes in the form of work-related injuries using New Zealand accident claims data. That report takes advantage of Stats NZ's integrated data, which provides rich information on work-related injuries which can be related to the characteristics of workers and their workplaces via an extensive set of linked administrative and survey data.

However, WHS is about more than the absence of injury. Therefore, as a supplement to Hennecke et al. (2021), this report explores the possibility of using mental health referral and chronic conditions that is also available as part of Stats NZ's Integrated Data Infrastructure (IDI) to create broader health outcome variables that can be linked to the characteristics of workers and their workplaces.

This exploratory investigation discusses the nature of the available mental health and chronic conditions data, highlighting its strengths and limitations. Overall, these datasets provide a wealth of information on these health outcomes. However, while the injury claims data used in Hennecke et al. (2021) differentiates between work-related and non-work-related injuries, one of the main limitations in using these data to measure WHS outcomes is that it would be extremely difficult to determine whether a mental health or chronic condition is work-related.

This report proceeds as follows. The next section describes the mental health referrals and chronic conditions datasets and provides some descriptive statistics. Section 3 presents some exploratory analysis on the bivariate relationships between these health outcomes and the characteristics of workers and their workplace, including future-of-work practices. Section 4 briefly concludes.

2 Data and descriptive statistics

We use linked administrative and survey data available in Stats NZ's Integrated Data Infrastructure (IDI) and Longitudinal Business Database (LBD). These databases provide a rich set of population-level unit record information on individuals and businesses. This includes a census of all Accident Compensation Corporation (ACC) injury claims. These injury claims data are used in Hennecke et al. (2021) to construct workplace safety outcome variables. It linked this to information on workers, which is available in the IDI, with information on their workplaces, which is available in the LBD, via the Linked Employer-Employee Database (LEED). This allowed them to analyse associations between ACC injury claims and the characteristics of individuals as well as the characteristics of the businesses they work in.

However, work-related injuries are only one type of WHS outcome. Given growing concerns about psychosocial risks, this report supplements Hennecke et al. (2021) by looking at Ministry of Health (MoH) Programme for the Integration of Mental Health (PRIMHD) data. In addition, since work-related harm can also involve gradual onset illnesses, we consider MoH data on chronic conditions.

This section briefly outlines how the spine dataset was created, then details the construction of mental health and chronic condition outcomes variables. It then briefly describes the relevant explanatory variables. For full details of the construction of the spine dataset and the exploratory variables, see Hennecke et al. (2021).

2.1 Creating the data spine

As detailed in Hennecke et al. (2021), we create a spine which defines our population of interest. We use workers with observed monthly PAYE 'wage and salary' income information for 2018 from the Inland Revenue (IR) Employer Monthly Schedule (EMS). The rationale for using monthly data is to link workers with their workplaces in a more accurate way than annual data would allow.

Consistent with Hennecke et al. (2021), we retain employee-month observations associated with a firm that was surveyed in the Business Operations Survey (BOS) 2018. In addition, since BOS includes only firms with six or more employees, we retain a random sample of 13% of all small firms with less than six employees. This was done for consistency with the size of the BOS sample (13% of firms with six or more employees). Hennecke et al. (2021) mainly focused on those employee-month observations associated with BOS-respondent firms in order to examine the relationship between injury claims and future-of-work

practices (as this information is only available for BOS firms). This is because the BOS 2018 featured a 'Changing nature of work' module which included information on businesses' use of a number of future-of-work practices and policies. However, we focus on the full sample spine which means we include observations relating to small firms but do not examine the relationship between mental health referrals and future-of-work practices such as flexible work arrangements. This is because our aim is to illustrate how the mental health and chronic conditions data could be used to examine WHS outcomes, and what the limitations are, rather than to conduct analysis of the relationship between these WHS outcomes and future-of-work trends as in Hennecke et al. (2021). This results in over 8 million individual-month observations (see Table 1). As will be discussed below, due to the nature of the chronic conditions information, we use individual-level observations rather than individual-month observations when examining these health outcomes.

2.1.1 Mental health referrals (PRIMHD)

We explore the possibility of using Ministry of Health (MoH) Programme for the Integration of Mental Health Data (PRIMHD) within the IDI to create mental health outcome variables. PRIMHD is a single national data source of mental health and addiction referrals that was created with the aim of improving service delivery and health outcomes.

While PRIMHD is a unique and rich source of national mental health information, it has some limitations. The data includes only healthcare users referred to a MoH-funded secondary mental health or addition service provider.[1] Furthermore, it does not include information on diagnoses. Therefore, the only available information to proxy the type of mental health issue involved is what treatment activity is undertaken. The difficulty of pinpointing the origins of a particular mental health issue is a more general concern, and there are often likely to be several contributory factors. In terms of that mental health outcomes cannot be readily identified as being work-related or not, meaning that the mental health data are less informative than injury claims data (used in Hennecke et al., 2021) for examining WHS outcomes.

We consider all observed mental health referrals in the PRIMHD data in 2018. For each referral, the number and type of treatment activity undertaken are available. The majority of activities are grouped into contacts and bednights.[2] Contacts are mental health and addiction services that are generally provided in an outpatient setting. Bednights are the number of nights spent in a residential or inpatient setting. The data is collapsed in line with the approach described in Hennecke et al. (2021) for the ACC claims data: duplicate

[1] Additionally, some information is missing for a number of NGOs who do not report to PRIMHD, but the coverage of the data has strongly improved in recent years (for more information, see Stats NZ, 2015).
[2] A third type of activity is seclusions, but these are very rarely observed in our sample of individuals and we, therefore, do not consider them.

observations are dropped and multiple activities corresponding to one referral are collapsed, and only the first activity is kept.

Looking at our sample of about 8 million individual-month observations, 99.8% had no mental health referrals observed in the PRIMHD data, while 0.2% (16,218) had at least one referral. For those with at least one referral, the average number of contacts was 11.19 and the average number of bednights was 0.67 (Table 1).

Table 1 Outcome variables: Mental health referrals based on MoH PRIMHD data

Variable	Definition	Mean
Mental health referral	A dummy equal to one if at least one mental health referral is observed in the month; zero otherwise.	0.2%
Number of contacts	Number of contacts with the organisation/ reporting entity (e.g. clinic, DHB, doctor) recorded for the referrals started during the month.	11.19
Number of bednights	Number of bednights recorded for the referrals started during the month.	0.67
Number of individual-month observations		**8,025,291**

2.1.2 Chronic conditions

Data on chronic health conditions is retrieved from MoH's chronic condition/significant health event cohort. It combines data from four data sources: the Health Tracker, the Virtual Diabetes Register (VDR), the Cancer Registry and the National Minimum Data Set (NMDS). Thus, the following six chronic conditions are captured: cancer, diabetes, acute myocardial infarction (AMI), gout, stroke and traumatic brain injuries (TBI). We concentrate on cancer, AMI and TBI as the other three conditions have a lower likelihood of being directly linked to or affected by work-related characteristics. Nevertheless, like the mental health conditions, we cannot identify whether an individual's chronic condition is related to their work.

The database covers all registered cases of AMI and TBI until December 2017 and cancers until December 2016 (as of August 2020). Consequently, we cannot use monthly incidents in 2018 as our outcome variable as with the case of work-related injuries and mental health referrals. Instead, we consider all registered chronic conditions with a first incident reported a maximum of five years ago (i.e. since 2013) at the individual (rather than individual-month) level. For the time-varying exploratory variables, such as industry, the 2018 information relating to the earliest month the individual appears in the full dataset is used.

In our full sample of 914,274 individuals in 2018, 12,474 individuals (1.36%) were registered as having at least one of the three chronic conditions since 2013 (Table 2). The most common of the three conditions is cancer (0.62% of individuals), followed by TBI (0.46%) and AMI (0.29%).

Table 2 Outcome Variables: Chronic conditions based on Ministry of Health chronic conditions data

Variable	Definition	Mean
At least one of the chronic conditions of interest (AMI, TBI or cancer)	A dummy equal to one if any recorded AMI, TBI or cancer since 2013; zero otherwise	1.36%
Any recorded AMI	A dummy equal to one if any recorded AMI since 2013; zero otherwise	0.29%
Any recorded TBI	A dummy equal to one if any recorded TBI since 2013; zero otherwise	0.46%
Any recorded cancer	A dummy equal to one if any recorded cancer since 2013; zero otherwise	0.62%
Number of observations (individuals)		**914,274**

3 Exploratory results: Mental health and chronic conditions

Work-related injuries are only one type of WHS outcome. Therefore, this section provides initial explorations into the measurement of mental health and chronic condition outcomes using IDI data. While the available data in the IDI presents a rich source of information on these outcomes, the data are more limited than the ACC data on work-related injuries. As such, our analysis is limited to descriptive statistics.

The general limitations of the mental health and chronic conditions datasets are described in Section 3.2. In terms of analysing WHS outcomes, there are some additional specific limitations. While the ACC claims data allow us to differentiate between work-related and non-work-related injuries, it is not possible to determine whether a mental health or chronic condition is work-related. This issue does not arise due to data limitations as such, but rather the nature of these conditions. Even if more information were available in the mental health data, it would be extremely difficult to pinpoint the origins of a mental health issue and there are often likely to be several contributory factors. This means that it is too difficult to tie a mental health issue to a person's work – for example, while workplace stress may contribute to a mental health issue, there may be other contributory factors (e.g. traumatic life events, personal triggers etc.).

Reverse causation is also likely to be an issue. For example, if we find that workers in low-paid, precarious roles are more likely to have greater mental health referrals compared with other workers, there is a possibility that they are working in these kind of roles due to existing mental health issues rather than having mental health issues due to the nature of the work they are undertaking. For example, using UK data, Dawson et al. (2015) finds that workers with poor mental health appear to select into temporary employment.

Similarly, it is often difficult to pinpoint the cause of a chronic condition. Moreover, due to the gradual nature of many chronic conditions, it is difficult to link these to particular workplace conditions in the data. With physical injuries, we can identify who the individual's employer was at the time of the injury, which allows us to examine the characteristics of businesses with high injury claim rates. However, even if it is determined that a person's cancer was caused by work-related asbestos exposure, say, this exposure may have occurred years ago and there is no way to determine in the data who the person's employer was at the time of the exposure. It is, therefore, not clear which workplace should be associated with the condition.

3.1 Mental health

Table 3 presents descriptive, bivariate statistics of the relationship between mental health referral outcomes and individual- and firm-level characteristics.

Women have a slightly higher share of mental health referrals and a higher number of contacts when a referral occurs. The share of observations associated with a mental health referral falls as age increases. This may be a combination of greater mental health issues in younger people and a greater normalisation of seeking help for mental health concerns among young people. When a referral does occur, young people aged 15-24 have a lower average number of bednights, while those age 45-54 have a higher average number.

Turning to ethnicity, Māori workers have a higher average rate of mental health referrals, while Pacific Peoples have a slightly below average rate and Asian workers have a much a very low rate. Those workers who were not born in NZ have a much lower referral rate, which could be related to greater stigma around mental health issues in some cultures.

Referral rates go down as job tenure and earnings increases. Referrals are also higher for those with multiple jobs and who started a new job in that month. However, as discussed, this may be a case of reverse causation.

Turning to the characteristics of workers' employers, there are large differences in referral rates by industries. Workers in administration & support service and accommodation & food services firms have very high mental health referral rates. Those in financial & insurance service and professional, scientific & technical service firms have very low referral rates.

Table 3 Descriptives of mental health referrals

	Mental health referral	Number of contacts	Number of bednights
Groups	**share (%)**	**mean**	**mean**
All	0.2	11.19	0.67
Gender			
Men	0.2	10.45	0.66
Women	0.21**	12.11***	0.68
Age			
15-24	0.42***	10.95	0.52***
25-34	0.24***	10.80	0.72
35-44	0.19***	11.65	0.67
45-54	0.13***	11.60	0.86**
55-64	0.09***	12.22*	0.80
65 and over	0.04***	8.60*	0.38
Ethnicity			
Māori	0.39***	10.23***	0.61
Pacific Peoples	0.17***	13.54***	0.74
Asian	0.07***	14.68***	0.69
MELAA	0.18*	12.88	0.52
Other	0.18**	11.41	0.67
European	0.2***	10.95	0.70
NZ Born			
Not NZ Born	0.11	12.64	0.68
NZ Born	0.26***	10.82***	0.67
Multiple jobs			
Has only one job	0.2	11.18	0.69
Has multiple jobs	0.25***	11.40	0.41**
New employer			
Stayed with same employer	0.18	11.35	0.68
Started job with new employer	0.41***	10.44**	0.62
Job tenure			
Less than 1 year	0.37***	11.10	0.79***
1-3 years	0.21***	11.59	0.52***
3-6 years	0.14***	10.56	0.56
6 years or more	0.08***	11.36	0.68
Monthly gross earnings			
Less than $3,000	0.45***	11.94***	0.87***
$3,000-$4,500	0.18***	9.76***	0.45***
$4,500-$6,500	0.12***	10.67	0.36***
$6,500 and over	0.07***	10.93	0.50*

Table 3 Descriptives of mental health referrals Continued

	Mental health referral	Number of contacts	Number of bednights
Groups	**share (%)**	**mean**	**mean**
Industry			
Agriculture, Forestry & Fishing	0.27***	10.13	0.74
Mining	0.11***	11.31	0.46
Manufacturing	0.19***	10.35**	0.63
Electricity, Gas, Water & Waste Services	0.18	10.00	0.50
Construction	0.19	9.84**	0.41**
Wholesale Trade	0.16***	11.24	0.79
Retail Trade	0.24***	11.45	0.49*
Accommodation and Food Services	0.3***3	11.67	0.94**
Transport, Postal & Warehousing	0.15***	9.94*	0.56
Information Media & Telecommunications	0.18***	13.62**	0.60
Financial & Insurance Services	0.11***	13.40***	0.42
Rental, Hiring & Real Estate Services	0.17**	10.34	0.54
Professional, Scientific & Technical Services	0.11***	12.19	0.58
Administration & Support Services	0.38***	11.30	0.76
Education & Training	0.17***	13.28*	0.60
Health Care & Social Assistance	0.23***	12.06*	0.97***
Arts & Recreation Services	0.23**	13.07	0.62
Other Services	0.2	9.30	0.84
Firm size			
5 or less employees	0.21	10.96	0.67
6-49 employees	0.21**	10.55	0.55
50-249 employees	0.21***	11.44	0.65
250+ employees	0.19***	11.16	0.72
Firm age			
Under 5 years	0.28***	10.92	0.59
5-9 years	0.23***	11.29	0.79***
10-24 years	0.2	11.34	0.60
25-49 years	0.19***	11.23	0.66
50 years or older	0.14***	10.54	0.69
Number of individual-month observations (full sample)			**8,025,291**

Notes: p-values: *, **, *** represent statistically significant differences at the 10%, 5% and 1% levels respectively. For binary categorical variables (e.g. men/women), the p-value refers to differences between the given category and the base category. For multi-level categorical variables (e.g. ethnicity), the p-value refers to differences between the given category and all other categories combined.

3.2 Chronic conditions

Table 4 presents descriptive statistics on the bivariate relationships between our chronic condition outcome measures and the individual- and firm-level variables. Recall that due to the nature of the chronic conditions information, we are using individual-level observations rather than individual-month observations.

About 1.4% of the individuals in the full dataset have had at least one chronic condition since 2013. This share is 0.62% for cancer, 0.46% for TBI and 0.29% for AMI. Women have a lower average incidence of chronic conditions overall, but this reflects much lower rates of AMI and TBI but higher rates of cancer.

As expected, given the gradual nature of many chronic conditions, they tend to be more prevalent among older workers. This is particularly true of AMI and cancer, although the youngest workers have comparatively high rates of TBI. This also highlights the difficulty of attributing chronic conditions to work. For example, the high rate of TBI among young people potentially reflects factors such as greater involvement in contact sports rather than employment in a risky workplace. However, TBI could be linked to work accidents if the ACC data were used to investigate this instead of the chronic conditions dataset (since diagnosis codes are available allowing the identification of TBI).[3]

Asians have a relatively low rate of chronic conditions across all three types of conditions compared with Māori, Pacific Peoples and Europeans. Māori and Pasifika workers have comparatively high rates of AMI and TBI, while Europeans have relatively high cancer rates. This also highlights another issue in that only diagnosed conditions can be measured in the data, and there is ongoing concern about disparities in cancer diagnosis, treatment and survival rates between Māori and non-Māori (e.g. Gurney et al., 2020; Gurney et al., 2019). Workers who were born in NZ have higher rates of diagnosed chronic conditions across all three types investigated than those who were born overseas.

Those with longer job tenure have, on average, higher rates of AMI and cancer, but lower rates of TBI. As discussed in relation to work-related injuries, it is likely that the positive relationship between tenure and worker age is playing a role here. Older workers have longer tenure on average, and are also more likely to have AMI or cancer, whereas younger workers who also have shorter average tenure are more likely to have TBIs. AMI and cancer rates tend to increase with earnings, although given this is a bivariate relationship, this may also be mediated by other factors such as age. TBI rates tend to be higher among

[3] Note that the source of information for injury claims and chronic conditions data on TBIs is different. Injury claims data includes any injuries covered by ACC and, as such, treatment could have been sought from a variety of healthcare providers. In contrast, the chronic conditions TBI data is based on hospital discharge information.

low-income earners, but reverse causation may be an issue here, since those who suffer long-term effects from TBI are probably more likely to work part time or in low-paid roles.

In terms of industry of work, again, it is likely that higher rates of chronic conditions in some industries is due to differences in factors such as the age of the workforce more so than differences in the nature of the job. Looking at construction as an example, AMI and TBI rates are relatively high, but this could reflect that this is a male dominated industry and AMI and TBI rates are much higher among men. Perhaps surprisingly given relatively high risk of exposure to carcinogens such as asbestos, rates of cancer are not statistically significantly different for construction industry workers than the total population in our dataset. However, this could reflect that construction workers may be relatively young and older, former construction workers who developed cancer perhaps as a result of exposure to carcinogens on-the-job were no longer working in construction in 2018.

Overall, the analysis of chronic conditions has a number of large limitations. However, given that population-level data are available, it may be possible in future research to narrow attention to particular types of cancer which are known to linked to exposure to, for example, asbestos or silica dust.

Table 4 Descriptives of chronic conditions

	Chronic Conditions	AMI	TBI	Cancer
Groups	**share (%)**	**share (%)**	**share (%)**	**share (%)**
All	1.36	0.29	0.46	0.62
Gender				
Men	1.58	0.42	0.58	0.59
Women	1.1***	0.13***	0.32***	0.66***
Age				
15-24	1.01***	S	0.95***	0.06***
25-34	0.57***	0.01***	0.45	0.11***
35-44	0.66***	0.1***	0.27***	0.31***
45-54	1.52***	0.42***	0.31***	0.8***
55-64	2.95***	0.96***	0.3***	1.72***
65 and over	5.09***	1.44***	0.33***	3.4***
Ethnicity				
Māori	1.55***	0.32**	0.72***	0.5***
Pacific Peoples	1.23***	0.24***	0.6***	0.4***
Asian	0.51***	0.16***	0.15***	0.19***
MELAA	0.55***	S	0.31***	0.17***
Other	1.99***	0.56***	0.51	0.94***
European	1.62***	0.33***	0.47	0.83***
NZ Born				
Not NZ Born	0.92	0.24	0.25	0.44
NZ Born	1.64***	0.32***	0.6***	0.73***

Table 4 Descriptives of chronic conditions Continued

	Chronic Conditions	AMI	TBI	Cancer
Groups	**share (%)**	**share (%)**	**share (%)**	**share (%)**
Multiple jobs				
Has only one job	1.38	0.3	0.46	0.64
Has multiple jobs	1.14***	0.18***	0.54***	0.44***
New employer				
Stayed with same employer	1.41	0.31	0.43	0.68
Started job with new employer	1.16***	0.18***	0.64***	0.35***
Job tenure				
Less than 1 year	1.13***	0.17***	0.63***	0.33***
1-3 years	1.15***	0.24***	0.43***	0.49***
3-6 years	1.39	0.33***	0.33***	0.75***
6 years or more	2.05***	0.56***	0.25***	1.26***
Monthly gross earnings				
Less than $3,000	1.36	0.23***	0.62***	0.52***
$3,000-$4,500	1.24***	0.25***	0.44	0.56***
$4,500-$6,500	1.39	0.35***	0.36***	0.7***
$6,500 and over	1.49***	0.39***	0.29***	0.82***
Industry				
Agriculture, Forestry & Fishing	1.24**	0.23**	0.61***	0.41***
Mining	1.9***	0.47**	0.59	0.84*
Manufacturing	1.52***	0.38***	0.46	0.69***
Electricity, Gas, Water & Waste Services	1.51	0.4**	0.39	0.73
Construction	1.76***	0.44***	0.67***	0.66
Wholesale Trade	1.4	0.3	0.42	0.69**
Retail Trade	1.12***	0.2***	0.43	0.49***
Accommodation and Food Services	0.72***	0.08***	0.42	0.22***
Transport, Postal & Warehousing	1.87***	0.5***	0.47	0.92***
Information Media & Telecommunications	0.95***	0.16***	0.26***	0.53**
Financial & Insurance Services	1.15***	0.18***	0.27***	0.7***
Rental, Hiring & Real Estate Services	1.61***	0.34	0.4	0.88***
Professional, Scientific & Technical Services	1.09***	0.21***	0.31***	0.59
Administration & Support Services	1.31*	0.25***	0.66***	0.41***
Education & Training	1.06***	0.18***	0.36**	0.53
Health Care & Social Assistance	1.53***	0.29	0.31***	0.93***
Arts & Recreation Services	1.19*	0.15***	0.62***	0.42***
Other Services	1.7***	0.33	0.71***	0.66
Number of individuals				**914,274**

Notes: p-values: *, **, *** represent statistically significant differences at the 10%, 5% and 1% levels, respectively. For binary categorical variables (e.g. men/women), the p-value refers to differences between the given category and the base category. For multi-level categorical variables (e.g. ethnicity), the p-value refers to differences between the given category and all other categories combined.

4 Conclusion

Workplace health and safety (WHS) is about more than the absence of injury, and work-related illness and psychosocial risks are important considerations. Hennecke et al. (2021) examined the relationship between work-related injury claims and the characteristics of workers and the workplaces they are employed by. As a supplement to Hennecke et al. (2021), this report examined the possibility of constructing WHS outcome variables on mental health and chronic conditions using data available in Stats NZ's Integrated Data Infrastructure (IDI), with the view to potentially linking these outcomes to the characteristics of workers and their workplaces.

This report uses data on mental health referrals (PRIMHD) and chronic conditions from the Ministry of Health. These datasets are a rich source of population-level information. However, despite their usefulness it is difficult to use them to examine work-related WHS outcomes. Unlike the ACC injury claims data used in Hennecke et al. (2021), it is not possible to identify mental health and chronic conditions which are work related. Indeed, these health outcomes may involve several contributory factors. Moreover, it is difficult to tie outcomes to specific workplaces. For example, due to the gradual nature of many chronic conditions, it is difficult to link these to particular workplace conditions in the data. Reverse causation is a further issue. For example, if we find that workers in low-paid, precarious roles are more likely to have greater mental health referrals compared with other workers, there is a possibility that they are working in these kind of roles due to existing mental health issues rather than having mental health issues due to the nature of the work they are undertaking (See Dawson et al. 2015).

With these limitations in mind, this report examined the bivariate relationships between mental health referrals and chronic conditions and the characteristics of workers and their workplaces. It found that women, young people, Māori workers, those born in NZ and those working in firms in the administration & support service and accommodation & food services industries had higher rates of mental health referrals. The results for chronic conditions tended to vary by the conditions examined. For cancer, the prevalence rates tended to be higher among women, older workers, European workers, those with longer job tenure and higher income earners. The rates of acute myocardial infarction (AMI) tend to be higher among men, older workers, Māori and Pasifika workers and those with longer job tenure. Traumatic brain injury (TBI) is more common among men, younger workers, Māori and Pasifika workers and low-income earners.

Overall, the analysis has a number of large limitations. However, given that detailed population-level data are available, it may be possible that future research that focuses on narrower health outcomes could be

useful. For example, for chronic conditions, attention could be restricted to particular types of cancer which are known to be linked to exposure to, for example, asbestos or silica dust.

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