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Driving Health Study

Analysis of Life Insurance claims data

June
2020

Background and Rationale

- Australia's transport and logistics workforce is a rapidly ageing male workforce. This workforce has a high prevalence of health risks including obesity, cardiovascular and respiratory disease and diabetes.

- There is limited published academic research evidence within Australia on the non work-related heath conditions in transport workers.

- The life insurance data provided by TWUSUPER provides a unique opportunity to characterise the causes of death benefit claims in transport workers.

- The study is a companion to analysis of work-related health conditions in truck drivers through workers compensation data. This study will provide an additional perspective on health conditions resulting in loss of life in transport workers.

This project sought to achieve the following study objectives via analysis of a life insurance claims dataset:

1. To explore the feasibility of using life insurance claim data to understand non work-related death claims in transport workers.

2. To describe the major cause of death claims by Australian transport workers for whom life insurance lump sum payments for death are paid.

3. To determine the number and rate of Australian transport workers for whom life insurance lump sum payments for death are paid, by age and cause of death (COD).

4. To examine the trends in death claims over time by COD.

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Snapshot of TWUSUPER life insurance data

TWUSUPER is the largest Industry Superannuation Fund for workers in transport with over 120,000 registered members. It provides insurance cover to help protect transport workers and their family in the event of their death or if they are unable to work due to serious illness or injury. Data was collected by TWUSUPER for the purposes of administering and managing the life insurance claims that are provided as part of superannuation fund contributions.

2004-2017 calendar year

№ ~3500 death benefit claims

- Gender
- Date of birth (DoB)
- Date of death (DoD)
- Cause of death
- Insurance paid date

Inclusion criteria

All death benefit claims with date of death between 1st January 2004 and 31st December 2017 were included in the study.

Exclusion criteria

Cases were excluded from analysis if they
- were missing COD codes;
- contained unlikely Dob or Dod.

Cause of death information for each case received from TWUSUPER can be extracted from two variables:

a. CAUSEOFDEATHdthCert : This variable contains the summary of cause of death information transcribed from the death certificate.

b. ShortformCauseofDth: This variable was created by TWUSUPER, which coded the cause of death into major groups such as cancer, cardiovascular and suicide based on the death certificate information and some additional information that may not have been recorded on the death certificate (e.g. police report or a statement from family members)

Table 1: Examples of original coding in the data

CAUSEOFDEATHdthCert	ShortformCauseofDth
Multiple injuries arising from an accidental motor vehicle rollover	Motor vehicle accident
Multiorgan failure	Multi organ failure
Heart Disease	Heart attack
Carcinoma Oesophagus	Cancer
Multi organ failure	Organ failure
Asphyxia in the setting of irresponsible atmosphere and hydrocarbon inhalation	Suicide
Acute toxicity due to morphine and alcohol	Drug overdose
Head injury in a man with ischaemic heart disease	Head injury
Lung cancer	Cancer
Multiple Injuries	Multiple injuries
Compression of the neck subsequent upon hanging	Suicide

COD re-coding strategy

Step 1: Creating unified description of COD

We reviewed the original death certificate description as received from TWUSUPER and created our internal, shorter COD description for each case using unified medical terminology for further coding.

e.g. "Acute lymphocytic leukemia" and "Acute myeloid Leukaemia" coded to **Leukaemia**
"Adenocarcinoma of the lung" coded to **Lung cancer**
"Adenocarcinoma of the stomach with metastases" coded to **Stomach cancer**

Step 2: Identifying underlying COD

Using the unified COD descriptions and the categories created by TWUSUPER, two researchers (TX and CVV) independently coded each COD to the following descriptors where possible:

- **Underlying Cause of death:** The disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury.
- **Intermediate Cause of death:** A disease or condition that preceded and caused the immediate cause of death.
- **Immediate Cause of Death:** Final disease or condition resulting in death.
- **Manner of death:** Describes how injury occurred: Natural, External (Suicide, Homicide, Accident/Unintentional) or Unknown

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Step 3: Assigning broad categories to COD:

The same researchers (TX and CVV) independently assigned a broad category to each COD based on the global burden of disease and Australian burden of disease categories. Based on preliminary analysis the top 5 COD Broad categories were: Cardiovascular disease, Cancer, External cause of injury, Suicide, Respiratory and Others (e.g. kidney and urinary diseases, neurological conditions). The "Unknown" group was assigned if the 'CAUSEOFDEATHdthCert' was recorded as "Unknown", and the "Unable to code" group was assigned if insufficient information was recorded in the 'CAUSEOFDEATHdthCert'.

Table 1: Example of output

Deathcertcleaned	Shortformcleaned	Underlying COD	Intermediate COD	Immediate COD	Manner of death	Broad
Acute myeloid leukaemia	Cancer	Leukaemia	-	-	Natural	Cancer
liver failure, metastatic esephageal cancer, subglottic swelling	Cancer	Oesophageal cancer	Subglottic swelling	Liver failure	Natural	Cancer
Cerebral contusion	Work place accident	Workplace accident	Cerebral contusion	-	Injury_accident	Injury
Neck compression	Suicide	Hanging	Neck compression	-	Injury_suicide	Suicide

**Step 4:** Final decision on the COD:

There were 1720 unique "CAUSEOFDEATHdthCert" extracted from the data. The broad category was decided mainly on the underlying COD. If the underlying COD was not provided in the description, the intermediate and immediate COD with the "shortform" information were considered. The following table shows the percentage of cases under each type of COD description.

Underlying COD	Intermediate COD	Immediate COD
71%	33%	31%

There was agreement on the broad category in 85.8% of cases. Any cases of disagreement on coding was referred to a 3rd researcher (RI) to resolve.

- Descriptive analysis was performed to summarise the counts (N) of death benefit claims by COD and age.

- Trends in claim counts between 2004 and 2017 were plotted.

- Death benefit claim rates were calculated using the TWUSUPER annual membership estimates as the denominator, and expressed as the number of claims per 100,000 memberships.

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

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Average annual TWUSUPER membership, 2004-2017
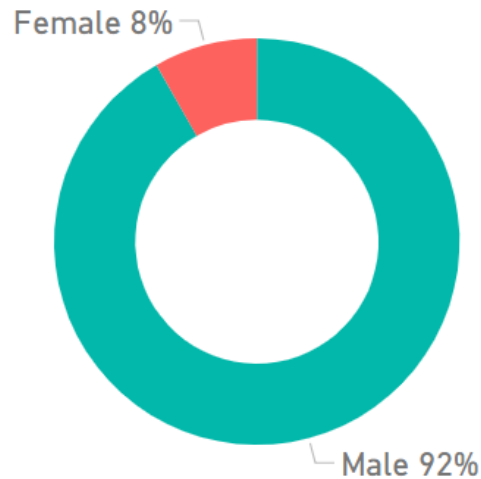
Average annual TWUSUPER membership by age group
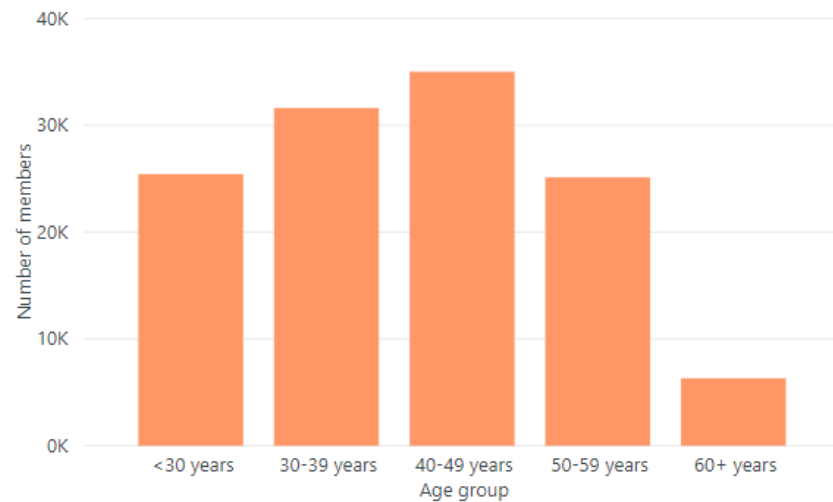
During 2004-2017, TWUSUPER had approximately 126,000 members annually, with 92% of them were males. Workers aged between 40-49 years had the greatest proportion of the total memberships (28.4%), followed by 30-39 years (25.6%). Workers aged 60+ years made the smallest proportion of the total memberships (5.1%).

Broad COD categories of death benefit claims for male members

## Broad COD categories of death benefit claims (males), 2004-2017
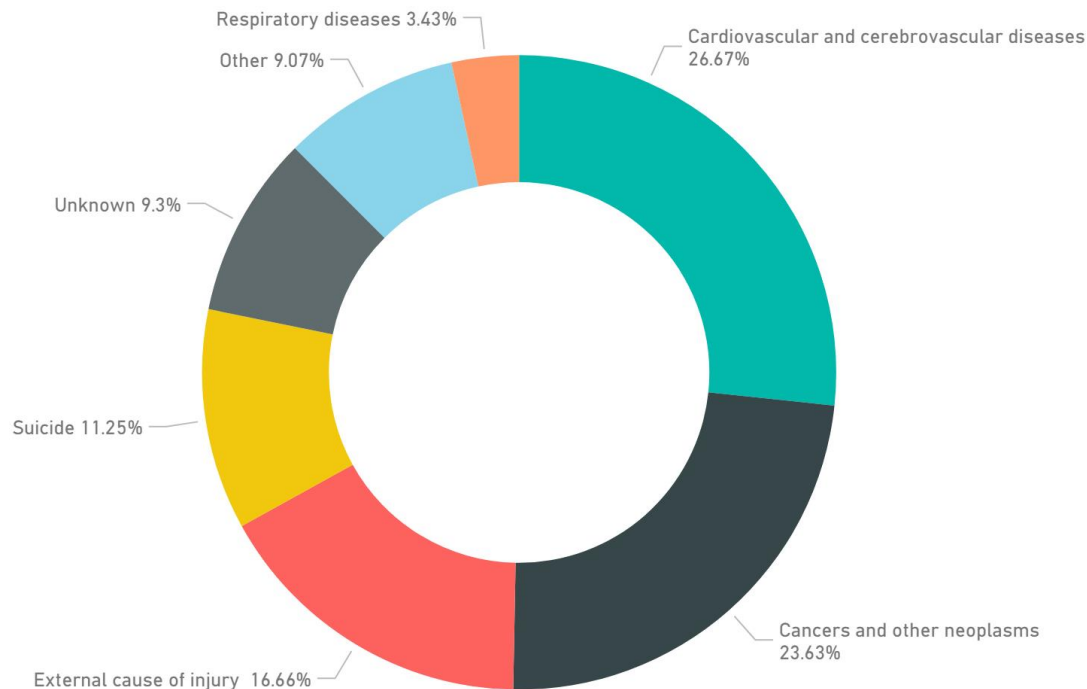
Of the 3,386 death benefit claims for men during the period of 2004 to 2017, more than half were due to cardiovascular disease (26.7%) and cancers (23.6%). External cause of injury (16.7%) and suicide (11.3%) recorded the third and fourth leading cause of death benefit claims. 3.4% of the claims were due to respiratory diseases and 9.1% were due to other diseases. In addition, 3% of the claims were unable to be coded and 9.3% of the claims were due to an unknown cause.

Number and rate of death benefit claims of male members

Number of death benefit claims
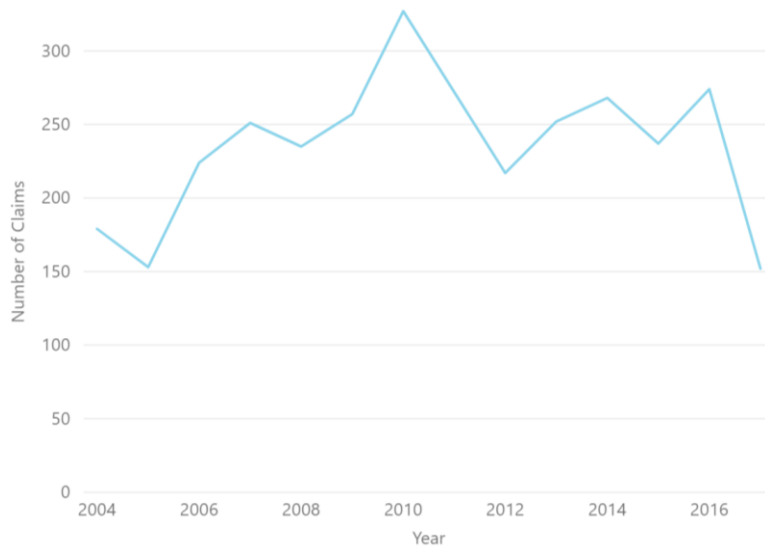
Number of death benefit claims per 100,000 members
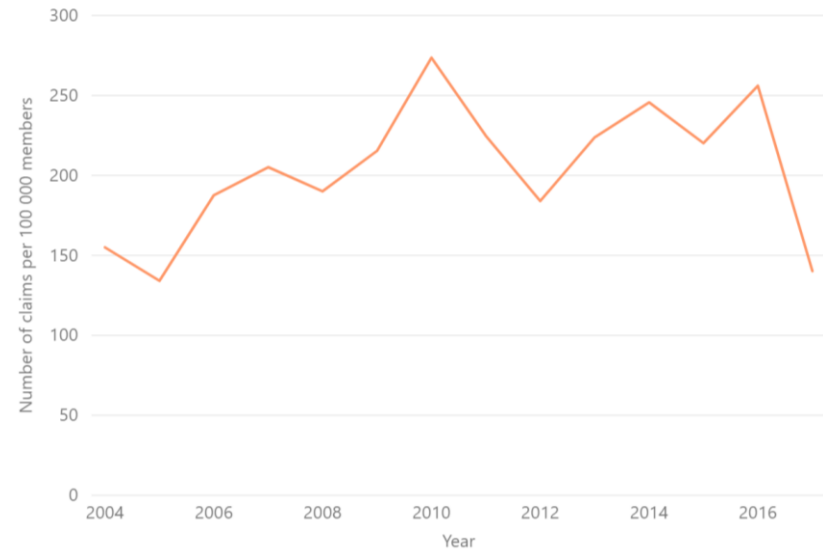
Fluctuations were observed in the number of claims and the number of claims per 100,000 members from 2004 to 2017. On average, there were approximately 235 death benefit claims recorded annually. The annual average death benefit claim rate was estimated at 203 claims per 100,000 members, ranging from 154 to 256.

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# Leading cause of death benefit claims for male members, 2004-2017

Ranking	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	28.8%	28.3%	33.5%	25.7%	30.9%	28.4%	25.1%	27.0%	24.9%	26.7%	26.2%	29.4%	25.7%	27.6%
2	24.5%	22.5%	23.2%	23.0%	25.4%	25.0%	22.8%	22.4%	19.5%	23.5%	22.3%	19.7%	22.4%	21.8%
3	20.7%	17.8%	16.8%	17.3%	18.8%	19.5%	20.8%	19.7%	16.2%	13.6%	14.8%	14.1%	14.5%	13.1%
4	12.5%	15.7%	7.7%	11.9%	7.8%	7.6%	12.0%	12.4%	11.6%	10.4%	14.5%	13.8%	10.0%	11.6%
5	5.4%	6.3%	5.2%	7.5%	6.6%	7.6%	9.3%	10.3%	11.2%	9.0%	8.2%	11.5%	9.5%	10.5%
6	1.6%	1.6%	3.2%	1.8%	2.7%	1.7%	1.9%	2.4%	5.4%	5.4%	5.5%	5.2%	3.3%	4.0%

● Cardiovascular diseases ● Cancers ● External cause of injury ● Suicide ● Others ● Respiratory diseases

During the study period, cardiovascular diseases were the leading causes of death benefit claims in men except 2008, 2009 and 2011 when it was replaced by cancers. External cause of injury were found to be the third leading cause of death benefit claims except in 2015 where it was replaced by suicide. Suicide was the fourth leading cause during 2004-2011 and 2013, 2014 and 2016, and fifth in 2012 and 2017.
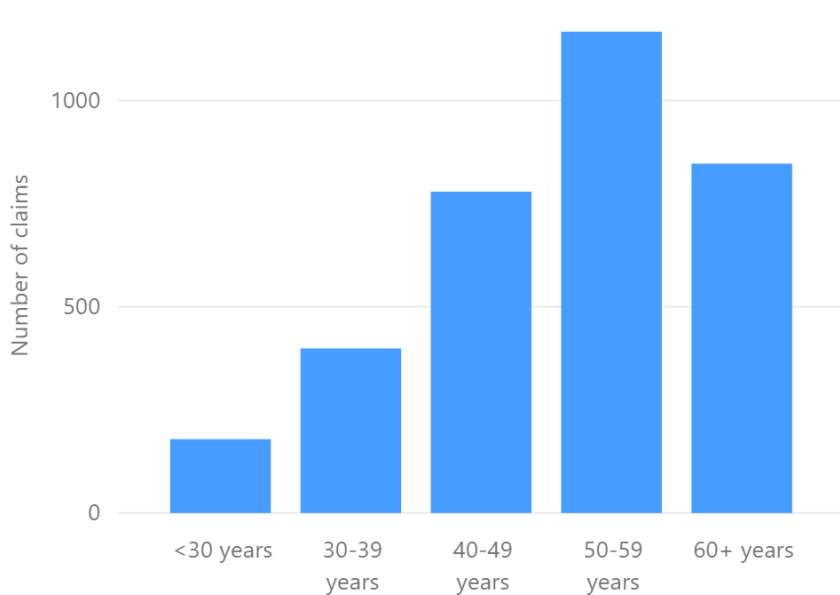
Trends in the number of death benefit claims per 100,000 members by major COD categories
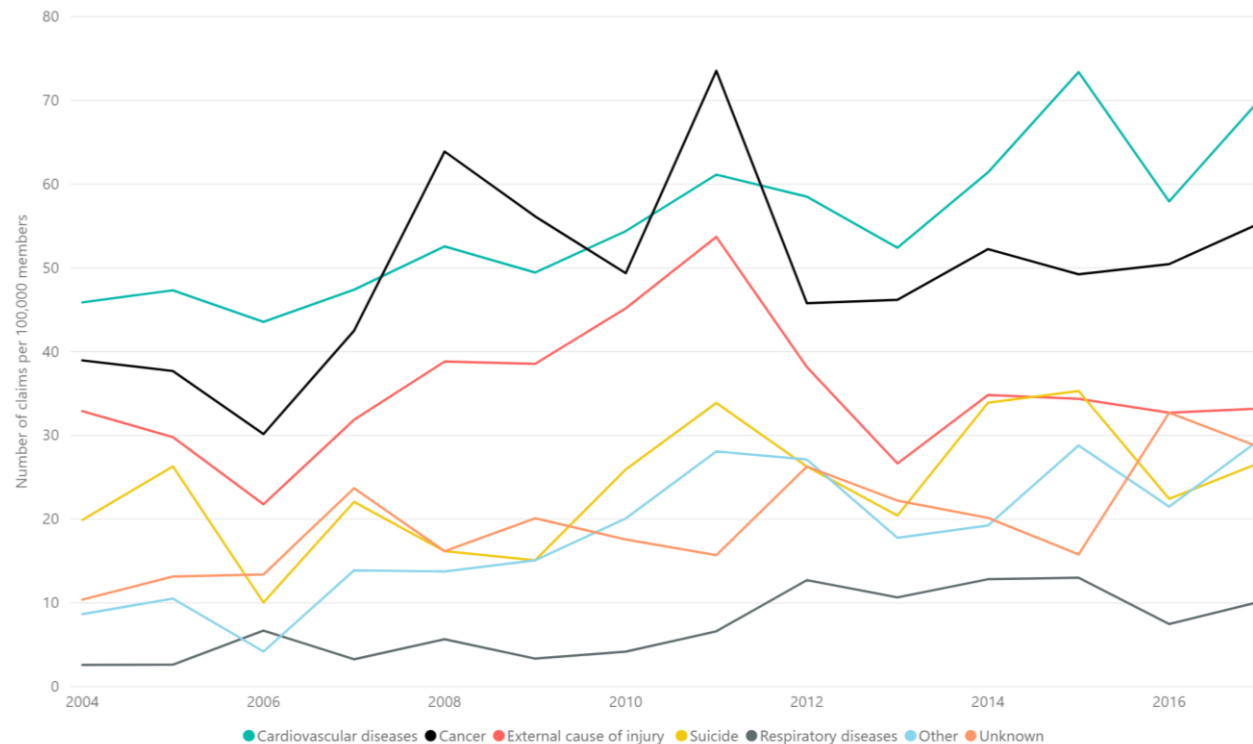
Cardiovascular diseases and cancers recorded the highest rates of death benefit claim at 55.4 and 49.4 claims per 100,000 members per year. External cause of injury and suicide recorded rates at 35.2 and 23.9 per 100,000 member per year, which was approximately 5 times and 1.3 times higher than respiratory disease respectively. The volatility in trends is most likely due to the relatively small number of death benefit claim in each COD category.

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Number and rate of death benefit claims of male members by age group

Number of death benefit claims by age groups

The number of death benefit claims varied significantly by age. The 50-59 year old group formed the greatest proportion of claims (35% of total), followed by the 60+ years group (25.0 %). Only 5% of claims came from workers less than 30 years old.

Number of death benefit claims per 100,000 members for each age group
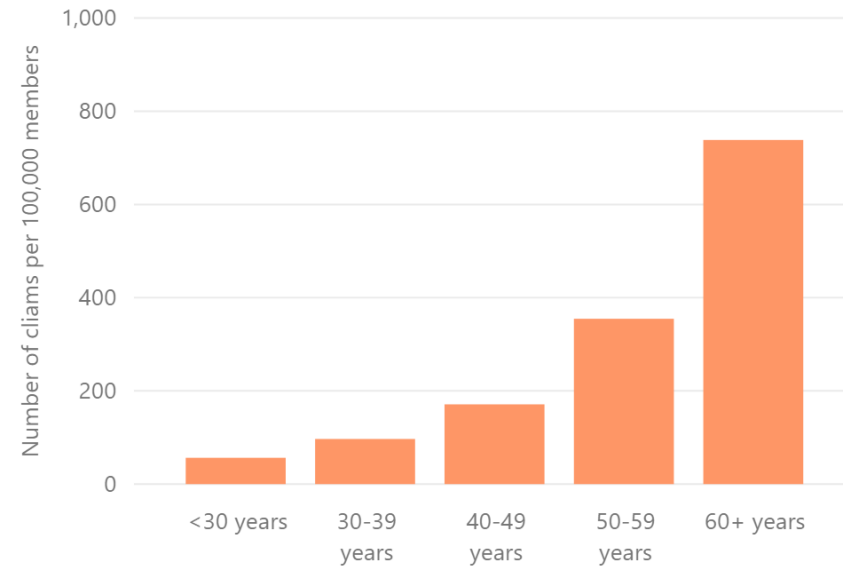
Workers aged 60 years old recorded a rate of 738 claims for every 100,000 members per year in this age group. This is 2.1 times higher than the comparable rate in workers aged 50-59 years old and 13 times higher than workers under 30.

Top three leading causes of death benefit claims by age groups

	<30 years % (N)	30-39 years % (N)	40-49 years % (N)	50-59 years % (N)	60+ years % (N)
1st	External cause of injury 46.9% (84)	External cause of injury 39.3% (157)	Cardiovascular disease 25.5% (199)	Cardiovascular disease 32.8% (383)	Cancers 34.7% (294)
2nd	Suicide 27.4% (49)	Suicide 27.8% (111)	External cause of injury 20.3% (158)	Cancers 27.7% (323)	Cardiovascular disease 30.2% (256)
3th	Cardiovascular disease 6.7% (12)	Cardiovascular disease 12.3% (49)	Cancers 17.5% (136)	External cause of injury 10.4% (121)	Others 11.2% (95)

The top three leading causes of death benefit claims also varied by age. External cause of injury was the leading cause of death for people under 40 years old, followed by suicide and cardiovascular diseases. Cardiovascular disease was the leading cause of death benefit claims among people aged 40-49 and 50-59. Cancers were the third leading cause of death for people aged 40-49, second for people 50-59 and was the leading cause of death benefit claims for people over 60.
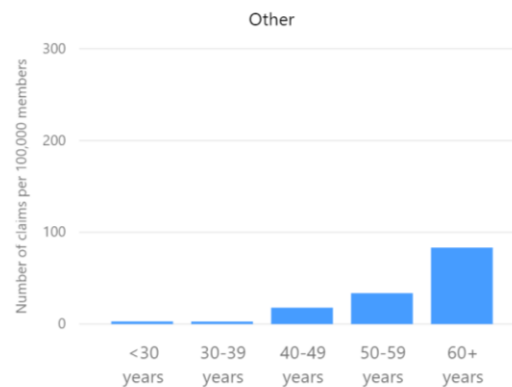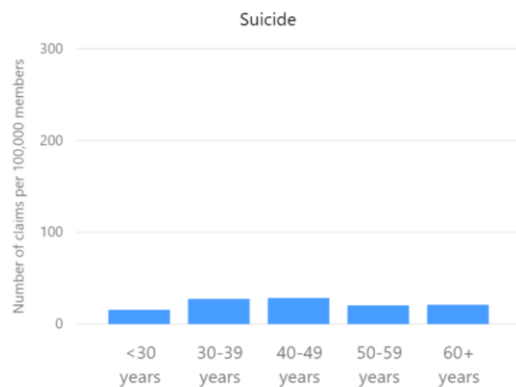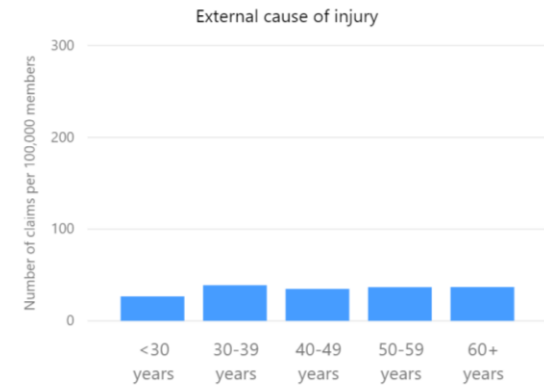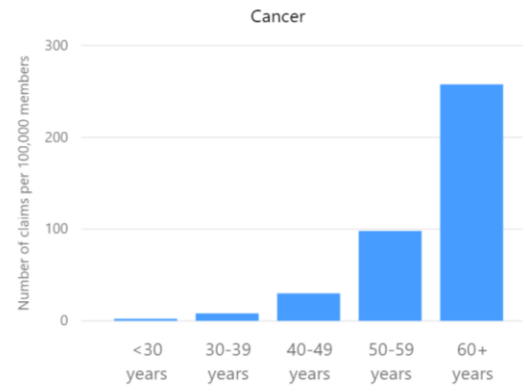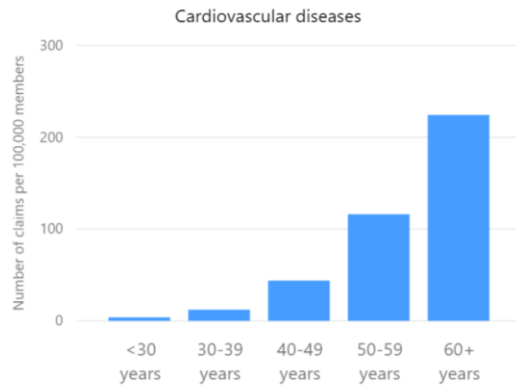
With the exception of suicide and external cause of injury, rates of death benefit claim in COD categories increased with age. Workers aged 60 years old and over recorded significantly higher rates of death benefit claims due to cardiovascular disease and cancers. For suicide and external cause of injury, the death benefit claim rate was reasonably consistent across all age groups.

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Suicide

Age	National rate	TWU member rate
60-70	18	21
50-59	23	20
40-49	28	28
30-39	25	27
15-30	18	16

Cancer

Age	National rate	TWU member rate
60-70	431	258
50-59	165	98
40-49	46	30
30-39	13	8
15-30	4	2

National rate   TWU member rate

CVD death by age			
Age group (years)	National rate	Age group (years)	TWU member claims
<35	2	<30	12
35-44	19	31-40	49
45-54	59	41-50	199
55-64	129	51-60	383
65-74	323	60+	256

Comparison data for death rate in males from intentional self harm from ABS data 2009-2017. Life insurance data is not significantly different to national data.

Comparison data for death rate in males from cancer from AIHW (2019 only). Direct comparison is difficult due to differences in data sources, however rates of death due to cancer appear lower than national data.

Comparison Data for death rate in males from CVD is from AIHW data (2017 only) and for slightly different age groups. Despite these differences, the rate of death due to cardiovascular disease appears higher than national data.

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Summary of Findings

- Cardiovascular diseases and cancers were the most commonly recorded COD benefit claims in the life insurance data, far surpassing injury and trauma.

- However, 60% to 70% of death benefit claims in the younger group (<40 years old) were due the external causes and suicide. Suicide was the second leading COD in workers less than 40 years old, but did not appear in the top three COD in older groups.

- The risk of making death benefit claims due to cardiovascular disease and cancer increases with age.

- Injury resulting from external causes, and suicide showed small changes in age-related risk, with younger people at slightly greater risk than older people.

Strengths

- This is the first attempt to use life insurance data to explore non-work-related heath issues in transport workers.

- Sample includes workers in a range of occupations working in the transport industry.

- The longitudinal nature of the data provides the opportunity to explore trends and changes over time.

- The death benefit claim information is recorded directly from death certificate.

Limitations

- The information of COD contained within the dataset varies from very detailed descriptors to a single word description, making main cause of death hard to determine without making assumptions about the data. There remain some unresolved cases even after using independent coders and resolution by discussion with a third party.

- The database contains limited information on some factors contributing to death benefit claims, such as occupation, duration of membership and socio-economic status.

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- This is the first study to explore non work-related death claims in transport workers using life insurance claim data.

- Life insurance claim data has the potential to investigate non work-related health issues for a working population.

- The quality of life insurance claim data can be improved by using a standardised cause of death coding system.

- Understanding the leading causes of death in transport workers is important for disease prevention and health promotion strategies for this labour force. For instance, cardiovascular disease and cancer prevention should be priority occupational health activities for the transport industry, while mental health and suicide interventions are particularly important for younger workers. The consistent rate of death due to external causes suggests a continued focus on road safety is also warranted.

Commonwealth of Australia. Trends: Infrastructure and Transport to 2030. Commonwealth of Australia; 2014

Apostolopoulos Y, Sönmez S, Shattell MM, Gonzales C, Fehrenbacher C. Health survey of US long-haul truck drivers: Work environment, physical health, and healthcare access. Work. 2013;46(1):113-23.

Birdsey J, Sieber WK, Chen GX, Hitchcock EM, Lincoln JE, Nakata A, et al. National survey of US long-haul truck driver health and injury: health behaviors. Journal of occupational and environmental medicine. 2015;57(2):210-6.

Milner A, Page K, LaMontagne AD. Suicide among male road and rail drivers in Australia: a retrospective mortality study. Road & Transport Research: A Journal of Australian and New Zealand Research and Practice. 2015;24(2):26.

- This report should be cited as: Xia, T., Iles, R., Vreden, C.,Newnam. S., Lubman, D., Rajaratnam, S., & Collie, A. Driving Health Study Report No 5: analysis of Life Insurance claims data. Insurance Work and Health Group, Faculty of Medicine Nursing and Health Sciences, Monash University (2020).

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

Acknowledgments

For more information please contact:

Dr Ross Iles

Director, Insurance Work and Health Group

Faculty of Medicine, Nursing & Health Sciences

Email: ross.iles@monash.edu

Tel: 03 9903 0776