



Government of **Western Australia**
Department of **Health**

Western Australian Burden of Disease Study 2015

Aboriginal report

Western Australian Burden of Disease Study 2015 – Aboriginal report

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Introduction

Burden of disease studies provide an assessment of the impact of diseases, injuries and risk factors on a population. This impact is measured as 'Disability-Adjusted Life Years' (DALY); that is, the sum of 'Years of Life Lost Prematurely' (YLL) and 'Years Lived with Disability' (YLD) (Prüss-Üstün, Mathers et al. 2003). YLL represents the number of deaths by sex and age multiplied by standard life expectancy at age at which death occurs, according to a reference life table (AIHW 2019). YLD is a measure of years lived with ill-health or disability, which accounts for the person-time with the condition multiplied by a weight representing the severity of the condition (AIHW 2019).

The first global burden of disease (GBD) study was GBD 1990 and is updated every few years (Institute for Health Metrics and Evaluation 2019). To supplement GBD studies, national burden of disease studies provide country-specific estimates to monitor population health, guide national policy and health service planning (AIHW 2019). The Australian Institute of Health and Welfare (AIHW) has conducted national studies for Australia. These studies adapt the global methods to use the best available Australian data, resulting in estimates that are better aligned to the Australian health policy context and provide burden estimates for sub-national population groups, including for the states and territories (AIHW 2019).

The Western Australian Burden of Disease Study (WABoDS) 2015 is a collaboration between the AIHW and the Epidemiology Branch of the WA Department of Health (DoHWA). The study provided disease group and disease-level data for the Aboriginal population of WA (Department of Health Western Australia 2020). The study used certain datasets that are available in WA but not other states when estimating YLD in the national study.

The WABoDS 2015 used an improved methodology compared to the 2006 state estimates, with updated data sources. This report provides an overview of the results of the study for Aboriginal Western Australians¹.

¹ Further details of results for the whole state population and the WA Health regions, as well as risk factors for disease and injury, can be found in other reports on WABoDS 2015.

Methods

The WABoDS methodology was based on the AIHW burden of disease studies for the Australian Burden of Disease Study (ABDS) 2011 and 2015, with minor updates specific to WA's population. Additional data sources specific to WA have also been used to enhance WABoDS. AIHW provided technical advice to the WABoDS study and the ABDS system infrastructure was used to calculate YLL, YLD and Population Attributable Fractions derived from WA-provided input data.

Calculation of YLD was based on the prevalence of 216 diseases and injuries (grouped into 17 disease groups)² in the WA population by age group, sex and Aboriginality, and the relative severity of each disease or condition, for the reference year 2015. For each disease, there were several potential sequelae and associated health states. Details of this can be found in the WABoDS Western Australia Summary report (Department of Health Western Australia 2020). Aboriginal-specific data sources included the Aboriginal and Torres Strait Islander Health Survey (AATSIHS), 2012-13.

Estimation of YLL required data on each death in WA during the reference year of 2015. The cause of death, age, sex and Aboriginality were utilised to calculate fatal burden. Mortality data in the study was sourced from the Registry of Births, Deaths and Marriages WA.

Data collections specific to WA were utilised where possible; details are listed in Box 3 of the summary report (Department of Health Western Australia 2020).

Linked data was used to identify Aboriginality in most datasets. This enabled the use of state-specific Aboriginal data, unlike national BoD studies which used national-level data. A locally derived Aboriginal and Torres Strait Islander Status Flag has been developed by Data Linkage Branch, DoHWA, to identify Indigenous status of individuals in the linked data sets used for WA. A validated Multi-Stage Median algorithm was used to create a flag for any individual (in WA) by utilising up to eight WA government administrative data sets and two survey collections, where Aboriginal and Torres Strait Islander status was recorded (Christensen, Davis et al. 2014). The algorithm used the information from several records in an individual's (linkage) chain to produce an overall derived Aboriginal and Torres Strait Islander status of "Yes", "No" or "Missing", for that individual. More detail on the Aboriginal and Torres Strait Islander Status Flag can be sought in Christensen et al. (2014).

For diseases where linked data were not available, national surveys such as the National Aboriginal and Torres Strait Islander Health Survey (AATSIHS) were used to estimate prevalence in the Aboriginal population. The most recent survey may have taken place earlier than 2015. In such cases, modelling was required to estimate prevalence in 2015.

Several epidemiological studies were also used to estimate Aboriginal prevalence. However, for some diseases, there was an absence or lack of Aboriginal data. For cases such as this, indirect methods were required to provide reliable prevalence estimates for the Aboriginal population. Dependent upon data availability and the disease in question, indirect methods using, for example, national Aboriginal rates were applied to the WA population. Age and sex distribution of the WA Aboriginal population was used to break down disease-specific age groups.

² The disease groups and diseases used in this study are listed in Appendix D AIHW (2019). Australian Burden of Disease Study: methods and supplementary material 2015. Canberra, AIHW.

Furthermore, for some diseases or injuries, there was an issue with small numbers, particularly when data was disaggregated by age-group. In these cases (when the DALY was less than 100), numbers and ranks were not reported as they might be inaccurate or misrepresent trends.

To enable comparisons between the Aboriginal and non-Aboriginal populations, the YLD for the Aboriginal population were subtracted from the YLD for the whole WA population to estimate the non-Aboriginal YLDs. The same procedure was followed for the YLL to calculate the non-Aboriginal YLL. DALY for the non-Aboriginal population were the sum of the non-Aboriginal YLD and YLL. This method was the same as that used by the AIHW in their comparisons (AIHW 2016).

Due to differences in methodology, direct comparisons between the 2006 WABoDS study and the most recent 2015 WABoDS study, and between WABoDS 2015 and ABDS 2015 cannot be made.

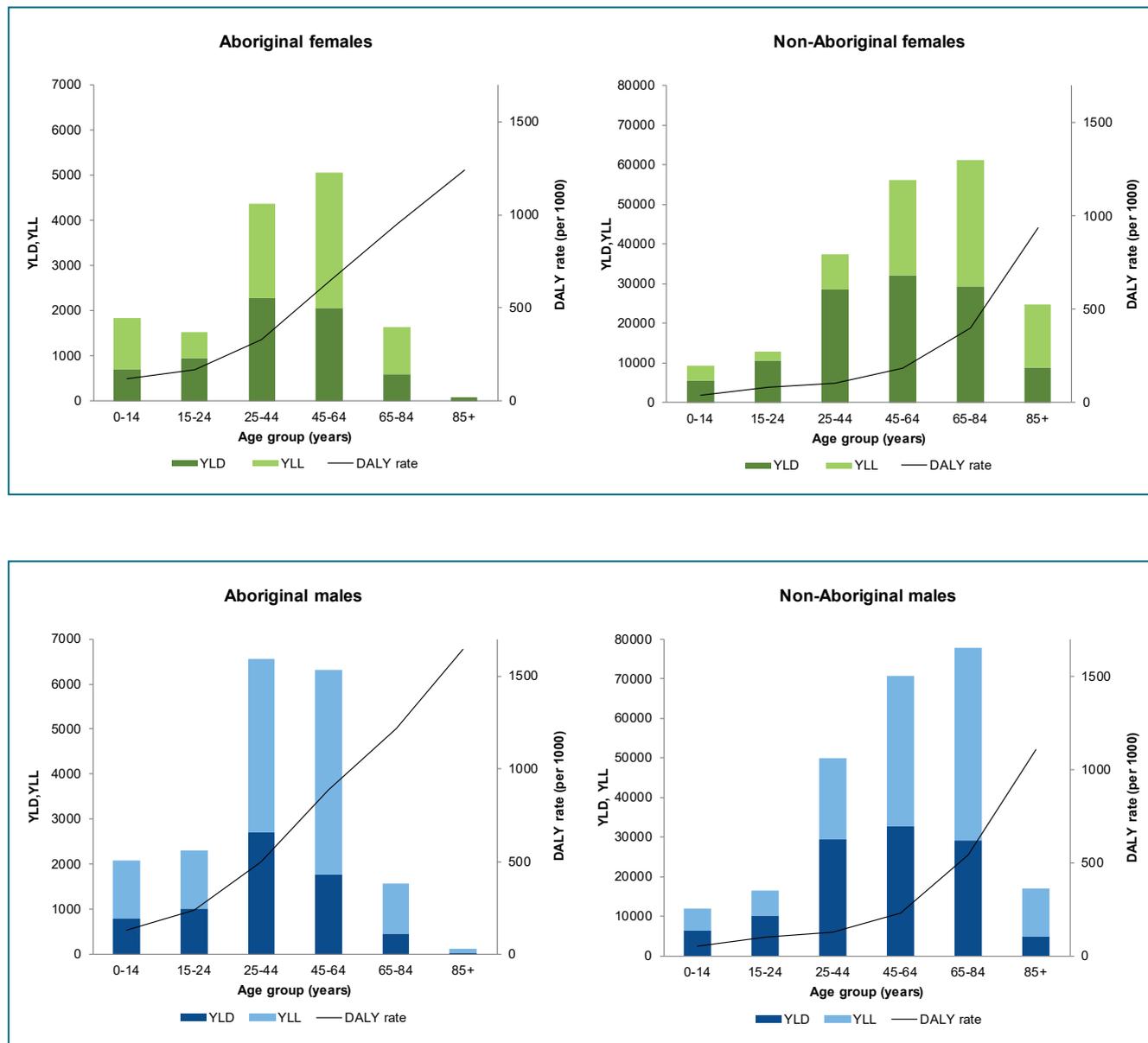
This study has ethics approval from the Department of Health WA Human Research Ethics Committee (DOHWA HREC) and the WA Aboriginal Health Ethics Committee (WAAHEC).

Results

Total fatal and non-fatal burden across the life course

- In 2015, there were 512 years of healthy life lost per 1000 Aboriginal residents of Western Australia (WA) due to living with or dying prematurely from disease, injury or other health-related conditions, compared to 171 years of healthy life lost per 1000 in the non-Aboriginal population (age-standardised rate). This amounts to approximately 33 607 DALY (disability-adjusted life years) for the WA Aboriginal population, compared to 445 214 DALY in the WA non-Aboriginal population.
- The total burden of disease (DALY) was low in younger Aboriginal Western Australians, increasing from age 25 years and older, then dropping from age 65 years and older due to the smaller population size in the older age groups (Figure 1). A similar pattern was seen in non-Aboriginal Western Australians up to the age of 65 years, but the total burden remained high among non-Aboriginal Western Australians up to the age of 84, and then dropped. This may be related to lower life expectancy among Aboriginal Western Australians than non-Aboriginal Western Australians (Australian Bureau of Statistics 2018).
- Note that the DALY rate (total DALY divided by population for each age-group) increased steeply among Aboriginal males from the age-group 45 to 64 years to peak in the age-group 85+ years, as the population size dropped. The DALY rate among Aboriginal females increased with age, but less steeply than among Aboriginal males. A similar pattern was seen among non-Aboriginal males compared to Aboriginal males; however, non-Aboriginal females showed a much steeper increase in the DALY rate from age 65 years old compared to Aboriginal females.
- Just over one third (38%) of the burden experienced by Aboriginal children aged under 15 years is from living with illness or injury (YLD – also known as ‘non-fatal burden’), with the remainder from dying prematurely (years of life lost – YLL – also known as ‘fatal burden’). In Aboriginal Western Australians aged 15 to 44, dying prematurely accounted for 58% of the burden of disease in males and 45% of the burden of disease in females. The proportion of burden of disease accounted for by premature death was high in those under 5 years, then dropped in 15 to 44-year-olds and rose in older Aboriginal Western Australians. This was more marked in older Aboriginal males.
- Aboriginal males accounted for a higher burden of disease (DALY) than Aboriginal females, across all age-groups except 65+ years. This is primarily due to higher fatal (YLL) burden among males.

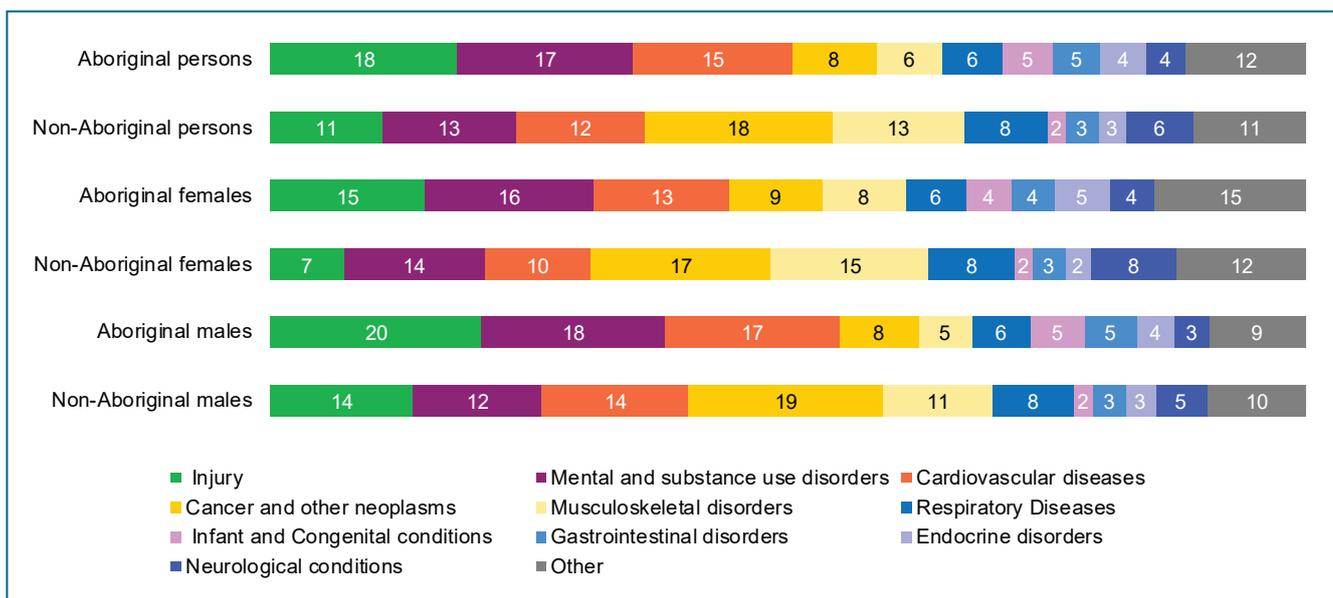
Figure 1: Non-fatal (YLD) and fatal (YLL) composition of the total burden (DALY), and DALY rates (per 1000 population), by sex and age group, among Aboriginal (left) and non-Aboriginal (right) residents of Western Australia in 2015. (Note the different scale on the left (YLD/YLL) axes for Aboriginal and non-Aboriginal persons due to the difference in population size and therefore large differences in absolute numbers of YLD and YLL).



Burden by disease group

- The disease groups causing the most burden (DALY) among Aboriginal persons in 2015 were injury (18% of the total burden) and mental and substance use disorders (17%). Cardiovascular conditions, ranked third, contributed 15% to the total burden (Figure 2 and 3). In comparison, the leading disease group in non-Aboriginal persons was cancer and other neoplasms (18%), followed by mental and substance use disorders (13%) and musculoskeletal disorders (13%).

Figure 2: Percentage (%) of total burden (DALY), by disease group and sex, among Aboriginal and non-Aboriginal residents of Western Australia in 2015¹



¹ Other disease groups include: kidney and urinary diseases, infectious diseases, oral disorders, blood and metabolic disorders, skin disorders, vision and hearing loss, and reproductive and maternal conditions.

- Both Aboriginal males and females experienced the highest proportion of disease burden from injury (20% and 15% respectively) and mental and substance use disorders (18% and 16% respectively). Cardiovascular diseases accounted for the next highest proportion of the burden in both Aboriginal males (17%) and females (13%). In contrast, non-Aboriginal males and females experienced the highest burden of disease from cancer and other neoplasms (19% and 17% respectively), followed by musculoskeletal conditions in non-Aboriginal females (15%) and injury and cardiovascular diseases in non-Aboriginal males (14% each).
- At the specific disease level, the five leading causes of burden among Aboriginal people were coronary heart disease (9.8%), suicide and self-inflicted injuries (7.6%), alcohol use disorders (5.7%), type 2 diabetes (4.1%) and chronic kidney disease (3.6%). The five leading causes of burden among non-Aboriginal persons were coronary heart disease (6.5%), chronic obstructive pulmonary disease (COPD – 4.7%), back pain and problems (4.4%), suicide and self-inflicted injuries (3.6%) and depressive disorders (3.5%).
- The top 15 diseases and injuries are listed by sex and Aboriginality in Table 1 below.

Table 1: Top 15 diseases¹ by proportion of DALY and Age Standardised rates (ASR), by sex, among Aboriginal and non-Aboriginal residents of Western Australia in 2015

Female rank	Aboriginal Western Australians			Non-Aboriginal Western Australians		
	Disease	DALY: n (%)	ASR (per 1000)	Disease	n (%)	ASR (per 1000)
1	Coronary heart disease	1176 (8.0)	40.5	Back pain and problems	10 185 (5.1)	8.0
2	Type 2 diabetes	720 (4.9)	31.0	Coronary heart disease	9341 (4.6)	6.2
3	Anxiety disorders	690 (4.7)	17.4	Dementia	9019 (4.5)	5.7
4	Chronic kidney disease	616 (4.2)	24.5	COPD ²	8972 (4.5)	6.5
5	Suicide/self-inflicted injuries	593 (4.1)	10.8	Depressive disorders	8763 (4.4)	7.1
6	RTI ³ (motor vehicle)	581 (4.0)	10.5	Anxiety disorders	8148 (4.0)	6.6
7	Alcohol use disorders	526 (3.6)	11.8	Osteoarthritis	6766 (3.4)	5.0
8	COPD ²	459 (3.1)	19.0	Breast cancer	6620 (3.3)	4.9
9	Depressive disorders	454 (3.1)	12.3	Lung cancer	6356 (3.2)	4.5
10	Chronic liver disease	387 (2.6)	11.3	Asthma	5560 (2.8)	4.5
11	Back pain and problems	385 (2.6)	10.2	Rheumatoid arthritis	5516 (2.7)	4.0
12	Asthma	376 (2.6)	8.4	Stroke	4848 (2.4)	3.2
13	Poisoning	331 (2.3)	8.4	Suicide/self-inflicted injuries	4253 (2.1)	3.5
14	Homicide and violence	318 (2.2)	8.0	Type 2 Diabetes	3691 (1.8)	2.6
15	Lung cancer	290 (2.0)	10.2	Bowel cancer	3646 (1.8)	2.7
Male rank	Disease	DALY: n (%)	ASR (per 1000)	Disease	n (%)	ASR (per 1000)
1	Coronary heart disease	2118 (11.2)	86.4	Coronary heart disease	19 666 (8.1)	15.7
2	Suicide/self-inflicted injuries	1972 (10.4)	39.8	COPD ²	11 931 (4.9)	9.3
3	Alcohol use disorders	1404 (7.4)	33.6	Suicide/self-inflicted injuries	11 620 (4.8)	9.0
4	Type 2 diabetes	649 (3.4)	25.6	Back pain and problems	9449 (3.9)	7.3
5	Chronic kidney disease	608 (3.2)	31.1	Lung cancer	8727 (3.6)	6.7
6	COPD ²	559 (2.9)	27.9	Depressive disorders	6737 (2.8)	5.3
7	RTI ³ (motor vehicle)	538 (2.8)	10.5	Type 2 Diabetes	5688 (2.3)	4.4
8	Chronic liver disease	522 (2.8)	15.6	Anxiety disorders	5514 (2.3)	4.4
9	Anxiety disorders	464 (2.4)	12.6	Dementia	5382 (2.2)	4.7
10	Poisoning	442 (2.3)	11.1	Stroke	5325 (2.2)	4.4
11	Asthma	389 (2.1)	9.5	Poisoning	5210 (2.1)	4.1
12	Depressive disorders	381 (2.0)	10.8	Alcohol use disorders	5030 (2.1)	4.0
13	Stroke	380 (2.0)	18.0	Prostate cancer	4832 (2.0)	4.0
14	Drug use disorders	372 (2.0)	7.8	Osteoarthritis	4509 (1.8)	3.4
15	Homicide and violence	352 (1.9)	7.8	Bowel cancer	4394 (1.8)	3.4

¹ This figure excludes all 'other' categories, for example, other musculoskeletal conditions.

² COPD: Chronic Obstructive Pulmonary Disease.

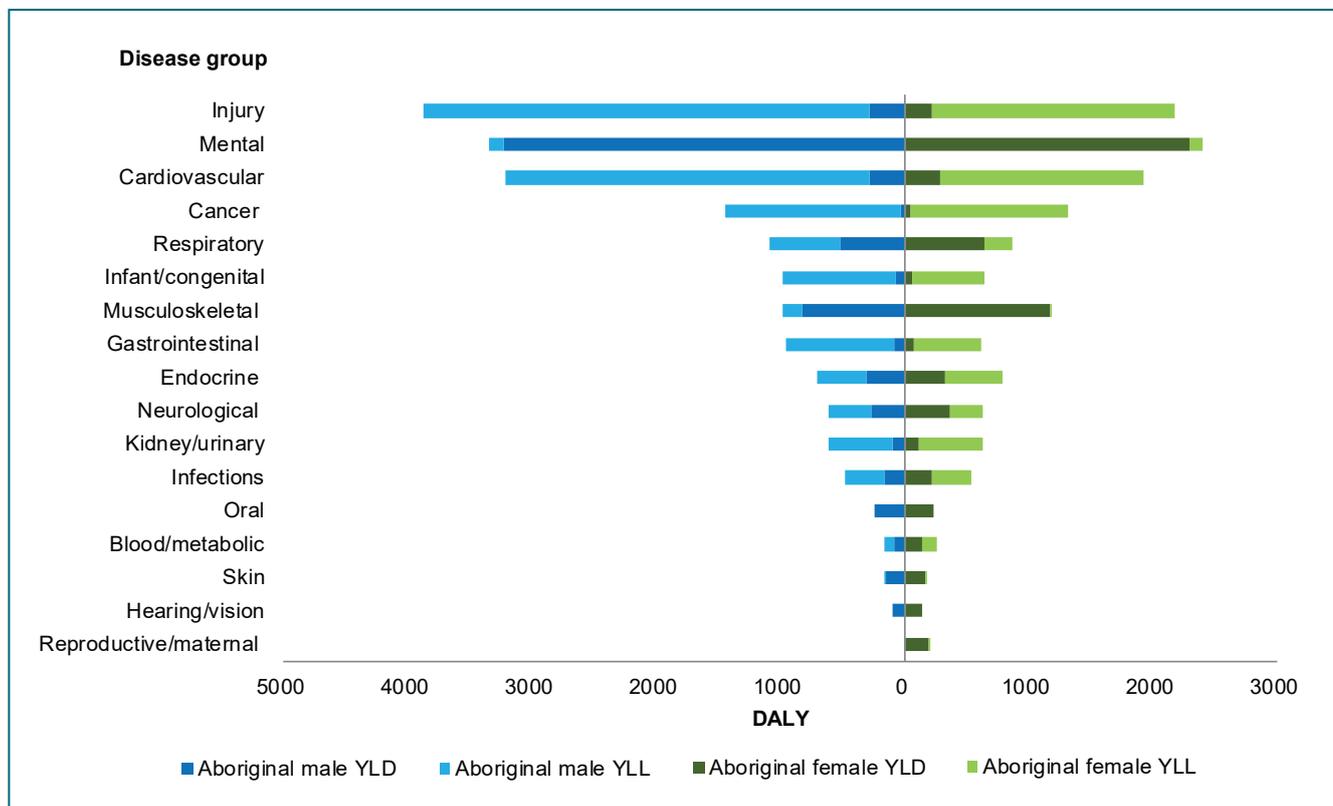
³ RTI: Road traffic injury.

Fatal and non-fatal burden by disease group

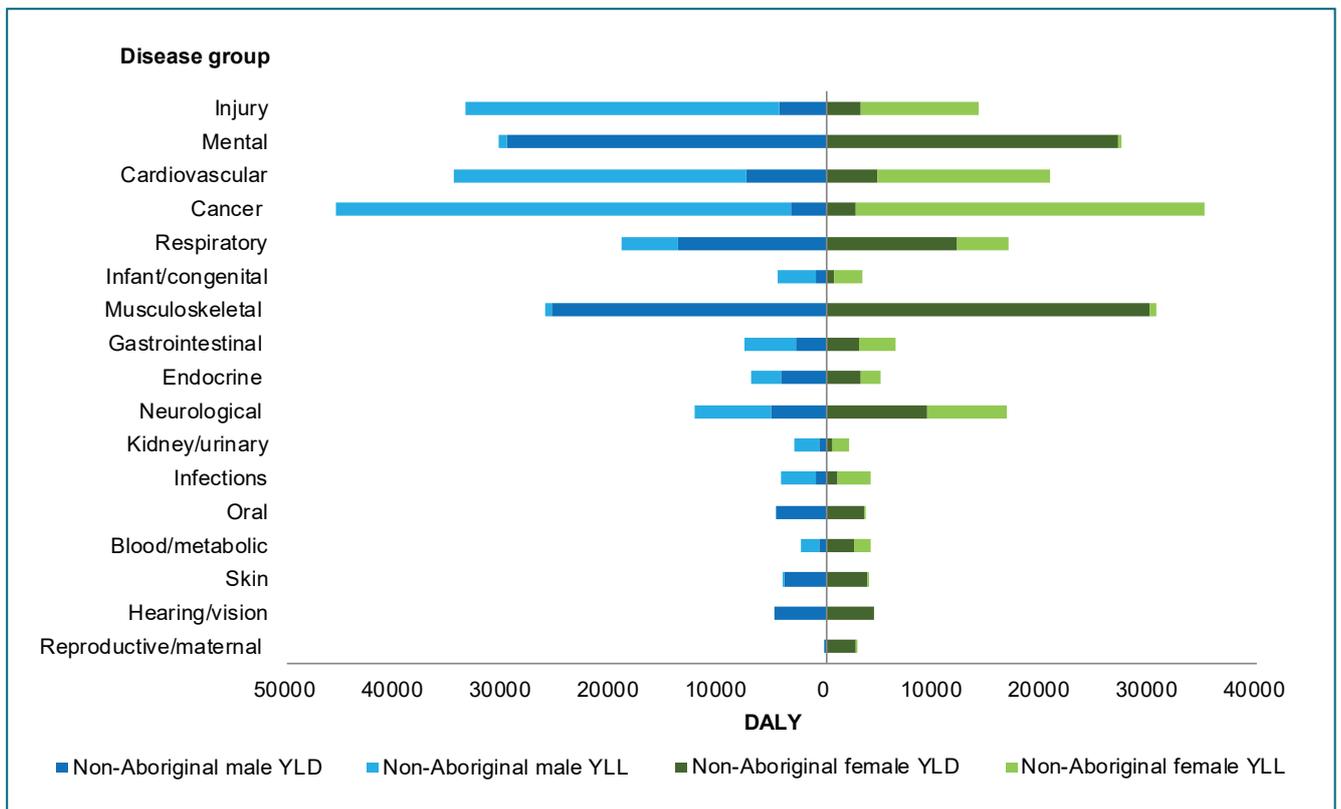
- Among the five disease groups causing the highest proportion of burden among Aboriginal persons (Figure 3):
 - cancer, cardiovascular diseases, and injuries³ caused mainly fatal burden (YLL)
 - mental and substance use disorders, and musculoskeletal conditions caused primarily non-fatal burden (YLD).
- Among the remaining disease groups in Aboriginal persons:
 - the burden from kidney and urinary diseases, infant and congenital conditions and gastrointestinal disorders was primarily fatal.
 - the burden from reproductive and maternal disorders, skin disorders, oral disorders and hearing and vision disorders was mainly non-fatal.

The findings for these five disease groups were similar in non-Aboriginal persons.

Figure 3: Non-fatal (YLD) and fatal (YLL) burden, by disease group and sex, among Aboriginal and non-Aboriginal residents of Western Australia in 2015



³ Note that suicide and self-inflicted injuries are part of the injury disease group, not the mental and substance use disorders group.



Total burden by sex

Overall, Aboriginal males accounted for 56% of the total fatal and non-fatal burden (DALY) compared to Aboriginal females who contributed the remaining 44%. This proportion was similar for non-Aboriginal males and females (55% and 45% respectively). The relative contribution of males and females to total burden varied by disease group:

- Aboriginal males contributed a greater proportion of the total burden for: injuries (64%); cardiovascular diseases (63%); infant and congenital conditions (61%); gastrointestinal disorders (61%); mental and substance use disorders (58%); and respiratory diseases (56%).
- Aboriginal females contributed a greater proportion of the total burden for: reproductive and maternal conditions (96%); blood and metabolic disorders (61%); hearing and vision disorders (56%); and musculoskeletal conditions (55%).

Disease groups and diseases across the life course

The pattern of disease group and specific disease burden across the life course among Aboriginal Western Australians is described below. Figure 4 and 5 illustrate the leading five diseases by sex and age-group. (For those up to 24 years of age, disease rankings are reported with DALY for males and females combined due to small numbers – Figure 4. For those aged 25+ years, disease rankings are reported by sex – Figure 5).

- Infant and congenital conditions made up 51% of the total burden of disease among Aboriginal children less than 5 years old. This was similar to non-Aboriginal young children, where infant and congenital conditions made up 50% of total burden of this age-group.
- Mental and substance use disorders contributed nearly a third (31%) of the total burden in 5 to 14-year-olds, followed by injury (25%). More than a third (36%) of total burden in non-Aboriginal 5 to 14-year-olds was from mental and substance use disorders, followed by respiratory diseases (13%) and injury (12%).

- In Aboriginal persons aged 15 to 44 years, injury, and mental and substance use disorders contributed the most to the burden (31% and 26% respectively). These disease groups also caused a high proportion of total burden in non-Aboriginal persons (22% and 31% respectively).
- Cardiovascular diseases contributed a high proportion of the burden in Aboriginal persons aged 45 years and older (24% in 45 to 64-year-olds and 23% in 65+ year olds). In non-Aboriginal persons aged 45 to 64-year-olds, cardiovascular diseases accounted for only 12% of total burden, rising to 20% in those aged 65+ years.
- Cancer contributed the second highest proportion of DALY in Aboriginal persons aged 45 years and older (15% in 45 to 64-year-olds and 13% in 65+ year olds). These proportions were higher in non-Aboriginal persons (24% in each age-group).

Ages under 5:

- The leading causes of total burden in the youngest age group of Aboriginal persons were pre-term and low birth weight (LBW), sudden infant death syndrome, birth trauma, protein-energy deficiency and cardiovascular defects (Figure 4).

Ages 5 to 14:

- Road traffic injury (RTI - motor vehicle occupants), conduct disorder, asthma and anxiety disorders were the leading causes of total burden in 5 to 14-year-old Aboriginal Western Australians.

Ages 15 to 24:

- Suicide and self-inflicted injuries, alcohol use disorders, drug use disorders, RTI (motor vehicle occupants) and anxiety disorders were the leading causes of total burden in Aboriginal persons aged 15 to 24 years.

Figure 4: Leading causes¹ of total burden (DALY; %), by age group, among Aboriginal residents of Western Australia in 2015

		Age group (years)		
		Under 5	5-14	15-24
Persons	1st	Pre-term birth/LBW ² complications (398; 16.1%)	RTI ³ - motor vehicle occupants (229, 15.9%)	Suicide and self-inflicted injuries (1120; 29.1%)
	2nd	Sudden infant death syndrome (218; 8.8%)	Conduct disorder (155; 10.8%)	Alcohol use disorders (390; 10.1%)
	3rd	Birth trauma/asphyxia (209, 8.4%)	Asthma (136; 9.4%)	Drug use disorders (excluding alcohol) (184; 4.8%)
	4th	Protein-energy deficiency (140; 5.7%)	Anxiety disorders (101; 7.0%)	RTI ³ - motor vehicle occupants (163; 4.2%)
	5th	Cardiovascular defects (108; 4.3%)	<100 DALY	Anxiety disorders (162; 4.2%)

¹ This figure excludes all 'other' categories, for example, other musculoskeletal conditions. Disease contributing less than 100 DALY have been excluded from the table.

² LBW: low birth weight

³ RTI: road traffic injury

Ages 25 to 44:

- Suicide and self-inflicted injuries, alcohol use disorders, coronary heart disease, poisoning, and RTIs were the leading contributors to total burden in 25 to 44-year-old Aboriginal persons and when males were examined separately (Figure 5).
- Among Aboriginal females in this age-group, however, anxiety disorders and homicide and violence ranked first and third respectively, with poisoning ranking second and coronary heart disease ranking fifth.

Ages 45 to 64:

- The leading five causes of total burden in 45 to 64-year-old Aboriginal persons were coronary heart disease, type 2 diabetes, chronic kidney disease, COPD and alcohol use disorders.
- Among Aboriginal males, alcohol use disorders ranked third with chronic liver disease ranking fourth and COPD ranking fifth.
- Among Aboriginal females of this age-group, anxiety disorders ranked fifth.

Ages 65+

- The five leading causes of total burden were coronary heart disease, COPD, chronic kidney disease, type 2 diabetes and dementia in Aboriginal persons aged 65+ years.
- Type 2 diabetes was ranked top among Aboriginal females of this age-group, while coronary heart disease ranked top among Aboriginal males (and overall) and second among Aboriginal females.

Figure 5: Leading causes¹ of total burden (DALY; %), by sex and age group, among Aboriginal residents of Western Australia in 2015

		Age group (years)		
		25-44	45-64	65+
Female	1st	Anxiety disorders (286; 6.6%)	Coronary heart disease (719; 14.2%)	Type 2 diabetes (204; 11.2%)
	2nd	Poisoning (245; 5.6%)	Type 2 diabetes (399; 7.9%)	Coronary heart disease (171; 9.4%)
	3rd	Homicide and violence (234; 5.4%)	Chronic kidney disease (335; 6.6%)	Dementia (166; 9.1%)
	4th	Alcohol use disorders (220; 5.0%)	COPD ² (271; 5.4%)	Chronic kidney disease (157; 8.6%)
	5th	Coronary heart disease (219; 5.0%)	Anxiety disorders (210; 4.2%)	COPD ² (106; 5.8%)
Male	1st	Suicide/self-inflicted injuries (902; 13.8%)	Coronary heart disease (1,213; 19.2%)	Coronary heart disease (314; 18.3%)
	2nd	Alcohol use disorders (849; 13.0%)	Type 2 diabetes (402; 6.4%)	COPD ² (253; 14.8%)
	3rd	Coronary heart disease (590; 9.0%)	Alcohol use disorders (292; 4.6%)	Chronic kidney disease (177; 10.4%)
	4th	Poisoning (379; 5.8%)	Chronic liver disease (282; 4.5%)	Dementia (100; 5.8%)
	5th	RTI ³ – motor vehicle occupants (328; 5.0%)	COPD (272; 4.3%)	DALY <100

¹ This figure excludes all 'other' categories, for example, other musculoskeletal conditions. Disease contributing less than 100 DALY have been excluded from the table.

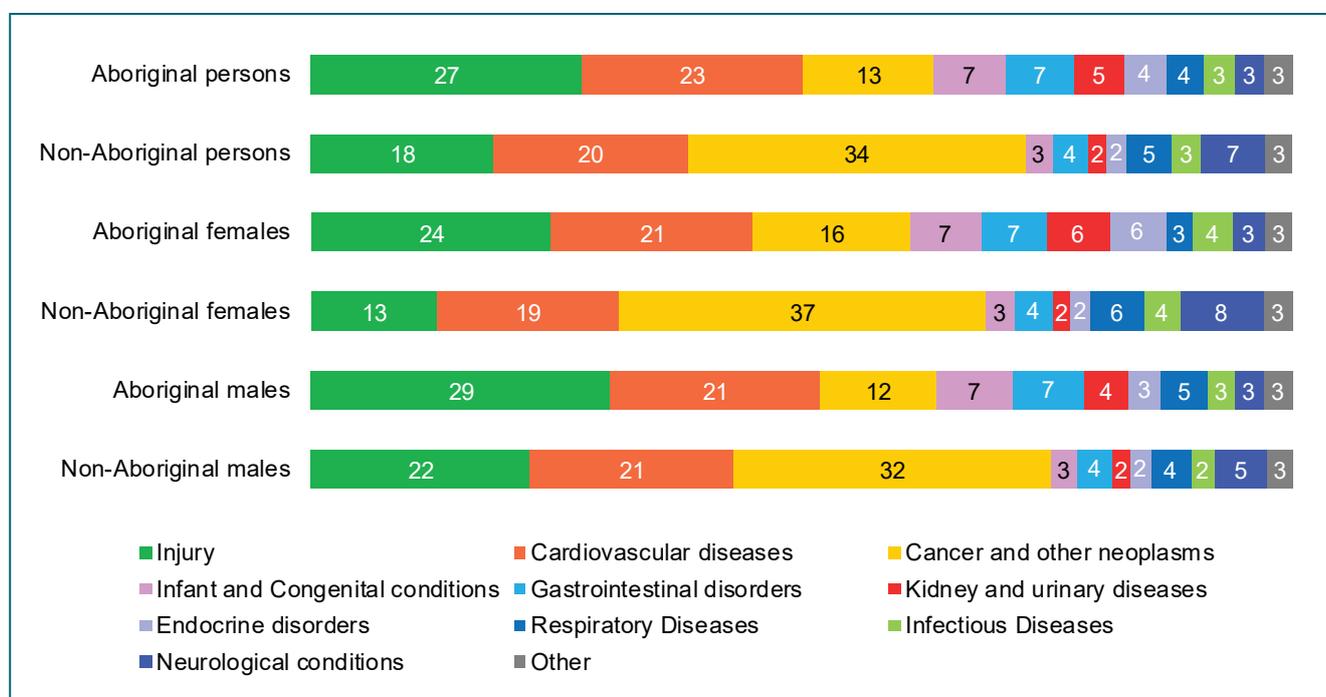
² COPD: Chronic Obstructive Pulmonary Disease

³ RTI: road traffic injury

Fatal burden

- There was a total of 20 169 years of life lost in Aboriginal Western Australians in 2015.
- The leading cause of fatal burden in Aboriginal persons in 2015 was injury, which was responsible for 27% of years of life lost (YLL – Figure 6). Injury was ranked top among both Aboriginal males and females (29% and 24% respectively). In contrast, cancer was the leading cause of fatal burden in non-Aboriginal persons (34% overall, 32% of male and 37% of female fatal burden).
- The second and third leading causes of years of life lost in Aboriginal persons were cardiovascular diseases (23%) and cancer (13%). Injury was ranked second in non-Aboriginal males while cardiovascular disease was ranked second in non-Aboriginal females.
- The years of life lost by Aboriginal males was 61% (12 214) of the total years of life lost by all Aboriginal Western Australians. This was similar in non-Aboriginal males (YLL= 130 844, 60%).

Figure 6: Percentage (%) of fatal burden (YLL), by disease group and sex, among Aboriginal and non-Aboriginal residents of Western Australia in 2015

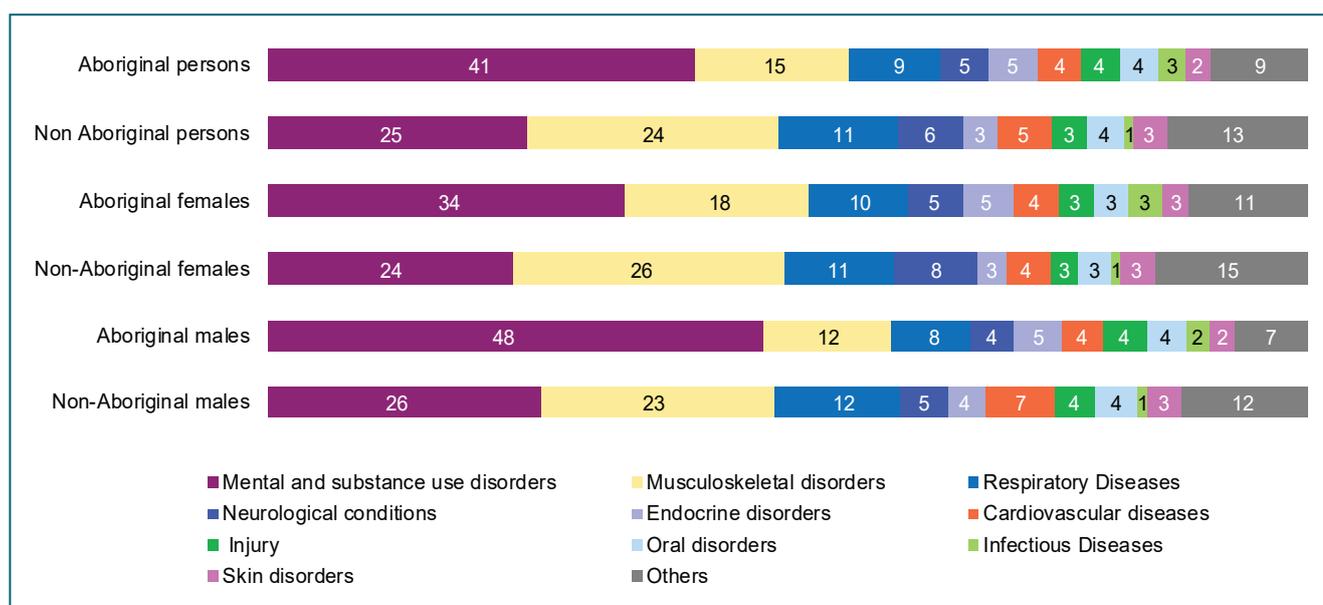


- The top three diseases causing overall fatal burden in Aboriginal persons were coronary heart disease (13.2%), suicide and self-inflicted injuries (7.3%), and RTI – motor vehicle occupants (7.1%). The top two diseases were the same in non-Aboriginal persons (coronary heart disease: 10.6% and suicide and self-inflicted injuries: 7.2%) but RTIs were not ranked in the top five. Among Aboriginal males, suicide and self-inflicted injuries ranked first while among females this ranked second. Suicide and self-inflicted injuries was ranked second in non-Aboriginal males but was not in the top five in non-Aboriginal females.
- RTI (motor vehicle occupants) ranked fourth for Aboriginal males and third for Aboriginal females. Chronic kidney disease ranked third for males and fourth for females. Neither condition was in the top five for non-Aboriginal males or females.
- Other conditions which ranked highly for both Aboriginal males and females were type 2 diabetes, chronic liver disease, poisoning, COPD and stroke.

Non-fatal burden

- Non-fatal burden was similar in Aboriginal males (YLD=6764; 50.3%) and females (6673; 49.7%). A similar pattern was seen in non-Aboriginal males and females.
- The overall leading cause of years of healthy life lost due to disease and injury (YLD) among Aboriginal persons was mental and substance use disorders (41% – Figure 7). The proportion was higher in Aboriginal males (48%) than females (34%). Mental and substance use disorders was also ranked first among non-Aboriginal persons, but the proportions were smaller (non-Aboriginal persons: 25%, males: 26%, females: 24%).
- Musculoskeletal conditions ranked second among Aboriginals overall (15%). The proportion of non-fatal burden due to musculoskeletal conditions was higher among Aboriginal females (18%) than males (12%). The proportion of non-fatal burden related to musculoskeletal disorders was also higher among non-Aboriginal females (26% compared to 23% among males).

Figure 7: Percentage (%) of non-fatal burden (YLD), by disease group and sex, among Aboriginal and non-Aboriginal residents of Western Australia in 2015



- The leading three diseases causing non-fatal burden in Aboriginal persons were alcohol use disorders, anxiety disorders and depressive disorders. Among non-Aboriginal persons, the top three non-fatal diseases were back pain and problems, depressive disorders and COPD.
- Drug use disorders was ranked fourth among Aboriginal males, with back pain and problems ranking fourth for Aboriginal females and fifth overall. Drug use disorders were not in the top five diseases among non-Aboriginal males or females, with alcohol use disorders ranked only fifth in non-Aboriginal males.
- Asthma was ranked fifth in both Aboriginal males and females. This was not ranked in the top five in non-Aboriginal males or females.

Gap in burden between Aboriginal and non-Aboriginal Western Australians

Burden of disease and injury data in the WA Aboriginal population in 2015 demonstrated a substantial health gap between Aboriginal and non-Aboriginal Western Australians. The overall (direct) age-standardised DALY rate in Aboriginal persons was three times that in non-Aboriginal persons (Table 2), with the highest rate ratio for kidney diseases (rate ratio=14.1) and rate ratios of more

than seven for endocrine disorders and more than four for cardiovascular diseases, gastrointestinal diseases and infectious diseases. The disease groups with the highest ASR in Aboriginal residents were cardiovascular diseases (96.4 per 1000 population), followed by mental health and substance use disorders, and injury (67.9 and 63.5 per 1000 population).

Table 2: Age-standardised DALY rates (per 1000 population, rate ratios and rate differences, among Aboriginal and non-Aboriginal residents of Western Australia in 2015

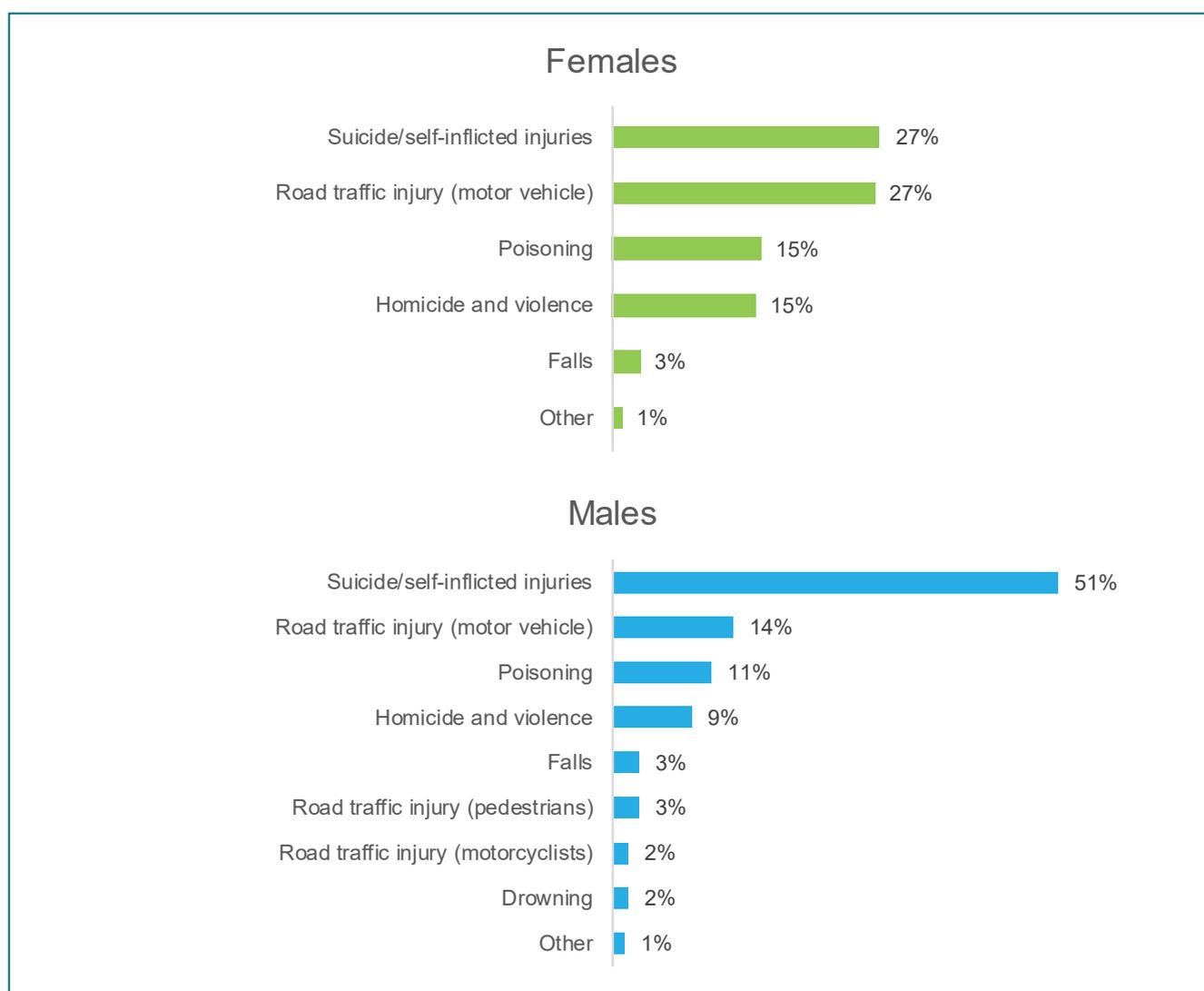
	ASR DALY per 1000		Health gap	
	Aboriginal	Non-Aboriginal	Rate difference	Rate ratio
Cardiovascular diseases	96.4	20.7	75.7	4.7
Mental and substance use disorders	67.9	23.2	44.7	2.9
Injury	63.5	18.9	44.7	3.4
Cancer and other neoplasms	53.6	30.3	23.3	1.8
Musculoskeletal disorders	35.6	21.7	14.0	1.6
Respiratory diseases	34.6	13.8	20.9	2.5
Endocrine disorders	32.0	4.5	27.5	7.1
Kidney and urinary diseases	27.2	1.9	25.3	14.1
Neurological conditions	26.5	11.0	15.5	2.4
Gastrointestinal disorders	23.8	5.4	18.5	4.4
Infectious diseases	14.2	3.2	11.1	4.5
Infant and congenital conditions	11.6	3.1	8.5	3.7
Oral disorders	6.6	3.1	3.4	2.1
Blood and metabolic disorders	5.8	2.5	3.3	2.3
Hearing and vision disorders	5.0	3.5	1.5	1.4
Skin disorders	3.6	3.3	0.4	1.1
Reproductive and maternal conditions	3.5	1.1	2.3	3.0
Total	511.5	171.1	340.5	3.0

Selected highly ranked disease groups and diseases

Injury

- Injury was the highest contributing disease group to total burden of disease and injury among Aboriginal Western Australians.
- Overall, fatal burden contributed 90% of female injury burden and 93% of the male injury burden, with the remainder contributed by non-fatal burden.
- Most of the burden of injury occurred in males aged 25 to 44 (52% of male burden due to injury) and females aged 25 to 44 (45% of female injury burden). Those aged less than 5, and 65 years and older contributed relatively small proportions to the burden due to injury.
- Using external cause codes, the leading cause of injury burden in males was suicide and self-inflicted injuries (51% - Figure 8). RTI (motor vehicle – 14%), poisoning (11%) and homicide and violence (9%) contributed substantially to the injury burden.
- Similarly, the leading cause of injury burden in females was suicide and self-inflicted injuries (27%) and RTI (motor vehicle – 27%).

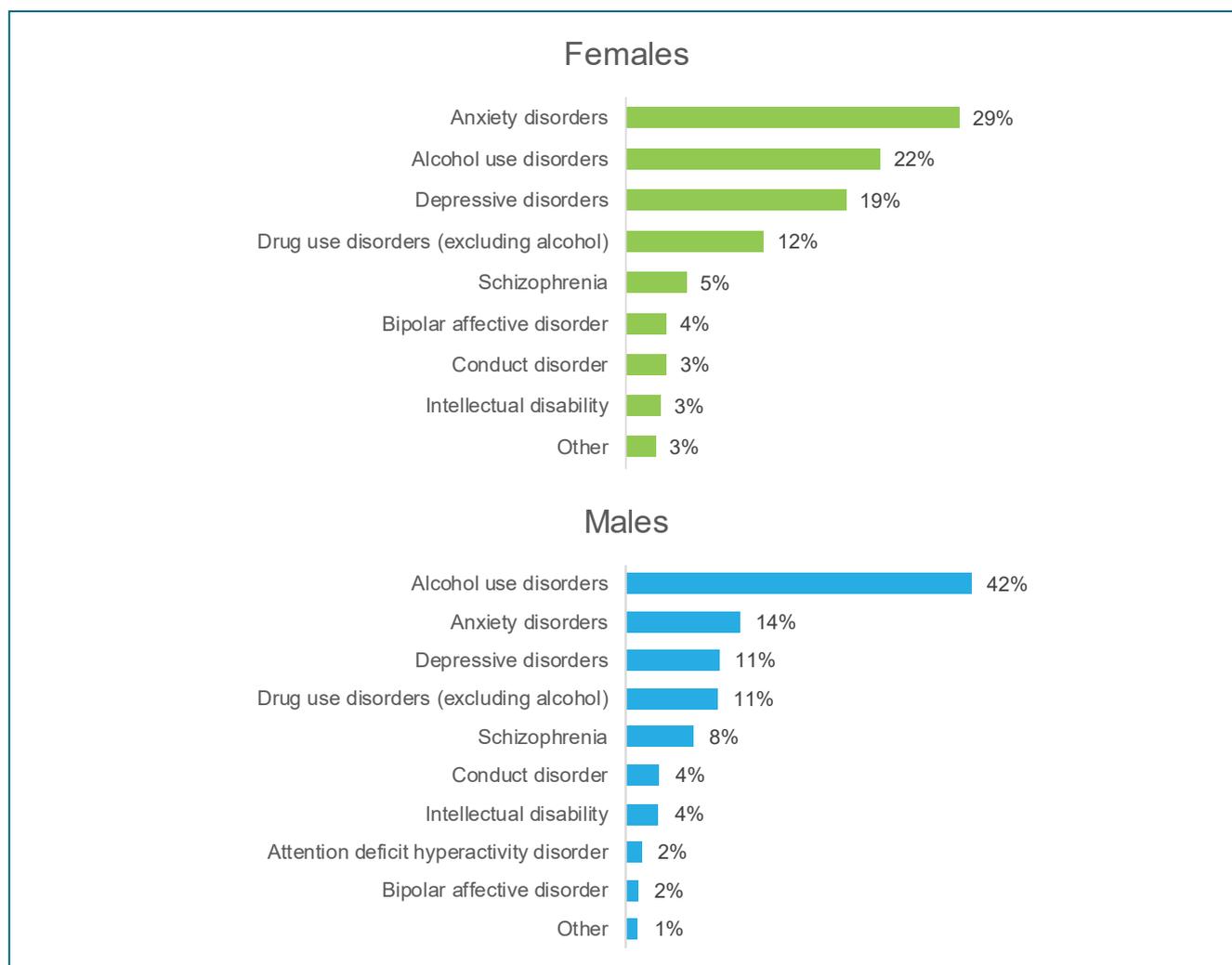
Figure 8: Proportion of total injury burden (DALY) by disease and sex, among Aboriginal residents of Western Australia in 2015



Mental and substance use disorders

- Mental and substance use disorders was the disease group which made the second highest contribution to the total burden of disease and injury among Aboriginal Western Australians. This group consisted of alcohol use disorders, anxiety disorders, attention deficit hyperactivity disorder, autism spectrum disorders, bipolar disorder, conduct disorder, depressive disorders, drug use disorders, eating disorders, intellectual disability and schizophrenia.
- Overall, non-fatal burden contributed 96% of both female and male mental and substance use disorder burden, with the remainder contributed by fatal burden.
- Most of the burden of mental and substance use disorders occurred in those aged 25 to 44 years and older (44% of total female burden and 51% of male burden). Those aged 15 to 24, and 45 to 64 years contributed between 19% and 25%, depending on age-group and sex.
- In both males and females, the youngest age-group (under 5 years) contributed approximately 1% to the total burden of mental and substance use disorders.
- The leading two mental and substance use disorders in females were anxiety disorders (29%) and alcohol use disorders (22% – Figure 9). Depressive disorders (19%) and drug use disorders (12%) also contributed substantially to the burden in this disease group in females.
- The leading cause of mental and substance use disorder burden in males was alcohol use disorders (42%). This was followed by anxiety disorders (14%), depressive disorders (11%) and drug use disorders (11%).

Figure 9: Proportion of total mental and substance use disorders burden (DALY) by disease and sex, among Aboriginal residents of Western Australia in 2015

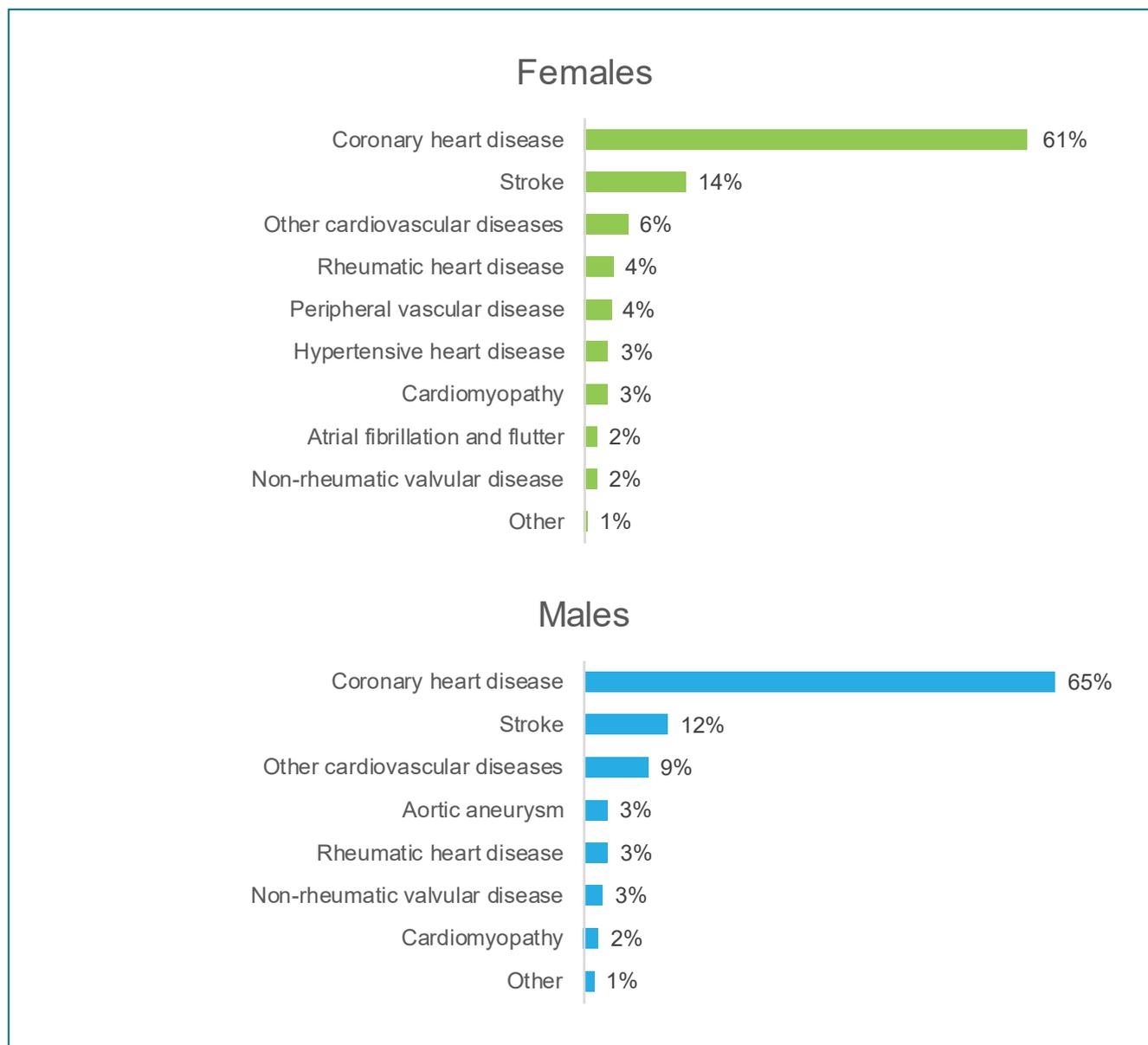


Cardiovascular diseases

- Cardiovascular disease was the disease group was the third greatest contributor to the total burden of disease and injury in the WA Aboriginal population. This group consisted of aortic aneurysm, atrial fibrillation and flutter, cardiomyopathy, coronary heart disease, hypertensive heart disease, inflammatory heart disease, non-rheumatic valvular disease, other cardiovascular diseases, peripheral vascular disease, rheumatic heart disease and stroke.
- Overall, fatal burden contributed 85% of female burden and 91% of male burden, with the remainder contributed by non-fatal burden.

- Most of the burden occurred in those aged 45 to 64 years (56% of total female burden and 52% of male burden).
- In both males and females, those aged under 25 years contributed approximately 5% to the burden due to cardiovascular diseases.
- Coronary heart disease contributed nearly two-thirds of the burden of cardiovascular diseases (61% in females and 65% in males – Figure 10). This was followed by stroke (14% in females and 12% in males).

Figure 10 : Proportion of total cardiovascular disease burden (DALY) by disease and sex, among Aboriginal residents of Western Australia in 2015



Summary

Burden of disease and injury data in the WA Aboriginal population in 2015 demonstrated a substantial health gap between Aboriginal and non-Aboriginal Western Australians with approximately three times the rate of years of healthy life lost in the Aboriginal population compared to the non-Aboriginal population (ASR of 512 compared to 171 DALY per 1000 population). The study showed that certain disease groups had much higher age-standardised DALY rates in Aboriginal Western Australians, with more than 14 times the rate of kidney disease in Aboriginal than non-Aboriginal persons, concurring with previous findings in the ABDS (AIHW, 2016). The study showed an increase in burden of disease among Aboriginal Western Australians over the life course up to the age of 64, after which it dropped as the population declined. Burden is higher among Aboriginal males than females, due to higher years lost to premature death (YLL) in males.

The disease group contributing the most burden in Aboriginal persons was injury, followed by mental and substance use disorders and cardiovascular diseases. The leading disease was coronary heart disease, followed by suicide and self-inflicted injuries, alcohol use disorders, type 2 diabetes, and chronic kidney disorders.

This study was strengthened by using WA-specific Aboriginal data using linked data from several WA datasets. This was unlike national BoD studies that used national-level data. Limitations of the study included the small sample sizes and lower frequency of Aboriginal health surveys, and limited availability of data for some conditions. For example, this study used the 2012/13 Australian Aboriginal and Torres Strait Islander Health Survey as it was the more recent, and the results had to be adjusted to represent the 2015 WA Aboriginal population. To improve these data, Aboriginal health surveys with large WA sample sizes should be conducted more regularly to provide more recent data.

The findings in this report can inform health policy and planning for the Aboriginal population in WA.

Glossary⁴

Age-standardised rate: Rate that takes into account the age structure of the population.

Burden of disease (and injury): The quantified impact of a disease or injury on a population using the **disability-adjusted life year (DALY)** measure.

Condition (health condition): A broad term that can be applied to any health problem, including symptoms, diseases and certain risk factors, such as high blood cholesterol and obesity. Often used synonymously with disorder or problem.

Disability: In burden of disease analysis, any departure from an ideal health state.

Disability-adjusted life years (DALY): A year of healthy life lost, either through premature death or living with disability due to illness or injury.

Disability weight: A factor that reflects the severity of health loss from a particular **health state** on a scale from 0 (perfect health) to 1 (equivalent to death).

Disease: A broad term that can be applied to any health problem, including symptoms, diseases, injuries and certain risk factors, such as high blood cholesterol and obesity. Often used synonymously with condition, disorder or problem.

External cause: The environmental event, circumstance or condition that causes injury, poisoning and other adverse effect.

Fatal burden: The burden from dying prematurely as measured by years of life lost. Often used synonymously with **years of life lost (YLL)**.

Health state: Reflects a combination of signs and symptoms that result in health loss, and are not necessarily unique to one particular disease. A health state might also be a severity level of a **sequela** (typically mild, moderate and severe levels are distinguished). For example, the health state 'mild heart failure' is used as a sequela of coronary heart disease, hypertensive heart disease, congenital heart disease and several other conditions. Each health state is associated with a **disability weight**.

Incidence: Refers to the occurrence of a disease or event. The incidence rate is the number of new cases occurring during a specified time period.

Morbidity: Ill health in an individual, and levels of ill health in a population or group.

Mortality: Death.

Non-fatal burden: The burden from living with ill health as measured by years lived with disability. Often used synonymously with **years lived with disability (YLD)**.

Premature death: Deaths that occur at a younger age than a selected cut-off.

Prevalence: Refers to the existence of a disease or event, whether or not it is newly occurring; the prevalence rate is the number of cases existing at a point in time (point prevalence) or over a specified time period (period prevalence).

Rate: A rate is one number (the numerator) divided by another number (the denominator). The numerator is commonly the number of events in a specified time. The denominator is the population at risk of the event. Rates (crude, age-specific and age-standardised) are generally multiplied by a number such as 100,000 to create whole numbers.

Rate ratios and rate differences (based on age-standardised rates) are used for comparisons between population groups (that is Indigenous and non-Indigenous Australians and subnational populations), in measures of the gap as well as in comparisons over time. A rate ratio shows how many times one rate of burden is relative to another, while a rate difference shows the difference between one rate and another.

Reference life table: A table that shows, for each age, the number of remaining years a person could potentially live, to measure the **years of life lost** from dying at that age.

Risk factor: Any factor that causes or increases the likelihood of a health disorder or other unwanted condition or event.

Sequelae: Health consequences of diseases and injuries, such as heart failure due to coronary heart disease. Each sequela may be mapped to one or more **health states**.

Years lived with disability (YLD): Measures the years of what could have been a healthy life that were instead spent in states of less than full health. YLD represent non-fatal burden.

Years of life lost (YLL): Measures years of life lost due to premature death, defined as dying before the global ideal life span at the age of death. YLL represent fatal burden.

⁴ This glossary has been extracted from the Australian Burden of Disease Study 2015 report (AIHW 2019) and 2011 report (AIHW 2016).

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