

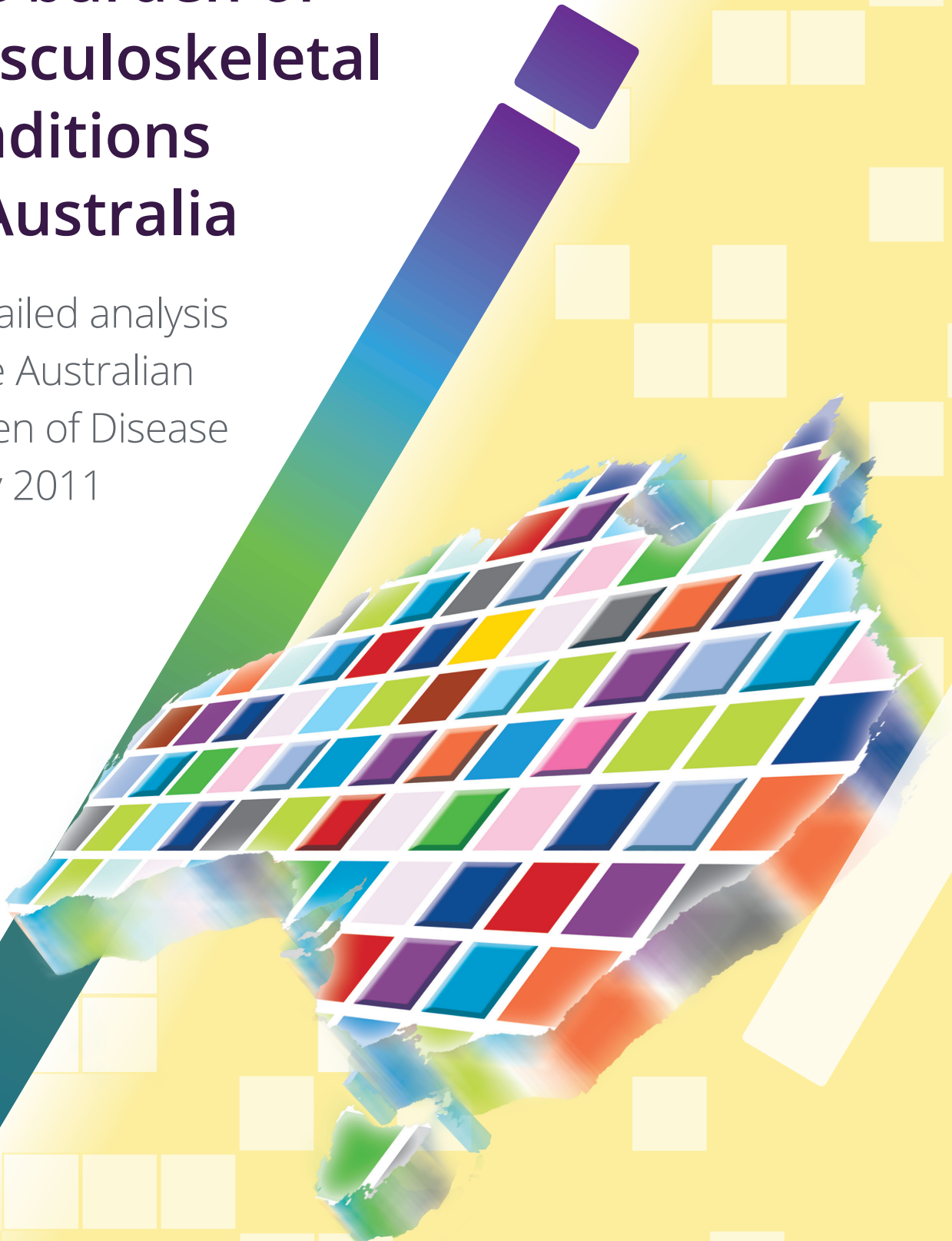


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The burden of musculoskeletal conditions in Australia

A detailed analysis
of the Australian
Burden of Disease
Study 2011



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Abbreviations

ABDS	Australian Burden of Disease Study
ABS	Australian Bureau of Statistics
ASR	age-standardised rate
AHS	Australian Health Survey
AIHW	Australian Institute of Health and Welfare
BEACH	Bettering the Evaluation and Care of Health
DALY	disability-adjusted life years
GBD	Global Burden of Disease Study
NHS	National Health Survey
YLD	years lived with disability
YLL	years of life lost

Symbols

..	not applicable
<	less than
+	and over

Summary

Musculoskeletal conditions, such as various forms of arthritis and back pain and problems, are common long-term conditions affecting the bones, muscles and connective tissues. These conditions contribute substantially to the disease burden within the Australian population. Burden of disease analysis measures the combined impact of living with illness and injury (non-fatal burden) and dying prematurely (fatal burden). This report presents detailed information on the disease burden due to musculoskeletal conditions by age, sex, population groups and over time using data from the Australian Burden of Disease Study (ABDS) 2011.

Musculoskeletal conditions contributed 12% of the total burden of disease and injury in Australia in 2011, a total of 521,286 disability-adjusted life years (DALY), and were ranked as the fourth leading contributor to total burden after cancer, cardiovascular diseases, and mental and substance use disorders. While nearly one-quarter (23%) of the total non-fatal burden in 2011 was due to musculoskeletal conditions, they contributed less than 1% of the total fatal burden.

The total burden due to musculoskeletal conditions was higher among females compared with males and generally increased with age to be highest among people aged 60–64. After accounting for population increase and ageing, there was a 15% reduction in the total burden from 26 DALY per 1,000 people in 2003 to 22 DALY per 1,000 people in 2011.

The burden due to musculoskeletal conditions varied by condition and disease severity

Back pain and problems contributed just under one-third (31%) of the total burden of all musculoskeletal conditions, followed by osteoarthritis (17%), rheumatoid arthritis (16%) and gout (0.8%). The group 'other musculoskeletal conditions', including juvenile arthritis and ankylosing spondylitis, contributed more than one-third (35%) of the total burden.

For osteoarthritis and rheumatoid arthritis, the non-fatal burden was mostly due to severe and moderate cases of each disease. For back pain and problems, severe cases contributed the most to the non-fatal burden.

Population groups experienced different levels of musculoskeletal burden

In 2011, the rate of total burden due to musculoskeletal conditions was generally:

- similar across the states and territories, although the rate in Tasmania was 20% higher than the national rate
- higher among people living in *Very remote* areas and *Inner regional* areas, compared with other remoteness areas
- higher among people living in areas of the lowest socioeconomic group, compared with other socioeconomic groups
- higher among Aboriginal and Torres Strait Islander people compared with non-Indigenous Australians, with the exception of burden of back pain and problems, which was lower among Indigenous Australians.

Some of the burden can be attributed to modifiable risk factors

In 2011, around 17% of the total burden due to back pain and problems was attributed to occupational exposures and hazards; and 45% of the burden due to osteoarthritis was attributed to overweight and obesity.

Introduction

This report presents information about the disease burden due to musculoskeletal conditions using data from the Australian Burden of Disease Study (ABDS) 2011. This includes information on the contribution of musculoskeletal conditions to the overall burden, changes in that burden over time, and the burden by sex, age group, state/territory, remoteness area, socioeconomic group and Indigenous status.

Musculoskeletal conditions affect the bones, muscles and connective tissues. There are more than 150 different types of musculoskeletal conditions, including various forms of arthritis, back problems and osteoporosis. Their causes include overuse of joints, congenital anomalies, metabolic or biochemical abnormalities, infections, inflammatory conditions, trauma and cancer.

These conditions are large contributors to illness, pain and disability in Australia. As such, they pose a substantial burden on the community, both economic and personal, through the need for hospital and primary health-care services, disruptions to daily life and lost productivity.

This report presents detailed disease burden estimates for 5 conditions: osteoarthritis, rheumatoid arthritis, back problems, gout and the group 'other musculoskeletal conditions', which includes other conditions not covered by these categories. A brief description of these musculoskeletal conditions is provided in Box 1. Note that in the ABDS 2011 osteoporosis was considered a risk factor and not included in any of the estimates for musculoskeletal conditions.

In addition, this report presents estimates of musculoskeletal burden due to 2 risk factors shown to be associated with musculoskeletal conditions—occupational exposure and hazards, and overweight and obesity.

Box 1: Musculoskeletal conditions covered in this report

osteoarthritis: A degenerative joint condition that mostly affects the hands, spine and joints, such as the hips, knees, ankles and feet. Its main feature is the breakdown of the cartilage that overlies the ends of the bones in the joints. Age is the strongest factor in the development and progression of osteoarthritis. Other more modifiable risk factors are being overweight, physical inactivity, joint trauma and repetitive joint-loading tasks (for example, kneeling, squatting and heavy lifting).

rheumatoid arthritis: A chronic disease marked by inflammation of the joints, most often affecting the hand joints in a symmetrical fashion (that is, both sides of the body are affected at the same time). The immune system attacks the tissues lining the joints, causing pain, swelling and stiffness. Over time, there is progressive and irreversible joint damage, resulting in deformities and severe disability. The exact cause of rheumatoid arthritis is not well understood although there is a strong genetic component.

back problems: Back problems include a range of conditions related to the bones, joints, connective tissue, muscles and nerves of the back. Back problems here include back pain or problems where there is no identifiable cause or diagnosis, disc disorders, sciatica and curvature of the spine. The occurrence of back problems can be associated with several factors, such as age, physical fitness, smoking, being overweight and type of occupation (for example, those requiring lifting, bending, twisting, pulling and pushing).

gout: Gout is a form of inflammatory arthritis. It occurs when excess uric acid in the blood vessels leads to deposits of uric acid crystals in 1 or more joints. These deposits cause inflammation, with the big toe being most commonly affected. However, gout can also affect other joints in the arms (fingers, wrists, elbows) and legs (toes, ankles, knees).

'other musculoskeletal conditions': These include specific conditions, such as juvenile arthritis, ankylosing spondylitis and systemic lupus erythematosus, and broad categories, such as systemic connective tissue disorders, soft tissue disorders, osteopathies and chondropathies, and other disorders of the musculoskeletal system and connective tissue. This category in the ABDS 2011 excludes osteoporosis (considered a risk factor) and symptoms and signs involving musculoskeletal conditions.

Overview of musculoskeletal conditions in Australia

Musculoskeletal conditions are highly prevalent, affecting 30% (6.9 million) of all Australians in 2014–15, based on self-reported data. This includes 3.7 million people with back problems, 2.1 million people with osteoarthritis, 0.8 million people with osteoporosis and 0.4 million people with rheumatoid arthritis (ABS 2015). In general, these conditions are more common in women than men, and more than half of those Australians with musculoskeletal conditions (61%) are of working age (25–64).

Musculoskeletal conditions are a significant cause of disability and have a strong negative effect on a person's quality of life, affecting the ability to participate in self-care, work, family and social activities. In 2015, 31% of people with disability reported having musculoskeletal conditions (ABS 2016).

Treatment and management of musculoskeletal conditions are mostly aimed at controlling pain and improving functioning and health-related quality of life. These conditions are predominantly managed in primary health-care settings by a range of health professionals and involving a combination of medication, physical therapy, self-management education and (where necessary) referral to specialist care.

Data from the Bettering the Evaluation and Care of Health (BEACH) survey of general practitioners suggest that, in 2015–16, musculoskeletal conditions were managed at a rate of 18 per 100 encounters (Britt et al. 2016). Hypertension is the most frequently managed problem, managed at 75 in 1,000 general practice encounters in 2015–16 (Britt et al. 2016). In the same period, back complaints were managed at 31 in 1,000 general practice encounters and osteoarthritis was managed at 26 in 1,000 general practice encounters (Britt et al. 2016).

Hospitalisations for musculoskeletal conditions are less frequent than general practitioner visits. Hospitalisation usually occurs when surgical intervention is required. According to the Australian Institute of Health and Welfare (AIHW) National Hospital Morbidity Database, in 2014–15, there were 534,187 hospitalisations with the principal diagnosis of musculoskeletal conditions. Of these, 126,579 were for the principal diagnosis of back problems, 111,053 for osteoarthritis, 11,982 for rheumatoid arthritis, 6,724 for gout and 277,849 for 'other musculoskeletal conditions'.

With almost 7 million Australians having musculoskeletal conditions, resulting expenditure on health services is substantial. For example, in 2008–09, musculoskeletal conditions were the fourth largest overall contributor to direct health expenditure in Australia, accounting for 8.7% (\$5,690 million) of total health-care expenditure after cardiovascular disease, oral health and mental disorders (AIHW 2014).

More information on musculoskeletal conditions in Australia can be found on the AIHW website <<http://www.aihw.gov.au/arthritis-and-musculoskeletal-conditions>> (AIHW 2016a).

What is burden of disease?

Burden of disease analysis measures the combined impact of living with illness and injury (non-fatal burden) and dying prematurely (fatal burden) (AIHW 2016b). More than merely counting deaths and disease prevalence, it also takes into account age at death and severity of disease. The contribution of various modifiable risk factors to disease burden can also be estimated. See Box 2 for key burden of disease terms used in this report.

Box 2: Key terms used in this report

attributable burden: The amount of burden that could be reduced if exposure to the risk factor had been avoided.

disability-adjusted life years (DALY): A measure (in years) of healthy life lost, either through premature death (defined as dying before the ideal life span) (YLL) or, equivalently, through living with disability due to illness or injury (YLD). DALY represent total burden.

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

years of life lost (YLL): A measure of the years of life lost due to premature death, defined as dying before the ideal life span. YLL represent fatal burden.

risk factors: Any factor that represents a greater risk of a health condition or health event. Examples include smoking, alcohol use and overweight and obesity (also referred to as 'high body mass' in the ABDS 2011 report; AIHW 2016b).

Source: AIHW 2016c.

About the Australian Burden of Disease Study 2011

The ABDS 2011 provides Australian-specific burden of disease estimates for the total Australian population and the Aboriginal and Torres Strait Islander population for 2011 and 2003 (AIHW 2016b). The study uses and adapts the methods of global studies to produce estimates that are more relevant to the Australian context (AIHW 2016b). See Box 3 for information on the data sources and limitations for the ABDS and the analysis presented in this report. More information on the ABDS 2011 can be found on the AIHW website <<http://www.aihw.gov.au/burden-of-disease>> (AIHW 2016e).

Box 3: Data sources and limitations

The fatal burden estimates (YLL) for musculoskeletal conditions were derived from the AIHW National Mortality Database, and are considered to be of high quality. More information on the National Mortality Database is available at <<http://www.aihw.gov.au/deaths/aihw-deaths-data>>.

Non-fatal burden estimates (YLD) for musculoskeletal conditions were derived from the Australian Bureau of Statistics (ABS) 2011–12 Australian Health Survey (ABS 2013) and the 2004–05 National Health Survey (NHS) (for 2003 estimates) (ABS 2006). Non-fatal burden estimates were derived from self-reported:

- prevalence information from the 2011–12 AHS and 2004–05 NHS and severity distributions of pain reported from the 2011–12 AHS for osteoarthritis, rheumatoid arthritis, back pain and problems, and 'other musculoskeletal conditions'. These estimates are considered to be of high quality
- prevalence information from the 2011–12 AHS and 2004–05 NHS for gout. Distribution of severity and the average number and duration of gout episodes were based on the Global Burden of Disease Study (GBD) 2010 pain method (Hoy et al. 2014) which assigned 1.4% of cases as chronic (with 12 months duration) and the remaining 98.6% of cases as acute (with an average of 3.9 episodes of 6.8 days duration). These estimates are considered to be reasonably accurate.

The risk factors included in the ABDS 2011, and the selection of diseases linked to each risk factor, are based on those in the GBD 2010 that were relevant to Australia. The prevalence of exposure to each risk factor was drawn from Australian data. A comparative risk assessment method was used to measure the relationship between a risk factor and a disease outcome, called 'attributable burden'.

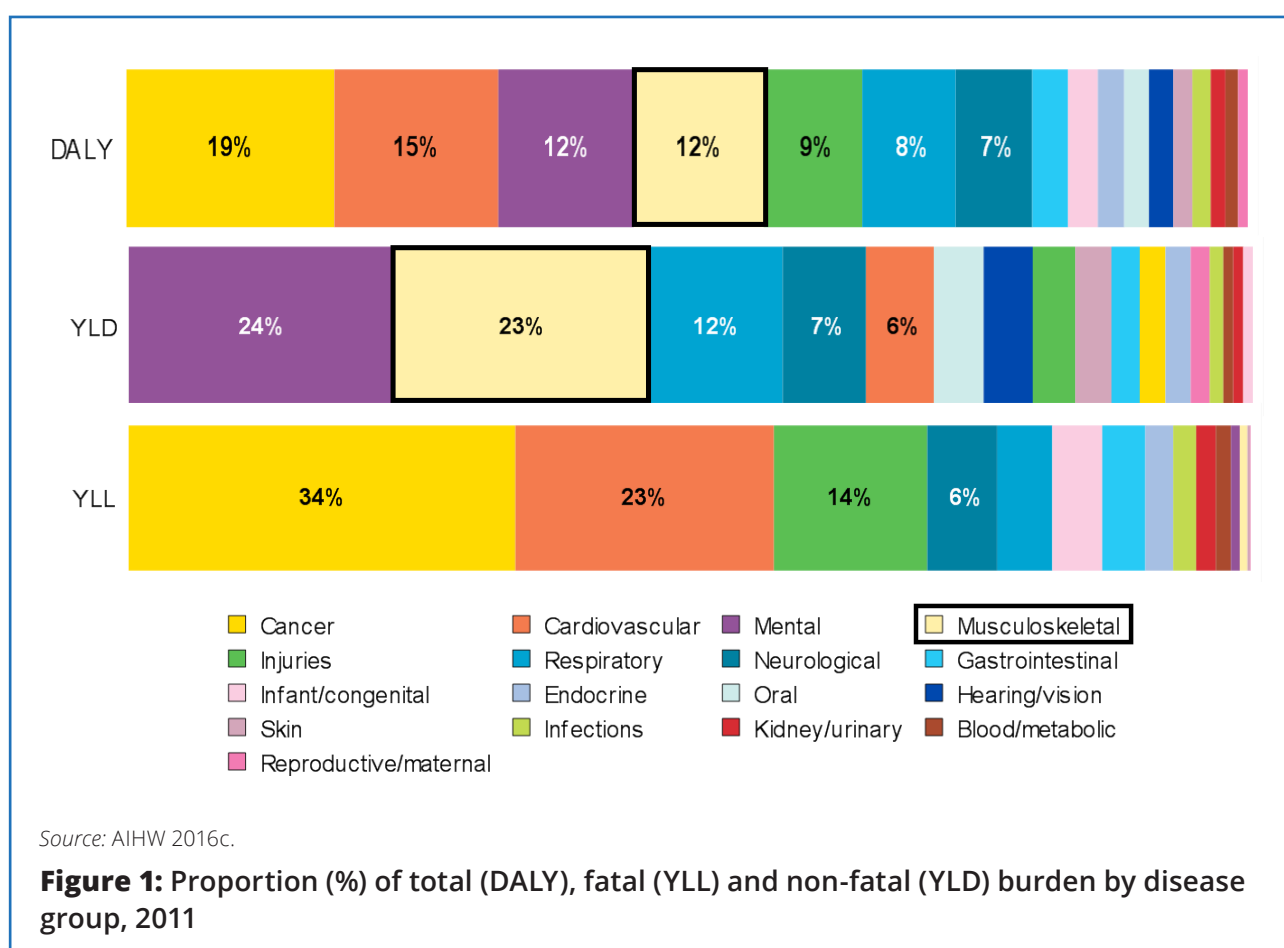
More information on the ABDS methods and data quality can be found in the report *Australian Burden of Disease Study 2011: methods and supplementary material* (AIHW 2016d), available at <<http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129557087>>.

Specific information on the quality of burden estimates can be found in Appendix B of the report *Australian Burden of Disease Study: impacts and causes of illness and death in Australia 2011* (AIHW 2016b), available at <<http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129555476>>.

Burden of musculoskeletal conditions

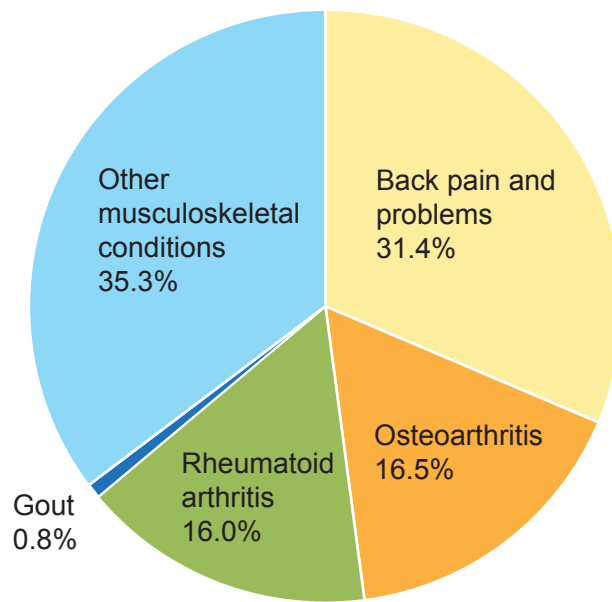
Based on the data from the ABDS 2011, musculoskeletal conditions were responsible for 12% (521,286 DALY) of the total burden of disease and injury in Australia in 2011 and were ranked as the fourth leading contributor to total burden (DALY) (Figure 1).

Musculoskeletal conditions contributed more to the non-fatal burden (YLD) than to the fatal burden (YLL). In 2011, musculoskeletal conditions accounted for 23% of the non-fatal burden (505,673 YLD), and were ranked second after mental health and substance use disorders. Musculoskeletal conditions were not a large contributor to fatal burden in Australia, accounting for less than 1% of the fatal burden (15,613 YLL).



Total burden

In 2011, the leading causes of burden due to musculoskeletal conditions were 'other musculoskeletal conditions' (35%) and back pain and problems (31%). The remaining burden was distributed across osteoarthritis (17%), rheumatoid arthritis (16%) and gout (0.8%) (Figure 2).



Source: AIHW 2016b.

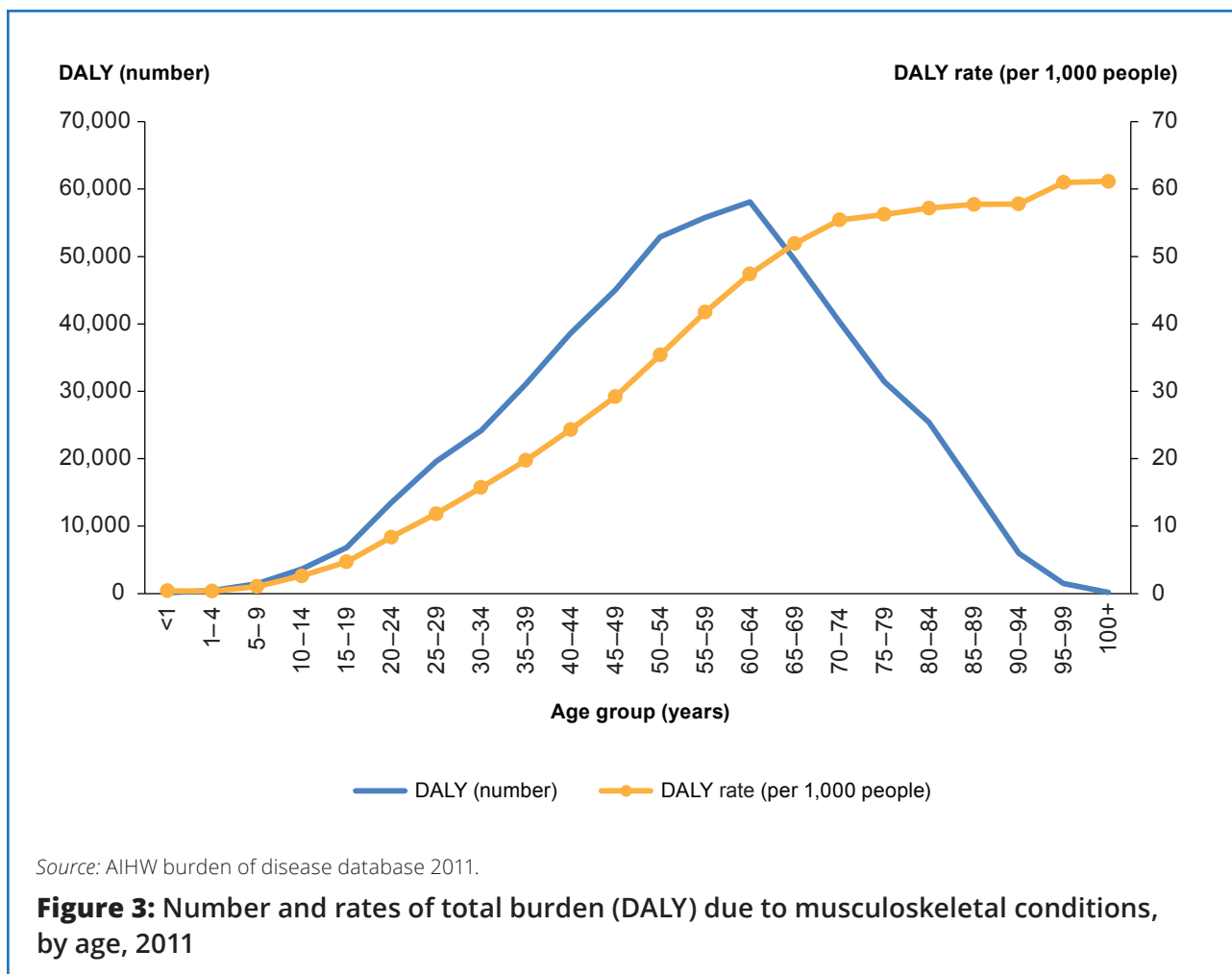
Figure 2: Musculoskeletal conditions burden (DALY), by disease, 2011

Sex

The total burden due to musculoskeletal conditions was higher among females (55%) compared with males (45%). Females experienced a greater proportion of burden than males for osteoarthritis (66% females compared with 34% males), rheumatoid arthritis (64% females; 36% males) and 'other musculoskeletal conditions' (53% females; 47% males). Males experienced a greater proportion of burden than females for gout (83% males; 17% females).

Age

In 2011, the total burden due to musculoskeletal conditions broadly reflected the age distribution of the total population, increasing with increasing age to a peak at ages 60–64 (11% of the total burden) before decreasing sharply for people aged 65 and over (Figure 3). In contrast, the age-standardised rate of total burden continued to increase from age 65 and was highest among people aged 100 and over (61 DALY per 1,000 people).



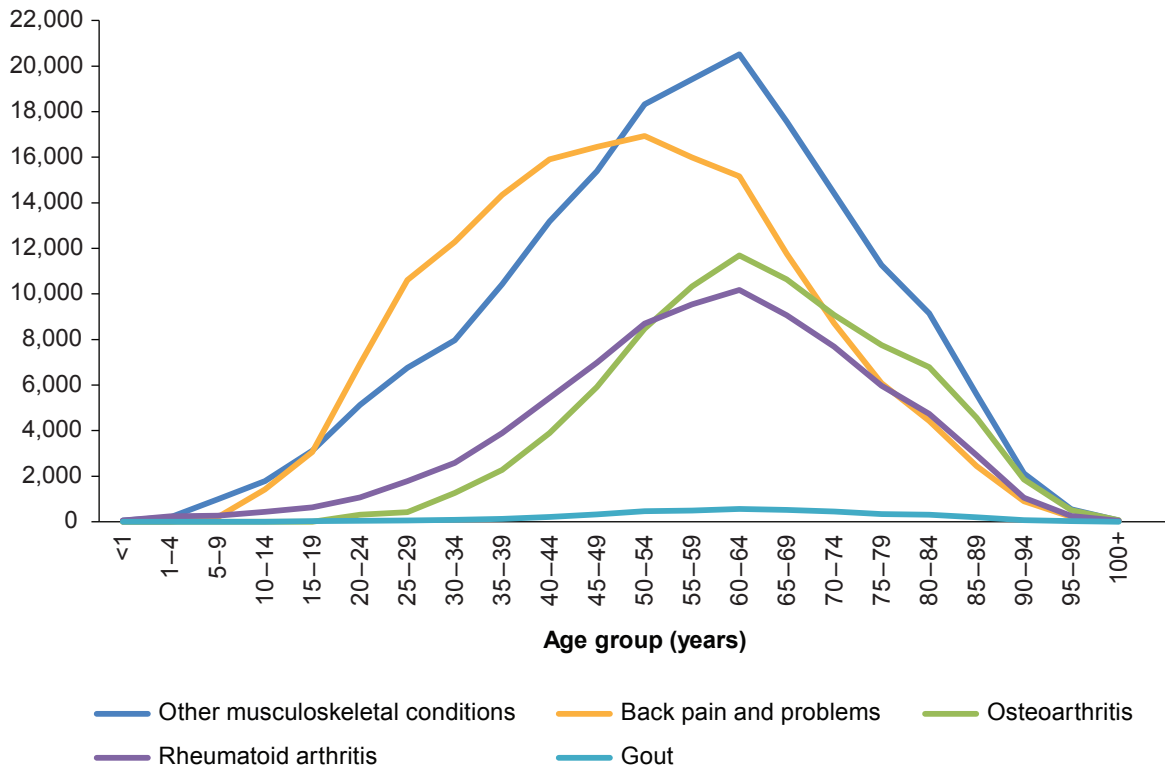
The proportion of the total burden due to musculoskeletal conditions experienced by different age groups differed by condition (Figure 4).

The age distribution of the burden due to osteoarthritis, rheumatoid arthritis, gout and 'other musculoskeletal conditions' followed a similar pattern to all musculoskeletal conditions, increasing with age to a peak at ages 60–64, before decreasing again in the older age groups. An exception to this was seen for back pain and problems, where the burden peaked at ages 50–54 (Figure 4a).

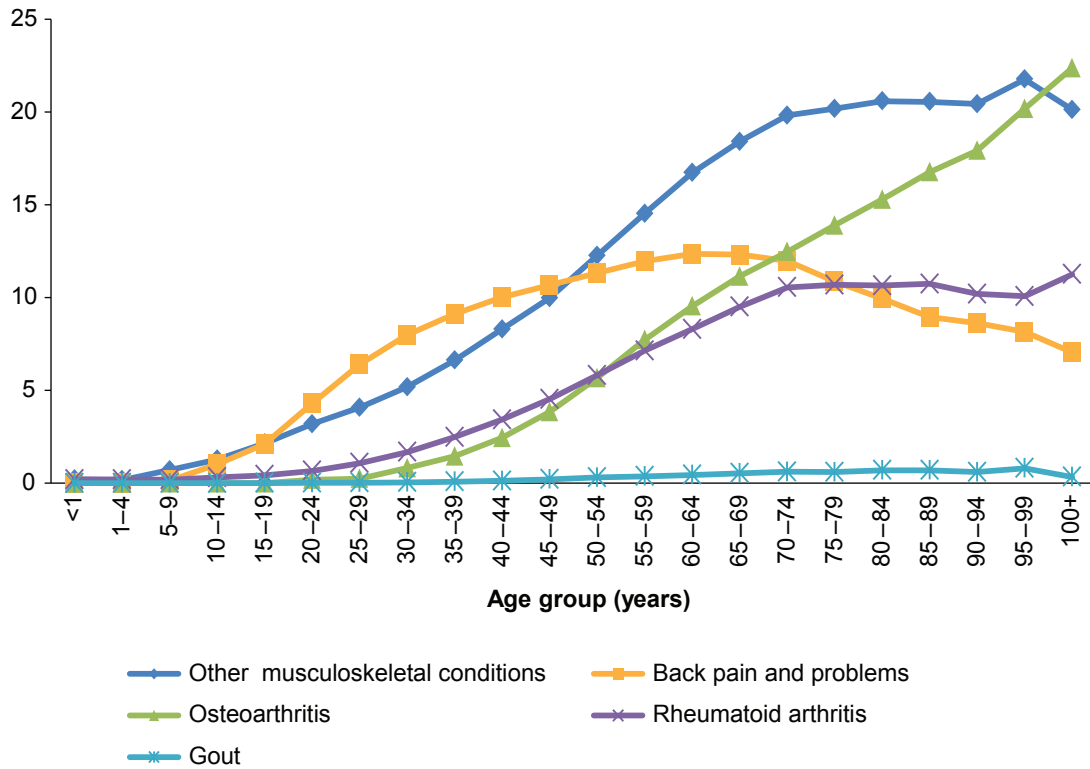
The age-specific rates for:

- osteoarthritis increased with increasing age and was highest among people aged 100 and over (22 DALY per 1,000 people)
- rheumatoid arthritis and 'other musculoskeletal conditions' increased with increasing age to 65–69, after which they generally stabilised and were highest among people aged 100 and over (11 DALY per 1,000 people) and 95–99 (22 DALY per 1,000 people), respectively
- back pain and problems increased with age up to 55–59 (12 DALY per 1,000 people), remained steady and then slowly declined
- gout increased slightly to age 65–69 and remained relative stable in the older age groups (Figure 4b).

(a) DALY (number)



(b) DALY rate (per 1,000 people)



Source: AIHW burden of disease database 2011.

Figure 4: Number (a) and rate (b) of total burden (DALY) for specific musculoskeletal conditions, by age, 2011

Fatal burden (YLL)

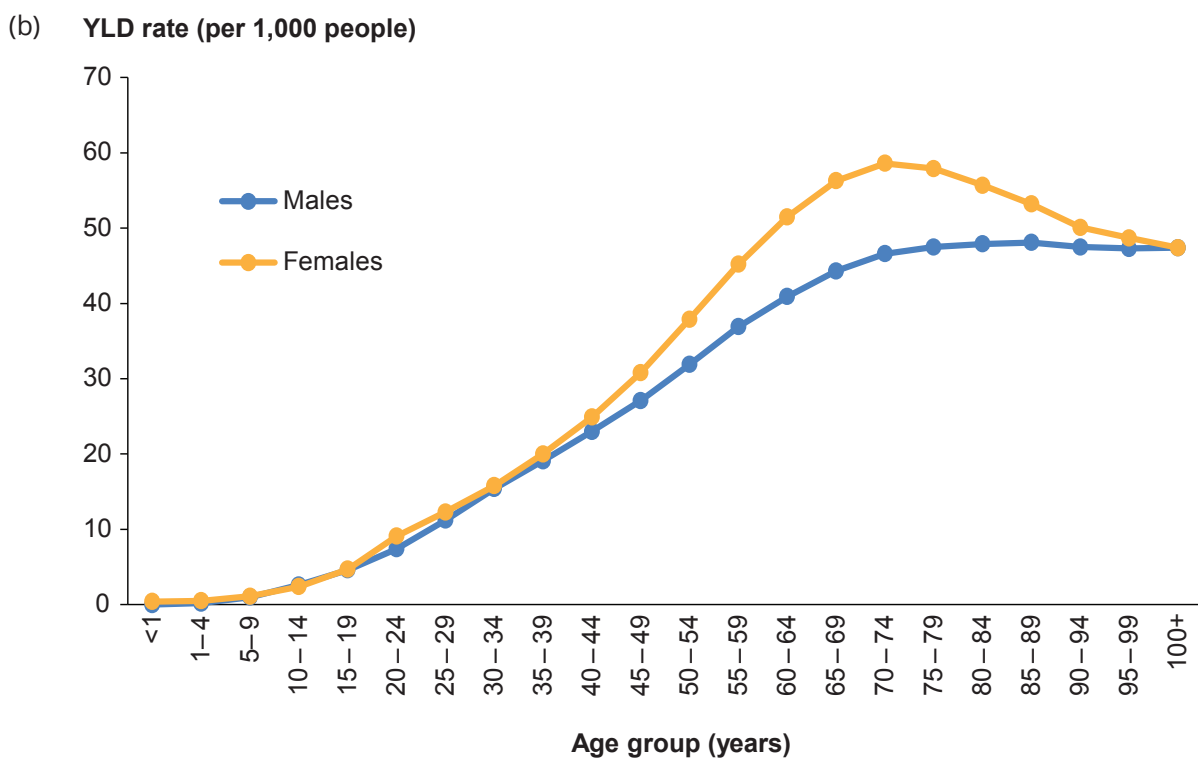
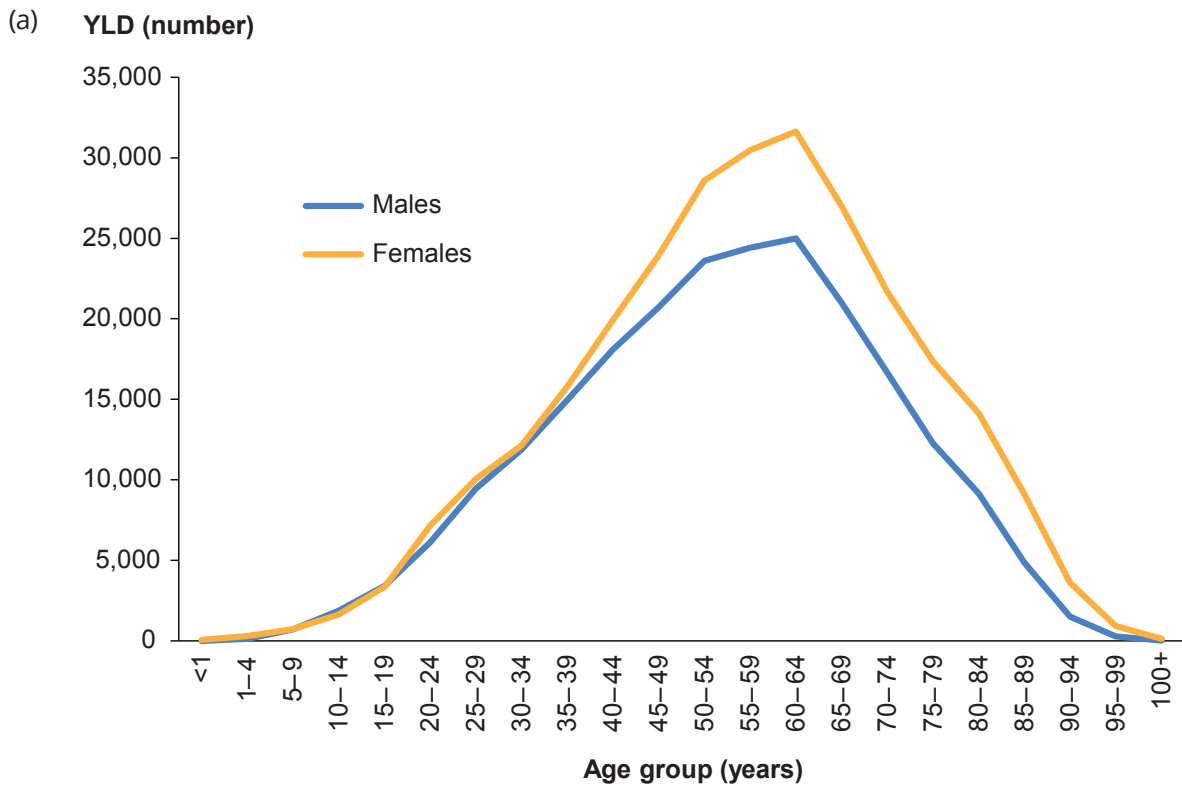
Musculoskeletal conditions were not a large contributor to fatal burden (YLL) in Australia, accounting for 0.7% of the fatal burden (15,613 YLL) in 2011. 'Other musculoskeletal conditions' contributed more than two-thirds (69%) of the fatal burden due to all musculoskeletal conditions, followed by rheumatoid arthritis (16%), back pain and problems (8.9%), osteoarthritis (4.6%), and gout (1.3%). A greater proportion of the fatal burden was experienced by females (61%) than males (39%), and by people aged 80–84 (14%) than other age groups.

Non-fatal burden (YLD)

Musculoskeletal conditions accounted for 23% of the non-fatal burden in 2011, a total of 505,673 YLD. 'Other musculoskeletal conditions' (34%) and back pain and problems (32%) each contributed around one-third of the non-fatal burden, followed by osteoarthritis (17%), rheumatoid arthritis (16%) and gout (0.8%).

A greater proportion of the non-fatal burden was experienced by females (55%) than males (45%). Females experienced more non-fatal burden than males in all age groups, with the exception of ages 10–19 where the non-fatal burden was slightly higher in males (Figure 5a).

The non-fatal burden due to musculoskeletal conditions varied by age, increasing from 1.3% among people aged 15–19 to a peak of 11% among people aged 60–64, and declining again from age 65. While the non-fatal burden due to musculoskeletal conditions decreased in absolute terms from age 65 onwards, the age-specific rate increased up to the age of 70–74 for females and 90–94 for males (Figure 5b), indicating that a substantial amount of health loss was experienced by the elderly population.



Source: AIHW burden of disease database 2011.

Figure 5: Number (a) and rate (b) of non-fatal burden (YLD) for musculoskeletal conditions, by age and sex, 2011

Sex

The contribution of specific conditions to the non-fatal burden due to musculoskeletal conditions varied by sex:

- Females experienced a higher proportion compared with males for osteoarthritis (66% females; 34% males), rheumatoid arthritis (64% females; 36% males) and 'other musculoskeletal conditions' (52% females; 48% males).
- Males experienced a much higher proportion compared with females for gout (84% males; 16% females).
- There was no difference by sex for back pain and problems (50% males; 50% females).

Age

The contribution of specific conditions to the non-fatal burden due to musculoskeletal conditions varied by age:

- People aged 45 and over experienced the majority of the non-fatal burden for 'other musculoskeletal conditions'—72% for those aged 45 and over compared with 28% for those aged 44 and under.
- People aged 64 and under experienced the majority of the non-fatal burden for osteoarthritis (52%), rheumatoid arthritis (63%) and gout (58%) compared with people aged 65 and over (48%, 37%, and 42%, respectively).
- People aged 54 and under experienced the majority of the non-fatal burden for back pain and problems (60%) compared with those aged 55 and over (40%).

Variation in non-fatal burden by severity of musculoskeletal conditions

Severity is a component of the non-fatal burden and indicates the level of health loss associated with the condition. Examining the distribution of the burden by severity provides another means of assessing the impact of musculoskeletal conditions on the population. Australian-specific severity information was available for osteoarthritis, rheumatoid arthritis, and back pain and problems. Severity levels for non-fatal burden differed by condition:

- osteoarthritis and rheumatoid arthritis cases were classified as mild, moderate or severe
- back pain and problems were classified as mild, moderate, severe or most severe.

For information on the methods used to estimate severity distributions, see *Australian Burden of Disease Study 2011: methods and supplementary material* (AIHW 2016e).

The non-fatal burden of osteoarthritis was mostly due to severe osteoarthritis (40%) and moderate osteoarthritis (38%) (Table 1). Similarly, non-fatal burden of rheumatoid arthritis was mostly due to moderate rheumatoid arthritis (38%) and severe rheumatoid arthritis (34%).

For back pain and problems, severe cases contributed the most (41%) to the non-fatal burden, moderate cases contributed over one-quarter (28%), mild cases contributed 22% and most severe cases contributed 9% (Table 1).

There was no difference in the severity levels of osteoarthritis, rheumatoid arthritis or back pain and problems between males and females.

Table 1: Non-fatal burden (YLD) of selected musculoskeletal conditions, by severity of the condition, 2011

Severity	Osteoarthritis		Rheumatoid arthritis		Back pain and problems	
	Number	%	Number	%	Number	%
Mild	19,103	22.5	23,008	28.4	36,329	22.4
Moderate	32,378	38.1	30,443	37.6	44,834	27.6
Severe	33,606	39.5	27,586	34.0	66,925	41.2
Most severe	14,305	8.8
Total	85,088	100.0	81,036	100.0	162,393	100.0

.. Not applicable.

Note: Columns may not add to the total due to rounding.

Changes in burden from 2003 to 2011

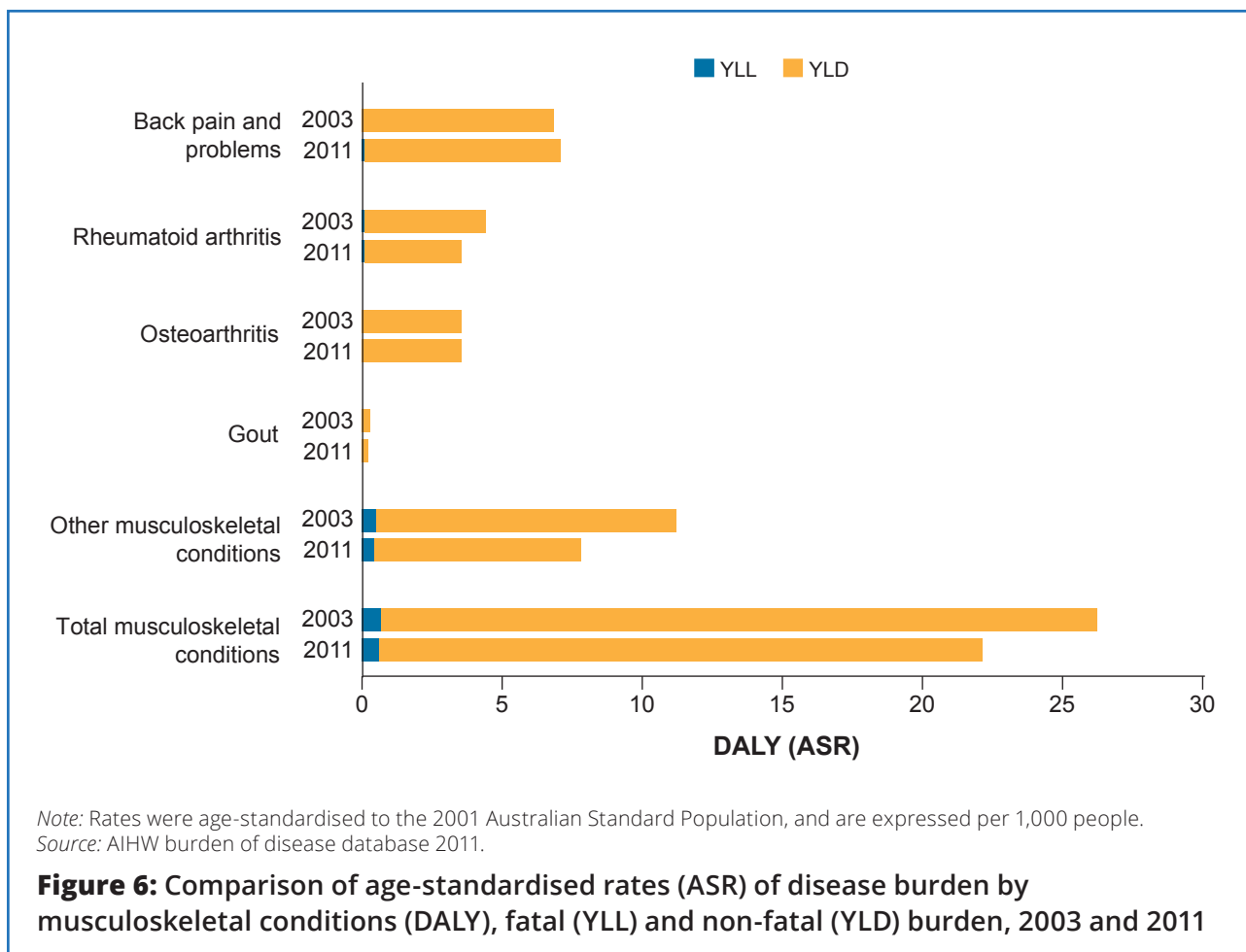
After accounting for population increase and ageing, there was a 15% reduction in the total burden due to musculoskeletal conditions between 2003 and 2011, from 26 to 22 DALY per 1,000 people (Figure 6). This reduction was due to a 15% decrease in non-fatal burden (YLD), with the age-standardised rate reducing from 26 to 22 per 1,000 people. Fatal burden (YLL) had a small decrease from 0.7 per 1,000 people in 2003 to 0.6 per 1,000 people in 2011.

Between 2003 and 2011:

- The total burden for 'other musculoskeletal conditions' decreased from 10.8 to 7.8 DALY per 1,000 and non-fatal burden (YLD) decreased from 10.7 to 7.4 YLD per 1,000 people. This decrease in non-fatal burden was due to a decrease in prevalence for this group of conditions.
- The total burden for rheumatoid arthritis decreased from 4.4 to 3.5 DALY per 1,000 people and the non-fatal burden decreased from 4.3 to 3.4 YLD per 1,000. This decrease in non-fatal burden was due to a decrease in prevalence. There was no change in the fatal burden, with a rate of 0.1 per 1,000 in both 2003 and 2011.
- The total burden for gout decreased from 0.3 to 0.2 DALY per 1,000.

In contrast, the total burden due to back pain and problems increased slightly from 6.8 to 7.1 DALY per 1,000 and the non-fatal burden increased from 6.8 to 7.0 YLD per 1,000.

There was no change in the DALY rate for osteoarthritis (3.5 DALY per 1,000 in both years).



Variation across geographic and population groups

Burden of disease analysis provides a good way of examining inequalities in population health. This section presents the burden (total, fatal and non-fatal) due to musculoskeletal conditions, presented as comparative rates of burden, for 4 broad geographic and population groups:

- state and territory
- remoteness area
- socioeconomic group
- Aboriginal and Torres Strait Islander status.

State and territory

In 2011, the age-standardised rate of total burden (DALY), fatal burden (YLL) and non-fatal burden (YLD) due to musculoskeletal conditions did not vary greatly by state and territory, with around 22 DALY per 1,000 people, 21 YLD per 1,000 people and 0.7 YLL per 1,000 people.

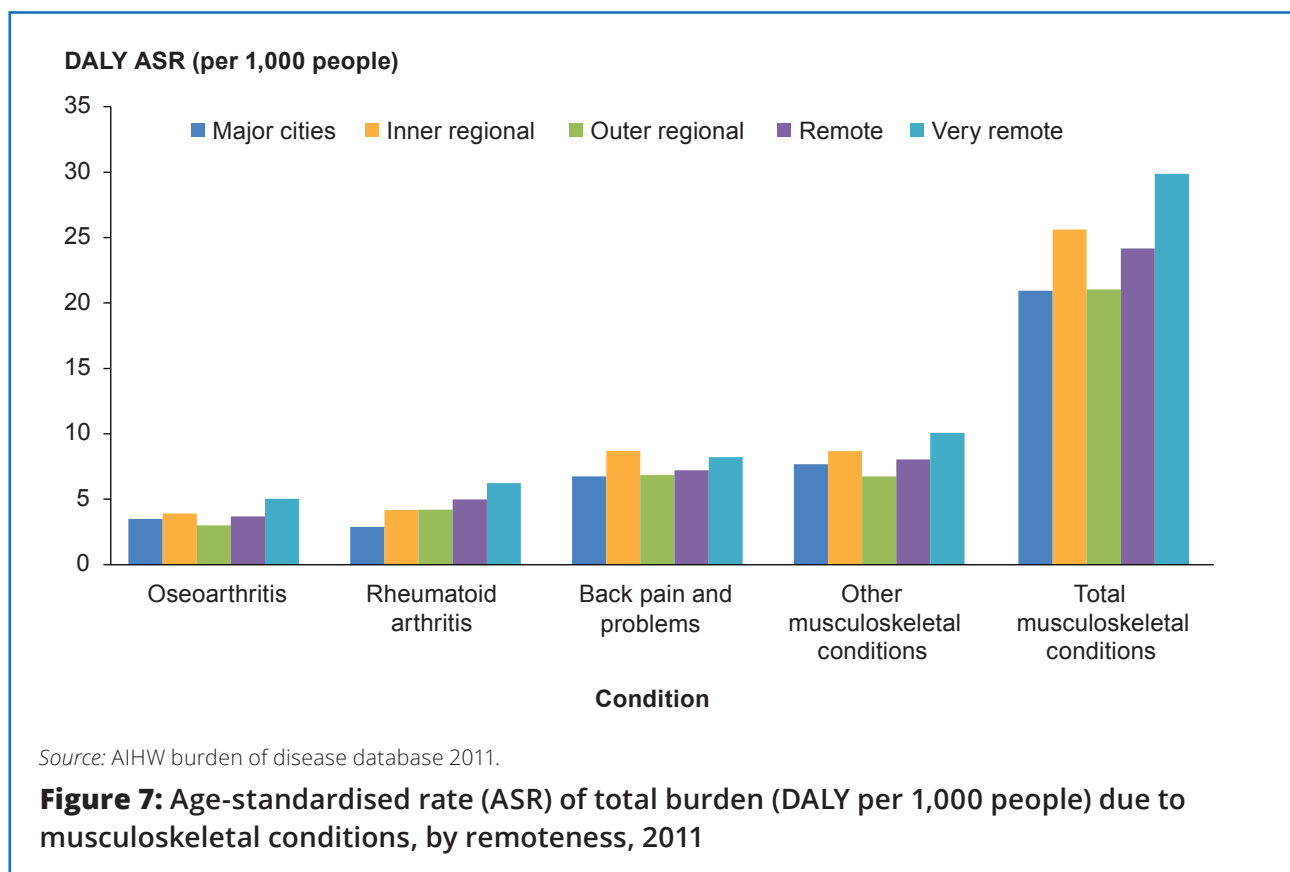
The exception was for Tasmania, where musculoskeletal burden rates were higher compared with other jurisdictions, and higher compared with the national rate. The rate of total burden due to musculoskeletal conditions (26 DALY per 1,000 people) in Tasmania was 1.2 times as high as the national rate (22 per 1,000 people). This was attributed to the higher rates of burden due to rheumatoid arthritis (5.7 per 1,000 people) and 'other musculoskeletal conditions' (9.8 per 1,000 people) in Tasmania, which were 1.6 and 1.3 times the national rate, respectively.

Remoteness area

The rate of total burden due to all musculoskeletal conditions was highest in *Very remote* areas (30 DALY per 1,000 people), followed by *Inner regional* areas (26 per 1,000) and lowest in *Major cities* and *Outer regional* areas (both 21 per 1,000).

The highest rates of total burden due to 'other musculoskeletal conditions' (10 DALY per 1,000 people), rheumatoid arthritis (6.2 per 1,000) and osteoarthritis (5.0 per 1,000) were seen in *Very remote* areas, while the highest rate of total burden due to back pain and problems was seen in *Inner regional* areas (8.7 DALY per 1,000 people) (Figure 7).

The lowest rate of total burden due to rheumatoid arthritis was seen in *Major cities* (2.9 DALY per 1,000 people), while for osteoarthritis (3.0 per 1,000) and 'other musculoskeletal conditions' (6.7 per 1,000) the lowest rate was seen in *Outer regional* areas. Similar to all musculoskeletal conditions, the lowest rates of back pain and problems were in *Major cities* and *Outer regional* areas (6.8 and 6.9 DALY per 1,000 people, respectively) (Figure 7).



Fatal burden

For all musculoskeletal conditions, the rate of fatal burden was highest in *Remote* and *Very remote* areas (1.0 and 0.8 YLL per 1,000 people, respectively) and lowest in *Major cities* (0.6 per 1,000).

Non-fatal burden

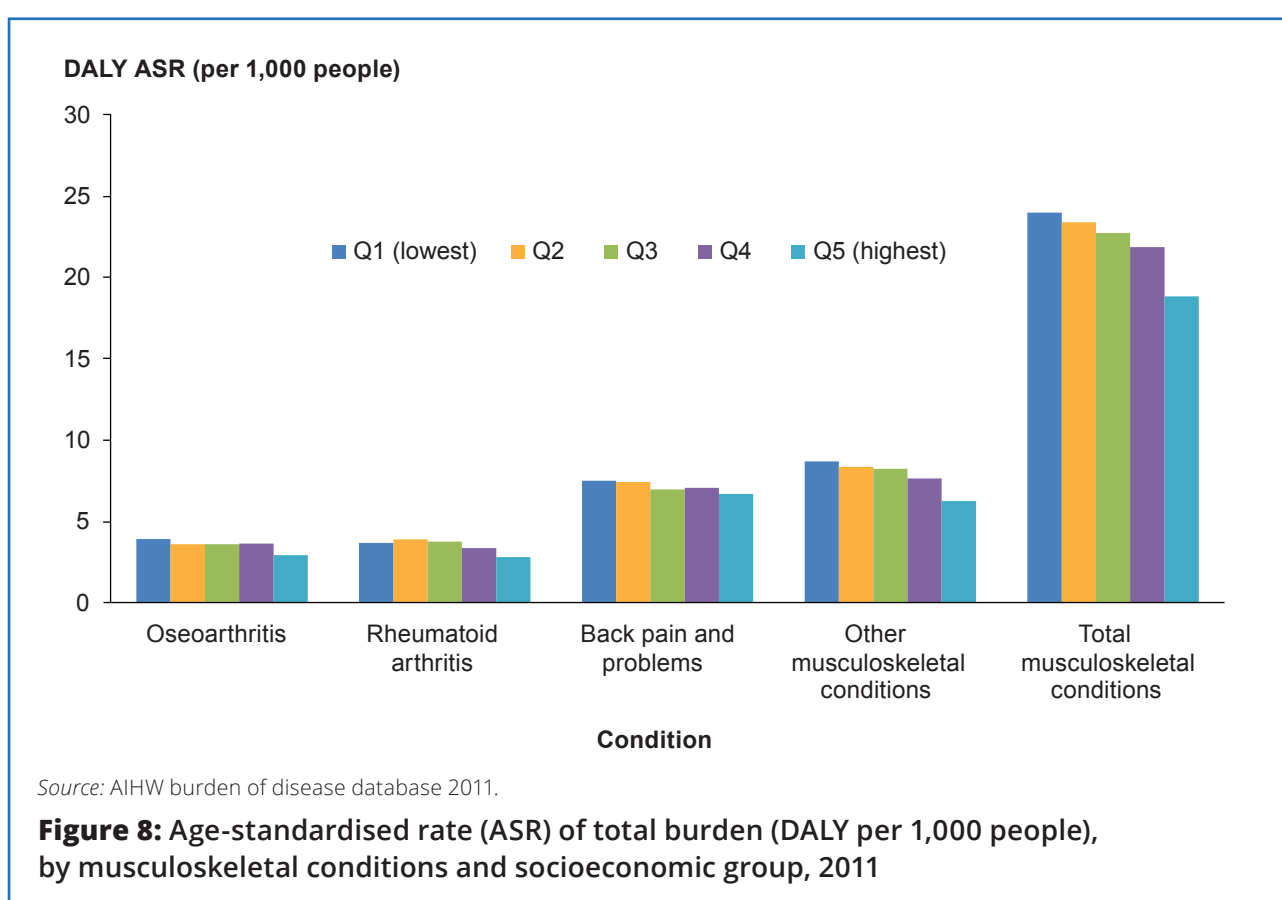
For all musculoskeletal conditions, the rate of non-fatal burden (YLD) increased with increasing remoteness, and was lowest in *Major cities* (20 YLD per 1,000 people) and highest in *Very remote* areas (29 per 1,000).

Socioeconomic group

Socioeconomic groups in this report are based on an index of relative socioeconomic disadvantage defined by the area in which a person lives. The population is divided into 5 equally sized socioeconomic groups (quintiles). Quintile 1 (Q1) represents the 20% of the population with the lowest socioeconomic characteristics. The level of socioeconomic position increases with each quintile, through to the 20% of the population with the highest socioeconomic characteristics (Q5).

The rate of total burden due to all musculoskeletal conditions followed a general gradient of increasing burden with decreasing socioeconomic status, and was highest in the lowest socioeconomic group (24 DALY per 1,000 people) and lowest in the highest socioeconomic group (19 DALY per 1,000 people) (Figure 8).

The socioeconomic gradient was present for 'other musculoskeletal conditions' and present but less pronounced for back pain and problems, osteoarthritis and rheumatoid arthritis (Figure 8).



Fatal burden

The rate of fatal burden (YLL) due to all musculoskeletal conditions followed a socioeconomic gradient of increasing burden with decreasing socioeconomic position. The rate of fatal burden was highest in the lowest socioeconomic group (0.9 YLL per 1,000 people) and lowest in the highest socioeconomic group (0.4 YLL per 1,000 people).

'Other musculoskeletal conditions' were the leading cause of fatal burden across all socioeconomic groups, with the highest rate in the lowest socioeconomic group (0.6 YLL per 1,000 people).

Non-fatal burden

The rate of non-fatal burden (YLD) due to all musculoskeletal conditions also decreased with increasing socioeconomic position. The rate was highest in the lowest socioeconomic group (23 YLD per 1,000 people) and lowest in the highest socioeconomic group (18 YLD per 1,000 people).

'Other musculoskeletal conditions' were the leading cause of non-fatal burden in all socioeconomic groups, followed by back pain and problems.

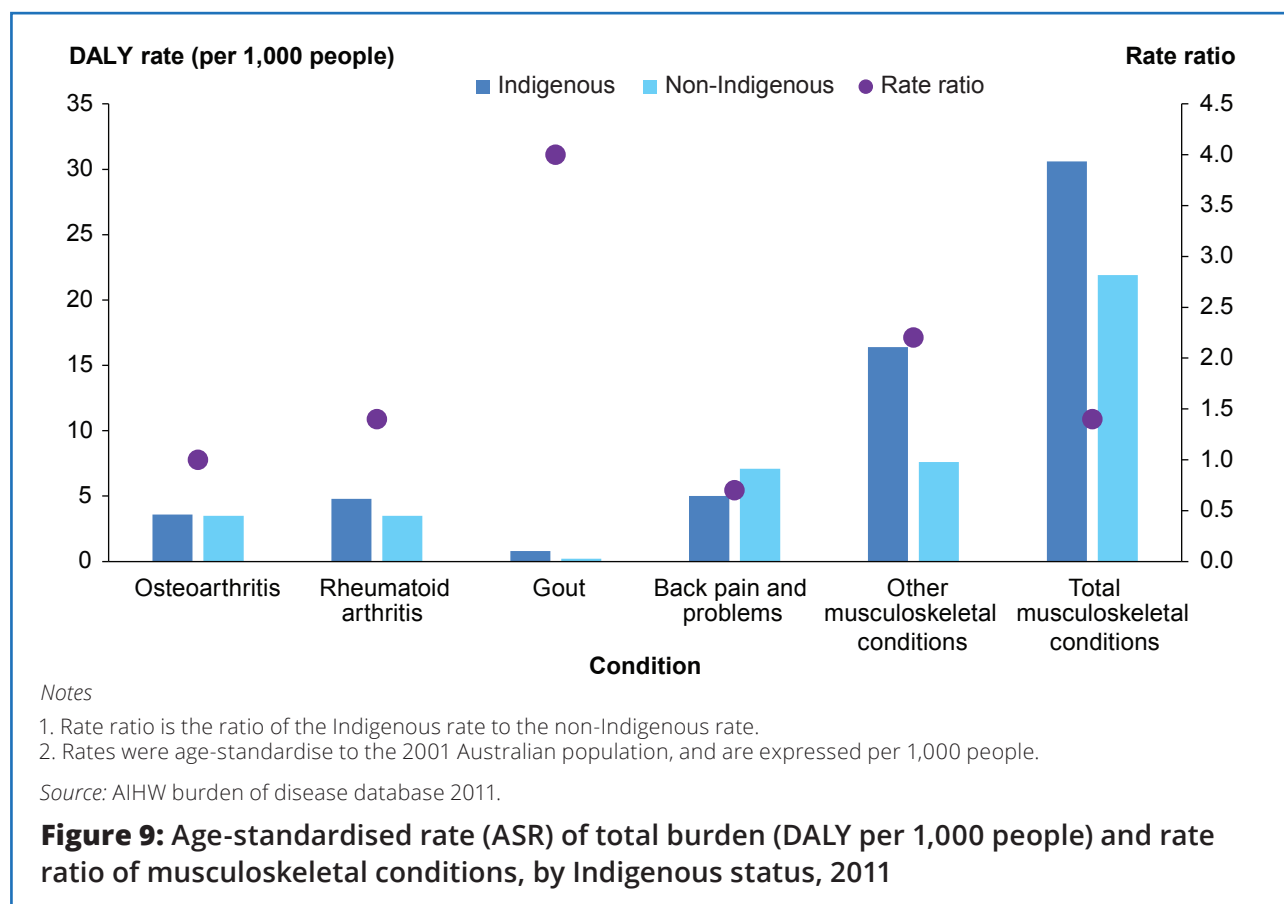
Aboriginal and Torres Strait Islander status

In 2011, the rate of total burden due to musculoskeletal conditions was 1.4 times higher for Aboriginal and Torres Strait Islander Australians (31 DALY per 1,000 people) compared with non-Indigenous Australians (22 DALY per 1,000 people) (Figure 9).

Compared with non-Indigenous Australians, the rate of total burden among Indigenous Australians was:

- 4.0 times as high for gout (0.8 DALY per 1,000 people for Indigenous Australians compared with 0.2 DALY per 1,000 for non-Indigenous Australians)
- 2.2 times as high for 'other musculoskeletal conditions' (16.4 DALY per 1,000 people compared with 7.6 DALY per 1,000)
- 1.4 times as high for rheumatoid arthritis (4.8 DALY per 1,000 people compared with 3.5 DALY per 1,000) (Figure 9).

In contrast, the rate of burden due to back pain and problems was 30% lower for Indigenous Australians (5.0 DALY per 1,000 people) compared with non-Indigenous Australians (7.1 DALY per 1,000 people). The rate of total burden due to osteoarthritis was the same for both Indigenous and non-Indigenous Australians (Figure 9).



Fatal burden

For all musculoskeletal conditions, the rate of fatal burden (YLL) was 2.7 times higher for Indigenous Australians (1.6 YLL per 1,000 people) than for non-Indigenous Australians (0.6 YLL per 1,000 people). Compared with non-Indigenous Australians, the rate of fatal burden among Indigenous Australians was:

- 3.5 times higher for 'other musculoskeletal conditions' (1.4 YLL per 1,000 people for Indigenous Australians compared with 0.4 YLL per 1,000 for non-Indigenous Australians)
- 2.3 times higher for osteoarthritis (0.1 YLL per 1,000 people compared with less than 0.1 YLL per 1,000).

Non-fatal burden

For all musculoskeletal conditions, the rate of non-fatal burden (YLD) was 1.4 times higher for Indigenous Australians (29 YLD per 1,000 people) than for non-Indigenous Australians (21 YLD per 1,000 people). Compared with non-Indigenous Australians, the rate of non-fatal burden among Indigenous Australians was:

- 4.0 times as high for gout (0.8 YLD per 1,000 people for Indigenous Australians compared with 0.2 YLD per 1,000 for non-Indigenous Australians)
- 2.1 times as high for 'other musculoskeletal conditions' (15.1 YLD per 1,000 people compared with 7.2 YLD per 1,000)
- 1.4 times higher for rheumatoid arthritis (4.7 YLD per 1,000 people compared with 3.4 per 1,000).

Proportion of burden attributable to modifiable risk factors

The contribution of selected risk factors to the burden due to musculoskeletal conditions (referred to as attributable burden) is described below. Attributable burden is the amount of burden that could be reduced if exposure to the risk factor had been avoided. The results presented here are based on the ABDS 2011 analysis of the attributable burden related to 2 risk factors associated with musculoskeletal conditions: overweight and obesity (also referred to as 'high body mass') and occupational exposures and hazards. The estimates for overweight and obesity have been updated based on recent extension analyses undertaken by the AIHW to include burden in people aged under 25 and revised diseases linked to overweight or obesity based on the latest evidence (AIHW 2017). The ABDS 2011 was dependent on the quality and completeness of available data to determine the proportion of the burden of musculoskeletal conditions that was attributable to specific risk factors. While other risk factors are known to be associated with musculoskeletal conditions, the risk factors for musculoskeletal conditions in the ABDS 2011 were limited to those included in the GBD 2010 and reflect the strength of the evidence in the research literature. For information on the methods and data sources, see *Australian Burden of Disease Study 2011: method and supplementary material* (AIHW 2016d).

The study showed that in 2011:

- overweight and obesity contributed to 10% of the total burden due to all musculoskeletal conditions, 45% of the burden of osteoarthritis, 39% for gout and 7.5% for back pain and problems
- occupational exposures and hazards contributed to 5.4% of the total burden due to all musculoskeletal conditions, and 17% of the burden due to back pain and problems (Table 2).

Risk factor estimates were not available for rheumatoid arthritis or 'other musculoskeletal conditions'.

Table 2: Proportion (%) of burden attributable to risk factors, for selected musculoskeletal conditions, 2011

Conditions	Overweight and obesity	Occupational exposures and hazards ^(a)
Osteoarthritis	44.6	..
Gout	38.5	..
Back pain and problems	7.5	17.2
Total musculoskeletal conditions	10.0	5.4
All diseases	7.0	2.0

.. Not applicable: the risk factor is not associated with the musculoskeletal condition.

(a) Occupations were broadly grouped as: administrative and managerial work; clerical and related work; agricultural, animal husbandry, forestry, fishers and hunters; production and related work; transport equipment operators and labourers; professional, technical and related work; sales work; and service work. Exposure from working in these occupations was used to estimate the proportion of burden attributable in people aged 15–64, and no severity distribution was applied.

Note: Risk factor estimates cannot be added together due to the complex pathways and interactions between them.

Sources: ABDS 2016d; 2017.

Conclusion

The primary aim of this report was to build on available information and provide detailed analysis of the disease burden of musculoskeletal conditions in Australia using data from the ABDS 2011.

Previous analysis has shown that musculoskeletal conditions were the fourth leading contributor to total burden and that back pain and problems, osteoarthritis and rheumatoid arthritis made the greatest contribution to that burden (AIHW 2016b). Those analyses also showed that females experienced more than half of the burden due to all musculoskeletal conditions combined, and closer to two-thirds of the burden due to osteoarthritis, while males experienced the majority of the burden due to gout.

This report extends those previous analyses and shows that the burden due to musculoskeletal conditions is generally decreasing over time (although not for all conditions), varied by condition severity and by population group, and that some burden can be attributable to modifiable risk factors.

Between 2003 and 2011, there was a decrease in the total burden due to all musculoskeletal conditions combined, driven by large reductions in 'other musculoskeletal conditions' and rheumatoid arthritis and a smaller reduction in gout. In contrast, there was a slight increase in the total burden due to back pain and problems.

The burden due to musculoskeletal conditions varied by geographic and population groups, with the rate of total burden higher among people living in Tasmania, *Very remote* areas, areas of the lowest socioeconomic group, and among Aboriginal and Torres Strait Islander people.

A large proportion of the burden of osteoarthritis and gout was attributed to overweight and obesity, suggesting that a reduction in the prevalence of this risk factor may also reduce the level of burden associated with specific musculoskeletal conditions.

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This report presents findings from the Australian Burden of Disease Study 2011 on the burden of musculoskeletal conditions in Australia. Musculoskeletal conditions were the fourth leading contributor to total burden of disease in Australia, with back pain and problems, osteoarthritis and rheumatoid arthritis being the greatest contributors to the musculoskeletal burden. The burden due to musculoskeletal conditions generally decreased over time, varied by condition severity and by population group, and some of the burden was attributed to modifiable risk factors such as overweight and obesity.

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