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The burden of chronic respiratory conditions in Australia

A detailed analysis
of the Australian
Burden of Disease
Study 2011



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ISSN 2204-4108 (PDF)

ISSN 2006-4508 (Print)

ISBN 978-1-76054-152-1 (PDF)

ISBN 978-1-76054-153-8 (Print)

Suggested citation

Australian Institute of Health and Welfare 2017. The burden of chronic respiratory conditions in Australia: a detailed analysis of the Australian Burden of Disease Study 2011. Australian Burden of Disease Study series no. 14. BOD 15. Canberra: AIHW.

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Published by the Australian Institute of Health and Welfare.

Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.



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Acknowledgments

This report was prepared by Dale Gruber and Naila Rahman, with input from Mardi Ellis and Claire Sparke, of the Population Health and Primary Care Unit at the Australian Institute of Health and Welfare (AIHW). Valuable analytical contributions were made by Wendy Ho, Melanie Dunford and Vanessa Prescott of the Burden of Disease and Mortality Unit at the AIHW.

The report was reviewed by Michelle Gourley, Lynelle Moon, Andrew Kettle and Geoff Neideck of the AIHW, by the Australian Centre for Airways disease Monitoring (ACAM) at the Woolcock Institute of Medical Research, University of Sydney, and by members of the National Asthma and Other Chronic Respiratory Conditions Monitoring Advisory Group, chaired by Professor Christine Jenkins.

This report was funded by the Australian Government Department of Health.



Abbreviations

ABDS	Australian Burden of Disease Study
ABS	Australian Bureau of Statistics
ASR	age-standardised rate
AIHW	Australian Institute of Health and Welfare
BEACH	Bettering the Evaluation and Care of Health
BOLD	Burden of Obstructive Lung Disease
COPD	chronic obstructive pulmonary disease
DALY	disability-adjusted life years
GBD	Global Burden of Disease Study
NHMD	National Hospital Morbidity Database
NMD	National Mortality Database
YLD	years lived with disability
YLL	years of life lost

Symbols

..	not applicable
<	less than
+	and over

Summary

Chronic respiratory conditions, such as chronic obstructive pulmonary disease (COPD) and asthma, 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 of chronic respiratory conditions by age, sex and population groups using data from the Australian Burden of Disease Study (ABDS) 2011.

Respiratory conditions as a group contributed 8% of the total burden of disease and injury in Australia in 2011, a total of 374,985 disability-adjusted life years (DALY), and were ranked as the sixth leading contributor to total burden after cancer, cardiovascular diseases, mental and substance use disorders, musculoskeletal conditions and injuries. Nearly three-quarters (70%) of the burden of respiratory conditions was due to non-fatal burden.

The total burden of respiratory conditions was similar for males and females, was highest in older Australians aged 70–74, and decreased over time from 17 DALY per 1,000 people in 2003 to 16 DALY per 1,000 people in 2011.

The burden of respiratory conditions varied by condition and disease severity

COPD contributed the highest percentage (43%) of the total burden of all respiratory conditions, followed by asthma (29%) and upper respiratory conditions (20%). Sarcoidosis, pneumoconiosis, interstitial lung disease and other respiratory diseases accounted for the remaining 8% of the burden.

The non-fatal burden of COPD was mostly due to moderate COPD (48%) and severe COPD (42%). Uncontrolled asthma contributed two-thirds (66%) of the non-fatal burden due to asthma.

Population groups experienced different levels of respiratory burden

In 2011, the rate of total burden of respiratory conditions:

- was similar across most states and territories, although was 1.6 times as high in the Northern Territory compared with the national rate
- generally increased with increasing remoteness, with the highest rates of burden among people living in *Very remote* areas and the lowest among those living in *Major cities*
- generally increased with increasing socioeconomic disadvantage, with the highest rates of burden among people living in areas of the lowest socioeconomic group and the lowest among people in the highest socioeconomic group
- was 2.5 times as high among Aboriginal and Torres Strait Islander people compared with non-Indigenous Australians.

Some of the burden can be attributed to modifiable risk factors

In 2011, three-quarters (75%) of the COPD burden, and more than one-third (36%) of the total burden for all respiratory conditions, was attributed to tobacco use. Occupational exposures and hazards, and air pollution also contributed to the burden of respiratory conditions, but to a lesser extent at 4.4% and 0.1%, respectively.

Introduction

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

Respiratory conditions affect the lungs, the airways and other associated tissues. These conditions can be long lasting (chronic) or short term (acute) and can cause ill health, disability and death. This report focuses on chronic obstructive pulmonary disease (COPD), asthma and upper respiratory conditions, as these conditions account for most of the burden of respiratory conditions. Other respiratory conditions included in this report are interstitial lung disease, pneumoconiosis, sarcoidosis (with lung involvement) and other respiratory diseases (including bronchiectasis). See Box 1 for descriptions of these conditions. The analysis presented in this report excludes acute respiratory infections, influenza, pneumonia and nasal skin infections.

Box 1: Descriptions of respiratory conditions in this report

asthma: A long-term disorder of the airways. People with asthma experience episodes of wheezing, breathlessness and chest tightness due to widespread narrowing of the airways. In many, but not all, people with asthma, the disease can be well controlled with treatment.

chronic obstructive pulmonary disease (COPD): COPD is a general term for diseases in which airflow is limited. This often leads to shortness of breath. It is not fully reversible even with treatment. COPD develops over many years and therefore mainly affects middle-aged and older people. In the past, these conditions were referred to by a variety of names including 'emphysema' and 'chronic bronchitis'.

upper respiratory conditions: Chronic conditions of the upper respiratory tract, mainly allergic rhinitis (commonly known as hay fever) and sinusitis.

interstitial lung disease: A group of long-term, and usually progressive, diseases of the lungs that more commonly affect older people, are associated with shortness of breath and are poorly responsive to treatment.

pneumoconiosis: A special form of interstitial lung disease caused by inhalation of dusts. Pneumoconiosis is usually considered an occupational lung disease, and includes asbestosis, silicosis and coal workers' pneumoconiosis (also known as black lung disease) (ALA 2016).

sarcoidosis: A condition in which small nodules or 'sarcoid granulomas' appear in the body's tissues (LFA 2016). Sarcoidosis can involve any organ in the body; however, in this report, it refers only to sarcoidosis with lung involvement.

other respiratory diseases: Includes various conditions such as bronchiectasis (abnormal and irreversible widening of air passages in the lungs) and respiratory disease due to inhalation of chemicals, gases, fumes and vapours.

Note: It should be noted that having a history of asthma is a major risk factor for being diagnosed with COPD. It can be difficult to distinguish COPD from asthma because the symptoms of both conditions can be similar. This is called asthma-COPD overlap (also called asthma-COPD overlap syndrome, or ACOS). Asthma-COPD overlap affects around 15%–20% of people with a diagnosis of either condition (Bateman et al. 2015).

Overview of chronic respiratory conditions in Australia

Chronic respiratory conditions affect an estimated 7.1 million Australians (ABS 2015). The development of COPD occurs over many years and therefore mainly affects middle-aged and older people, while asthma affects people of all ages. In 2014–15, based on self-reported data, an estimated 2.5 million Australians had asthma and 600,000 had COPD (ABS 2015). Allergic rhinitis is 1 of the most common chronic respiratory conditions, affecting an estimated 4.5 million Australians in 2014–15 (ABS 2015).

Respiratory conditions are some of the most commonly managed problems in general practice. Data from the Bettering the Evaluation and Care of Health (BEACH) survey of general practitioners suggest that asthma and COPD are among the most frequently managed chronic problems in general practice (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, asthma was managed at 20 in 1,000 general practice encounters and COPD was managed at 9 in 1,000 general practice encounters (Britt et al. 2016).

In 2014–15, based on data from the Australian Institute of Health and Welfare (AIHW) National Hospital Morbidity Database (NHMD) asthma was the principal diagnosis for 39,502 hospitalisations, equating to a hospitalisation rate of 171 per 100,000 population. The asthma hospitalisation rate was markedly higher among children aged 0–14 (451 per 100,000 population) than among people aged 15 and over (98 per 100,000 population). COPD was the principal diagnosis for 66,540 hospitalisations for people aged 45 and over, equating to a hospitalisation rate of 690 per 100,000 population in this age group.

In 2015, chronic lower respiratory diseases (mainly COPD) were the fifth leading cause of death in Australia (ABS 2016). Data from the AIHW National Mortality Database (NMD) show that COPD was the underlying cause of 7,025 deaths in 2014 (25 per 100,000 population). In 2014, asthma was the underlying cause of 419 deaths in Australia, which corresponds to a mortality rate of 2 per 100,000 population.

More information on chronic respiratory conditions in Australia can be found on the AIHW website <<http://www.aihw.gov.au/chronic-respiratory-conditions>> (AIHW 2016f).

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, severity and duration of disease (AIHW 2016b). The contribution of various modifiable risk factors to disease burden can also be estimated (AIHW 2016b). 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 (referred to as 'high body mass' in the ABDS 2011 report; AIHW 2016a).

Source: AIHW 2016b.

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 methods for the ABDS 2011 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 methods

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

Non-fatal burden (YLD) estimates for respiratory conditions were derived from a variety of data sources using information on prevalence and severity of these conditions in Australia. The prevalence of:

- asthma and upper respiratory conditions was derived from self-reported data from the Australian Health Survey (AHS) 2011–12 (ABS 2013) and the Australian Aboriginal Torres Strait Islander Health Survey (AATSIHS) 2012–13 (ABS 2014). These estimates are considered to be reasonably accurate. Severity distribution was based on an Australian cross-sectional web-based survey (Reddel 2015)
- COPD was based on measured data from the Australian arm of the Burden of Obstructive Lung Disease (BOLD) study (Toelle et al. 2013). This study collected data from 6 locations around Australia in people aged 40 and over which are considered to be more accurate than self-reported data
- sarcoidosis, interstitial lung disease and pneumoconiosis cannot be reliably estimated in population health surveys, as these conditions are rare. Instead, prevalence estimates for moderate and severe cases were derived from the NMD and NHMD. These data sets are considered to be of very high quality; however, as these data sources only captured moderate/severe cases, transformations were required to fill gaps due to low data specificity. Prevalence of mild and asymptomatic cases of these diseases were derived by extrapolating estimates for moderate and severe disease based on severity distributions used in the Global Burden of Disease Study (GBD) 2013
- other respiratory diseases was derived from the ratio of hospitalisations for other respiratory diseases relative to hospitalisations from the identified respiratory diseases, applied to the combined prevalence of the identified respiratory diseases. This assumes a similar hospitalisation rate for other respiratory conditions and the identified conditions. Substantial transformations were required to fill data gaps. Due to the low data and method ratings, the estimates must be interpreted with caution.

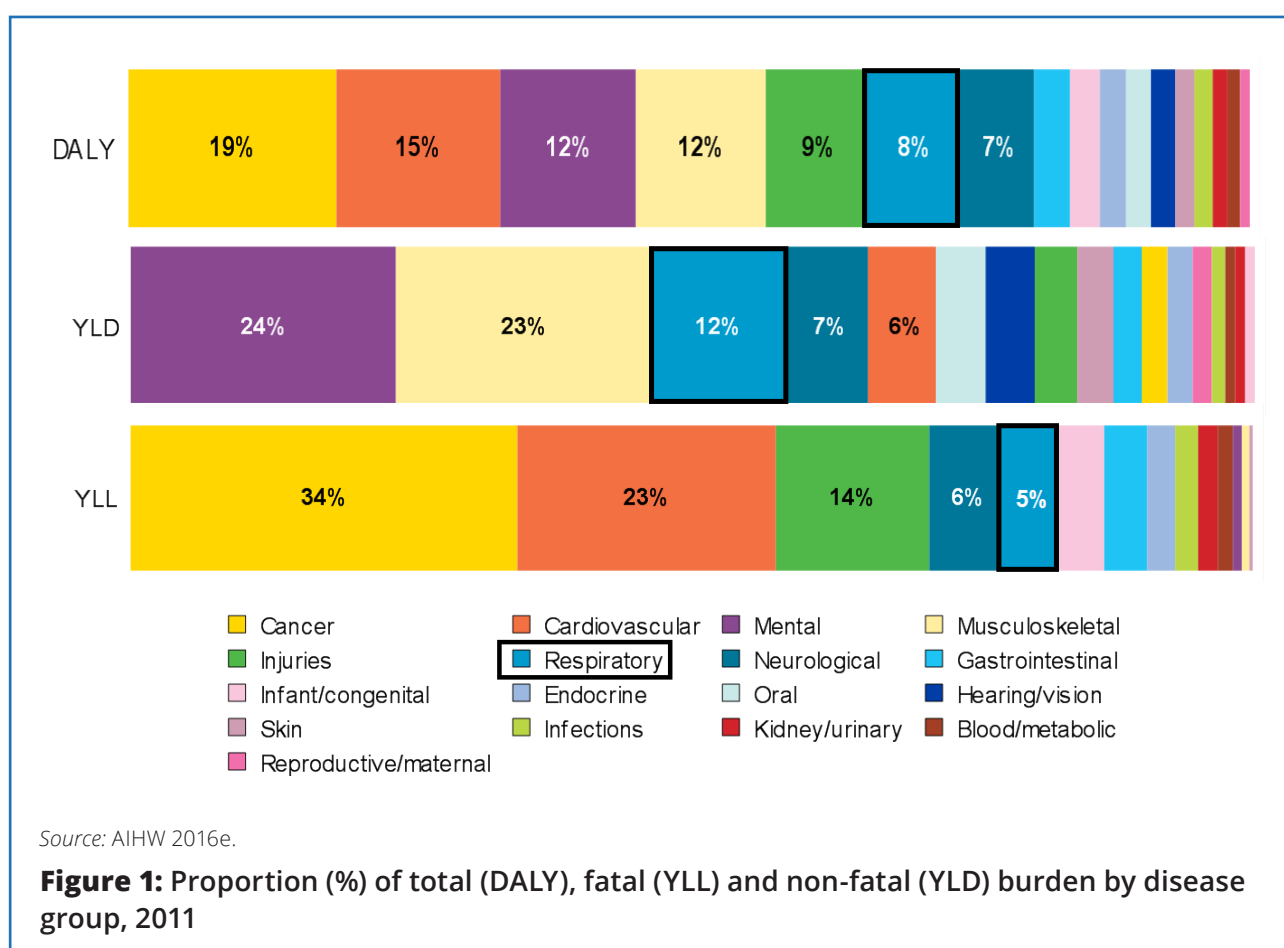
The risk factors included, the selection of diseases linked to each risk factor, and the estimates of effect size in the ABDS 2011 are based on those in the GBD 2010 that were relevant to Australia. The estimates of effect size are a statistical measure of the strength of the relationship between 2 variables, in this context, between a risk exposure and a disease outcome, expressed as a relative risk. 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 2016c), 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 2016a) available at <<http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129555476>>.

Burden of respiratory conditions

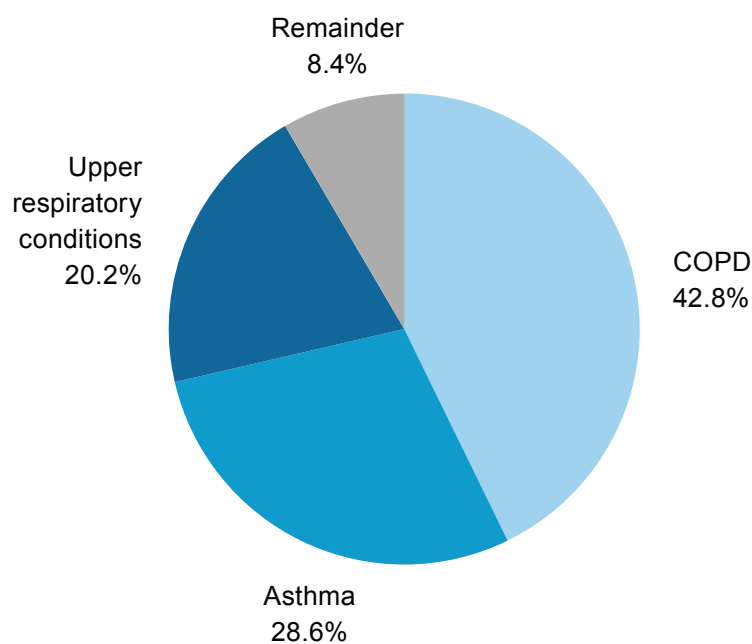
Based on data from the ABDS 2011, respiratory conditions accounted for 8% (374,985 DALY) of the total burden of disease and injury in Australia in 2011, and ranked as the sixth leading contributor to total burden. The total rate of DALY for respiratory conditions was 16.0 per 1,000 people.

Respiratory conditions contributed more to the non-fatal burden (YLD) than to the fatal burden (YLL) (Figure 1). In 2011, respiratory conditions accounted for 12% of the non-fatal burden (263,603 YLD) and were ranked third after mental and substance use disorders and musculoskeletal conditions. They accounted for 5% of the fatal burden (111,382 YLL) and were ranked fifth after cancer, cardiovascular diseases, injuries and neurological conditions.



Total burden

In 2011, more than two-fifths (43%, 160,346 DALY) of the total burden of respiratory conditions was attributed to COPD, followed by asthma (29%, 107,313 DALY) and upper respiratory conditions (20%, 75,674 DALY) (Figure 2). The remaining 8% was contributed by the less common respiratory conditions, including sarcoidosis, pneumoconiosis, interstitial lung disease and other respiratory diseases.



Source: AIHW 2016a.

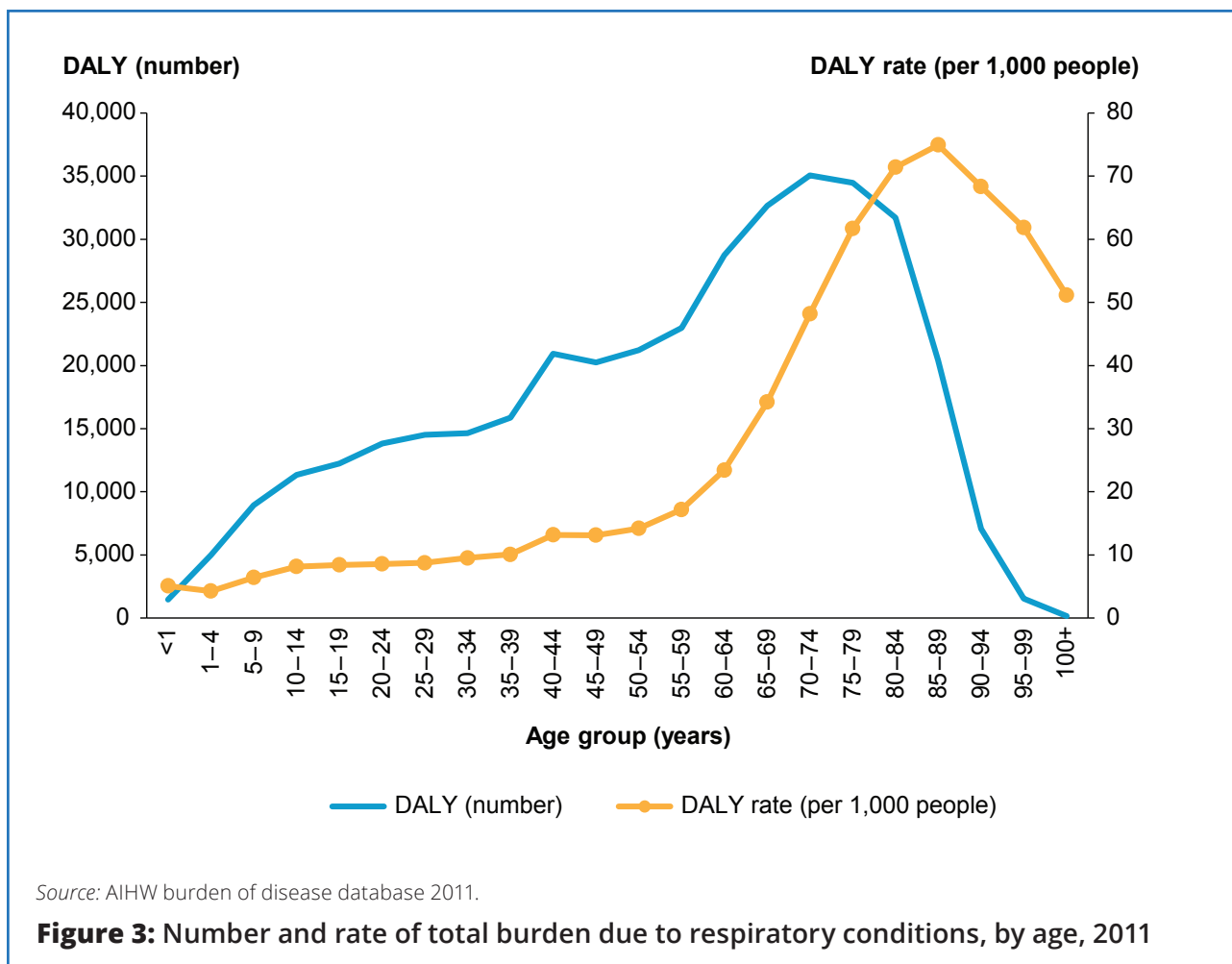
Figure 2: Respiratory conditions burden (DALY) by condition, 2011

Sex

The total burden of respiratory conditions was similar among females (51%) and males (49%). Females experienced a greater percent of the burden than males for asthma (54% females compared with 46% males) and upper respiratory conditions (52% females; 48% males). Males experienced a greater percent of burden than females for pneumoconiosis (96% males; 4% females), sarcoidosis (64% males; 36% females) and interstitial lung disease (61% males; 39% females). The burden of COPD was very similar for males and females, as was the burden for other respiratory diseases.

Age

In 2011, the total burden of respiratory conditions broadly reflected the age distribution of the total population, increasing with increasing age to a peak at ages 70–74 (with 9.4% of the total burden in this age group) before decreasing sharply from ages 80–84 as the size of the population also decreased (Figure 3). The age-specific rate of burden also generally increased with age, peaking at ages 85–89 (75 DALY per 1,000 people), then decreasing in the older age groups.

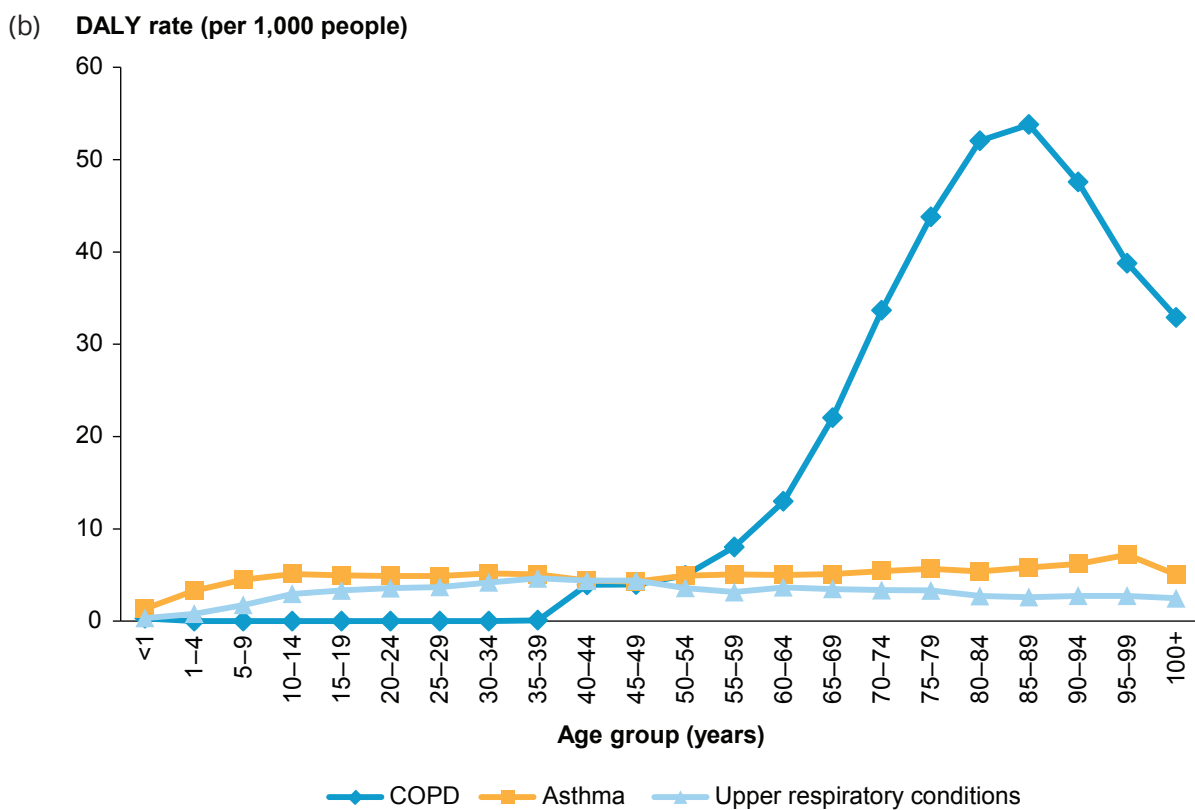
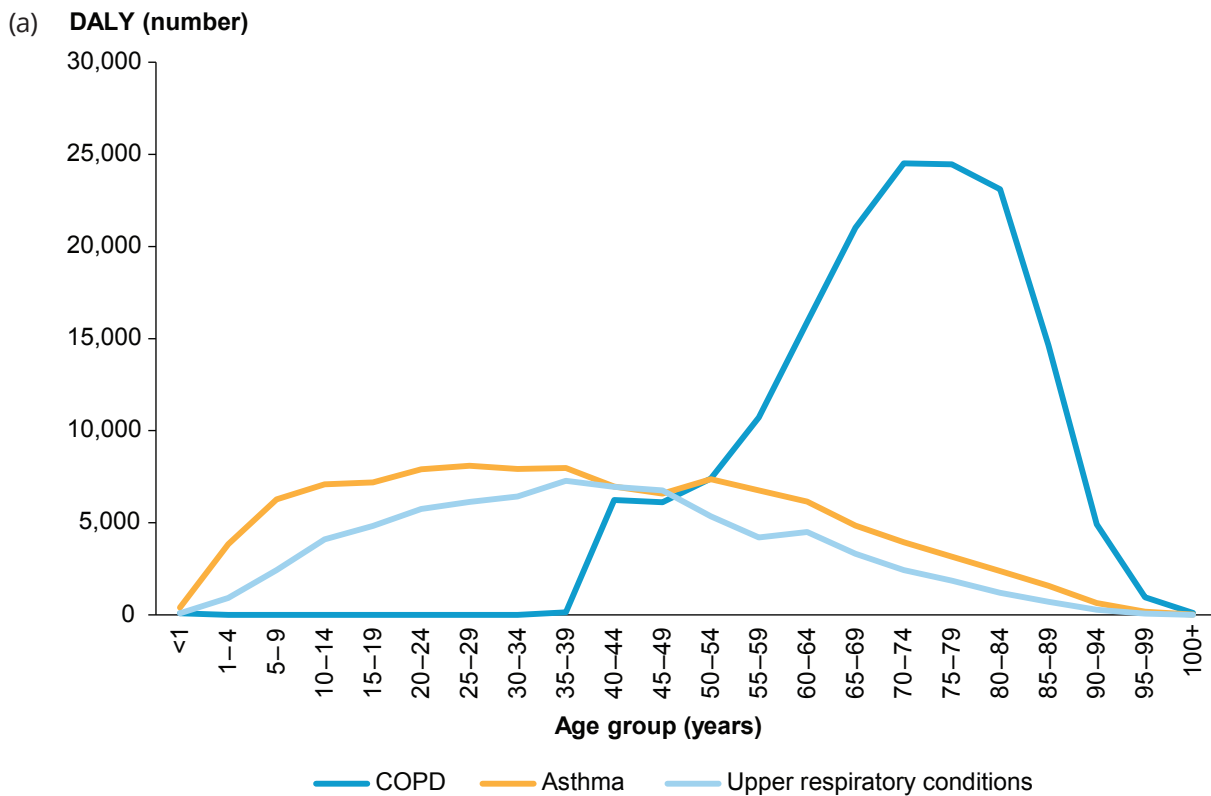


The burden due to respiratory conditions experienced by different age groups varied by condition (figures 4 and 5). The more prevalent and higher burden conditions of COPD, asthma and upper respiratory conditions are shown in Figure 4, and the remaining conditions of interstitial lung disease, pneumoconiosis, sarcoidosis and other respiratory diseases are shown in Figure 5. As noted in Box 3, COPD estimates were based on data collected for adults aged 40 and over.

The age distribution of the burden of COPD followed a similar pattern to all respiratory conditions combined, increasing from ages 40–44 to peak at ages 70–74, before decreasing again in the older age groups (Figure 4). The rate of burden of COPD rose sharply from ages 55–59, peaking at ages 85–89, before decreasing in the older age groups. COPD was among the top 5 causes of burden in people aged 65 and over, being the second leading cause of burden in males aged 75–84 years (AIHW 2016a).

Unlike COPD, the burden from asthma and upper respiratory conditions was more evenly distributed by age (Figure 4). The rate of burden for asthma increased to around ages 5–9 after which it remained relatively stable at between 5 and 7 DALY per 1,000 people. Asthma was the leading cause of burden in males and the second leading cause of burden in females aged 5–14 years (AIHW 2016a).

It should be noted that having a history of asthma is a major risk factor for being diagnosed with COPD. Many people with asthma also have features consistent with COPD—this is often called asthma-COPD overlap. Due to this overlap, it can be difficult to make an accurate diagnosis of these conditions among people in middle and older ages.



Source: AIHW burden of disease database 2011.

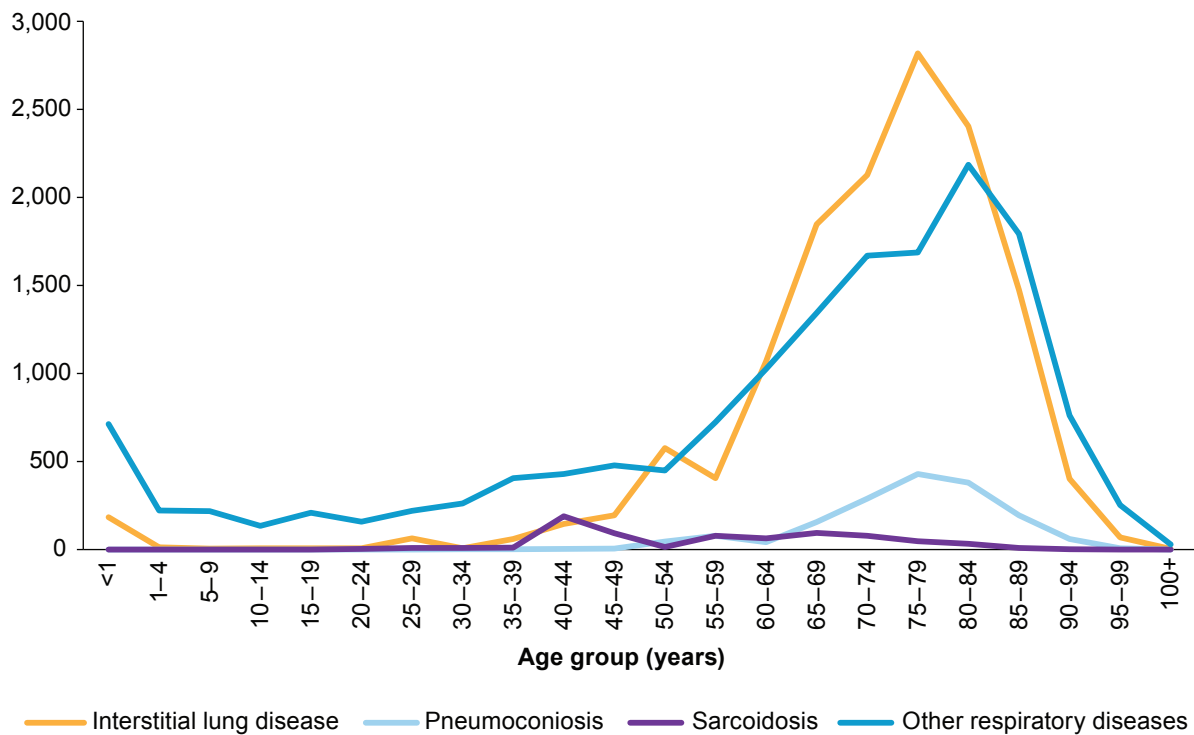
Figure 4: Number (a) and rate (b) of total burden due to COPD, asthma and upper respiratory conditions, by age, 2011



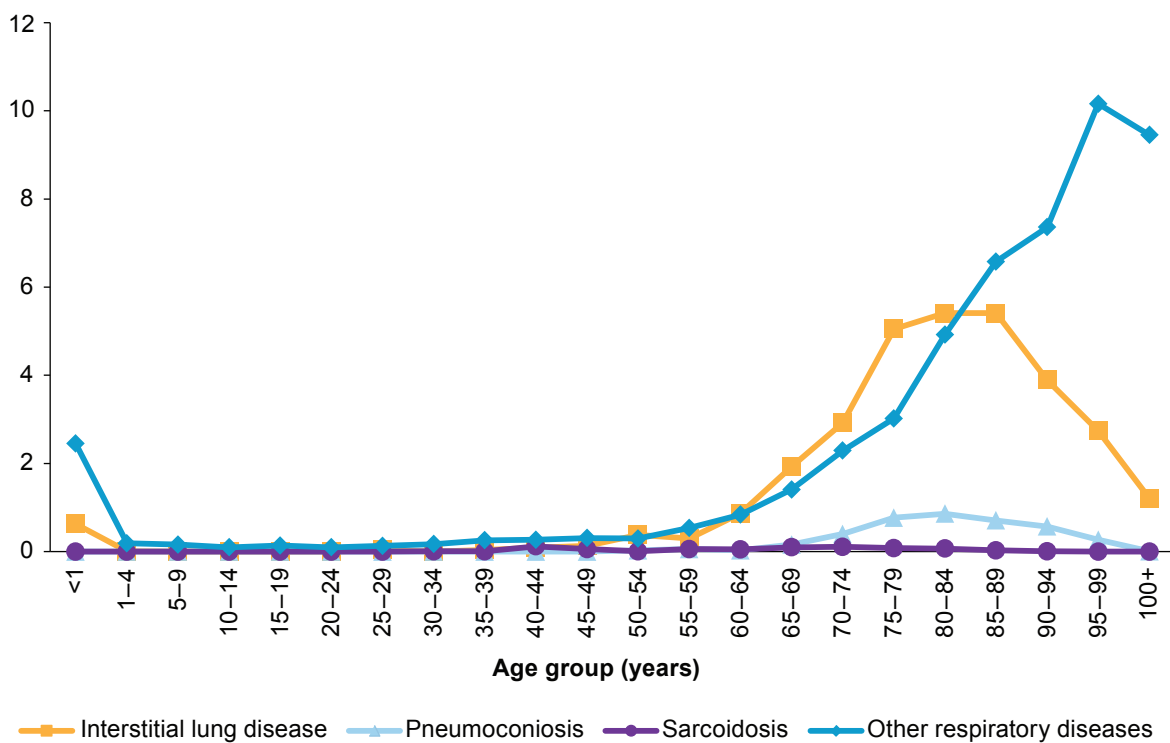
For the 4 conditions with the lowest total burden (interstitial lung disease, pneumoconiosis, sarcoidosis and other respiratory diseases):

- the burden from interstitial lung disease, other respiratory diseases and pneumoconiosis occurred mostly in the older age groups, peaking between ages 75 and 84
- the burden from other respiratory diseases was relatively high among infants aged under 1 year, with that age group experiencing 4.6% of the total burden
- the rate of burden for other respiratory diseases increased sharply from ages 60–64 to ages 95–99
- the rate of burden for interstitial lung disease increased sharply from ages 60–64, before decreasing from age 85
- the highest percent of burden from sarcoidosis was experienced by people aged 40–44 (26%) (Figure 5).

(a) DALY (number)



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



Source: AIHW burden of disease database 2011.

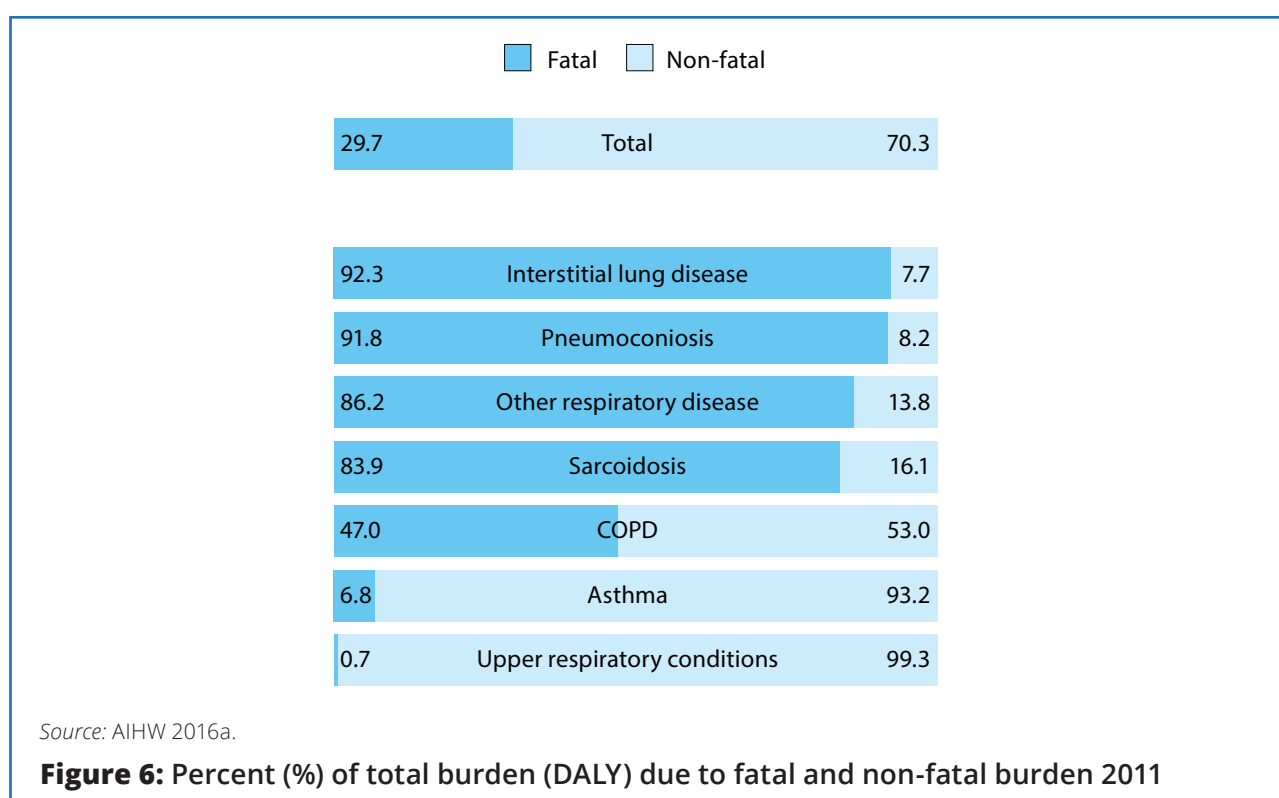
Figure 5: Number (a) and rate (b) of total burden due to pneumoconiosis, interstitial lung disease, sarcoidosis and other respiratory diseases, by age, 2011

Differences by fatal and non-fatal burden

While the burden of respiratory conditions overall was mostly non-fatal (70%), at the condition level, there are clear differences in the distribution of fatal and non-fatal burden:

- more than 90% of the burden for interstitial lung disease and pneumoconiosis, and more than 80% of the burden for other respiratory diseases and sarcoidosis, was fatal burden
- just under half (47%) of the burden for COPD was fatal burden
- less than 7% of the burden for asthma, and less than 1% of the burden for upper respiratory conditions, was fatal burden (Figure 6).

For more information on the sources and the quality of data used to estimate the fatal and non-fatal burden of specific respiratory conditions in the ABDS 2011, refer to Box 3.

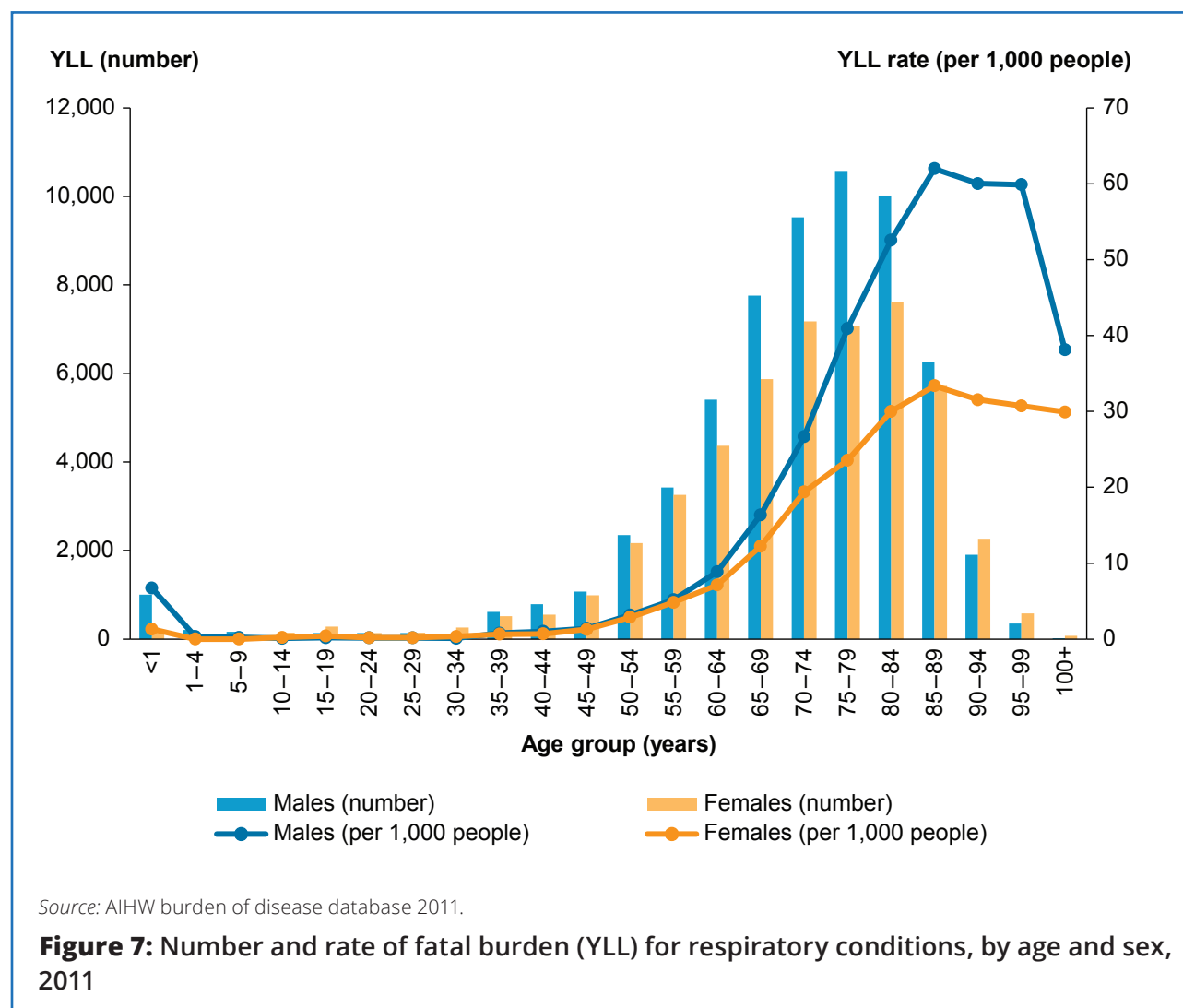


Fatal burden (YLL)

Respiratory conditions accounted for 5% of the overall fatal burden of disease and injury in Australia in 2011 (AIHW 2016a). COPD was the main contributor to the fatal burden for respiratory conditions, accounting for more than two-thirds (68%), followed by other respiratory diseases (12%), interstitial lung disease (11%) and asthma (7%). The fatal burden for respiratory conditions was experienced more by males (56%) than females (44%), and by people aged 30–79 (66%).

Males experienced more fatal burden from respiratory conditions than females in almost all age groups, and the difference was most notable among infants aged under 1 year, where males in this age group experienced around 4 times the burden compared with females (Figure 7). The exceptions were those aged 10–34 and aged 90 and over, in which the fatal burden was higher among females. Males also experienced a higher rate of fatal burden due to respiratory conditions in the under 1 age group and from ages 60–64 and over, with the highest rate in males aged 85–89 at 62 YLL per 1,000 people. The 85–89 age group also had the highest rate in females at 33 YLL per 1,000 people.

The percent of fatal burden for respiratory conditions generally increased with age from 0.3% among people aged 30–34 to a peak of 16% among people aged 75–79, and then declined from age 80.



The contribution of specific conditions to the fatal burden of respiratory conditions varied by age and sex:

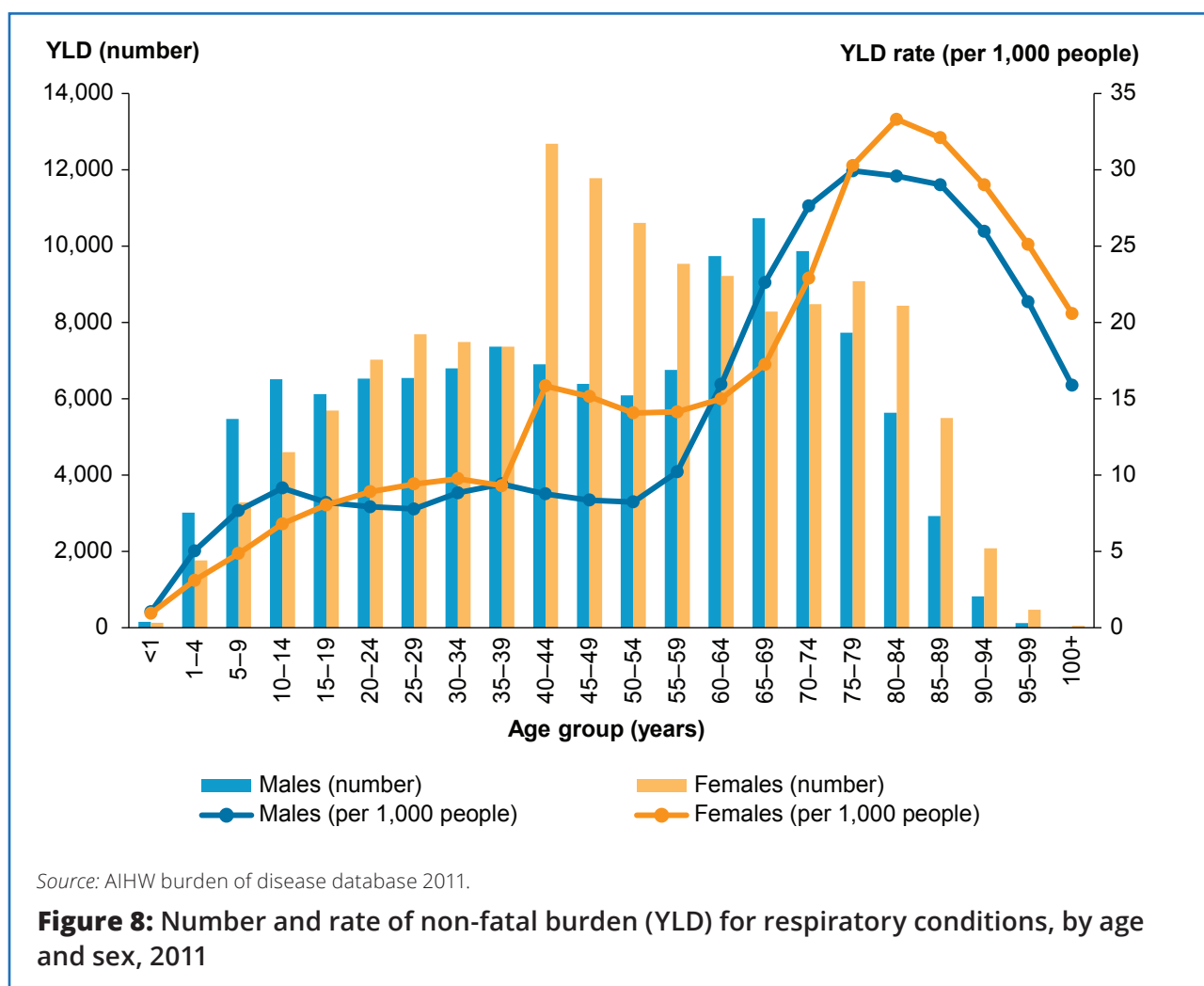
- Females experienced a higher percentage of the fatal burden compared with males for asthma (64% females compared with 36% males) and other respiratory diseases (51% females; 49% males).
- Other respiratory diseases were the leading cause of fatal burden in ages 0–44 for both males and females (38% of all respiratory fatal burden for males; 18% of all respiratory fatal burden for females).
- COPD was the prominent respiratory condition contributing to fatal burden (YLL) in both males and females in people aged 50 and over (72% of all respiratory fatal burden for males; 69% of all respiratory fatal burden for females). The rate of fatal burden due to COPD was higher in males (3.8 YLL per 1,000 people) compared with females (2.4 YLL per 1,000 people).

Non-fatal burden (YLD)

Respiratory conditions accounted for 12% of the overall non-fatal burden of disease and injury in Australia in 2011. The main causes of non-fatal burden for respiratory conditions were asthma (38%), COPD (32%) and upper respiratory conditions (29%).

Non-fatal burden due to respiratory conditions was experienced more by females (54%) than males (46%), and by people aged 40–44 (7.4%). The sharp increase at ages 40–44 in females (Figure 8) was mainly driven by the inclusion of estimates of COPD starting at age 40. At ages 40–54, the rates of non-fatal burden due to COPD in females were more than 4 times higher than the rates for males; however, this may be due to the very small numbers that underpin the prevalence estimates. These results reflect findings from the Australian arm of the BOLD study (Toelle et al. 2013), which reported higher prevalence of COPD in females compared with males in the 40–54 age group. The prevalence estimates for COPD in the ABDS 2011 were based on measured data from the BOLD study (see Box 3). The non-fatal burden for respiratory conditions varied with age, increasing from 1.8% among people aged 1–4 to a peak of 7.4% among people aged 40–44, after which there was a general decline. Males experienced more non-fatal burden due to respiratory conditions than females in the 0–19 and 60–74 age groups, while females experienced more non-fatal burden in ages 20–59 and 75 and over (Figure 8). The rates of non-fatal burden followed a similar pattern, with males experiencing a higher rate in the 0–14 and 60–74 age groups. From age 80–84, females had higher rates of non-fatal burden than males, peaking at age 80–84, with a rate of 33 YLD per 1,000 people.

Among all conditions included in the ABDS, asthma was the leading cause of non-fatal burden for children (aged under 5) and young males (aged 5–14) and the second leading cause of non-fatal burden for young females (aged 5–14) after anxiety disorders (AIHW 2016a).



The contribution of specific conditions to the non-fatal burden of respiratory conditions varied by age and sex:

- Females experienced a higher percentage of the burden compared with males for asthma (54% females compared with 46% males), COPD (55% females; 45% males) and upper respiratory conditions (52% females; 48% males).
- In the younger age groups (ages 0–19), the non-fatal burden from asthma was higher in males (58% compared with females (42%).
- A different pattern was noted for the non-fatal burden of COPD, with the burden increasing from age 40, and becoming the major contributor for males aged 65–69 (69% of all respiratory non-fatal burden for males) and females aged 80–84 (74% of all respiratory non-fatal burden for females).

Variation in non-fatal burden by severity of respiratory conditions

Severity is a component of non-fatal burden and indicates the level of health loss associated with a condition. Examining the distribution of non-fatal burden by severity provides another means of assessing the impact of respiratory conditions on the population. Australian-specific severity information was estimated for COPD and asthma using methods drawn from the Global Burden of Disease Study 2013: severity for non-fatal burden of COPD was classified as mild, moderate or severe; severity for non-fatal burden of asthma was classified as controlled, partially controlled or uncontrolled (see Box 4). For further information on the methods used to estimate severity distributions, see *Australian Burden of Disease Study 2011: methods and supplementary material* (AIHW 2016c).

Box 4: Severity classification descriptions

COPD mild: Has cough and shortness of breath after heavy physical activity, but is able to walk long distances and climb stairs.

COPD moderate: Has cough, wheezing and shortness of breath, even after light physical activity. The person feels tired and can walk only short distances or climb only a few stairs.

COPD severe: Has cough, wheezing and shortness of breath all the time. The person has great difficulty walking even short distances or climbing any stairs, feels tired when at rest, and is anxious.

asthma controlled: Has wheezing and cough once a month, which does not cause difficulty with daily activities.

asthma partially controlled: Has wheezing and cough once a week, which causes some difficulty with daily activities.

asthma uncontrolled: Has wheezing, cough and shortness of breath more than twice a week, which causes difficulty with daily activities and sometimes wakes the person at night.

Source: Salomon et al. 2012.

The non-fatal burden of COPD was mostly due to moderate severity COPD (48%) and severe COPD (42%) (Table 1). Mild severity COPD contributed 11% to the non-fatal burden of COPD. The percentage of mild and severe COPD contributing to non-fatal burden was higher in males (11% and 51%, respectively) than in females (10% and 34%, respectively). Females had a higher percentage of moderate severity COPD contributing to non-fatal burden (56%) compared with males (38%).

Table 1: Non-fatal burden (YLD) of COPD by severity, 2011

Severity	Number	%
Mild	8,995	10.6
Moderate	40,640	47.8
Severe	35,350	41.6
Total	84,985	100.0

Source: AIHW burden of disease database 2011.

Uncontrolled asthma contributed two-thirds (66%) of the non-fatal burden due to asthma (Table 2). Partially controlled asthma and uncontrolled asthma both contributed 17% of the non-fatal burden of asthma. There was no difference in the percentages of non-fatal burden by severity between males and females.

Table 2: Non-fatal burden (YLD) of asthma by severity, 2011

Severity	Number	%
Controlled	17,070	17.1
Partially controlled	17,268	17.3
Uncontrolled	65,678	65.7
Total	100,017	100.0

Note: Numbers do not sum to total due to rounding.

Source: AIHW burden of disease database 2011.

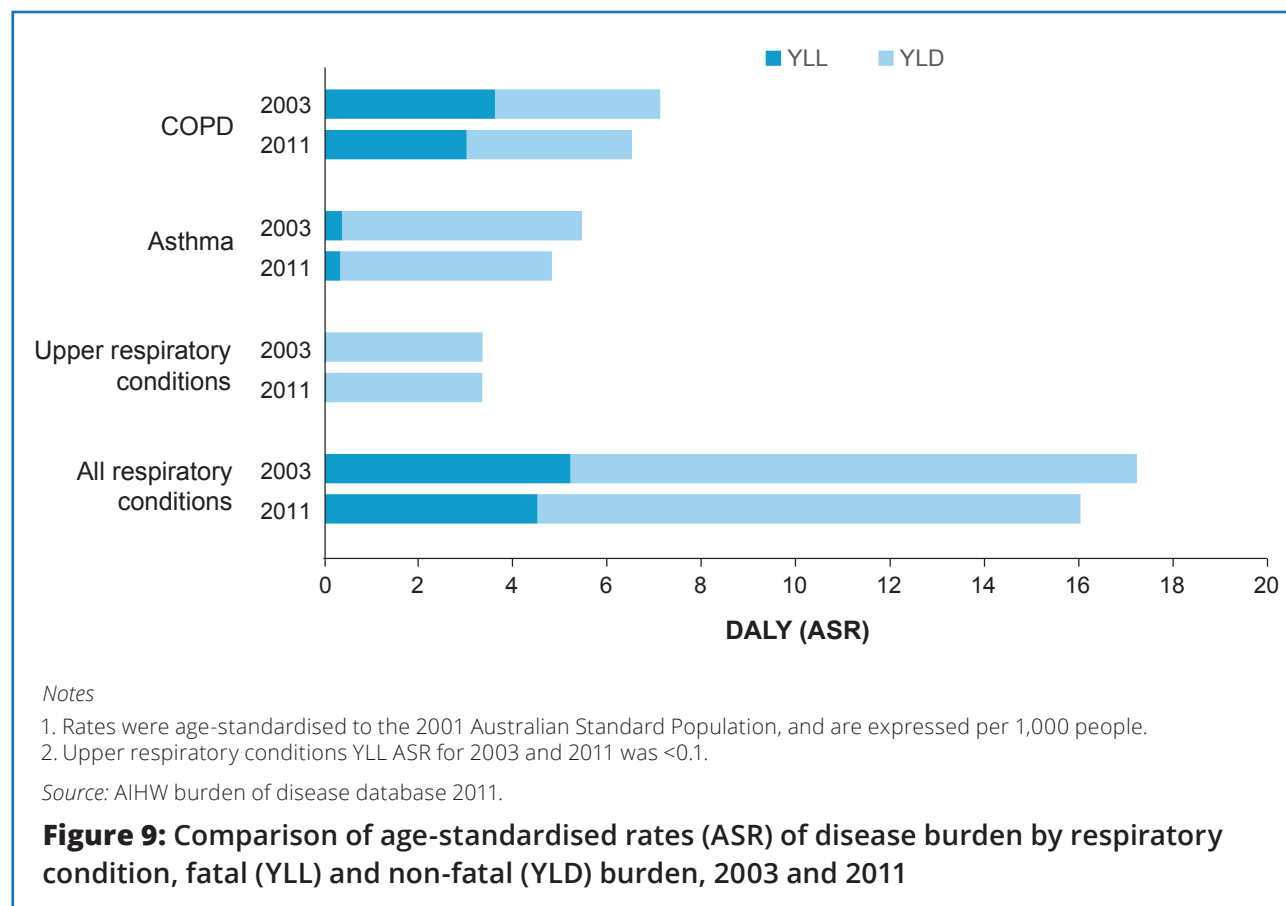
Changes in burden from 2003 to 2011

After accounting for population increase and ageing, there was a 7% reduction in the overall burden from respiratory conditions between 2003 and 2011, from 17.2 to 16.0 DALY per 1,000 people (Figure 9). During this period, the age-standardised rates of fatal burden (YLL) and non-fatal burden (YLD) for respiratory conditions also decreased:

- YLL decreased 13% from 5.2 to 4.5 YLL per 1,000 people
- YLD decreased 4% from 12.0 to 11.5 YLD per 1,000 people.

These were mainly driven by decreases in the fatal burden of COPD and non-fatal burden of asthma. Between 2003 and 2011:

- The total burden for COPD decreased from 7.2 to 6.5 DALY per 1,000 people and the fatal burden decreased from 3.6 to 3.0 YLL per 1,000 people. There was no change in the rate of non-fatal burden due to COPD, with a rate of 3.5 YLD per 1,000 people in both 2003 and 2011.
- The total burden for asthma decreased from 5.4 to 4.8 DALY per 1,000 people, the fatal burden decreased slightly from 0.4 to 0.3 YLL per 1,000 people and the non-fatal burden decreased from 5.1 to 4.5 YLD per 1,000 people.
- There was no change in total burden (3.3 DALY per 1,000 people), fatal burden (3.3 YLL per 1,000 people) or non-fatal burden (<0.1 YLD per 1,000 people) for upper respiratory conditions.



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) of respiratory 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, fatal burden and non-fatal burden for respiratory conditions did not vary greatly by state and territory, with around 16 DALY per 1,000 people, 5 YLL per 1,000 people and 12 YLD per 1,000 people, respectively.

The exception was the Northern Territory where the age-standardised rate of burden was higher compared with other jurisdictions and the national rate. The rate of total burden (26.4 DALY per 1,000 people) in the Northern Territory was 1.6 times as high as the national rate (16.0 per 1,000 people), and was attributed to the higher rates of burden due to COPD in the Northern Territory (16.3 per 1,000 people), which were 2.5 times the national rate (6.5 per 1,000 people). This partly reflects the high proportion of Indigenous Australians living in the Northern Territory who have much higher rates of burden due to COPD than non-Indigenous Australians. For more information, see 'Aboriginal and Torres Strait Islander status'.

Similar to the rate of burden for all respiratory conditions, there was little variation by state and territory for asthma or upper respiratory conditions.

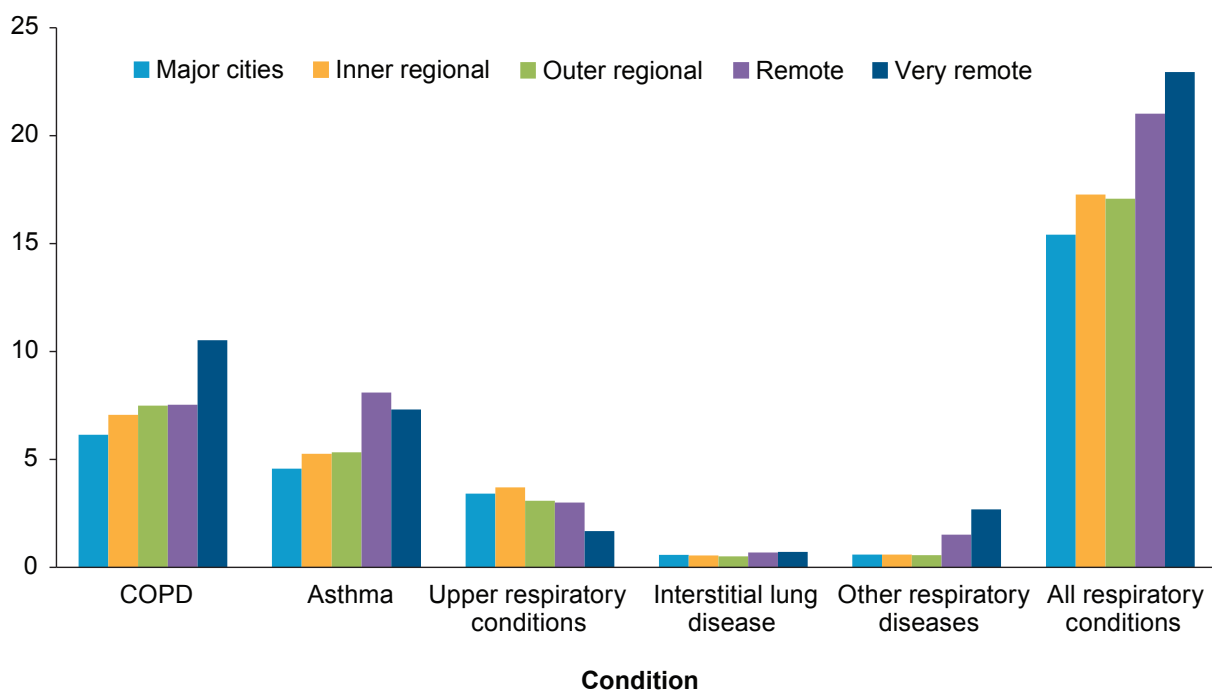
Remoteness area

The rate of burden for respiratory conditions generally increased with increasing remoteness (Figure 10). The rate of total burden was highest in *Very remote* areas (23.0 DALY per 1,000 people), 1.5 times the rate in *Major cities* (15.4 DALY per 1,000 people). An exception to this gradient was seen for upper respiratory conditions, which had the lowest rate in *Very remote* areas (1.7 per 1,000 people).

In 2011, COPD was the major contributor to the higher burden in *Very remote* areas, and was the leading cause of the respiratory burden in most remoteness areas. The exception was *Remote* areas where the burden of asthma was highest.

There was less variation by remoteness in burden rates for interstitial lung disease than for the other respiratory conditions.

DALY ASR (per 1,000 people)



Source: AIHW burden of disease database 2011.

Figure 10: Age-standardised rates (ASR) of total burden (DALY per 1,000 people) due to respiratory conditions, by remoteness, 2011

Fatal burden

The rate of fatal burden (YLL) generally increased with remoteness for respiratory conditions, with the exception of upper respiratory conditions. The rate was highest in *Very remote* areas (10.8 YLL per 1,000 people), 2.6 times the rate of *Major cities* (4.1 per 1,000 people). COPD was the leading cause of fatal burden in all remoteness areas, with the highest rate in *Very remote* areas (7.1 per 1,000 people).

Non-fatal burden

There was less difference in the rate of non-fatal burden (YLD) by remoteness for all respiratory conditions, ranging from 11.3 YLD per 1,000 people in *Major cities* to 14.3 per 1,000 people in *Remote* areas. Asthma was the leading cause of non-fatal burden in all remoteness areas, with the highest rate in *Remote* areas (7.7 per 1,000 people).

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 burden for respiratory conditions generally increased with decreasing socioeconomic position (Figure 11). The rate of burden for all respiratory conditions was greatest in the lowest socioeconomic group (18.4 DALY per 1,000 people), 1.4 times the rate of the highest socioeconomic group (13.1 DALY per 1,000 people). The exception to this was upper respiratory conditions which showed no clear trend by socioeconomic group. COPD was the leading cause of burden in all socioeconomic groups, followed by asthma.

Fatal burden

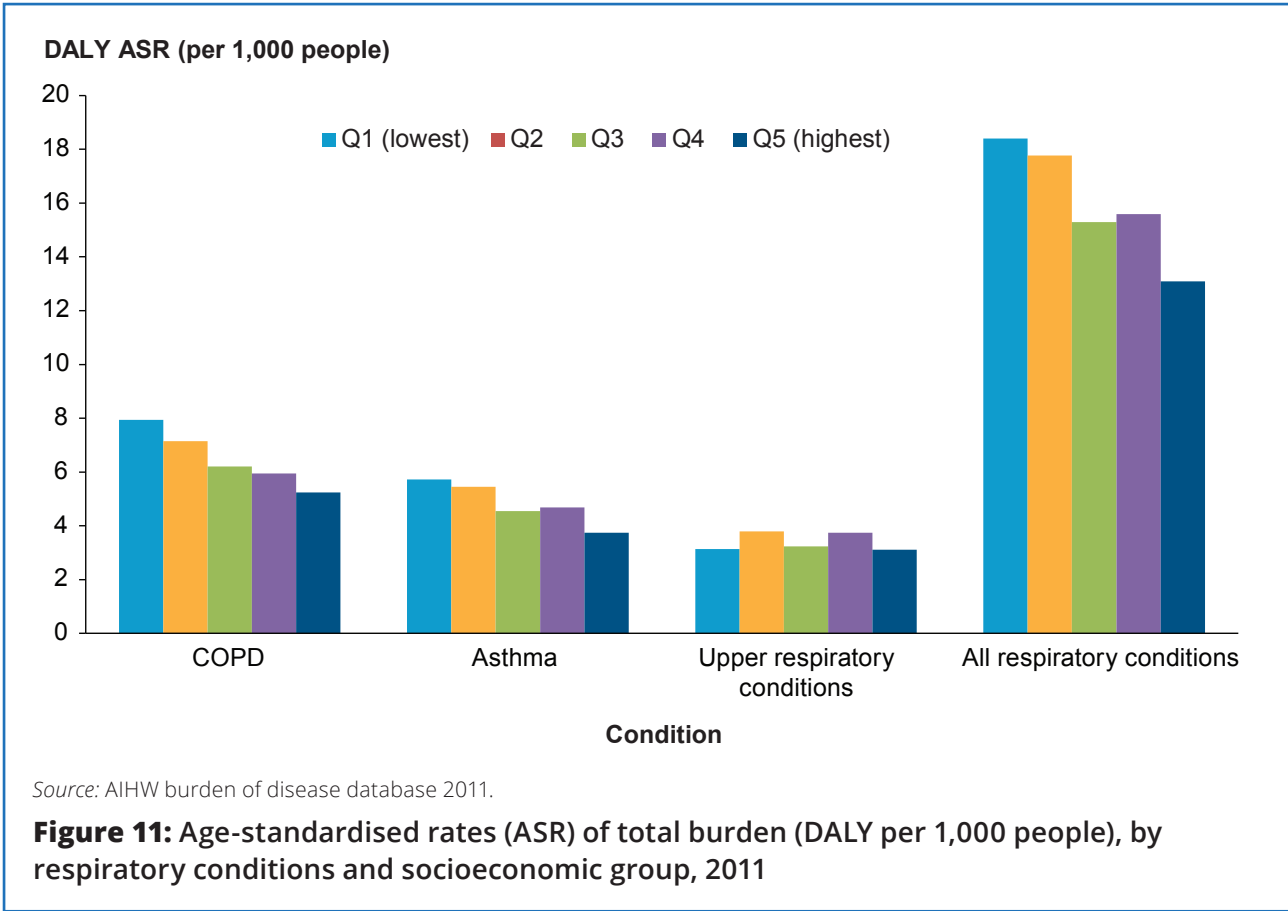
The rate of fatal burden (YLL) for all respiratory conditions decreased with increasing socioeconomic position. The rate was highest in the lowest socioeconomic group (6.4 YLL per 1,000 people), 2.3 times the rate in the highest socioeconomic group (2.8 YLL per 1,000 people).

COPD had the highest rate of fatal burden in all socioeconomic groups, with the rate in the lowest socioeconomic group (4.4 YLL per 1,000 people), 2.5 times the rate in the highest socioeconomic group (1.8 YLL per 1,000 people).

Non-fatal burden

The rate of non-fatal burden (YLD) showed less variation by socioeconomic group for all respiratory conditions combined, with the highest rate in Quintile 2 (12.6 YLD per 1,000 people) and the lowest rate in the highest socioeconomic group (10.3 YLD per 1,000 people).

Asthma had the highest rate of non-fatal burden in all socioeconomic groups, with the highest rate in the lowest socioeconomic group (5.2 YLD per 1,000 people) and the lowest in the highest socioeconomic group (3.6 YLD per 1,000 people).

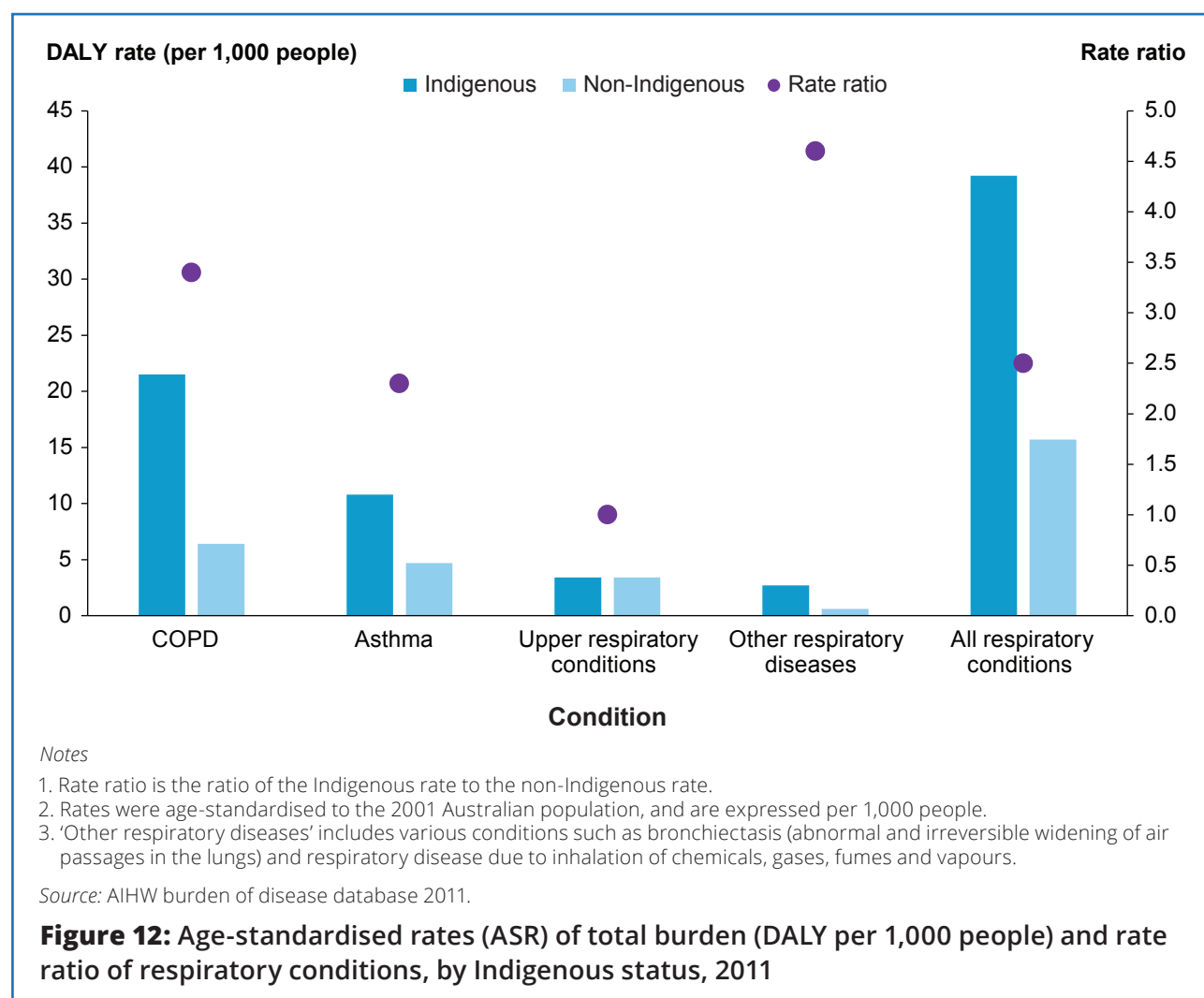


Aboriginal and Torres Strait Islander status

In 2011, the rate of burden for respiratory conditions was higher for Aboriginal and Torres Strait Islander people compared with non-Indigenous Australians (Figure 12). The higher rate for Aboriginal and Torres Strait Islander people may be linked to the higher rates seen in the Northern Territory and people living in *Very remote* areas. The rate of total burden (DALY) for all respiratory conditions was 2.5 times as high for Indigenous Australians (39.2 DALY per 1,000 people) as for non-Indigenous Australians (15.7 DALY per 1,000 people). The exception to this was upper respiratory conditions which showed no difference in the rate of burden between the 2 population groups.

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

- 4.6 times as high due to other respiratory diseases (2.7 DALY per 1,000 people for Indigenous Australian compared with 0.6 DALY per 1,000 people for non-Indigenous Australians). This is likely driven by the high incidence of bronchiectasis in Indigenous populations compared with non-Indigenous populations in Australia (Chang et al. 2010)
- 3.4 times as high due to COPD (21.5 DALY per 1,000 people compared with 6.4 DALY per 1,000 people)
- 2.3 times as high due to asthma (10.8 DALY per 1,000 people compared with 4.7 DALY per 1,000 people).



Fatal burden

For all respiratory conditions, the rate of fatal burden (YLL) was 3.7 times as high among Indigenous Australians (16.0 YLL per 1,000 people) as for non-Indigenous Australians (4.4 YLL per 1,000 people).

COPD greatly contributed to the gap in fatal burden between the 2 groups, with a rate 4.1 times as high in Indigenous Australians (12.0 YLL per 1,000 people) as in non-Indigenous Australians (2.9 YLL per 1,000 people). This was also the largest rate difference (9.1 YLL per 1,000).

Non-fatal burden

The rate of non-fatal burden (YLD) for all respiratory conditions was 2.1 times as high for Indigenous Australians (23.2 YLD per 1,000 people) as for non-Indigenous Australians (11.3 YLD per 1,000 people).

Asthma had the highest rate of non-fatal burden for Indigenous Australians (10.2 YLD per 1,000 people) and non-Indigenous Australians (4.4 YLD per 1,000 people), although COPD had the highest rate ratio at 2.8 compared with 2.3 for asthma.

Proportion of burden attributable to modifiable risk factors

The contribution of selected risk factors to the burden of respiratory 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 3 risk factors associated with chronic respiratory conditions: tobacco use, occupational exposures and hazards, and air pollution.

In 2011, tobacco use contributed more than one-third (36%) of the total burden for all respiratory conditions combined. There were differences for specific respiratory conditions, with tobacco use contributing:

- 75% of COPD burden
- 22% of interstitial lung disease burden
- 10% of asthma burden
- 19% of burden due to other respiratory diseases (Table 3).

While air pollution made only a small contribution (0.3%) to the burden of COPD, occupational exposures and hazards were responsible for all of the burden (100%) for pneumoconiosis and 9.5% of burden due to asthma (Table 3).

Table 3: Proportion (%) of burden attributable to risk factors, for respiratory conditions, 2011

Conditions	Tobacco use	Occupational exposures and hazards	Air pollution
COPD	74.6	2.9	0.3
Asthma	9.6	9.5	..
Upper respiratory conditions	..	..	..
Interstitial lung disease	21.5	..	..
Pneumoconiosis	..	100	..
Sarcoidosis	..	..	..
Other respiratory diseases	18.5	..	..
All respiratory conditions	36.2	4.4	0.1
All diseases	9.0	2.0	0.6

.. Not applicable

Notes

1. The attributable burden of air pollution was estimated for fatal burden only.
2. Risk factor estimates cannot be added together due to the complex pathways and interactions between them.

Source: AIHW burden of disease database 2011.

The prevalence of tobacco use differs by geographic and population groups. The likelihood of being a daily smoker is:

- 3 times as high in the lowest socioeconomic group compared with the highest socioeconomic group
- 2.6 times as high for Aboriginal and Torres Strait Islander Australians compared with non-Indigenous Australians
- 2 times as high in *Remote/Very remote* areas compared with *Major cities* (AIHW 2016d).

Recent extension analyses of the ABDS 2011 undertaken by the AIHW produced updated estimates of disease burden due to overweight and obesity (referred to as 'high body mass' in the ABDS 2011 report; AIHW 2016a) based on the latest available evidence in the literature and to include burden in people aged under 25. It was estimated that overweight and obesity contributed to 2.2% of asthma burden, which related to burden in children only (AIHW 2017).

The ABDS 2011 was dependent on the quality and completeness of available data to determine the proportion of the burden of respiratory conditions that was attributable to specific risk factors. While risk factors such as physical inactivity and genetic predisposition are known to be associated with respiratory conditions, the risk factors for respiratory conditions in the ABDS 2011 were limited to those included in the GBD 2010. Similarly, air pollution is a known risk factor for asthma (AIHW 2010; Bowatte et al. 2015); however, the results presented in Table 3 show no association for air pollution and asthma. This is due to the methods used in the ABDS, which estimated attributable burden of air pollution for fatal burden only. As the burden of asthma is mostly (93%) non-fatal burden, the results showed no association.

For information on the methods and data sources used to select and analyse risk factors, see *Australian Burden of Disease Study 2011: methods and supplementary material* (AIHW 2016c).



Conclusion

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

Previous analysis has shown that respiratory conditions are the sixth leading contributor to total burden of disease in Australia, and that COPD, asthma and upper respiratory conditions contributed the greatest percentage of the respiratory burden (AIHW 2016a). Those analyses also showed that females experienced just over half of the burden due to all respiratory conditions combined, and over half of the burden due to asthma and upper respiratory conditions, while males experienced the majority of the burden due to pneumoconiosis, sarcoidosis and interstitial lung disease.

This report shows further that the burden due to respiratory conditions is generally decreasing over time, varied by condition severity and by population group, and that some of the burden can be attributed to modifiable risk factors.

Between 2003 and 2011, there was a reduction in the total, fatal and non-fatal burden of respiratory conditions, driven by decreases in the fatal burden of COPD and non-fatal burden of asthma.

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

Three-quarters of the burden due to COPD and more than one-third of the burden due to all respiratory conditions combined was attributed to tobacco use. These findings suggest that reducing exposure to modifiable risk factors, particularly tobacco use, may reduce the amount of burden due to respiratory conditions.

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This report presents information on the disease burden of chronic respiratory conditions using data from the Australian Burden of Disease Study 2011. Respiratory conditions were the sixth leading contributor to total burden of disease in Australia, with chronic obstructive pulmonary disease (COPD), asthma and upper respiratory conditions being the greatest contributors to the respiratory burden. The burden due to respiratory 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 tobacco use.

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