

# Lung disease in Australia

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**Leanne M Poulos**

**Patricia K Correll**

**Brett G Toelle**

**Helen K Reddel**

**Guy B Marks**

**Woolcock Institute of Medical Research,  
University of Sydney, NSW**

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## Contents

Executive Summary.....	1
INTRODUCTION.....	3
Purpose of the report .....	3
Structure of the report.....	3
Using the report.....	3
CHAPTER 1. LUNG DISEASE.....	4
Health care utilisation due to lung disease in Australia.....	4
Burden (DALYs) attributable to lung disease in Australia.....	6
Deaths due to Lung Disease in Australia.....	10
Conclusion.....	11
CHAPTER 2. CHRONIC RESPIRATORY DISEASES .....	12
2.1 Asthma.....	12
Prevalence of asthma.....	12
Health care utilisation due to asthma.....	13
Burden (DALYs) attributed to asthma.....	15
Deaths due to asthma.....	17
Risk factors for asthma .....	17
2.2 Chronic Obstructive Pulmonary Disease (COPD) .....	18
Prevalence of COPD .....	18
Health care utilisation due to COPD .....	18
Burden (DALYs) attributed to COPD.....	20
Deaths due to COPD.....	21
Risk factors for COPD .....	21
2.3 Pneumoconiosis.....	22
Prevalence of Pneumoconiosis .....	22
Health care utilisation due to pneumoconiosis .....	22
Burden (DALYs) attributed to pneumoconiosis .....	23
Deaths due to pneumoconiosis .....	24
2.4 Interstitial lung disease.....	24
Health care utilisation due to interstitial lung disease .....	24
Burden (DALYs) attributed to interstitial lung disease .....	25
Deaths due to interstitial lung disease .....	25

2.5	Cystic fibrosis .....	25
	Health care utilisation due to cystic fibrosis .....	26
	Burden (DALYs) attributed to cystic fibrosis .....	26
	Deaths due to cystic fibrosis .....	26
2.6	Non-CF Bronchiectasis .....	26
	Health care utilisation due to bronchiectasis .....	27
	Burden (DALYs) attributed to bronchiectasis .....	27
	Deaths due to non-CF bronchiectasis .....	27
CHAPTER 3. LUNG CANCER AND MESOTHELIOMA.....		28
	Risk factors.....	28
	Lung Cancer.....	28
	Mesothelioma .....	28
	Incidence .....	29
	Lung Cancer.....	29
	Mesothelioma .....	30
	Burden of disease .....	31
	Deaths .....	32
	Lung cancer .....	32
	Mesothelioma .....	33
	Health Care Utilisation.....	33
	Lung cancer .....	33
	Mesothelioma .....	35
CHAPTER 4. INFECTIOUS DISEASE.....		37
	Introduction .....	37
	Notifiable diseases that cause respiratory infection .....	37
	Invasive pneumococcal disease .....	37
	Influenza.....	38
	Pertussis.....	38
	Tuberculosis .....	38
	Acute lower respiratory infections .....	39
	Pneumonia .....	39
	Bronchitis .....	39
	Bronchiolitis .....	40
	Risk reduction for lower respiratory infections .....	40

Incidence of respiratory infection.....	40
Burden of disease due to respiratory infection .....	41
Mortality due to acute respiratory infection .....	44
Healthcare utilisation for respiratory infections.....	44
General practice encounters.....	44
Hospitalisations.....	44
APPENDIX: ICD CODES USED TO CLASSIFY DISEASES.....	50
References .....	52

# Lung disease in Australia

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## Executive Summary

- Lung disease accounted for 10.3% of the total burden of disease in Australia in 2010.
- The contribution of lung disease to overall burden is greatest in children and older adults and lowest in young adults.
- Among infants (up to the age of one year) most of the burden of lung disease is due to lower respiratory infections (pneumonia and bronchiolitis).
- In children aged over one year and young adults, asthma is the major contributor to the burden of lung disease.
- In older Australians, lung cancer and COPD comprise the majority of the burden of lung disease.

Among people with lung disease in Australia:

- Lower respiratory infections are the leading cause of hospitalisation
- Asthma represents the leading cause of disability
- Lung cancer represents the leading cause of death (40% of deaths from lung disease)
- COPD contributes one-third of the burden
- COPD contributes almost one-third of all deaths.

Lung disease was the cause of:

- 20,376 deaths in 2012, representing 13.9% of all deaths
- 276,505 hospitalisations in 2011-12, representing 2.99% of all hospitalisations
- over 1.4 million hospital patient-days in 2011-12, representing 5.07% of all patient-days.

Chronic respiratory disease, which includes asthma, COPD, bronchiectasis, interstitial lung disease and pneumoconiosis was the cause of:

- 117,391 hospitalisations in 2011-12, representing 1.26% of all hospitalisations
- 579,910 hospital patient-days in 2011-12, representing 2.09% of all patient-days
- Over 300,000 disability-adjusted life years (DALYs) in 2010, representing 6% of all DALYs
- 7,962 deaths in 2012 (5.41% of all deaths)
- 97,109 years of life lost due to premature death (in 2010).

Respiratory neoplasms (including lung cancer and mesothelioma) were the reason for:

- Nearly 11,000 new neoplasm diagnoses in 2010
- Around 20,000 hospitalisations in 2011-12, representing 0.2% of all hospitalisations
- 143,551 DALYs due to lung cancer in 2010, representing 17.5% of DALYs due to cancer
- 8,775 deaths in 2012, representing 6.0% of all deaths in Australia.

Acute respiratory infections, which include pneumonia, bronchitis, bronchiolitis, invasive pneumococcal disease (IPD), influenza, pertussis and tuberculosis (TB) were the reason for:

- 43,502 notifications (IPD, influenza, pertussis and TB) to the National Notifiable Diseases Surveillance System in 2013
- 129,392 hospitalisations in 2011-12, representing 1.4% of all hospitalisations
- 44,788 DALYs due to lower respiratory disease and TB in 2010, comprising 0.9% of all DALYs
- 3,023 deaths in 2012, representing 2.1% of all deaths in Australia in that year.



## INTRODUCTION

### Purpose of the report

This document provides data on the prevalence, burden and impact of lung disease in Australia, derived from a range of available sources, for the Lung Foundation Australia to use for various purposes including education, marketing and advocacy.

### Structure of the report

The first chapter provides information about the burden and impact of lung disease as a whole in Australia. The second chapter describes what is known about the prevalence of chronic respiratory diseases, including COPD, asthma, interstitial lung disease, cystic fibrosis, pneumoconiosis and non-CF bronchiectasis, and the level of health care utilisation, overall burden, and rate of deaths attributable to these diseases. The third chapter includes information about the risk factors for and incidence of lung cancer and mesothelioma in Australia. Data on disease burden, deaths and health care utilisation due to these malignant diseases are also presented. The fourth chapter presents information on the incidence of, and burden, deaths and health care utilisation due to, infectious diseases affecting the lungs. These include non-specific lower respiratory infections (mainly pneumonia and bronchiolitis) as well as whooping cough and tuberculosis.

In the Appendix we have listed the disease codes that were used to identify lung diseases within the various data sources access for this report. This will facilitate updating of the report in future years and for tracking change over time.

### Using the report

We hope that readers will find the report a useful resource for summary information about the burden and impact of lung disease in Australia. We have provided references for the sources of information used to create this report and interested readers are recommended to view these sources for more detailed information and description of how the data were obtained and analysed.

## CHAPTER 1. LUNG DISEASE

This chapter summarises information about health care utilisation and deaths attributed to lung disease, as well as information from the Global Burden of Disease Study (2010) (1) on the burden of lung disease in Australia. For the purposes of this report, we have classified lung diseases as follows:

1. **chronic respiratory diseases** (includes chronic obstructive pulmonary disease (COPD), asthma, interstitial lung disease and sarcoidosis, pneumoconiosis (mainly asbestosis and silicosis), cystic fibrosis (CF)),
2. **lung cancer and mesothelioma**
3. **respiratory infection** (includes lower respiratory infections, pertussis (whooping cough) and tuberculosis (TB)), and
4. **other respiratory diseases** (includes non-CF bronchiectasis, pleural disease, unspecified respiratory disease).

These groupings are largely consistent with those used in the Global Burden of Disease study (1). It should be noted that for the burden of disease data, information about bronchiectasis is grouped in 'other respiratory diseases', while information about cystic fibrosis is not available separately. However, we have reported information about deaths and health care utilisation due to bronchiectasis and CF (under 'chronic respiratory disease'). A full description of all the diseases (and their associated ICD-10 codes) included can be found in the appendix (Table A1.1).

### Health care utilisation due to lung disease in Australia

In 2011-12, there were 276,505 hospitalisations for lung disease in Australia. This represented 3.0% of all hospitalisations in Australia in that year (Table 1.1).

Respiratory infections accounted for 46.8% of all hospitalisations due to lung disease, with 129,392 hospitalisations, representing 1.4% of all hospitalisations due to any disease in that year. Lung cancer accounted for 18,402, while COPD accounted for 65,224 hospitalisations, representing 0.2% and 0.7% of all hospitalisations, respectively. Chronic respiratory disease was the cause of 117,391 hospitalisations in Australia in 2011-12, which represented 1.3% of all hospitalisations.

There were more hospitalisations for lung disease among males (146,708) than females (129,797) in 2011-12 and this was true for all types of lung disease except for asthma, bronchiectasis, cystic fibrosis and pertussis, where there were more female admissions than male admissions.



**Table 1.1 Number of hospitalisations due to Lung Disease, Australia, 2011-12, by sex**

Disease	Males	Females	Persons	% All hospitalisations
<b>CHRONIC RESPIRATORY DISEASES</b>				
COPD	34,728	30,496	<b>65,224</b>	<b>0.70%</b>
Asthma	18,818	19,863	<b>38,681</b>	<b>0.42%</b>
Interstitial lung disease and sarcoidosis	2,209	1,855	<b>4,064</b>	<b>0.04%</b>
Cystic fibrosis	1,982	2,058	<b>4,040</b>	<b>0.04%</b>
Pneumoconiosis (mainly asbestosis and silicosis)	185	12	<b>197</b>	<b>0.0021%</b>
Bronchiectasis	1,712	3,473	<b>5,185</b>	<b>0.05%</b>
<b>TOTAL CHRONIC RESPIRATORY DISEASES</b>	<b>59,634</b>	<b>57,757</b>	<b>117,391</b>	<b>1.26%</b>
<b>LUNG CANCER AND MESOTHELIOMA</b>				
Lung cancer	10,834	7,568	<b>18,402</b>	<b>0.20%</b>
Mesothelioma	1,676	353	<b>2,029</b>	<b>0.02%</b>
<b>TOTAL LUNG CANCER AND MESOTHELIOMA</b>	<b>12,510</b>	<b>7,921</b>	<b>20,431</b>	<b>0.22%</b>
<b>RESPIRATORY INFECTION</b>				
Lower respiratory infections	67,497	59,657	<b>127,154</b>	<b>1.37%</b>
Pertussis (whooping cough)	453	511	<b>964</b>	<b>0.01%</b>
Tuberculosis	1,026	248	<b>1,274</b>	<b>0.01%</b>
<b>TOTAL RESPIRATORY INFECTION</b>	<b>68,976</b>	<b>60,416</b>	<b>129,392</b>	<b>1.40%</b>
<b>OTHER RESPIRATORY DISEASES</b>				
	<b>5,588</b>	<b>3,703</b>	<b>9,291</b>	<b>0.11%</b>
<b>Hospitalisations due to ALL LUNG DISEASE</b>	<b>146,708</b>	<b>129,797</b>	<b>276,505</b>	<b>2.99%</b>

Notes: All diseases classified using ICD-10 codes (see Table A1.1). It should be noted that one person could have multiple hospitalisations.  
Source: AIHW hospitals principal diagnosis data cubes.

Hospital patient-days represent the number of days of stay in hospital for patients who were admitted to hospital for an episode of care.

In 2011-12, there were over 1.4 million hospital patient-days attributed to lung disease in Australia, representing 5.1% of all hospital patient-days in Australia in that year (**Table 1.2**).

This figure included 636,142 patient-days attributable to respiratory infections in that year, which accounted for 46.4% of all hospital patient-days due to lung disease and 2.3% of all hospital-patient-days.

It also included 579,910 hospital-patient-days due to chronic respiratory diseases. COPD was the leading cause of hospital patient-days due to chronic respiratory disease, with 389,008 patient-days representing 1.4% of hospital patient-days due to any disease and 67% of hospital patient-days for chronic respiratory disease.

Lung cancer accounted for 140,012 patient-days (0.5% of all patient-days). This relatively low rate of hospitalisation reflects that fact that the majority of people with lung cancer do not have surgery and do not require hospital-admission for management of their condition.

**Table 1.2: Number of Patient-Days due to Lung Disease, Australia, 2011-12, by sex**

Disease	Males	Females	Persons	% All patient-days
<b>CHRONIC RESPIRATORY DISEASES</b>				
COPD	202,807	186,201	<b>389,008</b>	<b>1.40%</b>
Asthma	32,212	49,411	<b>81,623</b>	<b>0.29%</b>
Cystic fibrosis	20,732	22,499	<b>43,231</b>	<b>0.16%</b>
Interstitial lung disease and sarcoidosis	15,446	13,053	<b>28,499</b>	<b>0.10%</b>
Pneumoconiosis (mainly asbestosis and silicosis)	985	55	<b>1,040</b>	<b>0.00375%</b>
Bronchiectasis	11,813	24,696	<b>36,509</b>	<b>0.13%</b>
<b>TOTAL CHRONIC RESPIRATORY DISEASES</b>	<b>283,995</b>	<b>295,915</b>	<b>579,910</b>	<b>2.09%</b>
<b>LUNG CANCER AND MESOTHELIOMA</b>				
Lung cancer	79,370	60,642	<b>140,012</b>	<b>0.50%</b>
Mesothelioma	11,877	2,501	<b>14,378</b>	<b>0.05%</b>
<b>TOTAL LUNG CANCER AND MESOTHELIOMA</b>	<b>91,247</b>	<b>63,143</b>	<b>154,390</b>	<b>0.56%</b>
<b>RESPIRATORY INFECTION</b>				
Lower respiratory infections	321,515	299,486	<b>621,002</b>	<b>2.24%</b>
Pertussis (whooping cough)	1,797	2,401	<b>4,198</b>	<b>0.015%</b>
Tuberculosis	7,108	3,834	<b>10,942</b>	<b>0.04%</b>
<b>TOTAL RESPIRATORY INFECTION</b>	<b>330,420</b>	<b>305,721</b>	<b>636,142</b>	<b>2.3%</b>
Other respiratory diseases	<b>22,298</b>	<b>14,354</b>	<b>36,652</b>	<b>0.13%</b>
<b>Hospital patient-days due to ALL LUNG DISEASE</b>	<b>727,960</b>	<b>679,133</b>	<b>1,407,094</b>	<b>5.07%</b>

Notes: All diseases classified using ICD-10 codes (see Appendix table A1.1). It should be noted that one person could have multiple hospitalisations.

Source: AIHW hospitals principal diagnosis data cubes.

There were more hospital patient-days for lung disease among males (727,960) than females (679,133) in 2011-12 and this was true for all types of lung disease except for asthma, bronchiectasis, cystic fibrosis and whooping cough, where there were more patient-days among females compared to males.

The average length of stay for all patients hospitalised with lung disease was 5.1 days. This is 1.7 times longer than the average length of stay for all-cause hospitalisations (3.0 days).

### **Burden (DALYs) attributable to lung disease in Australia**

Burden of disease can be quantified by adding the years of expected life that are lost due to premature death (years of life lost, YLL) and the years lived with the disability due to the disease (years of life disabled, YLD). The value of YLD for any given disease is determined by the magnitude of the disability suffered by individuals with the disease and the duration of living with that disability. The addition of these two components yields what is known as disability-adjusted life years (DALYs). DALYs represent the burden of the disease.

In 2010, lung disease accounted for 10.3% of all DALYs in Australia, with COPD (3.4%), lung cancer (2.9%) and asthma (2.3%) the main contributors to this burden (**Table 1.3**).

COPD accounted for 33.6% of the burden due to lung disease while lung cancer and asthma accounted for 28.4% and 23.1%, respectively.

**Table 1.3: Burden (number of DALYs) due to Lung disease Australia, 2010, by sex**

Disease	Males	Females	Persons	% All DALYs
<b>CHRONIC RESPIRATORY DISEASES</b>				
COPD	90,434	79,428	<b>169,862</b>	<b>3.4%</b>
Asthma	55,421	61,211	<b>116,632</b>	<b>2.3%</b>
Interstitial lung disease and sarcoidosis	6,611	3,632	<b>10,244</b>	<b>0.2%</b>
Pneumoconiosis (mainly asbestosis and silicosis)	2,174	1,226	<b>3,400</b>	<b>0.1%</b>
<b>TOTAL CHRONIC RESPIRATORY DISEASES</b>	<b>154,640</b>	<b>145,497</b>	<b>300,138</b>	<b>6.0%</b>
<b>LUNG CANCER</b>	<b>93,755</b>	<b>49,796</b>	<b>143,551</b>	<b>2.9%</b>
<b>RESPIRATORY INFECTION</b>				
Lower respiratory infections	21,985	20,522	<b>42,507</b>	<b>0.9%</b>
Tuberculosis	1,384	896	<b>2,281</b>	<b>0.05%</b>
<b>TOTAL ACUTE RESPIRATORY INFECTION</b>	<b>23,369</b>	<b>21,418</b>	<b>44,788</b>	<b>0.95%</b>
<b>OTHER RESPIRATORY DISEASES</b>	<b>8,434</b>	<b>9,071</b>	<b>17,505</b>	<b>0.4%</b>
<b>TOTAL LUNG DISEASE</b>	<b>280,198</b>	<b>225,782</b>	<b>505,981</b>	<b>10.25%</b>

Note: Adding values for males and females may not necessarily yield values for persons, due to rounding. Total lung disease includes totals for chronic respiratory disease, lung cancer, respiratory infection and other respiratory diseases. Cystic fibrosis data from the Global Burden of Disease study were not included due to grouping with several other diseases that were not relevant for this report. Bronchiectasis is included under 'other respiratory diseases' for the Global Burden of Disease study.

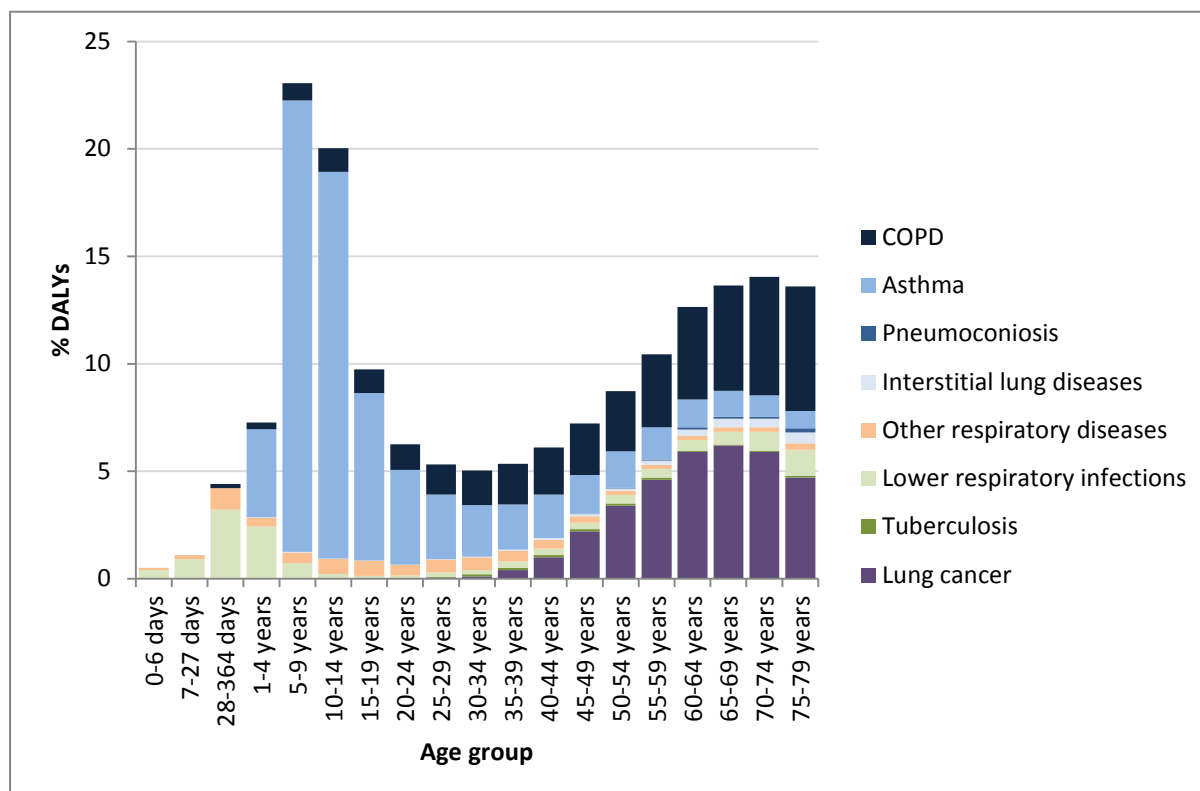
Source: Institute for Health Metrics, Global Burden of Disease study 2010 (1).

The contribution of lung disease to overall burden is greatest in children and older adults and lowest in young adults (Figure 1.1).

Among infants (up to the age of one year) most of the burden of lung disease is due to lower respiratory infections (pneumonia and bronchiolitis; **Figure 1.1**). In children aged over one year and young adults, asthma represents the major contributor to the burden of lung disease, while in older Australians lung cancer and COPD comprise the majority of the burden.

The burden of lung disease is low among infants and is attributed almost exclusively to lower respiratory infections and 'other respiratory diseases'. Lower respiratory infections were the cause of 3.2% of the total burden of disease in infants aged one month to one year, while other respiratory diseases accounted for 1% of the total burden of disease in this age group. It should be noted that some of the burden of lung disease in young children in the Global Burden of Disease report is attributed to COPD, which does not occur in children. This may be due to the inclusion of bronchitis (not specified as acute or chronic) in the definition of COPD used in that study.

Figure 1.1: Burden (DALYs) due to lung disease as a proportion of total DALYs, Australia, 2010, by age



Source: Institute for Health Metrics, Global Burden of Disease study 2010 (1).

The burden of COPD increases with age and represents one of the major components of the total burden of lung disease in older Australians. Among those aged 75-79 years, COPD accounts for 42.6% of the total burden of lung disease and 5.8% of the total burden of disease.

The burden of asthma peaks in children aged 5-9 years. In this age group, asthma represents 21% of the burden of disease. In children aged 10-14 years asthma accounts for 18% of the total burden of disease and then gradually decreases into adulthood and old age where the disease represents 0.8% of the total burden among those aged 75-79 years.

Interstitial lung diseases and pneumoconiosis contribute up to 0.5% of the total burden of disease in each age group. The burden of interstitial lung diseases and pneumoconiosis gradually increases with age to 0.5% and 0.2%, respectively, among those aged 75-79 years.

The burden of lung cancer gradually increases with age, peaking at 6.2% of the total burden of disease at 65-69 years. Among those aged 55-69 years, lung cancer accounts for almost half of the burden of lung disease.

While COPD and lung cancer rank higher in terms of their total burden (Table 1.3), in 2010, asthma was the leading cause of disability among people with lung disease in Australia (Table 1.4). This is because asthma affects people of all ages, rather than affecting a predominantly older population (as with COPD) and because asthma deaths occur mostly in older people, hence there is the possibility of living with less than perfect health for a long period of time.

Chronic respiratory disease accounted for 7.53% of all years lived with disability in Australia in 2010. Asthma was responsible for 108,698 years of living with disability, that is 108,698 years lived with less than perfect health (Table 1.4). Of all years lived with disability due to any disease, asthma accounted for 4.0%, while COPD accounted for 3.4%. Respiratory infections were responsible for 6,452 years lived with disability (representing 0.3% of all years lived with disability due to any disease) while lung cancer accounted for 0.1% of all years lived with disability. Respiratory infections and lung cancer are both relatively short-duration illnesses. Hence people do not live with the associated disability for very long.

**Table 1.4: Years Lived with Disability (YLD) due to lung disease in Australia, 2010, by sex**

Disease	Males	Females	Persons	% All YLDs
<b><i>CHRONIC RESPIRATORY DISEASES</i></b>				
Asthma	51,931	56,767	<b>108,698</b>	<b>4.0%</b>
COPD	44,678	47,187	<b>91,865</b>	<b>3.4%</b>
Pneumoconiosis (mainly asbestosis and silicosis)	791	1,038	<b>1,829</b>	<b>0.1%</b>
Interstitial lung disease and sarcoidosis	387	250	<b>637</b>	<b>0.03%</b>
<b>TOTAL CHRONIC RESPIRATORY DISEASES</b>	<b>97,787</b>	<b>105,242</b>	<b>203,029</b>	<b>7.53%</b>
<b><i>LUNG CANCER</i></b>	<b>1,300</b>	<b>716</b>	<b>2,016</b>	<b>0.1%</b>
<b><i>RESPIRATORY INFECTION</i></b>				
Lower respiratory infections	2,729	2,464	<b>5,193</b>	<b>0.2%</b>
Tuberculosis	756	503	<b>1,259</b>	<b>0.1%</b>
<b>TOTAL RESPIRATORY INFECTION</b>	<b>3,485</b>	<b>2,967</b>	<b>6,452</b>	<b>0.3%</b>
<b><i>OTHER RESPIRATORY DISEASES</i></b>	<b>5,164</b>	<b>6,149</b>	<b>11,313</b>	<b>0.4%</b>
<b>ALL LUNG DISEASE</b>	<b>107,736</b>	<b>115,074</b>	<b>222,810</b>	<b>8.33%</b>

Note: “% All YLDs” refers to the proportion of total years of life lived with disability due to any disease. Cystic fibrosis data from the Global Burden of Disease study were not included due to grouping with several other diseases that were not relevant for this report. Bronchiectasis is included under ‘other respiratory diseases’ for the Global Burden of Disease study.

Source: Institute for Health Metrics, Global Burden of Disease study 2010 (1).

Lung cancer was the leading cause of years of life lost due to premature death attributable to lung disease in Australia in 2010 (Table 1.5). Lung cancer accounted for 6.2% of all YLLs in Australia and half (50.0%) of the YLLs due to lung disease.

COPD was the cause of 28% of YLLs due to lung disease and 3.4% of YLLs overall. In terms of chronic respiratory disease, COPD contributed 80.3% of the years of life lost due to premature death.

**Table 1.5: Years of Life Lost (YLL) due to Lung disease in Australia, 2010, by sex**

Disease	Males	Females	Persons	% All YLLs
<b>CHRONIC RESPIRATORY DISEASES</b>				
COPD	45,759	32,241	<b>77,997</b>	<b>3.4%</b>
Asthma	3,490	4,444	<b>7,934</b>	<b>0.4%</b>
Interstitial lung disease and sarcoidosis	6,224	3,383	<b>9,607</b>	<b>0.4%</b>
Pneumoconiosis	1,383	188	<b>1,571</b>	<b>0.1%</b>
<b>TOTAL CHRONIC RESPIRATORY DISEASES</b>	<b>56,856</b>	<b>40,256</b>	<b>97,109</b>	<b>4.3%</b>
<b>LUNG CANCER</b>	<b>92,455</b>	<b>49,080</b>	<b>141,535</b>	<b>6.2%</b>
<b>RESPIRATORY INFECTION</b>				
Lower respiratory infections	19,256	18,058	<b>37,314</b>	<b>1.6%</b>
Tuberculosis	628	393	<b>1,021</b>	<b>0.05%</b>
<b>TOTAL RESPIRATORY INFECTION</b>	<b>19,884</b>	<b>18,451</b>	<b>38,335</b>	<b>1.65%</b>
<b>OTHER RESPIRATORY DISEASES</b>	<b>3,270</b>	<b>2,922</b>	<b>6,191</b>	<b>0.3%</b>
<b>ALL LUNG DISEASE</b>	<b>172,465</b>	<b>110,709</b>	<b>283,170</b>	<b>12.45%</b>

Note: Adding the YLL for males and females does not necessarily yield the YLL for persons. “% All YLLs” refers to the proportion of total years of life lost due to any disease. Cystic fibrosis data from the Global Burden of Disease study were not included due to grouping with several other diseases that were not relevant for this report. Bronchiectasis is included under ‘other respiratory diseases’ for the Global Burden of Disease study.

Source: Institute for Health Metrics, Global Burden of Disease study 2010 (1).

## Deaths due to Lung Disease in Australia

In Australia in 2011, lung cancer was the second most common of all causes of death among males, while COPD was the fifth most common cause of death (2). Among females, lung cancer was the fourth most common cause of death in Australia in 2011.

In 2012, there were 20,376 deaths due to lung disease in Australia, representing 13.9% of all deaths in Australia in that year (1 in 7 deaths) (Table 1.6). Lung disease was the cause of a higher proportion of male deaths (15.1%) than female deaths (12.5%).

The majority of deaths due to lung disease were attributable to lung cancer, which was the underlying cause of 8,137 deaths. Lung cancer and mesothelioma accounted for 6.0% of all deaths in Australia in 2012, with lung cancer contributing 5.5%. COPD accounted for 5,923 deaths, which represented 74.4% of deaths due to chronic respiratory disease and 4.0% of all deaths in Australia. Asthma was the underlying cause of 2.0% of all deaths from lung disease, representing 0.3% of all deaths in Australia in 2012. Respiratory infections accounted for 3,023 deaths in 2012, representing 14.8% of deaths from lung disease and 2.1% of deaths overall.

**Table 1.6: Deaths due to Lung Disease, Australia, 2012, by sex**

Disease	Males	Females	Persons	% All deaths
<b>CHRONIC RESPIRATORY DISEASES</b>				
COPD	3,292	2,631	<b>5,923</b>	<b>4.0%</b>
Interstitial lung disease and sarcoidosis	681	480	<b>1,161</b>	<b>0.8%</b>
Asthma	134	260	<b>394</b>	<b>0.3%</b>
Pneumoconiosis (mainly asbestosis and silicosis)	117	3	<b>120</b>	<b>0.08%</b>
Cystic fibrosis	12	20	<b>32</b>	<b>0.02%</b>
Bronchiectasis	116	216	<b>332</b>	<b>0.2%</b>
<b>TOTAL CHRONIC RESPIRATORY DISEASES</b>	<b>4,352</b>	<b>3,610</b>	<b>7,962</b>	<b>5.41%</b>
<b>LUNG CANCER AND MESOTHELIOMA</b>				
Lung cancer	4,882	3,255	<b>8,137</b>	<b>5.5%</b>
Mesothelioma	538	100	<b>638</b>	<b>0.4%</b>
<b>TOTAL LUNG CANCER AND MESOTHELIOMA</b>	<b>5,420</b>	<b>3,355</b>	<b>8,775</b>	<b>6.0%</b>
<b>RESPIRATORY INFECTION</b>				
Lower respiratory infections	1,264	1,737	<b>3,001</b>	<b>2.04%</b>
Pertussis (whooping cough)	3	0	<b>3</b>	<b>0.002%</b>
Tuberculosis	13	6	<b>19</b>	<b>0.01%</b>
<b>TOTAL RESPIRATORY INFECTION</b>	<b>1,280</b>	<b>1,743</b>	<b>3,023</b>	<b>2.06%</b>
<b>OTHER RESPIRATORY DISEASES</b>	<b>279</b>	<b>337</b>	<b>616</b>	<b>0.4%</b>
<b>TOTAL DEATHS due to ALL LUNG DISEASE</b>	<b>11,331</b>	<b>9,045</b>	<b>20,376</b>	<b>13.9%</b>

Notes: All diseases classified using ICD-10 codes (see Appendix table A1.1).

Source: Causes of death, Australia, 2012 (3).

## Conclusion

Lung diseases are a major contributor to disability, premature mortality and health care utilisation in Australia. The burden is evident in people of all ages although is greatest in the young and the elderly.

## CHAPTER 2. CHRONIC RESPIRATORY DISEASES

In this chapter of the report, we present information on the prevalence, burden and health care utilisation attributed to 'chronic respiratory diseases', by summarising information about asthma, COPD, pneumoconiosis, cystic fibrosis, interstitial lung disease and bronchiectasis.

Chronic respiratory diseases accounted for:

- 7,962 deaths in 2012 (5.41% of all deaths in Australia)
- 97,109 years of life lost due to premature death (in 2010)
- Over 300,000 DALYs in 2010
- 117,391 hospitalisations in 2011-12 (1.26% of all hospitalisations)
- 579,910 patient-days in 2011-12 (2.09% of all patient-days)

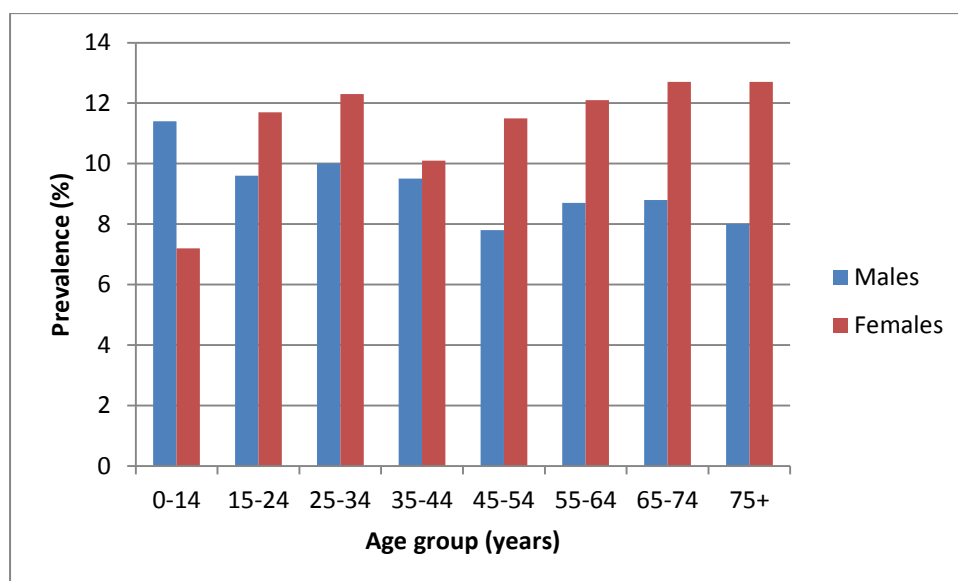
### 2.1 Asthma

People with asthma experience breathlessness, chest tightness and episodes of wheezing, which are associated with narrowing of the airways. Asthma affects people of all ages and represents a substantial burden on the community, particularly among children.

#### Prevalence of asthma

In 2011-12, it was estimated that approximately 2.3 million people had asthma, representing 10.2% of the Australian population (4). While the overall prevalence of asthma is similar in males (1,047,300 males; 9.5%) and females (1,207,400 females; 10.9%), the pattern differs with age (Figure 2.1). The prevalence of asthma is higher in boys aged 0-14 years (11.4%) compared to girls of the same age (7.2%) and higher in women compared to men from the age of 15 years onwards. Among those aged 75 years and over, approximately 12.7% of females reported having the condition compared to 8% of males.

Figure 2.1: Prevalence of asthma, Australia, 2011-12, by sex



Note: Based on self-reported doctor-diagnosed asthma and symptoms or treatment for asthma in the last 12 months.

Source: 2011-12 Australian Health Survey (4).



## Health care utilisation due to asthma

Asthma was managed at 2.2% of patient-GP encounters (visits) in 2012-13 (5).

In 2011-12, in Australia, there were 38,681 hospitalisations with a principal diagnosis of asthma (Table 2.1). This represented 0.4% of all hospitalisations in Australia in that year and 173 hospitalisations per 100,000 people. The rate of hospitalisations for asthma was highest among children aged 0-14 years, among whom the rate was 510 per 100,000 people, and was particularly high in young boys (628 per 100,000 boys aged 0-14 years) (Figure 2.2). After the age of 15 years, females have a higher rate of hospitalisation for asthma than males. This reflects the pattern of prevalence of the disease by age and sex.

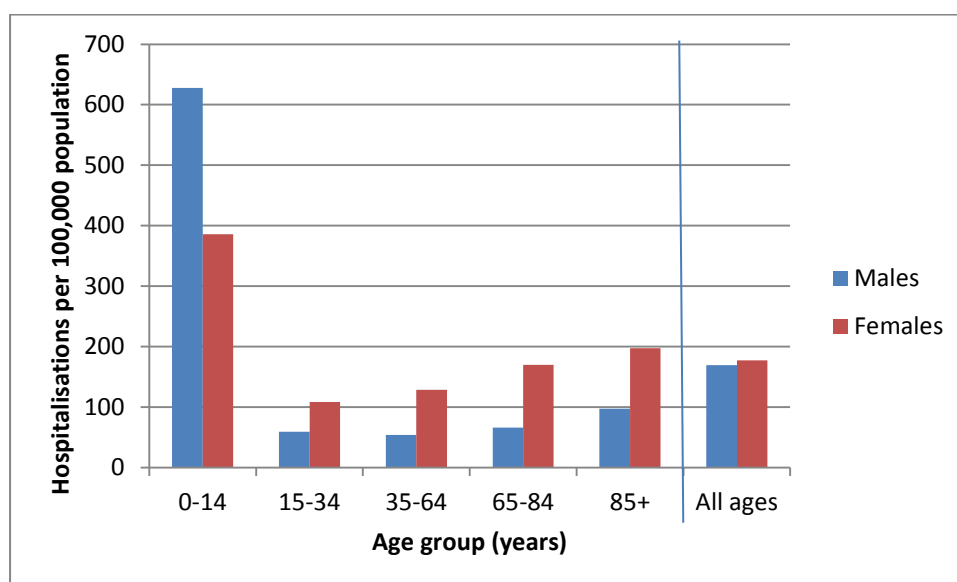
**Table 2.1: Number and rate of hospitalisations for asthma, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons	Males	Females	Persons
	<b>Number of hospitalisations</b>			<b>Rate (per 100,000 population)</b>		
<b>0-14</b>	13,639	7,955	<b>21,594</b>	627.9	385.9	<b>510.1</b>
<b>15-34</b>	1,876	3,336	<b>5,212</b>	59.0	108.3	<b>83.3</b>
<b>35-64</b>	2,326	5,667	<b>7,993</b>	53.5	128.4	<b>91.3</b>
<b>65-84</b>	842	2,383	<b>3,225</b>	65.8	169.8	<b>120.1</b>
<b>85 and over</b>	135	522	<b>657</b>	97.1	197.3	<b>162.8</b>
<b>ALL AGES</b>	<b>18,818</b>	<b>19,863</b>	<b>38,681</b>	<b>169.3</b>	<b>177.0</b>	<b>173.1</b>

Note: Asthma classified according to ICD-10-AM codes J45 and J46.

Source: AIHW hospitals principal diagnosis data cubes.

**Figure 2.2: Hospitalisations for asthma per 100,000 population, Australia, 2011-12, by sex**



Note: Asthma classified according to ICD-10-AM codes J45 and J46.

Source: AIHW hospitals principal diagnosis data cubes.

There were 81,623 hospital patient-days attributed to asthma in 2011-12 (Table 2.2). There were more hospital patient-days for asthma among females (49,411) than males (32,212).

**Table 2.2: Number and rate of hospital patient-days for asthma, Australia, 2011-12, by sex**

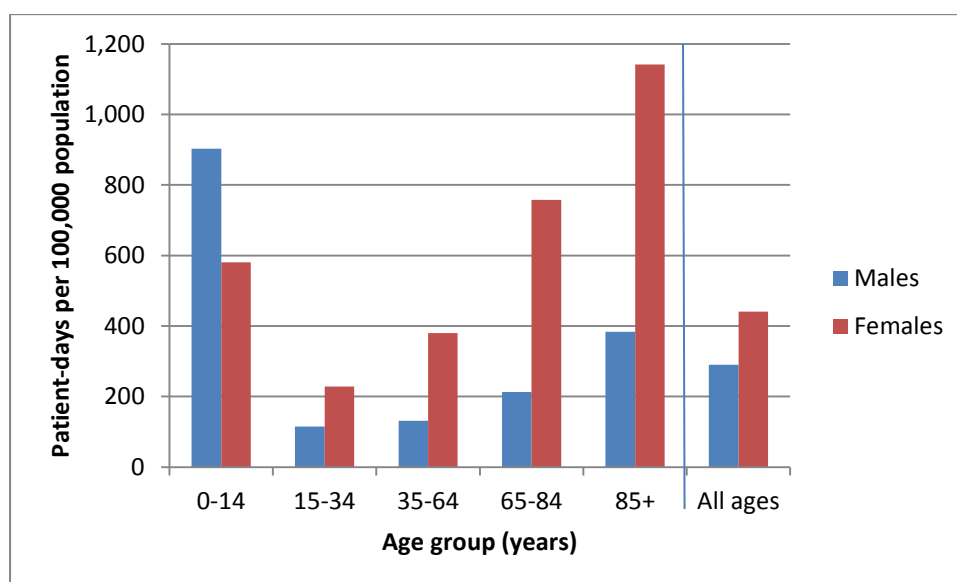
Age group (years)	Males	Females	Persons	Males	Females	Persons
	<b>Number of patient days</b>			<b>Rate (per 100,000 population)</b>		
<b>0-14</b>	19,617	11,974	<b>31,591</b>	903.1	580.9	<b>746.2</b>
<b>15-34</b>	3,650	7,035	<b>10,685</b>	114.8	228.5	<b>170.7</b>
<b>35-64</b>	5,685	16,754	<b>22,439</b>	130.8	379.6	<b>256.2</b>
<b>65-84</b>	2,726	10,628	<b>13,354</b>	212.9	757.1	<b>497.5</b>
<b>85+</b>	534	3,020	<b>3,554</b>	384.0	1141.6	<b>880.6</b>
<b>ALL AGES</b>	<b>32,212</b>	<b>49,411</b>	<b>81,623</b>	<b>289.7</b>	<b>440.3</b>	<b>365.4</b>

Note: Asthma classified according to ICD-10-AM codes J45 and J46.

Source: AIHW hospitals principal diagnosis data cubes.

Overall, the rate of hospital patient-days for asthma in Australia in 2011-12 was 290 per 100,000 population among males and 440 per 100,000 among females (Table 2.2; Figure 2.3). Among children, the rate of hospital patient-days was 903 per 100,000 population among boys and 581 per 100,000 population among girls aged 0-14 years. In older Australians, the rate of hospital patient-days for asthma was much higher in females compared to males, particularly among those aged 65-84 years where the rate among women (757 per 100,000 population) was 3.5 times higher than that among men (213 per 100,000 population).

**Figure 2.3: Hospital patient-days for asthma per 100,000 population, Australia, 2011-12, by sex**



Note: Asthma classified according to ICD-10-AM codes J45 and J46.

Source: AIHW hospitals principal diagnosis data cubes.

### Burden (DALYs) attributed to asthma

In 2010, asthma accounted for 116,632 DALYs which represented 2.3% of total DALYs in Australia (Table 2.3). Overall, the burden was higher in females (2.6%) compared to males (2.1%) and much higher in children compared to adults.

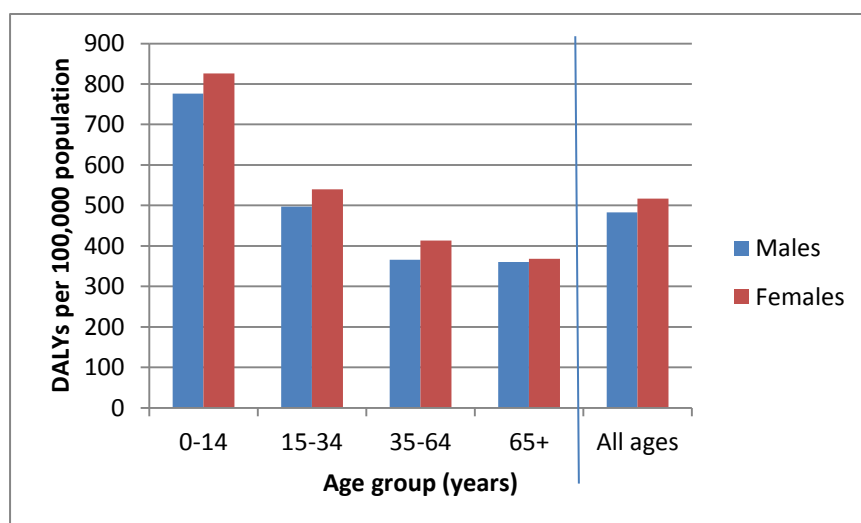
**Table 2.3: Burden (number (%) of DALYs) attributed to asthma, Australia, 2010, by age and sex**

Age group (years)	Males	Females	Persons
1-4	1,172 (3.8)	1,168 (4.5)	2,339 (4.1)
5-9	6,879 (19)	6,896 (23)	13,775 (21)
10-14	8,814 (17)	8,957 (18)	17,771 (18)
15-19	6,018 (7.3)	6,144 (8.5)	12,162 (7.8)
20-24	4,173 (3.9)	4,314 (5.0)	8,487 (4.4)
25-29	3,158 (2.7)	3,382 (3.4)	6,540 (3.0)
30-34	2,466 (2.1)	2,784 (2.7)	5,249 (2.4)
35-39	2,499 (1.9)	2,866 (2.3)	5,366 (2.1)
40-44	2,583 (1.8)	2,858 (2.2)	5,441 (2.0)
45-49	2,752 (1.6)	3,206 (2.1)	5,958 (1.8)
50-54	2,776 (1.5)	3,197 (1.9)	5,973 (1.7)
55-59	2,670 (1.3)	3,092 (1.8)	5,762 (1.5)
60-64	2,630 (1.1)	3,036 (1.6)	5,666 (1.3)
65-69	2,132 (1.0)	2,415 (1.5)	4,547 (1.2)
70-74	1,682 (0.8)	2,024 (1.3)	3,706 (1.0)
75-79	1,300 (0.7)	1,711 (1.0)	3,012 (0.8)
<b>ALL AGES</b>	<b>55,421 (2.1)</b>	<b>61,211 (2.6)</b>	<b>116,632 (2.3)</b>

Source: Institute for Health Metrics and Evaluation, University of Washington, GBD cause patterns.

Among children aged 0-14 years, there were 16,865 DALYs attributed to asthma among boys (equivalent to 776 per 100,000 population) and 17,021 DALYs among girls (826 per 100,000 population). Among those aged 65 years and over, there were 5,115 DALYs due to asthma among men (5,115 per 100,000 population) and 6,150 among women (6,150 per 100,000 population; Figure 2.4).

**Figure 2.4: Burden (DALYs) due to asthma per 100,000 population, Australia, 2010, by age and sex**

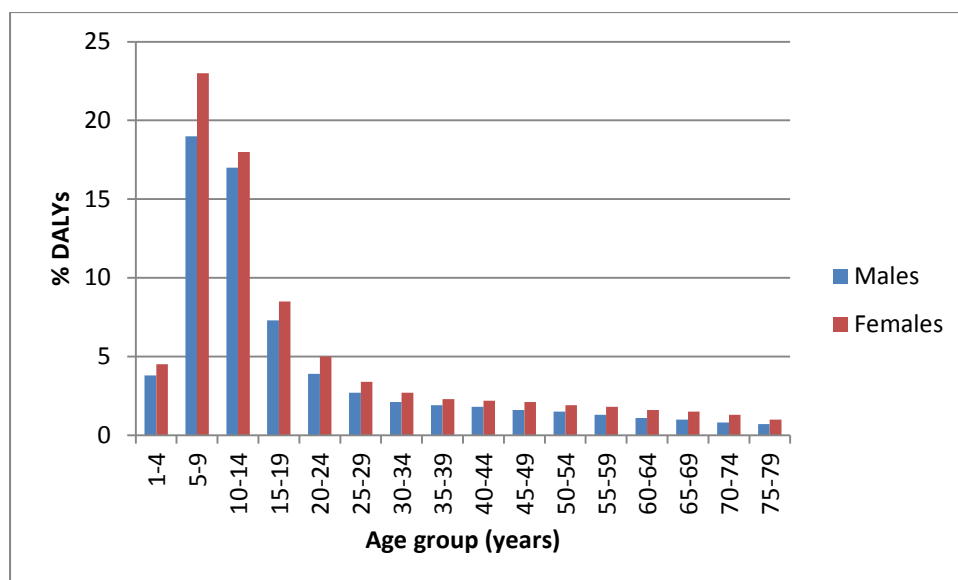


Source: Institute for Health Metrics and Evaluation, University of Washington, GBD cause patterns.

Asthma represented 19% of the total burden of disease among boys and 23% among girls aged 5-9 years. Among children aged 10-14 years, asthma accounted for 17% and 18% of the total burden among boys and girls, respectively (Figure 2.5).

In contrast, asthma represented less than 2% of the total burden of disease among males and females aged 50 years or more. Among those aged 35-64 years, asthma accounted for 18,255 DALYs among females and 15,911 DALYs among males. See also Figure 1.1.

**Figure 2.5: Percent of total burden (DALYs) due to asthma, Australia, 2010, by age and sex**



Source: Institute for Health Metrics and Evaluation, University of Washington, GBD cause patterns.

Asthma contributes the highest proportion of years lived with disability (YLD) of all lung diseases (see Table 1.4). This is because asthma affects people of all ages, rather than affecting a predominantly older population (as with other chronic respiratory diseases such as COPD) and because asthma deaths occur mostly in older people. Therefore, there is the possibility of living with asthma (and with its associated disability) for a long period of time.

In 2010, asthma was responsible for 108,698 years of living with disability, that is, 108,698 years lived with less than perfect health. Of all years lived with disability due to any disease, asthma accounted for 4.0%.

**Table 2.4: Percent of total YLD, YLL and DALYs due to asthma, Australia, 2010, by age**

Age group (years)	% all YLD	% all YLL	% all DALYs
1-4	6.6	0.4	<b>4.1</b>
5-9	24.0	0.7	<b>21.0</b>
10-14	20.0	1.5	<b>18.0</b>
15-19	10.0	0.6	<b>7.8</b>
20-24	5.7	0.6	<b>4.4</b>
25-29	3.8	0.6	<b>3.0</b>
30-34	3.0	0.5	<b>2.4</b>
35-39	2.7	0.5	<b>2.1</b>
40-44	2.6	0.6	<b>2.0</b>
45-49	2.5	0.5	<b>1.8</b>
50-54	2.5	0.4	<b>1.7</b>
55-59	2.4	0.4	<b>1.5</b>
60-64	2.3	0.4	<b>1.3</b>
65-69	2.2	0.3	<b>1.2</b>
70-74	2.0	0.3	<b>1.0</b>
75-79	1.9	0.2	<b>0.8</b>
<b>ALL AGES</b>	<b>4.0</b>	<b>0.4</b>	<b>2.3</b>

Source: Institute for Health Metrics and Evaluation, University of Washington, GBD cause patterns.

### Deaths due to asthma

About 1 in 50 deaths due to lung disease are attributed to asthma. In 2012, there were 394 deaths due to asthma in Australia, which represented 0.27% of all deaths in Australia in that year (3). There were 134 deaths due to asthma among males (representing 0.18% of all deaths among males) and 260 deaths due to asthma among females (representing 0.36% of all deaths among females).

### Risk factors for asthma

Risk factors for the development of asthma include:

- a family history of asthma, eczema or allergic rhinitis
- exposure to environmental tobacco smoke in utero or in infancy
- the presence of allergic disease (including allergic rhinitis or eczema) early in life
- exposure to occupational sensitisers or irritants (e.g. chemicals).

Furthermore, among people with asthma, symptoms and airway narrowing can be triggered by viral infections, irritants (for example tobacco smoke and other air pollutants), airborne allergen exposure (for example house dust mites, pollens, mould spores, animal dander), occupational sensitisers and irritants, certain food chemicals or additives and exercise.

## 2.2 Chronic Obstructive Pulmonary Disease (COPD)

Chronic obstructive pulmonary disease (COPD) is a progressive, long-term disease of the lungs that mainly affects older people. COPD is characterised by airflow limitation that is not fully reversible with bronchodilator medications. In everyday language COPD is often referred to as emphysema or chronic bronchitis.

People with COPD experience shortness of breath, which occurs initially on strenuous exertion but in time with minimal or no exertion, as well as cough and wheeze. COPD is commonly associated with comorbidities such as cardiovascular disease and diabetes mellitus, sometimes because of shared outcomes from common risk factors, such as smoking, but also because of systemic effects of COPD (6, 7).

### Prevalence of COPD

In 2011-12, the Australian Health Survey estimated that 529,100 people had self-reported that they had a diagnosis of emphysema, chronic bronchitis or COPD (4). The prevalence of COPD increases with age. Among those aged 55-64, 65-74 and 75 years and over, approximately 4.6%, 6.5% and 6.7% of Australians, respectively, reported having COPD as a long-term condition.

The Burden of Obstructive Lung Disease (BOLD) study estimated, based on lung function testing, that 7.5% (95% CI 5.7-9.4) of Australians aged 40 years and over and 29.2% (95% CI 18.1-40.2) of people aged 75 years and over had COPD, defined as post-bronchodilator forced expiratory volume in one second ( $FEV_1$ ) to forced vital capacity (FVC) ratio of 0.70 or less and post-bronchodilator  $FEV_1$  less than 80% of the predicted value for their age and sex (GOLD Stage II or higher) (8). That equates to over 770,000 Australians, including 410,000 people aged 75 years and over (2011 population). In total, 1.49 million (14.5%) Australians aged 40 years and over had airflow limitation defined as  $FEV_1/FVC$  ratio of  $<0.7$  (8).

However, fewer people reported ever being diagnosed with chronic bronchitis, emphysema or COPD, with only 5.2% (95% CI 4.2-6.2%) of people aged 40 years and over (approx. 534,000 people) and 6.2% (95% CI 3.5-8.9%) of people aged 75 years and over (87,000 people) reporting ever being diagnosed.

### Health care utilisation due to COPD

COPD was managed at 0.5% of general practice encounters in 2012-13 (5).

The next section of the report presents statistics about hospitalisations due to COPD among those aged 55 years and over, since the condition mainly affects older people.

In 2011-12 there were 59,265 hospitalisations for COPD among people aged 55 years and over in Australia. This represented 1.2 % of all hospitalisations and 1,049 hospitalisations per 100,000 people aged 55 years and over in Australia in that year.

**Table 2.4: Number & rate of hospitalisations for COPD, people aged 55+, Australia, 2011-12, by sex**

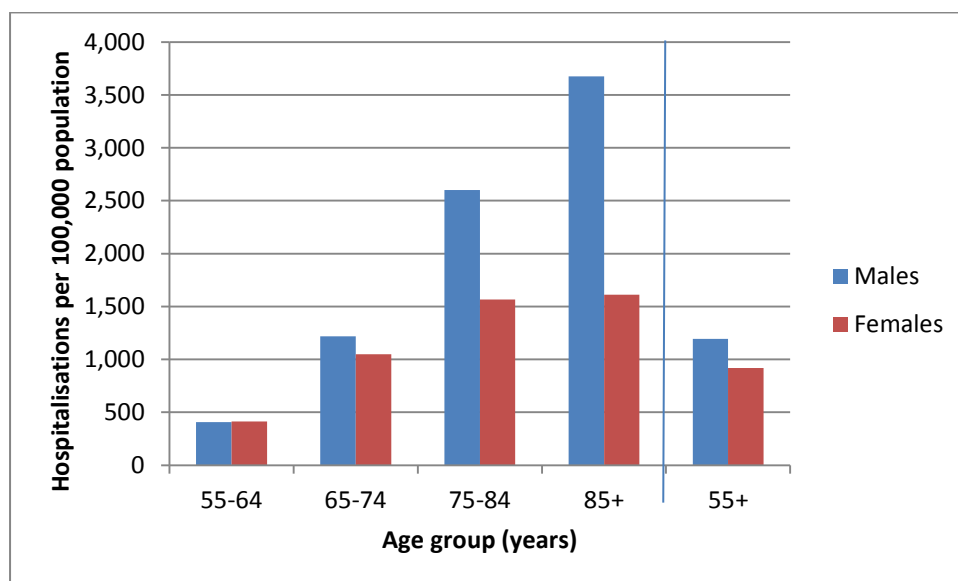
Age group (years)	Males	Females	Persons	Males	Females	Persons
	<b>Number of hospitalisations</b>			<b>Rate (per 100,000 population)</b>		
55-64	5,182	5,315	<b>10,497</b>	407	412	<b>410</b>
65-74	10,140	8,905	<b>19,045</b>	1,219	1,047	<b>1,132</b>
75-84	11,675	8,673	<b>20,348</b>	2,600	1,567	<b>2,030</b>
85+	5,111	4,264	<b>9,375</b>	3,675	1,612	<b>2,323</b>
<b>ALL PEOPLE AGED 55+</b>	<b>32,108</b>	<b>27,157</b>	<b>59,265</b>	<b>1,192</b>	<b>918</b>	<b>1,049</b>

Note: COPD classified according to ICD-10-AM codes J40- J44.

Source: AIHW hospitals principal diagnosis data cubes.

The rate of hospitalisations for COPD in 2011-12 increased with age (Table 2.4; Figure 2.6). The rate was higher among males (1,192 per 100,000 males aged 55 and over) compared to females (918 per 100,000 females aged 55 and over). The disparity in the hospitalisation rate for COPD between males and females was greatest among those aged 85 years and over. In this age group, the rate of hospitalisations for COPD was more than twice as high among males (3,675 per 100,000 males aged 85 and over) compared to females (1,612 per 100,000 females aged 85 and over).

**Figure 2.6: Hospitalisations for COPD per 100,000 population, people aged 55 years and over, Australia, 2011-12, by sex**



Note: COPD classified according to ICD-10-AM codes J40-J44.

Source: AIHW hospitals principal diagnosis data cubes.

In 2011-12, there were 365,760 patient-days for COPD among people aged 55 years and over. Males had more patient-days due to COPD (193,028) than females (172,732).

Overall, the rate of patient-days for COPD was 7,168 per 100,000 population age 55 years and over among males and 5,841 per 100,000 population age 55 years and over among females.

**Table 2.5: Number and rate of hospital patient-days for COPD, people aged 55 years and over, Australia, 2011-12, by sex**

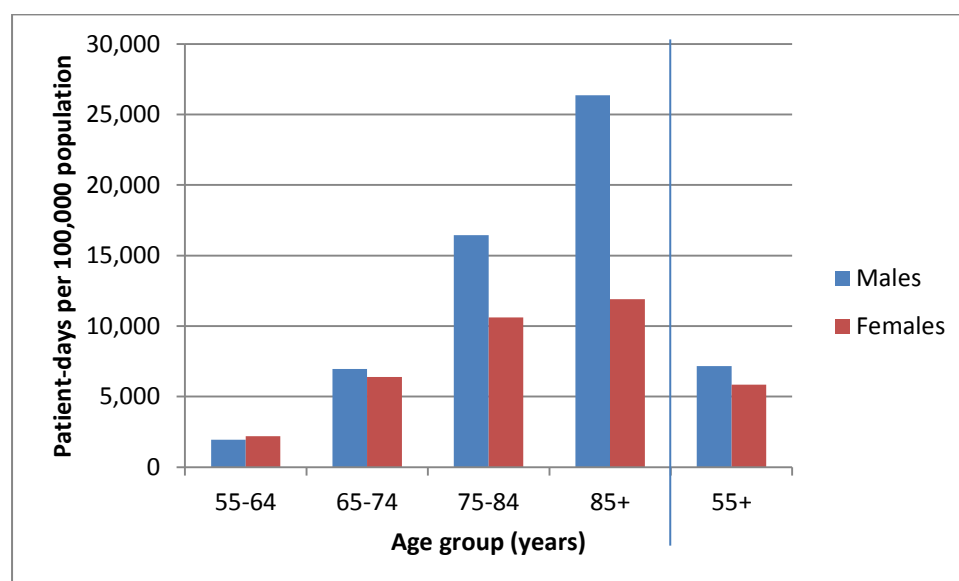
Age group (years)	Males	Females	Persons	Males	Females	Persons
	<b>Number of patient-days</b>			<b>Rate (per 100,000 population)</b>		
55-64	24,728	28,194	<b>52,922</b>	1,942	2,188	<b>2,066</b>
65-74	57,817	54,370	<b>112,187</b>	6,953	6,394	<b>6,670</b>
75-84	73,828	58,700	<b>132,528</b>	16,443	10,607	<b>13,221</b>
85+	36,655	31,468	<b>68,123</b>	26,357	11,896	<b>16,879</b>
<b>ALL PEOPLE AGED 55+</b>	<b>193,028</b>	<b>172,732</b>	<b>365,760</b>	<b>7,168</b>	<b>5,841</b>	<b>6,474</b>

Note: COPD classified according to ICD-10-AM codes J40- J44. Data included here are only for people aged 55 years and over, but this includes 95% of all patient-days attributed to COPD among males and 93% of all patient-days attributed to COPD for females.

Source: AIHW hospitals principal diagnosis data cubes.

Among males, the rate of patient-days for COPD increased with increasing age and was highest in males aged 85 years and over (26,357 per 100,000 population). The disparity between the rate of patient-days for COPD between males and females also increased with age. Among those aged 55-64 years, there were similar rates of hospital patient-days for COPD for males (1,942 per 100,000 population) and females (2,188 per 100,000 population) but among those aged 85 years and over, the rate among males (26,357 per 100,000 population) was more than double the rate among females (11,896 per 100,000 population).

**Figure 2.7: Patient-days for COPD per 100,000 population, people aged 55 and over, Australia, 2011-12, by sex**



Note: COPD classified according to ICD-10-AM codes J40-J44.

Source: AIHW hospitals principal diagnosis data cubes.

### Burden (DALYs) attributed to COPD

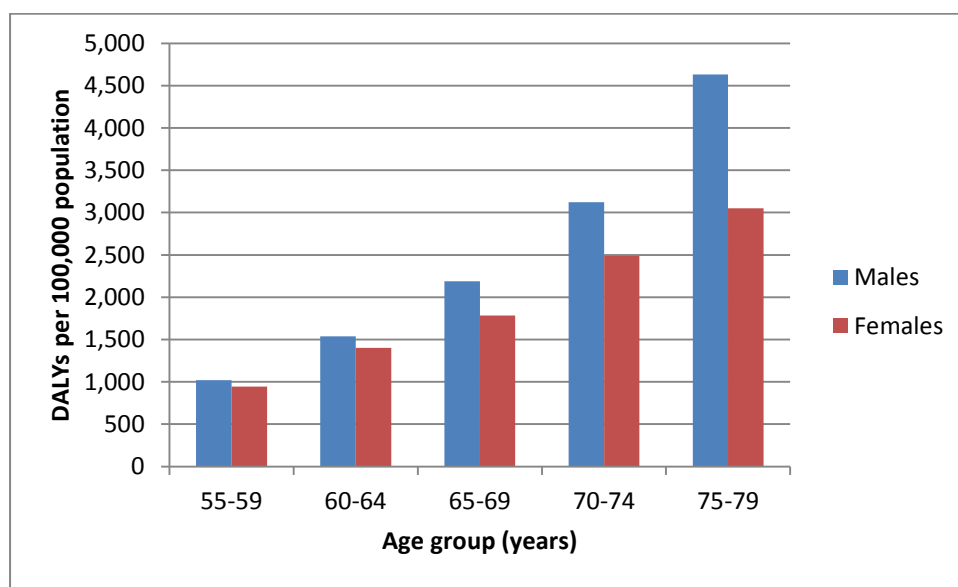
Among older Australians, the burden of COPD represents one of the major components of the total burden of lung disease (see Figure 1.1). In 2010, it was estimated that COPD accounted for 169,862 DALYs, which represented 3.4% of the total DALYs in Australia and one third of the burden due to



lung disease. The burden was higher in males (90,434 DALYs) than females (79,428 DALYs) and increased with age (Figure 2.8).

COPD accounted for 3.4% of total DALYs among those aged 55-59 years and 5.8% of total DALYs among those aged 75-79 years. Among those aged 55 years and over, there were 91,563 DALYs due to COPD, including 49,666 DALYs among males and 41,897 DALYs among females.

**Figure 2.8: Burden (DALYs) due to COPD per 100,000 population, people aged 55 and over, Australia, 2010, by age and sex**



Source: Institute for Health Metrics and Evaluation, University of Washington, GBD cause patterns.

### Deaths due to COPD

Approximately 1 in 3 deaths due to lung disease in Australia are attributed to COPD.

In 2012, there were 5,923 deaths due to COPD in Australia (all ages), which represented 4.0% of all deaths in Australia in that year. There were 3,292 deaths due to COPD among males (representing 4.4% of all deaths among males) and 2,631 deaths due to asthma among females (representing 3.6% of all deaths among females).

In Australia in 2011, there were 5,767 deaths due to COPD among people aged 55 and over (102 per 100,000 people aged 55+), which represented 4.4% of all deaths in that age group in that year (9).

### Risk factors for COPD

The predominant cause of COPD is tobacco smoking (10), although COPD can also occur in non-smokers, which indicates that genetic and/or other environmental factors are also likely to be involved.

A diagnosis of COPD is more likely in individuals with a history of childhood respiratory infections, pulmonary tuberculosis, or chronic asthma and among those who have been exposed to occupational fumes and dusts, biomass fuels or outdoor air pollution (11).

## 2.3 Pneumoconiosis

Pneumoconiosis is an occupational lung disease that leads to restriction of the lungs. The disease is caused by the inhalation of mineral dust or inorganic particles. Most affected people have been exposed to these dusts in the course of mining or tunnelling work. The most common forms of pneumoconiosis that occur in Australia are asbestosis and silicosis. The disease can be prevented by adequate occupational health and safety controls that limit exposure at work to these harmful dusts.

Pneumoconiosis is a disease with a long latency and in the early stages those who have the disease are asymptomatic. However, as the disease progresses it is associated with significant breathlessness causing disability and, for many, premature death (12).

### Prevalence of Pneumoconiosis

There are no nationally representative datasets that allow for the estimate of the prevalence of pneumoconiosis in Australia.

In the absence of these data there are two data sources that can provide information about notifications about this disease. The Surveillance and Australian Workplace Based Respiratory Events (SABRE) collected data from Victoria and Tasmania since 1997 and New South Wales from 2001. The National Data Set for Compensation-based Statistics (NDSCS) is maintained by The National Occupational Health and Safety Commission (NOHSC). However, it is important to note that these systems rely on voluntary notification and do not represent a complete enumeration of cases.

Reports from SABRE in NSW showed there were 366 notified cases of asbestosis and 87 notified cases of silicosis from 2001 to July 2008 (website data, no longer accessible, but cited in AIHW report referenced below). In Victoria and Tasmania, there were around 90 SABRE notifications of pneumoconiosis from 1999 to 2005 (Report by Sim et al. 2005 original unavailable but cited in AIHW report referenced here (13)). Data from the NDSCS that was reported in the Compendium of Workers' Compensation Statistics Australia 2005–06 showed that there were 245 successful compensation claims for asbestosis and 20 claims for silicosis in 2004–05.

### Health care utilisation due to pneumoconiosis

This section of the report presents statistics about hospitalisations due to pneumoconiosis. It is limited to people aged 30 years and over, since the condition only affects adults.

In 2011-12 there were 197 hospitalisations for pneumoconiosis among people aged 30 years and over in Australia, with a clear predominance of men being hospitalised.

**Table 2.6: Number of hospitalisations for pneumoconiosis, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons
30-34	0	1	1
35-44	2	1	3
45-54	3	0	3
55-64	13	3	16
65-74	60	4	64
75-84	81	2	83
85+	26	1	27
<b>ALL PEOPLE AGED 30+</b>	<b>185</b>	<b>12</b>	<b>197</b>

Note: Pneumoconiosis classified according to ICD-10-AM codes J60-J65.

Source: AIHW hospitals principal diagnosis data cubes.

There were 1.47 hospitalisations for pneumoconiosis per 100,000 adults aged 30+ years.

In 2011-12, there were 1,040 patient-days for pneumoconiosis among people aged 30 years and over. Males had many more patient-days due to pneumoconiosis (985) than females (55).

**Table 2.7: Number of patient-days for pneumoconiosis, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons
30-34	0	26	26
35-44	13	1	14
45-54	14	0	14
55-64	42	10	52
65-74	271	15	286
75-84	480	2	482
85+	165	1	166
<b>ALL PEOPLE AGED 30+</b>	<b>985</b>	<b>55</b>	<b>1040</b>

Note: Pneumoconiosis classified according to ICD-10-AM codes J60-J65.

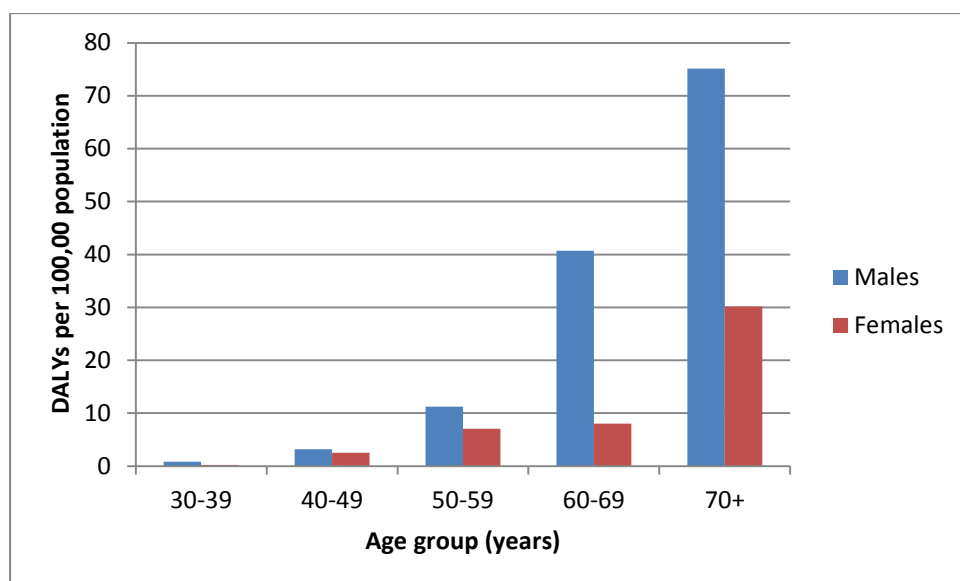
Source: AIHW hospitals principal diagnosis data cubes.

There were 7.77 patient days due to pneumoconiosis per 100,000 adults aged 30+ years.

### **Burden (DALYs) attributed to pneumoconiosis**

The burden of disease of pneumoconiosis is most apparent in at older ages. It is estimated that pneumoconiosis accounts for 1,959 DALYs in Australia with the burden being more than double in males (1,369 DALYs) than in females (589 DALYs).

**Figure 2.9: Burden (DALYs) per 100,000 adults due to pneumoconiosis, Australia, 2010, by age and sex**



### Deaths due to pneumoconiosis

In 2012, there were 120 deaths (0.14 per 100,000 adults aged 30 or more years) attributed to pneumoconiosis in Australia, with males accounting for 117 (97.5%) of the deaths.

## 2.4 Interstitial lung disease

Interstitial lung disease refers to over 200 entities that affect the interstitium of the lung. They share similar radiological and clinical characteristics.

There are no nationally representative datasets with which to calculate an Australian prevalence (14).

### Health care utilisation due to interstitial lung disease

In 2011-12 there were 4,050 hospitalisations due to interstitial lung disease. The number of hospitalisations increased with age.

**Table 2.8: Number and rate of hospitalisations for interstitial lung disease, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons	Male	Female	Persons
	<b>Number of hospitalisations</b>			<b>Rate (per 100,000 population)</b>		
0-14	16	16	32	0.7	0.8	0.8
15-34	43	71	114	1.4	2.3	1.8
35-64	461	379	840	10.6	8.6	9.6
65+	1,675	1,389	3064	118.0	83.3	99.2
<b>ALL PEOPLE</b>	<b>2,195</b>	<b>1,855</b>	<b>4,050</b>	<b>19.7</b>	<b>16.5</b>	<b>18.1</b>

Note: Interstitial Lung Disease classified according to ICD-10-AM codes D86.0, D86.2, D86.9, J84.

Source: AIHW hospitals principal diagnosis data cubes.

In 2011-12 there were 28,232 patient-days due to interstitial lung disease with males and females being fairly evenly represented. The number of patient-days spent in hospital increased with age.

**Table 2.9: Number of and rate patient-days for interstitial lung disease, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons	Male	Female	Persons
	Number of patient days			Rate (per 100,000 population)		
0-14	133	54	32	6.1	2.6	4.4
15-34	82	195	114	2.6	6.3	4.4
35-64	2,211	1,821	840	50.9	41.3	46.0
65+	12,753	10,983	3064	898.4	658.3	768.7
<b>ALL PEOPLE</b>	<b>15,179</b>	<b>13,053</b>	<b>28,232</b>	<b>137.5</b>	<b>116.3</b>	<b>126.4</b>

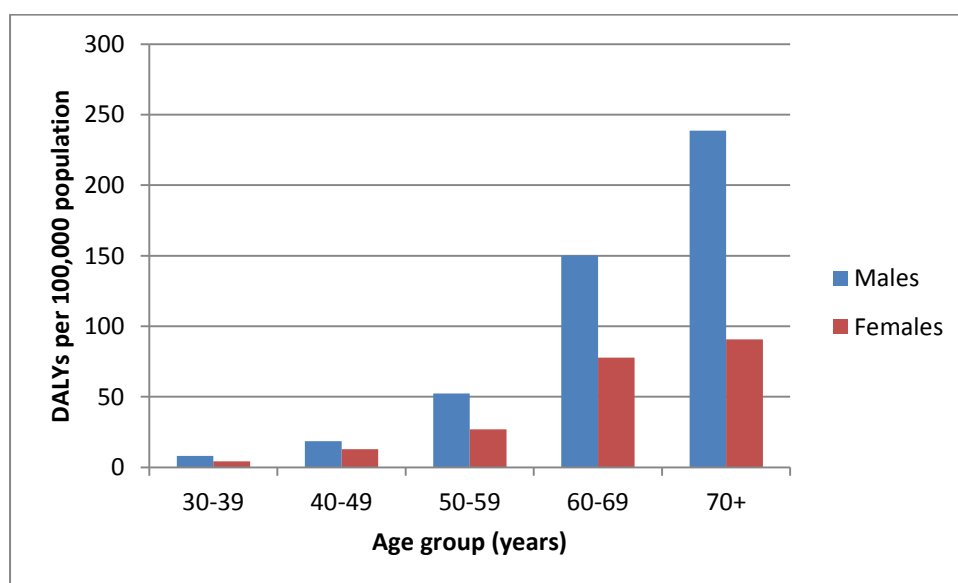
Note: Interstitial Lung Disease classified according to ICD-10-AM codes D86.0, D86.2, D86.9, J84.

Source: AIHW hospitals principal diagnosis data cubes.

### Burden (DALYs) attributed to interstitial lung disease

The burden of disease of interstitial lung disease is most apparent in the adult age range from 30 years and older. It is estimated that interstitial lung disease overall accounts for 7,611 DALYs in Australia. The burden is 140 DALYs in ages less than 30 years. The burden due to interstitial lung disease is more than double in males (5,032 DALYs) than in females (2,578 DALYs).

**Figure 2.10: Burden (DALYs) per 100,000 adults due to interstitial lung disease, Australia, 2010, by age and sex**



### Deaths due to interstitial lung disease

In 2012, there were 1,161 (5.2 per 100,000 population) deaths due to interstitial lung disease in Australia, with males accounting for 681 (58.7%) of the deaths.

## 2.5 Cystic fibrosis

Cystic fibrosis is a recessively inherited (genetic) condition that mostly affects the lungs and digestive system but has a range of other manifestations. In the lungs the secretions are thicker and less able to be cleared which means that patients with this condition are predisposed to the development of infections. It often leads to airflow limitation (obstruction) and bronchiectasis. The disease is present from birth but is sometimes not diagnosed until some months or years after birth.

In Australia, one in 2,500 babies is born with Cystic Fibrosis (data cited on <http://www.cysticfibrosis.org.au/all/learn/>). The Australian Cystic Fibrosis Data Registry (ACFDR) held records of 3,156 people of all ages with cystic fibrosis at 31 December 2012.

### Health care utilisation due to cystic fibrosis

In 2011-2012 there were 4,040 hospitalisations due to cystic fibrosis with males and females being fairly evenly represented. The number of hospitalisations decreased with age reflecting the reduced life expectancy of people with cystic fibrosis.

**Table 2.10: Number and rate of hospitalisations for cystic fibrosis, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons	Male	Female	Persons
	Number of hospitalisations			Rate (per 100,000 population)		
0-14	461	479	940	21.2	23.2	22.2
15-34	1,080	1,198	2,278	34.0	38.9	36.4
35-64	440	373	813	10.1	8.5	9.3
65+	1	8	9	0.1	0.5	0.3
<b>ALL PEOPLE</b>	<b>1,982</b>	<b>2,058</b>	<b>4,040</b>	<b>17.8</b>	<b>18.3</b>	<b>18.1</b>

Note: Cystic fibrosis classified according to ICD-10-AM code E84.

Source: AIHW hospitals principal diagnosis data cubes.

In 2011-2012 there were 43,231 patient-days due to cystic fibrosis with the males and females being fairly evenly represented. The number of patient-days spent in hospital decreased with age.

**Table 2.11: Number and rate of hospital patient-days for cystic fibrosis, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons	Male	Female	Persons
	Number of patient days			Rate (per 100,000 population)		
0-14	3,495	4,150	7,645	160.9	201.3	180.6
15-34	11,525	13,294	24,819	362.4	431.8	396.5
35-64	5,710	4,995	10,705	131.4	113.2	122.2
65+	2	60	62	0.1	3.6	2.0
<b>ALL PEOPLE</b>	<b>20,732</b>	<b>22,499</b>	<b>43,231</b>	<b>186.5</b>	<b>200.5</b>	<b>193.5</b>

Note: Cystic fibrosis classified according to ICD-10-AM code E84.

Source: AIHW hospitals principal diagnosis data cubes.

### Burden (DALYs) attributed to cystic fibrosis

In the GBD study CF is grouped under 'other endocrine, nutritional, blood and immune disorders'. There are no separate data on the burden of cystic fibrosis in the GBD study.

### Deaths due to cystic fibrosis

In 2012, there were 32 (0.14 per 100,000 population) deaths due to cystic fibrosis in Australia, with females accounting for 20 (62.5%) of the deaths.

## 2.6 Non-CF Bronchiectasis

Bronchiectasis is characterised by abnormal and irreversible dilation of the airways. Patients often have a chronic cough with the production of sputum. This disease is also associated with increased respiratory infections.

Bronchiectasis most commonly occurs together with other respiratory conditions so that it is often not the primary condition but a consequence of other respiratory conditions. There are no nationally representative datasets to estimate the prevalence of bronchiectasis. However, in a study of indigenous children the incidence rate of bronchiectasis confirmed by high resolution computerised tomography (HRCT) was estimated to be 14.7 per 1,000 indigenous children (15).

### Health care utilisation due to bronchiectasis

In 2011-12 there were 5,185 hospitalisations due to bronchiectasis. The number of hospitalisations increased with age, with a preponderance of females most notably in the older age groups.

**Table 2.12: Number and rate of hospitalisations for bronchiectasis, Australia, 2011-12, by sex**

Age group (years)	Males	Females	Persons	Male	Female	Persons
	<b>Number of hospitalisations</b>			<b>Rate (per 100,000 population)</b>		
0-14	82	89	171	3.8	4.3	4.0
15-34	138	129	267	4.3	4.2	4.3
35-64	438	633	1,071	10.1	14.3	12.2
65+	1,054	2,622	3,676	74.2	157.2	119.0
<b>ALL PEOPLE</b>	<b>1,712</b>	<b>3,473</b>	<b>5,185</b>	<b>15.4</b>	<b>30.9</b>	<b>23.2</b>

Note: Bronchiectasis classified according to ICD-10-AM code J47.

Source: AIHW hospitals principal diagnosis data cubes.

In 2011-2012 there were 36, 509 patient-days due to bronchiectasis with greater number of patient-days for females in the older age groups.

**Table 2.13: Number and rate of patient-days for bronchiectasis 2011-12, by sex**

Age group (years)	Males	Females	Persons	Male	Female	Persons
	<b>Number of patient days</b>			<b>Rate (per 100,000 population)</b>		
0-14	605	656	1,261	27.9	31.8	29.8
15-34	1,029	871	1,900	32.4	28.3	30.4
35-64	2,510	3,788	6,298	57.8	85.8	71.9
65+	7,669	19,381	27,050	540.2	1161.7	876.0
<b>ALL PEOPLE</b>	<b>11,813</b>	<b>24,696</b>	<b>36,509</b>	<b>106.2</b>	<b>220.0</b>	<b>163.4</b>

Note: Bronchiectasis classified according to ICD-10-AM code J47.

Source: AIHW hospitals principal diagnosis data cubes.

### Burden (DALYs) attributed to bronchiectasis

In the GBD study, bronchiectasis is grouped under 'other respiratory diseases'. There are no separate data on the burden of non-CF bronchiectasis in the GBD study.

### Deaths due to non-CF bronchiectasis

In 2012, there were 332 (1.5 per 100,000 population) deaths due to non-CF bronchiectasis in Australia, with females accounting for 216 (65.1%) of the deaths.

## **CHAPTER 3. LUNG CANCER AND MESOTHELIOMA**

This chapter reviews information on two major malignant neoplasms affecting the respiratory system: lung cancer and mesothelioma. Mesothelioma is a malignant neoplasm that affects the pleura (lining of the lungs), the peritoneum (lining of the gut) and pericardium (lining of the heart). Pleural mesothelioma is the most.

Included is information on the incidence, risk factors and approaches to risk reduction. Where available, we present the available data on burden of disease in Australia for lung cancer from the Global Burden of Disease Study, and information on mortality in Australia due to these malignant neoplasms. Finally we present data hospitalisation rates in Australia.

### **Risk factors**

#### **Lung Cancer**

The major risk factor for lung cancer is smoking. While active smoking is, by far, the strongest risk factor for lung cancer, there is evidence that passive smoking, that is, exposure to environmental tobacco smoke or second-hand tobacco smoke, certain chronic infections, occupational exposure to carcinogenic dust particles, in particular, asbestos, environmental air pollution, other pre-existing lung disease including COPD and pulmonary fibrosis, exposure to ionizing radiation and certain drugs are also associated with an increased risk of developing lung cancer (16).

#### **Mesothelioma**

The major risk factor for mesothelioma is exposure to asbestos. Exposure has mainly occurred through past occupational settings preceding the cessation of production using asbestos fibre products. Other environmental exposures, including domestic exposure, have also been documented.



## Incidence

### Lung Cancer

In 2010, there were 10,296 newly diagnosed cases of lung cancer reported (Table 3.1). Lung cancer does not generally affect children (data not shown), and is rare among young people. The incidence of lung cancer rises steeply with increasing age.

**Table 3.1: Number and rate of new lung cancer diagnoses, people aged 35 & over, Australia, 2010, by age & sex**

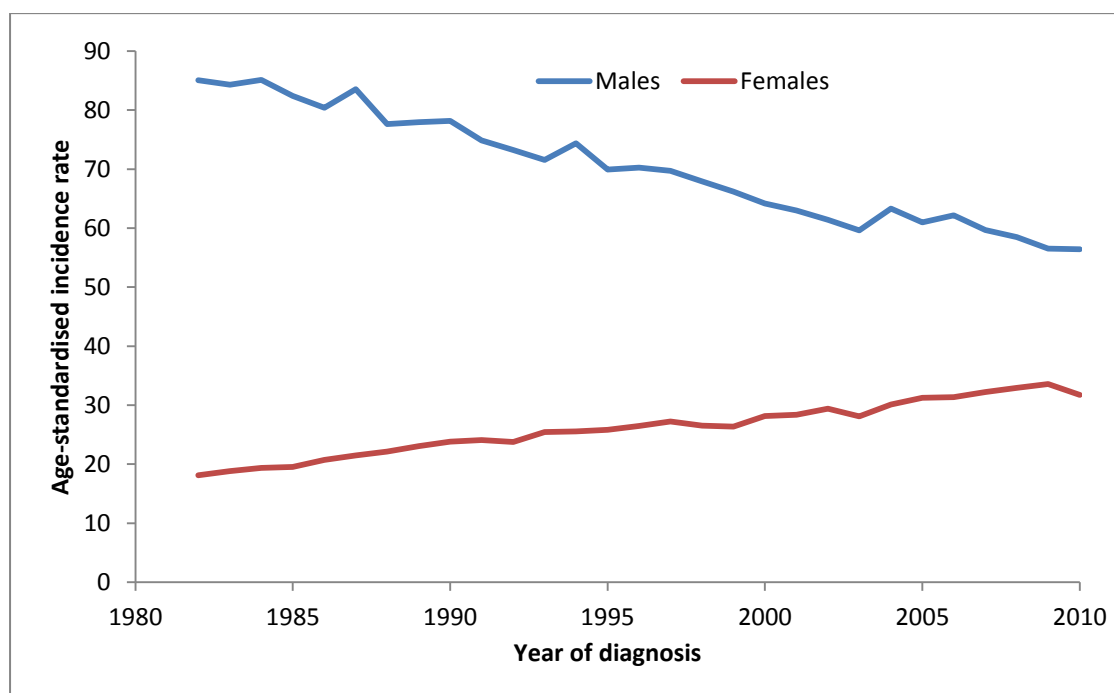
Age group (years)	Males	Females	Persons	Cases per 100,000 population
35-64	1,262	1,743	3,006	34.31
65-84	2,346	3,901	6,247	232.73
85 and over	424	591	1,015	251.55
<b>Total cases</b>	<b>4,045</b>	<b>6,251</b>	<b>10,296</b>	<b>46.09</b>

Notes: ICD-10-AM Principal diagnosis codes C33 and C34  
Total includes cases reported among persons aged less than 35 years.

Source: Australian cancer incidence and mortality book (16)  
Australian Bureau Estimated Resident Population of Australia, 2011, by age.

The incidence of lung cancer is higher in men than women. However, over the period 1982 to 2010, the incidence of lung cancer declined among males and increased among females (Figure 3.1). This is likely to reflect patterns in smoking over the preceding decades.

**Figure 3.1: Age-standardised incidence rate of lung cancer in Australia, 1982-2010, by sex**



Sources: Australian cancer incidence and mortality book (16)

## Mesothelioma

In 2010, there were 667 newly diagnosed cases of mesothelioma reported (Table 3.2).

Mesothelioma is extremely rare among children and young people.

**Table 3.2 Number and rate of new mesothelioma diagnoses (all sites), people aged 35 & over, Australia, 2010, by age & sex**

Age group (years)	Males	Females	Persons	Cases per 100,000 population
35-64	111	38	149	1.70
65-84	369	70	439	16.36
85 and over	63	15	78	19.30
<b>Total cases</b>	<b>543</b>	<b>124</b>	<b>667</b>	<b>2.99</b>

Notes: ICD-10-AM Principal diagnosis codes C45

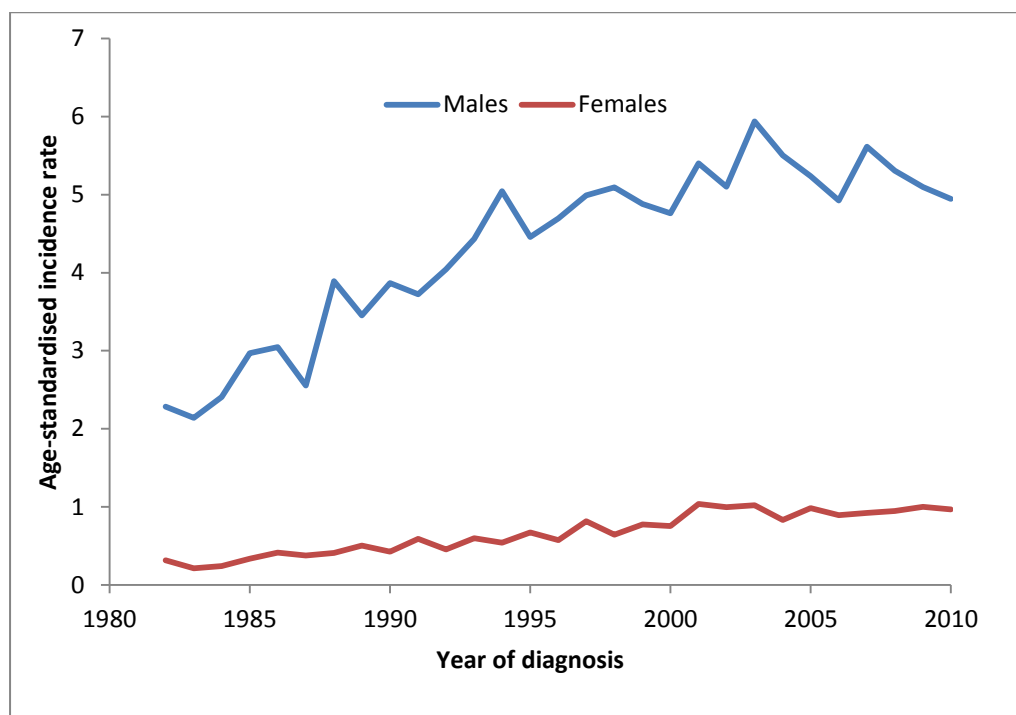
Total includes cases reported among persons aged less than 35 years.

Source: Australian cancer incidence and mortality book (AIHW 17)

Australian Bureau Estimated Resident Population of Australia, 2011, by age.

The incidence of mesothelioma is higher in men than women. Over the period 1982 to 2010, the incidence of mesothelioma increased among males and females (Figure.3.2).

**Figure.3.2: Age-standardised incidence rate of mesothelioma in Australia, 1982-2010, by sex**



Source: Australian cancer incidence and mortality book (17)

## Burden of disease

The Global Burden of Disease (GBD) study (1), included the estimation of disability adjusted life years (DALYs) for lung cancer. Separate estimates for mesothelioma were not produced in the study, therefore burden of disease for mesothelioma were not able to be included in this report.

DALYs are calculated by summing estimated years of life lost due to premature death (YLL) and years lived with disability due to the disease (YLD). Estimates of DALYs in the GBD (1) for lung cancer differ from those estimates of lung cancer burden that have been reported from the Australian Burden of Disease Database (18). This is due to differences in the methods used to calculate YLLs. As the Australian Burden of Disease Database is limited in the range of conditions addressed, we have presented data from the GBD estimates to be consistent with other parts of this report.

In 2010 there were over 143,000 DALYs in Australia attributed to lung cancer (**Table 3.3**). Lung cancer was the leading cause of burden of disease due to cancer in 2010, contributing 17.5% of DALYs attributed to cancer in Australia. Overall, lung cancer contributed almost 3% of 5 million DALYs for disease and injury in Australia in 2010.

**Table 3.3: Burden (DALYs) due to lung cancer, people aged 15 years and over, Australia, 2010, by age**

Age group (years)	Disability adjusted life years (DALYs)	Proportion of burden of disease due to cancers
15-34	458	1.9%
35-64	65,130	18.0%
65 and over	77,962	18.1%
<b>Total DALYs</b>	<b>143,551</b>	<b>17.5%</b>

DALYs: Disability adjusted life years

Source: Global Burden of Disease Study (1)

By far the major component of burden of disease due to lung cancer is due to years of life lost due to premature death (**Table 3.4**).

**Table 3.4: Burden (DALYs) due to lung cancer, people aged 15 years and over, Australia, 2010, by sex**

Measure	Males	Females	Persons	Proportion of all burden of disease in Australia (%)
YLD	1,300	716	2,016	0.1%
YLL	92,455	49,080	141,535	6.2%
<b>DALYs</b>	<b>93,755</b>	<b>49,796</b>	<b>143,551</b>	<b>2.9%</b>

YLD: Years lived with disability

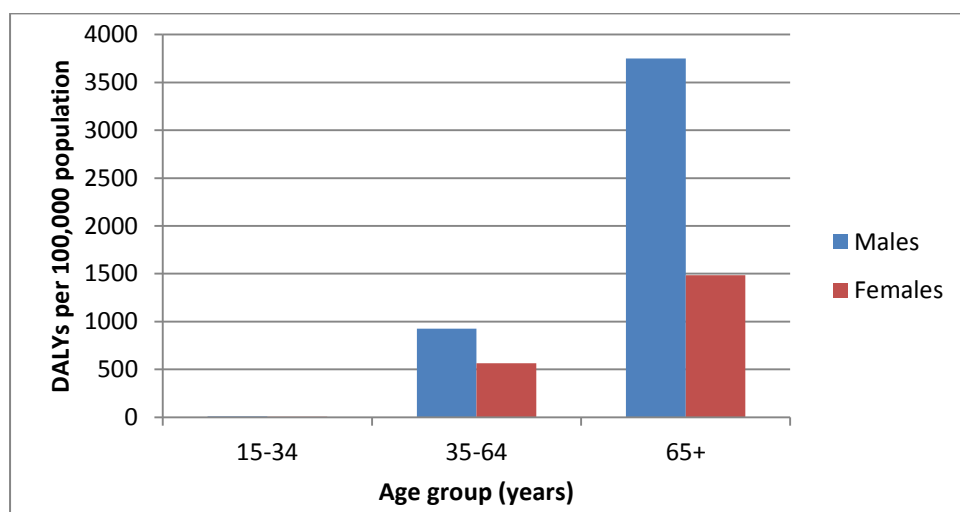
YLL: Years of life lost

DALYs: Disability adjusted life years

Source: Global Burden of Disease Study (1)

The burden of disease due to lung cancer was greatest among people aged 65 years and over and higher among men than women (**Figure 3.3**).

**Figure 3.3: Burden (DALYs per 100,000) due to lung cancer, people aged 15 years and over, Australia, 2010, by age and sex**



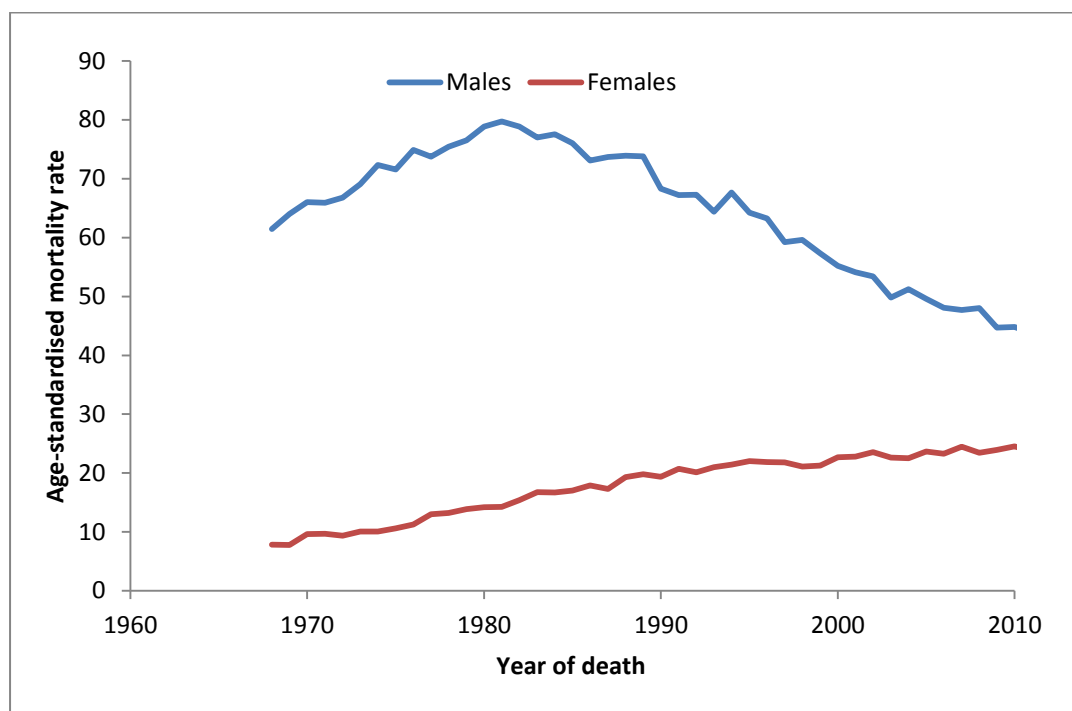
DALYs: Disability adjusted life years. Source: Global Burden of Disease Study (1)

## Deaths

### Lung cancer

In 2012 there were 8,137 deaths attributed to lung cancer as the underlying cause (4,482 males and 3,255 females). This represents 5.5% (1 in 20) of all deaths in Australia in 2012. Since around 1980, mortality due to lung cancer has decreased among males, but has steadily increased among females (although overall, mortality remains lower in females than males) (**Figure 3.4**). This is consistent with incidence data, and reflects smoking patterns in the Australian population in earlier decades.

**Figure 3.4: Age-standardised mortality rate due to lung cancer, Australia, 1968-2010**

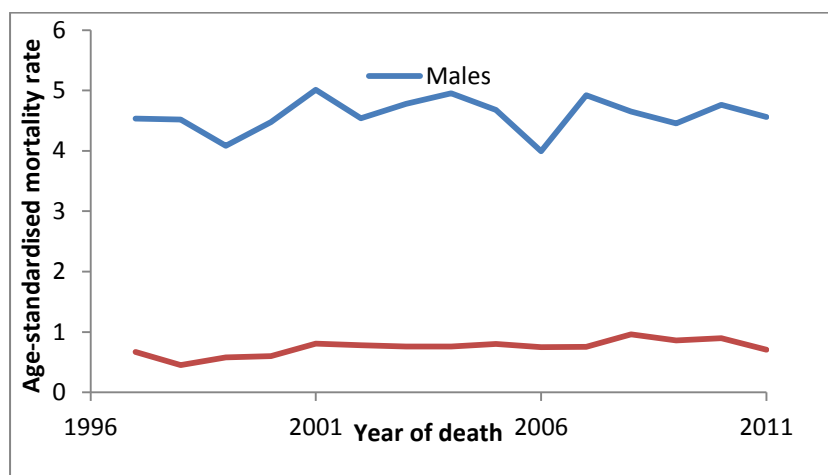


Source: Australian cancer incidence and mortality book (16).

## Mesothelioma

In 2012 there were 638 deaths attributed to mesothelioma as the underlying cause. There has been little change in the rate of deaths due to mesothelioma since 1996 (**Figure 3.5**). Mesothelioma has one of the lowest survival rates of all neoplasms, with a five year survival rate of only 6% in people diagnosed with this condition (18).

**Figure 3.5: Age-standardised mortality rate due to mesothelioma, Australia, 1997-2011**



Source: Australian cancer incidence and mortality book (17)

## Health Care Utilisation

### Lung cancer

In 2011-12 there were over 18,000 hospitalisations where lung cancer was the principal diagnosis, comprising 0.2% of hospitalisations in that year (**Table 3.5**). This relatively low rate of hospitalisation reflects that fact that the majority of people with lung cancer do not have surgery and do not require hospital admission for management of their condition.

**Table 3.5: Hospitalisations for lung cancer, persons aged 35 and over, Australia, 2011-12, by age and sex**

Age group (years)	Male	Female	Persons	Hospitalisations per 100,000 population	Proportion of all cause hospitalisations
35-64	3,065	2,702	5,767	65.8	0.2%
65-84	6,906	4,306	11,212	417.7	0.4%
85 and over	825	520	1,345	333.2	0.2%
<b>Total</b>	<b>10,834</b>	<b>7,568</b>	<b>18,402</b>	<b>82.4</b>	<b>0.2%</b>

Notes ICD-10-AM Principal diagnosis codes C33 and C34

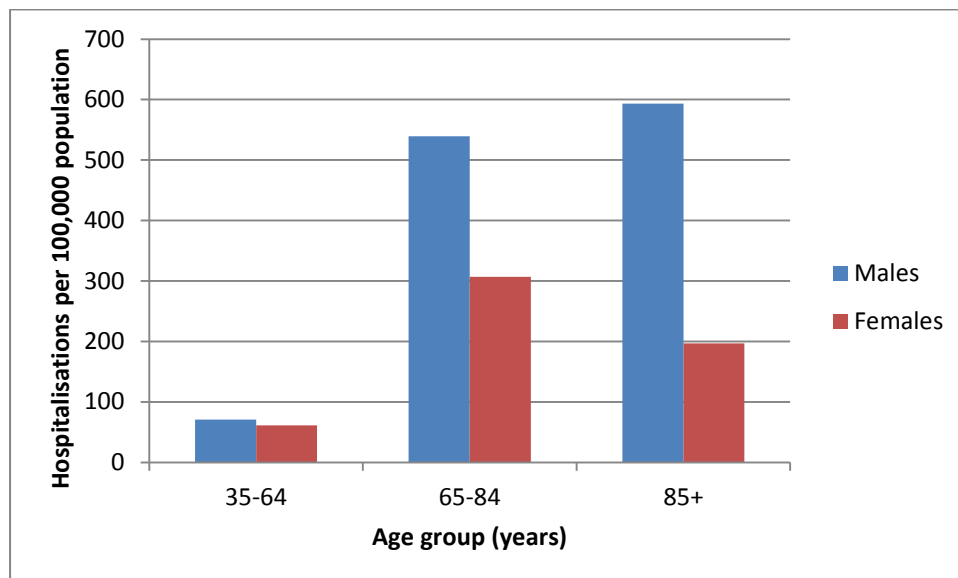
Total includes separations among persons aged less than 35 years.

Sources: AIHW Principal diagnosis data cubes.

Australian Bureau Estimated Resident Population of Australia, 2011, by age.

The majority of hospitalisations for lung cancer were in people aged 65 years and over, and they were higher among males than females (Figure 3.6).

**Figure 3.6: Hospitalisation rate for lung cancer, persons aged 35 and over, Australia, 2011-12, by age and sex**



Notes ICD-10-AM Principal diagnosis codes C33 and C34

Sources: AIHW Principal diagnosis data cubes.

Australian Bureau Estimated Resident Population of Australia, 2011, by age.

Overall, patients with a principal diagnosis of lung cancer occupied hospital for over 140,000 days in 2011-12, which was 0.5% of all hospital patient-days in that year. Each hospitalisation lasted for an average of just over one week (7.6 days). This is more than twice the average length of stay for all cause hospitalisations (3.0 days) (Table 3.6).

**Table 3.6: Patient-days and total average length of stay for lung cancer, Australia, 2011-12**

Age group (years)	Patient-days in hospital				Average length of stay (days)			
	Male	Female	Persons	Proportion of all cause patient-days	Males	Females	Persons	All causes
35-64	20,825	18,676	39,501	0.4%	6.8	6.9	6.9	2.5
65-84	51,283	35,937	87,220	0.9%	7.4	8.4	7.8	3.3
85 and over	7,062	5,797	12,859	0.4%	8.6	11.2	9.6	5.9
<b>Total</b>	<b>79,370</b>	<b>60,642</b>	<b>140,012</b>	<b>0.5%</b>	<b>7.3</b>	<b>8</b>	<b>7.6</b>	<b>3.0</b>

Notes ICD-10-AM Principal diagnosis codes C33 and C34

Sources: AIHW Principal diagnosis data cubes.

## Mesothelioma

In 2011-12 there were over 2029 hospitalisations where mesothelioma was the principal diagnosis, comprising 0.02% of hospitalisations in that year (Table 3.7).

**Table 3.7: Hospitalisations for pleural mesothelioma, people aged 35 and over, Australia, 2011-12, by age and sex**

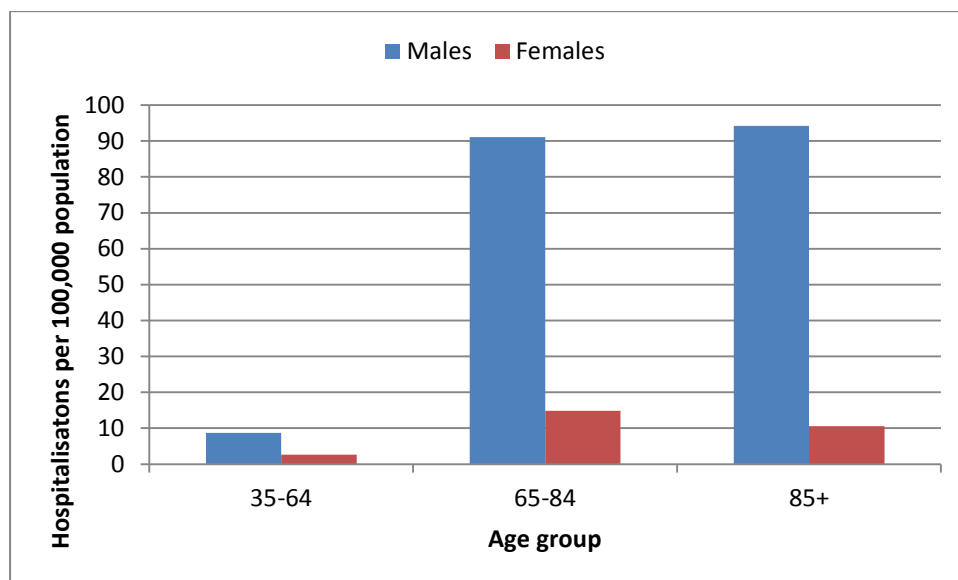
Age group (years)	Males	Females	Persons	Hospitalisations per 100,000 population	Proportion of all cause hospitalisations
35-64	377	116	493	5.63	0.01%
65-84	1,167	209	1,376	51.26	0.05%
85 and over	131	28	159	39.39	0.03%
<b>Total</b>	<b>1,676</b>	<b>353</b>	<b>2,029</b>	<b>9.08</b>	<b>0.02%</b>

Notes ICD-10-AM Principal diagnosis codes C45  
Total includes separations among persons aged less than 35 years.

Sources: AIHW Principal diagnosis data cubes.  
Australian Bureau Estimated Resident Population of Australia, 2011, by age.

Most hospitalisations for mesothelioma occurred in people aged 65 years and over, and most were for males (Figure 3.7).

**Figure 3.7: Hospitalisation rate for mesothelioma, persons aged 35 and over, Australia, 2011-12, by age and sex**



Notes ICD-10-AM Principal diagnosis codes C45  
Sources: AIHW Principal diagnosis data cubes.  
Australian Bureau Estimated Resident Population of Australia, 2011, by age.

Altogether, patients with a principal diagnosis of mesothelioma occupied hospital for over 14,000 days in 2011-12, which was 0.05% of all hospital patient-days in that year. Each hospitalisation lasted

for an average of one week (7.09 days). This is similar to lung cancer and more than twice the average length of stay for all cause hospitalisations (3.0 days) (Table 3.8).

**Table 3.8: Patient-days and total average length of stay for mesothelioma, Australia, 2011-12**

Age group (years)	Patient-days in hospital				Average length of stay (days)			
	Males	Females	Persons	Proportion of all cause patient-days	Males	Females	Persons	All causes
35-64	2,494	513	<b>3,007</b>	0.03%	6.62	4.42	<b>6.10</b>	<b>2.5</b>
65-84	8,179	1,690	<b>9,869</b>	0.10%	7.01	8.09	<b>7.17</b>	<b>3.3</b>
85 and over	1,085	298	<b>1,383</b>	0.04%	8.28	10.64	<b>8.70</b>	<b>5.9</b>
<b>Total</b>	<b>11,877</b>	<b>2,501</b>	<b>14,378</b>	<b>0.05%</b>	<b>7.09</b>	<b>7.08</b>	<b>7.09</b>	<b>3.0</b>

Notes ICD-10-AM Principal diagnosis codes C45

Sources: AIHW Principal diagnosis data cubes.



## CHAPTER 4. INFECTIOUS DISEASE

### Introduction

This section reports information on selected respiratory infections that may have serious health impacts including notifiable infections such as invasive pneumococcal disease, influenza, pertussis, tuberculosis, and lower respiratory infections including pneumonia, bronchitis and bronchiolitis.

Each of the conditions is described in detail including major characteristics, risk factors and risk reduction approaches. Where possible, we have provided estimates of the incidence of the various respiratory infections. After this, we present the available data on burden of disease in Australia for lower respiratory tract infections and tuberculosis from the Global Burden of Disease Study, and some information on mortality in Australia due to acute respiratory infection. Finally we present data for hospitalisation rates in Australia.

### Notifiable diseases that cause respiratory infection

These are diseases that Australian state and territory governments have decided are of sufficient importance to public health to require doctors, nurses or other health care workers to inform public health authorities (“notify” them) when they diagnose a new case of the disease. Invasive pneumococcal disease, laboratory confirmed influenza, pertussis and tuberculosis are conditions that cause respiratory infections and are notifiable in all Australian health jurisdictions (19).

### Invasive pneumococcal disease

Invasive pneumococcal disease (IPD) is caused by the bacterial organism *Streptococcus pneumoniae* (also known as “pneumococcus”). This organism colonises the nose and throat, usually without causing any problems. It commonly causes bronchitis (cough with purulent sputum), particularly in people with pre-existing lung disease. Bronchitis due to pneumococcus is usually self-limited (that is, resolves without treatment) or else can be relatively simply treated with antibiotics. However, occasionally the organism causes pneumonia, meningitis, septicaemia or other severe infections. This is referred to as IPD.

The burden of IPD is greatest among children, particularly those aged around 1 year, and elderly people aged 85 years and over. In 2011, the incidence rate of IPD among Indigenous people (53 per 100,000) was 8 times that of non-Indigenous people (6.7 per 100,000). The condition occurs slightly more often among males than females (male to female ratio 1.2:1 in 2011) and rates are generally highest during winter months (19).

Risk factors for pneumococcal disease are sought in notification data and include: premature birth, congenital or chromosomal abnormality, compromised immunity, chronic illness (including asthma), childcare attendance and past IPD.

IPD is a vaccine-preventable disease. Pneumococcal vaccination was introduced to the National Immunisation Program in 2001 for Aboriginal and Torres Strait Islander infants, and in 2005 for all infants. It has also been funded for all adults aged 65 years and over, or aged 50 years and over if Aboriginal or Torres Strait Islander (20).

## Influenza

Influenza is an infectious viral disease of birds and mammals (including humans and some domesticated animals such as pigs). Common symptoms are chills, fever, runny nose, sore throat, muscle pains, headache (often severe), cough, weakness/fatigue and general discomfort. Laboratory confirmed diagnosis of influenza is notifiable in all Australian jurisdictions; however, as many influenza infections are never laboratory confirmed, these notifications under-enumerate the true incidence of influenza in Australia (19).

Influenza is a vaccine preventable disease, however vaccination is usually required annually because the influenza virus evolves rapidly, and new strains quickly replace the older ones. Influenza spreads in yearly seasonal epidemics, and worldwide, has a mortality rate up to 10%. Pandemic influenza years are those in which transmission is very widespread. The most recent pandemic year was 2009 with a strain known as 'swine flu'.

In Australia, vaccination is targeted towards the elderly, because they are at greater risk of adverse outcomes due to influenza; and health workers, who have greater risk of exposure and spread. Annual free vaccination is offered in many occupational settings, particularly in health care services, to reduce staff absenteeism and also to reduce the spread of this infection in the workplace.

The World Health Organization position paper on influenza vaccines recommends the following population groups be targeted for annual influenza vaccination (21):

1. Residents of institutions for elderly people and the disabled.
2. Elderly, non-institutionalized individuals with chronic heart or lung diseases, metabolic or renal disease, or immunodeficiencies.
3. All individuals >6 months of age with any of the conditions listed above.
4. Elderly individuals above a nationally defined age limit, irrespective of other risk factors.
5. Other groups defined on the basis of national data and capacities, such as contacts of high-risk people, pregnant women, health-care workers and others with key functions in society, as well as children 6–23 months of age.

## Pertussis

Pertussis, commonly called whooping cough, is a highly contagious, vaccine preventable, bacterial disease. Symptoms are initially mild, and then develop into characteristic severe paroxysmal coughing fits, which last approximately six weeks before subsiding.

The condition is life-threatening in young children and vaccination is offered in Australia at age 2, 4 and 6 months, followed by a booster at 4 years and a 2nd booster of adolescent formulation between 12 and 17 years of age (22). To further reduce the risk that infants will acquire this disease, vaccination of selected adults can be used to reduce the incidence among those likely to have contact with very young children. This is achieved by giving booster vaccinations to parents and selected health care workers. Infectiousness can also be shortened through the use of antibiotics in confirmed cases.

## Tuberculosis

Tuberculosis (TB) is a widespread, occasionally fatal, infectious disease caused by *Mycobacterium tuberculosis*. The most common site of disease is the lungs (pulmonary TB) but nearly 40% of cases in Australia affect only sites outside the lungs (extra-pulmonary TB) (23). The symptoms of pulmonary

TB include long-term cough, coughing up blood, fever, night sweats and weight loss. The symptoms of extra-pulmonary TB depend on the site of disease.

TB is usually spread through the air when people who have an active (infectious) pulmonary TB cough, sneeze, talk or otherwise transmit respiratory droplets.

Many more people have latent TB infection (that is, evidence of TB infection without any evidence of disease) than have TB disease. Around 10% of people with latent TB infection develop active TB disease at some time in their life. However, latent TB infection itself is not associated with any symptoms or disability.

Drug treatment for TB has been available since the early 1950s. Data from before that time suggest that untreated TB is fatal in about 50% of cases.

The most frequently reported risk factor among people with TB in Australia was past travel to, or birth or residence in, a high-risk country (23). Globally, major risk factors for tuberculosis include HIV infection, overcrowding, malnutrition, incarceration, homelessness and other factors associated with poverty and disadvantage. In developed countries, like Australia, TB is most common among migrants from countries with a high burden of TB (24). In Australia in 90% of all cases of tuberculosis that were diagnosed in 2010 were in people who were born overseas (23). People with other chronic lung disease and diabetes are also at greater risk, as well as people with lifestyle risk factors including smoking and alcoholism. Some medications, such as corticosteroids and genetic factors may also increase susceptibility to TB.

BCG (Bacille de Calmette et Guérin) is the only approved vaccine against tuberculosis, however its effectiveness is limited and variable (0%-80%) (25). It is not recommended for routine use in Australia.

TB is treated with a combination of specialised antibiotics for a period of at least six months. Drug resistant TB is becoming an increasing problem in developing countries and requires treatment with more expensive and toxic antibiotic combinations for a longer duration (26).

## Acute lower respiratory infections

### Pneumonia

Pneumonia is an inflammatory condition of the lungs, primarily affecting the alveoli (air sacs). It is usually caused by infection with viruses or bacteria. Typical symptoms include cough, chest pain, pyrexia, and dyspnea. Diagnosis can be made with clinical evaluation together with a chest x-ray. People with severe pneumonia and those with other underlying lung diseases often require a period of hospital treatment but many other people with mild or moderate forms of pneumonia can be managed outside hospital.

### Bronchitis

Acute bronchitis refers to inflammation of the bronchi. Over ninety percent of cases of acute bronchitis are due to viral infections and the majority are self-limiting. Symptoms include cough with phlegm and, sometimes, wheeze and breathlessness.

## Bronchiolitis

Bronchiolitis refers to inflammation of the bronchioles (small airways). It is most common among children less than two years of age with the majority of cases being before age 12 months and up to one third of children being affected in their first year of life. It is most commonly attributable to a viral infection (most commonly respiratory syncytial virus (RSV)). Symptoms include coughing, wheezing and rapid breathing. Bronchiolitis is most common during winter.

## Risk reduction for lower respiratory infections

Vaccines are available to prevent certain types of pneumonia and other forms of acute lower respiratory infections including *Streptococcus pneumoniae* and seasonal influenza virus. Although a vaccine is available against *Haemophilus influenzae Type B*, this is not effective against the non-typable *Haemophilus influenzae* that commonly causes bronchitis in adults and older children.

The risk of these conditions may also be reduced by avoidance of, or cessation of, smoking (27).

## Incidence of respiratory infection

Incidence refers to the number of new cases of a disease within a defined population. Incidence can be difficult to accurately measure as conditions may be undiagnosed or there may not be a system whereby conditions are universally recorded and enumerated.

IPD, influenza, pertussis and tuberculosis are notifiable conditions. Notification data can provide an indication of disease incidence, though they are likely to underestimate incidence for some conditions, particularly influenza, which is only notified when laboratory confirmed (Table 4.1).

**Table 4.1: Notifications of selected diseases that cause respiratory infections, 2013**

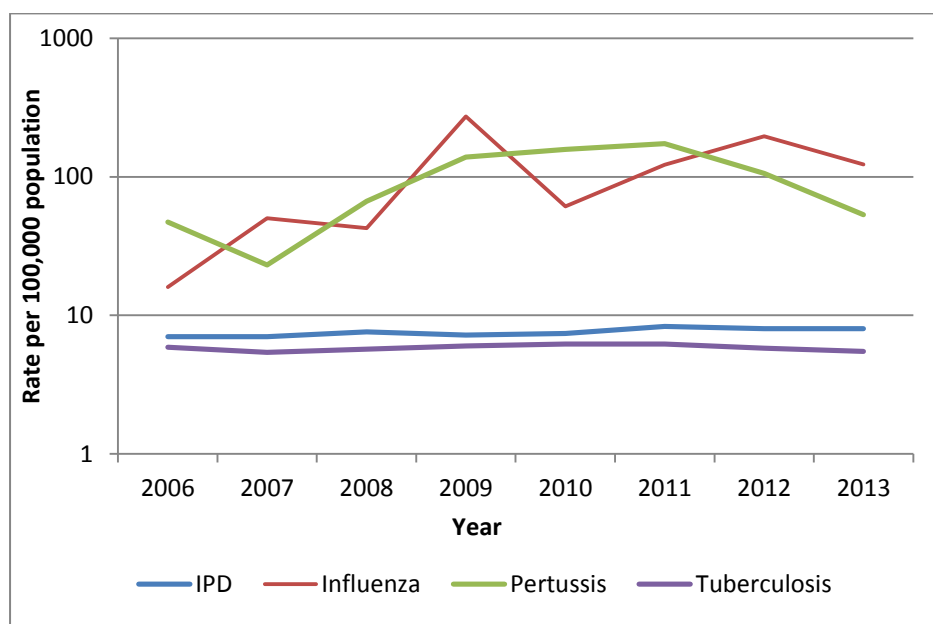
Condition	Number	Rate per 100,000 population
Influenza	28,333	122.5
Pertussis	12,357	53.4
Tuberculosis	1,263	5.5
Invasive Pneumococcal Disease	1,549	6.7
<b>Total</b>	<b>43,502</b>	<b>188.1</b>

Source: National Notifiable Diseases Surveillance System website (Accessed 17 October 2014)

**Figure 4.1** shows notifications for these conditions between 2006 and 2013. Australia has one of the lowest rates of tuberculosis in the world (23). Tuberculosis notifications remained stable in Australia over the period. IPD notification rates are also low and were stable over the period.

Influenza is the most commonly notified respiratory infectious disease in most years although, as previously noted, the true incidence of this infection is likely to be substantially underestimated because it is only notifiable when laboratory confirmed. There was a sharp peak in influenza in 2009 associated with the aforementioned pandemic in that year. Pertussis infections have decreased after a peak of notified cases in 2011.

**Figure 4.1: Notification rates of selected diseases that cause respiratory infections, Australia, 2006-2013**



Source: National Notifiable Diseases Surveillance System 2014

Notes: Rate per 100,000 shown as a log scale

There are no reliable and complete measures of the incidence of pneumonia, acute bronchitis and bronchiolitis. However health care utilisation data provide a measure of incidence of severe cases requiring hospitalisation (see Hospitalisations page 44).

### Burden of disease due to respiratory infection

In 2010 there were over 42,000 DALYs in Australia due to LRI. This represents approximately 1% of almost 5 million DALYs calculated for disease and injury in Australia (Table 4.2). Just over 2,000 DALYs in Australia in 2010 were attributed to tuberculosis with 60% of this burden being in males. Respiratory infections contributed 0.9% of DALYs in Australia in 2010.

**Table 4.2: Burden (DALYs) due to respiratory infections, Australia, 2010, by age**

Condition	Lower respiratory infections			Tuberculosis			Total burden
	Males	Females	Persons	Males	Females	Persons	
Age group (years)							
0-14	2,149	1,619	<b>3768</b>	32	22	<b>53</b>	<b>3,821</b>
15-34	715	540	<b>1,255</b>	200	117	<b>317</b>	<b>1,572</b>
35-64	4,524	2,919	<b>7,442</b>	705	448	<b>1,154</b>	<b>8,596</b>
65 and over	14,597	15,445	<b>30,041</b>	447	310	<b>757</b>	<b>30,798</b>
All ages	<b>21,985</b>	<b>20,552</b>	<b>42,507</b>	<b>1,384</b>	<b>896</b>	<b>2,281</b>	<b>44,788</b>
Proportion of all DALYs	<b>0.82%</b>	<b>0.87%</b>	<b>0.85%</b>	<b>0.05%</b>	<b>0.04%</b>	<b>0.05%</b>	<b>0.90%</b>

Source: Global Burden of Disease Study (1)

DALYs: Disability adjusted life years

The burden of disease due to respiratory infections is greatest in children and the elderly. Overall respiratory infections contributed an estimated 0.24% of years lived with disability in Australia in 2010 (Table 4.3) and 1.7% of years of life lost (Table 4.4).

**Table 4.3: Years lived with disability (YLD) due to respiratory infections, Australia, 2010, by age**

Condition	Lower respiratory infections			Tuberculosis			Total burden
	Age group (years)	Males	Females	Persons	Males	Females	
0-14	801	607	<b>1,408</b>	12	7	<b>20</b>	<b>1,427</b>
15-34	136	112	<b>248</b>	161	101	<b>262</b>	<b>510</b>
35-64	538	440	<b>978</b>	485	320	<b>805</b>	<b>1,783</b>
65 and over	1,254	1,307	<b>2,561</b>	98	74	<b>172</b>	<b>2,733</b>
All ages	<b>2,729</b>	<b>2,464</b>	<b>5,193</b>	<b>756</b>	<b>503</b>	<b>1,259</b>	<b>6,452</b>
Proportion of all YLD	<b>0.21%</b>	<b>0.18%</b>	<b>0.19%</b>	<b>0.06%</b>	<b>0.04%</b>	<b>0.05%</b>	<b>0.24%</b>

YLD: Years lived with disability

Source: Global Burden of Disease Study (1)

**Table 4.4: Years of life lost (YLL) due to respiratory infections, Australia, 2010, by age**

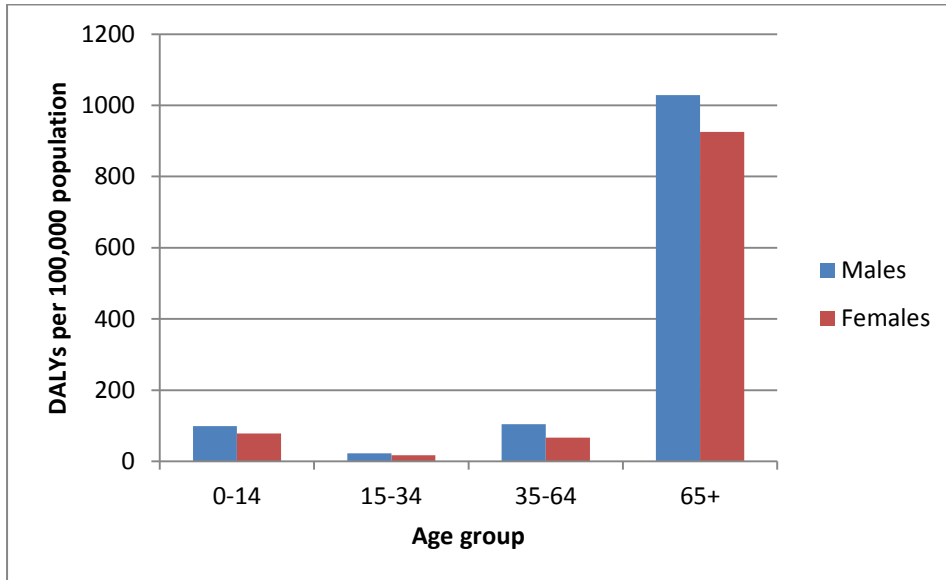
Condition	Lower respiratory infections			Tuberculosis			Total burden
	Age group (years)	Males	Females	Persons	Males	Females	
0-14	1,348	1,012	<b>2,361</b>	19	14	<b>34</b>	<b>2,394</b>
15-34	579	428	<b>1,007</b>	39	15	<b>55</b>	<b>1,062</b>
35-64	3,986	2,481	<b>6,466</b>	220	128	<b>348</b>	<b>6,815</b>
65 and over	13,342	14,137	<b>27,480</b>	349	235	<b>585</b>	<b>28,064</b>
All ages	<b>19,256</b>	<b>18,058</b>	<b>37,314</b>	<b>628</b>	<b>393</b>	<b>1,021</b>	<b>38,335</b>
Proportion of all YLD	<b>1.43%</b>	<b>1.96%</b>	<b>1.64%</b>	<b>0.05%</b>	<b>0.04%</b>	<b>0.05%</b>	<b>1.69%</b>

YLL: Years of life lost

Source: Global Burden of Disease Study (1)

The burden of disease as a rate of the Australian population due to LRI was greatest among people aged 65 years and over among both men and women (Figure 4.2).

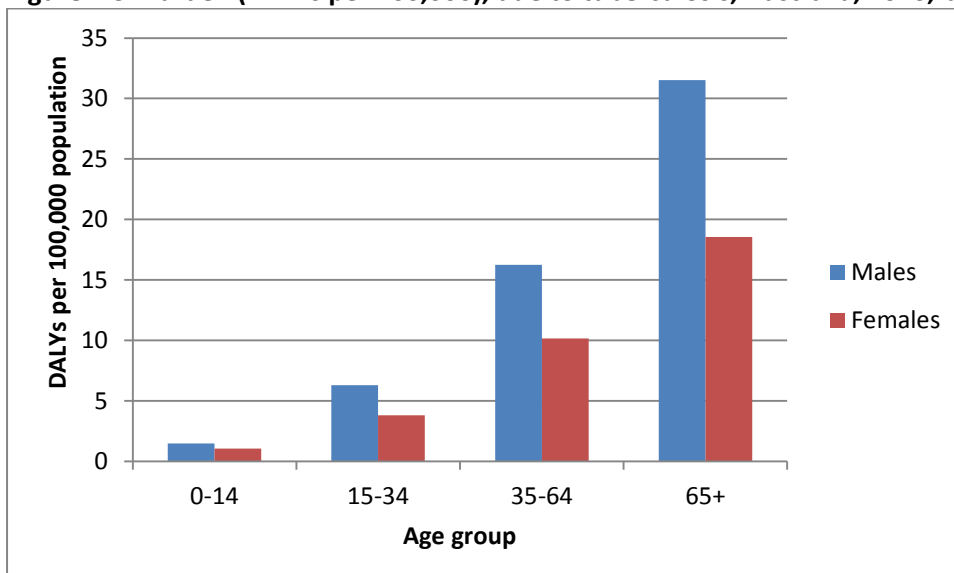
**Figure 4.2: Burden (DALYs per 100,000) due to lower respiratory infections, Australia, 2010, by age and sex**



Source: Global Burden of Disease Study (1)

The burden of disease due to tuberculosis in the Australian population was highest among males aged 65 years and over (Figure 4.3).

**Figure 4.3: Burden (DALYs per 100,000), due to tuberculosis, Australia, 2010, by age and sex**



DALYs: Disability adjusted life years

Source: Global Burden of Disease Study (1)



## Mortality due to acute respiratory infection

Death due to respiratory infection is relatively uncommon in Australia. In 2012 there were 3,023 deaths due to influenza, pertussis, tuberculosis, pneumonia, bronchitis and other lower respiratory infections combined. This represents 2.1% of all deaths in Australia in 2012. Of these, 1,280 were in males and 1,743 were in females.

## Healthcare utilisation for respiratory infections

### General practice encounters

General practice (GP) encounters for acute bronchitis and bronchiolitis were stable over the 10 year period between 2003-04 and 2012-13 (2.3% of encounters in 2012-13) (5).

### Hospitalisations

In the year July 2011 to June 2012 there were 129,393 hospitalisations in Australia in which the patient had a principal final diagnosis of one of the respiratory infections discussed in this report. This represents 1.4% of all hospitalisations in that year. Hospitalisations for respiratory infections were slightly more common among males (53%) than females; the difference was greatest among people hospitalised for tuberculosis where males represented 80% of those hospitalised for this condition (**Table 4.5**). The largest number of hospitalisations were for pneumonia, followed by other acute lower respiratory infections including bronchitis.

**Table 4.5: Hospitalisations for respiratory infections and proportion of all hospitalisations, Australia, 2011-12, by sex**

Condition	Males	Females	Persons	Proportion of all cause hospitalisations
Pneumonia	41,265	36,537	<b>77,802</b>	<b>0.84%</b>
Influenza	2,084	2181	<b>4,265</b>	<b>0.05%</b>
Pulmonary Tuberculosis	1,026	248	<b>1,274</b>	<b>0.01%</b>
Other lower respiratory infections (LRI) <sup>1</sup>	13,041	13,699	<b>26,740</b>	<b>0.29%</b>
Bronchiolitis	11,107	7,240	<b>18,347</b>	<b>0.20%</b>
Pertussis	453	511	<b>964</b>	<b>0.01%</b>
<b>All respiratory infections</b>	<b>68,976</b>	<b>60,416</b>	<b>129,392</b>	<b>1.40%</b>

1. Includes one case where sex was not reported

LRI: Lower respiratory infections comprising acute bronchitis and unspecified acute lower respiratory tract infections

Notes ICD-10-AM Principal diagnosis codes: pneumonia - J12-J18; influenza – J09-J11; pulmonary tuberculosis – A15-A16; acute LRTI – J20, J22; bronchiolitis – J21; pertussis – A37.

Sources: AIHW Principal diagnosis data cubes.

Australian Bureau Estimated Resident Population of Australia, 2011, by age.

There were over 500 hospitalisations for respiratory infections per 100,000 people in 2011-12. The rate was highest among people aged 85 years and over, among whom hospitalisation rates were over 5,000 per 100,000 people (**Table 4.6**). However the proportion of all hospitalisations that were for respiratory infections was highest among children aged up to 14 years (5.6%).

**Table 4.6: Hospitalisations for respiratory infections, Australia, 2011-12, by age**

Condition	0-14 years	15-34 years	35-64 years	65-84 years	85 years and over
Pneumonia	10,317	5,365	18,861	28,542	14,717
Influenza	1,531	812	1,145	628	149
Pulmonary Tuberculosis	25	911	196	108	34
Other lower respiratory infections <sup>1</sup>	3,912	1,971	6,562	9,216	5,080
Bronchiolitis	18,165	18	86	60	18
Pertussis	686	24	116	109	29
<b>All respiratory infections</b>	<b>34,636</b>	<b>9,101</b>	<b>26,966</b>	<b>38,663</b>	<b>20,027</b>
<b>Total per 100,000</b>	<b>818.1</b>	<b>145.4</b>	<b>307.9</b>	<b>1,440.3</b>	<b>4962.0</b>
<b>Proportion of all cause hospitalisations</b>	<b>5.64%</b>	<b>0.62%</b>	<b>0.75%</b>	<b>1.29%</b>	<b>3.38%</b>

1. LRI: Lower respiratory infections comprising acute bronchitis and unspecified acute lower respiratory tract infections

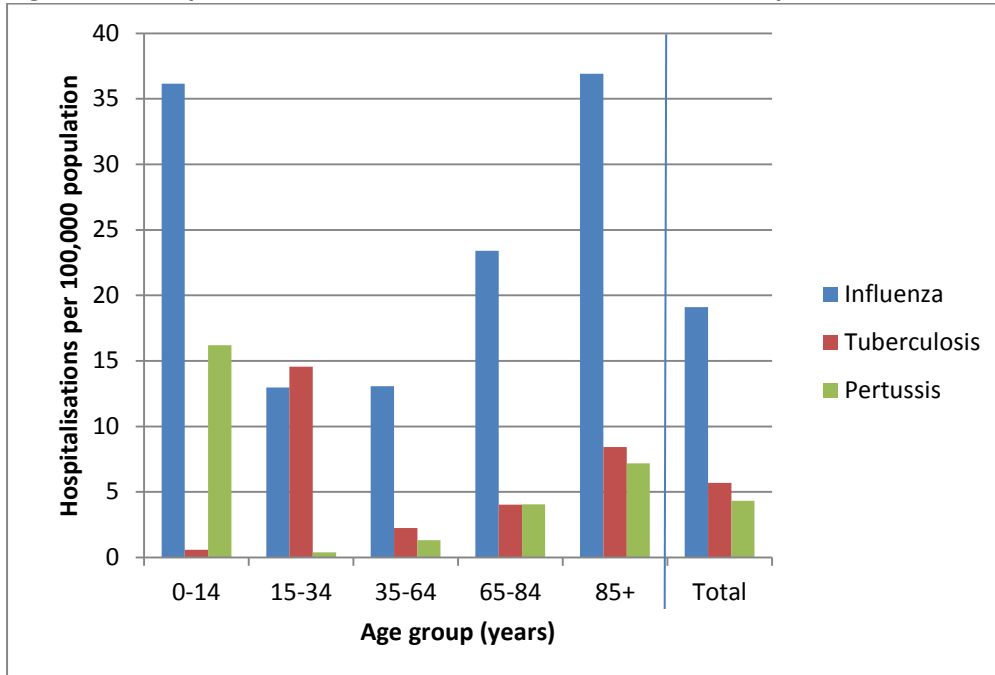
Notes ICD-10-AM Principal diagnosis codes: pneumonia - J12-J18; influenza – J09-J11; pulmonary tuberculosis – A15-A16; acute LRTI – J20, J22; bronchiolitis – J21; pertussis – A37.

Sources: AIHW Principal diagnosis data cubes.

Australian Bureau Estimated Resident Population of Australia, 2011, by age.

Hospitalisations for influenza, tuberculosis and pertussis in the year 2011-12 are shown in **Figure 4.4**. Hospitalisation rates for influenza were highest among children (36.2 per 100,000) and the elderly (36.9 per 100,000). Hospitalisation for tuberculosis was more common among young adults (73.9 per 100,000) and the elderly (162.3 per 100,000). The highest rate of hospitalisation for pertussis occurred among children (16.2 per 100,000).

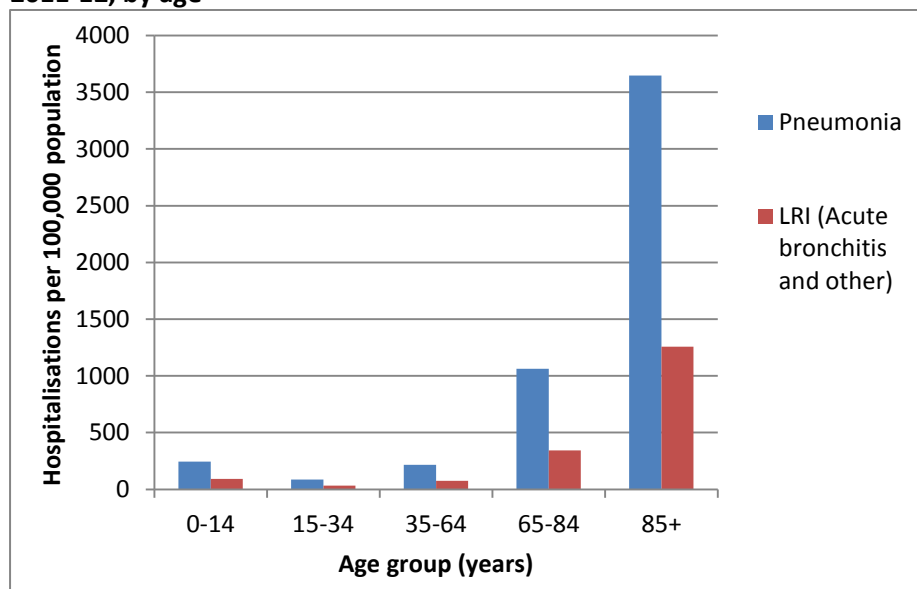
**Figure 4.4: Hospitalisation rates for influenza, tuberculosis and pertussis, Australia 2011-12, by age**



Sources: AIHW Principal diagnosis data cubes.  
 Australian Bureau Estimated Resident Population of Australia, 2011, by age.

Hospitalisation rates for pneumonia and other lower respiratory infections were highest among elderly people aged 85 years and over (3,646 per 100,000 and 1,259 per 100,000 population respectively) (Figure 4.5).

**Figure 4.5: Hospitalisation rates for pneumonia and other lower respiratory infections, Australia, 2011-12, by age**

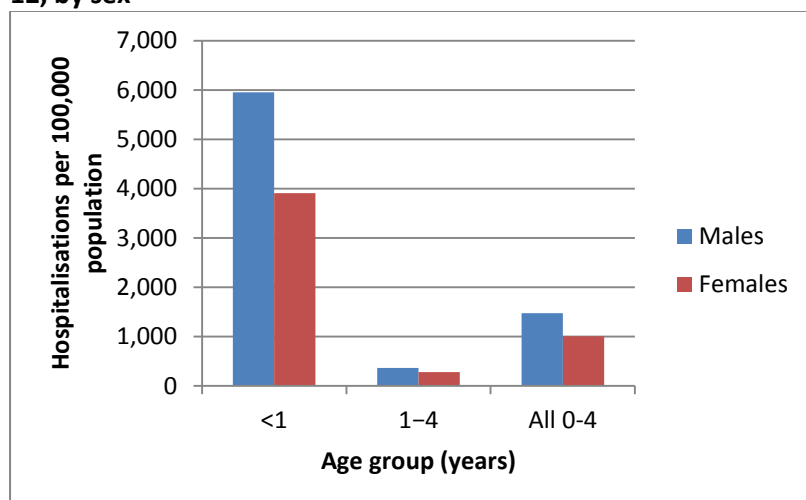


Notes: ICD-10-AM Principal diagnosis codes: pneumonia - J12-J18; LRI – J20, J22;. Acute LRI: Acute Lower respiratory infections comprising acute bronchitis and unspecified acute lower respiratory tract infections

Sources: AIHW Principal diagnosis data cubes. Australian Bureau Estimated Resident Population of Australia, 2011, by age.

On the other hand, hospitalisation for bronchiolitis occurred almost exclusively among children aged less than five years (Figure 4.6), and within this group the highest rates were among babies aged less than 12 months, particularly boys (5,952 per 100,000 baby boys).

**Figure 4.6: Hospitalisation rates for bronchiolitis among children aged 0-4 years, Australia, 2011-12, by sex**



Notes: ICD-10-AM Principal diagnosis codes: bronchiolitis – J21.

Sources: AIHW Principal diagnosis data cubes. Australian Bureau Estimated Resident Population of Australia, 2011, by age.

Altogether, the respiratory infections addressed in this report contributed over 600,000 hospital patient-days (the total number of days all patients spent in hospital) in Australia in 2011-12, which comprised 2.3% of all patient-days in that year (Table 4.7)

**Table 4.7: Patient-days in hospital for respiratory infections and all hospitalisations, Australia, 2011-12, by sex**

Condition	Males	Females	Persons	Proportion of all causes
Pneumonia	234,670	213,650	<b>448,320</b>	<b>1.62%</b>
Influenza	7,255	8,009	<b>15,264</b>	<b>0.06%</b>
Pulmonary tuberculosis	7,108	3,834	<b>10,942</b>	<b>0.04%</b>
Other lower respiratory infections <sup>1</sup>	51,251	57,665	<b>108,917</b>	<b>0.39%</b>
Bronchiolitis	28,339	20,162	<b>48,501</b>	<b>0.17%</b>
Pertussis	1,797	2,401	<b>4,186</b>	<b>0.02%</b>
<b>All respiratory infections</b>	<b>330,420</b>	<b>305,721</b>	<b>636,141</b>	<b>2.29%</b>

1. LRI: Lower respiratory infections comprising acute bronchitis and unspecified acute lower respiratory tract infections

Notes ICD-10-AM Principal diagnosis codes: pneumonia - J12-J18; influenza – J09-J11; pulmonary tuberculosis – A15-A16; acute LRTI – J20, J22; bronchiolitis – J21; pertussis – A37.

Sources: AIHW Principal diagnosis data cubes.

Hospital patient-days were highest among people aged 65 to 84 years, (Table 4.8). However the proportion of all hospital patient-days that were for respiratory infections was highest among children aged up to 14 years (5.5%).

**Table 4.8: Patient-days in hospital for respiratory infections and all hospitalisations, Australia, 2011-12, by age**

Condition	0-14 years	15-34 years	35-64 years	65-84 years	85 years and over
Pneumonia	29,303	20,042	95,043	192,383	111,549
Influenza	4,026	2,132	4,428	3,526	1,152
Pulmonary tuberculosis	162	5,519	2,718	1,825	718
Other lower respiratory infections <sup>1</sup>	9,123	4,669	21,016	43,463	30,645
Bronchiolitis	47,717	56	315	274	139
Pertussis	2,864	62	454	572	234
<b>All respiratory infections</b>	<b>93,195</b>	<b>32,480</b>	<b>123,975</b>	<b>242,043</b>	<b>144,437</b>
<b>Proportion of all patient-days</b>	<b>5.58%</b>	<b>0.85%</b>	<b>1.38%</b>	<b>2.47%</b>	<b>4.13%</b>

1. LRI: Lower respiratory infections comprising acute bronchitis and unspecified acute lower respiratory tract infections

Notes ICD-10-AM Principal diagnosis codes: pneumonia - J12-J18; influenza – J09-J11; pulmonary tuberculosis – A15-A16; acute LRTI – J20, J22; bronchiolitis – J21; pertussis – A37.

Sources: AIHW Principal diagnosis data cubes.

On average, patients spent nearly 5 days in hospital at a time for respiratory infections, which was longer than the overall average length of stay for all hospitalisations (3 days). This was highest for pulmonary tuberculosis (8.6 days) and lowest for bronchiolitis (2.6 days) (Table 4.9).

**Table 4.9: Average length of stay for respiratory infections and all hospitalisations, Australia, 2011-12, by age**

Condition	0-14 years	15-34 years	35-64 years	65-84 years	85 years and over	All ages
Pneumonia	2.8	3.7	5	6.7	7.6	<b>5.8</b>
Influenza	2.6	2.6	3.9	5.6	7.7	<b>3.6</b>
Pulmonary tuberculosis	6.5	6.1	13.9	16.9	21.1	<b>8.6</b>
Lower respiratory infections <sup>1</sup>	2.3	2.4	3.2	4.7	6	<b>4.1</b>
Bronchiolitis	2.6	3.1	3.7	4.6	7.7	<b>2.6</b>
Pertussis	4.2	2.6	3.9	5.2	8.1	<b>4.3</b>
All respiratory infections	<b>2.7</b>	<b>3.6</b>	<b>4.6</b>	<b>6.3</b>	<b>7.2</b>	<b>4.9</b>
All hospitalisations	<b>2.7</b>	<b>2.6</b>	<b>2.5</b>	<b>3.3</b>	<b>5.9</b>	<b>3.0</b>

1. Acute LRTI: Acute Lower respiratory tract infections comprising acute bronchitis and unspecified acute lower respiratory tract infections

Notes ICD-10-AM Principal diagnosis codes: pneumonia - J12-J18; influenza – J09-J11; pulmonary tuberculosis – A15-A16; acute LRTI – J20, J22; bronchiolitis – J21; pertussis – A37.

Sources: AIHW Principal diagnosis data cubes.

## APPENDIX: ICD CODES USED TO CLASSIFY DISEASES

Table A1.1: Disease codes included for Global Burden of disease data, hospitalisations data and deaths data

Disease/Codes included	GBD	Hospitalisations	Deaths
<b>Tuberculosis (TB)</b>			
A15 Respiratory TB, bacteriologically and histologically confirmed	✓	✓	✓
A16 Respiratory TB, not confirmed bacteriologically or histologically	✓	✓	✓
A17 TB of nervous system	✓	✗	✗
A18 TB of other organs	✓	✗	✗
A19 Military TB	✓	✗	✗
B90 Sequelae of TB	✓	✗	✗
P37.0 Congenital TB	✓	✗	✗
<b>Lower respiratory infections</b>			
J10 Influenza due to identified influenza virus	✓	✓	✓
J11 Influenza, virus not identified	✓	✓	✓
J12 viral pneumonia, not elsewhere classified	✓	✓	✓
J13 Pneumonia due to S. pneumonia	✓	✓	✓
J14 Pneumonia due to H. influenza	✓	✓	✓
J15 bacterial pneumonia, not elsewhere classified	✓	✓	✓
J16 pneumonia due to other infectious organisms, not elsewhere classified	✓	✓	✓
J17 Pneumonia in diseases classified elsewhere	✓	✓	✓
J18 Pneumonia, organism unspecified	✓	✓	✓
J20 Acute bronchitis	✓	✓	✓
J21 Acute bronchiolitis	✓	✗	✗
J22 Unspecified acute LRI	✓	✓	✓
J85 Abscess of lung and mediastinum	✓	✗	✗
P23 Congenital pneumonia	✓	✗	✗
<b>Lung cancer and mesothelioma</b>			
C33 Malignant neoplasm of trachea	✓	✓	✓
C34 Malignant neoplasm of bronchus and lung	✓	✓	✓
C45 Mesothelioma	✓	✓	✓
<b>Chronic Obstructive Pulmonary Disease (COPD)</b>			
J40 Bronchitis, not specified as acute or chronic	✓	✓	✓
J41 Simple and mucopurulent chronic bronchitis	✓	✓	✓
J42 Unspecified chronic bronchitis	✓	✓	✓
J43 Emphysema	✓	✓	✓
J44 Other COPD	✓	✓	✓
<b>Pneumoconiosis</b>			
J60 Coalworker's pneumoconiosis	✓	✓	✓
J61 Pneumoconiosis due to asbestos and other mineral fibres	✓	✓	✓
J62 Pneumoconiosis due to dust containing silica	✓	✓	✓
J63 Pneumoconiosis due to inorganic dusts	✓	✓	✓
J64 Unspecified pneumoconiosis	✓	✓	✓
J65 Pneumoconiosis associated with TB	✓	✓	✓
<b>Asthma</b>			
J45 Asthma	✓	✓	✓
J46 Status asthmaticus	✓	✓	✓

...(continued overleaf)

**Table A1.1 (continued): Disease codes included for Global Burden of disease data, hospitalisations data and deaths data**

Disease/Codes included	GBD	Hospitalisations	Deaths
<b>Interstitial lung disease</b>			
D86.0 Sarcoidosis of lung	✓	✓	✓
D86.2 Sarcoidosis of lung with sarcoidosis of lymph nodes	✓	✓	✓
D86.9 Sarcoidosis, unspecified	✓	✓	✓
J84 Other interstitial pulmonary diseases	✓	✓	✓
<b>Other respiratory diseases</b>			
J30 Vasomotor and allergic rhinitis	✓	✗	✗
J31 Chronic rhinitis, nasopharyngitis and pharyngitis	✓	✗	✗
J32 Chronic sinusitis	✓	✗	✗
J33 Nasal polyp	✓	✗	✗
J34 Other disorders of nose and nasal sinuses	✓	✗	✗
J35 Chronic diseases of tonsils and adenoids	✓	✗	✗
J36 Peritonsillar abscess	✓	✗	✗
J37 Chronic laryngitis and laryngotracheitis	✓	✗	✗
J38 Diseases of vocal cords and larynx, not elsewhere classified	✓	✗	✗
J39 Other diseases of upper respiratory tract	✓	✗	✗
J47 Bronchiectasis	✓	#	#
J66 Airway disease due to specific organic dust	✓	✓	✓
J67 Hypersensitivity pneumonitis due to organic dust	✓	✓	✓
J68 Respiratory conditions due to inhalation of chemicals, gases, fumes & vapours	✓	✓	✓
J70 Respiratory conditions due to other external agents	✓	✓	✓
J82 Pulmonary eosinophilia, not elsewhere classified	✓	✓	✓
J92 Pleural plaque	✓	✓	✓
J93.0 Spontaneous tension pneumothorax	✓	✓	✓
J93.1 Other spontaneous pneumothorax	✓	✓	✓
J95 Postprocedural respiratory disorders, not elsewhere classified	✓	✓	✓
J98 Other respiratory disorders (excluding J98.1 Pulmonary collapse, J98.2 Interstitial emphysema, J98.3 Compensatory emphysema, J98.9 Respiratory disorder, unspecified)	✓	✓	✓
<b>Pertussis</b>			
A37*	✗	✓	✓
<b>Cystic fibrosis</b>			
E84^	✗	✓	✓

Notes:

\*Only for infectious disease chapter and health care utilisation and deaths sections of lung disease chapter

^ only included in health care utilisation and deaths data because Global Burden of Disease estimates grouped cystic fibrosis with many other conditions that were not relevant to this report.

# J47 (bronchiectasis) included under 'chronic respiratory disease' for the hospitalisations and deaths data



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