MESOTHELIOMA IN AUSTRALIA INCIDENCE 1982 TO 2008 MORTALITY 1997 TO 2007



August 2012



Safe Work Australia

Mesothelioma in Australia

Incidence 1982 to 2008
Deaths 1997 to 2007

August 2012

Acknowledgement

Data on the number of new cases of mesothelioma in this report are collected by the National Cancer Statistics Clearing House, maintained by the Australian Institute of Health and Welfare (AIHW). Data on fatal cases of mesothelioma are collected in the National Mortality Database, made available to us by the AIHW. The authors, and not these agencies, are responsible for the use of the data in this report. The authors would like to thank the State Cancer Registries and the AIHW for allowing access to the data presented in this report.

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Report summary

Data on the number of new cases of mesothelioma are collected nationally by the Australian Institute of Health and Welfare (AIHW) in the National Cancer Statistics Clearing House, via the state and territory Cancer Registries. Information on deaths from mesothelioma is also collected by the AIHW as part of the National Mortality Database. Data are available from 1982 to 2008 for the number of new cases, and from 1997 to 2007 for the number of deaths.

New cases diagnosed

> In 2008 there were 661 new cases of mesothelioma diagnosed in Australia.

The number of new cases decreased from a previous peak of 652 new cases in 2003 to 591 new cases in 2006: initially suggesting a decreasing trend. However, the number of diagnoses reported in 2007 reached a new peak of 668 cases. This increase between 2006 and 2007 was mainly due to the increase in diagnoses for men (from 487 to 561 new cases respectively).

> In 2008, the age-standardised incidence rate of new cases of mesothelioma was 2.9 per 100 000 population.

This rate has increased over time, from 1.2 cases in 1982 to a peak of 3.2 in 2003. In 2008, the highest age-specific incidence rate of new cases occurred among men aged 85 years and over: 48 cases per 100 000 population aged 85 years and over.

Deaths due to mesothelioma

> In 2007 there were 551 deaths attributed to mesothelioma.

Data on the number of deaths due to mesothelioma are available for the years 1997 to 2007. Reflecting the increase in incidence of new cases diagnosed, the overall number of deaths resulting from mesothelioma generally increased over the period between 1997 and 2007: reaching a maximum of 551 deaths in 2007.

> In 2007, the age-standardised rate of death due to mesothelioma was 2.4 deaths per 100 000 population.

The overall age-standardised rate has remained relatively stable over the 10 years for which data are available. Over the period the standardised rate has ranged between a minimum of 2.1 deaths per 100 000 population in 1999 and a maximum of 2.7 in 2001.

Introduction

Mesothelioma is a usually fatal cancer which typically occurs 20 to 40 years after exposure to asbestos — although exposure does not necessarily result in the disease. All new cases of mesothelioma are notified to state and territory Cancer Registries, as mesothelioma is a notifiable disease. These data are collected nationally by the Australian Institute of Health and Welfare (AIHW) in the National Cancer Statistics Clearing House (NCSCH). Information on deaths from mesothelioma is also collected by the AIHW as part of the National Mortality Database. The AIHW publishes cancer data in spreadsheets on its website. This report uses the mesothelioma data, and additional data supplied by the state and territory cancer registries to the AIHW, to report on the incidence of new cases and deaths from mesothelioma by both age and sex. In addition, trends over time are shown for the period 1982 to 2008 for the number of new cases, and from 1997 to 2007 for the number of deaths. The mortality section of this report is identical to that published in the previous edition because data for 2008 are not yet available.

Mesothelioma of the pleura (a cancer affecting the protective lining of the lung and chest cavity) was the most common form of mesothelioma diagnosed in Australia: involving approximately 94% of cases since 1982. Mesothelioma of the peritoneum (a cancer affecting the abdominal lining) is a much less common diagnosis, accounting for approximately 5% of cases since 1982. The figures presented in this publication include all forms of mesothelioma.

Asbestos production, use and control in Australia

In Australia, more chrysotile (white asbestos) than amphibole (blue and brown) asbestos was mined until 1939. New South Wales, the first state to mine asbestos, produced the largest tonnages of chrysotile (until 1983) as well as smaller quantities of amphibole (until 1949). With the commencement of mining in Wittenoom in Western Australia in 1937, crocidolite (blue asbestos) dominated production until final closure of the mine in 1966. The main sources of raw asbestos imports were from Canada (chrysotile) and South Africa (crocidolite and amosite (brown asbestos)). Consumption peaked in about 1975 at approximately 70 000 tonnes per year.

In addition to imports of asbestos fibre, Australia also imported many manufactured asbestos products, including asbestos containing cement articles, yarn, cord and fabric, joint and millboard, friction materials and gaskets. The main sources of supply were the United Kingdom (UK), United States of America (USA), Federal Republic of Germany and Japan. With the closing of the crocidolite mine at Wittenoom, Australian asbestos production and exports declined. Imports of chrysotile also started to decline.

In Australia, over 60% of all production and 90% of all consumption of asbestos fibre was used in the asbestos cement manufacturing industry. From about 1940 to the late 1960s all three types of asbestos were used in this industry. The use of crocidolite began being phased out from 1967. Amosite was used until the mid 1980s. Much of the industry output remains in service today in the form of "fibro" houses and water and sewerage piping. By 1954, Australia was number four in the Western world in gross consumption of asbestos cement products, after the USA, UK and France: and clearly first on a per capita basis. After World War II to 1954, 70 000 asbestos cement houses were built in the state of New South Wales alone (52% of all houses built). In Australia, until the 1960s, 25% of all new housing was clad in asbestos cement.

Exposures to asbestos in the past were very high in some industries and occupations: as much as 25 million particles per cubic foot (150 fibres/ml) in asbestos pulverisors and disintegrators in the asbestos cement industry, and up to 600 fibres/ml among baggers at Wittenoom. The use of asbestos products has been regulated since the late 1970s. A series of regulations adopted in the late 1970s and early 1980s by the various

states imposed exposure limits of 0.1 fibres/ml for crocidolite and amosite, and 0.1-1.0 fibres/ml for chrysotile. In July 2003, a revised national exposure standard for chrysotile asbestos of 0.1 fibres/ml was declared by the National Occupational Health and Safety Commission (NOHSC). The prohibition of all forms of asbestos was adopted simultaneously under regulations in each Australian jurisdiction and Australian Customs on 31 December 2003.

A new national Model Code of Practice, *How to Manage and Control Asbestos in the Workplace*, *December 2011*, is available as an electronic publication on the Safe Work Australia web site. This Code of Practice provides practical guidance for persons conducting a business or undertaking on how to manage risks associated with asbestos and asbestos containing material at the workplace and thereby minimise the incidence of asbestos-related diseases such as mesothelioma, asbestosis and lung cancer.

Mesothelioma Projections

Due to the long latency between exposure to asbestos and diagnosis of mesothelioma, typically between 20 and 40 years, it is expected that the incidence of mesothelioma will not peak until after 2013. Clements et al (2007a) predict that the number of new cases in Australia will peak in 2017. In another study, Clements et al (2007b) used two different models to project the incidence of mesothelioma in men in New South Wales. Using an age/birth cohort model, they predict that the number of new cases would peak in 2021 and using a model based on potential exposure to asbestos in terms of age and calendar year, they predict the peak would occur in 2014.

The new Australian Mesothelioma Registry

In February 2010, Safe Work Australia initiated and funded the establishment of a new Mesothelioma Registry (www.mesothelioma-australia.com). The registry is administered by the Cancer Institute of New South Wales in association with the Monash Centre for Occupational & Environmental Health. Besides receiving notifications of new diagnosis of mesothelioma from all Australian cancer registries, consenting patients are asked about their residential, occupational and environmental history. The Registry management committee includes some of the leading experts in asbestos-related disease in Australia.

The aims of the Australian Mesothelioma Registry are to:

- better understand the exact relationship between asbestos exposure and mesothelioma
- better understand the nature and levels of asbestos exposure that can result in mesothelioma
- identify the groups of workers exposed to potentially dangerous levels of asbestos and to prevent that exposure
- assist the development of policies to best deal with the asbestos still present in our environment (mainly our built environment)
- provide information to assist researchers in undertaking investigations with the aim of preventing mesothelioma in the future, and
- identify other potential exposures that may cause mesothelioma.

Incidence of mesothelioma

New cases diagnosed in 2008

All cases of cancer in Australia are notifiable by legislation to state and territory cancer registries. These registries report to the NCSCH which is operated by the AIHW under the supervision of the Australasian Association of Cancer Registries (AACR). National data on mesothelioma are available from 1982. National data presented in this report were provided by the AIHW. State and territory data were provided by the relevant registry through the AIHW.

Incidence in a calendar year is defined as the number of new cases of mesothelioma diagnosed in an Australian state or territory in that year. In 2008, there were 661 people diagnosed with mesothelioma in Australia. Of these new cases about four out of every five cases (82%) were men.

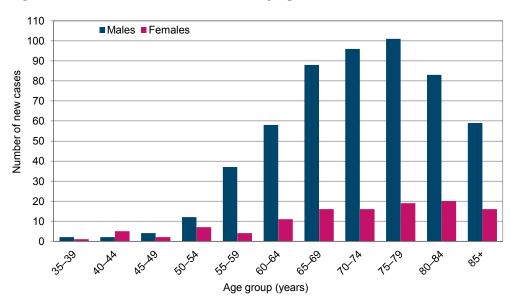


Figure 1 New cases of mesothelioma: by age and sex, 2008

Figure 1 shows the distribution by age and sex of new cases of mesothelioma diagnosed in 2008. There were 543 men diagnosed with mesothelioma (see Table 1). These men were predominately of older age: 427 (79%) were aged 65 years or more. There was one man in his early thirties diagnosed but none younger.

In 2008, there were 118 women diagnosed with mesothelioma. Similarly, these women were predominately of older age: 87 (74%) were aged 65 years or more. There was one women aged in her early thirties diagnosed but none younger.

50 Males 45 New cases per 100 000 population 40 35 30 25 20 15 10 Females 5 0 60.6A 65/89 10.74 ģ Age group (years)

Figure 2 New cases of mesothelioma: age-specific incidence rate by sex, 2008

Figure 2 shows the age-specific incidence rates (new cases per 100 000 population of that age) for the year 2008. For men, the incidence rate increased consistently and considerably with age: reaching a maximum of 49 new cases per 100 000 males among men aged 85 years and over. For women, a similar pattern was observed. The maximum rate for women occurred among those aged 80–84 years: 8 new cases per 100 000 females.

Trends over time, 1982 to 2008

Table 1 New cases of mesothelioma: year of diagnosis by sex, 1982 to 2008

Year	Males	Females	Total
1982	134	22	156
1983	131	15	146
1984	149	17	166
1985	178	24	202
1986	195	30	225
1987	174	29	203
1988	246	31	277
1989	229	40	269
1990	257	34	291
1991	260	47	307
1992	287	39	326
1993	318	51	369
1994	373	47	420
1995	335	59	394
1996	362	53	415
1997	393	75	468
1998	412	61	473
1999	400	76	476
2000	403	77	480
2001	468	107	575
2002	455	109	564
2003	540	112	652
2004	510	93	603
2005	499	114	613
2006	487	104	591
2007	561	107	668
2008	543	118	661

700 Persons 600 Number of new cases 500 400 300 200 Females 100 0 ⁽જુ, જુ, જુ, જુ, જુ, Year of diagnosis

Figure 3 New cases of mesothelioma: year of diagnosis by sex, 1982 to 2008

National data

Table 1 and Figure 3 show that the total number of new cases of mesothelioma diagnosed has risen steadily in most years since 1982, when national data first became available: reaching 652 new cases in 2003. The number of new cases then decreased to 591 in 2006: initially suggesting a decreasing trend. However, the number of diagnoses reported in 2007 reached a new peak of 668 cases. This increase between 2006 and 2007 was mainly due to the increase in diagnoses for men (from 487 to 561 new cases respectively). The figure for 2008 is only slightly lower at 661 new cases than that for 2007.

Figure 3 clearly shows that the large majority of new cases in any year are male. However, the proportion of female new cases increased slightly over the collection period. Over the five-year period 1982 to 1986 females represented on average 12% of all new cases, whereas over the period 2004 to 2008 the average was 17%.

Figures 4 and 5 show age-specific incidence rates for selected age groups for men and women respectively. The graphs show that for both men and women, the incidence rates in the two oldest age groups generally increased markedly over the period.

Since 2003, for men (Figure 4) the incidence rate among those aged 80 years and over declined from a peak of 50 new cases in 2003 to 38 new cases per 100 000 population in 2006, before increasing again in 2007 to 49. The rate then declined slightly in 2008 to 48 new cases per 100 000 population. Similarly, among men aged 65-79 years the incidence rate increased between 2006 and 2007 and then declined slightly.



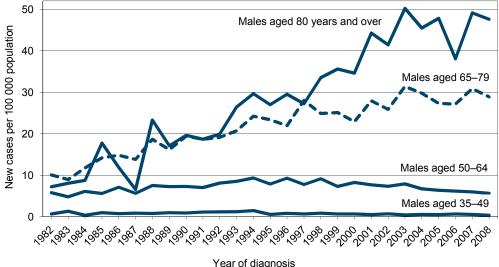
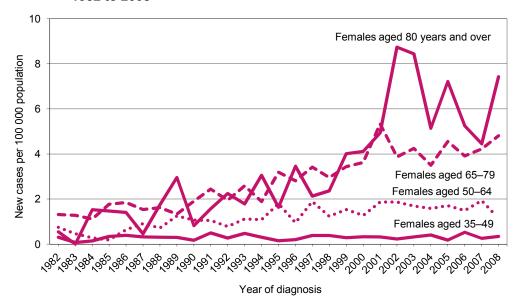


Figure 5 New cases of mesothelioma: age-specific incidence rates for females, 1982 to 2008



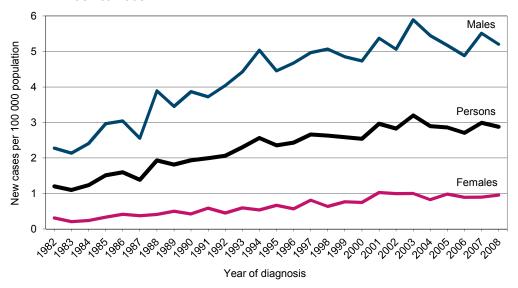
Since 2002, the incidence rate among women aged 80 years and over declined overall from 9 to 4.5 new cases per 100 000 population in 2007. In 2008 the rate was 7 new cases per 100 000 population (Figure 5). However, because of the relatively small number of women diagnosed, the rates are quite volatile.

Age-standardisation is a method of adjusting the crude incidence rate to eliminate the effect of differences in population age structures when comparing crude rates for different periods of time. By applying the observed age-specific death rates in each year to a standard population, the expected number of deaths can be calculated and a more comparable age-standardised rate can be calculated for each year.

Figure 6 shows the age-standardised incidence of new cases of mesothelioma (per 100 000 population) over the period 1982 to 2008. The overall incidence rate increased from a minimum of 1.1 new cases per 100 000 population in 1983 to a maximum of 3.2 in 2003. Since that date, the rate declined to 2.7 in 2006, increased again in 2007 to 3.0, and then fell again slightly to 2.9 in 2008.

The age-standardised incidence rate of new cases of mesothelioma for men was considerably higher than that for women in all years. The male rate ranged between a minimum of 2.1 new cases per 100 000 males in 1983 to a maximum of 5.9 in 2003:

Figure 6 New cases of mesothelioma: age-standardised incidence rate by sex, 1982 to 2008



in 2008 there were 5 new cases per 100 000 males. The age-standardised incidence rate for women over the period ranged between 0.2 new cases per 100 000 females in 1983 and at or near 1 new cases per 100 000 females in recent years.

Because asbestos exposure in the workplace and the general environment has now been eliminated or minimised, the incidence of new cases of mesothelioma in the population is expected to decline. However, because of the long latency between exposure to asbestos and diagnosis of mesothelioma, typically between 20 and 40 years, it is expected that the incidence of mesothelioma will not peak until 2014 to 2021, depending on the projection methodology. Further details can be found in the Introduction, under Mesothelioma projections — p.6.

State and Territory data

Figure 7 shows the five-year rolling average number of new cases of mesothelioma occurring in each state and territory over the time period 1982–1986 to 2004–2008: the period for which data are available for all states and territories. Five-year rolling averages are used to smooth random annual variations and preserve confidentiality in the smaller states and territories. Further detailed data by sex for each state and territory can be found in Table 2.

The five-year rolling average number of new cases of mesothelioma in each state and territory generally reflects population distribution. The more populous states, New South Wales, Victoria and Queensland, reported the largest number of new cases: respectively averaging 211, 135 and 119 cases over the five-year period 2004–08. These three states have also experienced relatively consistent and similar rates of increase in the number of cases of mesothelioma diagnosed over the period 1982–86 to 2004–08. The number of new cases diagnosed in Western Australia increased at a similar rate up until the mid-90s, and then the rate of increase reduced. In South Australia and Tasmania the rate of increase in the number of new cases since the early 90s was not as great as in other jurisdictions.

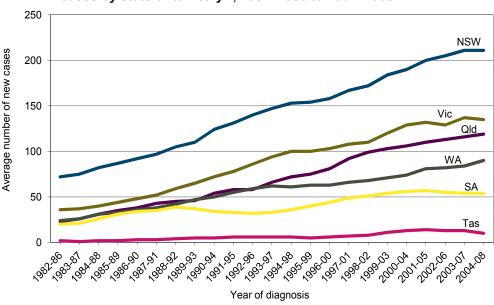


Figure 7 New cases of mesothelioma: five-year rolling average number of cases by state or territory^(a), 1982–1986 to 2004–2008

(a) Because the numbers of mesothelioma deaths in the ACT and the NT are relatively low, they cannot be plotted clearly at this scale. These numbers can be found in Table 2, p.12.

New cases of mesothelioma: five-year rolling average number by state or territory by sex, 1985-1989 to 2004-2008 Table 2

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	_	235	253	269	294	312	343	363	385	413	434	445	462	494	514	549	575	601	909	625	627

Notes: M= male, F= female and T= total. The data above are averages rounded to the nearest person, consequently the sum of the relevant male and females figures does not necessarily equal the total figure. The five-year rolling average for 1984–88 has been dropped from this table to allow for data for the latest reporting period, 2004–08, to be included. Please refer to earlier reports in this series for 1982–86, 1983–87, and 1984–88 data.

Deaths due to mesothelioma¹

Deaths in 2007

The cause of every Australian death is certified by a medical practitioner and recorded on a death certificate. These death certificates are required by state and territory Registrars of Births, Deaths and Marriages under jurisdiction specific legislation. On behalf of the Registrars these data are assembled, coded to the underlying cause of death, and released by the Australian Bureau of Statistics (ABS). Cases where the underlying cause of death was mesothelioma are discussed in this section. Data on deaths due to mesothelioma are available from 1997 onwards, the year in which a specific code for mesothelioma was added to the *International Classification of Diseases - 10th revision* (ICD10).

The information on deaths from mesothelioma in this section is based on the year of death except for the most recent year 2007, where year of registration is used. The year of death and registration usually coincide, although deaths at the end of a calendar year may be held over until the following year, as will deaths whose cause requires further examination by a coroner. In recent years less than 5% of deaths (all causes) were held over from one year to the next for processing. This method of reporting the data allows the most recent year to be used.

In 2007 there were 551 deaths registered with an underlying cause of mesothelioma. Of these deaths, 464 (84%) were of men and 87 (16%) were of women.

Figure 8 shows the age and sex distribution of those 551 decedents. Deaths among young adults are rare: in 2007 the youngest deaths were in the 25–29 year age group. The graph shows that deaths due to mesothelioma were distinctly skewed towards the older age groups: this is particularly clear for the male decedents with 75% aged over 65 years at the time of death. The comparable figure for female decedents was 70%.

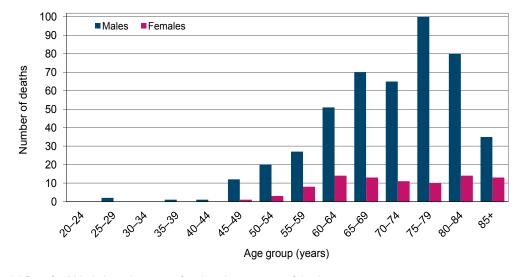


Figure 8 Deaths due to mesothelioma: by age and sex, 2007(a)

(a) Data for 2007 is based on year of registration, not year of death.

^{1.} Note that data on deaths reported in this publication are based on data from state and territory Registrars of Births, Deaths and Marriages which are assembled, coded and released by the ABS. This data may differ to those reported by state cancer registries, which use pathology reports and other notifications, as well as death certificates, to ascertain deaths from mesothelioma.

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Figure 9 Deaths due to mesothelioma: age-specific mortality rates by sex, 2007(a)

(a) Data for 2007 is based on year of registration, not year of death.

Figure 9 shows for 2007 the age-specific mortality rate (deaths per 100 000 population) of deaths caused by mesothelioma. Because of the relatively short survival period from onset of the disease, the age related pattern of mortality is very similar to that for diagnosis. The mortality rate for men increases considerably and steadily with age, reaching a maximum of 46 deaths per 100 000 population among men aged 80–84 years before declining to 31 in the open-ended age group of 85 years and over. For women, the rates were lower, but also reached a maximum of 6 deaths per 100 000 population among women in both the 80–84 and 85 years and over age groups.

Trends over time, 1997 to 2007

National data

The overall number of deaths resulting from mesothelioma increased over the period between 1997 and 2007. The number of deaths reached a maximum of 551 registered deaths in 2007; this followed a brief decline after an earlier peak of 545 in 2004. Most of these decedents were male, with an average of 84% of total deaths over the eleven years.

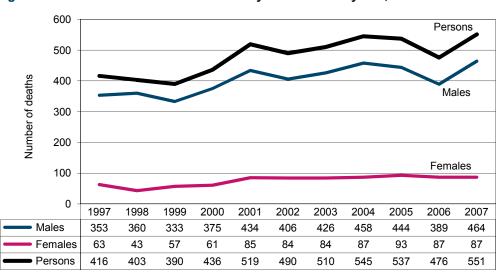


Figure 10 Deaths due to mesothelioma: year of death by sex, 1997 to 2007(a)

Year of death

(a) Data for 2007 is based on year of registration, not year of death.

5 Males Deaths per 100 000 population 4 3 Persons 2 1 Females 0 1997 1998 1999 2000 2001 2002 2003 2005 2006 2007 2004

Figure 11 Deaths due to mesothelioma: age-standardised mortality rate by sex, 1997 to 2007^(a)

(a) Data for 2007 is based on year of registration, not year of death.

Figure 11 shows that the overall age-standardised rate of death due to mesothelioma has remained relatively stable over the eleven years for which data are available. Over the period the standardised rate has ranged between a minimum of 2.1 deaths per 100 000 population in 1999 and a maximum of 2.7 in 2001. The standardised rate in 2007 was 2.4 deaths per 100 000 population.

Year of death

State and territory data

Figure 12 shows the average number of deaths due to mesothelioma occurring in each state and territory over the time period for which data are available. The pattern of mortality across the states and territories is similar to that of the incidence of new cases since the deaths reported result from developing mesothelioma: the ranking

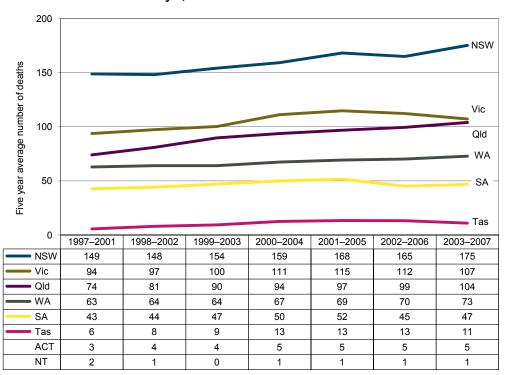


Figure 12 Deaths due to mesothelioma: five-year rolling average number by state or territory^(a), 1997-2001 to 2003-2007

Year of death

⁽a) Because the number of mesothelioma deaths in the ACT and NT are relatively low, they cannot be plotted clearly on this scale.

primarily reflecting the size of the population of the state or territory. Any differences between the number of people diagnosed with mesothelioma and the number that die from the disease must be attributable to variations in survival periods; the number of deaths that occur among those with the disease from causes other than mesothelioma; and in some cases, change of residence across state and territory borders between diagnosis and death.

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Leigh J & Driscoll T. Malignant Mesothelioma in Australia, 1945-2002. *International Journal of Occupational and Environmental Health* 2003;9:206-217.

Useful links

Many of the State Cancer Registries publish state specific reports which include information on mesothelioma. In addition the AIHW releases detailed spreadsheets of national mesothelioma data. This information can be found via the links below:

national mesotricilorna data.	The information out be found via the links below.
• AIHW	www.aihw.gov.au
Cancer Institute NSW	www.cancerinstitute.org.au
 Vic Cancer Registry 	www.cancervic.org.au
 WA Cancer Registry 	www.health.wa.gov.au/wacr
SA Cancer Registry	www.health.sa.gov.au/pehs/branches/branch-cancer- registry.htm
Qld Cancer Registry	http://www.cancerqld.org.au/page/research_statistics/queensland_cancer_registry/
 Tas Cancer Registry 	www.menzies.utas.edu.au
NT Cancer Registry	http://www.health.nt.gov.au/Health_Gains/Publications/index.aspx#NTCancerRegistry
ACT Cancer publications	http://health.act.gov.au/health-services/population-health/epidemiology-branch/epidemiology-publications-health-series/cancer-in-the-act-incidence-and-mortality-2011

Australian Mesothelioma Registry:

www.mesothelioma-australia.com

Safe Work Australia has a web page for Mesothelioma related reports:

http://www.safeworkaustralia.gov.au/AboutSafeWorkAustralia/WhatWeDo/Statistics/Pages/Mesothelioma.aspx

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