

# Mesothelioma as a Marker for Asbestos-Related Lung Disease in Victoria

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## Abstract

*This study describes the geographic distribution of asbestos-related health outcomes in Victoria using mesothelioma as a marker. The study team calculated standardised incidence and mortality ratios for each local government area and examined State-wide secular trends. The results show that mesothelioma is a rare disease occurring predominantly in elderly men, with higher-than-expected rates occurring in localities with traditionally high levels of occupational exposure to asbestos. Trends continue to increase despite a dramatic reduction in levels of exposure since the 1980s, confirming what is known about the lag between exposure and disease onset. Confounding factors (such as smoking) and imprecise estimates of the ratio of asbestos-related lung cancers to mesotheliomas make it difficult to quantify the wider impact of asbestos.*

## Introduction

Asbestos is attractive for use in industry because it combines a number of attributes, including strength, fire resistance and insulation. However, exposure to this material is associated with significant health risks<sup>1</sup>—a fact well established in the 1950s. Lung cancer and mesothelioma are the most commonly attributed malignancies, but cancers of the gastrointestinal tract, kidney, pancreas and larynx have also been reported.<sup>2</sup> The Latrobe Valley is Victoria's industrial centre for coal-fired power generation in the south-east of the State. Asbestos was used extensively in the construction of power stations following the establishment of the State Electricity Commission in 1921.<sup>3</sup> High levels of occupational exposure occurred in this industry<sup>4</sup> and other industries<sup>5,6</sup> until the 1980s when tighter regulations were introduced.

Because the lag between exposure

and malignant disease is about 20–30 years,<sup>7,8</sup> the size of the population health impact of this material is only just becoming apparent<sup>5</sup> and is expected to peak in 10–20 years.<sup>9</sup> The most common asbestos-related malignancy is bronco-genic lung cancer,<sup>10</sup> with the case ratio of asbestos-related lung cancers to mesotheliomas being as high as 10:1.<sup>11</sup> However, the independent effect of smoking on lung cancer confounds this association.<sup>12,13</sup> The aetiology of mesothelioma, on the other hand, is almost entirely due to asbestos exposure and is unrelated to smoking.<sup>14–16</sup> Thus, mesothelioma is a suitable marker for identifying the geographic distribution of asbestos-related health outcomes.<sup>17</sup> The aim of this study was to describe the epidemiology of mesothelioma throughout Victoria over the period 1986–99.

## Methods

Mortality and population data for the period 1986–99 were obtained from the Australian Bureau of Statistics. Incidence data for the period were obtained from the Victorian Cancer Registry (1998 being the most recent year for which data could be provided). Mesothelioma malignancies were identified using the codes 163 (ICD-9) and C45 (ICD-10). All data, regardless of year, were analysed in terms of current local government boundaries. Local governments comprise two or more statistical local areas (SLAs), which are the most disaggregated geographic identifier for place of usual residence in the data. To achieve geographic consistency over the study period, SLA data that were fragmented as a result of the 1993 council amalgamations were re-apportioned using information from the 1996 census on the proportion of each old SLA population residing in each of the new SLAs after the boundaries were redrawn.

Standardised incidence and mortality ratios (SIRs and SMRs respectively) and 95 per cent confidence limits for each local government and sex combination were calculated using Victoria as the standard population. This method, known as indirect standardisation, is appropriate for comparisons across areas with small populations.<sup>18</sup> A ratio of 1 indicates no difference from the State average. Annual age-adjusted incidence and mortality rates and confidence limits were also calculated using 1986 as the baseline to indicate secular trends.

## Results

A total of 997 incident cases were coded to mesothelioma in Victoria over the period 1986–98 (836 males and 161 females), resulting in 469 deaths. The majority of these malignancies occurred in elderly males, with an exponential increase from the age of 40 years. The average annual incidence rate per year was 1.7 per 100 000 population, rising from 41 cases (or 1 per 100 000) in 1986 to 111 cases (or 2.4 per 100 000) in 1998. When adjusted for age, the latter figure was reduced to 2.1 but was still significantly higher than at baseline (95 per cent confidence interval of 0.7–1.3 compared with 1.7–2.5). Mortality rates were consistently lower but followed the same trend, rising from 0.4 per 100 000 at baseline (95 per cent confidence interval of 0.2–0.6) to an age-adjusted rate of 1.3 per 100 000 (95 per cent confidence interval of 1.0–1.6) in 1999.

Figure 1 shows two municipalities with significantly raised SIRs in males: Latrobe at 3.3 times the expected incidence (95 per cent confidence interval of 2.3–4.5) and Hobsons Bay at 2.0 times (95 per cent confidence interval of 1.3–2.9). Three other municipalities also had higher-

than-expected incidence (Melbourne, Maribyrnong and Brimbank), but for these municipalities the results were of marginal significance. The pattern in mortality for males was the same, with Latrobe at 4.6 times the expected mortality (95 per cent confidence interval of 3.1–6.5) and Hobsons Bay at 2.9 times (95 per cent confidence interval of 1.9–4.4). Greater Geelong also had higher than expected mortality, with an SMR of 1.5 (95 per cent confidence interval of 1.1–2.2).

The differences for females were less conclusive as a result of the smaller numbers, as indicated by the wider confidence intervals. Only Hobsons Bay had higher-than-expected incidence, with an SIR of 3.2 (95 per cent confidence interval of 1.4–6.2), and two municipalities had excess mortality—Golden Plains at 12.6 (95 per cent confidence interval of 1.4–45.6) and Greater Bendigo at 3.7 (95 per cent confidence interval of 1.3–8.0).

## Discussion

Our analysis shows mesothelioma is a rare disease occurring predominantly in elderly men, with higher-than-expected rates of occurrence limited to specific localities. Incidence is increasing across the State, despite a dramatic reduction in levels of exposure since the 1980s. This confirms what is known about the lag between exposure and disease onset. Given that five-year survival for this cancer is as low as 7 per cent,<sup>19</sup> the consistently lower mortality rates compared with incidence suggests that a proportion of mesothelioma deaths are coded to other diseases. It is worth noting also, for SLAs fragmented by boundary changes, that it is uncertain whether the local government area of residence was correctly reassigned in every instance. Moreover, the study team could not determine the extent to which people relocated to other municipalities before being recorded as having the disease. The combined effect of these factors is likely to reduce the observed differences between local government areas.

The higher morbidity and mortality

rates for Latrobe and Hobsons Bay are of particular interest. These results confirm the existence of asbestos-related problems in the Latrobe Valley among males. That females do not experience higher rates in this region is significant, suggesting industrial exposure as the most likely aetiology. This explanation equally applies to Hobsons Bay and surrounding suburbs, which are areas with strong links to the shipping industry in which the practice of handling asbestos without protection was once widespread.<sup>20</sup> The assumption that the majority of workers in these industries live near their place of work could not be proven, because this type of information was not available.

The confounding effects of smoking, together with imprecise estimates of the ratio of asbestos-related lung cancers to mesotheliomas, make it difficult to quantify the wider impact of asbestos. It is clear, however, that mesothelioma is a disease for which the median survival time is extremely short (regardless of the speed of diagnosis) and the prospects for therapy advances are poor.<sup>21</sup> While the prognosis for asbestos-related broncogenic lung cancer is slightly better, and is comparable to survival rates for other lung cancers, early detection through more frequent chest x-ray screening does not reduce mortality.<sup>22</sup> Further, the evidence for alternative technologies such as helical or low-dose CT scanning remains equivocal.<sup>23,24</sup> By far the greatest impact on the burden of lung cancer in 20 years will be achieved through programs directed at increasing smoking cessation rates and reducing the number of children taking up smoking.<sup>25</sup>

## References

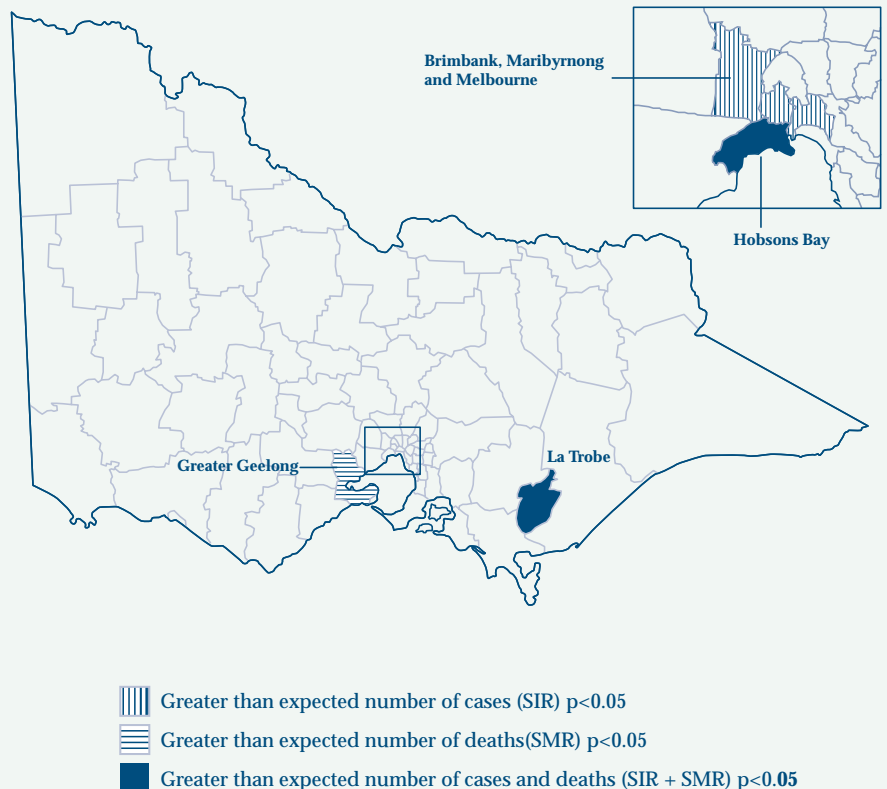
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Figure 1: Victorian Municipalities with Higher-than-Expected SIRs and SMRs for Mesothelioma, 1986–99

### Males



### Females



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