

Comments on 'Age-standardised mortality and cause of death in the Latrobe Valley at the time of (and five years prior to) the Hazelwood coalmine fire in Morewell, Victoria.'

General issues

1. Could a context/background section be included? The following content may be helpful:

Victoria experienced one of its hottest and driest summers on record in 2014. In mid-January 2014, Melbourne endured its most prolonged heatwave since 1908, with four consecutive days over 40 degrees Celsius. Between 7 and 9 February 2014, emergency services and firefighting resources were committed to responding to multiple significant fires across the State and within the Latrobe Valley. The Fire Services Commissioner and the Chief Health Officer made several announcements warning the community about the potential for extreme weather conditions and associated fire and health risks. On 9 February 2014, the entire State of Victoria was facing the most extreme weather conditions since Black Saturday. [Hazelwood Mine Fire Report 2014].

The Hazelwood Mine Fire Report 2014 found that the most likely cause of the Hazelwood mine fire was embers spotting from one or both of two bushfires outside the mine.

2. A number of statistical points are made in the executive summary, but it is difficult to understand what these points mean. A plain language explanation of each statistical point would assist the reader.
3. We understand that because the data sets are small, it is very difficult to draw conclusions. This point needs to be made very clear, especially where significant statistical claims are made, such as in the executive summary, which in fact, are later contradicted in the report – please see point 6 below.
4. It would be helpful if there could be an explanation for why five years of data have been examined. We understand that Barnett used a five year time period in his review. Were there other epidemiological reasons why a five year period was used? Could this be explained in the methodology? This age-standardised report should be readable in conjunction with the critique of the Barnett report.
5. The report refers to Feb – March periods and Feb – June periods. Could you please include an explanation as to why these have been used? The report often jumps around from period to period. It would be helpful if periods could be arranged and discussed systematically.

6. A number of reviewers have raised concerns about readability. Compare this to the review of the Barnett papers which was easy to read and the reader could come away with a very clear understanding. The Barnett review stated categorically that the data did not show an increase in deaths at the time of the mine fire. This fact seems to be in conflict with the last paragraph of the executive summary which states that there is statistical evidence of increases in mortality in 2014 compared to 2012-13. Elsewhere in the review, this claim is contradicted by the explanation that the confidence intervals overlap and therefore no increase in deaths have been identified from 2014. Similar examples of seemingly contradictory information between the executive summary and the discussion should be reconciled.
7. The executive summary does not include some of the key points made in the discussion. A number of statistical statements are given in the executive summary (which could lead the reader to think that definitive conclusions could be drawn from these statements) which are then heavily qualified or contradicted in the discussion, reflecting the need for better explanation in the executive summary.
8. Some of the executive summary is presented as dot points of different font size – could this be corrected so the executive summary is consistently presented?
9. It would be helpful if there was a brief discussion on the epidemiological difference between an association and causation.
10. The report uses the word 'extreme' to refer to air quality PM₁₀ readings of >50µg/m³. Using the word 'extreme' does not align with the policy setting for air quality in Victoria for smoke events. There are air quality levels for particulate matter used in Victoria that have associated tiered public health advice. It is preferable not to use the descriptor 'extreme' without knowledge of these tiered levels of advice. For example, in an event where the 24 hour PM₁₀ level is from 51µg/m³ to 65µg/m³, public health advice is targeted only at sensitive populations. Particulate matter is a non-threshold pollutant which means health effects may occur at this level (50µg/m³) however this value is currently what has been agreed as an acceptable level of protection of susceptible members of the community in Australia. Please refer to the tables on the EPA website for air quality values and associated public health advice to provide context: <http://www.epa.vic.gov.au/your-environment/air/bushfires-and-air-quality>

Please designate exceedences with figures rather than with subjective descriptors. If the word 'exceedences' is used, could you please define in the methodology? There is also an error in defining exceedences in the methodology on page 4. The threshold level for this analysis is no more than five days *annually*, not over ten years. The Department understands that the five days per annum was selected in 1998 to allow for exceedences due to events such as bushfires, planned burns, industry emissions and dust storms. No more than five days per annum greater than 50 µg/m³ is a reporting standard and goal that was to be achieved within ten years (between 1998 to 2008). Therefore, within 10 years, the goal was for there to be no more than five days/year exceeding 50µg/m³.

This correction of the definition from ten years to annually may impact the calculations used in this review – could you please review these if necessary?

Specific concerns

11. Page 2, second paragraph, 4th line: the Feb – March period is discussed. Does this refer to 2014 or all years? And the same issue arises in the 3rd dot point on this page.
12. Page 2, third paragraph, 1st line: what does 'these days' refer to? And again in the 3rd line in this paragraph.
13. Page 2, first dot point: 'There is no statistical evidence for the association of extreme daily average temperature with mortality in the Feb – March period for 2009-14.' Does this mean that there was evidence for an association in the other period of Feb - June?
14. Page 2, second dot point: 'There was no statistical evidence that any death was caused by direct relationship with fire rather than smoke-exposure....' This sentence is difficult to understand – does this mean that there were deaths that were smoke-exposure-related or not?
15. Page 2, 3rd dot point: We are unsure of the significance of 67% without knowing the percentage of daily PM₁₀ exceedences in Feb-March compared to other months. There is also reference to Feb-March period again: does this refer to 2014 or all years?
16. Page 2, 4th dot point: this discusses higher cardiovascular mortality in 2014 compared to 2009. However, the last paragraph in the discussion on page 15 states that there is insufficient data to associate these excess deaths with specific extremes in air quality or temperature. The second last dot point in the executive summary on page 2 should reflect this inability to associate cardiovascular deaths with extremes in air quality or temperature.
17. Page 2, 5th dot point: the concerns with this dot point have been raised above. There are also three references to 'mortality' in this point. Do each of these refer to all-cause mortality?
18. Page 5 discusses 'person years'. Could this term please be defined either here or in the methodology?
19. Page 5 results: Would it be helpful for the reader if the statement about difference in deaths between 2014 and the previous five years was qualified with the explanation of overlapping confidence intervals used elsewhere in the report (and what this means in plain language)?
20. Page 6, first paragraph, 4th line: there is a reference to 'this period'. What year(s) is this referring to?

21. Page 6, 3rd paragraph, 2nd line: would the inclusion of the word 'with' before the word 'most' be helpful?
22. Page 6 tables: It would be helpful if the number of days that exceed the 50µg/m³ in 24 hours for PM₁₀, even over quarters, was outlined to help the reader see what times of the year this occurs. This is important, as in winter personal log heaters may contribute significantly to ambient air quality which is usually outside bushfires, planned burns' seasons and the time of the Hazelwood fire.
23. Page 7, 3rd paragraph, 1st line: there is a reference to mortality – does this refer to all-cause mortality? The last sentence of this paragraph regarding the ratio of mortality rates being broad with overlapping confidence intervals should be explained in plain language.
24. Page 7, last paragraph: this paragraph is a key finding of the report – which seems to contradict the previous paragraphs on this page. Shouldn't the focus of this section be the content in the last paragraph?
25. Page 10, last paragraph: this paragraph is also a key finding of the report – shouldn't the focus of this section be the content of the last paragraph?
26. On page 15, second paragraph, it is claimed that: 'Victoria experienced a serious heatwave in January 2014 that resulted in substantial mortality across the state.' This claim should be referenced.
27. Page 15, 2nd paragraph: would the discussion around the January heatwave and its possible impact upon deaths during the mine fire period be helpful to the reader if canvassed in the executive summary?
28. Page 15, 3rd paragraph: there is discussion about association of colder temperatures with Feb-June mortality for all ages. Is this issue also identified in the results section?
29. In discussion, could it include discussion about the content in the paragraph from bottom of 7, regarding no statistical evidence of association between temperature and air quality and mortality rates from cardiovascular, respiratory or cardiovascular causes?
30. In discussion, could it include discussion about the content in the paragraph from bottom of page 10 regarding no association between temperature and air quality and mortality rates from cardiovascular, respiratory and cardiorespiratory causes in the 65+ age group?
31. Could a reference section please be included for all of the documents discussed in the report, including those in the methods' section?