

**From:** [Bruce Armstrong](#)  
**To:** [Justine Stansen](#)  
**Cc:** [Monica Kelly](#)  
**Subject:** RE: Hazelwood Mine Fire Inquiry  
**Date:** Friday, 18 September 2015 10:19:22 PM  
**Attachments:** [image001.jpg](#)

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Justine

I have now read Adrian Barnett's Analysis of daily death data during the Morwell mine fire (version of September 2015).

His analysis of deaths is, from a technical point of view, an improvement on his previous analyses because it uses daily death data (referenced to the postcode of residence) and Australian Bureau of Statistics population data. It also restricts the analysis to the four postcode areas of greatest interest – Churchill, Moe, Morwell and Traralgon. From this analysis he reports a relative risk of death from the days of the fire (9<sup>th</sup> February 2015 to 26<sup>th</sup> March 2014) of 1.32 (95% credible interval of 1.03 to 1.66; p value 0.01). He also estimates the number of additional deaths in the four postcode areas from the period of the fire to be 23, 1 in Churchill, 8 in Moe, 6 in Morwell and 8 in Traralgon.

These estimates take account of the time trend in mortality in these four postcodes from 2009 to 2014, the underlying differences in mortality in the four postcodes, the seasonal variation in mortality, the weekly variation in mortality and the maximum daily temperature. Therefore, on the face of it, the observed relative increase in mortality risk during the period of the mine fire was independent of these other variables.

These results are reasonably coherent with, but suggest a greater increase in mortality in the period of the mine fire than, the other mortality analyses. For example, the table below compares Adrian Barnett's latest result with my result for the period February to March 2014 (Table 2 of my report) based on the Flander et al 2015 analysis.

| Years                                | February-June |           |         | February-March |           |         | Notes  |
|--------------------------------------|---------------|-----------|---------|----------------|-----------|---------|--|
|                                      | Rate ratio    | 95% CI    | p-value | Rate ratio     | 95% CI    | p-value |  |
| <b><i>Deaths from all causes</i></b> |               |           |         |                |           |         |  |
| <b>2014</b>                          | 1             |           |         | 1              |           |         |  |
| <b>2009-2013<sup>b</sup></b>         | 0.90          | 0.80-1.00 | 0.04    | 0.83           | 0.68-1.02 | 0.08    | As in Table 2 of my report                                 |
| <b>2009-2013</b>                     |               |           |         | 1.20           | 0.98-1.47 | 0.08    | Inverted to be in the same form as Barnett's latest result |
| <b>2009-2013</b>                     |               |           |         | 1.32           | 1.03-1.66 | 0.01    | Barnett's latest result                                    |

The greater increase in mortality in the period of the mine fire could be due, perhaps, to the more precise definition of the period of the fire or to effects of one or more of the variables newly added to Barnett's statistical model for this analysis (time trend in mortality, weekly variation in mortality and maximum daily temperature). Whether it was any of the latter could be tested by removing each in turn from Barnett's statistical model and observing the change in the mine fire result consequent on the removal.

It is worth noting that Barnett's latest analysis shows an excess of deaths during the period of the mine fire in all four postcodes, Morwell included. In his second previous analysis there was an apparent deficit of deaths in Morwell (relative risk 0.8, 95% CI 0.55-1.28; Table 3 of the relevant report). Barnett does not describe how he arrived at the estimated number of extra deaths during the mine fire in the four postcodes.

Bruce

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**From:** Bruce Armstrong  
**Sent:** Thursday, 17 September 2015 2:42 PM  
**To:** 'Justine Stansen'  
**Subject:** RE: Hazelwood Mine Fire Inquiry

Thanks Justine. I will be happy to give the Board my opinion. You should have it by Monday.

Bruce

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**From:** Justine Stansen [REDACTED]  
**Sent:** Thursday, 17 September 2015 11:29 AM  
**To:** Bruce Armstrong  
**Subject:** Hazelwood Mine Fire Inquiry

Dear Bruce

I trust you are well. We have received some further analysis undertaken by Associate Professor

Adrian Barnett since the Hazelwood Inquiry hearings held earlier this month which is based on daily death data rather than monthly data. I was wondering whether you could consider the **attached** analysis and contact me to discuss your thoughts about it. The Board would be grateful for your additional input in relation to this issue.

I look forward to hearing from you.

Justine Stansen

**Principal Legal Advisor**  
**Hazelwood Mine Fire Inquiry**



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