

Research Summary

Results from the Respiratory Stream. The impact of coal mine fire smoke on lung health in adults.

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Analysis aims

Three and a half years after the mine fire, this research aimed to discover whether adults who were more highly exposed to the mine fire smoke had poorer lung function than adults who had less exposure.



Meet the team

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Background

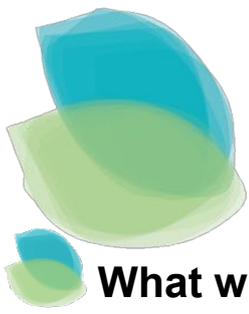
The fire in the Morwell open cut brown coal mine adjacent to the Hazelwood Power Station blanketed the town of Morwell and the surrounding area in smoke and ash for six weeks in February and March 2014. The smoke event was recognised as one of the most significant air quality incidents in Victoria's history. It caused considerable community concern within Morwell and the broader community. In response to these concerns, and following extensive community consultation, the Hazelwood Health Study (HHS) was established to examine the impacts of the mine fire. The HHS involves multiple research streams targeting different health outcomes and different vulnerable groups. The **Respiratory Stream** is the part of the HHS that examines whether exposure to smoke from the mine fire is associated with respiratory symptoms, asthma control and decline in lung function.

What we did

We worked with CSIRO to estimate the levels of fine particles in the smoke smaller than 2.5 thousandths of a mm in diameter (PM_{2.5}). Particles this fine can travel deep into people's lungs. We tested 346 adults from Morwell who were grouped into three levels of mine fire PM_{2.5} exposure (*low*: daily average of 6 micrograms per cubic metre of air (µg/m³); *medium*: average of 12 µg/m³; and *high*: average of 28 µg/m³) and 173 adults from Sale who had little or no exposure. Participants underwent a test of lung health using the forced oscillation technique (FOT). FOT involves normal breathing on a machine while sound waves are used to measure how easily air can move through the lungs and the stretchiness of the lungs. The test was conducted both before and after using an asthma puffer containing salbutamol (Ventolin). Participants also answered questions about respiratory symptoms such as cough and wheeze and medication use. We took into consideration other factors that could influence lung health, such as age, height, weight, cigarette smoking and participants' jobs that may have involved exposure to dusts, smoke or fumes.

A detailed paper describing the findings from this analysis can be requested from the Hazelwood Health Study researchers by email contact@hazelwoodhealthstudy.org.au or phone 1800 985 899





What we found

We found that as the level of mine fire PM_{2.5} exposure increased, lung stretchiness decreased. That is, three and a half years after the mine fire, higher levels of smoke exposure were associated with poorer lung function in adults. It is normal for the lungs to become less stretchy as we age. However, our findings indicated that each 10 µg/m³ increment in smoke exposure was associated with reduced stretchiness that you would normally observe after approximately four years of aging. This finding was independent of participants' actual age.



Hazelwood Health Study Respiratory Scientists above from left to right: Brigitte Borg, Tom McCrabb, Annie Makar.

Considerations

We cannot be absolutely certain that the mine fire smoke caused the change in lung stretchiness because additional factors can affect lung health, such as genes, previous exposure to other sources of smoke, infections or access to health services. The small decreases in lung stretchiness that we measured may not mean that the affected adults will experience any noticeable lung problems now or in the future. However, people with symptoms like shortness of breath, wheezing, or frequent coughing should always have these checked by a doctor. Further, because a large proportion of adults from Morwell and Sale did not participate in the baseline Adult Survey from which the Respiratory Stream participants were drawn, it is possible that the findings do not truly represent lung health in the two communities.



Where to from here

Follow up testing of the Respiratory Stream participants is important so that longer term health effects of the mine fire smoke can be investigated and we can see if changes in lung stretchiness resolve, persist or worsen.

The HHS is led by Monash University with collaborators from Menzies, Federation University, The University of Adelaide, and CSIRO.

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