Hazelwood HEALTH STUDY

Research Summary

Results from the Respiratory Stream. Coal mine fire smoke exposure and chronic obstruction of lung airflow in adults.

September 2020

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.

Meet the team

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What we did

Chronic Obstructive Pulmonary Disease (COPD) is characterised by persistent obstruction of lung airflow that interferes with normal breathing and is not fully reversible. In the past COPD has been called 'chronic bronchitis' and 'emphysema'. We measured COPD in 346 adults from Morwell and 173 from Sale, using a breathing test called spirometry. Spirometry measures how much air you inhale and exhale, and how fast you exhale. The test was performed ten minutes after using an asthma puffer containing salbutamol (Ventolin). We also conducted a test called 'transfer factor for carbon monoxide' ($T_L$co) which measures the ability of the lung to transport gas into and out of blood. Participants also answered questions about respiratory symptoms such as cough and chest tightness and medication use.
We worked with CSIRO to estimate the levels of fine particles in the mine fire smoke smaller than 2.5 thousandths of a mm in diameter ($PM_{2.5}$). Particles this fine can travel deep into people's lungs. Morwell participants were grouped into three levels of mine fire $PM_{2.5}$ exposure (*low*: daily average of 6 micrograms per cubic metre of air (µg/m^3); *medium*: average of 12 µg/m^3; and *high*: average of 28 µg/m^3). Sale participants were categorised as having little or no exposure. We took into consideration other factors that could influence lung health, such as age, height, weight, cigarette smoking and participant's jobs that may have involved exposure to gases, dusts or fumes.

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 more Chronic Obstructive Pulmonary Disease than adults who had less exposure.

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

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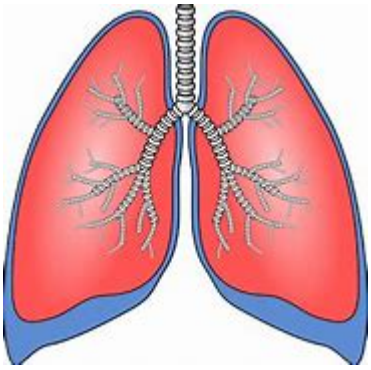
What we found

We found that as the level of mine fire $PM_{2.5}$ exposure increased evidence of chest tightness and chronic cough was increased more than three years later. When we investigated COPD, the results differed depending on whether participants were cigarette smokers or non-smokers. Amongst non-smokers, there was strong evidence of increasing levels of $PM_{2.5}$ exposure being associated with increased levels of COPD. We did not see this dose response relationship between $PM_{2.5}$ exposure and COPD amongst smokers. However, amongst smokers we did see that increased $PM_{2.5}$ exposure was particularly associated with increased evidence of chronic cough. We did not find any evidence of an association between mine fire $PM_{2.5}$ exposure and the ability of the lung to transport gas into and out of blood.



Considerations

We cannot be absolutely certain that the mine fire smoke caused the changes that we observed in lung airflow obstruction, chronic cough and chest tightness. This is because additional factors can affect lung health, such as genes, previous exposure to other sources of smoke, infections or access to health services. Regardless of the cause, people with symptoms like shortness of breath, chest tightness or frequent coughing should always have these checked by a doctor.

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 the changes in lung health resolve, persist or worsen.

The HHS is led by Monash University with collaborators from Menzies, Federation University, The University of Adelaide, and CSIRO.
The research was funded by the Department of Health and Human Services.