Hazelwood HEALTH STUDY

Research Summary

Dietary antioxidants reduce the effects of mine fire-related smoke on chronic cough and phlegm

May 2025

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 concern within Morwell and the broader community. In response to these concerns, and following extensive community consultation, the Hazelwood Health Study was established to examine the impacts of the mine fire. The Hazelwood Health Study involves multiple research streams targeting different health outcomes and different vulnerable groups.

Analysis aims

Our previous research has shown that mine fire smoke exposure increases respiratory symptoms and that good quality diets, high in fruits and vegetables, protect against respiratory symptoms. We aimed to determine whether the protective effects of fruits and vegetables could be attributed to their high content of dietary antioxidants.

What we did

We surveyed 282 residents of Morwell and 166 residents of Sale, 8.5-9 years after the mine fire. We asked about respiratory symptoms along with diet quality using the Australian Eating Survey. We determined whether people had met the recommended daily dietary intake of anti-oxidants; specifically, omega-3 fatty acids, Vitamins A, C and E and minerals zinc, magnesium and selenium. 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. We investigated whether higher $PM_{2.5}$ exposure was associated with increased respiratory symptoms and whether dietary antioxidants weakened the adverse impact of smoke exposure on those symptoms.

Hazelwood HEALTH STUDY

What we found

Fire-related $PM_{2.5}$ was associated with self-reported chronic cough, current wheeze and chronic phlegm. However, when we looked at this association together with dietary antioxidant intake, we discovered that consuming the recommended levels of dietary antioxidants, especially Vitamins A and E, magnesium and zinc, lessened the impact of fire-related $PM_{2.5}$ on chronic cough and chronic phlegm. Omega-3 fatty acids also moderated the association between $PM_{2.5}$ and COPD. This suggests that antioxidants present in fruits and vegetables play a role in lessening respiratory damage caused by $PM_{2.5}$.

A more detailed paper describing these findings can be found at
www.hazelwoodhealthstudy.org.au/study-findings/publications

Meet the team

Thara Govindaraju
Catherine Smith
Jillian Ikin
Alice Owen
Matthew Carroll
Brigitte Borg
Caroline Gao
David Brown
David Poland
Shantelle Allgood
Michael Abramson
Karen Walker-Bone
Tracey McCaffrey
Tyler Lane

Considerations

Both dietary antioxidants and respiratory symptoms were self-reported and may not have been accurate. The AES did not measure dietary polyphenols which are strong antioxidants. Considering the diet quality was measured 8.5 years after mine fire, it might not reflect the diet that participants had at the time of the event.

Where to from here?

The finding will be published in a peer reviewed journal and shared with relevant health and community services to ensure they are used to guide current health service provision and continuous improvement of lifestyle behaviours including healthy eating in the community.

The Hazelwood Health Study is led by Monash University with collaborators from Menzies Institute for Medical Research, Federation University and CSIRO.

The research was funded by the Victorian Department of Health.

Hazelwood Health Study website: www.hazelwoodhealthstudy.org.au