

Mining-related particulate exposure for children assessed

19 May 2014, by Rob Payne



The study suggests children's exposure to PM10 in Port Hedland is low, despite its mining activity but a larger study is recommended due to the current study's small sample size. Credit: J Thomas McMurray/ Blue Cloud Spatal

New research is looking into the effects of children's exposure to potentially dangerous PM10 particulate matter in urban, rural and mining-related settings.

A/Professor Andrea Hinwood, of Edith Cowan University, says there is considerable debate about the importance of size and type of particulate matter in terms of health effects, especially in dusty environments and those associated with mining.

With fine suspended particulates less than 10 microns in diameter, PM10 is capable of penetrating deep into the upper respiratory tract.

"Studies of the relationship between [environmental exposure](#) to PM10 and metals from mining activities are limited, with few studies focussing on iron ore dust," A/Professor Hinwood says.

"This study was initiated in Port Hedland in far north Western Australia due to the significant quantities of iron ore and other ores and

concentrates being stored in bulk and shipped through the [port](#), with residential areas found in close proximity to these activities."

The study saw 70 children between the ages of six and 12 selected from Port Hedland, the nearby residential community South Hedland, and Perth.

South Hedland was chosen because its PM10 concentrations and exposure were considered to be 'background' conditions to the region, while Perth was free from [iron ore mining](#) activities.

Over 24-hour periods, participants provided personal exposure to PM10 data collected by a SKC Aircheck sampler worn on their bodies, as well as hair and urine samples, daily activity diaries and information about potential exposure to [particulate matter](#) and metals through such things as cigarette smoke and bushfire smoke.

PM10 exposure low but further study recommended

Overall, the study found personal exposure PM10 concentrations to be generally low, though some extreme concentrations were recorded.

"Hair metals concentrations were elevated in some cases, and there were some significant differences between children in the three areas, but concentrations could not be related to PM10," A/Professor Hinwood says.

However, one area of concern that could benefit from further study was the elevated levels of manganese in hair samples from Port Hedland, possibly as a result of stockpiles and shipping of materials or exposure to [iron ore](#) dust.

High exposure to manganese has been linked to impaired intellectual functioning and impaired neurological development in children.

While the study suggests that children's [exposure](#) to PM10 overall in Port Hedland is low, despite its mining activity, a larger study is recommended due to the current study's small sample size.

More information: Andrea Hinwood, Anna C. Callan, Jane Heyworth, Peter McCafferty, Peter D. Sly, "Children's personal exposure to PM10 and associated metals in urban, rural and mining activity areas," *Chemosphere*, Volume 108, August 2014, Pages 125-133, ISSN 0045-6535, [dx.doi.org/10.1016/j.chemosphere.2014.02.071](https://doi.org/10.1016/j.chemosphere.2014.02.071).

Provided by Science Network WA

APA citation: Mining-related particulate exposure for children assessed (2014, May 19) retrieved 31 August 2022 from

<https://medicalxpress.com/news/2014-05-mining-related-particulate-exposure-children.html>

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