



Port Pirie Blood Lead Levels

Analysis of blood lead levels for the first
quarter of 2018
(1 January – 31 March 2018)



Government
of South Australia

SA Health

Background

Situated 230 km north of Adelaide in South Australia, Port Pirie is the location of one of the world's largest lead and zinc smelters.

The smelter has been in continuous operation since 1889. Over time, airborne lead-contaminated dust produced during smelter operations has contaminated the local environment. Even small amounts of lead can be toxic when ingested or inhaled. Lead-contaminated dust continues to be emitted by the smelter and these ongoing emissions, together with legacy lead from past operations, are a persistent source of exposure for the Port Pirie community.

SA Health has provided voluntary blood lead screening through the Port Pirie Lead Implementation Program that has been delivered by the Port Pirie Environmental Health Centre since 1984. This Program monitors and helps the local community reduce the amount of lead that children absorb by providing lead exposure-reduction advice, education and interventions for families. This paper reports the analysis of blood lead levels of Port Pirie children aged 0-4 years for the first quarter of each year since 2009.

Australian Lead Guidelines

The National Health and Medical Research Council (NHMRC) provides health advice and health guidelines for the Australian community, governments and health professionals. One of the NHMRC's tasks is to advise the Australian community about lead exposure, and the health effects of lead and how they can be managed.

Guideline for investigating lead exposure

In advice published in May 2015, the NHMRC recommends that if a person has a blood lead level greater than 5 micrograms per decilitre ($\mu\text{g}/\text{dL}$), the source of lead exposure should be investigated and reduced, particularly if the person is a child or pregnant woman. See the [Frequently Asked Questions: NHMRC Review of blood lead level guidelines](#).

The NHMRC advises that at blood lead levels above 10 $\mu\text{g}/\text{dL}$ it is well-established that exposure to lead can have harmful effects on a number of body functions and organs in both adults and children. Research now shows that blood lead levels below 10 $\mu\text{g}/\text{dL}$ may also be associated with some health effects ([NHMRC 2015, Evidence on the effects of lead on human health](#)). At this stage, the NHMRC has concluded that the evidence is not strong enough to show that lead is the cause of these effects.

In line with NHMRC's guidance, the blood lead levels of children living in Port Pirie are now reported against the exposure investigation level of 5 $\mu\text{g}/\text{dL}$. This is in addition to the target level of 10 $\mu\text{g}/\text{dL}$ that has been reported each year since 2000, and was the target level of the Targeted Lead Abatement Program when it commenced in 2014.

Port Pirie results

Blood tests indicate that the average blood lead level (geometric mean) of the children tested in the first three months of 2018 is 4.6 $\mu\text{g}/\text{dL}$. This average has decreased by 0.1 $\mu\text{g}/\text{dL}$ compared to the same reporting period last year.

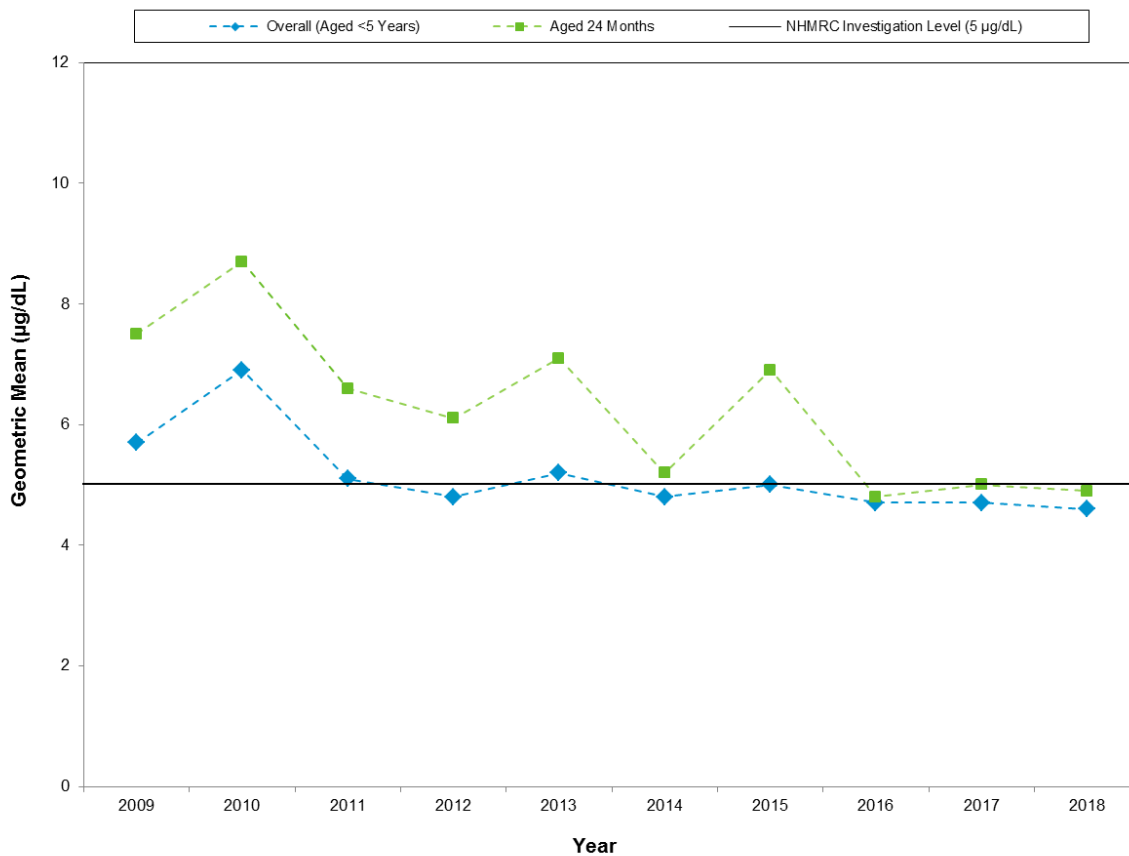
The average blood lead level (geometric mean) of children aged 24 months tested in the first three months of 2018 is 4.9 $\mu\text{g}/\text{dL}$, which decreased by 0.1 $\mu\text{g}/\text{dL}$ compared to the same reporting period last year. The geometric mean blood lead level for two-year-old children is considered to be a robust indicator of trends in lead exposure for the whole population (Table 1).



Table 1: Geometric mean of children tested aged under five years (with surrogates) and aged 24 months for the first quarter of each calendar year since 2009.

Year	Total number of children tested	Geometric mean of children tested ($\mu\text{g/dL}$)	Number of children aged 24 months tested	Geometric mean of children aged 24 months tested ($\mu\text{g/dL}$)
2009	248	5.7	33	7.5
2010	251	6.9	26	8.7
2011	208	5.1	42	6.6
2012	231	4.8	34	6.1
2013	229	5.2	26	7.1
2014	257	4.8	41	5.2
2015	261	5.0	31	6.9
2016	273	4.7	31	4.8
2017	277	4.7	30	5.0
2018	218	4.6	31	4.9

Figure 1: Geometric mean of children tested aged under five years (with surrogates) and aged 24 months for the first quarter of each calendar year since 2009. This is a schematic illustration that represents the trend in geometric mean of children living in Port Pirie.



Blood test results indicate that 51.4% of the children tested (together with surrogates) in the first three months of 2018 have blood lead levels of 5 µg/dL or below (Table 2). This is a 1.2% improvement compared to the same reporting period last year, and is a 9.5% improvement on results in 2009.

It is important to note that these percentages cannot be reported or interpreted to represent the proportion of the Port Pirie population at 5 µg/dL or 10 µg/dL. This is because not all children living in Port Pirie were tested in the first three months of 2018 and therefore their blood results do not appear in this analysis. The actual proportion of the population with blood lead levels of 5 µg/dL or below falls somewhere between the lower limit of 46.7% and the upper limit of 56.0% (population estimates used to calculate these limits were updated on 23 October 2017 using ABS 2016 census data).

In the first three months of 2018, 106 children had a reported result higher than 5 µg/dL.

Table 2: **Lead Exposure Investigation Level** - Frequency of children tested with blood lead levels ≤5 µg/dL (with surrogates) for the first quarter of 2018.

Year	Total number of children tested	≤5 µg/dL			
		n	Lower limit	%	Upper limit
2016	273	137	46.2	50.2	54.1
2017	277	139	46.3	50.2	54.1
2018	218	112	46.7	51.4	56.0

Targeted Lead Abatement Program

The Targeted Lead Abatement Program (TLAP) has been designed to identify and intensify community lead exposure reduction. In conjunction with the Port Pirie smelter redevelopment, TLAP will deliver the most significant reduction in lead emissions and community blood lead levels achieved in the life of the smelter. The TLAP blood lead level target was established to increase the number of children under five years of age below 10 µg/dL. This program now also focusses on driving levels below the NHMRC exposure investigation level of 5 µg/dL.

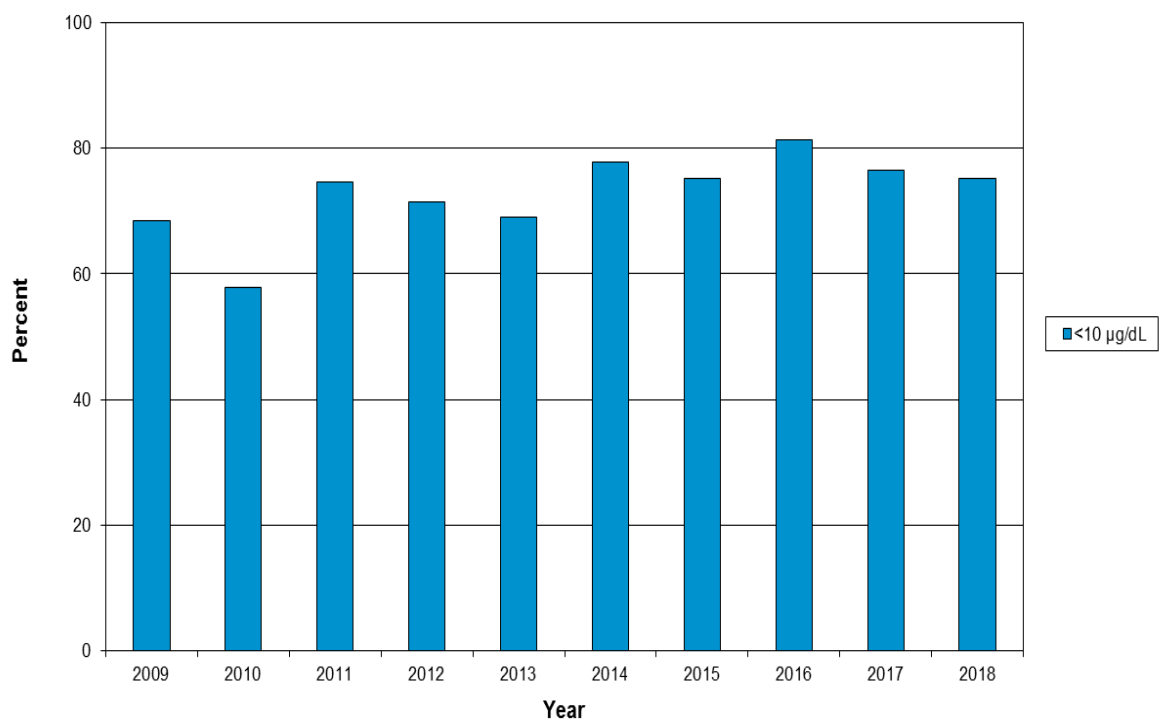
Blood tests indicate that 75.2% of children tested (together with surrogates) have blood lead levels below 10 µg/dL. This is a 1.3% decrease compared to the same reporting period last year (Table 3).

The number of children with blood lead levels equal to or exceeding 20 µg/dL (five children) has increased compared to the same reporting period last year (four children).

Table 3: Frequency of children tested with blood lead levels <10 µg/dL with surrogates for the first quarter of each calendar year since 2009.

Year	Total number of children tested	<10 µg/dL			
		n	Lower limit	%	Upper limit
2009	248	170	64.3	68.5	72.5
2010	251	145	53.4	57.8	62.0
2011	208	155	70.0	74.5	78.6
2012	231	165	67.1	71.4	75.4
2013	229	158	64.6	69.0	73.1
2014	257	200	74.1	77.8	81.1
2015	261	196	71.3	75.1	78.5
2016	273	222	78.0	81.3	84.2
2017	277	212	73.1	76.5	79.7
2018	218	164	71.0	75.2	79.0

Figure 2: Percentage of children tested with blood lead levels <10 µg/dL with surrogates for the first quarter of each calendar year since 2009.



Analysis Methods

Children included in this report were less than five-years of age and lived in Port Pirie at the time the blood test was taken. If more than one blood test was taken in the reporting period, the most recent test result was used in this analysis. Results are reported with surrogates, where surrogate data (the mother's blood lead level) represents a child's blood lead level at birth.

Data in this paper cannot be compared with complete annual or five-year cohort analysis and in general cannot be compared with those from older reports.

A new blood-lead results database was commissioned in 2017 and operated concurrently with the existing database until 31 March 2018. Results of blood tests collected from 1 January 2018 will be extracted from the new database for analysis in this and future Technical Papers. Blood tests collected prior to 2018 will continue to be extracted from the old database. Routine audit of the old database, occurring when each analysis is undertaken until the end of 2018, will continue to identify small numbers of data-entry anomalies that arise from database limitations (e.g. when families changed residential addresses, or venous testing was conducted in place of capillary testing). Correction of these anomalies can result in a minor variation in the number of children's and surrogate's test results included in a dataset (when compared to the same dataset reported in corresponding Technical Papers prepared for the previous year). These variations are not considered to impact on reported proportions and geometric means.

True population proportions may vary between reports as they are adjusted from year to year for the estimated population size based on ABS census data.

Further information about the analysis methods used in this paper is available at [Frequently Asked Questions Testing and Reporting Port Pirie Children's blood lead levels](#).

Report prepared by: Dr David Simon, Dr Carolyn Lewis and Ms Razia Zariff

Scientific Services Branch, Public Health Services

May 2018

Doc. no. A790328

File no. 2018-04932

For more information

Scientific Services Branch
Public Health Service
11 Hindmarsh Square
Adelaide 5000
Telephone: 8226 7100
www.sahealth.sa.gov.au

Public-I1-A1



www.ausgoal.gov.au/creative-commons



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