

COMPARISON OF BLOOD LEAD SURVEYS FOR ZERO TO FIVE YEARS AGE GROUP

It is valuable to be able to compare blood lead levels found in Esperance with other surveys of blood lead levels in Australia and particularly in Western Australia.

In general the survey data available falls into two groups:

1. Surveys specifically focused on population groups who have been exposed to lead contamination; and
2. Surveys of the general population.

Those surveys which have specifically focused on contaminated areas include Pt Pirie, Northampton (where children were exposed to lead tailings), Derby (where a survey was conducted to determine whether lead exports through Derby contributed to higher blood lead levels).

It is not always possible to compare different surveys because the data has been analysed in different ways.

Human exposure to lead has been derived from a number of different sources including lead in paint, lead in petrol, lead flashings, recreational sources (eg lead sinkers), occupational exposure and environmental contamination. The data below shows that lead in petrol has contributed significantly to the body burden of lead. This is shown in the Fremantle and Sydney studies.

The most vulnerable age-group for lead exposure is children between the ages of zero and five years. The table following compares the percentage of children in that age-group in various surveys and their blood lead levels in the ranges set out below.

The table following shows that whilst children in Esperance have been exposed to lead, the percentage of children exceeding the current guideline level of 10ug/dL is not as high as in previous surveys of the general population or in other areas of lead contamination.

For example, the percentage of children with blood lead levels above 10ug/dL in Esperance is significantly less (2.1%) than the Australia-wide survey conducted by the Australian Institute of Health and Welfare in 1995 which showed 9.25% exceeded 10ug/dL.

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Table

Survey	Number	< 5ug/dL	5 – 10ug/dL	10–25ug/dL	> 25ug/dL
Esperance 2007	342	76.3%	21.6%	2.1%	0%
		97.9%			
Brookdale 2003	66	98.4%		1.5%	0%
Fremantle 1993	164	67.1%		32.3%	0.6%
Northampton 1979	181 Primary and Secondary				5% highest 47ug/dL
Australian Institute of Health and Welfare 1995 Australia wide	1575	92.7%		9%	0.25% highest 32.7ug/dL
WA	162	89.5%		10.5%	0%
Sydney 1991	158	49%		48%	3%
Pt Pirie high risk area	304	3.99%	26.39%	50.99%	18%

Lead Isotopic Analyses of Samples Associated with the Esperance Lead Investigation

Report prepared for the Western Australian Department of Health, May 2007

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Summary

Samples of blood (22 from children under 5 years of age and 10 from adults aged more than 35 years) and 3 tank waters have been analysed for high precision lead (Pb) isotope measurements and Pb concentrations (for most samples) by isotope dilution.

The isotopic fingerprint for the Magellan ore is based on an ore concentrate sample supplied by the WA Department of Environment and Conservation and 6 samples from the unpublished CSIRO database measured in 1992. The isotopic fingerprint is highly distinctive for the different Pb isotopes compared with other sources of Pb in this area of Western Australia known to us, and allows a high degree of certainty in allocating sources of Pb, although this is constrained by the lack of data for other potential sources.

The isotopic data for blood samples lie around two arrays, one defined largely by the results for young children and which intersects the Magellan ore value (the "Magellan array") and the other largely defined by the data for the older subjects (the "Older array"). Using simple two-component mixing relationships, the contribution of Pb in the blood of young children, arising from Magellan ore, ranges from 30-87%.

For the older subjects, a more complex interpretation is required with sources of Pb arising from such things as lead from bone, lead paint, hobbies, DIY activities, unusual diets, medicines, cosmetics etc. Because of uncertainties in the sources of Pb and isotopic composition of the end-members, it is not valid to assign percentage contributions for these subjects.

The isotopic results for waters from the Castletown district lie around the "Older array" and indicate a minimal contribution from Magellan Pb. The relatively elevated Pb values in the water may represent leaching from tap or tank materials, or some other Pb-activity, including construction or hobby activities.