



TACKLING CHILDHOOD LEAD POISONING

THE NEWCASTLE LEAD STUDY

The major sources of environmental lead in Australia are lead processing facilities, paint in older houses and fuel additives. Epidemiologic research has identified adverse effects of lead on the intellectual development of young children at levels previously regarded as safe^{1 2 3 4}.

The number of children admitted to NSW hospitals has declined in the past 20 years. Between 1983 and 1989, eight NSW children were hospitalised for lead poisoning compared to 35 children admitted to the Royal Alexandra Hospital for Children between 1968 and 1978. Most of these admissions were a result of the ingestion of lead paint⁵.

The lead and zinc smelter at Boolaroo on Lake Macquarie is one of three major lead processing plants in NSW. A smelter was first built at the site in 1897. It was demolished in 1922 but roasting of zinc ore and sulphuric acid production continued at the site until the modern plant was commissioned in 1961. Stack and fugitive emissions and dust from ore and slag within the smelter perimeter may continue to contaminate the local area. Houses in the suburbs of Boolaroo and Argenton range from within 270m to 2km from the plant (Fig 1).

In these suburbs it is likely that contaminated house dust and soil are the sources of lead exposure in young children. However, lead in old paint, from car exhausts and on the clothes of lead workers may also be important.

A 1973 survey of children in Boolaroo and Argenton revealed that 6 per cent of children had blood lead levels above 25 µg/dL⁶, the current National Health and Medical Research Council level of concern. The survey was limited in that only 11 per cent of the participants were under four years of age — the group most at risk of exposure and most susceptible to the adverse effects of lead.

Concern by local residents about the adverse effects of lead contamination of the area prompted the Hunter Area Public Health Unit to initiate a new survey.

METHODS

We first consulted a broad range of community groups including parents, teachers, carers, health professionals, local environmental groups and representatives from the lead smelter.

To define a study area of likely lead contamination we conducted a pilot study of soil lead levels in Boolaroo, Speers Point and Argenton. We then combined these data with results of a 1973 soil survey of the area and data on prevailing wind direction and topography. All children aged one-four years living in the study area were identified by house-to-house survey.

We collected venous blood samples from all participating children. From the houses of those children with blood lead levels ≥ 25 µg/dL and from all houses in the two blocks closest to the smelter we collected samples of soil, ceiling and house dust and paint. We superimposed a grid on maps of the suburbs of Boolaroo, Speers Point and Argenton and sampled soil at each intersection point of this grid. To validate the results of blood lead, paint and soil testing, we sent samples to four participating analytical laboratories. This report presents our preliminary results.

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Tackling childhood lead poisoning

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RESULTS

A total of 149 children were eligible for inclusion in the study. Of these, 140 (94 per cent) agreed to be tested. The mean blood lead level was 15 µg/dL. Thirty children (21.4 per cent) had blood lead levels ≥ 20 µg/dL and of these 23 lived in Boolaroo within five streets of the smelter (Fig 1). Twelve (8.6 per cent) had levels ≥ 25 µg/dL.

For Boolaroo children blood lead levels tend to decrease with increasing distance of their house from the smelter (Fig 2). There is a similar, but less marked, gradient in Argenton children. Two of the three children living beyond the first five streets from the smelter with lead levels above 25 µg/dL lived in houses which may have a lead paint problem. The third child lived in Argenton.

Household assessments completed so far show levels of lead in ceiling dust ranging from 2759-30,764 parts per million (ppm) and in room dust from 23-35,870 ppm. Lead in soil ranged from 8-26,794 ppm. Australian guidelines for the assessment of contaminated sites recommend further investigation if soil levels are above 300 ppm⁷.

DISCUSSION

The high participation rate in this study reflects both the level of community concern and the successful interaction between the community and the Public Health Unit.

The mean blood lead level of 15 µg/dL in our study is high. It compares with a population mean of 8 µg/dL estimated in 1991 from a pooled blood sample from one-four year old children in the Newcastle area⁸ and 21 µg/dL found in Port Pirie, South Australia⁹. A study at a number of Sydney schools in 1979 estimated that between 12 per cent and 25 per cent of children had blood lead levels greater than 25 µg/dL¹⁰.

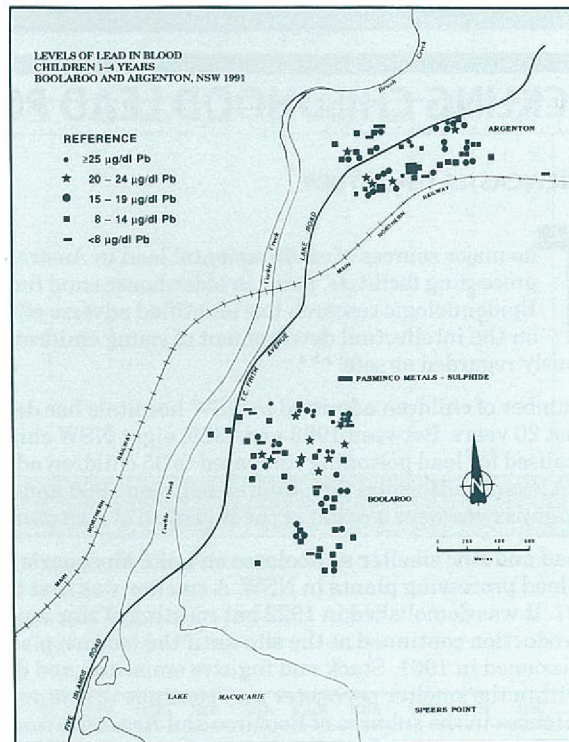
Reducing blood lead levels in these children will require a range of interventions. All households of children with blood lead levels ≥ 25 µg/dL have been assessed to identify sources of lead around the home and behaviour which could have resulted in increased lead absorption. The parents of all children with a blood lead level ≥ 15 µg/dL have been given education materials including a poster highlighting the main sources of lead exposure in young children and ways to control them. Other strategies may include removing heavily contaminated topsoil and contaminated ceiling dust, grassing uncovered and contaminated sites and erecting windbreaks around the smelter. The cost and effectiveness of each of these interventions will need to be assessed. The forthcoming soil testing results will help to delineate the extent of contamination.

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FIGURE 1

LEVELS OF LEAD IN BLOOD
CHILDREN 1-4 YEARS
BOOLAROO, ARGENTON AND
SPEERS POINT, NSW, 1991

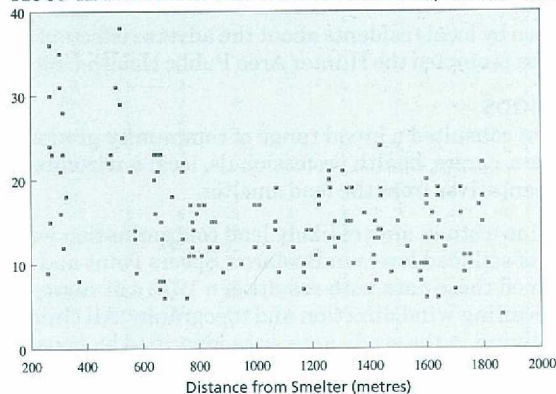


Map of Boolaroo, Argenton and Speers Point showing the place of residence and blood lead level.

Note: Two cases above 20 µg/dL were excluded from the figure as the children lived outside the study area.

FIGURE 2

CHILDREN AGED 1 TO 4 FROM BOOLAROO AND ARGENTON
BLOOD LEAD LEVELS BY DISTANCE FROM SMELTER, AUGUST 1991



Source: Newcastle Lead Study, 1991