



BROKEN HILL ENVIRONMENTAL LEAD PROGRAM

STEERING COMMITTEE ANNUAL REPORT 2018-2019

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CHAIRPERSON'S REPORT

I am pleased to present the *Broken Hill Environmental Lead Program (BHELP) Steering Committee Annual Report* for the 2018-2019 reporting period.

The Steering Committee is encouraged that results highlighted in this report consolidate the cumulative effect of the individual strategies and programs undertaken by the BHELP under its three key focus areas, year on year since it was established in 2015.

Most compelling is the independently compiled [Lead Report 2018: Broken Hill children under 5 years of age](#), (Public Health Unit, Health Protection, NSW Ministry of Health, May 2019), highlighting significant improvements across a range of key indicators relating to the ongoing public health issue of elevated blood lead levels in local children. Here is a snapshot:

- ✓ The proportion of all children with blood lead levels below the notifiable level of 5 micrograms of lead per decilitre of blood (ug/dL), increased from 42% to 46% from 2017 to 2018.
- ✓ The geometric lead mean level (age-sex standardized) for all children (1 to < 5 years) decreased from 5.7 in 2017 to 4.7 in 2018 – the lowest since 2010 and equal lowest on record.
- ✓ The mean result for non-Aboriginal children decreased, from 4.6 to 4.0 µg/dL– the lowest on record.
- ✓ The mean result for Aboriginal children improved from 8.7 to 7.9 µg/dL in 2018.
- ✓ The 2018 results show 62% of non-Aboriginal children in Broken Hill had a blood lead level below 5 µg/dL, a 4% improvement from 58% in the previous year.
- ✓ 24% of Aboriginal children had a blood lead level below 5.0 ug/dL – an increase from 22% in the previous year.
- ✓ The percentage of all children with blood lead levels above 5.0 ug/dL has decreased – from 54% in 2017 to 51% in 2018.
- ✓ The proportions of children in all the higher blood lead categories >10 ug/dL decreased to less than 20% (17% in 2018) for the first time since 2012.
- ✓ In 2018, numbers of children in the 10 to <15µg/dL category dropped by a third and in the 15 to <20 µg/dL category halved compared to 2017.

The Broken Hill Environmental Lead Program (BHELP) funding and advocacy has supported the reintroduction of blood lead screening for children aged 6 months to <12 months for the first time since 2012. In 2018, a total of 156 children in this category were screened, with a geometric mean lead level of 2.7 µg/dL - down from 3.9 µg/dL in 2012. The proportion of these children with blood lead levels below 5 ug/dL increased by 10% - from 75% in 2012 to 85% in 2018. These results are significant when considering that lead exposure in a child's first year of life is likely to be a major determinant of how high their blood lead level will rise until they are 5 years of age.

This enhanced blood lead screening and monitoring program, outlined in the revised Broken Hill Clinical Guidelines, has resulted in 878 point of care tests (total number of lead tests) being undertaken by Child & Family Health in the reporting period compared to 751 in the previous year. Maari Ma Health Aboriginal Corporation (Maari Ma) point of care tests increased from 561 in 2017-2018 to 667 in 2018-2019.

Our funding under Memoranda of Understanding (MoU) with Child & Family Health and Maari Ma continued to deliver targeted intervention and case management strategies, including environmental home assessments and the interagency home remediation program. During the

year, approximately 100 home assessments were undertaken to identify potential sources of lead exposure for a child in their home environment and provided targeted education at this occasion of service. If case managers identified significant risks, referral was made to the interagency home remediation program, with 15 home remediations completed in the financial year. Monitoring of children who have had their home remediated since the program commenced has shown an average 10 µg/dL reduction in blood lead levels – cementing the success of these programs.

Research and monitoring continued to provide quality data and insights to inform decisions on the development of sustainable public health and remediation actions to address elevated blood lead levels in local children. This included the following BHELP-led initiatives:

- Lead in plastics study
- Residual lead in mining clothes study
- Household lead dust isotope study
- Ongoing routine, monitoring, sampling and analysis of lead levels in local parks, playgrounds, schools, day care facilities and areas of public land by BHELP staff.

Our partnership with Broken Hill City Council (BHCC), to remediate risks of lead exposure in local parks, playgrounds, ovals and other public spaces, continued during the year. Five major projects, including the Patton Street Park redevelopment project were completed with BHELP funds allocated towards handwashing facilities, high pressure cleaning equipment and a playground shelter, to provide a safer environment for local children and the entire community.

We remained focused on the development of LeadSmart community engagement strategies aimed at delivering life-long learning outcomes and increasing the capacity of individuals to address the lead issue. The BHELP team continued working with teachers and local schools to develop a curriculum-linked, LeadSmart School Program, and piloted the educational resources, including teacher-led lesson plans, activities, multimedia interactives and a Lead Ted Roadshow. Work also commenced on an additional e-learning module for mining industry workers, to add to the suite of two other instructional modules piloted during the year. The modules target people working in and around homes and on public and private land. Both education programs will be launched in the next financial year.

Since the launch of the LeadSmart community awareness campaign in October 2016, over 46,000 education materials have been delivered to the Broken Hill community, and the LeadSmart website has attracted 12,400 users, 6,000 of these during the financial year. BHELP funding also continued to support the delivery of LeadSmart early intervention booklets to all newborn families in Broken Hill. During the year, 145 families were provided with a booklet at their two-week, postnatal home visit by a community health nurse.

We will continue to build strong relationships and engage with key stakeholders to deliver targeted, cost effective and sustainable strategies under the BHELP's three key focus areas - research and monitoring, remediation, and education - to address the issue of lead exposure and elevated blood lead levels of local children. It's all about providing better health and environmental outcomes for local children and the Broken Hill community now and into the future.



Marion Browne

Chairperson, Broken Hill Environmental Lead Program Steering Committee

ABOUT THE BROKEN HILL ENVIRONMENTAL LEAD PROGRAM

Background

On 13 February 2015, the NSW Government allocated more than \$13 million, over the five years from 1 July 2015 to 30 June 2020, to address the issue of lead exposure in Broken Hill and ongoing detections of elevated blood lead levels in local children.

The funding established the Broken Hill Environmental Lead Program (BHELP), with an aim of developing sustainable solutions to ensure children aged 0-4 meet the National Health & Medical Research Council (NHMRC) guidelines for blood lead levels into the future. The program has a focus on Aboriginal children, given 76% currently have blood lead levels above the NHMRC benchmark of less than 5 micrograms of lead per decilitre of blood ($\mu\text{g}/\text{dL}$).

On 19 May 2015, the NHMRC recommended that if a person has a blood lead level greater than $5\mu\text{g}/\text{dL}$ then the source of lead exposure should be investigated and reduced. The BHELP has adopted the NHMRC recommendations when addressing the issue of blood lead levels in local children.

BHELP Steering Committee

The BHELP Steering Committee is the governing body charged with administration of the budget and overseeing the direction and strategic alignment of the BHELP with overarching funding principles.

The Steering Committee held its first meeting on 12 October 2015 - Marion Browne, community representative, Broken Hill Lead Reference Group (BHLRG) and Councillor, Broken Hill City Council, was appointed Chairperson at this meeting.

The Committee comprises two representatives from the NSW EPA, two representatives from NSW Health, two community representatives from the BHLRG and 10 representatives from the Aboriginal Lead Reference Group (ALRG) – two members of the ALRG attend meetings on a rotational basis.

Committee members

Name	Representation
Marion Browne	Chairperson, BHELP Steering Committee Community representative, BHLRG Councillor and Deputy Mayor, Broken Hill City Council
Ken Barnett	General Manager, Broken Hill Base Hospital, NSW Health
Priscilla Stanley	Manager Health Protection, Western NSW Local Health District, NSW Health
Craig Bretherton	Manager Regional Operations Riverina Far West, NSW EPA
Cathy Dyer	Community representative, BHLRG Executive Manager Corporate Services, Maari Ma Health Aboriginal Corporation
Professor David Lyle	Head of Department, Broken Hill University Department of Rural Health, University of Sydney
Gary Whytcross	Regional Director South & West, NSW EPA.

Name	Representation
Jodielyn Edge	ALRG Heritage Conservation Officer, Office of Environment and Heritage
Tegan Hinchey-Gerard	ALRG Senior Project Officer, Aboriginal Affairs
Kaylene Kemp	ALRG Executive Manager Primary Health Care Services, Maari Ma Health Aboriginal Corporation
Donnalee Kennedy	ALRG Transition Worker, Initial Transition Service, Community Restorative Centre (CRC)
Jared Menz	ALRG Project Officer, Aboriginal Affairs
Nyoka Stone	ALRG Community representative
Lisa Pritchard	ALRG Community representative
Kenneth Dennis	ALRG Housing Officer, Murdi Paaki Regional Housing
Bilyara Bates	ALRG Project Officer, Aboriginal Affairs
Ann Bennett	ALRG Aboriginal Health Practitioner, Maari Ma Health Aboriginal Corporation

Steering Committee meetings and member attendance

	23 August 2018	29 November 2018	21 February 2019	30 May 2019
Marion Browne	✓	✓	✓	✓
Aboriginal Lead Reference Group	✓	Apology	Apology	✓
Ken Barnett	✓	Apology	✓	Apology
Priscilla Stanley	✓	✓	✓	✓
Craig Bretherton	✓	✓	✓	✓
Cathy Dyer	✓	✓	✓	✓
Professor David Lyle	✓	Apology	Apology	Apology
Gary Whytcross	✓	✓	✓	Apology

Broken Hill Lead Reference Group

The Broken Hill Lead Reference Group (BHLRG) is facilitated by the Broken Hill City Council (BHCC). The group is an important community consultation tool, providing guidance and feedback to BHELP through its meetings and the BHLRG Integrated Strategy.

The BHLRG meets at least quarterly – prior to the Steering Committee Meeting - and the BHELP project manager provides regular reports to the group on program progress and gathers invaluable feedback for the strategic direction of key projects.

Aboriginal Lead Reference Group

The Aboriginal Lead Reference Group (ALRG) comprises 10 Aboriginal representatives from a broad range of backgrounds in the local community. The ALRG is an important stakeholder consultation tool, providing two-way conversation between BHELP and the local Aboriginal community – who are over-represented when it comes to incidences of high blood lead levels.

BHELP project team

The BHELP project team works closely with key stakeholders and the local community to coordinate the work priorities of the BHELP under three key focus areas:

Research and monitoring

- Reviewing previous lead strategies at Broken Hill
- Identifying remediation priorities
- Identifying contamination and re-contamination processes and sources
- Researching and developing best practice in lead abatement
- Planning an abatement program that can be carried out systematically based on existing data and the potential for exposure for young children across Broken Hill
- Developing cost effective methods for abating lead risks within homes and areas where children congregate, such as at preschools and playgrounds
- Developing a modern interventions education and awareness program to assist to reduce high blood lead levels when they are detected.

Consultation, education and funding

- Enhancing existing services and programs provided by the Far West Local Health District (FWLHD) and Maari Ma Health by supporting the existing blood lead testing program with an emphasis on engaging with groups that may have been under-represented in previous testing programs
- Providing on-going education and advisory role through schools, local media, local health service providers, and local Aboriginal community support groups
- Identifying children with high blood lead levels and look to include these in a program to assess sources and pathways or lead exposure within homes
- Engaging with the BHLRG to identify priority areas/issues
- Engaging with owners of contaminated land (private and government) to identify priority areas/issues
- Initiating active public education programs and community engagement campaigns, with a focus on establishing adequate lead hygiene standards within the community
- Preparing applications for external funding.

Remediation

The project team coordinates the implementation of on-ground remediation of sites in priority order, according to:

- the research and monitoring stage of the program
- priorities and issues identified by the BHLRG and BHELP Steering Committee
- priorities and issues identified during key stakeholder and community engagement.

Staff and responsibilities

The NSW EPA manages the administrative functions of the BHELP project team. The BHELP team has five full time staff based in Broken Hill.

- Project Manager – oversees the team and overall project management, reports to BHLRG and the BHELP Steering Committee
- Technical Officer – undertakes on the ground assessment work of lead contaminated lands, and provides technical input to the priority areas for remediation
- Senior Community Engagement Officer – engages with the local community and key stakeholders on lead issues through communications and education programs
- Aboriginal Liaison Officer (identified position) – provides a linkage into the local Aboriginal community, to liaise with families of high-risk children, to ensure high risk groups are identified and encouraged to participate in the program
- Administration Officer – provides administrative support to the team
- BHELP also supports the employment of an Aboriginal Environmental Health Trainee – hosted by the Western NSW Local Health District, NSW Health Aboriginal Environmental Health Unit and BHELP.

SUMMARY BUDGET

The following table has been reviewed by the Committee, which is of the opinion it provides an accurate overview of program performance against budget objectives for the reporting period. For a detailed budget statement see [ATTACHMENT ONE](#).

<u>BHELP PROGRAM</u>	<u>TOTAL EXPENDITURE AS AT 30 JUNE 2018 (\$)</u>
BHELP Operations	\$630 120
Communication & Engagement	\$261 480
Aboriginal Children	\$250 000
FWLHD	\$250 000
Research and Monitoring	\$108 380
Clean Up / Remediation	\$206 000
<u>TOTAL</u>	\$1 705 980
<u>TOTAL BUDGET</u>	\$1 700 000
<u>NET RESULT</u>	\$ 5 980 Funded by EPA

SUMMARY OF BHELP ACTIVITIES AND PERFORMANCE

Residual lead in mining industry clothes study

Environmental home assessments of children with elevated blood lead levels indicated that washed work clothing, that had previously been in contact with mining equipment, may be a potential source of lead exposure for children at home.

This BHELP study aimed to quantify the amount of lead remaining in mining related work clothing after washing and determine if these levels were higher than in new, unused clothing and clothing not used for mining related work.

Lead levels in 29 items of washed mine clothing were assessed at the Consolidated Broken Hill (CBH) Resources Rasp Mine laundry, following approval from the company to undertake the project. The locker number of each item of clothing was recorded so that the wearer's work location and usual exposure to lead could be determined from CBH staff records. In addition, lead levels on 10 items of washed clothing sourced from the general community (staff, colleagues, friends and relatives) were assessed, and the usual activities undertaken while wearing the clothes were recorded.



A portable X-Ray fluorescence machine measures the amount of lead in a mine worker's washed clothing.

The results to date reinforce the need for clothing worn by workers undertaking mining or mining-related activities to be washed and left at work – these guidelines are already in place for all local mining company employees working in lead risk areas. In addition, any other worker who has contact with mining equipment as part of their employment should change out of their work clothing – even if clean in appearance - before playing with young children.

Contemporary dust analysis study

The Broken Hill Environmental Lead Study (BHELS) is a three-year study commissioned by the BHELP to determine likely source areas contributing to the amount of lead that is in the air and deposited at various locations representative of lead exposure across Broken Hill.

The Environment Energy and Science Group's Policy Strategy & Science directorate (former Office of Environment & Heritage) has been engaged to develop and deliver the study, in collaboration with the BHELP and with Macquarie University.

The BHELS project plan was established during the first year of the project to provide strategic direction for the monitoring of airborne and deposited lead. This included the best sampling locations, sampling parameters, data handling and quality assurance procedures.

Wind directional high-volume air gauges were installed at five sites representative of community exposure to lead in Broken Hill. Dust deposition samplers were installed at the same sampling sites to provide information on total dust deposition and deposited lead levels.

During the year, each air gauge continuously measured the wind speed and direction, air temperature and barometric pressure, and logged the volume of air sampled. The filters were changed weekly. Total suspended particle (TSP) samples were collected in the filters of the deposition samplers over a seven-day period before being sent to an independent laboratory for analysis. Part of the first year of the study was to commission Macquarie University to test advanced Scanning Electron Microscopy techniques to see if they were capable of distinguishing samples containing 'fresh' environmental lead (e.g. recently mined or milled material) from older or 'legacy' lead particles. However, they were not able to determine the age of lead particles, and thus could not distinguish lead deposited, for example five years ago, from lead deposited 30 years ago.

Data collected over the three-year study will be used to determine likely source areas contributing to the amount of lead that is in the air and deposited at various locations across Broken Hill and will be used to provide a case for and inform targeted, zonal remediation programs into the future.

Findings will not be released until the end of the study, to allow for annual seasonal and weather variations, and ensure an accurate representation of contemporary source contributions over time.



Technical officer, Frances Boreland changes an air filter on a high-volume air gauge

Lead in plastics and other household items study

The BHELP Steering Committee endorsed an internal study to investigate lead levels in plastics, toys and other household consumable items in Broken Hill to determine if these should be routinely screened during environmental home assessments - in addition to painted interior and exterior surfaces.

Eighty-eight items were screened - 4 furnishings, 14 general household, 20 PVC pipe, 50 toys. Three readings of lead levels were taken of each item using a portable XRF machine, with most items registering a reading average of less than 25mg/kg – thus posing very low risk of lead exposure. However, very high lead levels were found in some items, particularly old PVC pipe, one piece of which averaged 2.5% lead and had a maximum lead reading of 4.84% on a dark grey section which had been most exposed to sun.

In addition, two toy items registered high lead levels - a plastic tricycle had extremely high lead levels on its rubber tyres and very low levels in other areas, and a Hot Wheels orange toy car registered high lead levels on the roof but very low levels on other parts.

While lead levels were found to be generally low in the toys and other goods screened, the study reinforced the need for caregivers of young children to wash their hands after playing with toys and before eating – and to check the condition of toys and other household items for signs of degradation and sun damage. In addition, lead levels in toys, PVC and other plastic household items are now screened during home assessments of children with elevated blood lead levels when other sources of exposure can't be identified.

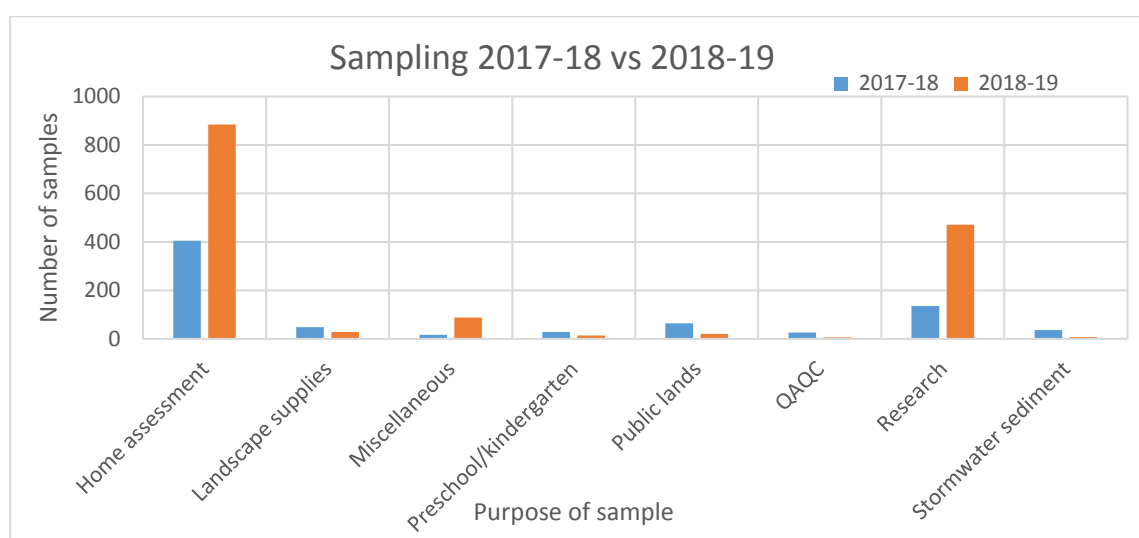
Routine sampling, testing and assessment

Two portable X-Ray Fluorescence (XRF) machines are routinely used by the BHELP team, the FWLHD Child & Family Health team and Maari Ma to immediately analyse lead levels in soil, dust and paint and identify high risk lead areas that require remediation.

In addition to the home assessments, the BHELP team uses the XRF to undertake research projects and routine sampling at playgrounds, preschools, schools, family day-care homes and areas of vacant land. The machine is also used to test landscaping and garden products at local distributors and stormwater sediment collected by local council street sweepers.

The BHELP team also regularly tests lead levels on playground equipment at local parks through simulated play activities, whereby the transfer of lead dust onto hands is sampled using wet wipes.

During the reporting period a total of 1,521 samples were taken at 123 sites across the city - an increase from 759 samples at 109 sites during the previous year.



Graph 1

Household lead dust isotope study

In October 2018, students from Macquarie University carried out a study of lead levels in vacuum cleaner dust, yard soils and verge soils in Broken Hill. The study identified a strong relationship between lead concentration in soil and dust, and distance of the property from the Line of Lode.

Four of the homes had lead concentrations in the vacuum cleaner dust that were about twice as high as other properties at the same distance from the mining operations, but there was no clear reason for the higher concentrations.

This instigated an extension of this study to determine the sources contributing to the lead concentrations in the vacuum cleaner dust. Twenty samples of vacuum cleaner dust were collected from the four homes with unexpectedly high lead concentration for distance from Line of Lode, and four comparison homes for each, with similar distances from the Line of Lode. These were subjected to isotope ratio analysis to pinpoint the contribution of Broken Hill orebody lead compared to other potential sources such as lead based paint, leaded petrol and lead in Broken Hill soil.

Isotope ratios for the vacuum dust samples were found to be largely similar to the Broken Hill orebody but become increasingly different with greater distance from the Line of Lode, indicating greater contribution from other sources.

In addition, source apportionment estimates based on similarity of isotope ratios with the Broken Hill orebody found most of the vacuum dust samples had upwards of 95% of their lead from the orebody, including three of the samples with unusually high lead concentration according to their location. There was one exception, with an estimated 60% lead from the orebody and the rest from other sources.

The study suggests that the main source of lead in the vacuum dust samples was the Broken Hill orebody, but that other sources increase in significance with distance from the Line of Lode.

Communications and Engagement Strategy

As part of the BHELP's commitment to keep the Broken Hill community informed about the local lead issue, staff from Maari Ma, Child & Family Health, BHELP and Lead Ted Jnr (the LeadSmart life-sized mascot) attended numerous community events and pop ups, promoting LeadSmart messages throughout the year.

Having a presence in the community provides a 'go to', on-the-ground source for information and advice, with team members on hand to answer any questions and queries families and members of the public may have. The goal is to ensure the delivery of targeted information on how best to reduce the risks of elevated blood lead levels and make residents fully aware of exposure pathways and simple measures to take to prevent lead exposure.



Lead Ted Jnr meets with community members to help spread important LeadSmart messages

Since the launch of the LeadSmart community engagement program in October 2016, the BHELP has delivered over 46,000 LeadSmart education materials to the Broken Hill community. These products are available at key touchpoints, including educational facilities and community service organisations. In addition, they are distributed directly to families and caregivers by Maari Ma and Child & Family staff at their occasions of service and at all events and promotions attended by the interagency team.

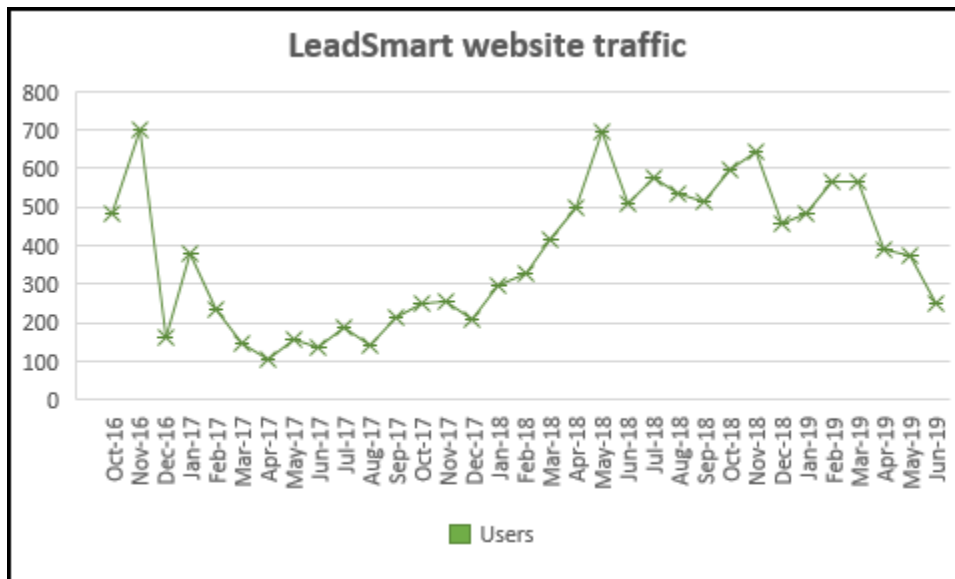
LEADSMART EDUCATION COLLATERAL	QUANTITY DISTRIBUTED
Top Tips for living LeadSmart - Aboriginal targeted brochure	4,100
CleanSmart – Hygiene brochure	3,200
EatSmart -Nutrition brochure	2,900
BuildSmart - Renovating and maintenance brochure	2,150
Top Tips for living LeadSmart - non-Aboriginal targeted brochure	2,400
LiveSmart – Backyard and garden brochure	1,650
WorkSmart – Tradespeople and mining brochure	3,500
StartSmart – Pregnancy and baby brochure	2,500
Living with lead (general awareness)– non-Aboriginal brochure	10,000 letterbox drop to all Broken Hill households + 2,500 general distribution
Living with lead (general awareness) in Broken Hill – Aboriginal targeted brochure	5,000
Colouring Book - Aboriginal targeted	600
Colouring Book – non-Aboriginal targeted	1,100
Healthy Eating / Recipe Book	1,300
Early intervention booklet – families of Aboriginal babies	1,000
Early intervention booklet – families of non-Aboriginal babies	500

Table 1

LeadSmart website

The LeadSmart website was launched in October 2016 to act as a one stop shop for the local Broken Hill community to access information on the local lead issue, including exposure pathways, health effects, testing and tips to reduce lead exposure under LeadSmart’s six key focus areas of CleanSmart, EatSmart, LiveSmart, BuildSmart, WorkSmart, StartSmart.

Since its launch, the website has accumulated over 12,400 visitors who have viewed approximately 27,500 website pages. In the 2018-2019 financial year over 6,000 people visited the website, with 91.3% of these being new users.



Graph 2

A major project was completed during the year to ensure the website complies with stringent NSW Government website guidelines and has functionality to support the development and launch of a new learning management system and the LeadSmart School Program. The work included:

- transferring the existing website from a shared hosting arrangement to a dedicated externally hosted server
- creating and updating the domain name server, mail exchange and sender policy framework records
- updating security, content management system and c-Panel settings
- installing a widget to allow the community to provide real-time feedback on content and make suggestions on how to improve the website into the future.

LeadSmart e-learning modules and learning management system

Two e-learning modules - *Lead in and around homes* and *Lead on public and private lands* - entered the final phase of development, with piloting being undertaken by targeted users.

As part of this consultative feedback process, and recommendations from studies conducted by the BHELP, the Steering Committee endorsed the development of an additional learning module – *Working with lead: mining industry workers and contractors* - and a social media strategy, including campaign assets to promote the training modules to key target audiences in the Broken Hill community.

All three learning modules will be incorporated into a comprehensive learning management system that will be accessed through the existing LeadSmart website, using animations and interactive quizzes to engage and educate targeted workers on the lead issue in Broken Hill and how to reduce lead exposure risks for themselves, their workmates, their family and the community.

LeadSmart - Curriculum Aligned Education Program

During the year, work continued on a large-scale program to develop a suite of curriculum-aligned LeadSmart education materials for students in local preschools and primary schools in Broken Hill. The aim is to deliver lifelong learning outcomes, so that children are equipped with the skills to address the local lead issue now and into the future.

The materials include:

1. Preschool and K-2 incursion / Lead Ted Jnr Roadshow to be facilitated by the BHELP, Child & Family Health and Lead Ted Jnr life-sized mascot – facilitator guide and script, welcome song, handwashing song, goodbye song, banners, props, animations, Dusty the lead dust puppet
2. Lesson plans – 4 x teacher lesson plans for each of the stages: Preschool, Early Stage 1 /Stage 1 (K-Yr2), Stage 2 (Yr3-4), Stage 3 (Yr5-6)
3. Interactive resources, quizzes, activities – Early Stage 1/Stage1, Stage 2, Stage 3 to support the delivery of lesson plans into classrooms by teachers
4. Preschool Activity book
5. Interactive quiz for families
6. Website education portal – design and development of pages on the existing LeadSmart website for teacher registrations and to house and access the teaching resources.
7. Marketing materials – poster, student information sheet, teacher and parent letters and six electronic direct mail (e-DM) marketing emails to engage teachers and encourage them to register on the portal, download lesson plans and to book incursions.
8. Surveys – to gain feedback and to evaluate effectiveness and specific learning outcomes.

The BHELP team engaged with local school executives and teachers in the development of resources, including program logistics and marketing to ensure teacher uptake of the program. In addition, the program was piloted at a local preschool and primary school to gather feedback and refine materials to ensure that key learning outcomes and objectives are reached.

The LeadSmart School Program will be launched in September 2019.

Memoranda of Understanding with Maari Ma and Far West Local Health District

The ongoing funding under Memoranda of Understanding (MoU) with Far West Local Health District (FWLHD) Child & Family Health and Maari Ma Health continued to increase the capacity of these health services to implement early intervention strategies to prevent blood lead levels from becoming elevated.

A key ingredient to the success of these funding arrangements has been the ability for these agencies to use funds to appoint additional staff to resource the increased workload of the enhanced blood lead screening, monitoring and early intervention programs, including the undertaking of environmental home assessments.

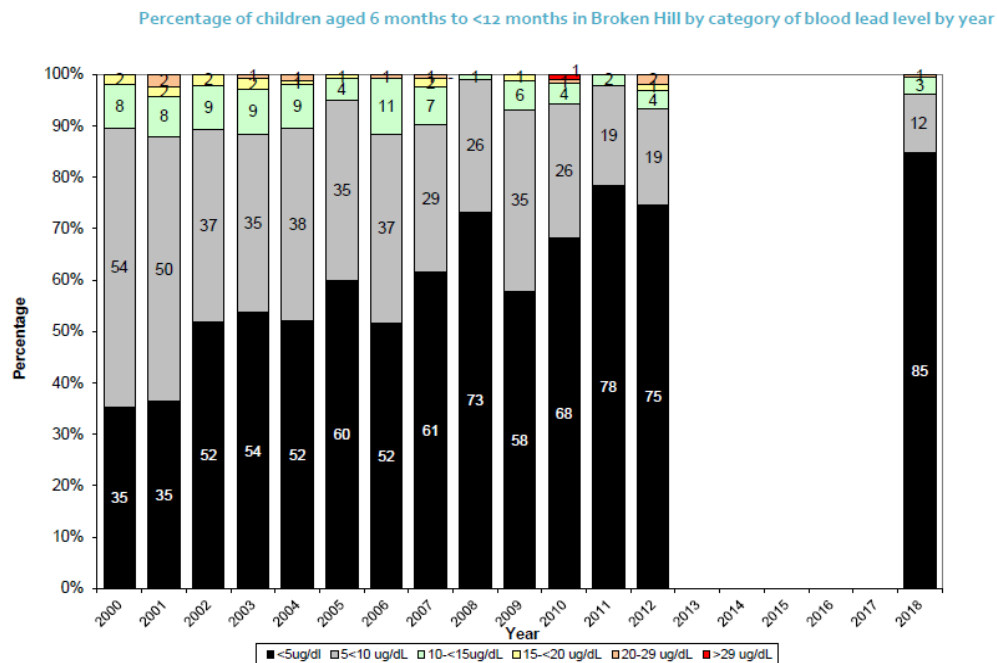
Here is a snapshot of some of the outcomes and achievements of the MOUs during the reporting period:

Funding from the BHELP has initiated and supported the review, trial and reintroduction of screening for children aged 6 months to < 12 months for the first time since 2012. Blood lead tests are now offered at 6, 9 and 18 months in addition to the pre-existing monitoring at 12 months, 2 years, 3 years and 4 years.

This enhanced screening and monitoring program, outlined in the BH Clinical Guidelines has resulted in 878 point of care tests (total number of tests) being undertaken by Child & Family Health in the reporting period compared to 751 in the previous year. Maari Ma's point of care tests increased from 561 in 2017-2018 to 667 in 2018.

In 2018, a total of 156 children aged 6 months to < 12 months were screened, in line with their 6-month immunisation schedule. The geometric mean lead level of children in this category for 2018 was 2.7 µg/dL, down from 3.9 µg/dL in 2012.
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The proportion of all children in the 6 months to <12 months age category with blood lead levels below 5.0 ug/dL increased by 10%, from 75% in 2012 to 85% in 2018. These results are significant and encouraging when considering that lead exposure in a child's first year of life is likely to be a major determinant of how high their blood lead level will subsequently rise until they are 5 years of age.



Graph 3. Percentage of Broken Hill children aged 6 months to < 12 months in each blood lead category (2008-2018). It should be noted that screening of children aged 6 months < 12 months ceased from 2013 to 2017.

(Public Health Unit, Health Protection, NSW Ministry of Health, May 2019)

Home visits are now offered to all Aboriginal babies and children case managed by Maari Ma. Child & Family Health staff offer home visits to families of all non-Aboriginal children with blood lead levels $\geq 5\mu\text{g}/\text{dL}$ and to all 12-month-old children at their scheduled screening – regardless of their blood lead level.

Approximately 100 home visits or environmental home assessments were undertaken during the year. These are now offered to all children with blood lead levels $\geq 5 \mu\text{g}/\text{dL}$. These include general education and advice on how to reduce lead exposure and the use of a portable XRF to immediately analyse lead levels in paint, soil and dust to identify sources of lead exposure and mitigate lead risks. Children with blood lead levels $\geq 15 \mu\text{g}/\text{dL}$ and significant risks identified in the home environment were referred to the BHELP home remediation program. Fifteen home remediations were completed during the financial year.

Child & Family Health, Lead Health Education Officers continued offering education packs to families and caregivers of all six-month-old children at scheduled six-month immunisation and lead test point of contact – 167 LeadSmart education packs were distributed at this occasion of service. In addition, 145 newborn families were provided with a LeadSmart information booklet and were educated about risks of lead exposure at their 2-week universal home visit by a community nurse. Where intervention was required, they were referred to a Child & Family Health Lead Health Education Officer.

Both services continued to provide LeadSmart education materials and advice at the time of point of care testing and have been offering supporting resources such as gardening, renovating and cleaning packs and sandpits to all families at the time of a home visit.

Maari Ma Health provided support where necessary for families of children with elevated blood lead levels including transport, temporary housing relocation and nutritional supplements.

Lead Health Education Officers at Child & Family Health commenced intensive training to facilitate and deliver the new Lead Ted Roadshow into local preschools.

Lead Report: 2018

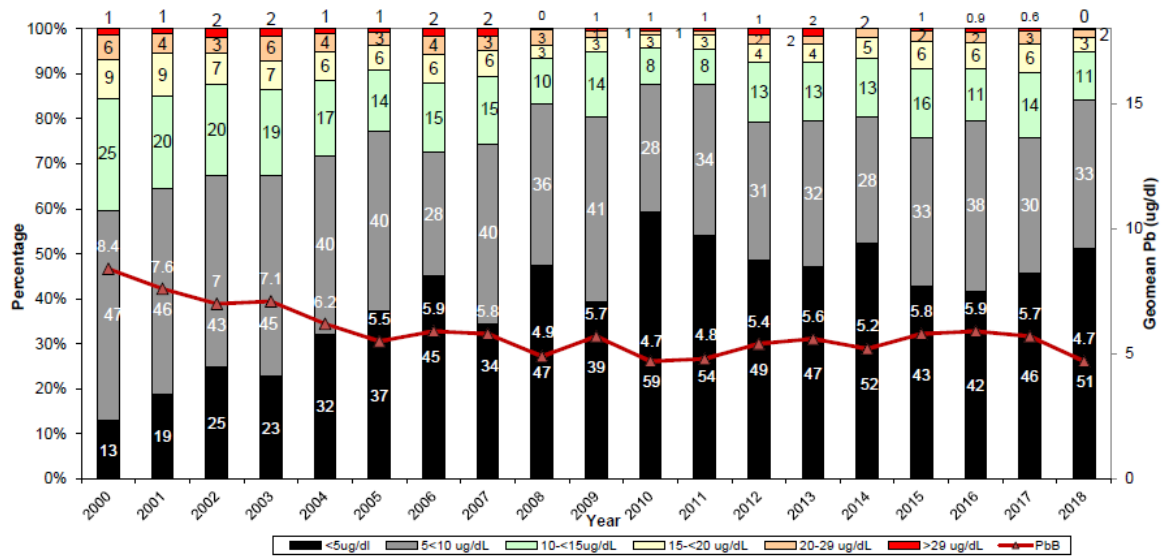
[The Lead Report: 2018](#) (Public Health Unit, Health Protection, NSW Ministry of Health, May 2019) is independently compiled annually by the FWLHD in partnership with Western NSW Health Intelligence Unit and the Broken Hill University Department of Rural Health. The report provides a calendar year update on the ongoing public health issue of elevated blood lead levels in Broken Hill children aged 0-5 years, using the voluntary blood lead data obtained through lead monitoring and screening services at Child & Family Health and Maari Ma Health.

The data contained in the 2018 report further reinforces the success of programs delivered by the BHELP under its three key focus areas. In particular, the ongoing funding arrangements under MoUs that have allowed enhancements of lead health services offered by Maari Ma Health and FWLHD Child & Family Health.

The following is a summary of results:

- ✓ The proportion of all children with blood lead levels below the notifiable level of 5.0 ug/dL increased from 42% to 46% from 2017 to 2018.
- ✓ The geometric lead mean level (age-sex standardized) for all children (1 to < 5 years) decreased from 5.7 in 2017 to 4.7 in 2018 – the lowest since 2010 and equal on record.
- ✓ The mean result for non-Aboriginal children decreased, from 4.6 to 4.0 µg/dL– the lowest on record.
- ✓ The mean result for Aboriginal children improved from 8.7 to 7.9 µg/dL in 2018
- ✓ The 2018 results show 62% of non-Aboriginal children in Broken Hill had a blood lead level below 5 µg/dL, a 4% improvement from 58% in the previous year
- ✓ 24% of Aboriginal children had a blood lead level below 5.0 ug/dL – an increase from 22% in the previous year
- ✓ The percentage of all children with blood lead levels above 5.0 ug/dL has decreased – from 54% in 2017 to 51% in 2018
- ✓ The proportion of children in all the higher blood lead categories >10 ug/dL decreased to less than 20% (17% in 2018) for the first time since 2012.
- ✓ In 2018 numbers of children in the 10 to <15µg/dL category dropped by a third and in the 15 to <20 µg/dL category halved compared to 2017.

Percentage of children aged 1 – <5 years in Broken Hill by category of blood lead level and age-sex-standardised geometric mean by year



Graph 4. Age-sex standardised percentage of Broken Hill children aged 1 to <5 years in each blood lead category and population age-sex standardised geometric mean (2000-2018).

(Public Health Unit, Health Protection, NSW Ministry of Health, May 2019)

Memorandum of Understanding with Broken Hill City Council

The BHELP continued its formal partnership with the Broken Hill City Council (BHCC), with an MoU outlining numerous lead remediation projects from April 2016 to June 2020 in accordance with an annual work plan.

The annual work plan has been developed on a priority or risk-based system. It focuses on projects identified by research as requiring remediation to effectively manage exposure to lead on public sites and land, including parks, playgrounds and ovals.

BHELP funding also allowed the Council to undertake regular high-pressure cleaning, maintenance and inspection of playground equipment and surrounding areas of parks and playgrounds. In addition, the Council maintained its increased schedule of street sweeping in high risk lead exposure areas to mitigate the risks of lead exposure in the local community.

The following remediation projects were completed during the reporting period and were aimed at managing and minimising exposure to lead in the local environment and addressing blood lead levels, particularly in children.

University Dam and Willyama Common project

This large-scale project commenced in 2016 and focused on remediating over five hectares of land at University Dam and the Willyama Common behind Robinson College, including the installation of a higher fence behind Queen Street in front of the regeneration area.

During the financial year, the final stage of the project was completed with the installation of further irrigation and the planting of saltbush to help stabilise the entire area which was previously capped with clean soil, limestone and mulch. The saltbush and native plant stock are fed using a water tank installed with solar panels.

Patton Street Park Redevelopment Project

BHELP funds were integrated into Council’s Stronger Communities Grants funded project to redevelop the park after previous studies indicated high lead exposure risks for children. During the year the playground opened, with the previous year’s funds allocated to the purchase and installation of high-pressure washing stations, handwashing facilities and shelters over the new playground equipment to reduce risks of lead exposure for children frequenting the park.

Component	BHELP funding
Playground Shelter	\$90,000
Handwashing Facilities	\$3,000
High Pressure Washer	\$7,000

Table 2

AJ Keast Park

Studies indicated that risk levels for exposure to lead at AJ Keast Park varied greatly, with lead concentrations generally increasing with increasing distance from the playground and grassed area (low risk areas) and towards the perimeters adjoining Block 10 (a high-risk area) in the back end of the park.

In addition, there were signs of lead paint flaking off the park benches, resulting in contamination of the soil in that area. The drainage line and levee showed also signs of erosion contributing to some high readings on the south east side of the park.

Work undertaken in previous years	Work undertaken in 2018-2019 financial year
Construction of a boundary fence mitigating public access from the park to Block 10 Hill.	Excavation of contaminated soil.
Contouring and rock armouring of storm water and drainage system.	Additional concrete footing around bare dirt areas – capped with loam and bark chips.
Benches containing lead-based paint were removed and replaced.	Revegetation – planting of 14 claret ash trees.
Erection of 200mm high concrete boundary around bare dirt areas identified with elevated lead levels - capped with loam, bark chips and drip irrigation installed.	

Table 3

O’Neill Park complex

Areas of the former bike track area, adjoining overflow cracker dust carpark and some bare dirt sloped areas of the soccer oval at the O’Neill Park complex were identified through BHELP-funded studies as priority areas for the public land remediation projects.

In the previous financial year, works included the capping of both areas and the commencement of the construction of a fence to mitigate public access to the bike track site. During the year, the fencing project was completed with double gates and padlocks.

Home remediation program

The home remediation program is generally targeted at those children with confirmed blood lead levels above 15 µg/dL, who have significant lead risks identified by Maari Ma Health and FWLHD Child & Family Health case managers during environmental home assessments. However, any child with a confirmed blood lead level greater than 5 µg/dL may be referred to the program, if the case manager identifies significant lead exposure risks whilst undertaking a home assessment.

Potential exposure risks are soil lead levels $\geq 1,000$ parts per million, unstable lead-based paint, and poorly sealed cornices with evident dust trails from the ceiling. These risks are abated by covering soil, stabilising or removing unstable lead-based paint, sealing cornices with flexible sealant and cleaning of carpets and soft furnishings.

Fifteen home remediations were completed during the reporting period, under the management of NSW Public Works, and in consultation with BHELP and case managers at FWLHD Child & Family Health and Maari Ma Health. The work included best-practice methods of minimising the lead hazard and were customised, in consultation with the family, based on known lead risks in the home.

Ongoing monitoring of children who have had their home remediated since the program commenced has shown an average 10 µg/dL reduction in blood lead levels – highlighting the success of this interagency program.



Above and below: High lead levels were detected in bare dirt and soil in the backyard of a child with elevated blood lead levels. Lead exposure risks were abated through capping and compacting the area with loam – creating a safer play environment for the child.





Above and below: Old, flaking and chipping lead-based paint on pressed metal walls of a hallway and on an exterior shed were identified as exposure sources for a child with elevated blood lead levels. The lead-based paint was removed safely by qualified tradespeople, the contaminated soil in and around the shed was replaced, and the surfaces were repainted.



ATTACHMENT ONE – DETAILED BUDGET 2018-2019

<u>PROGRAM</u>	<u>TOTAL EXPENDITURE AS AT 30 JUNE 2019 (\$)</u>	<u>EXPENDITURE 2018-2019 (\$)</u>
BHELP Operations	\$630 120	<p><u>\$ 572 920 Salaries & On costs</u></p> <ul style="list-style-type: none"> • Project Manager • Technical Officer • Senior Community Engagement Officer • Aboriginal Liaison Officer • Administration Officer • Aboriginal Environmental Health Trainee. <p><u>\$ 57 200 General operational expenditure</u></p> <ul style="list-style-type: none"> • Office space, equipment and consumables • Communications and information technology • Postage, courier and freight.
Communication & Engagement	\$261 480	<p><u>\$261 480 LeadSmart stage 2</u></p> <ul style="list-style-type: none"> • E learning modules and curriculum aligned education programs. Module 3, mines and mine workers.
Indigenous Children	\$250 000	<p><u>\$250 000 Maari Ma Health Aboriginal Corporation provision of specific monitoring and services for Aboriginal children.</u></p> <ul style="list-style-type: none"> • Employment of two Lead Field Officers to engage with Maari Ma Health children and families • Blood lead testing / monitoring of Aboriginal children in line with agreed testing schedule and blood lead management guidelines by appropriately qualified staff • Home assessment and education program for all children with blood lead levels $\geq 5\mu\text{g/dL}$. In home education and the assessment of a child's primary home environment is undertaken, including a visual assessment of house and yard and testing via

		<p>XRF to identify sources of lead exposure.</p> <ul style="list-style-type: none"> • Medical supplies relating to blood lead screening • Lead health education and incentive activities • Home remediation program.
FWLHD	\$250 000	<p><u>\$250 000 Child & Family Health augment existing monitoring & services.</u></p> <ul style="list-style-type: none"> • Employment of Lead Health Education Officer to undertake monitoring, home visits, environmental assessments and education programs • Blood lead testing / monitoring of children in line with agreed testing schedule and blood lead management guidelines by appropriately qualified staff • Home assessment and education program for all children with blood lead levels $\geq 5\mu\text{g/dL}$. In home education and the assessment of a child's primary home environment is undertaken, including a visual assessment of house and yard and testing via XRF to identify sources of lead exposure • Cord blood and venous testing verification • Home remediation program • Early intervention program • Lead health education and incentive activities.
Research and Monitoring	\$108 380	<p><u>\$105 980 OEH Dust Study</u></p> <ul style="list-style-type: none"> • Ongoing three-year study to determine the contribution of current dust emissions from the Line of Lode to existing lead levels in dust and children's blood. <p><u>\$2 400 Dust Study Extension</u></p> <ul style="list-style-type: none"> • Extension of work carried out by Macquarie University to determine the relative isotope ratios in house dust.

Clean Up / Remediation	\$206 000	<u>\$206 000 Home Remediation Program</u> <ul style="list-style-type: none"> 15 houses were abated for those children with elevated blood lead levels and environmental risks identified in either the house or the yard.
<u>TOTAL</u>	\$1 705 980	
<u>TOTAL BUDGET</u>	\$1 700 000	
<u>NET RESULT</u>	\$5 980	Funded by EPA

REFERENCES

Western NSW Public Health Unit, Health Protection, Ministry of Health. (May 2019). *Lead Report 2018: Broken Hill children under 5 years of age.*