BROKEN HILL ENVIRONMENTAL LEAD PROGRAM

ANNUAL REPORT 2019-2020

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CHAIRPERSON'S REPORT

I am pleased to present the 2019-20 Annual Report of the Broken Hill Environmental Lead Program (BHELP).

The year saw us continue to work in partnership with the local community, health service providers and other key stakeholders and build on a wealth of important environmental and health initiatives implemented since 2015 to mitigate lead exposure risks across the community and protect the health of Broken Hill children into the future.

Our funding partnerships with Maari Ma Health Aboriginal Corporation and Far West Local Health District (Child & Family Health) under Memoranda of Understanding (MoUs) expanded the existing blood lead screening program and bolstered the capacity of these agencies to connect and work with local families to assist them to take actions that are required to reduce children's blood lead levels and keep them safe from lead.

Lead exposure is critical in a child's first year of life and is usually an indicator of how high blood lead levels will rise over time. In 2018, our funding enabled the reintroduction of testing for children under 12 months of age for the first time since 2012. This has contributed to the early identification of 'at risk' children who need environmental and public health interventions to prevent blood lead levels from becoming elevated.

A total of 201 children were screened in this category with a geometric mean blood lead level of 2.8 micrograms of lead per decilitre of blood (µg/dL) - down from 3.9 µg/dL in 2012. Most importantly, the proportion of children less than 12 months with blood lead levels below the National Health & Medical Research Council (NHMRC) investigation level of 5 µg/dL increased by 10% - from 75% in 2012 to 85% in both 2018 and 2019 (Public Health Unit, Health Protection, NSW Ministry of Health, December 2020).

The LeadSmart community awareness and education program has contributed to increased participation rates in blood lead testing for children, from 77% of the targeted population of children less than five years of age in 2015 to over 87% in 2019 - up from 82% in 2018 (Public Health Unit, Health Protection, NSW Ministry of Health, December 2020). This, along with an increase in the number of tests - from 1,569 in 2018 to 1,754 in 2019 – has provided a more accurate depiction of the community-wide issue of lead exposure and for the identification of 'at risk' children and targeted interventions to keep local children safe from lead.

Our funding has ensured 108 environmental home visits were undertaken during the year – up from 100 in 2018. These are offered to all children at testing, regardless of their blood lead level, and include education and advice by BHELP-funded case managers on how to reduce lead exposure and the use of two portable X-Ray Fluorescence (XRF) machines to immediately analyse lead levels in paint, soil and dust to identify potential sources of lead exposure in the home environment.

Children with elevated blood lead levels and significant risks identified in the home environment were referred to the BHELP home remediation program. Sixteen home remediations were completed as part of round five of the program, with over 60 homes remediated since 2016 – removing or mitigating lead exposure risks in home environments where children spend most of their time.

Monitoring of children who have had environmental home assessments and their home remediated since 2016 has found blood lead levels declined by an average of 7.7 µg/dL between home assessments and 10 to 14 months after remediation – cementing the success of these programs.

We invested further in a five-year study in collaboration with the NSW Environment Energy & Science (EES) Group's Directorate of Policy Strategy & Science that uses an extensive network of dust gauge monitoring stations at strategic locations across Broken Hill to measure airborne and deposited dust to provide insight into the amount, source and location of environmental lead and direct the efforts of the broader public land remediation program. During the year, the BHELP continued weekly sampling at these sites and we relocated some of the sites to better detect and respond to the issue of environmental lead contamination.

Research and monitoring projects have directed the remediation of over 20 hectares of public land such as ovals, playgrounds, parks and vacant spaces since 2015 - that's equivalent to over 40 football fields of the local environment that is now safer thanks to the works of the program. In the 2019-20 financial year, over 2 hectares of land was remediated in partnership with Broken Hill City Council (BHCC), removing or mitigating risks of lead exposure and creating a safer environment for the local community.

A key focus of the BHELP is educating and increasing the capacity of individuals to respond to the lead issue and adopt LeadSmart behaviours to minimise risks of lead exposure for themselves and others. This year, we launched our curriculum-aligned LeadSmart School Education Program in collaboration with local preschools and primary schools, who have now integrated the program into their policies and everyday practices, ensuring they effect sustainable, long-term behavioural and lifestyle change.

The Lead Ted Roadshow has been delivered by BHELP staff to around 25% of the targeted student population since launch – despite

Marion Browne, Chairperson

COVID-19 restrictions preventing delivery for a significant proportion of the 2020 year.

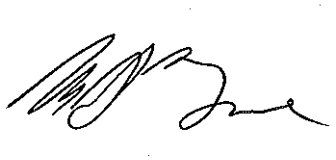
Lesson plans and interactive resources for teachers, students and families on the LeadSmart website have garnered 1,266 users over this period.

We continued educating local workers on all aspects of occupational health, hygiene and other lead exposure reduction techniques. In 2019, 180 employees from the National Broadband Network (NBN) rollout and Water2Broken Hill pipeline project were trained to protect themselves and the community from lead exposure whilst they undertook work that had the potential to disturb existing dust and soil contaminated with lead.

Despite the achievements of the BHELP over the past five years, there is a demonstrated need for ongoing and enhanced funding, given current data available that: 40% of non-Aboriginal children and 80% of Aboriginal children exceed the NHMRC investigation level of 5 µg/dL (Public Health Unit, Health Protection, NSW Ministry of Health, December 2020); and that there is an association between levels less than 10 µg/dL and health effects.

I am pleased to report that the NSW Environment Protection Authority (EPA) has committed funding for the continuance of the existing program for the 12 months from 1 July 2020 to 30 June 2021.

The BHELP remains focussed on delivering a multifaceted and integrated whole-of-community program, where state and local government, industry, workers and the community continue to play a part in safeguarding the long-term health of local children.



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 will revive the Environmental Lead Program to establish a long-term sustainable solution to ensure that children in Broken Hill meet the National Health Medical Research Council (NHMRC) goal for blood levels into the future, “ the Minister for Natural Resources stated in 2015.

“The money allocated will enable the Broken Hill Environmental Lead Program to work collaboratively with key stakeholders such as the Far West Local Health District, Broken Hill Lead Reference Group, Broken Hill City Council, the Maari Ma Health Aboriginal Corporation and the local community in resolving lead contamination in Broken Hill to provide children of Broken Hill an environmentally safe place to grow up in.

“The funding will assist in the protection of the most vulnerable members of the local community.” (Minister for Natural Resources, 2015)

The program has a focus on Aboriginal children, given 80% currently have blood lead levels above the NHMRC benchmark of less than 5 micrograms of lead per decilitre of blood (µg/dL).

On 19 May 2015, the NHMRC recommended that if a person has a blood lead level greater than 5µg/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 independent, 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 and Marion Browne, community representative, Broken Hill Lead Reference Group (BHLRG) and Councillor, Broken Hill City Council, was appointed Chairperson.

The Committee comprises two representatives from the EPA, three 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. The BHELP

Steering Committee members

Name	Representation
Marion Browne	Chairperson, BHELP Steering Committee Community representative, BHLRG Councillor and Deputy Mayor, Broken Hill City Council
Melissa Welsh	General Manager, Broken Hill Base Hospital, NSW Health
Priscilla Stanley	Manager Health Protection, Western NSW Local Health District, NSW Health
Craig Bretherton	Manager Regulatory Operations Regional 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	Director Regulatory Operations Regional West, NSW EPA.
Jodielyn Edge	ALRG Heritage Conservation Officer, Office of Environment and Heritage
Lisa Pritchard	ALRG Community representative
Kaylene Kemp	ALRG Executive Manager Primary Health Care Services, Maari Ma Health Aboriginal Corporation
Stevie Kemp	ALRG Aboriginal Health Worker, Nursing & Midwifery Directorate, NSW Health
Donna Sutton	ALRG Community representative
Donna Kennedy	ALRG Aboriginal Cultural Officer, NSW Department of Planning, Industry and Environment
Nyoka Stone	ALRG Community representative
Kenneth Dennis	ALRG Housing Officer, Murdi Paaki Regional Housing
Bilyara Bates	ALRG Project Officer, Aboriginal Affairs
Chantelle Bates	ALRG Community representative
Ann Bennett	ALRG Aboriginal Health Practitioner, Maari Ma Health Aboriginal Corporation
Tammy Flemming	ALRG Community Participation & Tenant Engagement Officer, Compass Housing

Steering Committee meetings and member attendance

	22 August 2019	21 November 2019	27 February 2020	28 May 2020
Marion Browne	✓	✓	✓	✓
Aboriginal Lead Reference Group	✓	Apology	Apology	✓
Melissa Welsh	✓	✓	✓	✓
Priscilla Stanley	✓	Apology	✓	Apology
Craig Bretherton	✓	Apology	✓	Apology
Cathy Dyer	✓	✓	✓	✓
Professor David Lyle	✓	✓	✓	✓
Gary Whytcross	✓	✓	✓	✓

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 the program's 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; consultation, education and funding; and remediation.

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 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 ongoing 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 six staff based in Broken Hill.

- Project Manager (full-time) – oversees the team and overall project management, reports to BHLRG and the BHELP Steering Committee
- Technical Officer (full-time) – undertakes on the ground assessment work of lead contaminated lands, and provides technical input to the priority areas for remediation
- Senior Community Engagement Officer (full-time)– engages with the local community and key stakeholders on lead issues through the development of communications and education programs
- Education Facilitator (part-time) – delivers the Lead Ted Roadshow component of the LeadSmart School Education Program into local preschools and schools. Provides support to the Senior Community Engagement Officer
- Aboriginal Liaison Officer (full-time) – 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 (part-time) – provides administrative support to the team.

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.

PROGRAM	**FULL YEAR TOTAL BUDGET 2019-2020 ($)**	**EXPENDITURE ($) (as at 30 June 2020)**	**PROJECTS**
BHELP Operations	$1,000,000	$867,655	• $715,245 BHELP Operations • $57,790 LeadSmart Communications & Engagement Strategy • $6,060 Aboriginal Health Trainee • $88,560 Public Works Advisory administration fees
Aboriginal Children	$250,000	$250,000	• $250,000 Maari Ma Health Aboriginal Corporation
Far West Local Health District (Child & Family Health)	$250,000	$250,000	• $250,000 Child & Family Health
Research and Monitoring Clean Up / Remediation	$200,000	$361,745	• $106,700 Public Land Abatement Program - Block 10 • $129,650 Home Remediation Program • $80,705 Dust Study and monitors • $44,690 Strategy development and research
Total Budget	**$1,700,000**	**$1,729,400**	**$1,729,400**

There was a $29,400 end of financial year overspend and this was paid by the EPA.

SUMMARY OF BHELP ACTIVITIES AND PERFORMANCE

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

To facilitate the delivery of specific programs required to address the issue of lead exposure and elevated blood lead levels in local children, we continued funding partnerships under Memoranda of Understanding (MoUs) with health service providers, Far West Local Health District (Child & Family Health) and Maari Ma Health Aboriginal Corporation.

As part of the agreements, $250,000 per year is granted to each of these providers to strengthen their capacity to carry out more actions to prevent blood lead levels from becoming elevated. This has resulted in the expansion of the existing blood lead screening and monitoring programs and the implementation of targeted education, early intervention, case management and remediation programs.

Blood lead screening and monitoring

Advocacy and funding from the BHELP initiated and supported the review of the Broken Hill Clinical Guidelines and the reintroduction of screening of children aged 6 months to less than 12 months in 2018 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. In 2019, there was an increase in the number of tests undertaken by Child & Family Heath and Maari Health Aboriginal Corporation, from 1,569 in 2018 to 1,754.

A Maari Ma Lead Health Worker tests a child's blood lead levels. Photo: Shannon Minnis/BHELP

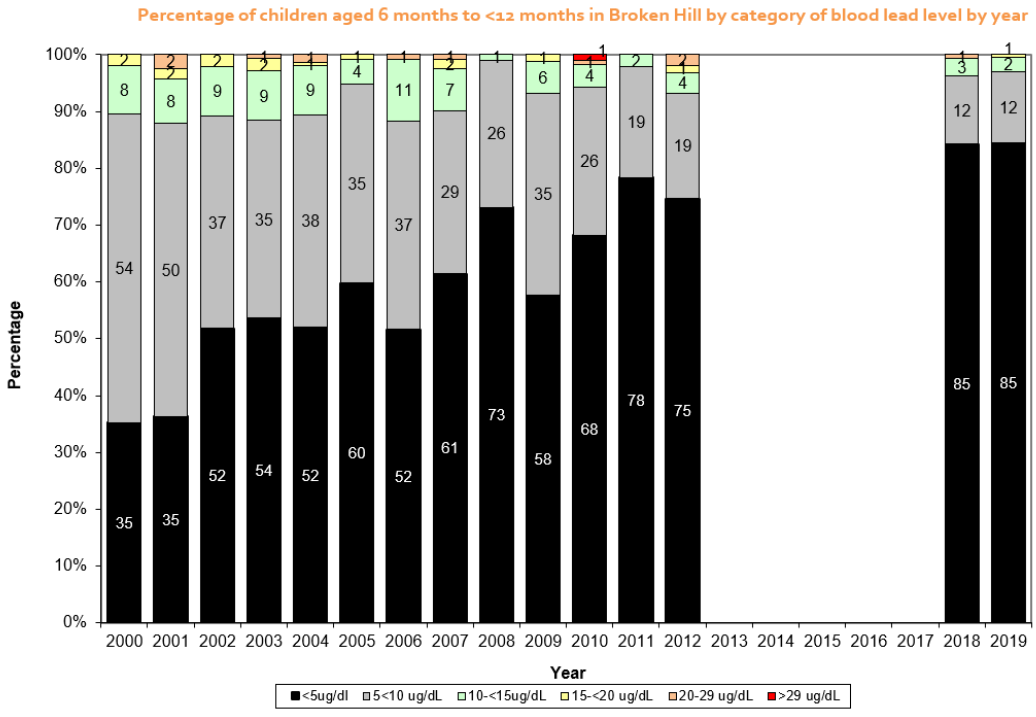
In addition, the proportion of children participating in the screening program has increased by 10% - from 77% in 2015 to over 87% in 2019 - up from 82% in 2018.

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. The reintroduction of testing for children less than 12 months of age has contributed to the early identification of 'at risk' children who need environmental and public health interventions to prevent blood lead levels from becoming elevated.

A total of 201 children aged 6 to less than 12 months were tested in 2019 - an increase from the 156 children in 2018. The geometric mean lead level of children in this category was 2.8 µg/dL a slight increase from 2.7 µg/dL in 2018, but down from 3.9 µg/dL in 2012.

The enhanced screening and monitoring program has provided a more accurate depiction of the community-wide issue of lead exposure and for the earlier identification of 'at risk' children and targeted interventions to keep local children safe from lead.

The proportion of all children in the 6 months to less than 12 months age category with blood lead levels below 5ug/dL increased by 10%, from 75% in 2012 to 85% in 2018 and 2019.



(Public Health Unit, Health Protection, NSW Ministry of Health, December 2020)

The population trends in this cohort are encouraging as they are considered the most useful and robust measure of trends in lead exposure and blood lead levels for the whole population. At this age children have had a limited time to accumulate a body burden of lead – this means changes in lead exposure at a population level will show up in this age group first.

Environmental home assessments

In Broken Hill, children's blood lead levels are associated with lead levels inside and outside their home which in turn are associated with the location of the home, its sealing against dust, the condition of lead-based paint, and soil lead levels.

BHELP funding has enabled Child & Family Health and Maari Ma Health Aboriginal Corporation to start offering environmental home assessments to all families at the time of testing. During the year, 108 home visits were undertaken by case managers to assess children's indoor and outdoor environments, and immediately analyse dust, paint and soil lead levels using portable X-Ray Fluorescence (XRF) machines.

Case managers use the information to develop customised plans with families to help reduce exposure risks in the household. Every family's situation is different - this visit can simply involve providing targeted information to families about how to identify and mitigate sources of exposure, and where simple measures can be taken to eliminate risks, the family are provided with targeted and practical interventions, such as cleaning kits and sandpits, to minimise exposure to lead.

Those children with elevated blood lead levels and significant environmental exposure risks identified in the home environment are referred to the BHELP-funded home remediation program.

Aboriginal Liaison Officer Denise O'Donnell checks for the presence of lead-based paint, using a handheld X-Ray Fluorescence machine. Photo: Shannon Minnis/BHELP

Home remediation program

NSW Public Works Advisory manages the home remediation program on behalf of the BHELP and partner health service providers, Maari Ma Health Aboriginal Corporation and Child & Family Health. Sixteen home remediations were completed as part of round five of the program in the financial year, with over 60 homes remediated since 2016.

Monitoring of children who have had environmental home assessments and their home remediated since the program started has shown that blood lead levels declined by an average of 4.4 µg/dL 10 to 14 months after remediation, and 7.7 µg/dL between home assessments and 10 to 14 months after remediation.

Works include capping and or replacement of lead contaminated soils within the yard, sealing of gaps and cracks in the home, sealing/repainting of unstable lead painted surfaces, replacement of floor coverings in some instances and a one off clean of the house and soft furnishings once works are complete.

Contractors lay grass over bare soil identified with elevated lead levels in a child's front yard. Photo: NSW Public Works Advisory

Expansion of the home remediation program

During the year, we extended the home remediation program to include investigation of secondary homes where children spend significant amounts of their time when environmental risks in the home environment couldn't be identified.

This followed a BHELP-funded study undertaken by the Sydney University Department of Rural Health (UDRH) that found exposure to other residences, outside the family home, was almost universal - for 88% of children in Broken Hill. Many spent a substantial amount of time there, with nearly two-thirds of all children staying five or more hours per week at least in one other residence over many months, increasing the likelihood of exposure to lead hazards in that environment. Grandparents owned or occupied 66% of all households visited by children.

In May 2020, the Steering Committee approved an extension of the home remediation program to include children in the lower blood lead level category of 10 to less than14 µg /dL, who live-in high-risk zones for exposure and who are less than two years of age.

These additional abatements will be undertaken within the existing budget, given the number of children with higher blood lead levels greater than 15 µg /dL is decreasing over time. Fifteen homes are targeted in round 6 of the program, commencing December 2020.

Sampling and assessment of environmental risks

In addition to home assessments, the BHELP team uses the XRF machine to undertake research projects and routine sampling at playgrounds, preschools, schools, family day-care homes and areas of vacant land. Landscaping and garden products at local distributers are also analysed.

During the reporting period, a total of 1,188 samples were taken at 105 sites across Broken Hill – 1,081 of these samples were for environmental home assessments.

Purpose and type of samples

	Soil	Paint	Plastics	Total
Home assessment	499	578	4	1081
Preschool, kindergarten, school	64	8		72
Landscape	30			30
Miscellaneous	5			5

Public land remediation

Since 2015, research and monitoring projects have directed the remediation of over 20 hectares of public land in partnership with BHCC under a MoU. That is equal to over 40 football fields of land, including parks, ovals, sporting grounds, and playgrounds.

The aim is to deliver targeted, cost-effective and sustainable lead remediation works based on research and monitoring and risk assessments to remove or mitigate lead exposure and provide a safer environment for local children and the community into the future.

During the year, a major project was completed to reduce airborne lead-contaminated dust and access to soils with high lead levels on over two hectares of public land in the vicinity of South Road, Block 10 and the RSPCA. The project involved clearing the area, filling and compacting soil with road base and capping with a rock mulch layer.

Over 20 hectares of public land has been remediated since 2015. That's equivalent to 40 football fields of the local environment that is now safer thanks to the work of the BHELP.

Ongoing works continued during the year as part of the five-year MoU with BHCC. These works included:

- ✓ playground equipment at all BHCC parks and surrounding surfaces were cleaned weekly, using high-pressure cleaning equipment
- ✓ handwashing facilities and signage were regularly inspected and maintained to ensure that children can wash their hands after playing and before eating
- ✓ bare surfaces at local parks and playgrounds were tested regularly for lead levels and were remediated with appropriate ground covers where necessary
- ✓ a BHCC street sweeper increased its sweeping schedule to give priority to local streets with known high lead levels in storm water sediment /runoff. The street sweeper was fitted with a dust control system to keep lead dust generated by sweeping activities to a minimum and to avoid recontamination of previously lead-remediated sites.

The Broken Hill Environmental Lead Study

The Broken Hill Environmental Lead Study (BHELS) was commissioned by the BHELP in 2016 to measure airborne and deposited dust to provide insight into the amount, source and location of environmental lead and direct the efforts of the broader public land remediation program.

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

As part of the study, an extensive network of wind directional high-volume air gauges was 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.

Each air gauge continuously measures the wind speed and direction, air temperature and barometric pressure, and logged the volume of air sampled. The filters are changed weekly. Total suspended particle (TSP) samples are collected in the filters of the deposition samplers over a seven-day period before being sent to an independent laboratory for analysis.

The sampling program continues; however, three-years of sampling data will be used to outline likely source areas contributing to the amount of lead that is in the air and deposited at various locations across Broken Hill. Data will also be used to track seasonal variations such as temperature, rainfall and wind conditions and impacts on lead levels over time. This information will be useful to inform targeted, zonal public land and home remediation programs into the future.

BHELP Technical Officer Dr Frances Boreland changes an air filter on a dust gauge monitor located on the rooftop of the National Parks and Wildlife building. Photo: Shannon Minnis/BHELP

Landcare partnership

During the year, the BHELP partnered with Landcare to facilitate the revegetation of over five hectares of public land in the Regeneration Reserve surrounding Broken Hill, known as University Dam.

Our funding supported the propagation of suitable native seedlings and plants, grow bags, potting mix, mulch, stakes, an irrigation system and a battery back-up system to allow watering at night.

Landcare volunteers have responsibility for the re-establishment and ongoing maintenance of the area that will help stabilise the entire area that was remediated by the BHELP in partnership with BHCC between 2016 to 2018 with clean soil, limestone and mulch, irrigation, a water tank and solar panels.

The revegetation of the area will provide a protective trap for windblown dust, reducing risks of lead exposure for the community.

Local Landcare volunteers at the community garden that contains a nursery to propagate native seedlings and plants. Photo: Barrier Daily Truth

High Efficiency Particulate Air (HEPA) filter study

One of the most significant exposure sources for children in Broken Hill is lead contaminated indoor dust from current mining activities and legacy sources associated with mining operations. Lead-based paint is also a significant source of exposure for children in and around their homes.

Research examining the role of HEPA (High Efficiency Particulate) filters has shown they can reduce airborne particulates in the home and associated elevated levels of blood cadmium. However, no research has examined the efficacy for doing the same with respect to lead contaminated airborne dusts and blood lead levels.

As there is currently no intervention that can systematically mitigate the risk of exposure from contaminated dust that that has penetrated homes, the BHELP approved commencement of a six-month pilot study in collaboration with Macquarie University. The pilot will involve 20 participating

homes split into a control and intervention group at various locations across Broken Hill —10 will be installed with HEPA filters and 10 without.

During the year, we took delivery of the HEPA filters and had them retrofitted with a timing device, however, due to COVID-19 restrictions the trial was unable to commence.

Prior to the start of the study, the houses will be sampled for lead concentrations in yard soil, vacuum dusts and surface dust wipes. They will then be cleaned and yards remediated, where necessary. BHELP staff will undertake monthly environmental home assessments for the monitoring of lead concentrations in vacuum dust samples and other household surfaces. Child & Family Health staff will also test blood lead levels of children who reside in the houses on a monthly basis. HEPA filters will be checked and replaced every two months during the trial.

Macquarie University will issue a summary report at the end of the trial.

Education, engagement and communication

Engaging with individuals, the community, independent experts and industry, including those affected by similar environmental and health issues, helps inform and drive the work of the BHELP. Their involvement enables us to respond effectively to specific issues and keep improving our approach to addressing the issue of lead exposure and elevated blood lead levels in local children.

We continued to collaborate with key stakeholders in the development of community-wide and targeted programs, interventions and initiatives to generate awareness and knowledge of the key LeadSmart behaviours that people should adopt in their everyday life to help keep themselves and other safe from lead harm.

A family use a handwashing station installed by BHELP at a local playground. Photo: Shannon Minnis/BHELP

Aboriginal Women's Group participants learn how to make home made soap. Photos: Denise O'Donnell/BHELP

Lead Ted was a special guest at a local school's Teddy Bears' Picnic. Photo: Shannon Minnis/BHELP

The BHELP makes it easy for the community to know more about the local lead issue, the health effects of lead exposure and how to reduce risks to help keep people safe from lead.

We regularly attend community events and forums and promote and improve our website, post on our Facebook page and distribute a range of resources and interventions at key touch points across the community.

Engaging with the Aboriginal community continues to be an important focus of BHELP given that Aboriginal children have higher instances of elevated blood lead levels. Our funding partnership with Maari Ma Health Aboriginal Corporation, and collaborations with other health and community service providers, have enabled meaningful connections and interventions to ensure that Aboriginal families have a better understanding and increased capacity to respond to the lead issue.

Brothers Jack and Oscar Sawires visited Lead Ted at Sturt Park to surprise him with his favourite food – apples. Photo: Shannon Minnis/BHELP

Results

- ✓ attracted 2,000 visitors to the LeadSmart website, with 85.9% of these being new users
- ✓ installed handwashing signage at local parks, playgrounds and schools
- ✓ educated 180 employees from the National Broadband Network (NBN) rollout and Water2Broken Hill pipeline project to protect themselves and the community from lead exposure whilst they undertook work that had the potential to disturb existing dust and soil contaminated with lead
- ✓ produced over 50,000 LeadSmart resources including brochures, posters, colouring books and recipe books
- ✓ hosted an inaugural Lead Forum in February 2020, attended by health and environmental professionals and researchers that have worked in Port Pirie, Mt Isa and Broken Hill – cities that face similar historical and contemporary lead contamination and exposure issues from lead mining and processing activities. This has provided ongoing connections to exchange ideas, knowledge, key learnings and perspectives
- ✓ launched the LeadSmart School Education Program in September 2019
- ✓ supported International Lead Poisoning Prevention Week of Action and International Children's Week by collaborating with Child & Family Health, Maari Ma Health Aboriginal Corporation and Consolidated Broken Hill Resources, holding an information stall and activities at a local park
- ✓ participated in the BHCC 2019 Christmas Pageant
- ✓ formed a partnership network group with a number of community service providers to establish an Aboriginal Women's Group. The Group meets fortnightly to hold information sessions and activities to increase access to services and build women's skills and capacity to respond to a range of issues, including lead, in a culturally appropriate and safe environment
- ✓ distributed 200 LeadSmart booklets 'Congratulations on your new baby – being LeadSmart in Broken Hill' to families of a newborn via a community midwife at a universal home visit. That represents 91% of the 219 births in Broken Hill during 2019.

Future

Over the coming year, the BHELP will deliver a comprehensive learning management system (LMS) that will be accessed through the existing LeadSmart website, using animations and interactive quizzes to engage and educate targeted groups on the lead issue in Broken Hill and how to reduce lead exposure risks for themselves and others. A LeadSmart community awareness and behaviour change social media and television campaign is also planned for the first quarter of the 2021 year.

Lead Ted was joined by some local children on the LeadSmart float in the 2019 BHCC Christmas Pageant. Photo: Shannon Minnis/BHELP

The LeadSmart School Education Program was developed in collaboration with local teachers to empower children with the life-long knowledge, skills, attitudes and behaviours to make safer and healthier choices to help protect themselves and others from lead harm – at home, at school, and across the community.

Through an education portal on the LeadSmart website, teachers have access to targeted lesson plans and supporting interactive activities to deliver into classrooms year-on-year - building on learnings from preschool right through to Year 6.

To complement the teacher-led program, specially trained BHELP and Child & Family Health facilitators are joined by a life-sized mascot, Lead Ted, to deliver fun-filled roadshows into preschool to Year 2 classrooms, teaching children to be LeadSmart through games, songs, dancing and animations.

Lead Ted and BHELP Roadshow Facilitator Rebecca Black teach children at Morgan Street Public School how to be LeadSmart. Photo: Shannon Minnis/BHELP

Prior to the program launch in September 2019, preschool children were the primary focus of ad-hoc lead education visits by local health service providers. The new program has expanded the target audience to include students up to Year 6 – in recognition that older children are conduits for information into their households and strong influencers on behaviours. In addition, education resources are now aligned with the curriculum and are age-appropriate and engaging.

Results

- ✓ partnered with 100% of local schools to engage with teachers and provide access to the lesson plans
- ✓ delivered the Lead Ted Roadshow to over 25% of the targeted student population, despite COVID-19 restricting access to schools for the majority of the 2020 year
- ✓ garnered 1,266 users of the teacher and student / family education portals on the LeadSmart website since September 2019.

This a great example of where the BHELP partnered with other NSW Government agencies and local stakeholders to enhance existing services and develop a sustainable, long-term program to educate the community on important health and environmental issues.

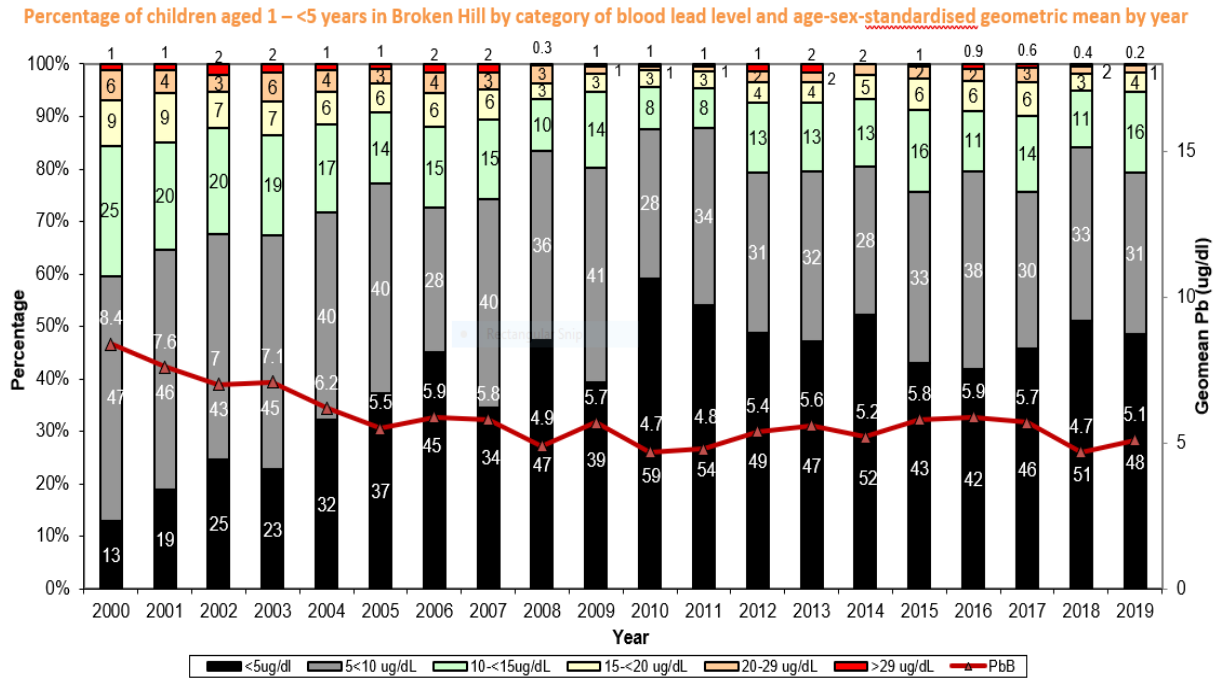
Lead Report: 2019

The *Lead Report: 201*9 (Public Health Unit, Health Protection, NSW Ministry of Health, December 2020) 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 stakeholders and the public with a picture of how the population of children aged 0-4 years is being impacted by lead year on year, using the voluntary blood lead data obtained through lead monitoring and screening services at Child & Family Health and Maari Ma Health Aboriginal Corporation.

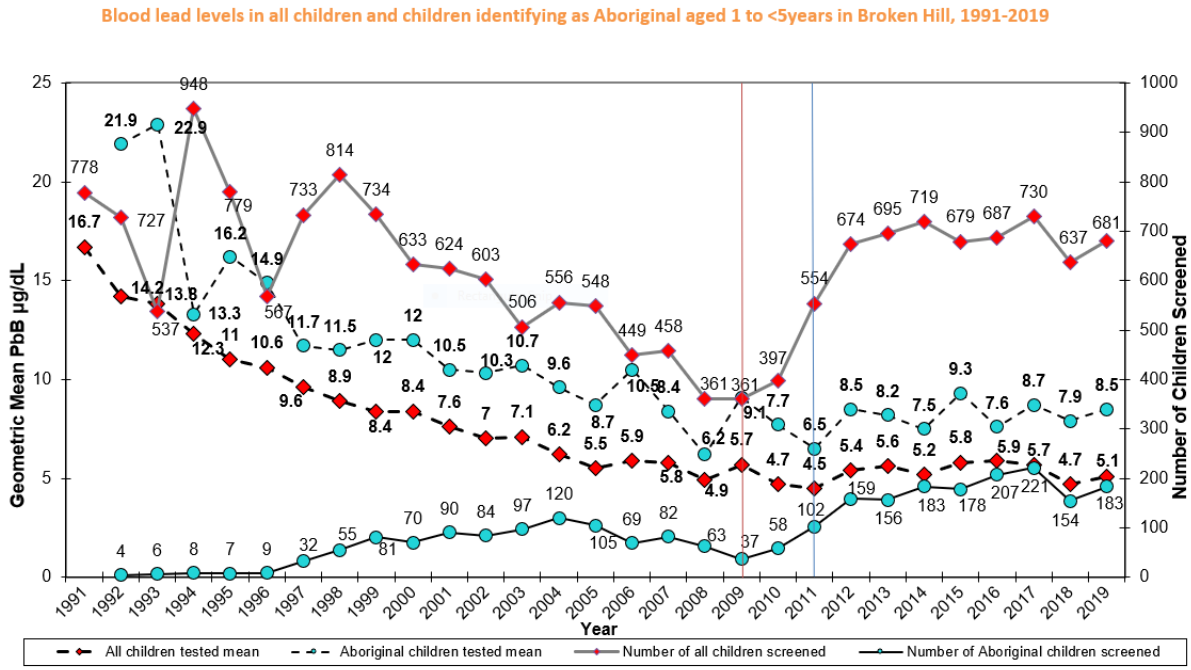
Significant outcomes in the 2019 report include:

- 681 children were screened - an increase of 6.9% from 2018
- The geometric lead mean level (age-sex standardised) for all children (1 to <less than5 years) increased slightly by 0.4 ug/dL - from 4.7 ug/dL in 2018 to 5.1 ug/dL in 2019
- The mean result for Aboriginal children increased from 7.9 in 2018 to 8.5 ug/dL in 2019
- The non-Aboriginal children mean result increased from 4.0 in 2018 to 4.2 ug/dL in 2019
- 201 children aged 6 months to less than 12 months were tested and the geometric mean lead level was 2.8 ug/dL, compared to 2.7 ug/dL from 156 children in 2018. In 2019, as in 2018, 85% of children in this age group had a blood lead level below 5 ug/dL, compared to 75% in 2012
- In 2019, a total of 159 newborn cord bloods were tested for lead and the geometric mean was 0.7 ug/dL – the same as in 2018.



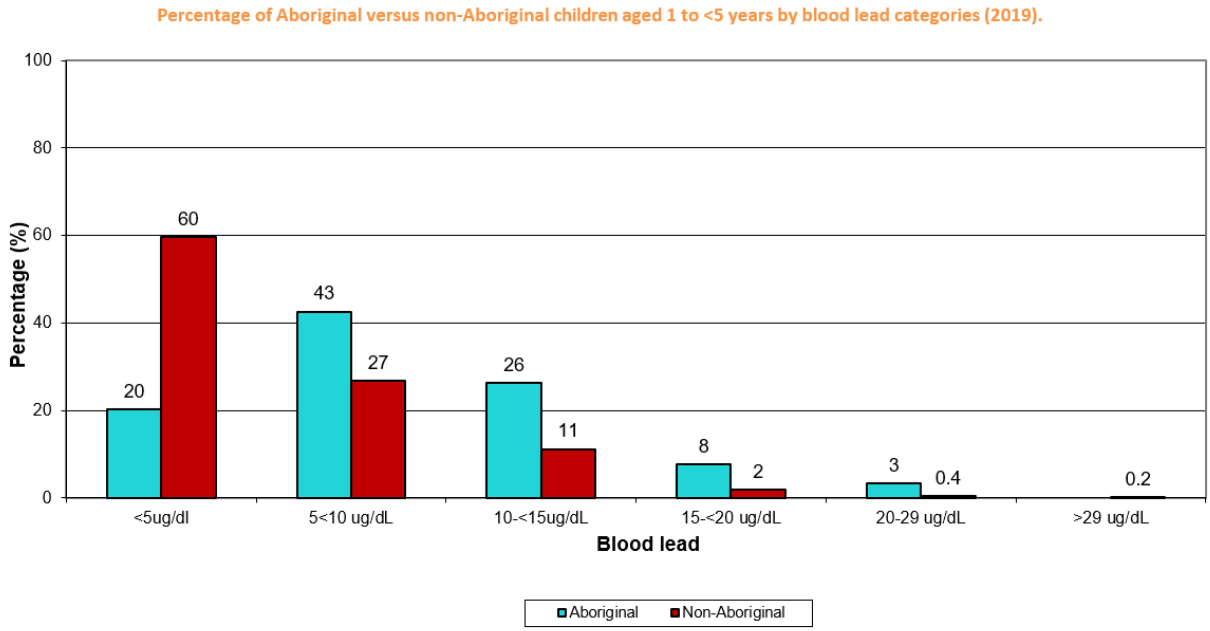
Age-sex standardised percentage of Broken Hill children aged 1 to <5 years in each blood lead category and population age sex standardised geometric mean (2000-2019).

(Public Health Unit, Health Protection, NSW Ministry of Health, December 2020)



Population age-sex standardised geometric mean blood lead concentration and number of all children and Aboriginal* children screened aged between 1 to <5 years in Broken Hill, 1991-2019. The red vertical line indicates the point in which both venous and capillary samples are reported together and the blue the inclusion of screening with childhood immunisation. *There were no recorded tests for Aboriginal children in 1991. Standardisation applied only from 1997 onwards, due to small sample size. Additionally, Aboriginal status was only consistently collected from 1997. The geomeans reported since 2016 cannot be compared to previous geomeans as recording of results and use of the capillary method affects geomeans. See Methods – Reporting of Blood Lead Levels.

(Public Health Unit, Health Protection, NSW Ministry of Health, December 2020)



(Public Health Unit, Health Protection, NSW Ministry of Health, December 2020)

The population trends in the report are not intended to measure the effectiveness of the BHELP – they are designed for the specific purposes of public health monitoring and protection.

The report is for the period 1 January 2019 to 31 December 2019 and uses a child's first test in the calendar year, so it is possible that individual test results in the dataset were measured up to two years ago. It also doesn't reflect how BHELP funding is case managing and protecting individual children who present with elevated blood lead levels, or the public land remediation and education programs the BHELP has delivered since the period the report considers.

Maari Ma Health Aboriginal Corporation and Child & Family Health use an individual child's latest test results to identify emerging exposure issues and rapidly implement tailored intervention measures, like the home remediation program, to reduce exposure for a child's unique circumstances. Where a child lives, their behaviour and what they eat can all be contributors to a child's blood lead levels. Children also absorb lead very rapidly; however, it takes a long time to be excreted from the body – a reduction in children's exposure to lead does not immediately impact on population levels.

The 2019 report shows that seasonal factors such as temperature, wind speeds and rainfall can contribute to slight fluctuations in blood lead levels annually. Due to the prevailing hot and dry conditions - and higher annual average wind speed - Broken Hill experienced more dust storms in 2019 compared with 2017 and 2018, increasing potential for children's exposure to lead. Seasonal analysis showed that the highest blood lead levels were generally between January to April, which also corresponds with many children having their first test.

The BHELP uses the population trends in the report to inform higher level, strategic community-wide approaches for the management and reduction of exposure to lead in Broken Hill. One of the key focus areas of our program will continue to be Aboriginal children and our ongoing partnership with Maari Ma Health Aboriginal Corporation, given that 80% of Aboriginal children have blood lead levels above the NHMRC investigation level of 5µg/dL, compared to only 40% of non-Aboriginal children.

ATTACHMENT ONE – DETAILED BUDGET 2019-2020

PROGRAM	**TOTAL EXPENDITURE AS AT 30 JUNE 2020 ($)**	**EXPENDITURE 2019- 2020 ($)**
BHELP Operations	$721,200	$ 678,700 Salaries & on costs • Project Manager • Technical Officer • Senior Community Engagement Officer • Education Facilitator • Aboriginal Liaison Officer • Administration Officer • Aboriginal Environmental Health Trainee. $ 42,500 General operational expenditure • Office space, equipment and consumables • Communications and information technology • Postage, courier and freight.
Communication & Engagement	$57,800	$57,800 LeadSmart • Collateral reprint • Additional incursion kit for LeadSmart School Education Program. • Learning Management System development.
Aboriginal Children	$250,000	$250,000 Maari Ma Health Aboriginal Corporation provision of specific monitoring and services for Aboriginal children. • 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. 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 • Medical supplies relating to blood lead screening • Lead health education and incentive activities • Home remediation program.
FWLHD	$250,000	$250,000 Child & Family Health augment existing monitoring & services. • 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. 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	$125,500	$37,270 EES Dust Study • 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. $43,430 Dust Monitoring • Maintain & operate high-volume samplers to determine community exposure. $30,000 Strategy development • Development of BHELP Strategy Report. $14,800 Research – HEPA Filter Study • Use of HEPA filters study in Broken Hill homes.
Clean Up / Remediation	$324,900	$218,200 Home Remediation Program • 16 houses were abated for those children with elevated blood lead levels where environmental risks are identified in either the house or the yard • Includes Public Works Advisory administration fees. $106,700 Public Land Remediation • Block 10 Area • Includes Public Works Advisory administration fees.
TOTAL EXPENDITURE	**$1,729,400**	
TOTAL BUDGET	**$1,700,000**	
NET RESULT	**$29,400**	**Funded by the EPA**

REFERENCES

Minister for Natural Resources, (2015, February 13). *Media Release*. Retrieved from https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/MinMedia/EPAMin150213.ashx

Public Health Unit, Health Protection, NSW Ministry of Health. (December 2020). *Lead Report 2019: Broken Hill children under 5 years of age.* Retrieved from www.fwlhd.health.nsw.gov.au