# Occupational lead absorption notifications

This factsheet presents a national indicator, which allows us to monitor occupational lead absorption in people aged 15 years and over.

## Key facts

Pb

**The occupational lead absorption notification rate has decreased from 3.0 per 100,000 (122 notifications) in 2019 to 1.4 per 100,000 (59 notifications) in 2020. The lower rate in 2020 may have been impacted by COVID-19 nationwide lockdown.**

**Over 90% of the occupational lead notifications were males in 2014–20.**

**There were no significant differences in blood lead levels from occupational exposures between age groups in 2014–20.**

**Pacific workers had the highest occupational lead absorption notification rate in 2014–20.**

**Painters have remained the most notified group with lead absorption since 2014.**

**Workers living in the most deprived areas (NZDep2018 quintile 5) were nearly 2.5 times as likely to have occupational lead absorption as those in the least deprived areas in 2014–20.**

**The Wairarapa District Health Board (DHB) had the highest reported occupational lead absorption rate. The Public Health Unit (PHU) with the highest reported rate was Regional Public Health.**

## Occupational lead exposure is an important public health issue

Lead (Pb) is a persistent environmental pollutant, and the continued occurrence of occupational lead exposure in New Zealand remains an important public health issue. Lead can be found in a variety of occupational sources, and the following occupational activities may increase the risk of exposure:

- painting
- mining
- smelting/metal working
- soldering
- automotive repair
- metal recycling
- renovating older houses
- glazed pottery making
- battery manufacturing
- fishing sinker manufacturing
- bullet casting
- stained glass window making (BPAC 2021).

Lead exposure can have adverse health effects in both the short term and long term. Although absorbed lead can affect many organs, the nervous system is considered the most vulnerable to lead-related toxicity.

Initial symptoms may range from those that are relatively mild (eg, headache and memory loss) to severe complications such as encephalopathy. People with prolonged exposure to lead may also be at risk for high blood pressure, heart disease, kidney disease, and reduced fertility (BPAC 2021).

Although no safe level of exposure to lead has been found, the levels of blood lead that are required to be notified in New Zealand are lead absorption equal to or in excess of 0.24 µmol/L . This is a recent reduction in the notifiable threshold from 0.48 µmol/L to 0.24 µmol/L since 9 April 2021. This new level is aligned with the threshold recommended by the Centres for Disease Control and Prevention in the United States and the Australian National Health and Medical Research Council (Ministry of Health 2021).

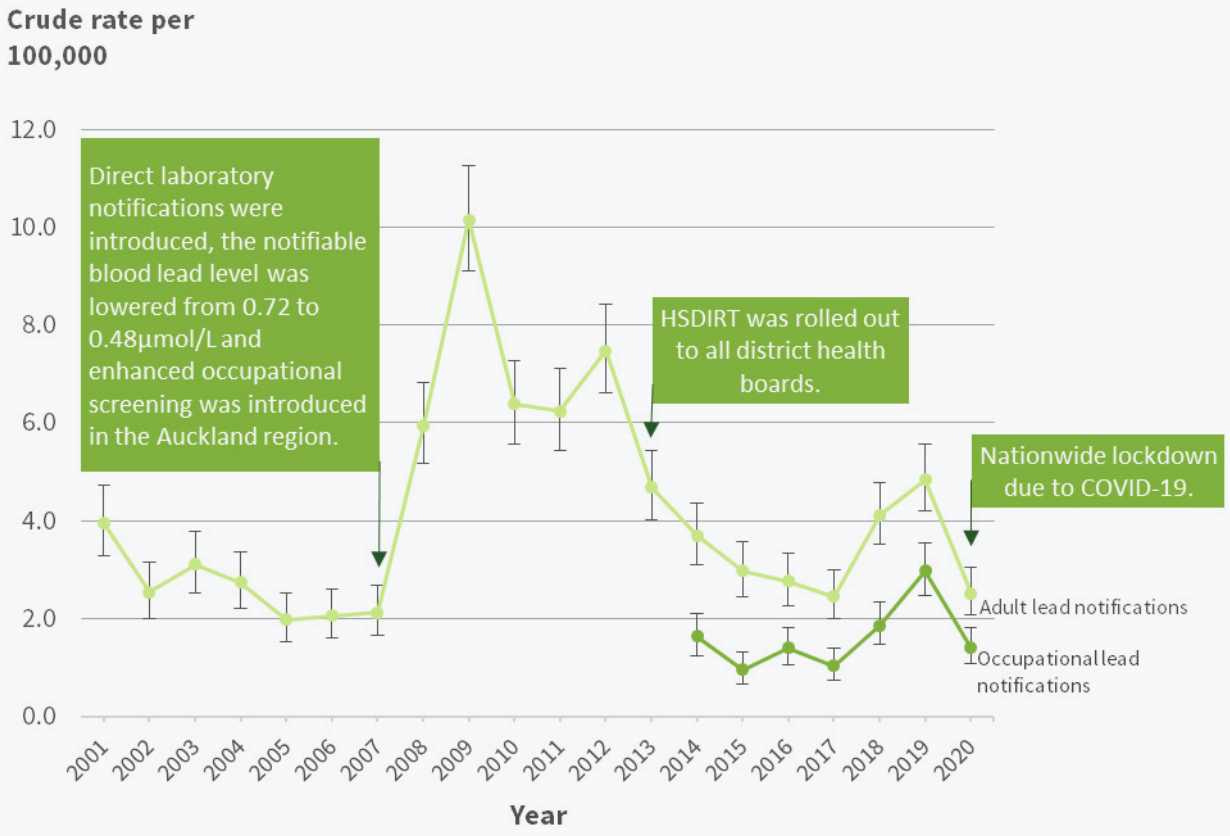
This factsheet presents occupational lead absorption notifications based on a blood lead notification threshold of ≥0.48 µmol /L, which has since been lowered.

## The occupational lead absorption rate dropped in 2020

The occupational lead absorption notification rate has decreased from 3.0 per 100,000 (122 out of a total of 206 lead notifications) in 2019 to 1.4 per 100,000 (59 out of 110 lead notifications) in 2020. The nationwide lockdown from COVID-19 may have contributed to the low rate in 2020. Between 2014 and 2017, the occupational lead absorption notification rate fluctuated from year to year, followed by an increase in 2018 and 2019.

The adult lead absorption notification rate from all exposure sources was 2.5 per 100,000 (106 notifications) in 2020. This rate has halved from 2019, which may be due to COVID-19 nationwide lockdown (Figure 1).

**Figure 1: Occupational lead (15+ years) and adult lead absorption notification rate, by year**




**Note1:** Notifications peaked in 2009, with around 50 lead absorption cases associated with repainting the Auckland Harbour Bridge. This was drawn to the attention of the Department of Labour (now Worksafe NZ) who revised their Guidelines for the Medical Surveillance of Lead Workers in 2011. These guidelines state that employers must ensure that medical surveillance is provided to all workers involved in lead work.
**Note2:** Adults are defined as those aged 15 years and over.
**Note3:** The collection of occupational lead notifications data from the HSDIRT system rolled out progressively throughout 2013; therefore the 2013 data is not complete. Consequently, occupational lead data were reported from 2014 onwards.
**Note4:** 95% confidence intervals have been presented as error bars. See Metadata for more information on how to interpret this graph.
**Source:** Institute of Environmental Science and Research; Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) 2021.

## Over 90% of the occupational lead notifications were males

In 2014–20, nearly all of the occupational lead notifications were males (421 out of 447 occupational lead notifications, 94%), while 4% (16 notifications) were females and 2% (10 notifications) with unknown sex.

## There were no significant differences in blood lead levels from occupational exposures between age groups

Several studies have found that older adults have higher blood lead levels than younger adults (Vig et al 2015). However, in this data, there were no significant differences in blood lead levels from occupational exposures between age groups in 2014–20 (Table 1).

**Table 1: Median blood lead level, interquartile range and number of occupational lead notifications by working-age group (15+ years) and sex, 2014–20**

| Median blood lead levels (µmol /L, interquartile range) | | Number of occupational lead notifications | | | |
|---|---|---|---|---|---|
| Age group in years | Male | Male | Female | Unknown | Total |
| 15–24 | 0.73 (0.61-1.29) | 45 | 1 | 1 | 47 |
| 25–34 | 0.71 (0.56-1.1) | 57 | 3 | 2 | 62 |
| 35–44 | 0.69 (0.57-1.08) | 95 | 1 | 1 | 97 |
| 45–54 | 0.80 (0.62-0.97) | 96 | 6 | 3 | 105 |
| 55–64 | 0.74 (0.59-1.10) | 94 | 5 | 2 | 101 |
| 65+ | 0.81 (0.62-1.03) | 31 | 0 | 0 | 31 |
| Unknown | – | 3 | 0 | 1 | 4 |
| **Total** | **–** | **421** | **16** | **10** | **447** |

**Note:** The median blood lead levels and the interquartile range were not calculated for females due to low numbers of notifications reported.
**Source:** Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) 2021.

## Occupational exposures affected workers aged 35–64 years

In 2014–20, workers in the 45–54 years age group had the highest number of occupational lead notifications (105 notifications), closely followed by those aged 55–64 years (101 notifications) and 35–44 years (97 notifications) (Table 1). These age groups accounted for 68% of all occupational notifications.

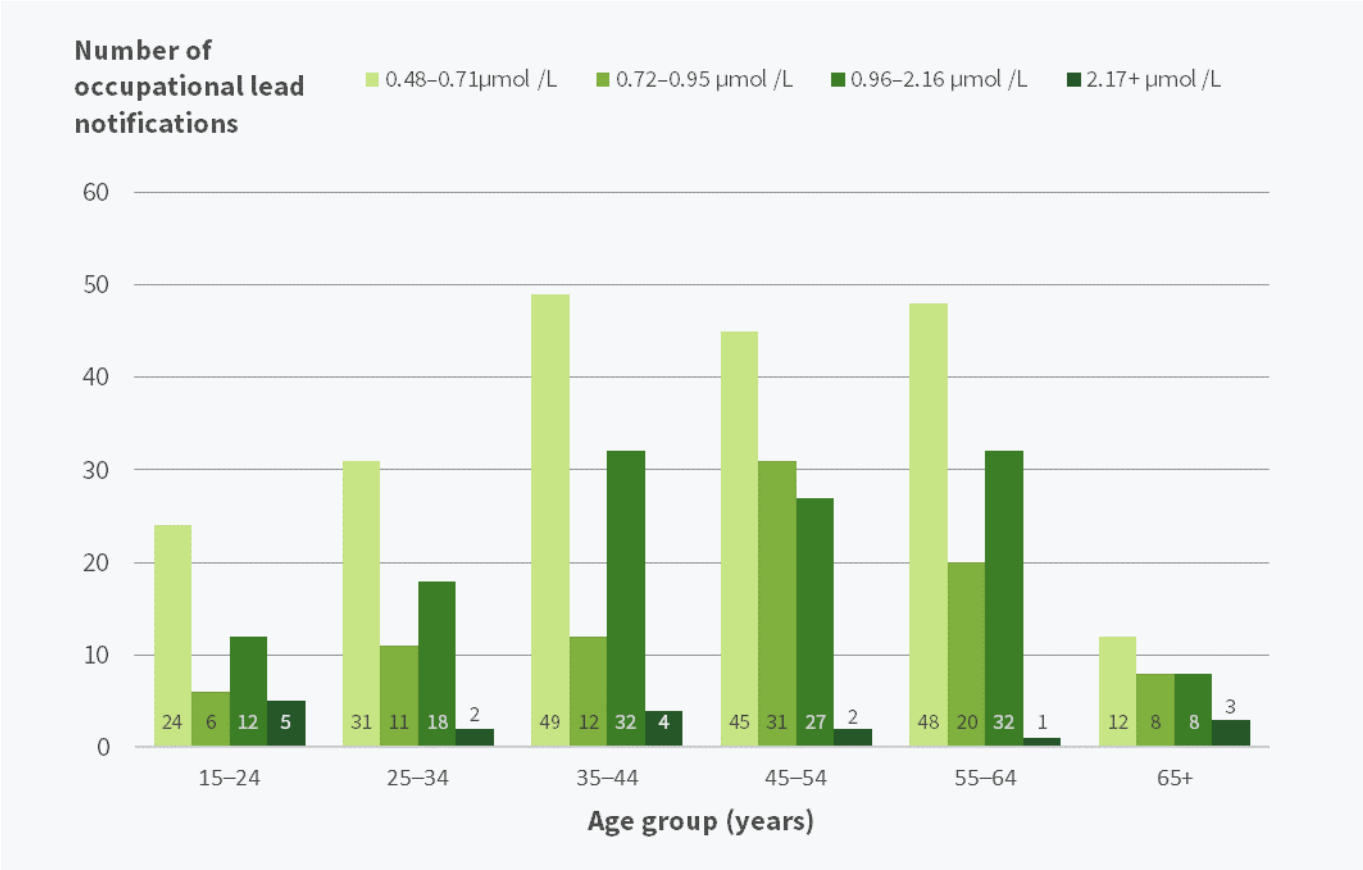
## Nearly 80% of the occupational notifications had blood lead levels less than 0.96µmol/L in 2020

The blood lead level groupings are based on the Ministry of Health guidelines, which provide recommendations for the management of elevated lead levels according to the level of blood lead (Ministry of Health 2021).

In 2020, of the 59 occupational notifications, 54.2% (32 notifications) with blood lead levels 0.48–0.71µmol/L, 25.4% (15) with 0.72–0.95 µmol/L, 18.6%(11) with 0.96–2.16 µmol/L, and 1.7% (1) with 2.17+ µmol/L.

In 2014–20, the majority (67%) of the occupational lead notifications had blood lead levels below 0.96µmol/L (Figure 2).

**Figure 2: Number of occupational lead absorption notifications, by working age-group (15+ years) and blood lead level, 2014–20**




**Note:** A total of four occupational lead absorption notifications with unknown age were excluded from this graph.
**Source:** Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) 2021.

In 2020, WorkSafe implemented new exposure standards for lead for occupationally exposed people (WorkSafe 2018). The following WorkSafe exposure standards apply for lead in blood of occupationally exposed people:

- a Biological Exposure Index (BEI) of 0.97 µmol/l of whole blood
- a suspension (removal) level of 1.45 µmol/l of whole blood for females not of reproductive capacity (ie, 45 or more years), and males
- a suspension level of 0.48 µmol/l of whole blood for females of reproductive capacity, and those pregnant and/or breastfeeding.

In 2020, one female worker under the age of 45 years exceeded the suspension level of 0.48 µmol/l. There were no female workers over the age of 45 years who reached the BEI of 0.97 µmol/l. In males, six exceeded the BEI, and five exceeded the suspension level of 1.45 µmol/l.

## Pacific workers had the highest occupational lead absorption notification rate in 2014–20

In 2014–20, Pacific workers had the highest occupational lead absorption notification rate (2.5 per 100,000) (Table 2).

In 2020, European/Other workers accounted for 52.5% (31 notifications) of occupational lead absorptions, Pacific Peoples for 10.2% (6 notifications), Asian for 10.2% (6 notifications), and Māori for 5.0% (3 notifications). However, a large number of occupational lead absorption notifications had an unknown ethnicity (13 notifications, 22.0%).

**Table 2: Occupational lead absorption by prioritised ethnic group, 2014–20**

| Ethnic group (prioritised) | Number (% of total occupational notifications) | Crude rate per 100,000 (95% CI) |
|---|---|---|
| Māori | 41 (9.2) | 0.7 (0.5–1.0) |
| Pacific Peoples | 57 (12.8) | 2.5 (1.9–3.3) |
| Asian | 28 (6.3) | 0.6 (0.4–0.8) |
| European/Other | 238 (53.2) | 1.1 (1.0–1.3) |
| Unknown | 83 (18.6) | – |

**Source:** Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) 2021.

## Painters remain the most notified group with occupational lead since 2014

In 2020, painters remained the most notified group with occupational lead absorption, accounting for approximately 41% of work-related notifications. This has remained the same since 2014. Other high ranking groups include foundry, builder, radiator, metal and glazier workers (Table 3).

**Table 3: Number of occupational lead absorption notifications, 2014–20**

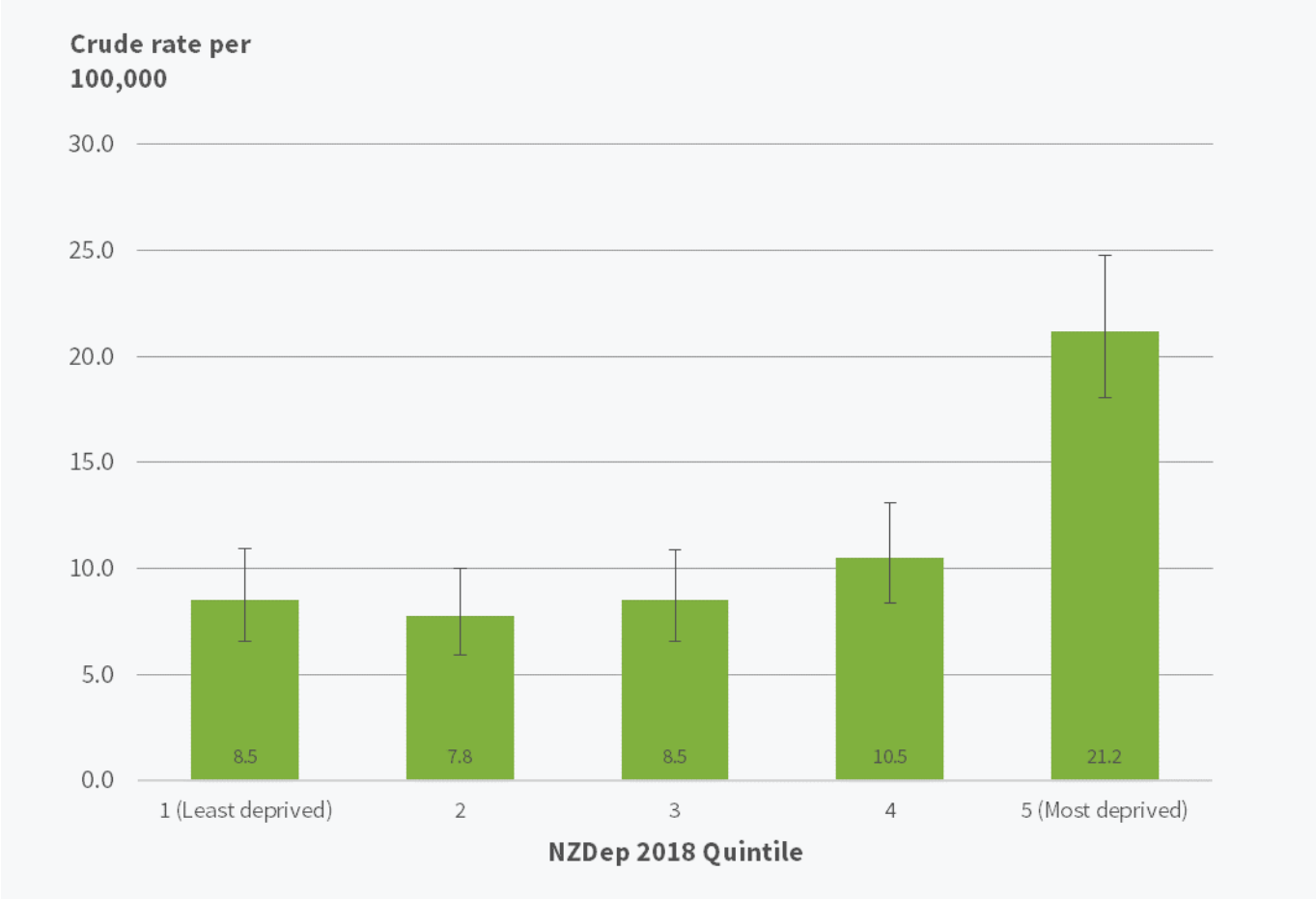
| Rank | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|
| 1 | Painter (19) | Painter (16) | Painter (31) | Painter (27) | Painter (37) | Painter (38) | Painter (24) |
| 2 | Unknown (9) | Radiator (5) | Metal worker (8) | Radiator (3) | Unknown (19) | Unknown (44) | Foundry/ metal worker (18) |
| 3 | Metal worker (5) | Builder (3) | Radiator (3) | Metal worker (2) | Metal worker (3) | Metal worker (4) | Glazier (4) |
| **Total*** | **60** | **36** | **54** | **41** | **75** | **122** | **59** |

**Note 1:** *Totals include categories outside of the three rankings listed.
**Note 2:** More than one lead exposure source can be recorded for a single notification. Therefore, the number can add to more than the total notifications.
**Source:** Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) 2021.

## Workers living in the most deprived areas had the highest occupational lead absorption in 2014-20

In 2014–20, workers in the most deprived areas (NZDep2018 quintile 5, 161 notifications) were 2.49 times as likely to have occupational lead absorption as those in the least deprived areas (62 notifications) (Figure 3).

**Figure 3: Occupational lead absorption notification rate, by NZDep 2018 quintiles, 2014–20**




**Note1:** A total of 19 occupational cases with unknown address were excluded from this graph.
**Note2:** 95% confidence intervals have been presented as error bars. See Metadata for more information on how to interpret this graph.
**Source:** Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) 2021.

## Wairarapa DHB and Regional Public Health had the highest reported rates of occupational lead absorption

In 2014–20, people living in the Wairarapa DHB had the highest reported rate of occupational lead absorption (7.8 per 100,000; 21 notifications) compared to other DHBs (Table 4). Similarly, Regional Public Health reported the highest rate (3.3 per 100,000; 97 notifications) of occupational lead absorption. These are most likely due to increased use of the HSDIRT in these areas rather than an increased exposure to lead. On the other hand, there were no lead cases reported for Northland, Lakes, Tairāwhiti and Nelson Marlborough DHBs.

## Table 4: Occupational lead absorption notification rate and number of notifications, by DHB and PHU, 2014–20

| DHB | Number of notifications | Crude rate (per 100,000) |
|---|---|---|
| Northland | 0 | 0.0 |
| Waitematā | 43 | 1.2 |
| Auckland | 63 | 2.2 |
| Counties Manukau | 63 | 2.1 |
| Waikato | 33 | 1.4 |
| Lakes | 0 | 0.0 |
| Bay of Plenty | 6 | 0.4 |
| Tairāwhiti | 0 | 0.0 |
| Hawkes Bay | 12 | 1.2 |
| Taranaki | 19 | 2.8 |
| MidCentral | 22 | 2.1 |
| Whanganui | 12 | 3.2 |
| Capital & Coast | 49 | 2.7 |
| Hutt Valley | 26 | 3.0 |
| Wairarapa | 21 | 7.8 |
| Nelson Marlborough | 0 | 0.0 |
| West Coast | 5 | 2.6 |
| Canterbury | 31 | 1.0 |
| South Canterbury | 10 | 2.8 |
| Southern | 7 | 0.4 |

| PHU | Number of notifications | Crude rate (per 100,000) |
|---|---|---|
| Northland | 0 | 0.0 |
| Auckland Regional Public Health Service | 175 | 1.9 |
| Waikato Population Health Service | 36 | 1.5 |
| Toi Te Ora Public Health | 11 | 0.5 |
| Tairawhiti DHB Public Health Unit | 0 | 0.0 |
| Hawke's Bay Public Health Unit | 12 | 1.2 |
| Taranaki District Health Board | 19 | 2.8 |
| MidCentral Public Health Service | 33 | 2.3 |
| Regional Public Health | 97 | 3.3 |
| Nelson Marlborough | 0 | 0.0 |
| Community | 50 | 1.3 |
| Public Health South | 7 | 0.4 |

**Note:** DHB is based on individual spatial address. PHU is based on the locality of the notification reported.
**Source:** Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) 2021.

## Data for this indicator

This indicator reports HSDIRT occupational lead absorption notifications from 2014 to 2020. The data were extracted from the HSDIRT system on 5 March 2021. Updates or additions made to HSDIRT after this date are not reflected in this factsheet.

Data have sometimes been pooled to give sufficient numbers for analysis.

Repeat blood lead tests taken within a year of the original test have been excluded from these data unless further investigation has resulted.

Crude rates presented in this factsheet do not take into account varying age distributions when comparing between populations.

For additional information, see the metadata link below.

## References


BPAC. 2021. Lead absorption notification levels have reduced. *Occupational medicine: Public Health* URL: **https://bpac.org.nz/2021/lead.aspx** (Accessed 10 August 2021)

Ministry of Health. 2021. The environmental Case Management of Lead-exposed Persons. URL: **https://www.health.govt.nz/publication/environmental-case-management-lead-exposed-persons** (Accessed 10 August 2021)

Vig E K, Hu H. 2015. Lead toxicity in older adults. *Journal of the American Geriatrics Society, 48*(11), 1501-1506.

Worksafe New Zealand. 2018. Workplace Exposure Standards and Biological Exposure Indices. URL: **https://www.worksafe.govt.nz/topic-and-industry/monitoring/exposure-standards-and-biological-exposure-indices/** (Accessed 10 August 2021)


## Other related topics include:

**Hazardous substances notifications**

**Unintentional hazardous substances exposures in children (0–14 years)**

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## Citation

Environmental Health Intelligence. 2021. *Occupational lead absorption notifications* [Factsheet]. Wellington: Environmental Health Intelligence NZ, Massey University.

## Further information

For descriptive information about the data **Metadata Sheet**

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