

# National Hazardous Substances and Lead Notifications

January – December 2015

Report to the Ministry of Health

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## Author

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**Disclaimer:** The data source is the Hazardous Substances Disease and Injury Reporting Tool (HSDIRT). For more information on the data source see <http://www.ehinz.ac.nz/our-projects/hazardous-substances/hsdirt-notification-tool/>

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The notification data contained in this report is based on information recorded on HSDIRT as at 23 May 2016. Updates or additions made to HSDIRT data after this date are not reflected in this report. Consequently, future data analysis may produce revised results. The data in the HSDIRT are continually improved and updated, so numbers in this report may differ from those previously published, but represent the most accurate record at the time of writing.

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## Hazardous Substances and Lead notifications

### 1. Key Findings

- There were 186 notifications in 2015, including 121 lead absorption, 61 hazardous substances and four agrichemical spray-drift notifications. In comparison, in 2014, there were 230 notifications that included 130 lead absorption, 95 hazardous substances and five agrichemical spray-drift notifications.
- Most notifications in 2015 were reported by laboratories (75 notifications) and general practitioners (57 notifications).

#### *Lead notifications*

- The majority of lead notifications (102 notifications) were males and the most common age groups were 45-64 years (56 notifications) and 25-44 (33 notifications) years.
- There were 37 (31%) lead notifications where occupation was recorded as the source of exposure in 2015 compared with 56 notifications in 2014.
  - Two radiator repairers had a blood lead level of  $\geq 1.5$   $\mu\text{mol/l}$ . There were no occupationally-related cases reported above the suspension level (2.4  $\mu\text{mol/l}$ )
  - Painters (16 notifications) were the occupation most exposed to lead in 2015
  - Two cases were admitted to hospital
- There were 87 lead notifications from non-occupational or unknown exposures
  - There were six cases under 15 years old
  - The highest blood level recorded was 2.75  $\mu\text{mol/l}$ , due to exposure to lead-based paint
  - Lead-based paint was the most common source of non-occupational/unknown lead exposure for both children and adults
  - Five cases were admitted to hospital including a child under five years old
- Taranaki DHB had the highest rate (11.2 per 100,000) of lead absorption notifications in 2015.

#### *Hazardous substances notifications*

- There were 61 hazardous substances notifications in 2015, five of which were for children under five years old.
- Fifty-four percent (33 notifications) of hazardous substances notifications were males.
- Eighty-four percent (51 notifications) of hazardous substances notifications were unintentional exposures.
- Industrial chemical was the most common substance category (25 notifications).
- Forty-eight percent (29 notifications) of hazardous substances notifications occurred at home, followed by 34 percent (21 notifications) at workplaces.
- There were 19 hazardous substances notifications admitted to hospital, including five children under 15 years old.

### *Agrichemical spray-drift notifications*

- There were four agrichemical spray-drift notifications in 2015.

## **2. Introduction**

The electronic reporting system, the Hazardous Substances Disease and Injury Reporting Tool (HSDIRT), was designed for general practitioners (GPs) to notify cases of disease and injury related to hazardous substances exposure. Notification is required under the Hazardous Substances and New Organisms (HSNO) Act 1996 and Health Act 1956. The HSDIRT is a short electronic form linked to a Patient Management System.

Following a pilot in one region, development of online resources and training of public health unit (PHU) staff, a phased roll out across PHUs occurred in 2013. A national communications strategy was also implemented to raise awareness about hazardous substances notifications.

Since November 2013, the HSDIRT is operating in all health districts of New Zealand.

## **3. Methods**

### **3.1 Notifications included**

This report records cases entered into the HSDIRT. Notified cases are:

- Injuries and diseases due to hazardous substances (Hazardous Substances and New Organisms Act 1996)
- Lead absorption where blood lead level is greater than or equal to 0.48µmol/l (Health Act 1956)<sup>1</sup>, and
- Poisoning arising from chemical contamination of the environment (Health Act 1956)

### **3.2 Data checking**

Notification data supplied by the PHUs via the HSDIRT have been checked by the Environmental Health Indicators Programme. Where an error or duplicate was suspected this was discussed with the PHU and a decision made regarding inclusion or removal of the notification from the analysis.

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<sup>1</sup> Lead absorption can also be notified under the HSNO Act.

### 3.3 Standard procedure regarding repeat lead levels

As stated in the Ministry of Health's Environmental Health Circular Letter April 2013, where a person has had a repeat blood lead level taken within 12 months of the original test, the repeat blood test is not included as a second notification unless further investigation or public health action has resulted.

### 3.4 Statistical notes

Data are presented primarily as numbers and crude rates – unadjusted for any differences in age. The 2014 and 2015 mid-year population estimate served as the denominator for primary care notification rates.

## 4. Total number of notifications

There was a total of 186<sup>2</sup> notifications entered into the HSDIRT in 2015. These included 121 lead absorption, 61 hazardous substances and four agrichemical spray-drift notifications (Table 1). This compares to 230 notifications in 2014, including 130 lead absorption, 95 hazardous substances and five agrichemical spray-drift notifications.

In 2015, the Auckland Regional Public Health Service (38 notifications) had the highest number of lead absorption notifications, and the Regional Public Health (33 notifications) had the highest number of hazardous substances notifications (Table 1). This may be due to the larger population size in these two PHUs.

**Table 1:** Number of notifications by Public Health Unit, 2015

| Public Health Unit                       | Lead       | Hazardous substances | Agrichemical Spray-drift |
|--|------------|----------------------|--------------------------|
| Auckland Regional Public Health Service  | 38         | 8                    | 1                        |
| Community and Public Health              | 22         | 2                    |                          |
| Hawke's Bay Public Health Unit           | 1          | 1                    |                          |
| MidCentral Public Health Service         | 9          | 5                    | 1                        |
| Northland Health                         |            |                      |                          |
| Nelson-Marlborough Public Health Service | 3          |                      |                          |
| Public Health South                      | 4          | 1                    |                          |
| Regional Public Health                   | 19         | 33                   |                          |
| Tairāwhiti DHB Public Health Unit        |            |                      |                          |
| Taranaki District Health Board           | 13         | 2                    |                          |
| Toi Te Ora - Public Health               | 5          | 1                    | 1                        |
| Waikato Population Health Service        | 7          | 8                    | 1                        |
| <b>Total</b>                             | <b>121</b> | <b>61</b>            | <b>4</b>                 |

<sup>2</sup> Twenty notifications were excluded from the total. Seventeen of the 20 notifications were assigned a case status of 'Not a case' and the remaining three were not subject to the HSNO act.

The majority (71 notifications) of lead notifications in 2015 were reported by laboratories, followed by GPs (47 notifications). Over half (36 notifications) of hazardous substances notifications were reported by Emergency Department (ED) clinicians.

Table 2 shows the number of lead absorption, hazardous substances and agricultural spray-drift notifications in 2015 by reporting source.

**Table 2:** Number of notifications by reporting source, 2015

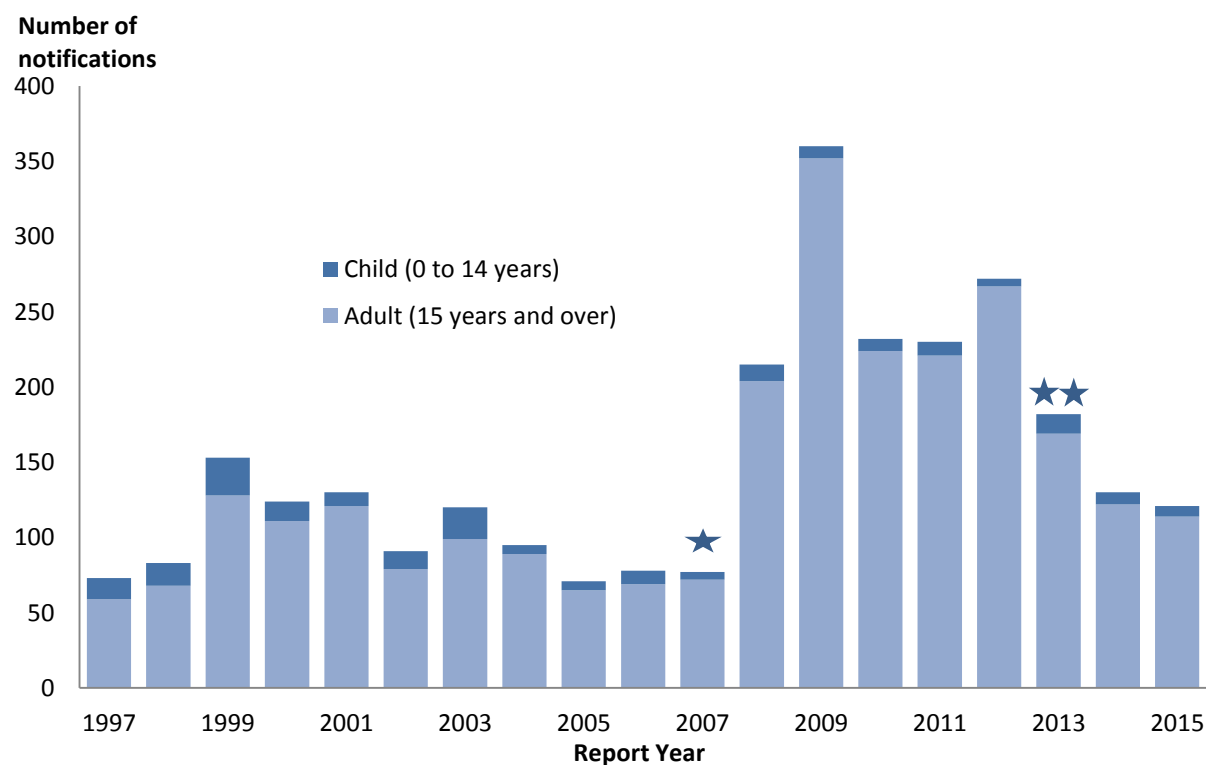
| Reporting source              | Lead       | Hazardous Substances | Agricultural spray-drift | Total      |
|-------------------------------|------------|----------------------|--------------------------|------------|
| ED clinician                  |            | 36                   |                          | 36         |
| General Practitioner          | 47         | 8                    | 2                        | 57         |
| Laboratory                    | 71         | 4                    |                          | 75         |
| Occupational Health clinician | 1          |                      |                          | 1          |
| Other                         | 1          | 6                    |                          | 7          |
| Other hospital clinician      | 1          | 3                    | 1                        | 5          |
| Public Health Unit            |            | 4                    | 1                        | 5          |
| <b>Total</b>                  | <b>121</b> | <b>61</b>            | <b>4</b>                 | <b>186</b> |

## 5. Lead absorption notifications

**There were 121 lead absorption notifications in 2015 compared to 130 notifications in 2014**

There were 121 notifications of lead absorption in 2015 (2.6 per 100,000 population) compared with 130 notifications in 2014 (2.9 per 100,000 population) (Figure 1).

**Figure 1:** Number of lead absorption notifications in children and adults by year, 1997 – 2015



Sources: Institute of Environmental Science and Research (1997-2013) and HSDIRT (2013-2015).

\* In 2007, direct laboratory notification was introduced, the non-occupational notifiable blood lead level was lowered from 0.72 to 0.48µmol/L, and enhanced occupational screening was introduced in the Auckland region.

\*\* In 2013, the HSDIRT became available to all health districts. Exclusion of repeat blood lead level tests taken within a year of the original test from the data unless further investigation resulted may have partly accounted for the decline in notifications.

### Males and adults are the most exposed

In 2015, 84 percent (102/121) of all lead notifications were males, and the most common age groups were 45-64 years (56 notifications), followed by 25-44 years (33 notifications) (Table 3). The most common ethnic group was European/Other with 85 notifications.

**Table 3:** Demographics of lead absorption notifications, 2015

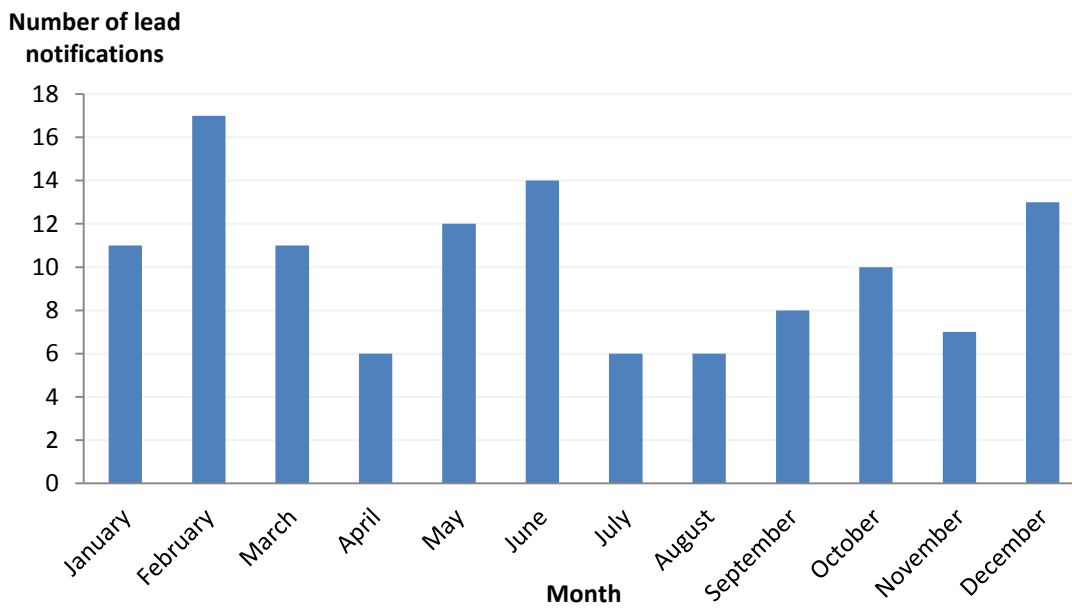
| Age group (years) | Female    | Male       | Unknown  | Total      |
|-------------------|-----------|------------|----------|------------|
| 00-04             | 6         |            |          | 6          |
| 05-14             |           | 1          |          | 1          |
| 15-24             |           | 9          |          | 9          |
| 25-44             | 7         | 26         |          | 33         |
| 45-64             | 3         | 52         | 1        | 56         |
| 65+               | 2         | 14         |          | 16         |
| <b>Ethnicity</b>  |           |            |          |            |
| Māori             | 1         | 4          |          | 5          |
| Pacific           | 1         |            |          | 1          |
| Asian             |           | 4          |          | 4          |
| European/Other    | 12        | 72         | 1        | 85         |
| Unknown           | 4         | 22         |          | 26         |
| <b>Total</b>      | <b>18</b> | <b>102</b> | <b>1</b> | <b>121</b> |

### February had the highest number of lead notifications

February had the highest number of lead notifications (17 notifications) in 2015, followed by 14 notifications in June (Figure 2).



**Figure 2:** Number of lead absorption notifications by month, January –December 2015



Note: Four cases notified in 2015 were not entered into the HSDIRT until 2016. These cases were assigned a new notification date of 31 December 2015 in order to be included in the 2015 analysis. This contributed to the high number of notifications in December.

**Taranaki DHB had the highest rate of lead absorption notifications**

Taranaki District Health Board (DHB) had the highest rate of lead notifications (11.2 per 100,000 population) in 2015, followed by MidCentral DHB (4.1 per 100,000 population) (Table 4). In 2014, Wairarapa DHB had the highest rate of lead notifications (14.0 per 100,000 population) followed by MidCentral DHB (9.4 per 100,000 population) (Table 4).

**Table 4:** Number and crude rate (per 100,000 population) of lead absorption notifications by DHB and year

| DHB                | 2014          |            | 2015          |            |
|--------------------|---------------|------------|---------------|------------|
|                    | Notifications | Rate       | Notifications | Rate       |
| Northland          | 0             |            | 0             |            |
| Waitemata          | 7             | 1.2        | 12            | 2.1        |
| Auckland           | 24            | 5.1        | 18            | 3.7        |
| Counties Manukau   | 8             | 1.6        | 6             | 1.2        |
| Waikato            | 8             | 2.1        | 7             | 1.8        |
| Lakes              | 2             |            | 1             |            |
| Bay of Plenty      | 4             |            | 4             |            |
| Tairāwhiti         | 1             |            | 0             |            |
| Taranaki           | 3             |            | 13            | 11.2       |
| Hawke's Bay        | 2             |            | 1             |            |
| Whanganui          | 3             |            | 3             |            |
| Mid Central        | 16            | 9.4        | 7             | 4.1        |
| Hutt Valley        | 5             | 3.5        | 4             |            |
| Capital and Coast  | 9             | 3.0        | 10            | 3.3        |
| Wairarapa          | 6             | 14.0       | 3             |            |
| Nelson Marlborough | 1             |            | 3             |            |
| West Coast         | 4             |            | 0             |            |
| Canterbury         | 7             | 1.4        | 19            | 3.6        |
| South Canterbury   | 4             |            | 4             |            |
| Southern           | 7             | 2.3        | 4             |            |
| Unknown            | 9             |            | 2             |            |
| <b>Total</b>       | <b>130</b>    | <b>2.9</b> | <b>121</b>    | <b>2.6</b> |

Note:

- i) Mid-year population estimate was used for the denominator
- ii) Crude rates were not calculated for those with counts less than five
- iii) Spatial analysis was based on an individual's residential address.

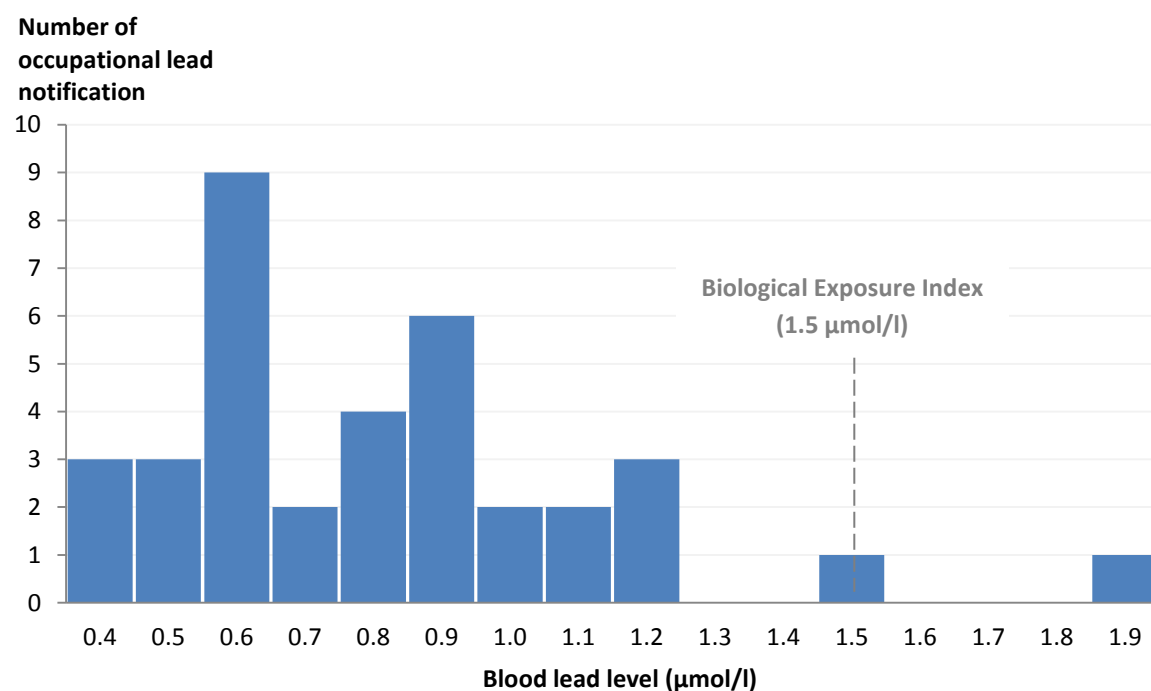
## 5.1 Occupational lead exposure

### There were 37 lead notifications from occupational exposure in 2015

In 2015, there were 37<sup>3</sup> lead absorption notifications (31% of all lead notifications) where occupation was recorded as the source of exposure, compared to 56 notifications in 2014. Two cases were admitted to hospital.

The blood lead levels of occupational relevance are 1.5 µmol/l (the Biological Exposure Index) and 2.4 µmol/l (the suspension level). Two radiator repairers had a blood lead level of ≥1.5 µmol/l. There were no occupationally-related cases reported above the suspension level (2.4 µmol/l). The highest blood lead level recorded for occupational lead cases was 1.98 µmol/l (Figure 3).

**Figure 3:** Number of occupational lead absorption notifications, by blood lead levels, 2015



### Painters were the most exposed to lead

In 2015, painter (16 notifications) was the most commonly reported occupation for occupational lead exposure, followed by radiator repairer (5 notifications) (Table 5). Painter (20 notifications) and metal worker (5 notifications) were the most commonly reported occupations in 2014.

<sup>3</sup> Two cases were recorded as both occupational and non-occupational exposure and one case was recorded as both occupational and unknown exposure. Those three cases were included in both occupational and non-occupational/unknown cases analyses.

**Table 5:** Number of lead absorption notifications by occupation, 2015

| Occupation                      | Notifications |
|---------------------------------|---------------|
| Painter                         | 16            |
| Radiator repairer               | 5             |
| Builder                         | 3             |
| Metal worker                    | 3             |
| Glazier                         | 2             |
| Sandblaster                     | 2             |
| Engineer                        | 1             |
| Port worker                     | 1             |
| Renovator                       | 1             |
| Machinery mechanics and fitters | 1             |
| Cabinet maker                   | 1             |
| Student                         | 1             |
| Unknown                         | 1             |
| <b>Total</b>                    | <b>38*</b>    |

\*Note: More than one occupation can be reported for a single notification. Therefore the sum of notification for each occupation may be higher than the total notifications.

#### Five lead cases were enrolled in a workplace monitoring programme

Of the 37 occupational lead absorption notifications, five notifications were enrolled in a workplace monitoring programme and six notifications were not. This was unknown for the remaining 26 notifications.

#### PHU Action

Of the 37 occupational lead absorption notifications, investigation was recorded as being complete in 18 notifications and underway in two notifications. No further investigation was recorded in 16 notifications. One notification was referred to another agency.

## 5.2 Non-occupational/unknown lead exposure

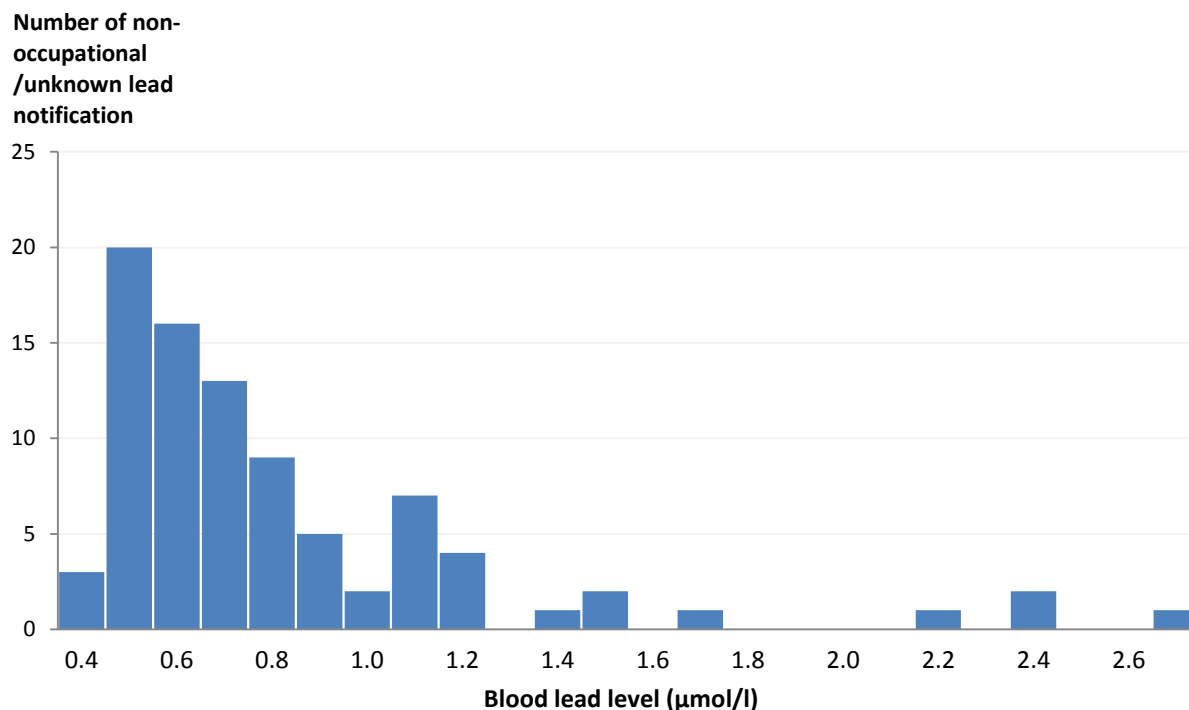
#### Lead notification from non-occupational/unknown exposures slightly increased in 2015

There were 87<sup>4</sup> non-occupational/unknown lead absorption notifications in 2015. These included 43 lead absorption notifications from non-occupational exposures and 44 notifications from unknown lead exposures (Figure 4). This compares to 79 non-occupational/unknown lead absorption notifications in 2014.

<sup>4</sup> Two cases were recorded as both occupational and non-occupational exposure and one case was recorded as both occupational and unknown exposure. Those three cases were included in both occupational and non-occupational/unknown cases analyses.

The blood lead levels ranged from 0.49 to 2.75  $\mu\text{mol/l}$  (Figure 4). The case with the highest blood lead level was exposed to lead-based paint. Five cases were admitted to hospital, including a child under five years old.

**Figure 4:** Number of non-occupational/unknown lead notifications, by blood lead level, 2015



### Six children were reported with lead absorption in 2015

Six children under the age of 15 were reported with lead absorption in 2015 (Table 6), of which one case was admitted to hospital. The blood lead level concentrations ranged from 0.50 to 1.14  $\mu\text{mol/l}$ . In 2014, there were eight notifications for children under 15 years old.

**Table 6:** Blood lead level of notifications for children 0-14 years old, 2015

| Blood lead levels ( $\mu\text{mol/l}$ ) | Age groups |       |
|---|------------|-------|
|   | 00-04      | 05-14 |
| 0.48-0.71                               | 5          |       |
| 0.72-0.95                               |            |       |
| 0.96-2.16                               | 1          |       |
| $\geq 2.17$                             |            |       |
| <b>Total</b>                            | <b>6</b>   |       |

### Lead-based paint was the most common source of lead exposure in children

Five out of the six lead notifications for children less than 15 years old were exposed to lead-based paint at home. Of these five cases, pica (an eating disorder characterised by eating non-food items) was also recorded in two cases.

The source of lead was not reported for the remaining case.

### Lead-based paint and indoor rifle ranges were the most common sources of lead exposure in adults

There were 81 lead absorption notifications for adults (15+ years) in 2015. Lead-based paint (21 notifications) and indoor rifle ranges (20 notifications) were the most common sources of lead exposure (Table 7).

**Table 7:** Sources of lead exposure for adults (15 years and over), 2015

| Non-occupational/unknown lead sources              | Notifications |
|--|---------------|
| Lead-based paint                                   | 21            |
| Indoor rifle range                                 | 20            |
| Bullet/sinker manufacturer                         | 5             |
| Close contact with people who were exposed to lead | 2             |
| Occupation involved lead exposure                  | 2             |
| Traditional medicine or cosmetic                   | 2             |
| Leadlighting                                       | 1             |
| Bullet   | 1             |
| Lead-based solder                                  | 1             |
| Unknown/other                                      | 33            |
| <b>Total</b>                                       | <b>88*</b>    |

\*Note: More than one lead exposure source can be recorded for a single notification. Therefore, the total can add to more than the number of notifications.

### PHU Action

Of the 87 non-occupational/unknown lead absorption notifications, investigation was recorded as being complete in 59 notifications and underway in five notifications. No further investigation was recorded in the remaining 23 notifications.

## 6. Hazardous substances notifications

### Hazardous substances notifications have decreased since 2014

There were 61<sup>5</sup> notifications related to hazardous substances in 2015, compared to 95 in 2014. Over half of the notifications (33 notifications) were from males.

Forty-one percent (25 notifications) of the hazardous substances notifications were from the 25-44 year age group, followed by 26 percent (16 notifications) from the 45-64 year age group. The most common ethnic group was European/Other (38 notifications) (Table 8).

Nearly one third (19 notifications) of hazardous substances notifications were admitted to hospital.

**Table 8:** Demographics of hazardous substances notifications, 2015

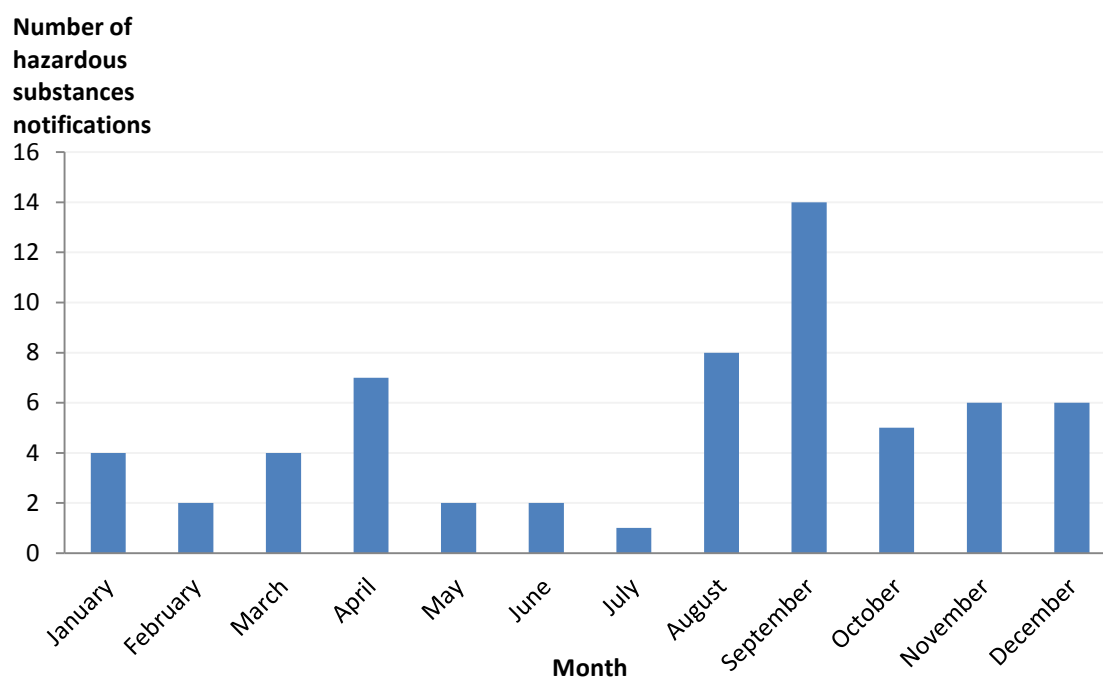
| Age group (years) | Female    | Male      | Unknown  | Total     |
|-------------------|-----------|-----------|----------|-----------|
| 00-04             | 4         | 1         |          | 5         |
| 05-14             | 2         | 2         |          | 4         |
| 15-24             | 4         | 1         |          | 5         |
| 25-44             | 9         | 16        |          | 25        |
| 45-64             | 4         | 11        | 1        | 16        |
| 65+               | 4         | 1         |          | 5         |
| Unknown           |           | 1         |          | 1         |
| <b>Ethnicity</b>  |           |           |          |           |
| Māori             | 4         | 2         |          | 6         |
| Pacific           |           | 4         |          | 4         |
| Asian             |           | 2         |          | 2         |
| European/Other    | 20        | 18        |          | 38        |
| Unknown           | 3         | 7         | 1        | 11        |
| <b>Total</b>      | <b>27</b> | <b>33</b> | <b>1</b> | <b>61</b> |

### September had the highest number of hazardous substances notifications

September (14 notifications) had the highest number of hazardous substances notifications in 2015, followed by August (8 notifications) and April (7 notifications) (Figure 5).

<sup>5</sup> Nineteen notifications have been excluded from this analysis as they were either recorded as 'Not a case' or they were exposed to substances not subject to the HSNO act.

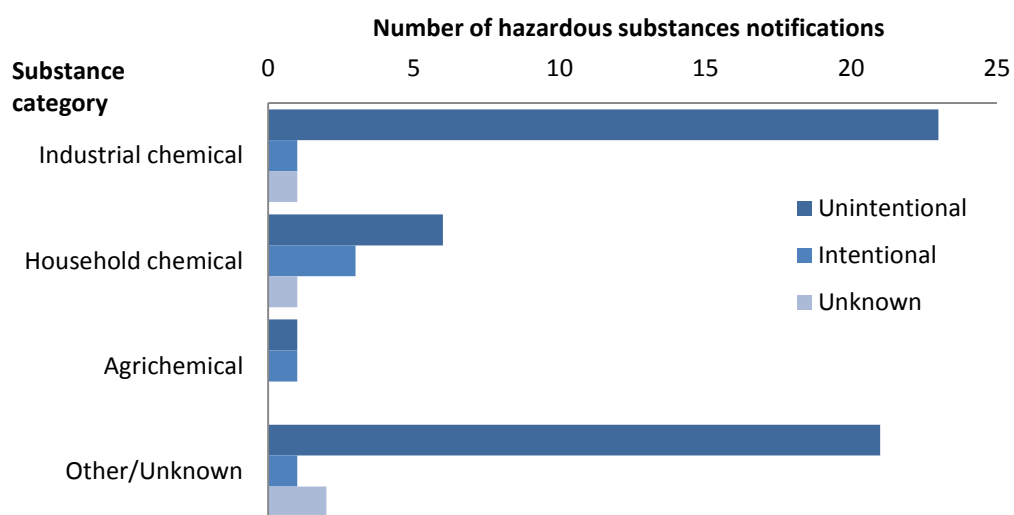
**Figure 5:** Number of hazardous substances notifications, by month, 2015



**Majority of hazardous substances notifications were due to unintentional exposures**

Eighty-four percent (51 notifications) of hazardous substances notifications were from unintentional exposures and the most common substance category was industrial chemical (25 notifications) (Figure 6 and Table 9).

**Figure 6:** Number of hazardous substances notifications, by substance category and intent, 2015





**Table 9:** Hazardous substances notifications, by substance category<sup>6</sup>, 2015

| Substances category        | Substances  | Notifications |
|----------------------------|---|---------------|
| <b>Industrial chemical</b> | tetrafluoroethane refrigerant gas   | 5             |
|                            | unknown white crystalline powder  | 3             |
|                            | ammonia   | 2             |
|                            | hydrofluoric acid   | 2             |
|                            | dichlorvos (flea spray)   | 1             |
|                            | dry powder from fire extinguisher   | 1             |
|                            | anti - freeze   | 1             |
|                            | 3M Neutral Quat disinfectant  | 1             |
|                            | Ultramaxx Multiclean (2-(2-butxyethoxy)ethanol, triphosphoric acid, pentasodium salt, sodium hydroxide, dodecylbenzenesulfonic acid, sodium salt) | 1             |
|                            | C - Tec (Cream cleaner)   | 1             |
|                            | hydrogen cyanide  | 1             |
|                            | liquefied petroleum gas (LPG)   | 1             |
|                            | battery acid  | 1             |
|                            | peracetic acid  | 1             |
|                            | cement  | 1             |
|                            | petrol  | 1             |
|                            | turpentine  | 1             |
| <b>Total</b>               | <b>25</b>   |               |
| <b>Household chemical</b>  | bleach  | 3             |
|                            | Jif   | 2             |
|                            | Dettol  | 1             |
|                            | nail polish remover   | 1             |
|                            | sodium hydroxide (drain cleaner)  | 1             |
|                            | methylated spirits  | 1             |
|                            | hair dye (hydrogen peroxide, ammonium)  | 1             |
|                            | DampRid   | 1             |
| <b>Total</b>               | <b>11</b>   |               |
| <b>Agrichemical</b>        | MossBoss (weedkiller)   | 1             |
|                            | rat poison  | 1             |
|                            | <b>Total</b>  | <b>2</b>      |
| <b>Other</b>               | methamphetamine   | 5             |
|                            | carbon monoxide   | 5             |
|                            | smoke   | 3             |
|                            | nicotine (e – Cigarettes)   | 2             |
|                            | asbestos  | 1             |
|                            | bronze  | 1             |
|                            | propylene glycol (e - Cigarettes)   | 1             |

<sup>6</sup> Obvious errors in assigning substances to a substance category have been corrected.

|                            |              |            |
|----------------------------|--------------|------------|
|                            | sulphur      | 1          |
|                            | amyl nitrite | 1          |
|                            | paint        | 1          |
|                            | sunblock     | 1          |
|                            | <b>Total</b> | <b>22</b>  |
| <b>Unknown</b>             | <b>Total</b> | <b>3</b>   |
| <b>Total notifications</b> |              | <b>63*</b> |

\*Note: more than one hazardous substance can be reported for a single notification, therefore, the sum of hazardous substances can add to more than the number of notifications.

### Household chemicals were the most common cause of injury in the 0-4 year age group

There were five notifications for children under the age of five years in 2015, one of which was exposed to an industrial cleaning product and required hospital admission.

Household chemicals were the most common cause of injury in this age group. These included Jif and DampRid .

### Most hazardous substances injuries occurred in the home

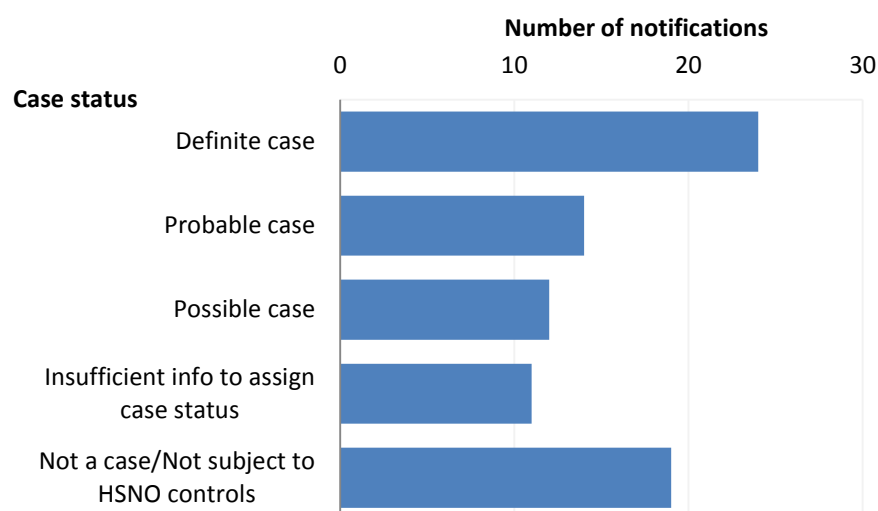
Nearly half (29 notifications) of the hazardous substances notifications occurred at home. Over one third (21 notifications) of the notifications occurred at workplaces. Two notifications were exposed to hazardous substances in public places.

### Case status

Thirty-nine percent (24 notifications) of the notifications were classified as 'definite cases' (Figure 7). Eleven occurred at workplaces, including five cases that were exposed to tetrafluoroethane refrigerant gas and two cases that were exposed to ammonia.

There were 14 'probable cases' and 12 'possible cases' notified. Eleven notifications had insufficient information to assign case status. Notifications were excluded from analysis if they were classified as 'not a case'.

**Figure 7:** Number of hazardous substances notifications, by case status, 2015



#### *PHU Action*

Of the 61 hazardous substances notifications, investigation was recorded as being complete in 13 notifications and underway in three notifications. No further investigation was recorded in 41 notifications. Four notifications were referred to another agency.

## 7. Agrichemical spray-drift notifications

### **There were four agrichemical spray-drift notifications in 2015**

There were four agrichemical spray-drift notifications in 2015 compared to five notifications in the previous year.

Half of the notifications were males and half were females. All notifications were for adults. Agrichemicals included organophosphorus (an insecticide), diazinon (an organophosphate) and hydrogen cyanamide. One notification might have been exposed to an unidentified weed killer but it was inconclusive.

#### **Case status**

Of the four agrichemical spray-drift notifications, one notification was classified as a 'probable case' and one a 'possible case'. There was insufficient information to assign case status for the remaining two notifications.

## PHU Action

Investigation was recorded as being complete in two notifications and no further investigation in one notification. The remaining notification was referred to another agency.

## Contact people

If you have questions regarding this report or suggestions on how our data presentation can be improved please contact the following members of the Environmental Health Indicators Programme:

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