CENTRE FOR PUBLIC HEALTH RESEARCH

Annual Hazardous Substances Injury Report 2015

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MASSEY UNIVERSITY
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cphr | hsss Hazardous Substances Surveillance System

Author

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Executive Summary

The report presents data from the Hazardous Substances Surveillance System (HSSS), initiated in 2010 by the Centre for Public Health Research (CPHR) on the health effects of exposure to hazardous substances.

Deaths and injuries continue to occur from hazardous substance exposures that appear to be entirely preventable. A high proportion of these incidents is caused by hazardous substances used in everyday domestic and workplace situations.

Following is a summary of key findings on the health effects of hazardous substances.

Key Findings

- There were 46 hazardous substances-related deaths registered in 2012 compared to 43 deaths in 2011.
- There were no deaths of children less than five years old from 2006 to 2012 due to hazardous substances exposure.
- Toxic effects of carbon monoxide contributed to 324 deaths between 2006 and 2012, of which 308 were intentional exposures or suicides. Death from carbon monoxide exposure was most common in the 25-44 and 45-64 year age groups.
- On average, 15 deaths are referred to the coroner every year from exposure to a hazardous substance.
- There were 676 hazardous substances-related hospital discharges in 2014 compared to 624 in 2013.
- Children under five years old had the highest rates of hospital discharges in New Zealand. Over 300 of these child injuries were from solvents, hydrocarbons and corrosive substances and 143 from pesticide.
- Māori have higher hospital discharge rates from hazardous substances injuries than non-Māori.
- From 2006-2014, 3341 of all hazardous substances-related hospital discharges were from injuries that occurred in the home.
- Hospital discharges increased with socio-economic deprivation. This relationship was more apparent in the 0-4 year age group.
- There were 130 lead absorption notifications and 99 hazardous substances notifications in 2014.
- Lead-based paint was the common source of non-occupational lead exposure for both children and adults.
- There were eight lead notifications and 10 hazardous substances notifications involving children under the age of 15 years in 2014.
- The New Zealand Fire Service attends over 1000 hazardous substances incidents each year. Methane, ammonia, and chlorine were the most common substances involved in the more serious (level 2 and 3) incidents.
- Over half (5712 calls) of the hazardous substances-related calls to the National Poison Centre in 2014 involved children less than five years of age.
- Calls regarding household agents, and more specifically household cleaners (966 calls) and detergents (610 calls), were most frequent among children. Of all agricultural agents, molluscicides or snail baits (84 calls) were the most common product among children.

Introduction

The Hazardous Substances Surveillance System (HSSS)

The HSSS was established in 2010 by the Centre for Public Health Research (CPHR), Massey University Wellington with funding from the Ministry of Health. The HSSS was developed to meet a legal requirement[1] for medical practitioners to notify injury caused by hazardous substances to a Medical Officer of Health. A separate legislation requires medical practitioners to notify elevated blood lead levels, and cases of poisoning arising from chemical contamination of the environment[2]. Although there is no legal requirement to report deaths, the HSSS includes deaths as they are the most severe form of hazardous substances injury.

The HSSS has four goals:

- To describe the distribution and characteristics of exposure to hazardous substances.
- To describe the morbidity and mortality experienced by workers and the general public (including children) as a result of exposure to hazardous substances.
- To provide high-quality information on outcomes, exposures, and hazards for monitoring, policy development, measuring compliance and control.
- To identify strategies that might reduce future morbidity and mortality resulting from exposure to hazardous substances.

Degrees of injury severity

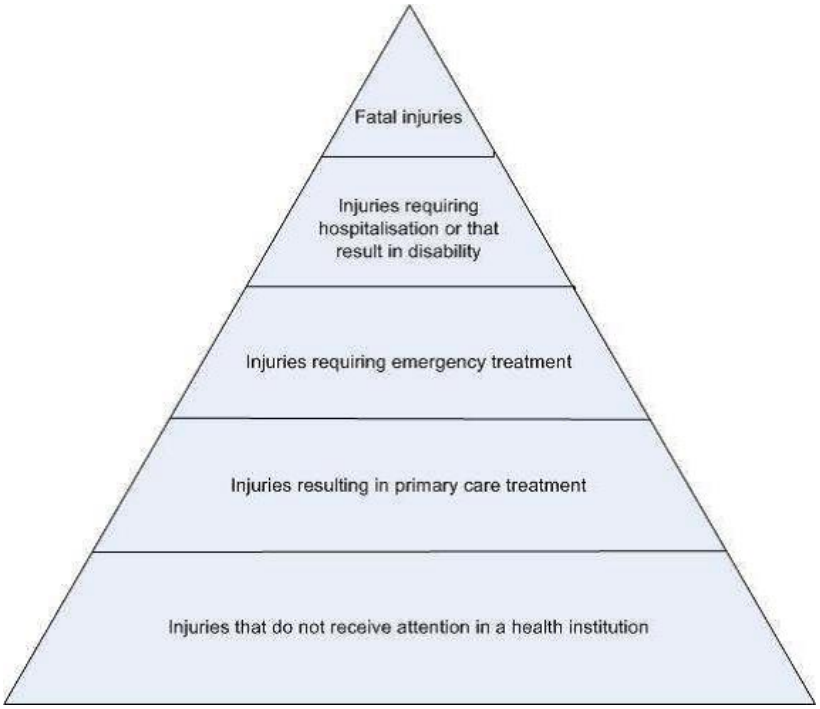
The HSSS monitors data from several different sources (including the latest addition of primary care notifications and hazardous substance incident reports) which capture hazardous substances injuries of different severity. These include:

- mortality data
- coroners' reports
- hospital discharges
- primary care notifications
- hazardous substance incident reports
- National Poison Centre calls.

To obtain a robust and meaningful data on the incidence and prevalence of hazardous substance injuries and deaths, data capture has to be extended to all five levels of the 'injury pyramid' (Figure 1). The injury pyramid reflects the relationship between injury severity and the number of injuries that occur. Deaths are the most severe form of hazardous substances injury. They are fewer in number, but more easily ascertained. Conversely, the bottom of the pyramid represents injuries that do not require formal medical care. However, this is where the greatest number of injuries occur. Reviewing data from different levels of injury severity (mortality data, through to National Poisons Centre call logs) enables a more complete surveillance of hazardous substances injuries and deaths, and ultimately helps to prevent future disease and injury.

[1] Hazardous Substances and New Organisms Act 1996, s 143.
[2] Health Act 1956, Schedule 2.

Figure 1: Injury Pyramid



Source: Adapted from (Espitia-Hardeman and Paulozzi, 2005)

What's in this report?

The report provides evidence for agencies (eg, government departments) involved in policy development and decision-making about hazardous substances, and provides information for researchers, health practitioners, regional and community organisations, and the wider public.

It presents findings on hazardous substances-related injuries from the following data sources:

- National Mortality Collection
- National Coronial Information System (NCIS)
- National Minimum Dataset (NMDS)
- Hazardous Substances Disease and Injury Reporting Tool (HSIDRT)
- New Zealand Fire Service
- National Poisons Centre (NPC).

Results are presented to answer three guiding questions from each source.

- What is the current level of injury from hazardous substances in the population?
- How has it changed?
- Who are more at risk from diseases and injuries from hazardous substances?

This report contains key statistical information through graphs and tables, with short comments about the noteworthy results. Trends over time are presented where possible.

Definitions

What is a hazardous substance?

The Hazardous Substances and New Organisms Act 1996 (HSNO Act) regulates all substances that are classified as hazardous in New Zealand. In HSNO terms, a substance is considered hazardous if it triggers any one of the threshold levels for any of the following properties:

- explosiveness
- flammability
- oxidising capacity
- corrosiveness
- toxicity
- ecotoxicity.

Hazardous substances can, however, have more than one hazardous property such as methylated spirits and petrol which are both toxic and flammable. A substance is also considered hazardous if it generates a substance with any or more of these hazardous properties when it comes into contact with air or water.

The report therefore only includes injuries by hazardous substances as defined in the HSNO Act. It excludes poisonings from medicines in fixed dose form, alcohol, drugs, and cases where the substance was carbon monoxide and the source was not from the combustion of gas from a cylinder.

The HSNO Act was designed to protect people from the everyday use of hazardous substances, therefore, does not manage suicide. However, intentional harm has been included in this report as it is an important cause of deaths from hazardous substances in New Zealand.

Data sources

Numerators

Details on the data obtained, their sources and time periods are presented in Table 1.

Table 1: Sources of data

Source	Data	Period
Ministry of Health	Mortality	2006-2012
	National Minimum Dataset (hospital discharges)	2006-2014
New Zealand National Coronial Information System	Coroners' findings	2007-2013
Hazardous Substances Disease and Injury Reporting Tool	Primary Care notifications	2013-2014
New Zealand Fire Service	Hazardous substances incidents	2009-2014
National Poison Centre	Hazardous substances calls	2009-2014
Statistics New Zealand	Population census	2006-2013
	Population estimates	2006-2014

National Minimum Dataset (NMDS)

A 'hospital discharge' includes a person that has been admitted to hospital and later discharged. However, this does not include those who have been discharged home directly from the emergency department.

It is important to note that hospital events recorded in the NMDS represent individual events rather than individual people. The number of events will be higher than the number of people because one person can contribute numerous unique hospital events to the dataset.

Readmissions have been excluded from the data set. In this report, a 'readmission' is defined as the unintended acute readmission of a patient from any injury within 30 days of discharge. Patients dying in hospital are also included.

Further information on the NMDS and the National Mortality Collection can be found in Appendix 1.

Causes of injury were assigned using the external-cause and nature-of-injury codes. External causes reflect the mechanism of the injury. The nature of injury reflects the clinical diagnosis. A full list of external-cause (E code) and diagnosis/nature-of-injury codes is provided in Appendix 2.

Statistical Notes

Age-specific and age-standardised rates

Data is presented primarily as numbers and rates. All age-standardised rates account for differences in population structure, and can be used to compare groups with different age structures (e.g., males and females, or Māori and non-Māori) and data from different years. Age-gender-specific rates are calculated to measure the frequency of hazardous substances-related deaths, hospital discharges, or notifications for specific groups.

In this report, age-standardised rates are standardised to the WHO world standard population. Rates are presented per 100,000 population (Ahmad et al, 2001).

Denominators

Mid-year population estimates for each year from 2006-2014 served as denominators for mortality, hospitalisation, and primary care notification rates. Denominators for the non-Māori rates were constructed by subtracting the Māori population estimates from the total New Zealand population estimates for each year. Population estimates were not available by District Health Board for the year 2014 and so the 2013 census population served as the denominator for this analysis.

Area deprivation

The NZDep2006 index of small area deprivation was used to examine patterns by socioeconomic status. It ranks small areas from the least deprived (decile 1) to the most deprived (decile 10). Deprivation quintiles are used in this report. Each NZDep quintile contains about 20 percent of small areas in New Zealand. Quintile 1 represents people living in the least deprived 20 percent of small areas. Quintile 5 represents people living in the most deprived 20 percent of small areas.

National Mortality Collection (2006-2012)

This section provides key findings on hazardous substances deaths from the National Mortality Collection, which is maintained by the Ministry of Health. The delay in finalising the mortality data is due primarily to the release of the coroners' reports once an investigation has been completed.

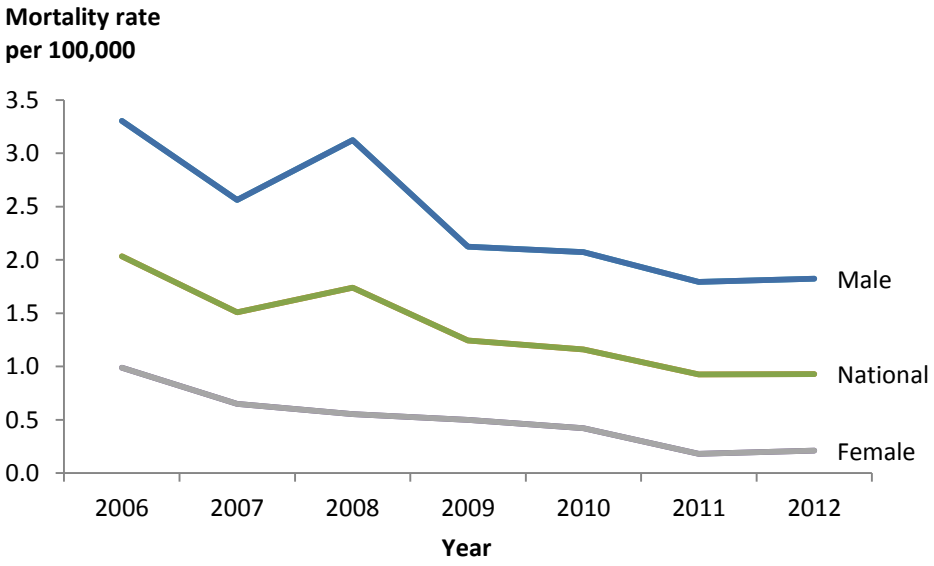
Key findings

- There were 46 hazardous substances-related deaths registered in 2012. These have decreased since 2006.
- Males continue to have higher rates of mortality than women from hazardous substances.
- Intentional exposure to hazardous substances accounted for 355 deaths between 2006 and 2012.
- From 2006-2012, there were no hazardous substances-related deaths of children less than five years old.
- Toxic effects of carbon monoxide contributed to 324 deaths between 2006 and 2012.

Deaths from hazardous substances are decreasing

There were 46 hazardous substances-related deaths registered in 2012. This represents a 49 percent decrease in the number of hazardous substances deaths since 2006 (91 deaths). Figure 2 shows a downward trend in the national mortality rate.

Figure 2: Age-standardised rate per 100,000 of hazardous substances deaths by gender, 2006-2012



Source: National Mortality Collection

Deaths from hazardous substances are more common in males than females

Between 2006 and 2012, male mortality rates from a hazardous substance were more than three times the female rates (Figure 2). These results are similar to those previously found (Peiris-John, Kool et al. 2014). While the rate for males has steadily declined over time, there were some fluctuations between 2006 and 2009.The

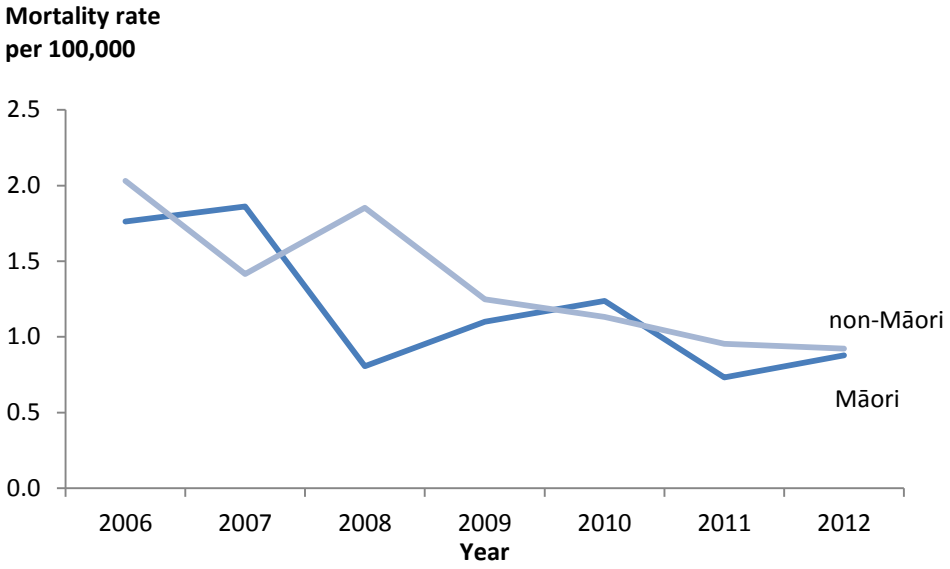
number of females who died from a hazardous substance has declined over time, with only five deaths reported in both 2011 and 2012, the lowest since 2006.

No clear ethnic difference in deaths from hazardous substances

In 2012, the rate of hazardous substances deaths for both Māori and non-Māori was the same (0.9 per 100,000); however this has varied over the last seven-year period (Figure 3). The Māori population experienced its lowest rate (0.7 per 100,000) in 2011.

Overall, there were no clear ethnic differences in deaths from hazardous substances.

Figure 3: Age-standardised rate per 100,000 of hazardous substances deaths by ethnicity, 2006-2012

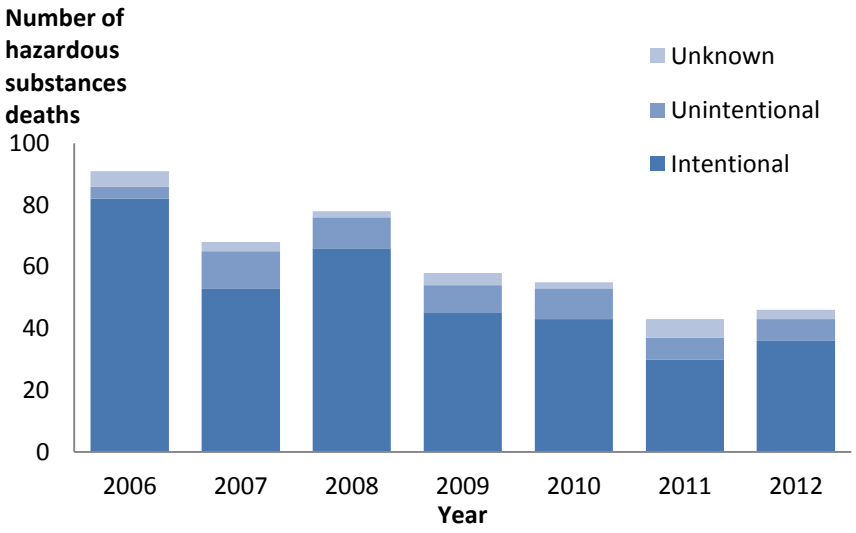


Source: National Mortality Collection

Intentional exposure accounts for 80 percent of hazardous substances deaths

Between 2006 and 2012, there were 439 deaths from hazardous substances, of which 80 percent (355 deaths) were attributed to intentional exposure, 13 percent (59 deaths) were unintentional, and for six percent (25 deaths), the intent was unknown (Figure 4).

Figure 4: Number of hazardous substances-related deaths by intent, 2006-2012



Source: National Mortality Collection

There were no hazardous substances deaths of children less than five years old

From 2006 to 2012, there were no reported hazardous substances deaths of children less than five years old (Table 2). The youngest victim was a nine-year-old who died from being exposed to petroleum products. The 25-44 and 45-64-year age group both contributed to 34 percent of all hazardous substances deaths.

There were eight deaths in the 5-14 year age group, of which five were due to inhaling butane and two were petrol-related. The remaining child suffered burns from an explosion. Six out of the eight deaths from this age group were also from the most deprived areas (NZDep06 Quintile 5).

Table 2: Number of deaths from hazardous substances, by age group and cause of death, 2006-2012

Cause of death	Age Groups (years)					
	05-14	15-24	25-44	45-64	65+	Total
Organic solvents and halogenated hydrocarbons and their vapours	2	5	7	3	0	17
Pesticides	0	2	0	8	6	16
Explosion of other materials	1	1	1	4	1	8
Exposure to ignition of highly flammable material	0	1	0	1	3	5
Explosion and rupture of gas cylinder	0	1	0	3	0	4
Explosion and rupture of other specified pressurized devices	0	0	1	0	0	1
Explosion and rupture of pressurized tyre, pipe or hose	0	0	0	0	1	1
Other and unspecified chemicals and noxious substances	0	1	7	3	3	14
Other gases and vapours	5	59	132	128	49	373
Total	8	70	148	150	63	439

Source: National Mortality Collection

Toxic effects of carbon monoxide contributed to the majority of deaths

Toxic effects of carbon monoxide contributed to 324 deaths between 2006 and 2012, of which 308 deaths were intentional exposures or suicides. Death from carbon monoxide exposure was most common in the 25-44 and 45-64 year age groups. According to WorkSafe NZ (2010), common sources of carbon monoxide include running a vehicle in a confined space such as a garage, unflued gas heaters, burning fuel in a confined space, gas stoves not working properly, or broken or blocked chimneys.

Coronial data (2007-2013)

This section summarises key findings on hazardous substances deaths from the National Coronial Information System. The NCIS is a data repository for mortality data from all Australian and New Zealand coroners. It includes all deaths reported to a coroner since July 2007. All deaths that result from acute hazardous substances injury are deemed to be suspicious; therefore, a coroner's inquest should be completed. New Zealand case information is only available on the NCIS once the coroner has completed the investigation.

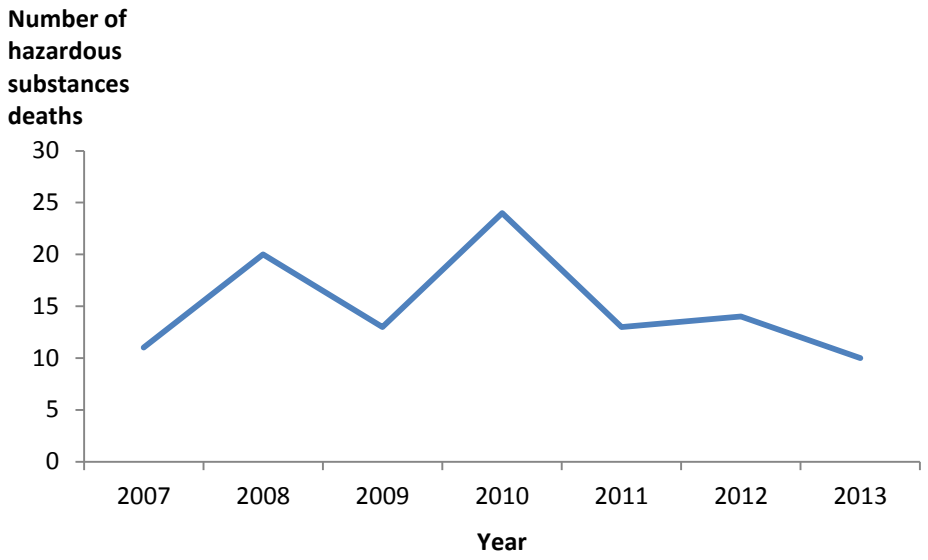
Key findings

- On average, 15 deaths are referred to the coroner due to hazardous substances exposure every year.
- Males outnumber females in unintentional and intentional causes of death from hazardous substances.
- There were no deaths from hazardous substances that were reported to the coroner of children less than five years old between 2007 and 2013.
- Toxic gases (e.g. liquid petroleum gas (LPG), butane, propane, methane) were the most common substances causing death, especially in the 15-24 year age group.

Approximately 15 deaths from hazardous substances are referred to the coroner each year

There were 105 hazardous substances deaths referred to the coroner from 2007 to 2013, which equates to 15 deaths per year on average (Figure 5). There were 10 deaths reported to the coroner in 2013, compared to 14 deaths the previous year.

Figure 5: Number of hazardous deaths reported to the coroner, 2007-2013



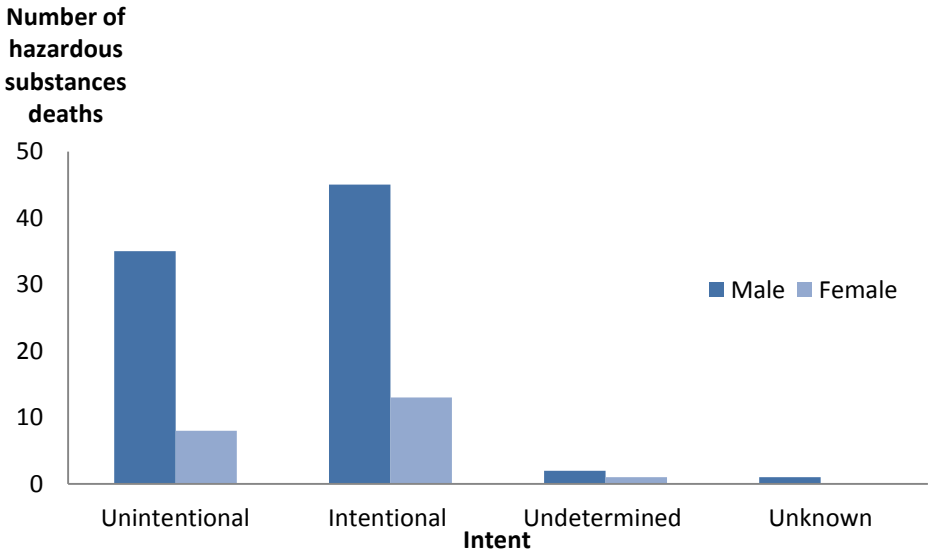
Source: National Coronial Information System

Males have more deaths from hazardous substances exposure than females

From 2007 to 2013, the majority of hazardous substances deaths were males (83 deaths) (Figure 6). Intent was recorded according to the judgement of the coroner, and during that time, more than half (58 deaths) were

intentional and 43 deaths were unintentional exposures. Males continue to outnumber females in both intentional and unintentional cause of deaths.

Figure 6: Hazardous substances deaths by intent and gender, 2007-2013



Source: National Coronial Information System

Toxic gases are the leading causes of unintentional exposure among 15-24-year-olds

Toxic gases such as LPG, methane, propane, and butane were the most common substances causing death, with the 15-24 year age group the most affected (Table 3). This has a similar trend to that reported in the previous two years.

Table 3: Hazardous substances deaths by substance group and age group, 2007-2013

Substance causing injury	Age group (years)					
	5-14	15-24	25-44	45-64	65+	Total
LPG Gas, Natural Gas, Methane Gas, Propane Gas, Butane Gas	4	17	2	1	1	25
Other Sources of Carbon Monoxide		1	8	9	2	20
Petrol, Diesel, Gasoline	1	4	3			8
Weed Killer, Herbicide				5	3	8
Ethylene Glycol, Antifreeze		1	3	2		6
Cyanide			4	1	1	6
Other Specified Non-Pharmaceutical Chemical Substance			4	1		5
Explosive			1	1		2
Other Specified Pesticide Herbicide		1		1		2
Hydrogen Sulphide					2	2
Methylated Spirits		1		1		2
Paraquat			1	1		2
Other Insecticide		1			1	2
Helium Gas			2			2
Drain Cleaners					1	1

Barbeque, Weber Grill, Outdoor Cookers/Griller, Outdoor Clay Oven			1			1
Sodium Hydroxide, Caustic Soda				1		1
Organophosphate NEC					1	1
Pet (Veterinary) Product		1				1
Other Specified Object/Substance				1		1
Plant Food or Fertiliser, Plant Hormones				1		1
Lubricating Oils, Motor Oil		1				1
Toluene			1			1
Paint, Varnish, Stain			1			1
Unspecified Fuel or Solvent			1			1
Alcohol, Methanol NEC		1				1
Other Specified Fuel or Solvent			1			1
Total	5	29	33	26	12	105

Source: National Coronial Information System

National Minimum Dataset (2006-2014)

The following section presents key findings on publicly funded hospital discharges involving hazardous substances injuries. This is derived from the National Minimum Dataset (NMDS) which is maintained by the Ministry of Health.

Key findings

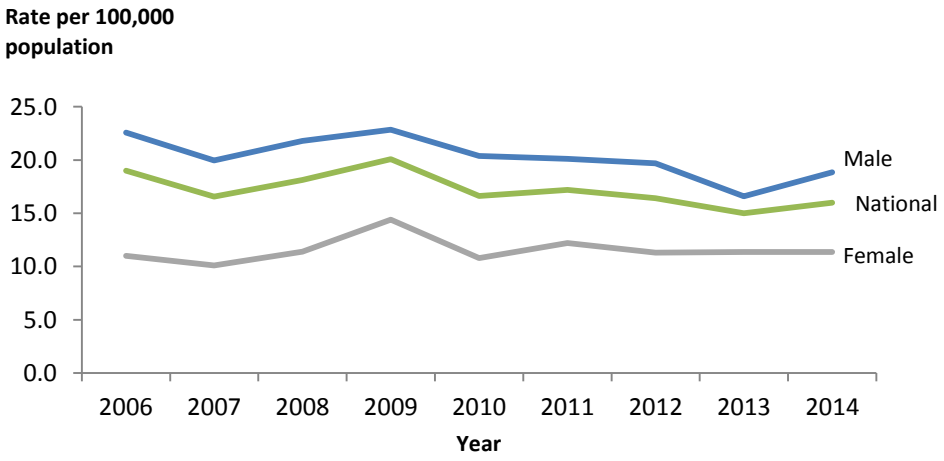
- There were 676 hazardous substances-related hospital discharges in 2014.
- On average, there are approximately 700 hospital discharges from exposure to hazardous substances every year.
- Each year more males are hospitalised from exposure to hazardous substances than females.
- Māori have higher hospital discharge rates from hazardous substances than non-Māori.
- Children under five years old had the highest rates of hospital discharges from hazardous substances exposure in New Zealand between 2006 to 2014.
- The most common cause of hazardous substances injury for children under the age of five years was solvents, hydrocarbons and corrosive substances.
- From 2006 to 2014, over half (3341) of all hazardous substances injuries occurred in the home.
- Hospital discharges due to hazardous substances exposure increased with socio-economic deprivation.

There were 676 hazardous substances-related hospital discharges in 2014

In 2014, there were 676 hazardous substances-related hospital discharges. During the nine-year period reviewed (2006 to 2014), there were 6336 hospital discharges attributed to hazardous substances exposure, an average of 704 per year.

Each year males had higher hospital discharge rates compared to females (Figure 7). While hospital discharges can be regarded as an indicator of severity, it is a major undercount of exposure to hazardous substances as not all diseases and injuries will require hospitalisation.

Figure 7: Age-standardised rate per 100,000 population of hospital discharges from hazardous substances by gender, 2006-2014



Source: National Minimum Dataset

Males outnumber females in hospital discharges for unintentional exposures to hazardous substances

Males continue to outnumber females in hospital discharges for unintentional injury (Table 4). However, males and females had similar rates of discharges for intentional exposure which have not changed markedly since 2006. The rate of undetermined exposure discharges among males has decreased from 10.7 per 100,000 in 2006 to 5.4 per 100,000 in 2014.

Table 4: Hospital discharges from hazardous substances, numbers and gender-specific rates per 100,000, 2006-2014

Year	Intentional exposure				Unintentional exposure				Undetermined				Total			
	Number		Rates		Number		Rates		Number		Rates		Number		Rates	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2006	63	88	3.1	4.1	203	126	9.9	5.9	220	39	10.7	1.8	486	253	23.7	11.8
2007	65	70	3.1	3.2	193	100	9.3	4.6	196	35	9.5	1.6	454	205	22.0	9.5
2008	63	87	3.0	4.0	245	115	11.8	5.3	186	33	8.9	1.5	494	235	23.7	10.8
2009	66	88	3.1	4.0	302	152	14.3	6.9	158	52	7.5	2.4	526	292	25.0	13.3
2010	78	81	3.7	3.6	239	106	11.2	4.8	141	43	6.6	1.9	458	230	21.5	10.3
2011	73	80	3.4	3.6	224	146	10.4	6.5	163	31	7.6	1.4	460	257	21.5	11.5
2012	70	92	3.2	4.1	232	117	10.8	5.2	148	27	6.9	1.2	450	236	20.9	10.5
2013	66	83	3.0	3.7	213	111	9.8	4.9	113	38	5.2	1.7	392	232	18.0	10.2
2014	85	111	3.8	4.8	238	91	10.8	4.0	120	31	5.4	1.3	443	233	20.0	10.1

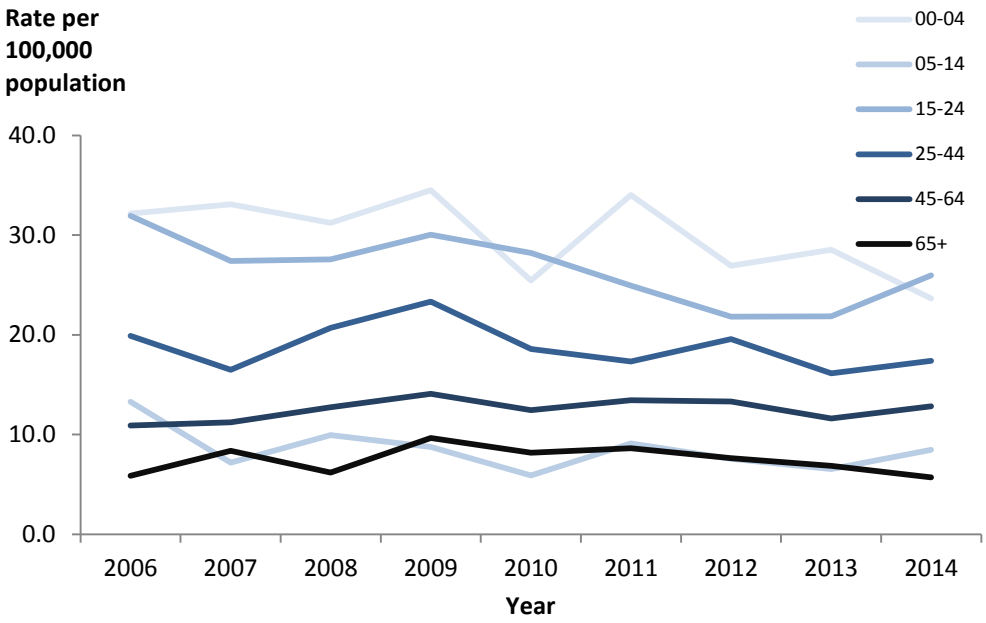
Source: National Minimum Dataset

Young children have the highest rates of hospital discharge from hazardous substances exposure

Marked differences are evident in age-specific hazardous substances-related discharge rates (Figure 8). Compared to all other age groups, children under five years old continue to have higher discharge rates from hazardous substances. In 2010 and 2014 however, rates were highest in the youth age group (15-24 years).

The 5-14 and 65+ year age groups had the lowest rates of hospital discharges over this nine-year period.

Figure 8: Age-specific rates per 100,000 population of hospital discharges from hazardous substance injuries, by age, 2006-2014

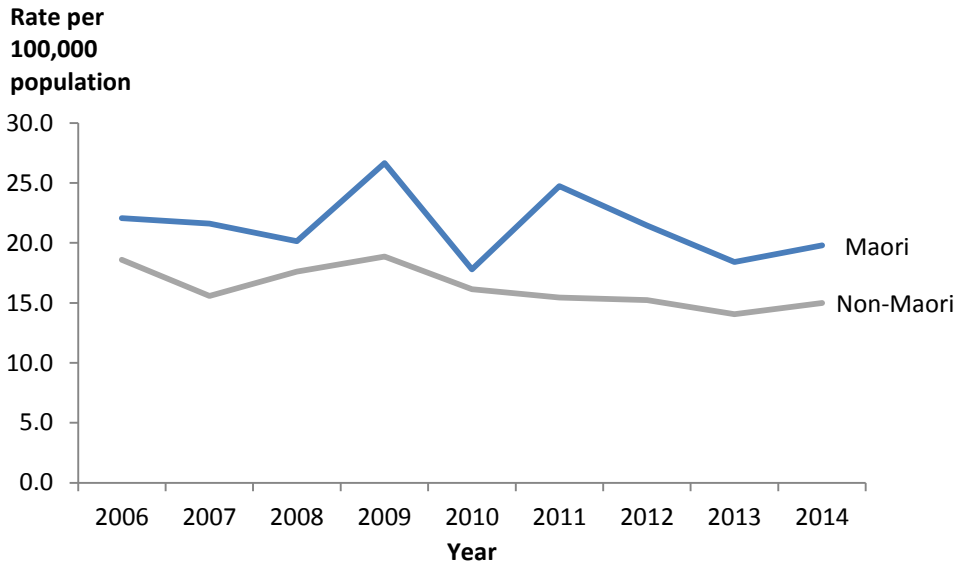


Source: National Minimum Dataset

Māori have higher hospital discharge rates from hazardous substances exposure compared to non-Māori

During the period 2006-2014, Māori hospital discharge rates from hazardous substances were higher than non-Māori (Figure 9). Hospital discharge rates for Māori fluctuated between 2008 and 2011 while the rate for non-Māori has held steady over this period.

Figure 9: Age-standardised rate per 100,000 population of hospital discharges for hazardous substances by ethnicity, 2006-2014



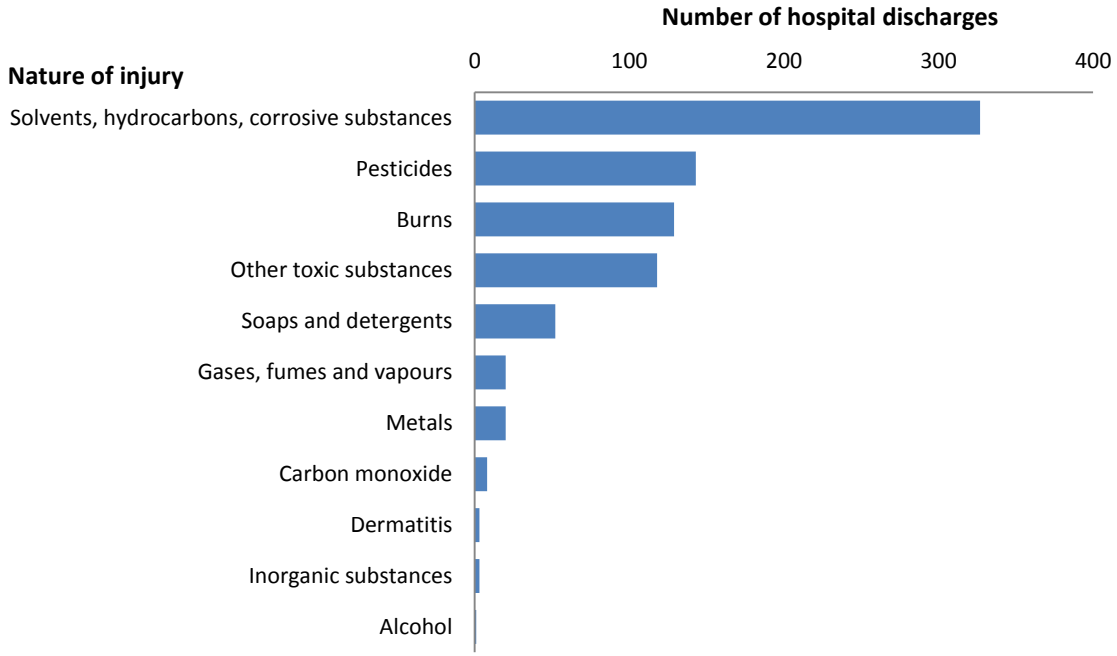
Source: National Minimum Dataset

In 2014, age-specific rates of hospital discharges among Māori children 0-4 years old was slightly higher (26.4 per 100,000) than non-Māori children (22.6 per 100,000). In the previous year, the hospital discharge rate for Māori children (44.0 per 100,000) was double the rate for non-Māori children (22.8 per 100,000).

Solvents, hydrocarbons and corrosive substances is the most common diagnostic group among 0-4-year-olds

Of the 824 hospital discharges among children 0-4 years old between 2006 and 2014, 327 were due to solvents, hydrocarbons and corrosive substance exposure and 143 from exposure to pesticide (Figure 10). In contrast, burns from hazardous substances were the most common injury across all other age groups followed by injuries from solvents, hydrocarbons and corrosive substances.

Figure 10: Hospital discharges from hazardous substances in children 0-4 years old, by diagnostic group, 2006-2014

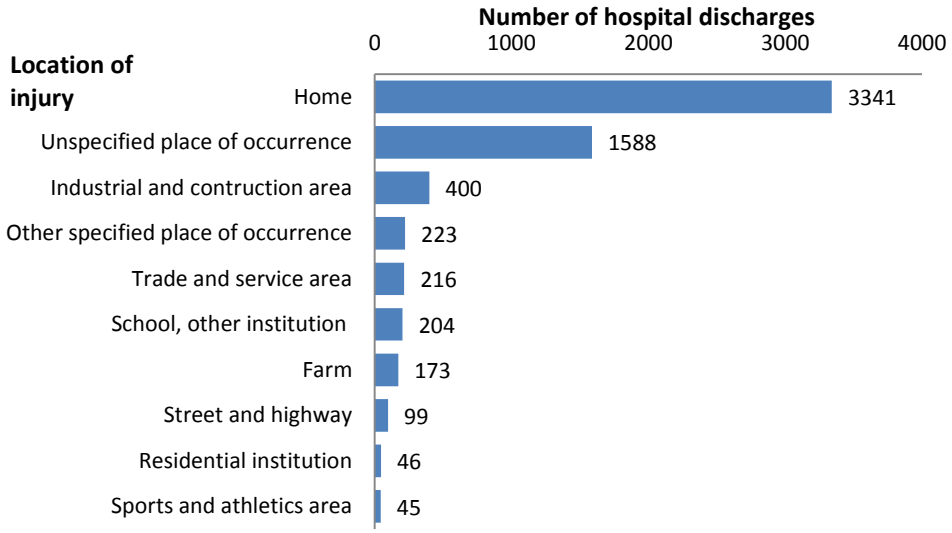


Source: National Minimum Dataset

Most hazardous substances injuries occurred in the home

Between 2006 and 2014, 3341 of all hazardous substances-related hospital discharges were from injuries that occurred in the home environment (Figure 11). Other injuries occurred in 'Unspecified places' (1588), and in the Industrial and construction area (400).

Figure 11: Hospital discharges from hazardous substances exposure, by injury location, 2006-2014



Source: National Minimum Dataset

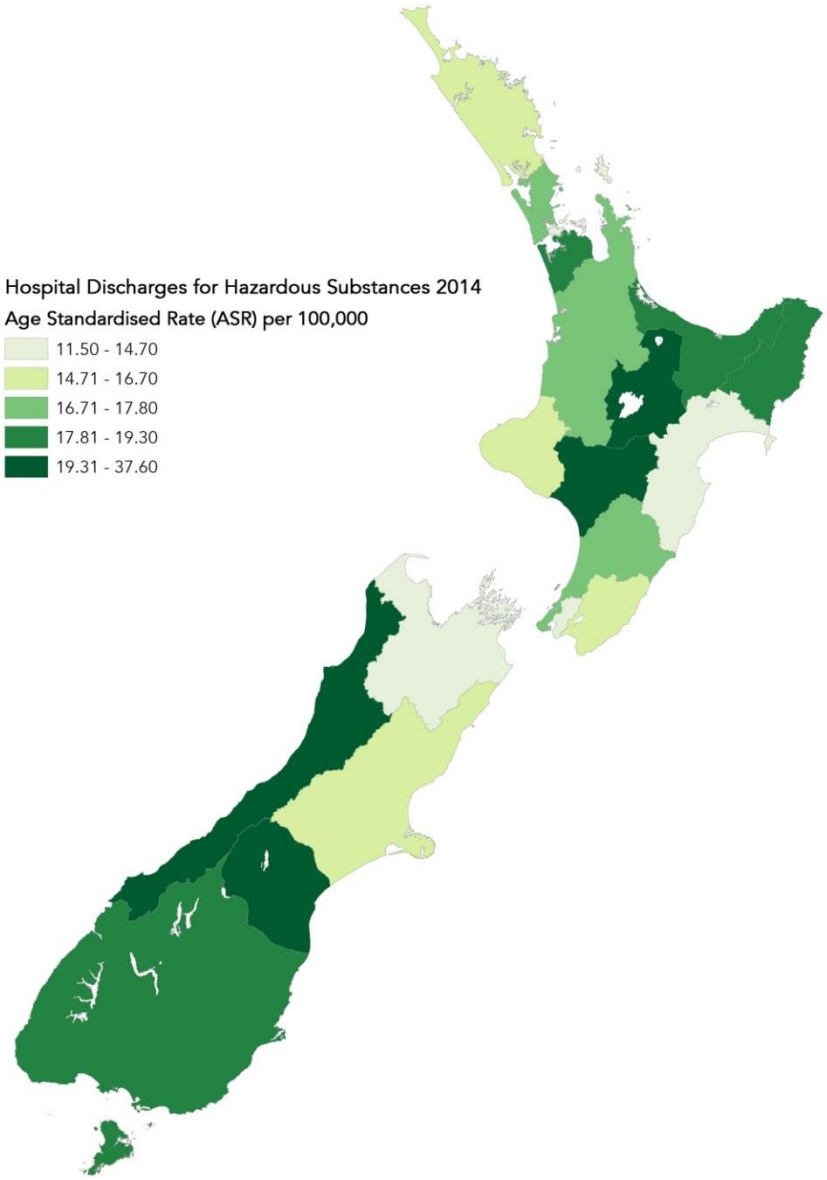
Eighty-one percent (670/824) of all hazardous substances injuries in children less than five years old occurred at home. Children are great explorers, and preschool children spend much of their time exploring at home. This can lead to children unintentionally being exposed to a number of hazardous substances.

West Coast had the highest rates of hospital discharges

In 2014, West Coast (37.6 per 100,000) District Health Board (DHB) had the highest rate of hospital discharge for hazardous substances injuries (Figure 12). Nelson Marlborough DHB had the lowest rate of hospital discharges (11.5 per 100,000). There was a similar pattern in 2013.

Overall, 15 out of 20 DHBs had higher hospital discharge rates than the national rate (16.0 per 100,000) for 2014.

Figure 12: Age-standardised rates per 100,000 population of hospital discharges from hazardous substances by DHB, 2014



Source: National Minimum Dataset

Hospital discharges due to hazardous substances exposure increased with socio-economic deprivation

Between 2006 and 2014, the number of hospital discharges increased with socio-economic deprivation (Table 5). Hospital discharge was highest among those who resided in the deprivation quintile 4 and 5, and lowest in quintile 1.

The relationship between deprivation level and hazardous substances injuries is more apparent in the 0-4 year age group. It was at least three times the number of hospital discharges in deprivation quintile 5 compared with quintile 1.

The same trend was less evident in older age groups aged 45-64 years and 65+ years.

Table 5: Number of hospital discharges from hazardous substances exposure, by deprivation quintile and age group, 2006-2014

NZDep06 (quintile)	Age group						
	00-04	05-14	15-24	25-44	45-64	65+	Total
1 (least deprived)	83	59	173	222	170	71	778
2	121	64	203	278	189	64	919
3	138	83	284	369	241	81	1196
4	210	126	355	448	300	82	1521
5 (most deprived)	269	124	451	639	313	80	1876

Note: There were 46 hospital discharges unable to be assigned a deprivation score.

Source: National Minimum Dataset

Primary Care notifications (2013-2014)

The Hazardous Substances Disease and Injury Reporting tool (HSDIRT) is an electronic form that simplifies notification of hazardous substances injuries, from primary health care to Medical Officers of Health. It was developed by the CPHR in conjunction with bestpractice Decision Support (BPAC), and funded by the Ministry of Health. The HSDIRT has been designed to allow notification of:

- lead absorption ≥0.48µmol/l
- injuries and diseases due to hazardous substances
- poisoning arising from chemical contamination of the environment.

Key findings

- There were 130 lead absorption notifications in 2014 compared to 180 notifications in 2013.
- There were eight lead notifications for children under the age of 15 years in 2014.
- Wairarapa DHB had the highest rate of lead absorption notifications in 2014.
- Among those reporting an occupational exposure, the most common occupations were painter/decorator, scrap metal worker, and mechanic.
- Lead-based paint was the most common source of non-occupational lead exposure for both children and adults.
- There were 99 hazardous substances notifications in 2014, of which 77 percent (76 notifications) were unintentional exposures.
- The most common substance categories were industrial (34%) and household chemicals (25%).

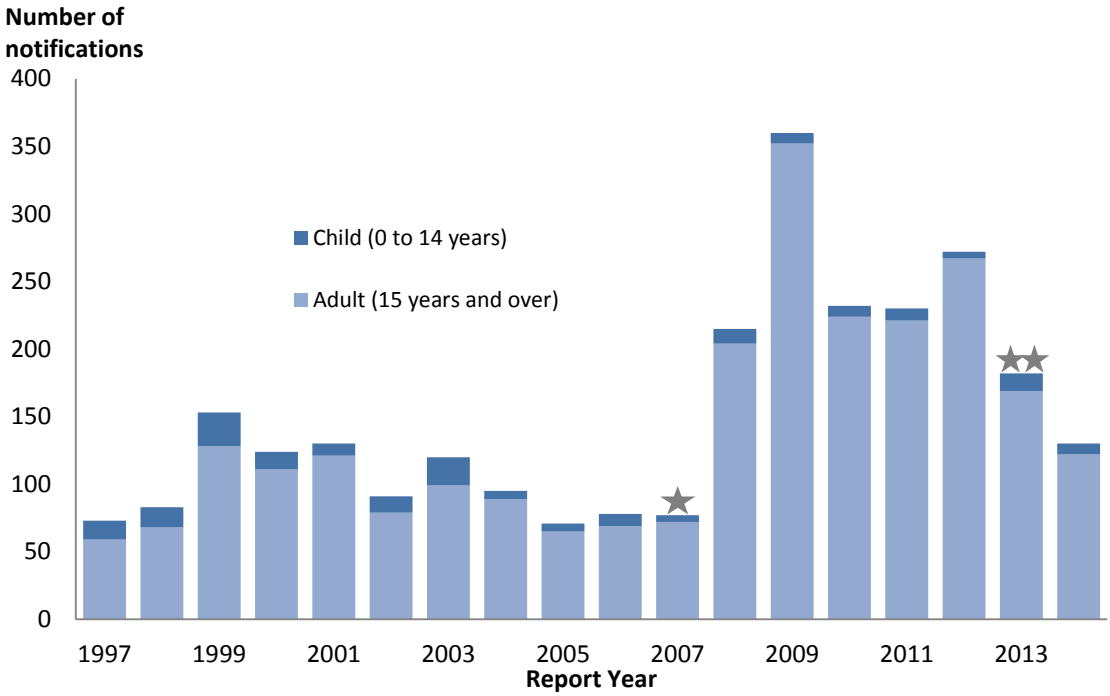
Lead notifications

There were 130 lead absorption notifications in 2014 compared to 180 notifications the previous year

There were 130 notifications of lead absorption in 2014 (2.9 per 100,000 population) compared with 180 notifications in 2013 (4.1 per 100,000 population) (Figure 13).

In 2013, blood lead level tests taken within 12 months of the original test were excluded from the data. This may have contributed to the decrease of lead notifications in 2013 and 2014.

Figure 13: Number of lead absorption notifications by age, 1997-2014



***** 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 Hazardous Substances Disease and Injury Reporting Tool (HSDIRT) was rolled out to all health districts. Repeat blood lead level tests taken within a year of the original test has been excluded from this data unless further investigation has resulted.

Sources: Institute of Environmental Science and Research (1997-2012) and HSDIRT (2013-2014).

There were eight child lead notifications in 2014

Of the 130 lead absorption notifications in 2014, eight were children under the age of 15 years (Table 6). In the previous year, there were 13 child lead notifications. The highest number of lead notifications occurred in the 25-44 and 45-64 year age groups.

Table 6: Lead notifications by age group and gender, 2014

Age group (years)	Female	Male	Unknown	Total
00-04	2	2		4
05-14	1	2	1	4
15-24	2	10		12
25-44	4	34		38
45-64	10	48		58
65+	3	10		13
Unknown			1	1
Total	**22**	**106**	**2**	**130**

Source: HSDIRT

Wairarapa had the highest rate of lead absorption notifications

The highest lead notification rate was for Wairarapa DHB (14.6 per 100,000 population), followed by MidCentral DHB (12.4 per 100,000 population) (Table 7). These two DHBs also had the highest rates of lead absorption notifications the previous year.

Table 7: Number and crude rates per 100,000 population of lead absorption notifications by DHB, 2014

DHB	Notifications	Rate
Auckland	26	6.0
Bay of Plenty	4	-
Canterbury	8	1.7
Capital and Coast	9	3.2
Counties Manukau	6	1.3
Hawke's Bay	2	-
Hutt Valley	6	4.3
Lakes	2	2.0
MidCentral	16	9.8
Nelson Marlborough	1	-
Northland	0	-
South Canterbury	4	-
Southern	6	2.0
Tairawhiti	1	-
Taranaki	3	-
Waikato	8	2.2
Wairarapa	6	14.6
Waitemata	7	1.3
West Coast	4	-
Whanganui	3	-
Area outside DHB	8	-

Note: i) The crude rates were not calculated for those with counts less than five. ii) Spatial analysis is based on an individual's residential address.

Source: HSDIRT

Painters/decorators are the most exposed to lead

In 2014, there were 56 lead absorption notifications where occupation was recorded as the source of exposure. The most common occupations were painter/decorator (20 cases), scrap metal worker (5 cases), and mechanic (4 cases) (Table 8). Painters had the highest number of lead notifications for the previous year as well.

Table 8: Number of lead notifications with occupation recorded as the source of exposure, 2014

Occupation	Notifications
Painter	20
Metal worker	5
Mechanic	4
Bricklayer	3
Artist / handyman	1

Carpenter	1
Factory hand - organ company	1
Fibreglass Worker	1
Jeweller	1
Joiner	1
Lab Technician	1
Mine worker /Semi-retired	1
Naylor Love Construction	1
Panel beater	1
Radiator Fitter	1
Store Manager	1
Storeman	1
Self-employed contractor -various jobs	1
Welder	1
Unknown	9
Total	**56**

Source: HSDIRT

Lead-based paint was the most common source of non-occupational lead exposure for children and adults

The most common non-occupational source of lead exposure for both children and adults (15+ years) was lead-based paint (Table 9). There were 79 lead absorption notifications where a non-occupational source of exposure was recorded, of which 28 were of unknown non-occupational exposure.

Table 9: Sources of non-occupational lead exposure, 2014

Non-occupational lead source	Notifications
Lead-based paint	19
Indoor rifle range	17
Bullet/sinker manufacture	9
Traditional medicine or cosmetic	3
Pica	1
Close contact with person whose occupation involves lead exposure	1
Other	2
Unknown (non-occupational source)	27
Total	**79**[a]

[a] More than one source of lead exposure can be selected for a single notification, therefore the total can add to more than the number of notifications.

Source: HSDIRT

Hazardous substances notifications

Hazardous substances notifications have increased since 2013

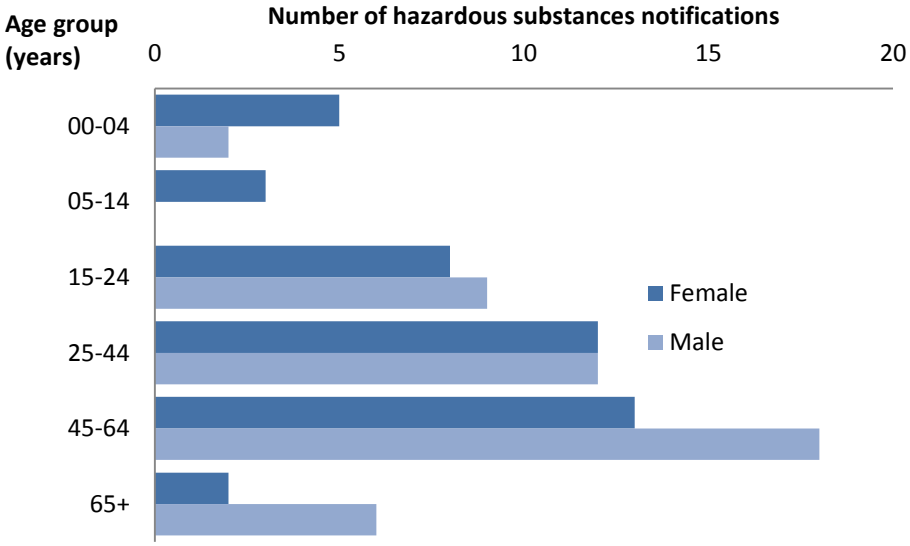
There were 99[3] notifications related to hazardous substances in 2014 compared, to 58 in 2013 (Figure 14). This represents an average of eight notifications per month.

[3] Eleven cases have been excluded from this analysis as they were either recorded as 'Not a case' or they were exposed to substances not subject to HSNO controls.

There were an equal number of notifications (49 cases) for both males and females. The gender field was not recorded for one case. The 45-64 year age group had the highest number of notifications (32 cases) across all age groups (Figure 14).

Of the 99 cases, 35 required hospital admission, including one person who later died from carbon monoxide poisoning.

Figure 14: Number of hazardous substances notifications, by gender and age group, 2014



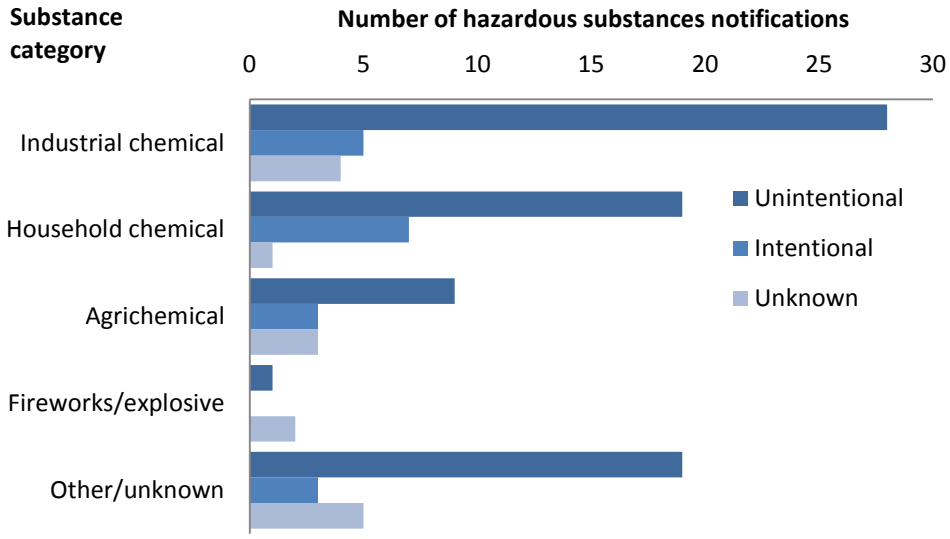
Source: HSDIRT

Seventy percent of hazardous substances notifications were unintentional exposures

Seventy percent (76 notifications) of all notifications were unintentional exposures and the most common substance categories were industrial chemicals (37 notifications) and household chemicals (27 notifications) (Figure 15).

Over 60 percent of injuries (62 notifications) occurred at the home while injuries in the workplace contributed to 22 percent (22 notifications) of all hazardous substances notifications followed by injuries in public (6 notifications).

Figure 15: Number of hazardous substances notifications, by substance category and intent, 2014



Note: More than one substance category can be selected for a single notification, and so the total adds to more than the number of notifications.

Source: HSDIRT

Hazardous substances incidents (2009-2014)

This section presents data from the hazardous substances incidents database maintained by the New Zealand Fire Service. Some incidents will involve more than one hazardous substance. A hazardous substance incident is an unplanned or uncontrolled release of hazardous substances such as fuels, flammable substances, explosives, toxic chemicals, pesticides, radioactive material, or microorganisms, including contaminated waste products. New Zealand Fire Service incidents are categorised on a scale from 1 to 5. This is based on the severity of the incident where 1 is low and 5 is very high.

There was a drop in the number incidents in 2011 and 2012 which is primarily attributed to industrial action in the NZ Fire Service. The Fire Service is the primary source of incident information because they attend the majority of call-outs where a hazardous substance is involved. During the period of industrial action, even though the Fire Service continued to respond to all emergencies, incident records did not get fully reported.

Key findings

- In 2014, the New Zealand Fire Service attended 1255 hazardous substances incidents.
- There have been no serious (level 4 or 5) hazardous substances incidents reported since 2009.
- Sixty percent of all hazardous substances incidents are 'liquid, gas leak or spill' incidents.
- Ammonia, methane gas, and chlorine were the most common hazardous substances involved in level 2 and 3 incidents between 2009 and 2014.

The New Zealand Fire Service attends over 1000 hazardous substances incidents every year

From 2009 to 2014, the New Zealand Fire Service attended 7277 hazardous substances incidents (Table 10), an average of 1212 incidents every year. The highest number of incidents (1436) was reported in 2010 followed by 1322 incidents in 2013.

There was a drop in the number of incidents in 2011 and 2012 due to industrial action in the NZ Fire Service.

Table 10: Number of hazardous substances incidents attended by the New Zealand Fire Service for each alarm level, 2009-2014

Alarm Level	Year						
	2009	2010	2011	2012	2013	2014	Total
1	1142	1413	988	1093	1302	1233	7166
2	10	22	11	18	19	17	97
3	0	1	1	1	1	5	9
Total	1152	1436	1000	1112	1322	1255	7277

Note: Alarm level indicates the severity of an incident where 1=low and 5=very high.
Source: New Zealand Fire Service

There were no level 4 or 5 hazardous substances-related incidents reported since 2009

There were no serious (level 4 or 5) incidents since reporting began in 2009. Of the 7227 incidents, nine were level 3 incidents and 97 were level 2 incidents. There were five level 3 incidents in 2014 alone, involving anhydrous ammonia, chlorine, hydrochloric acid, methane gas, and an unnamed corrosive liquid.

Approximately 60 percent of all hazardous substances incidents are liquid, gas leak or spills

From 2009-2014, the most common type of hazardous substances incidents were 'liquid, gas leak or spills' incidents, with around 700 every year (Table 11). The next most common type of incidents were 'gas liquid spill: vehicle accident' incidents. Chemical emergency incidents occur at about 100 to 140 a year.

Table 11: Number of hazardous substances incidents attended by the New Zealand Fire Service by incident type, 2009-2014

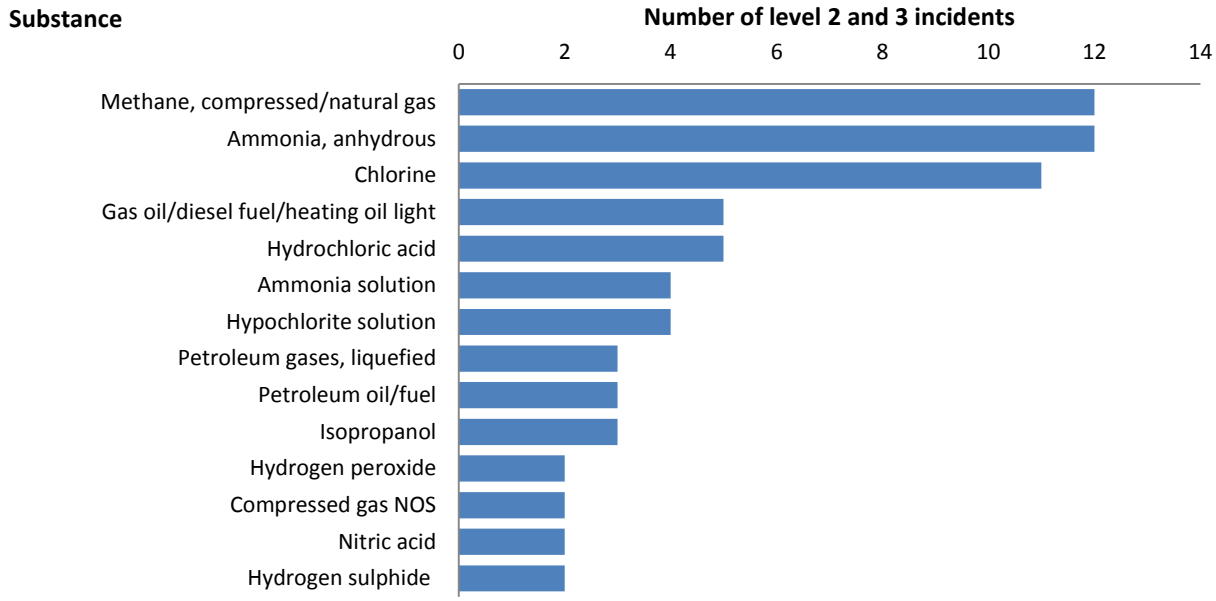
Incident Type	2009	2010	2011	2012	2013	2014	Total
Liquid Gas leak or spill: No fire	639	827	593	678	781	752	4270
Gas Liquid spill: Vehicle accident	150	166	127	128	138	105	814
Chemical emergency	117	146	97	109	110	127	706
Gas Liquid spill: No vehicle accident	108	144	85	85	110	116	648
Miscellaneous hazardous condition - not classified above	81	93	67	77	130	110	558
Attempted burning	14	16	6	9	6	5	56
Biohazard emergency	6	8	3	8	12	12	49
Chemical spill: Vehicle accident	10	11	7	7	6	7	48
Mobile property hazardous incident - not classified above	13	7	5	3	14	6	48
Gas liquid spill: Incorrect vehicle loading	7	7	6	4	8	7	39
Explosive present	6	7	2	3	5	3	26
Chemical spill: Incorrect vehicle loading	1	3	2	1	1	5	13
Radioactive condition		1			1		2
Total	**1152**	**1436**	**1000**	**1112**	**1322**	**1255**	**7277**

Source: New Zealand Fire Service

Ammonia, methane gas, and chlorine were the most common substances involved in level 2 or 3 incidents

From 2009 to 2014, the top three most common substances involved in more than one level 2 or 3 incidents were methane compressed gas, anhydrous ammonia, and chlorine (Figure 16).

Figure 16: Number of hazardous substances involved in more than one level 2 or 3 incident, 2009-2014



Note: Some incidents will involve more than one hazardous substance.
Source: New Zealand Fire Service

Hazardous substance-related telephone calls (2009-2014)

The National Poisons Centre (NPC) operates a 24-hour telephone service that fields enquiries regarding actual and potential poisoning exposures. Records in this database are from self-reported calls: they reflect only information provided when the public or healthcare professionals report an actual or potential exposure to a substance. There is no follow-up of the callers and confirmation of possible outcomes. Data analysis for 2013 and 2014 is based on summary tables rather than raw data, therefore, numbers may differ from previous years.

Key findings

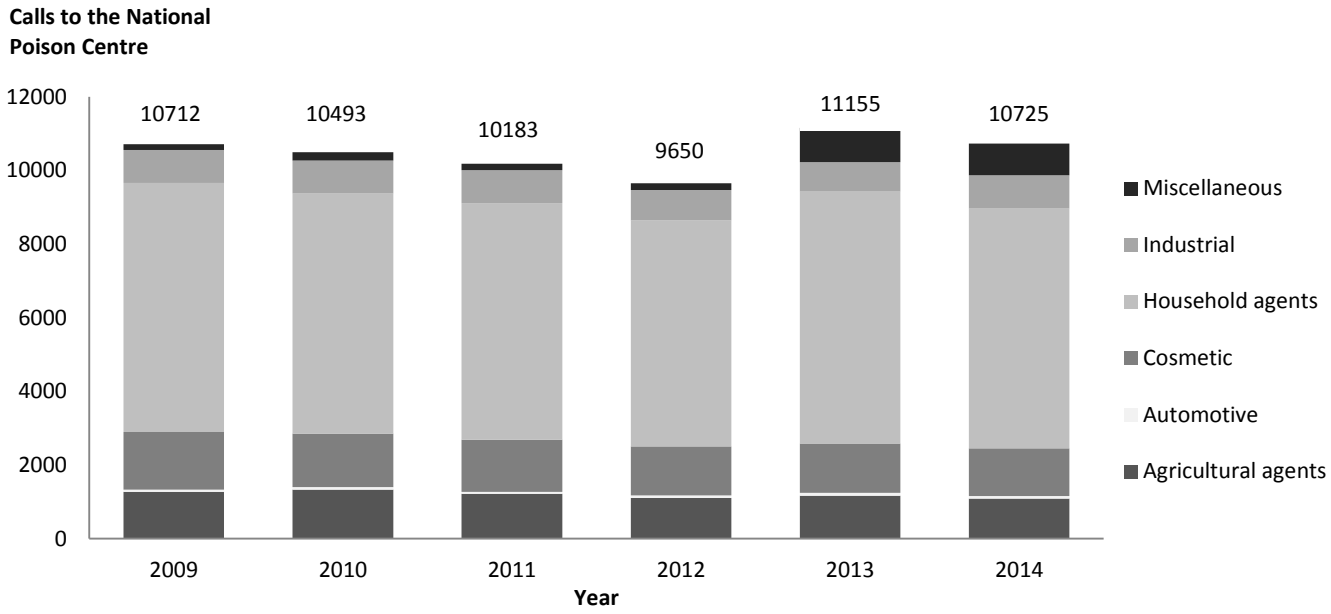
- Calls concerning hazardous substances have decreased by four percent between 2013 (11155 calls) and 2014 (10725 calls).
- Over half of the hazardous substances-related calls in 2014 involved children less than five years old.
- Calls regarding household agents, and more specifically cleaners and detergents were most frequent among children aged 0-4 years.
- Among adults, household cleaners were the most common household product (540 calls) and fertilisers (269 calls) the most common agricultural agent cited.
- Child exploratory behaviour was responsible for more than half of all calls in 2014.

Calls have decreased by four percent between 2013 and 2014

The number of hazardous substances-related calls made to the NPC has reduced by four percent between 2013 (11155 calls) and 2014 (10725 calls), but still higher than previous years (Figure 17).

Household products were the most common (61%) exposure reported to the NPC followed by cosmetics (12%) and agricultural agents (10%). The number of miscellaneous products was substantially higher for 2013 and 2014 since analysis is based on summary tables rather than the raw data.

Figure 17: Number of hazardous substances-related calls to the National Poison Centre by substance classification, 2009-2014

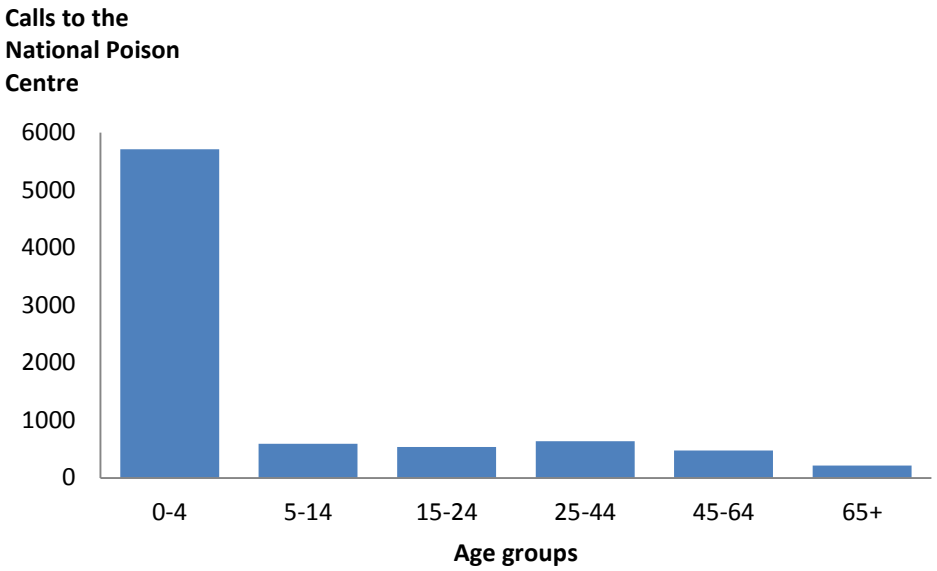


Source: National Poison Centre

Over half of the hazardous substances-related calls in 2014 concerned children less than five years old

Of the 10,725 hazardous substances-related calls made in 2014, over half (5712 calls) of them concerned children less than five years old (Figure 18). A similar trend was reported the previous year.

Figure 18: Number of hazardous substances-related calls to the National Poison Centre, by age group, 2014



Note: Calls, where age is recorded as 'Unknown', have been excluded from this graph.

Source: National Poison Centre

Calls regarding household products were most frequent among children

Among children aged 0-4 years, calls regarding household products (3906 calls) and cosmetics (974 calls) were the most common exposure in 2014 (Table 12). Of all household agents recorded, household cleaners (966 calls) and detergents (610 calls) were the most common source of enquiries regarding children. For agricultural agents, molluscicides or snail baits (84 calls) were the most common product among children.

Among adults, household cleaners (540 calls) was the most common household product and fertilisers (269 calls) was the most common agricultural agent recorded.

Table 12: Number of hazardous substances-related calls to the National Poison Centre, by age group and substance category, 2014

Substance Classification	Age Groups									
	0-4	5-14	15-24	25-44	45-64	65+	Child (age unknown)	Adult (age unknown)	Unknown	Total
Household	3906	335	270	343	238	129	173	1106	10	6510
Cosmetic	974	52	57	23	22	18	29	121	2	1298
Agricultural	326	57	59	108	113	41	26	362	1	1093
Industrial	109	48	110	115	81	13	13	410	9	908
Automotive	28	2	5	9	1	0	1	16	0	62
Miscellaneous	369	97	36	38	23	12	34	242	3	854

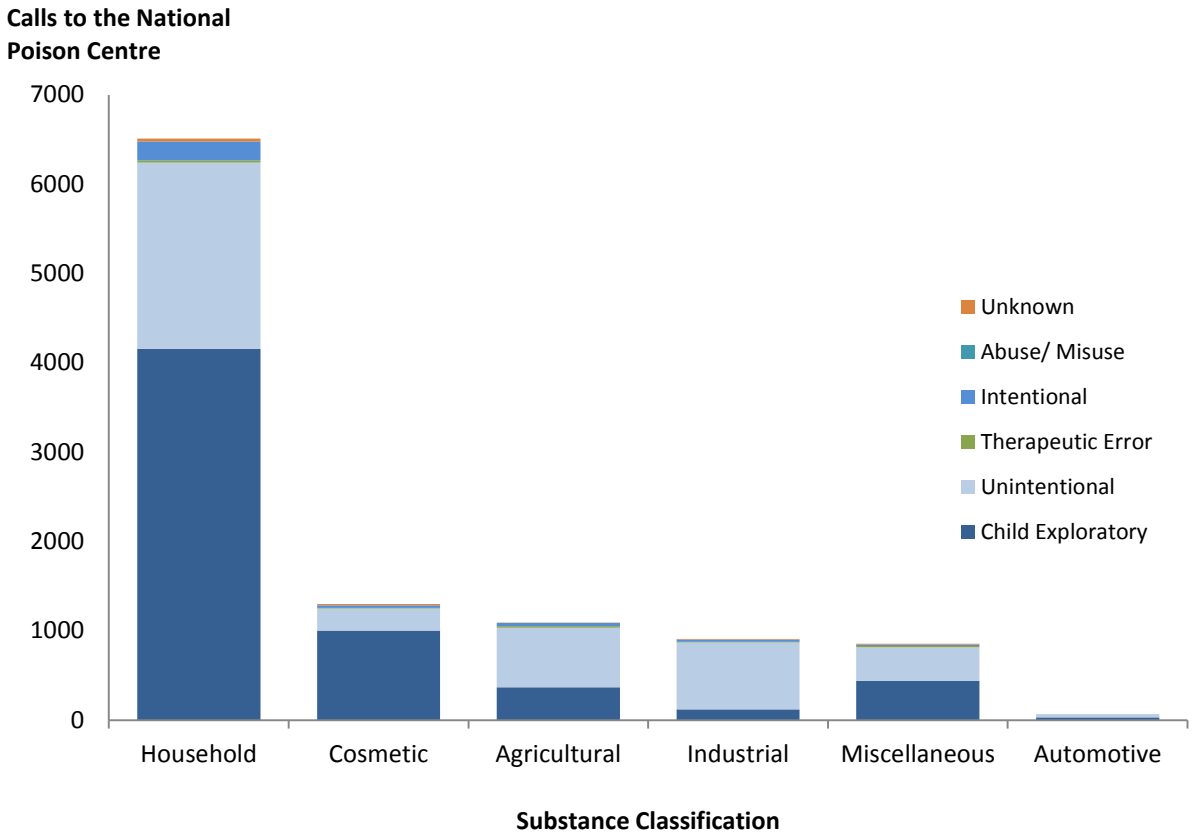
Total	5712	591	537	636	478	213	276	2257	25	10725

Source: National Poison Centre

Child exploratory behaviour was responsible for 57 percent of calls

In 2014, over half (6117 calls) of all hazardous substances-related calls were from child-exploratory behaviour, and a further 39 percent (4153 calls) were from adult unintentional exposures (Figure 19). The majority of calls concerning household and cosmetic products were from child exploratory behaviour while unintentional exposures were more common in calls concerning agricultural and industrial products.

Figure 19: Number of hazardous substances-related calls to the National Poison Centre by substance classification and intent, 2014



Source: National Poison Centre

Conclusion

Hazardous substance exposure accounted for 46 deaths in 2012. In 2014, it accounted for 676 hospital discharges, 229 primary care notifications, 125 hazardous substances incidents, and 10,725 calls. Most of these injuries could have been prevented. Mortality and hospital discharge rates have either declined or remained stable between 2006 and 2014, it is still a major undercount of exposure to hazardous substances as not all injuries are fatal or require hospitalisation.

This report has shown that some population groups are at much higher risk from exposure to a hazardous substance, particularly children under five years old and Māori.

Even though there were no reported deaths of children less than five old since 2006, this age group continues to have the highest hospital discharge rates. The high injury rate for this age group is of concern because injuries from hazardous substances are largely preventable. The number of hospital discharges also increased with socio-economic deprivation and this relationship is more apparent in the 0-4 age group.

While there were no clear ethnic differences in deaths from hazardous substances between Māori and non-Māori, the Māori population experienced higher hospital discharge rates compared to non-Māori.

The findings from this report will help inform about the adverse health effects of hazardous substances in New Zealand. It is important that preventive strategies are put in place in order to help to prevent future disease and injury, particularly among the vulnerable groups.

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Appendix 1: Technical Notes

Coronial Services Office data

- The main limitation associated with the coronial data is timelines. It is estimated that by the end of a given year, approximately 50-60 percent of cases for that year are available. By the end of the following year, it is estimated that 90-95 percent of cases for the preceding year will have files readily accessible.

National Mortality Collection and National Minimum Dataset

- The Ministry of Health maintains the national mortality and hospital discharge databases. The data provided in this report is the most recent data available.
- Hospital discharge and mortality data are presented by calendar year. The mortality data is based on the date of registration rather than the date of death.
- Readmissions have been excluded from the data set. In this report, a 'readmission' is defined as the unintended acute readmission of a patient from any injury within 30 days of discharge.
- Morbidity data are primarily based on hospitalisations from public hospitals. Day cases and patients dying in hospital are included but attendances at emergency departments and outpatient clinics are not.
- These data do not adequately capture chronic disease from hazardous substances as in most cases the cause of chronic disease cannot be identified.
- Prioritised ethnicity has been used in the mortality and hospital discharge datasets.

Appendix 2: External cause codes (E-code)

This table gives the external cause codes used in the mortality and hospital discharge data.

E-code	Description
X66	Organic solvents and halogenated hydrocarbons and their vapours
X67	Other gases and vapours
X68	Pesticides
X69	Other and unspecified chemicals and noxious substances
X75	Intentional self-harm by explosive material
X46	Organic solvents and halogenated hydrocarbons and their vapours
X47	Other gases and vapours
X48	Pesticides
X49	Other and unspecified chemicals and noxious substances
W36	Explosion and rupture of gas cylinder
W37	Explosion and rupture of pressurised tyre, pipe or hose
W38	Explosion and rupture of other specified pressurised devices
W39	Discharge of firework
W40	Explosion of other materials
X04	Exposure to ignition of highly flammable material
Y25	Contact with explosive material
Y16	Organic solvents and halogenated hydrocarbons and their vapours
Y17	Other gases and vapours
Y18	Pesticides
Y19	Other and unspecified chemicals and noxious substances

Appendix 2: Diagnosis/Nature of injury codes

Diag Codes	Substance	Group
T511	Methanol	Alcohol
T512	2-Propanol	Alcohol
T513	Fusel oil	Alcohol
T520	Petroleum products	Solvents, hydrocarbons and corrosive substances
T521	Benzene	Solvents, hydrocarbons and corrosive substances
T522	Homologues of benzene	Solvents, hydrocarbons and corrosive substances
T523	Glycols	Solvents, hydrocarbons and corrosive substances
T524	Ketones	Solvents, hydrocarbons and corrosive substances
T528	Other organic solvents	Solvents, hydrocarbons and corrosive substances
T529	Organic solvent, unspecified	Solvents, hydrocarbons and corrosive substances
T530	Carbon tetrachloride	Solvents, hydrocarbons and corrosive substances
T531	Chloroform	Solvents, hydrocarbons and corrosive substances
T532	Trichloroethylene	Solvents, hydrocarbons and corrosive substances
T533	Tetrachloroethylene	Solvents, hydrocarbons and corrosive substances
T534	Dichloromethane	Solvents, hydrocarbons and corrosive substances
T535	Chlorofluorocarbons	Solvents, hydrocarbons and corrosive substances
T536	Other halogen derivatives of aliphatic hydrocarbons	Solvents, hydrocarbons and corrosive substances
T537	Other halogen derivatives of aromatic hydrocarbons	Solvents, hydrocarbons and corrosive substances
T539	Halogen derivative of aliphatic and aromatic hydrocarbons, unspecified	Solvents, hydrocarbons and corrosive substances
T540	Phenol and phenol homologues	Solvents, hydrocarbons and corrosive substances
T541	Other corrosive organic compounds	Solvents, hydrocarbons and corrosive substances
T542	Corrosive acids and acid-like substances	Solvents, hydrocarbons and corrosive substances
T543	Corrosive alkalis and alkali-like substances	Solvents, hydrocarbons and corrosive substances
T549	Corrosive substance, unspecified	Solvents, hydrocarbons and corrosive substances
T55	Toxic effect of soaps and detergents	Soaps and detergents
T560	Lead and its compounds	Metals

T561	Mercury and its compounds	Metals
T562	Chromium and its compounds	Metals
T563	Cadmium and its compounds	Metals
T564	Copper and its compounds	Metals
T565	Zinc and its compounds	Metals
T566	Tin and its compounds	Metals
T567	Beryllium and its compounds	Metals
T568	Other metals	Metals
T569	Metal, unspecified	Metals
T570	Arsenic and its compounds	Inorganic substances
T571	Phosphorus and its compounds	Inorganic substances
T572	Manganese and its compounds	Inorganic substances
T573	Hydrogen cyanide	Inorganic substances
T578	Other specified inorganic substances	Inorganic substances
T579	Inorganic substance, unspecified	Inorganic substances
T58	Toxic effect of carbon monoxide	Carbon monoxide
T590	Nitrogen oxides	Gases, fumes and vapours
T591	Sulfur dioxide	Gases, fumes and vapours
T592	Formaldehyde	Gases, fumes and vapours
T593	Lacrimogenic gas	Gases, fumes and vapours
T594	Chlorine gas	Gases, fumes and vapours
T595	Fluorine gas and hydrogen fluoride	Gases, fumes and vapours
T596	Hydrogen sulfide	Gases, fumes and vapours
T597	Carbon dioxide	Gases, fumes and vapours
T598	Other specified gases, fumes and vapours	Gases, fumes and vapours
T599	Gases, fumes and vapours, unspecified	Gases, fumes and vapours
T600	Organophosphate and carbamate insecticides	Pesticides
T601	Halogenated insecticides	Pesticides
T602	Other insecticides	Pesticides
T603	Herbicides and fungicides	Pesticides

T604	Rodenticides	Pesticides
T608	Other pesticides	Pesticides
T609	Pesticide, unspecified	Pesticides
T650	Cyanides	Other toxic substances
T651	Strychnine and its salts	Other toxic substances
T653	Nitroderivatives and amino derivatives of benzene and its homologues	Other toxic substances
T654	Carbon disulfide	Other toxic substances
T655	Nitroglycerin and other nitric acids and esters	Other toxic substances
T656	Paints and dyes, not elsewhere classified	Other toxic substances
T658	Toxic effect of other specified substances	Other toxic substances
T659	Toxic effect of unspecified substance	Other toxic substances
T2123	Partial thickness [blisters, epidermal loss] burn of abdominal wall	Burns
T2124	Partial thickness [blisters, epidermal loss] burn of back [any part]	Burns
T2125	Partial thickness [blisters, epidermal loss] burn of genitalia [external]	Burns
T2129	Partial thickness [blisters, epidermal loss] burn of other sites of trunk	Burns
T2130	Full thickness burn of trunk, unspecified site	Burns
T2131	Full thickness burn of breast	Burns
T2132	Full thickness burn of chest wall, excluding breast and nipple thorax [external]	Burns
T2133	Full thickness burn of abdominal wall	Burns
T2134	Full thickness burn of back [any part]	Burns
T2135	Full thickness burn of genitalia [external]	Burns
T2139	Full thickness burn of other sites of trunk	Burns
T2200	Burn of unspecified thickness of shoulder and upper limb, except wrist and hand, unspecified site	Burns
T2201	Burn of unspecified thickness forearm and elbow	Burns
T2202	Burn of unspecified thickness arm (upper) and shoulder region	Burns
T2210	Erythema of shoulder and upper limb, except wrist and hand, unspecified site	Burns
T2211	Erythema of forearm and elbow	Burns
T2212	Erythema of arm (upper) and shoulder region	Burns
T2220	Partial thick [blisters epidermal loss] burn shoulder & upper limb except wrist & hand & unspec site	Burns
T2221	Partial thickness [blisters, epidermal loss] burn of forearm and elbow	Burns

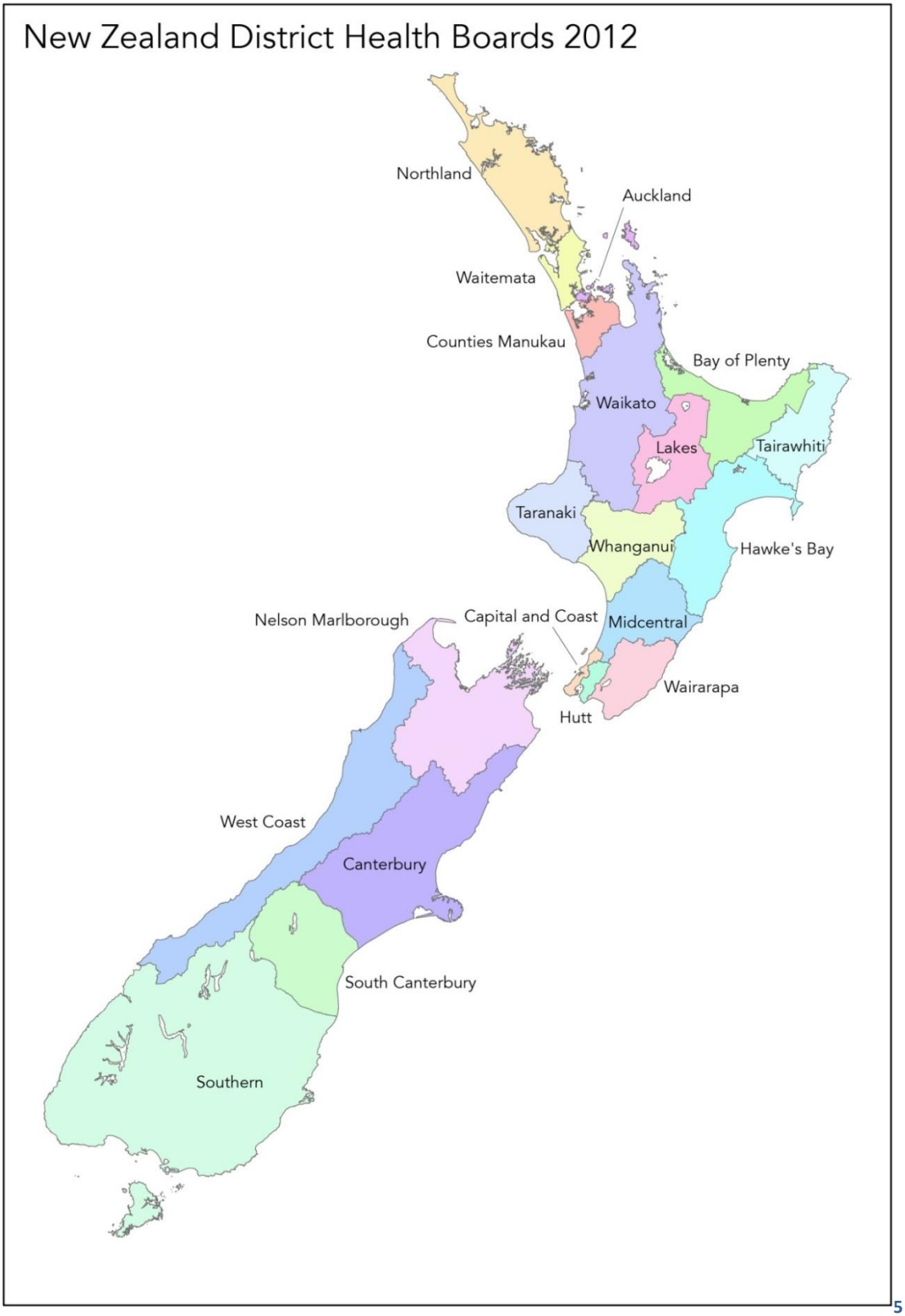
T2222	Partial thickness [blisters, epidermal loss] burn of arm (upper) and shoulder region	Burns
T2230	Full thickness burn of shoulder and upper limb, except wrist and hand, upper limb, unspecified site	Burns
T2231	Full thickness burn of forearm and elbow	Burns
T2232	Full thickness burn of arm (upper) and shoulder region	Burns
T230	Burn of unspecified thickness of wrist and hand	Burns
T231	Erythema of wrist and hand	Burns
T232	Partial thickness [blisters, epidermal loss] burn of wrist and hand	Burns
T233	Full thickness burn of wrist and hand	Burns
T240	Burn of unspecified thickness of hip and lower limb, except ankle and foot	Burns
T241	Erythema of hip and lower limb, except ankle and foot	Burns
T242	Partial thickness [blisters, epidermal loss] burn of hip and lower limb, except ankle and foot	Burns
T243	Full thickness burn of hip and lower limb, except ankle and foot	Burns
T250	Burn of unspecified thickness of ankle and foot	Burns
T251	Erythema of ankle and foot	Burns
T252	Partial thickness [blisters, epidermal loss] burn of ankle and foot	Burns
T253	Full thickness burn of ankle and foot	Burns
T260	Burn of eyelid and periocular area	Burns
T261	Burn of cornea and conjunctival sac	Burns
T262	Burn with resulting rupture and destruction of eyeball	Burns
T263	Burn of other parts of eye and adnexa	Burns
T264	Burn of eye and adnexa, part unspecified	Burns
T270	Burn of larynx and trachea	Burns
T271	Burn involving larynx and trachea with lung	Burns
T272	Burn of other parts of respiratory tract	Burns
T273	Burn of respiratory tract, part unspecified	Burns
T280	Burn of mouth and pharynx	Burns
T281	Burn of oesophagus	Burns
T282	Burn of other parts of alimentary tract	Burns
T283	Burn of internal genitourinary organs	Burns
T284	Burn of other and unspecified internal organs	Burns

T290	Burns of multiple regions, unspecified thickness	Burns
T291	Burns of multiple regions, no more than erythema burns mentioned	Burns
T292	Burns of multiple regions, no more than partial thickness burns mentioned	Burns
T293	Burns of multiple regions, at least one burn of full thickness mentioned	Burns
T300	Burn of unspecified body region, unspecified thickness	Burns
T301	Erythema, body region unspecified	Burns
T302	Burn of partial thickness, body region unspecified	Burns
T303	Burn of full thickness, body region unspecified	Burns
T3100	Burns involving less than 10% of body surface with less 10 % or unspecified full thickness burns	Burns
T3110	Burns involving 10-19% of body surface, with less than 10 % or unspecified full thickness burns	Burns
T3111	Burns involving 10-19% of body surface, with 10-19% full thickness burns	Burns
T3120	Burns involving 20-29% of body surface, with less than 10 % or unspecified full thickness burns	Burns
T3121	Burns involving 20-29% of body surface, with 10-19% full thickness burns	Burns
T3122	Burns involving 20-29% of body surface, with 20-29% full thickness burns	Burns
T3130	Burns involving 30-39% of body surface, with less than 10 % or unspecified full thickness burns	Burns
T3131	Burns involving 30-39% of body surface, with 10-19% full thickness burns	Burns
T3132	Burns involving 30-39% of body surface, with 20-29% full thickness burns	Burns
T3133	Burns involving 30-39% of body surface, with 30-39% full thickness burns	Burns
T3140	Burns involving 40-49% of body surface, with less than 10 % or unspecified full thickness burns	Burns
T3141	Burns involving 40-49% of body surface, with 10-19% full thickness burns	Burns
T3142	Burns involving 40-49% of body surface, with 20-29% full thickness burns	Burns
T3143	Burns involving 40-49% of body surface, with 30-39% full thickness burns	Burns
T3144	Burns involving 40-49% of body surface, with 40-49% full thickness burns	Burns
T3150	Burns involving 50-59% of body surface, with less than 10% or unspecified full thickness burns	Burns
T3151	Burns involving 50-59% of body surface, with 10-19% full thickness burns	Burns
T3152	Burns involving 50-59% of body surface, with 20-29% full thickness burns	Burns
T3153	Burns involving 50-59% of body surface, with 30-39% full thickness burns	Burns
T3154	Burns involving 50-59% of body surface, with 40-49% full thickness burns	Burns
T3155	Burns involving 50-59% of body surface, with 50-59% full thickness burns	Burns
T3160	Burns involving 60-69% of body surface, with less than 10 % or unspecified full thickness burns	Burns

T3161	Burns involving 60-69% of body surface, with 10-19% full thickness burns	Burns
T3162	Burns involving 60-69% of body surface, with 20-29% full thickness burns	Burns
T3163	Burns involving 60-69% of body surface, with 30-39% full thickness burns	Burns
T3164	Burns involving 60-69% of body surface, with 40-49% full thickness burns	Burns
T3165	Burns involving 60-69% of body surface, with 50-59% full thickness burns	Burns
T3166	Burns involving 60-69% of body surface, with 60-69% full thickness burns	Burns
T3170	Burns involving 70-79% of body surface, with less than 10% or unspecified full thickness burns	Burns
T3171	Burns involving 70-79% of body surface, with 10-19% full thickness burns	Burns
T3172	Burns involving 70-79% of body surface, with 20-29% full thickness burns	Burns
T3173	Burns involving 70-79% of body surface, with 30-39% full thickness burns	Burns
T3174	Burns involving 70-79% of body surface, with 40-49% full thickness burns	Burns
T3175	Burns involving 70-79% of body surface, with 50-59% full thickness burns	Burns
T3176	Burns involving 70-79% of body surface, with 60-39% full thickness burns	Burns
T3177	Burns involving 70-79% of body surface, with 70-79% full thickness burns	Burns
T3180	Burns involving 80-89% of body surface, with less than 10% or unspecified full thickness burns	Burns
T3181	Burns involving 80-89% of body surface, with 10-19% full thickness burns	Burns
T3182	Burns involving 80-89% of body surface, with 20-29% full thickness burns	Burns
T3183	Burns involving 80-89% of body surface, with 30-39% full thickness burns	Burns
T3184	Burns involving 80-89% of body surface, with 40-49% full thickness burns	Burns
T3185	Burns involving 80-89% of body surface, with 50-59% full thickness burns	Burns
T3186	Burns involving 80-89% of body surface, with 60-69% full thickness burns	Burns
T3187	Burns involving 80-89% of body surface, with 70-79% full thickness burns	Burns
T3188	Burns involving 80-89% of body surface, with 80-89% full thickness burns	Burns
T3190	Burns involving 90% or more of body surface, with less than 10% or unspecified full thickness burns	Burns
T3191	Burns involving 90% or more of body surface, with 10-19% full thickness burns	Burns
T3192	Burns involving 90% or more of body surface, with 20-29% full thickness burns	Burns
T3193	Burns involving 90% or more of body surface, with 30-39% full thickness burns	Burns
T3194	Burns involving 90% or more of body surface, with 40-49% full thickness burns	Burns
T3195	Burns involving 90% or more of body surface, with 50-59% full thickness burns	Burns
T3196	Burns involving 90% or more of body surface, with 60-69% full thickness burns	Burns

T3197	Burns involving 90% or more of body surface, with70-79% full thickness burns	Burns
T3198	Burns involving 90% or more of body surface, with 80-89% full thickness burns	Burns
T3199	Burns involving 90% or more of body surface, with 90% or more of body surface full thickness burns	Burns
L230	Allergic contact dermatitis due to metals	Dermatitis
L231	Allergic contact dermatitis due to adhesives	Dermatitis
L232	Allergic contact dermatitis due to cosmetics	Dermatitis
L234	Allergic contact dermatitis due to dyes	Dermatitis
L235	Allergic contact dermatitis due to other chemical products	Dermatitis
L240	Irritant contact dermatitis due to detergents	Dermatitis
L241	Irritant contact dermatitis due to oils and greases	Dermatitis
L242	Irritant contact dermatitis due to solvents	Dermatitis
L243	Irritant contact dermatitis due to cosmetics	Dermatitis
L245	Irritant contact dermatitis due to other chemical products	Dermatitis
L250	Unspecified contact dermatitis due to cosmetics	Dermatitis
L252	Unspecified contact dermatitis due to dyes	Dermatitis
L253	Unspecified contact dermatitis due to other chemical products	Dermatitis

Appendix 3: Map of District Health Boards



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