

# Unintentional hazardous substances exposures in children (0–14 years); calls to the National Poisons Centre in 2017–2019

The data presented here describe exposure calls to the National Poisons Centre (NPC) in 2017–19. Analysis of these data allows us to describe unintentional exposures to hazardous substances among children aged 0–14 years in New Zealand, where contact was made with the NPC.



**National Poisons Centre**  
Te Pokapū Mātauranga Tāoke

## Key facts



On average, there were more than 1,000 exposure calls per quarter between 2017 to 2019 relating to unintentional hazardous substance exposures involving children aged 0–14.



Children aged one had the highest rate of exposures.



Although boys were exposed to hazardous substances more often than girls, boys were only 1.1 times as likely as girls to be exposed to substances.



Children of European/Other ethnicity had the highest reported rate of exposures when compared to other ethnic groups.



Most exposures involved the 'household anti-infective/cleaners' category of substances, which was the most common cause of concern in children aged one.



Approximately 93% of the exposures occurred in the home environment. The top three hazardous substances reported were: dishwashing liquid (645 exposures), toilet bowl discs (637) and essential oils (570).

**87%**

While 87% of the exposures were safe to manage without further medical assessment, every situation should be checked with the NPC to determine the safest course of action.

**Two-thirds**

of the exposures contacted the NPC within an hour. Therefore, contacting NPC as early as possible is critical to provide appropriate advice to the patient for any exposure or suspected exposures.

## Unintentional exposure to hazardous substances in young children remains an under-recognised public health issue

Data from hospital discharges and the Hazardous Substances Disease and Injury Reporting Tool (Environmental Health Intelligence NZ 2020) show that across all age groups, children under five years of age continue to have the highest rate of unintentional hazardous substances-related hospitalisations and hazardous substances injury notifications. In New Zealand, poisoning is the fifth-leading cause of non-fatal unintentional injury in children aged 0–14 years (Safekids Aotearoa 2015). Even though the outcomes of paediatric poisoning incidents are rarely fatal, they lead to substantial health service use. Illness and injury from hazardous substances are largely preventable and treatable.

Anti-infectives/cleaners, cosmetics, household detergents and other household chemicals are commonly used and stored in homes. Children, especially under the age of five, commonly spend time exploring their surroundings at home, with regular hand-mouth contact with items they encounter there. If they gain access to hazardous substances, especially if stored incorrectly or unsafely, this can lead to unintentional exposures (Safekids Aotearoa, 2015).

This factsheet reports on calls to the National Poisons Centre (NPC) on unintentional exposures to hazardous substances in children aged 0–14 years. It includes data on substances covered by the Hazardous Substances and New Organisms Act (HSNO) 1996 and Health Act 1956. Examples of exposures and substances that would be included in this analysis:

- Children swallowing cleaning products or cosmetics
- Exposure to chemical contamination of the environment such as agrichemical spray drift, cyanotoxin and carbon monoxide
- Exposure to chemicals such as solvents, or chlorine, contact dermatitis from chemicals, an injury from fireworks, or inhalation or ‘huffing’ of butane

These Acts do not cover medicines in finished dose form, alcohol when classified as a food item, chemical toxins associated with food (food poisoning), nor radioactive materials as these are covered by different legislation. Manufactured items (e.g. button batteries) are also not covered in the HSNO Act. Any substances not covered by the two Acts are excluded, and only cases where at least one hazardous substance was involved in the exposure are included in this analysis.

**0800 764 766**  
(0800 POISON)

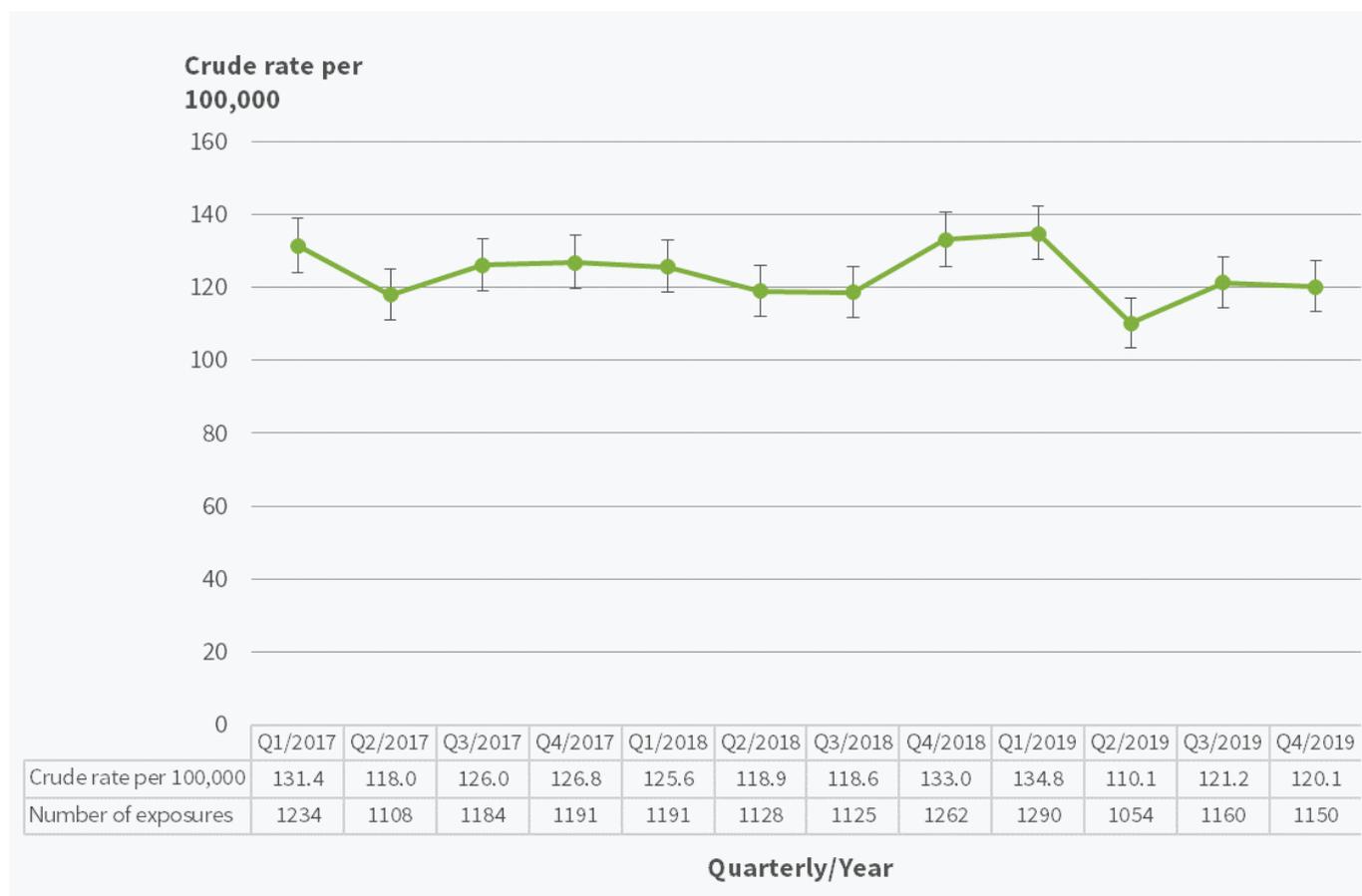
The National Poisons Centre provides a 24/7 free telephone service for enquiries about exposures to any substances.

## More than 1,000 exposures related to hazardous substances in each quarter

From 2017 to 2019, NPC provided risk assessment and management advice relating to 13,485 children aged 0–14 years who had been unintentionally exposed to 14,077 substances. During this period, there was an average of 1,173 exposures per quarter.

The exposure rate has remained relatively stable between 2017– 2019 (Figure 1).

**Figure 1: Unintentional hazardous substance exposure events for children under the age of 15 years, by quarterly/year (crude rate per 100,000)**



**Note 1:** 95% confidence intervals have been presented as error bars.

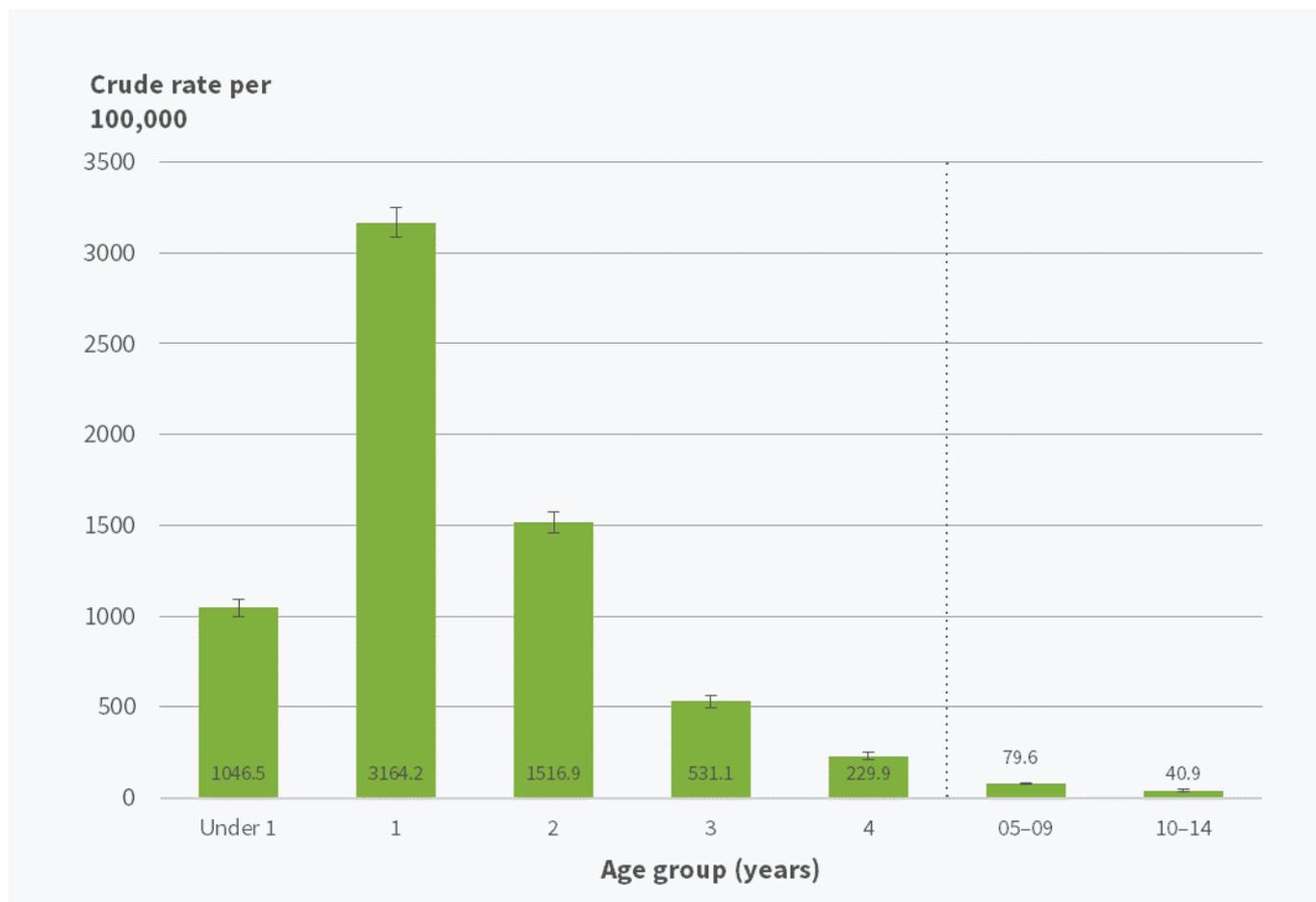
**Note 2:** When there were multiple calls about the same exposure incident ('linked calls'), all linked calls were excluded.

**Data source:** National Poisons Centre 2020

## One-year-old had the highest rate of exposures

Of all hazardous chemical exposure calls from 2017 to 2019 in children under 15 years, 5745 (42.6%) were relating to one-year-old children. Children aged one had the highest rate of exposures (3164.2 per 100,000 Figure 2). Their developmental stage makes them more prone to ingestion because of their curiosity to explore their surroundings and a desire to put things in their mouth (Safekids Aotearoa 2015).

**Figure 2: Unintentional hazardous substance exposure events, by age group, 2017–2019 (crude rate per 100,000 population)**



**Note 1:** 95% confidence intervals have been presented as error bars.

**Note 2:** A total of 517 (3.8%, 517 out of 13,485) children of unknown age were excluded from this graph.

Further, when there were multiple calls about the same exposure incident ('linked calls'), all linked calls were excluded.

**Data source:** National Poisons Centre 2020

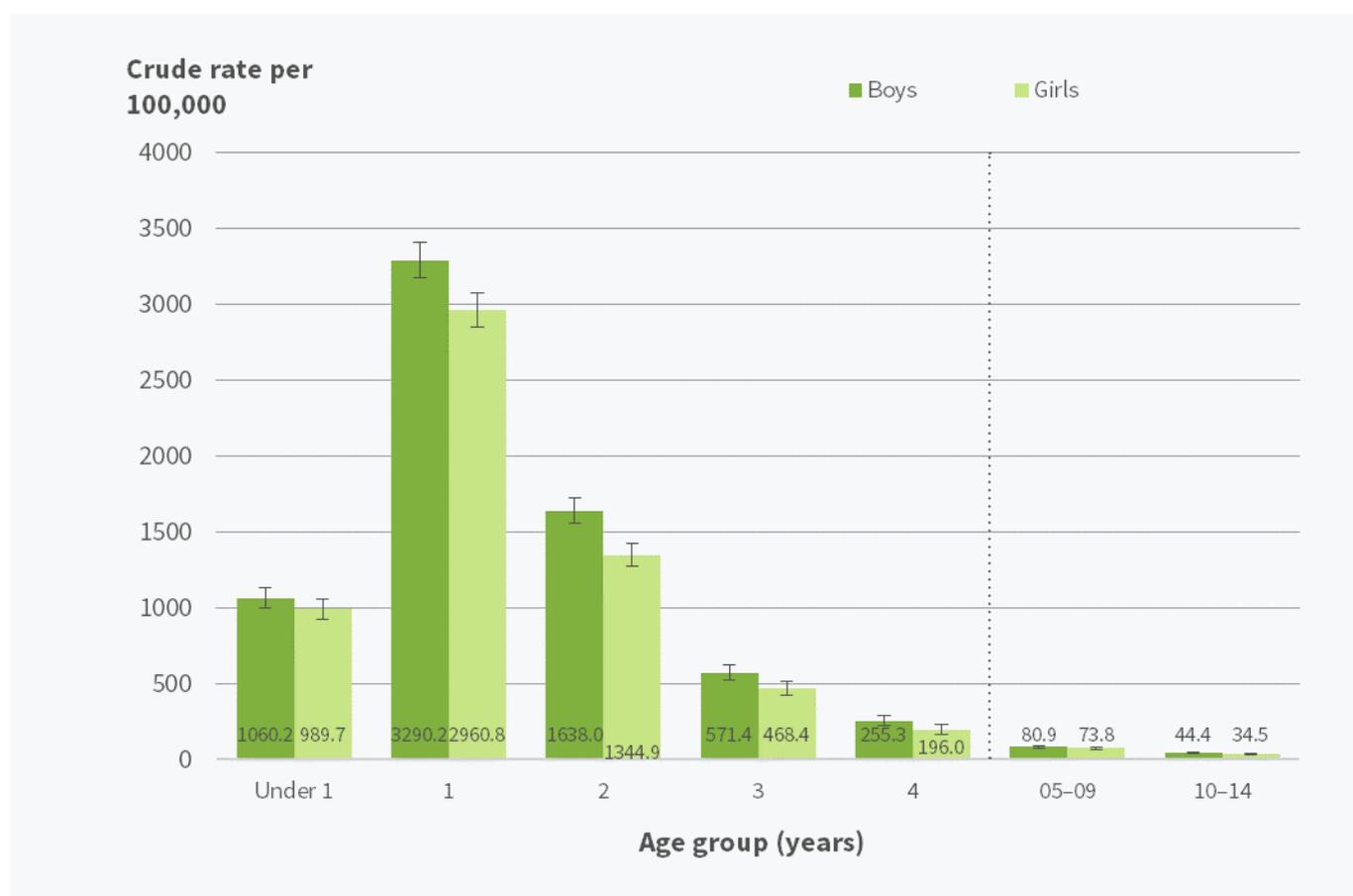
## Although boys were exposed to substances more often than girls, boys were only 1.1 times as likely as girls to be exposed to substances

From 2017 to 2019, the substances exposure rate was 493.8 per 100,000 (7,198 exposures) for boys, compared with 433.0 per 100,000 (5,983 exposures) for girls. Although the exposure rate is higher for boys than girls, boys were only 1.1 times as likely as girls to be exposed to substances.

The rate of exposures to hazardous substances for boys aged one was 3290.2 per 100,000 (3,050 exposures), compared to 2960.8 per 100,000 (2,631 exposures; Figure 3) for girls of the same age. There is a similar pattern for children aged one to four and 10–14 years, where boys experienced unintentional hazardous substances exposures more often than girls.

However, there were no differences in unintentional exposure rates between boys and girls in children aged under one year and 05–09 years age group.

**Figure 3: Unintentional hazardous substance exposure events, by sex and age group, 2017–2019 (crude rate per 100,000 population)**



**Note 1:** 95% confidence intervals have been presented as error bars.

**Note 2:** A total 714 children were excluded from this graph. These included 517 children where the age was unknown and 197 children where the sex was unknown/unspecified or other. Further, when there were multiple calls about the same exposure incident ('linked calls'), all linked calls were excluded.

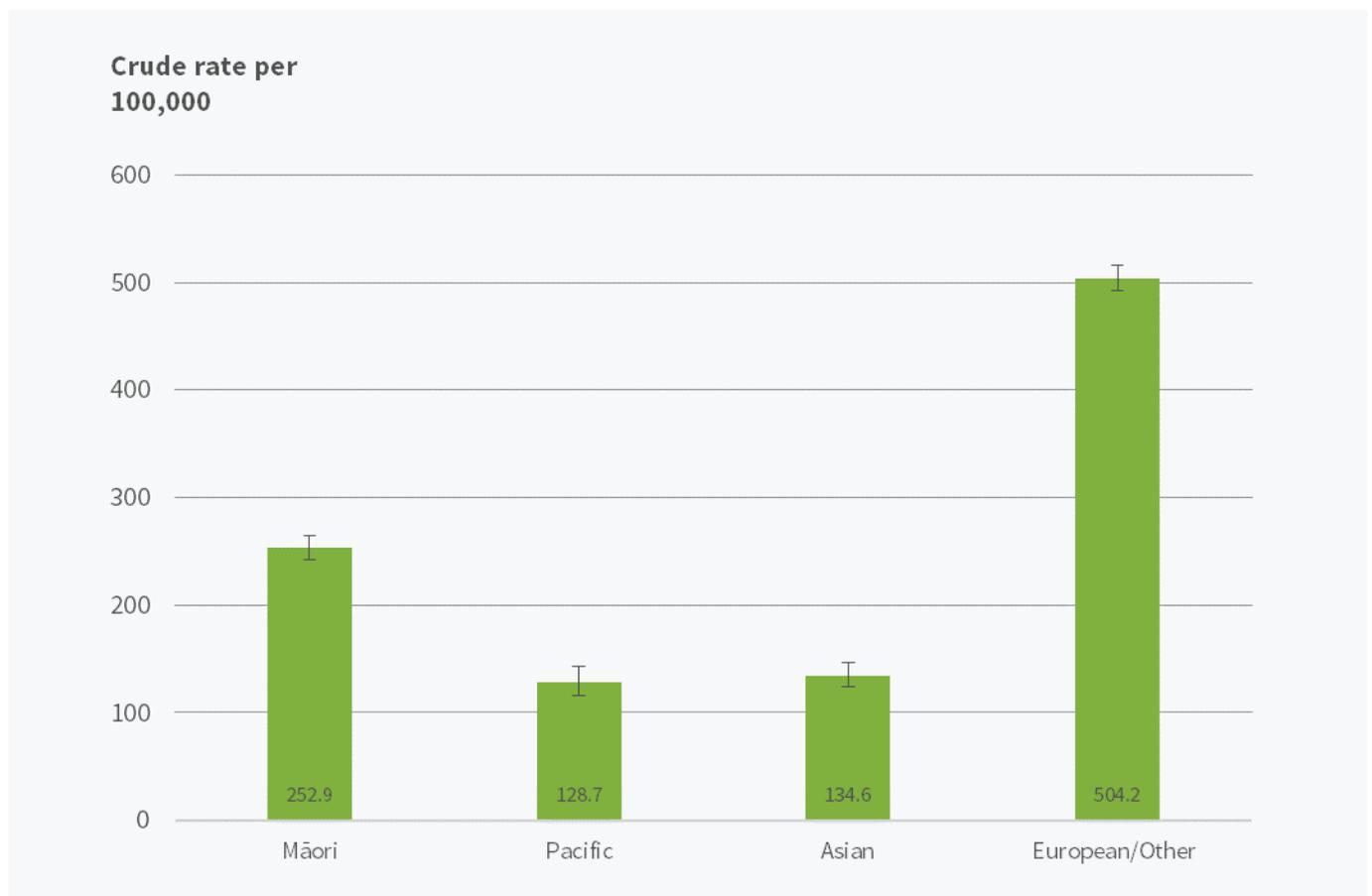
**Data source:** National Poisons Centre 2020

## Children of European/Other ethnicity had the highest reported rate of exposures

Children of European/Other ethnicity aged between 0–14 years accounted for 52% (7,048 exposures) of all unintentional exposures to hazardous substances between 2017–2019, Māori children for 14% (1,941 call exposures), Asian children for 4% (549 call exposures), and Pacific children for 3% (350 call exposures). However, a large number of patient records (3,597 exposures; 26.7%) had an unknown ethnicity.

The rate (504.2 per 100,000) in the use of the NPC service for European/Other children was twice the rate of 252.9 per 100,000 for Māori children (Figure 4).

**Figure 4: Unintentional hazardous substance exposure events, by prioritised ethnicity, 2017–2019 (crude rate per 100,000 population)**



**Note 1:** 95% confidence intervals have been presented as error bars.

**Note 2:** A total of 3,597 children (26.7%) where ethnicity was unknown were excluded from this graph. Further, when there were multiple calls about the same exposure incident ('linked calls'), all linked calls were excluded.

**Data source:** National Poison Centre 2020

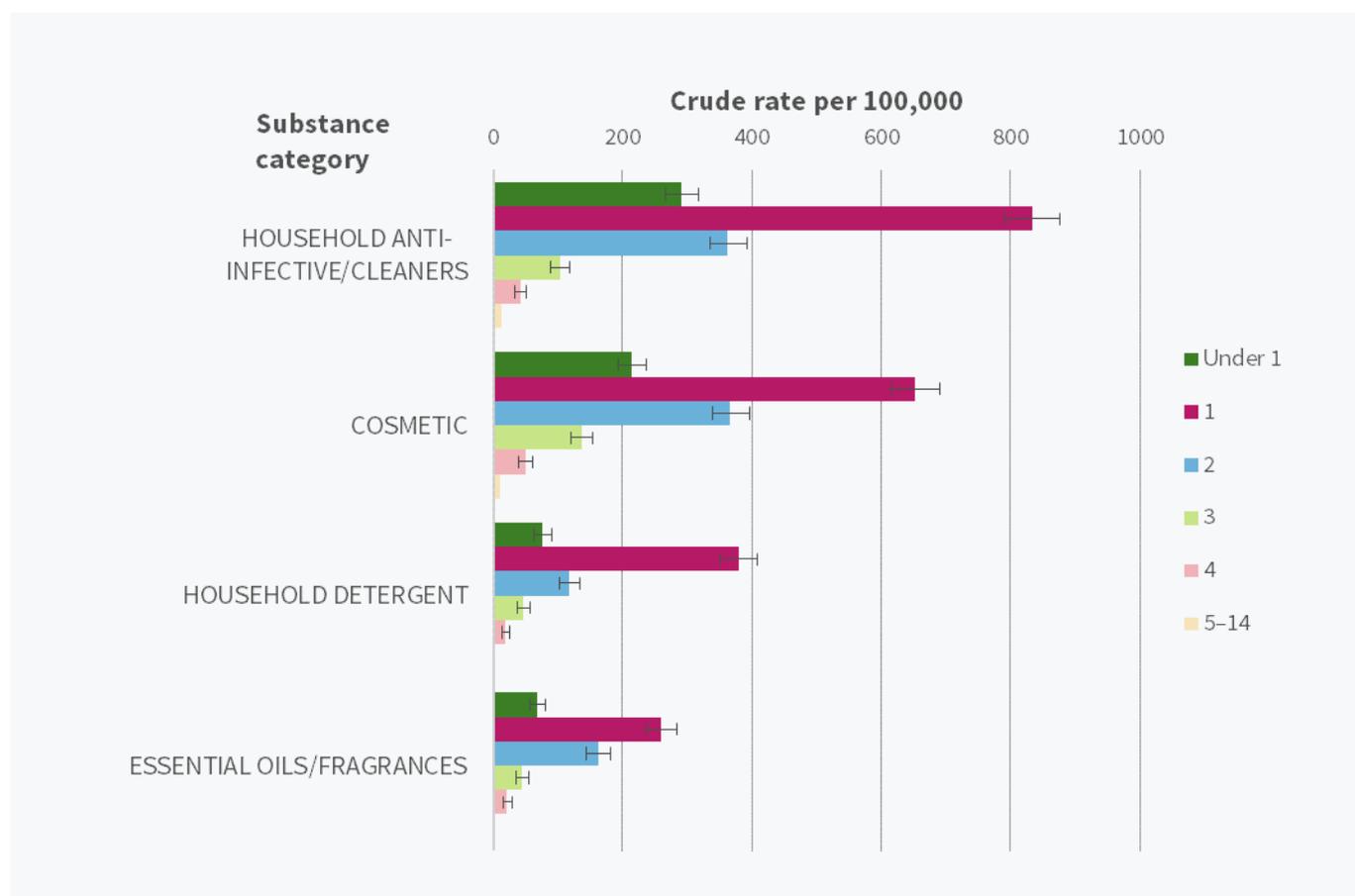
## ‘Household anti-infective/cleaners’ were the most common substance category reported to NPC in children aged one year

Of the 5,872 unintentional exposures to hazardous substances among children aged one year, 1,513 were due to ‘household anti-infective/cleaners’. One-year-olds may be at greater risk of acute ‘household anti-infective/cleaners’ exposures because they are more likely to put things in their mouth and spend time on the floor, where many cleaners are used or may be found. Children aged one year were more than twice as likely as children aged two years to be exposed to hazardous substances from ‘household anti-infective/cleaners’ (eg, toilet bowl disc, household bleach, multi-purpose cleaner, sanitiser).

The second highest rate of unintentional exposures was from ‘cosmetics’, including hand wash, nail polish and perfume, particularly affecting children aged one (651.6 per 100,000; 1183 exposures).

Children aged one year also had higher rates of unintentional exposures from ‘household detergents’ and ‘essential oils/fragrances’ than children in other age groups (Figure 5).

**Figure 5: Unintentional hazardous substance exposure events, by top four substance categories and age group, 2017–2019 (crude rate per 100,000 population)**



**Note 1:** 95% confidence intervals have been presented as error bars.

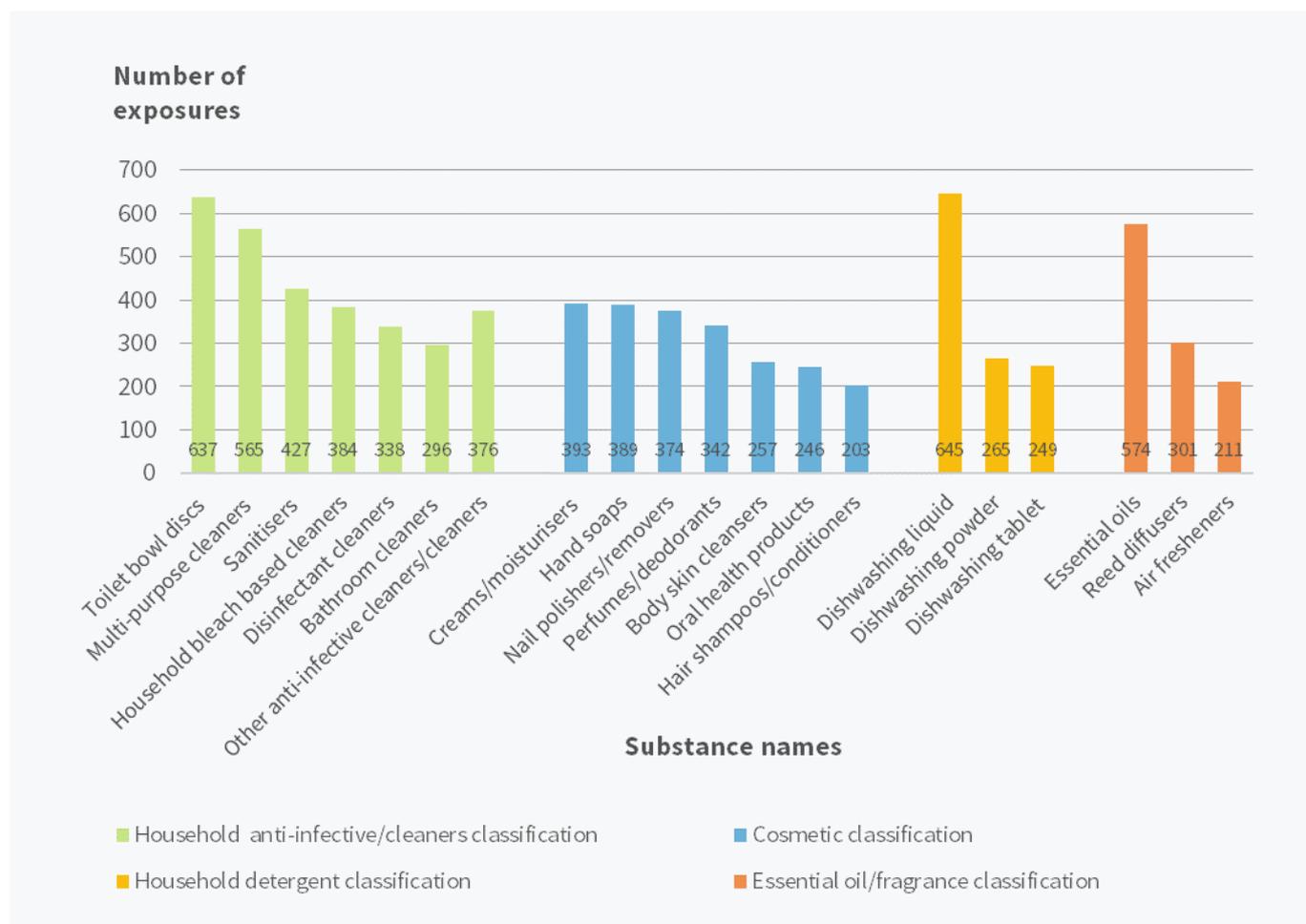
**Note 2:** A total of 556 exposures with unknown age were excluded from this graph. Further, when there were multiple calls about the same exposure incident (‘linked calls’), all linked calls were excluded. Only the top four substance categories are listed.

**Data source:** National Poisons Centre 2020

## The top three substances reported to the NPC were dishwashing liquid, toilet bowl discs and essential oils

Dishwashing liquids were the most common substances ingested unintentionally by children aged 0–14 years (645 out of 14,077 total exposures), followed by toilet bowl discs (637 exposures) and essential oils (574 exposures; Figure 6). Approximately 93% of the exposures occurred in the home environment.

**Figure 6: Unintentional hazardous substance exposure events by top four classifications, top 20 substance names, 2017–2019.**



**Note:** Only the top 4 categories and the top 20 substances are listed. When there were multiple calls about the same exposure incident ('linked calls'), all linked calls were excluded.

**Data source:** National Poisons Centre 2020

Among the 'household anti-infective/cleaners' classification, toilet bowl discs (637 exposures) were the most common cause of unintentional exposures, followed by multi-purpose cleaners (565 exposures) and sanitisers (427 exposures; figure 6). Children can be attracted to bright, nice-smelling, attractively packaged items and items in packaging resembling food items (Safekids Aotearoa 2015).

Among 2,833 exposures involving the 'cosmetic' classification, 393 were related to creams/moisturisers, 389 to hand soaps, and 374 to nail polishers/removers (Figure 6).

Among 1,276 exposures involving the 'household detergent' classification, dishwashing liquid was the most common substance (645 exposures), followed by dishwashing powder (265 exposures) and dishwashing tablet (249 exposures; Figure 6).

Among 1,127 exposures involving the 'essential oils/ fragrances' classification, essential oils such as tea tree oil, eucalyptus oil and lavender oil were the most common substances (574 exposures), followed by reed diffusers (301 exposures) and air fresheners (211 exposures; Figure 6). Essential oils have gained popularity in recent years and are often marketed as a natural solution for stress, sleep problems and other illness. However, they can be dangerous when ingested (Lee et al 2019).

**Packaging of non-consumable substances such as cleaners and chemicals should not resemble the packaging design of a food product.**

**National Poisons Centre and Safekids Aotearoa recommend that all products should be locked up and away from where children can gain unsupervised access.**

**Source:** Safekids Aotearoa 2015

**Source:** National Poison Centre 2021 & Safekids Aotearoa 2015

## Eighty-seven percent of the exposures did not require a medical assessment

From 2017 to 2019, a total of 14,077 (87%) paediatric patients aged 0–14 years were given advice for self-treatment or that no treatment was required, while 246 (2%) cases required more information before definite advice could be given. A total of 1,513 patients (11%) were referred for medical assessment.

Substances that children may potentially be exposed to at home have different risk profiles for causing harm. Exposures to some substances present more risk than others. For example, the highest proportion of medical referrals per substance category was for paediatric patients who had ingested clove oil (80.0% referred), followed by drain cleaners (54.5%) and hair dyes (25.7%; Table 1).

Every exposure is unique and should be checked with the NPC to determine the safest course of action. Based on the risk assessment and potential harm, the NPC may recommend a child be evaluated by a GP or go to the hospital for further management, or the situation may be appropriate for staying at home.

**Table 1: Unintentional hazardous substance exposure events, by classification break down, medical referral status, 2017–2019**

Essential oils/fragrances	Medical referral n(%)		Total exposures
	Yes	No	
Clove oils	32 (80.0)	8 (20.0)	40
Reed diffusers	67 (22.2)	234 (77.8)	301
Essential oils	106 (18.5)	468 (81.5)	574
Air fresheners	21 (10.0)	190 (90.0)	211
<b>Household anti-infective/cleaners</b>			
Drain cleaners	6 (54.5)	5 (45.5)	11
Household bleach based cleaners	84 (21.9)	300 (78.1)	384
Bathroom cleaners	59 (19.9)	237 (80.1)	296
Kitchen cleaners	24 (19.0)	102 (81.0)	126
Disinfectant cleaners	60 (17.8)	278 (82.2)	338
Other cleaners	56 (14.9)	320 (85.1)	376
Sanitisers	58 (13.6)	369 (86.4)	427
Multi-purpose cleaners	52 (9.2)	513 (90.8)	565
Window/glass cleaners	9 (9.0)	90 (91.0)	99
Floor/carpet cleaners	8 (8.0)	92 (92.0)	100
Toilet bowl discs	4 (0.6)	633 (99.4)	637

Cosmetics			
Hair dyes	9 (25.7)	26 (74.3)	35
Oral health products	33 (13.4)	213 (86.6)	246
Nail polishers/removers	41 (11.0)	333 (89.0)	374
Hair stylings	6 (9.8)	55 (90.2)	61
Creams/moisturisers	30 (7.6)	363 (92.4)	393
Perfumes/deodorants	25 (7.3)	317 (92.7)	342
Sunscreens	9 (5.9)	144 (94.1)	153
Facial cleaners	4 (5.7)	66 (94.3)	70
Body skin care cleansers	13 (5.1)	244 (94.9)	257
Hair shampoos/conditioners	8 (3.9)	195 (96.1)	203
Makeups/removers	4 (3.0)	128 (97.0)	132
Other	5 (2.8)	171 (97.2)	176
Hand soaps	7 (1.8)	382 (98.2)	389
Household detergents			
Dishwashing powder	12 (4.5)	253 (95.5)	265
Dishwashing tablet	10 (4.0)	239 (96.0)	249
Dishwashing liquid	22 (3.4)	623 (96.6)	645

**Note:** Only the top 4 substance classification were listed. When there were multiple calls about the same exposure incident ('linked calls'), all linked calls were excluded.

**Data source:** National Poisons Centre 2020

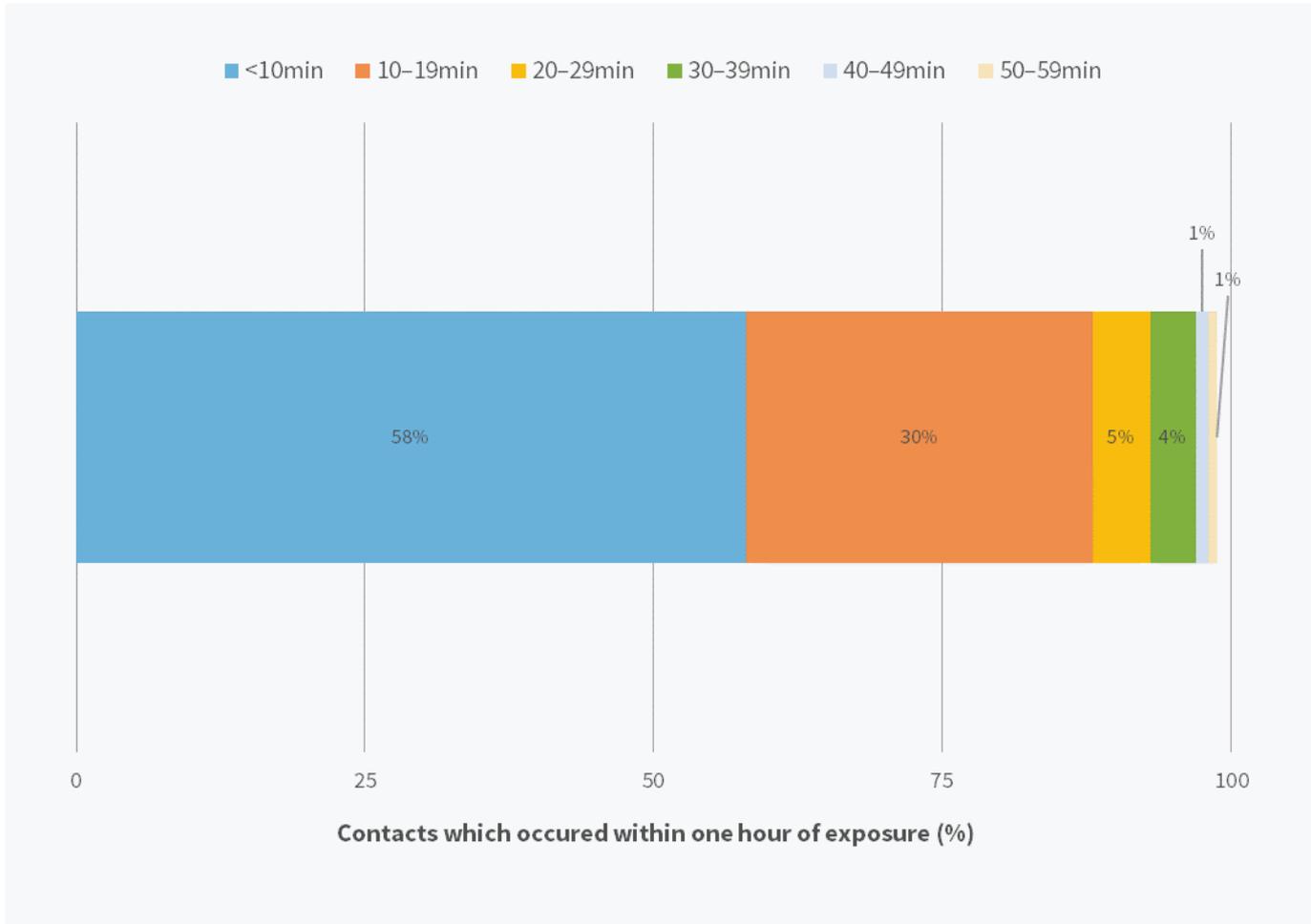
# Two-thirds of the exposures made contact with the NPC within an hour, which is vital for NPC to provide appropriate advice to the patient for any exposure or suspected exposures

From 2017 to 2019, the majority of the 9,487 exposures (67.4%) made contact with the NPC within an hour following exposure to hazardous substances; 699 (5.0%) were made between one and six hours and 1,366 (9.7%) after six hours. In 2525 cases (17.9%) the time of exposure was unknown.

Of the 9,487 calls that occurred within an hour, 58% (5,523 exposures) had contacted the NPC within 10 minutes following the exposure to hazardous substances (Figure 7).

Since the most common route of exposure was ingestion (81.8% of the cases), the onset of signs and symptoms may be delayed as it takes time to absorb the substance into the body. Hence it is expected no symptoms will be apparent for the majority of cases that contact the NPC early. However, it is still recommended to contact the NPC as soon as possible after an exposure occurs so a risk assessment can be performed and appropriate advice provided to safely manage the situation.

**Figure 7: Unintentional exposures to hazardous substances where contact with NPC was made within one hour, by proportion of contacts within time frames elapsed after exposure, 2017–2019**



**Note:** When there were multiple calls about the same exposure incident ('linked calls'), all linked calls were excluded.  
**Data source:** National Poisons Centre 2020

## Data for this indicator

This indicator analyses data from the National Poisons Centre (NPC) during 2017–2019. It provides information about the magnitude, characteristics and triage of unintentional child exposure to and poisoning enquiries from hazardous substances where a contact was made with the NPC in New Zealand. Contacting the NPC is voluntary, and therefore any exposures where no such contact was made are naturally not captured in these data.

All 95% confidence intervals have been presented as error bars on graphs. Unless otherwise stated, all differences mentioned in the text between two values are statistically significant at the 5% level or less.

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

## References

Glenn L. 2015. Pick your poison: What's new in poison control for the preschooler. *Journal of pediatric nursing*, 30(2), 395-401.

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## Other related topics include:

[Hazardous substances](#)

## Author

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## Citation

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## Acknowledgements

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## Further information

For descriptive information about the data [Q Metadata Sheet](#)