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Australian Institute of Health and Welfare

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Venomous bites and stings, 2017–18

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This report describes injury hospitalisations due to contact with venomous animals and plants in Australian hospitals in 2017–18.

Australia has a wide diversity of venomous animals and plants, found in both terrestrial and marine ecosystems. These include snakes, spiders, jellyfish and insects, all of which are capable of inflicting fatal bites or stings. Australia has 66 venomous species, some of which have the deadliest venom in the world.

Some of the world's most venomous marine animals are found in Australian waters; the box jellyfish, Irukandji jellyfish, marbled cone snail, blue ringed octopus and stonefish are among the world's top 10 most venomous animals (AVRU 2020).

Australia is also home to 20 of the 25 most venomous snakes in the world, including the top 10. The world's most venomous snake, the inland taipan, is found nowhere else on earth (AVRU 2020; Swan 2020).

The toxicity of venom is only one aspect of what makes bites and stings dangerous. Allergic reactions to the venom of bees and ants can also lead to hospitalisation and death.

Fortunately, deaths due to contact with venomous animals and plants are rare. The National Coronial Information System recorded 19 deaths in 2017–18 due to contact with venomous animals (7 with venomous snakes and 12 with bees and wasps). Nonetheless, many bites and stings due to contact with venomous species result in admission to hospital each year in Australia.

Key points

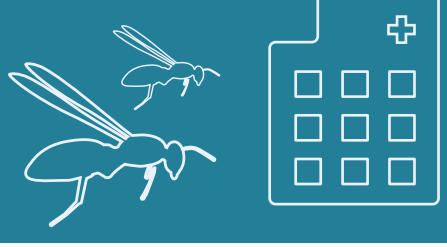
In 2017–18, **3,520** people were hospitalised due to contact with a **venomous animal or plant**. Almost twice as many **males** as **females** were hospitalised.

The highest rate of hospitalisation due to contact with **venomous animals and plants** occurred in the **Northern Territory** (**31 cases per 100,000 population**).

The **brown snake** was responsible for **215** of the **606** hospitalisations due to contact with a **venomous snake**.

There were **41** hospitalisations due to contact with the I**rukandji jellyfish**.

Bees were the most common type of **venomous animal** responsible for hospitalisations in **2017–18**.



AIHW

Hospitalisations due to contact with venomous animals or plants

In 2017–18, there were 3,520 cases of hospitalised injury due to contact with a venomous animal or plant (Table 1). The overall rate of hospitalisations was 14 cases per 100,000 population, with almost twice as many males as females hospitalised in 2017–18.

Table 1: Number and rate of injury hospitalisations due to contact with a venomous animal or plant, by age and sex, 2017–18

	Males	Females	Persons
Number of cases	2,206	1,314	3,520
Age-standardised (per 100,000 population)	17.9	10.5	14.2

Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants*.
2. Age-standardised to the 2001 Australian population (per 100,000), using 6 age groups (0–4, 5–14, 15–24, 25–44, 45–64, 65+).
3. Data underpinning this table can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Which species are included?

The category *Contact with venomous animals and plants* (X20–X29) contains codes covering a wide variety of venomous animals and plants. Within each subcategory, further detail is available on different species, most of which are specific to Australia. The categories are as follows:

X20 Contact with venomous snakes and lizards

X21 Contact with spiders

X22 Contact with scorpions

X23 Contact with hornets, wasps and bees

X24 Contact with centipedes and venomous millipedes (tropical)

X25 Contact with other venomous arthropods (includes ants, ticks and caterpillars)

X26 Contact with venomous marine animals and plants (includes jellyfish)

X27 Contact with other specified venomous animals

X28 Contact with other specified venomous plants

X29 Contact with unspecified venomous animal or plant.

Identifying the species that caused a bite or a sting is not always a simple task. The victim may misidentify the animal or plant causing the bite or sting (for example, identifying it as a brown snake when it was a black snake) or not have seen it. Only a limited number of snake species can be identified using a venom detection kit.

Length of stay for bite and sting cases

The length of stay for hospitalised venomous animal and plant cases was generally short.

Just over half of all cases were discharged on the day of admittance to hospital (51%, 1,794 cases). Nine of every 10 cases had a length of stay of 2 days or less (3,369 cases) and fewer than 1 of every 100 cases had a stay in hospital of more than a fortnight (10 cases).

A large proportion of venomous animal and plant cases occurred among older Australians, with almost half (46%) occurring in those aged 45 and over (Table 2). It was a similar pattern by age for males and females.

Table 2: Number of venomous animal and plant injury hospitalisations, by age and sex, 2017–18

	Males		Females		Persons	
Age group (years)	Number	%	Number	%	Number	%
0–4	98	4.4	59	4.5	157	4.5
5–14	233	10.6	110	8.4	343	9.7
15–24	241	10.9	136	10.4	377	10.7
25–44	673	30.5	357	27.2	1,030	29.3
45–64	656	29.7	457	34.8	1,113	31.6
65+	305	13.8	195	14.8	500	14.2
Total	**2,206**	**100.0**	**1,314**	**100.0**	**3,520**	**100.0**

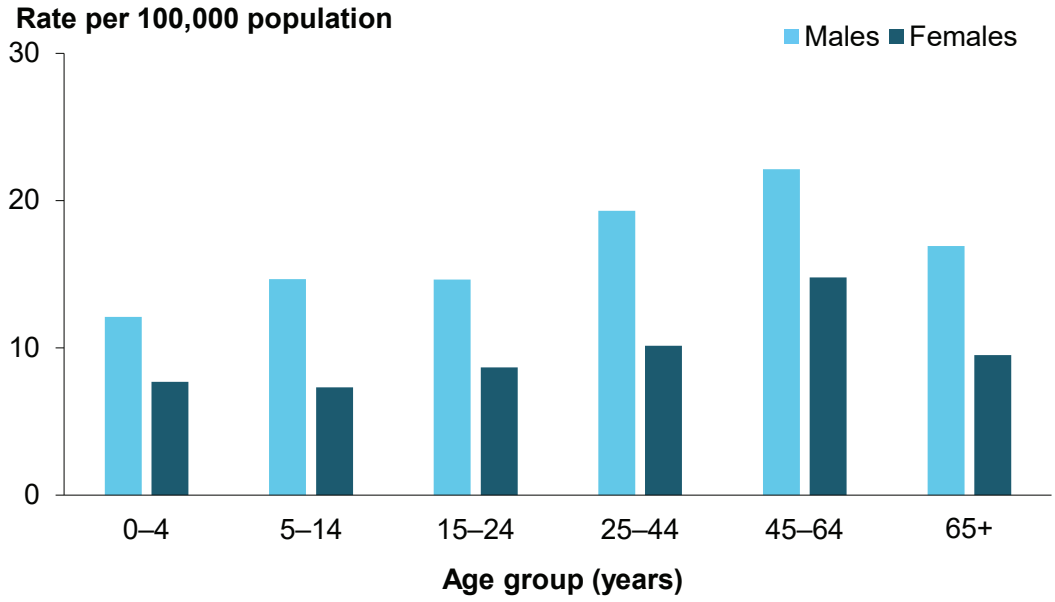
Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants*.
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

After adjusting for age and sex, the rate of hospitalisations due to *Contact with venomous animals and plants* was higher for males than for females for each age group examined (Figure 1). The highest rate of hospitalisation was 22 cases per 100,000 population in men aged 45–64. The rate of hospitalisations for women in that age group was 15 cases per 100,000, which was also the highest rate for females in any age group (Figure 1).

Figure 1: Age-specific rates of venomous animal and plant injury hospitalisations, by age and sex, 2017–18



Notes

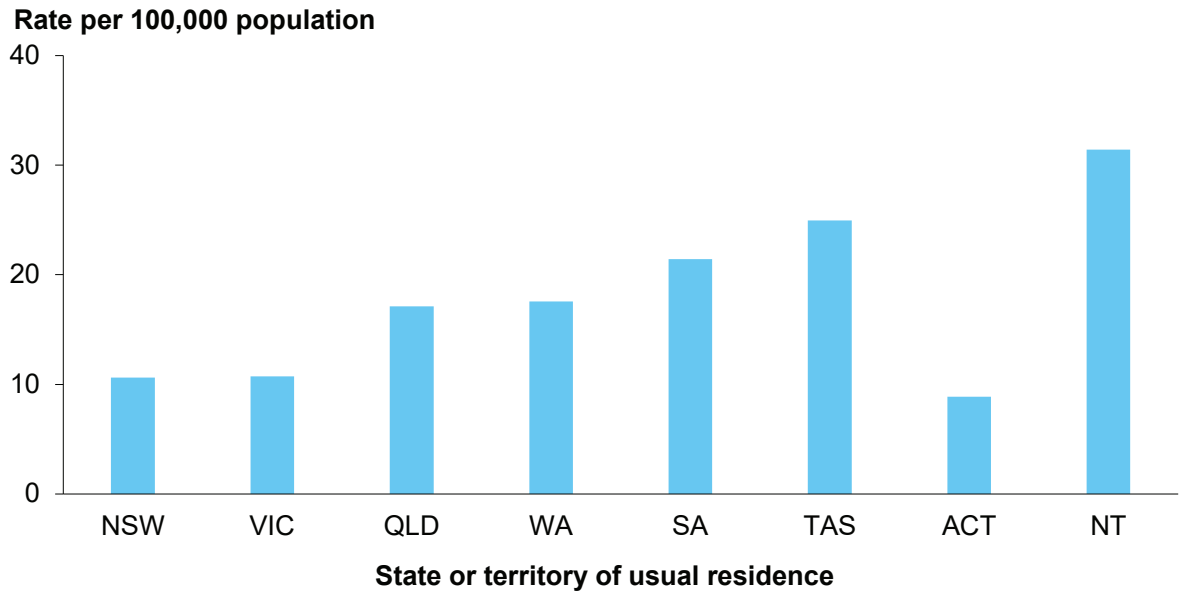
1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants.*
2. Data underpinning this chart can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

The rate of hospitalisations due to venomous animals and plants varied by state or territory of usual residence (Figure 2). The highest rate of hospitalisations occurred in the Northern Territory (31 cases per 100,000 population) and the lowest in the Australian Capital Territory (9 cases per 100,000). The distribution of hospitalised injury cases according to the person's state of usual residence largely reflected the known distributions of Australia's venomous species and/or the expected level of exposure to these creatures (AIHW: Bradley 2008).

The rate of bite and sting cases involving venomous animals and plants that required hospitalisation in 2017–18 increased linearly according to the remoteness of the person's place of usual residence (Figure 3). Residents of the *Major cities* of Australia had the lowest rate of injury hospitalisations (9 cases per 100,000 population) while the highest rate was observed for residents of the *Very remote* regions of Australia (49 cases per 100,000).

Figure 2: Age-standardised rates of injury hospitalisations due to *Contact with venomous animals and plants*, by state or territory of usual residence, 2017–18

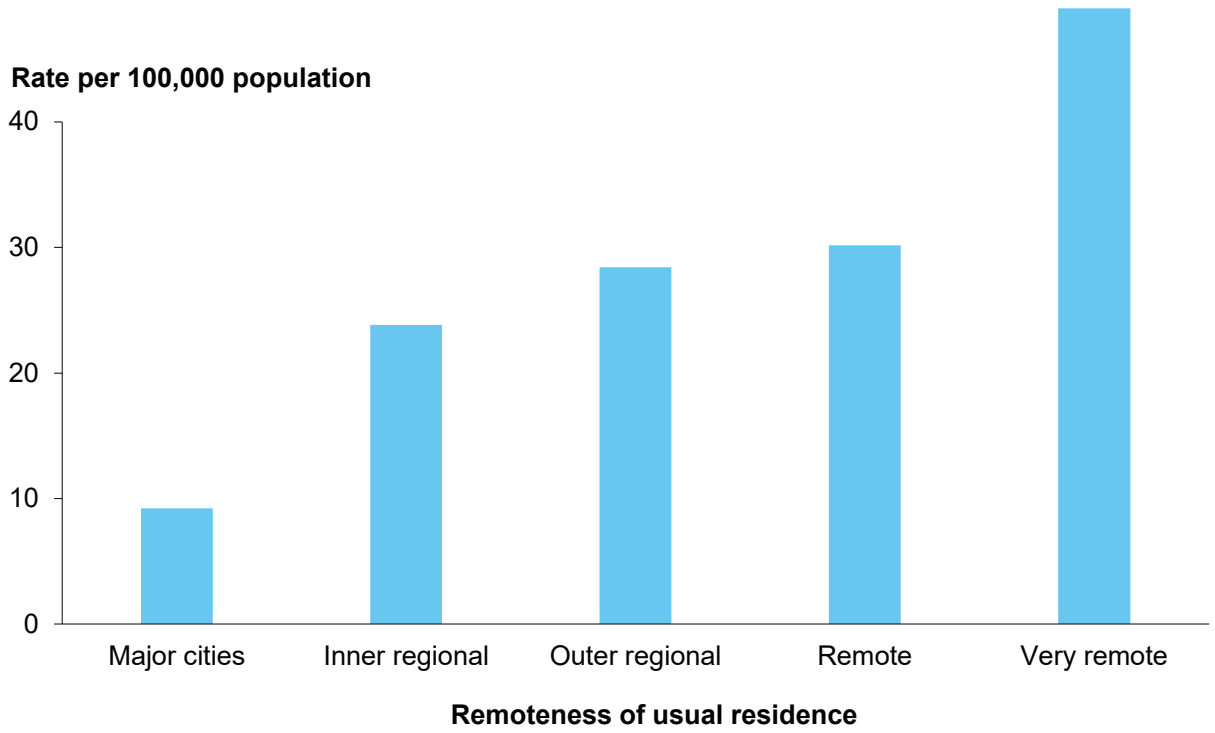


Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants.*
2. Age-standardised to the 2001 Australian population (per 100,000), using 5 age groups (0–14, 15–24, 25–44, 45–64, 65+).
3. Based on the patient's state of usual residence.
4. Data underpinning this table can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Figure 3: Age-standardised rates of injury hospitalisations due to *Contact with venomous animals and plants*, by remoteness of usual residence, 2017–18



Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants.*
2. Age-standardised to the 2001 Australian population (per 100,000), using 6 age groups (0–14, 15–24, 25–44, 45–64, 65+).
3. Data on the remoteness area of usual residence are defined using the Australian Bureau of Statistics' Australian Statistical Geography Standard Remoteness Structure 2011.
4. Data underpinning this table can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Type of venomous animals and plants

The most common category of venomous animal responsible for hospitalisations in 2017–18 were hornets, wasps and bees (Table 3). There were similar proportions of hospitalisations due to *Contact with hornets, wasps and bees* among males and females. Spider bites were the second most common cause of hospitalisations, with spider envenomations being more common among females (22%) than males (17%). Very few cases of contact with specified venomous plants (which includes injection of poisons or toxins into or through the skin by plant thorns, spines or other mechanisms) were recorded in 2017–18 (7 cases).

Table 3: Number of injury hospitalisations due to *Contact with venomous animals and plants*, by type of contact and sex, 2017–18

	Males		Females		Persons	
Contact with:	**Number**	**%**	**Number**	**%**	**Number**	**%**
Hornets, wasps and bees	840	38.1	425	32.3	1,265	35.9
Spiders	382	17.3	284	21.6	666	18.9
Snakes	402	18.2	206	15.7	608	17.3
Ants, ticks and caterpillars (other venomous arthropods)	252	11.4	226	17.2	478	13.6
Marine animals and plants	278	12.6	115	8.8	393	11.2
Centipedes and millipedes (tropical)	n.p	n.p	n.p	n.p	21	0.6
Scorpions	n.p	n.p	n.p	n.p	6	0.2
Other specified animals	13	0.6	9	0.7	22	0.6
Other specified plants	n.p	n.p	n.p	n.p	7	0.2
Unspecified animal or plant	27	1.2	27	2.1	54	1.5
Total	**2,206**	**100.0**	**1,314**	**100.0**	**3,520**	**100.0**

n.p Not publishable due to small numbers and confidentiality concerns

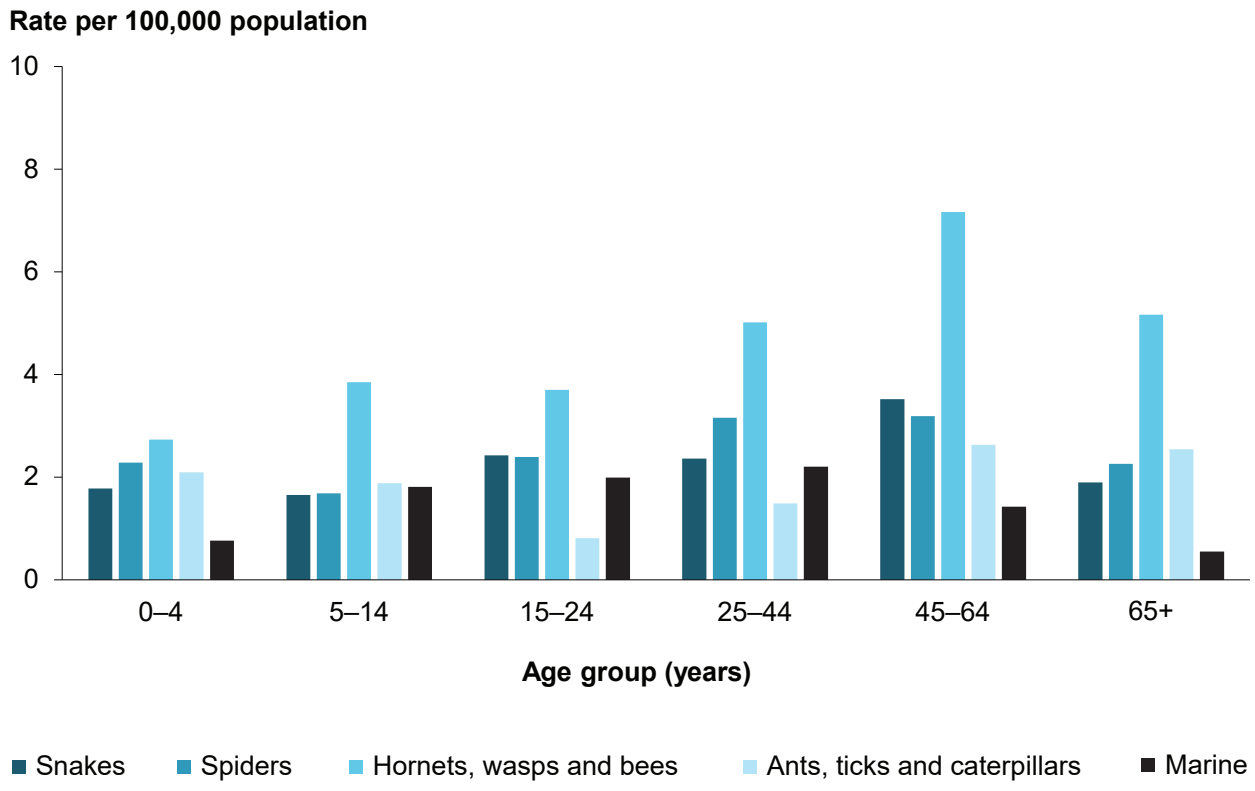
Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants*.
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Apart from high rates of hospitalisations due to *Contact with hornets, wasps and bees* in each age group, there were some differences in the types of *Contact with venomous animals and plants* by age (Figure 4). Spider bites were the second most common source of contact for children aged 0–4 (2.3 cases per 100,000 population) whereas snake bites were the second most common source of contact for those aged 45–64 (3.5 cases per 100,000). For those aged 65+, the rate of hospitalisation for contact with ants, ticks and caterpillars was 2.5 cases per 100,000.

Figure 4: Age-specific rates of selected injury hospitalisations due to *Contact with venomous animals and plants*, by age group, 2017–18



Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants*.
2. Data underpinning this chart can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Nature of injury

The principal diagnoses attributed to *Contact with venomous animals and plants* varied. They included open wounds and superficial injuries associated with the bite or sting itself, and a poisoning or toxic effect from the animal or plant's venom. Most hospitalised cases for *Contact with venomous animals and plants* were for a poisoning or toxic effect (73%, 2,583 cases) (Table 4). A quarter of all cases of *Contact with venomous animals and plants* caused an open wound or superficial injury.

Antivenom and envenomation

In cases of envenomation from a snake or spider bite, T63.0 'Toxic effect of contact with venomous animals, snake venom' or T63.3 'Toxic effect of contact with venomous animals, venom of spider' should be assigned as the principal diagnosis code. If there are no signs of envenomation and no antivenom administered, a code for open wound or superficial injury is used.

Detailed information on the coding standards for *Contact with venomous animals and plants* is available in Australian Coding Standard 1923 of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification.

Antivenom

There are 5 monovalent antivenoms (where antivenom is obtained from a single species) for use in treating Australian land snake bites (brown, tiger, black, death adder, taipan), a sea snake antivenom and various exotic antivenoms used to treat bites from non-Australian venomous snakes (for example, those kept in zoos). Where the species of snake is not identified, a polyvalent antivenom (where antivenom is obtained from 2 or more species) is also available, combining all 5 monovalent antivenoms.

Antivenoms are also available for stonefish, paralysis tick, redback spider and funnel web spider.

Table 4: Nature of injury for injury hospitalisations due to *Contact with venomous animals and plants*, by sex, 2017–18

	Males		Females		Persons	
Nature of injury:	Number	%	Number	%	Number	%
Poisoning or toxic effect	1,582	71.7	1,001	76.2	2,583	73.4
Open wound	502	22.8	226	17.2	728	20.7
Superficial injury	88	4.0	73	5.6	161	4.6
All other types of injury	34	1.5	14	1.1	48	1.4
Total	**2,206**	**100.0**	**1,314**	**100.0**	**3,520**	**100.0**

Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants.*
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

What is meant by '*Contact with venomous animals and plants*'?

Envenomation is the process by which venom is injected by the bite or sting of a venomous animal. In the case of plants, needle-like hairs act like tiny hypodermic needles that inject venom. Contact with a venomous animal or plant does not necessarily result in envenomation but could result in a cut or bite that would be coded as an open wound or superficial injury.

Envenomation is the toxic effect of contact with a venomous plant or animal and includes chemical released by animals and insects. Venom is released through fangs, hairs, spines, tentacles and other venom apparatus.

In cases of envenomation from snake bites or spider bites, clinical coders are instructed to assign T63.0 'Toxic effect of contact with venomous animals, snake venom' or T63.3 'Toxic effect of contact with venomous animals, venom of spider' as the principal diagnosis. As well as these 2 codes, there are 6 others in T63 identifying a type of toxic effect (Table 5). The use of T63 is not solely restricted to the principal diagnosis field; therefore, the total number of venomous animals and plants cases with a T63 diagnosis code in the record is higher than the poisoning or toxic effects cases described in Table 4. A high proportion of cases had a diagnosis code of 'Toxic effect of venom of other arthropods' which includes insect bites or stings (65%).

Table 5: Toxic effect of contact with venomous animals, by sex, 2017–18

	Males		Females		Persons	
Toxic effect of:	**Number**	**%**	**Number**	**%**	**Number**	**%**
Snake venom	107	6.7	54	5.3	161	6.1
Venom of scorpion	n.p	n.p	n.p	n.p	5	0.2
Venom of spider	299	18.6	232	22.8	531	20.2
Venom of other arthropods	1,057	65.8	635	62.4	1,692	64.5
Contact with fish	39	2.4	9	0.9	48	1.8
Contact with other marine animals	62	3.9	50	4.9	112	4.3
Contact with other venomous animals	18	1.1	12	1.2	30	1.1
Contact with unspecified venomous animal	n.p	n.p	n.p	n.p	46	1.8
Total	**1,607**	**100.0**	**1,018**	**100.0**	**2,625**	**100.0**

n.p Not publishable due to small numbers and confidentiality concerns

Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants*.
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Wasps and bees

Contact with hornets, wasps and bees was the most common type of external cause for hospitalised injury cases due to contact with a venomous animal or plant in 2017–18, being listed as the first external cause for 1,265 cases. This represents more than a third of all hospitalisations due to *Contact with venomous animals and plants* in this period (36%). The age-standardised rate of *Contact with hornets, wasps and bees* was 5.0 cases per 100,000 population. There were no recorded cases of hornet stings. There was a single case with 2 different species listed in the record as *Contact with hornets, wasps and bees*. The first listed species was a bee, followed by a wasp. The case has been included in the counts for bees only.

Type of wasps and bees

There were more hospitalisations due to bees (927 cases) than to wasps (329 cases) in 2017–18 (*Table 6*). There was very little information on the specific types of wasp or bee. The honey bee was the most commonly specified type of bee associated with a hospitalisation, while the paper wasp was the most commonly specified type of wasp.

Table 6: Type of wasp and bee associated with wasp and bee injury hospitalisations, by sex, 2017–18

	Males		Females		Persons	
Contact with wasp	**Number**	**%**	**Number**	**%**	**Number**	**%**
Paper wasp	19	2.3	7	1.6	26	2.1
Other specified wasp (including Yellow jacket wasp)	9	1.1	5	1.2	14	1.1
Unspecified wasp	179	21.3	110	25.9	289	22.8
Subtotal	***207***	***24.7***	***122***	***28.7***	***329***	***26.0***
Contact with bee						
Honey bee	27	3.2	9	2.1	36	2.8
Other specified bee (including Bumble bee and Native bee)	14	1.7	13	3.1	27	2.1
Unspecified bee	586	69.8	278	65.4	864	68.3
Subtotal	***627***	***74.6***	***300***	***70.6***	***927***	***73.3***
Unspecified as to hornet, wasp and bee	6	0.7	3	0.7	9	0.7
Total	**840**	**100.0**	**425**	**100.0**	**1,265**	**100.0**

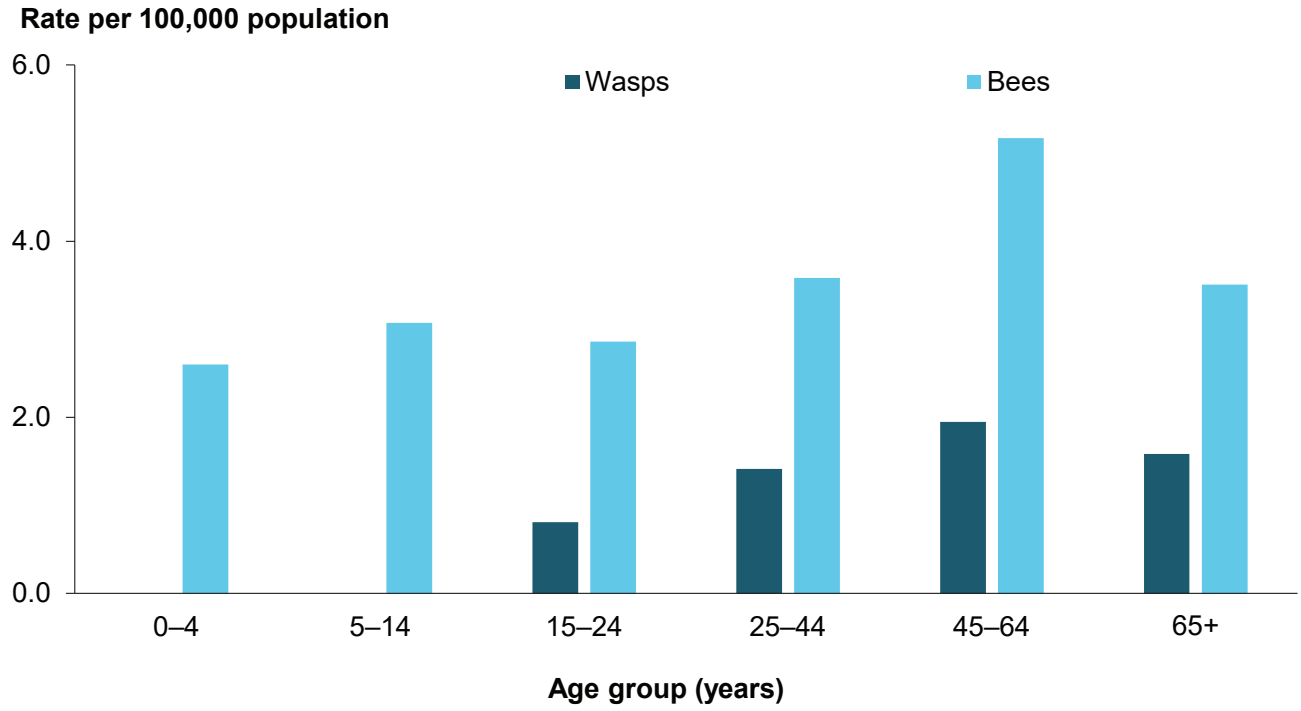
Notes

1. Cases include those that have an external cause code anywhere in the record of X20–X29 *Contact with venomous animals and plants.*
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

The rates of hospitalisations for wasps and bees by age group are shown in Figure 5; the rates for unspecified types of hornet, wasp and bee are not shown due to small numbers. The rate of bee injury hospitalisations was higher in each age group compared with wasp injury hospitalisations. The highest rate of bee injury hospitalisations occurred among people aged 45–64 (5.2 cases per 100,000 population). Wasp injury hospitalisations were also highest for those aged 45–64 (1.9 cases per 100,000). There were only 43 cases of hospitalisation due to hornet, wasp and bee stings for those aged 0–4.

Figure 5: Age-specific rate of wasp and bee injury hospitalisations for selected species, by age group, 2017–18



Notes

1. Rates based on underlying categories with fewer than 10 cases have been suppressed.
2. Data underpinning this chart can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Principal diagnosis

Almost all wasp and bee (97% each) injury hospitalisations in 2017–18 were coded with a principal diagnosis meaning venomous insect bite or sting (T63.4).

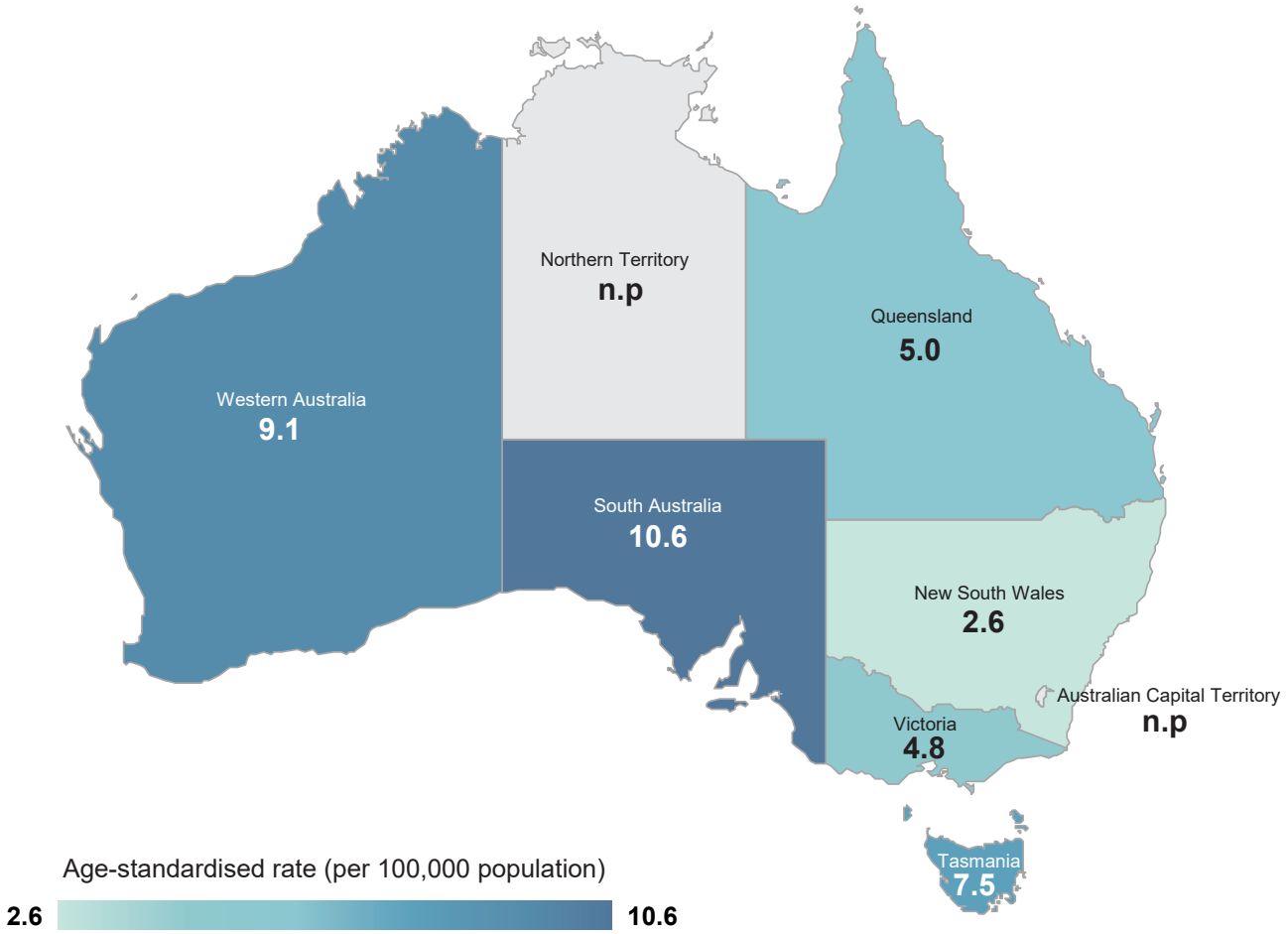
Place of occurrence

A fifth of wasp and bee injury hospitalisations occurred in and around people's homes (22%, 273 cases), but the majority had no information on place of occurrence (64%, 809 cases).

Distribution by state and territory of usual residence

Wasp and bee stings appear to have a very different pattern of occurrence according to the person's state of usual residence (Figure 6). The age-standardised rate of wasp and bee sting cases was noticeably higher for residents of South Australia (11 cases per 100,000 population) and Western Australia (9.1 cases per 100,000), despite various species of venomous bees, including the introduced honeybee, being nationally widespread. The rate of hospitalisation as a result of wasp and bee injury was lowest for residents of New South Wales (2.6 cases per 100,000).

Figure 6: Age-standardised rate of wasp and bee injury hospitalisations, by state and territory of usual residence, 2017–18



n.p Not publishable due to small numbers and confidentiality concerns

Notes

1. Cases include those that have an external cause code anywhere in the record of X23 *Contact with hornets, wasps and bees.*
2. Age-standardised to the 2001 Australian population (per 100,000), using 5 age groups (0–14, 15–24, 25–44, 45–64, 65+).
3. Based on the patient's state of usual residence.
4. Rates based on underlying categories with fewer than 10 cases have been suppressed.
5. Data underpinning this map can be found in the accompanying supplementary spreadsheets

Source: AIHW National Hospital Morbidity Database.

Spiders

Contact with spiders was the second most common type of external cause for hospitalised injury cases due to contact with a venomous animal or plant in 2017–18, being listed as the first external cause for 666 cases. This represents a fifth of all hospitalisations due to *Contact with venomous animals and plants* in this period (19%). The age-standardised rate of *Contact with spiders* was 2.7 cases per 100,000 population.

Type of spider

The type of spider was unknown in just under half of all cases (45%, 300 cases) (Table 7). The most common type of spider identified was the redback (42%, 283 cases). Redback spiders are found throughout Australia. Almost half of all cases had an unidentified spider, with many patients presenting without a definite bite history or without identification of the offending creature if a bite has been felt.

Table 7: Type of spider for injury hospitalisations for *Contact with spider*, by sex, 2017–18

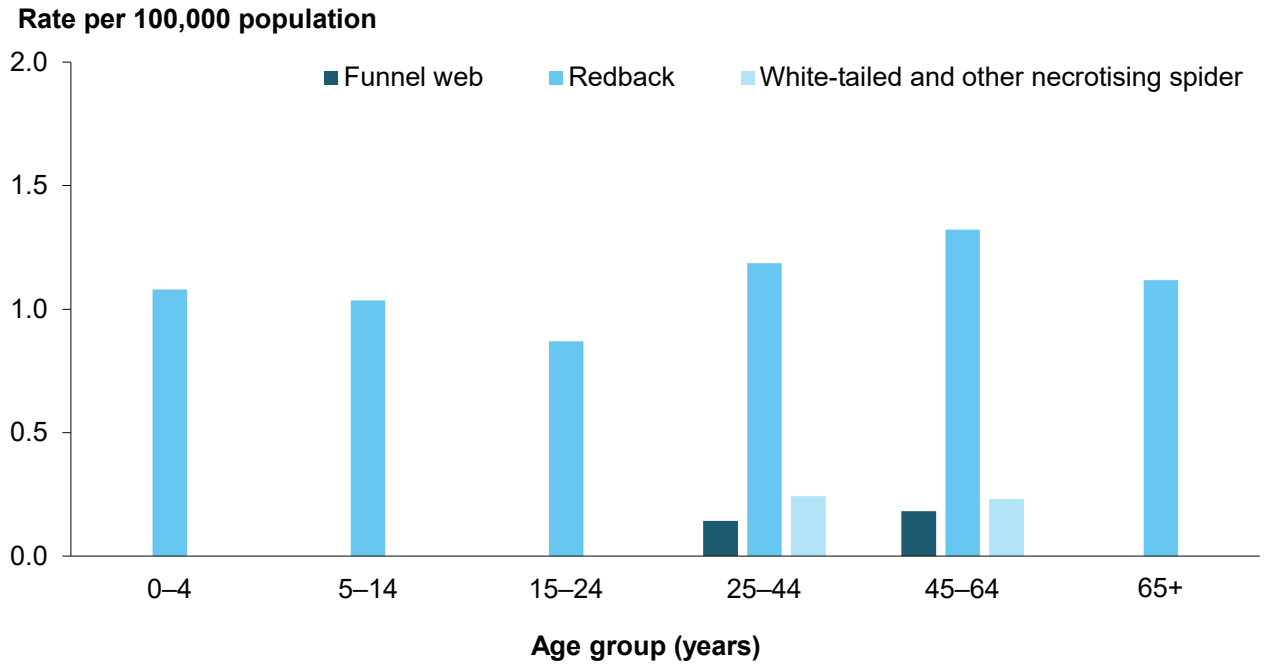
	Males		Females		Persons	
Type of spider:	**Number**	**%**	**Number**	**%**	**Number**	**%**
Funnel web	21	5.5	4	1.4	25	3.8
Redback	161	42.1	122	43.0	283	42.5
White-tailed and other necrotising spider	22	5.8	16	5.6	38	5.7
Other specified spider	7	1.8	13	4.6	20	3.0
Unspecified spider	171	44.8	129	45.4	300	45.0
Total	**382**	**100.0**	**284**	**100.0**	**666**	**100.0**

Note: Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

The rates of hospitalisations for the 3 most common types of spider by age group are shown in Figure 7. The highest rate of spider bite injury hospitalisations was caused by the redback spider in every age group, with the highest rate among people aged 45–64 (1.3 cases per 100,000 population). Funnel web and white-tailed spider bites were mostly seen in the older age groups.

Figure 7: Age-specific rate of injury hospitalisations for *Contact with spider* for selected species, by age group, 2017–18



Notes

1. Rates based on underlying categories with fewer than 10 cases have been suppressed.
2. Data underpinning this chart can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Principal diagnosis and antivenom use

Three-quarters (78%) of all hospitalised cases due to *Contact with venomous spiders* (522 cases) in 2017–18 were coded with a principal diagnosis of 'Toxic effect of spider venom' (T63.3). (Table 8). Of those cases with a T63.3 diagnosis, 26 (5%) were administered antivenom while in hospital. Antivenoms are available for redback and funnel web spider bites.

Table 8: Diagnosis and treatment for injury hospitalisations for *Contact with spider*, by type of spider, 2017–18

	Spider bite cases		
Type of spider:	Number of cases	Principal diagnosis of 'Toxic effect of spider venom' (T63.3)	Antivenom administered
Funnel web	25	19	0
Redback	283	271	26
White-tailed and other necrotising spider	38	28	0
Other specified spider	20	16	0
Unspecified spider	300	188	0
Total	**666**	**522**	**26**

Note: Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

For those cases without a principal diagnosis of 'Toxic effect of spider venom', 42 were superficial or open wounds to the wrist or hand and 31 were superficial or open wounds to the ankle and foot.

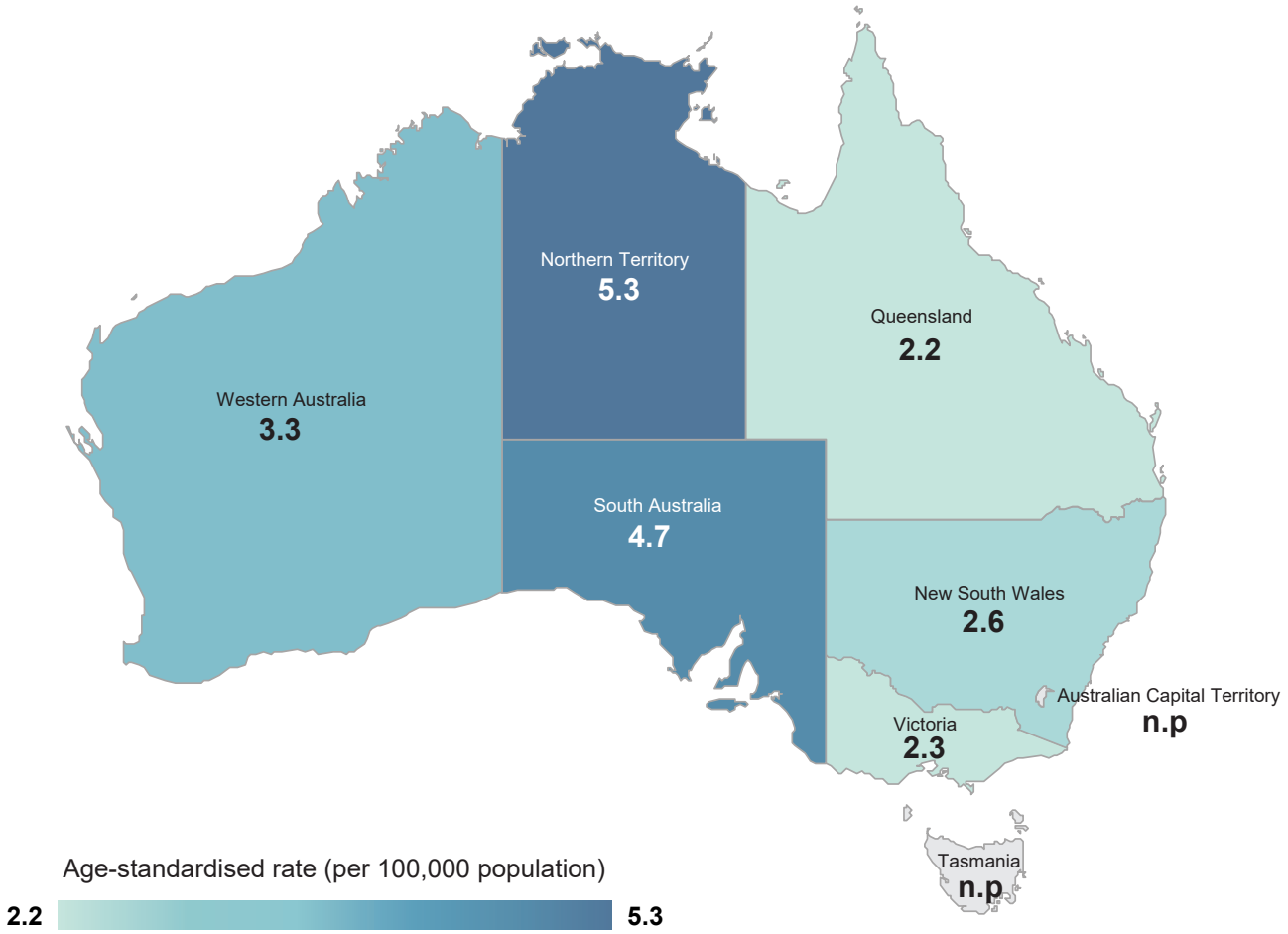
Place of occurrence

A third of venomous spider bites occurred in and around people's homes (221 cases) but the majority had no information on place of occurrence (56%, 375 cases).

Distribution by state and territory of usual residence

Venomous spiders—including the red back spider, which is responsible for most spider bite cases—are widespread throughout Australia; however, the distribution of cases by state and territory varies considerably (Figure 8). Residents of the Northern Territory (5.3 cases per 100,000 population) and South Australia (4.7 cases per 100,000) generally had the highest rate of hospitalised spider bites, while residents of Tasmania had the lowest rate (data are not shown due to small case numbers). Age-standardised rates of hospitalised spider bite cases were also quite low for residents of Victoria and Queensland.

Figure 8: Age-standardised rate of injury hospitalisations for venomous spider bite, by state and territory of usual residence, 2017–18



n.p Not publishable due to small numbers and confidentiality concerns

Notes

1. Cases include those that have an external cause codes anywhere in the record of *X21 Contact with spiders.*
2. Age-standardised to the 2001 Australian population (per 100,000), using 5 age groups (0–14, 15–24, 25–44, 45–64, 65+).
3. Based on the patient's state of usual residence.
4. Rates based on underlying categories with fewer than 10 cases have been suppressed.
5. Data underpinning this map can be found in the accompanying supplementary spreadsheets

Source: AIHW National Hospital Morbidity Database.

Venomous snakes

Contact with venomous snakes was listed as the first occurring external cause for 606 hospitalised injury cases due to contact with a venomous animal or plant. The age-standardised rate of *Contact with venomous snakes* was 2.4 cases per 100,000 population.

Two other cases containing a *Contact with venomous snakes* code had a first external cause of *Contact with powered lawnmower* and *Bitten or crushed by snake, unknown whether venomous or nonvenomous*. Because *Contact with venomous snakes* was not the first external cause for these cases, they were not included in this section, but they were included in the number of injury hospitalisations due to *Contact with venomous animals and plants* (Table 3).

Although not included in this report, there were another 1,684 cases of *Bitten or crushed by snake*, unknown whether venomous or nonvenomous (1,028 males, 656 females) and a further 259 cases of *Bitten or crushed by nonvenomous snake* (160 males, 99 females).

There were 3 cases with 2 different species listed in the record as *Contact with venomous snakes*. Two cases had the first listed species as a brown snake, followed by a tiger snake; the third case had a tiger snake as the first listed species, followed by a brown snake. Cases were assigned to a species category on the basis of the first occurring code in the record.

Type of snake

The type of snake was unknown in around a third of all cases (34%, 208 cases) (Table 9). The most common type of snake associated with *Contact with venomous animals and plants* were brown snakes (36%, 215 cases). Brown snakes are widely distributed throughout Australia. Taipans and sea-snakes accounted for the least number of cases. The taipan is considered to be the most venomous snake in the world and is found in remote and semi-arid regions in Queensland and South Australia. There were only 7 cases due to contact with a taipan in 2017–18.

Table 9: Type of snake for *Contact with snake* injury hospitalisations, by sex, 2017–18

	Males		Females		Persons	
Type of snake:	**Number**	**%**	**Number**	**%**	**Number**	**%**
Brown snake	141	35.1	74	36.3	215	35.5
Black snake	55	13.7	28	13.7	83	13.7
Tiger snake	44	10.9	21	10.3	65	10.7
Taipan	7	1.7	0	0.0	7	1.2
Death adder	n.p	n.p	n.p	n.p	10	1.7
Sea-snake	n.p	n.p	n.p	n.p	4	0.7
Other specified venomous snake	n.p	n.p	n.p	n.p	14	2.3
Unspecified venomous snake	135	33.6	73	35.8	208	34.3
Total	**402**	**100.0**	**204**	**100.0**	**606**	**100.0**

n.p Not publishable due to small numbers and confidentiality concerns

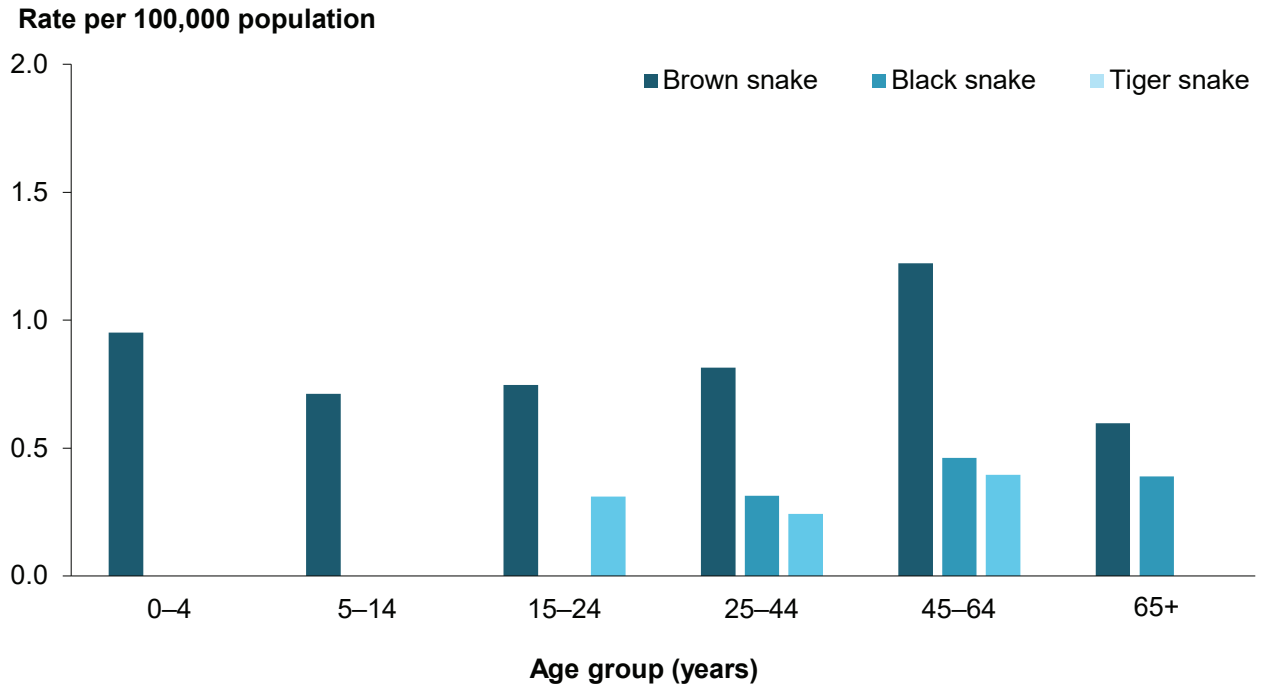
Notes

1. Cases include those that have a primary or first external cause code in the record of *X20 Contact with venomous snakes and lizards*.
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

The rates of hospitalisations for the 3 most common types of snake by age group are shown in Figure 9. The highest rate of injury hospitalisations for snake bite was caused by a brown snake in every age group, with the highest rate among people aged 45–64 (1.2 cases per 100,000 population). There were no tiger snake bites among the youngest age group.

Figure 9: Age-specific rate of *Contact with snake* injury hospitalisations for selected species, by age group, 2017–18



Notes

1. Cases include those that have a primary or first external cause code in the record of X20 *Contact with venomous snakes and lizards.*
2. Rates based on underlying categories with fewer than 10 cases have been suppressed.
3. Data underpinning this chart can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Principal diagnosis and antivenom use

Just over one-quarter (27%) of all hospitalised cases due to *Contact with venomous snakes* (161 cases) in 2017–18 were coded with a principal diagnosis meaning 'Toxic effect of snake venom' (T63.0) (Table 10). Of those cases with a T63.0 diagnosis, 86 (53%) were administered antivenom while in hospital.

Table 10: Diagnosis and treatment for *Contact with snake* injury hospitalisations, by type of snake, 2017–18

Type of snake:	Snake bite cases		
	Number of cases	Principal diagnosis of 'Toxic effect of snake venom' (T63.3)	Antivenom administered
Brown snake	215	52	27
Black snake	83	22	8
Tiger snake	65	35	24
Taipan	7	4	2
Death adder	10	4	1
Sea-snake	4	2	0
Other specified venomous snake	14	2	1
Unspecified venomous snake	208	40	23
Total	**606**	**161**	**86**

Notes

1. Cases include those that have a primary or first external cause code in the record of X20 *Contact with venomous snakes and lizards*.
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

For those cases without a principal diagnosis of 'Toxic effect of snake venom' (448 cases), 442 had a principal diagnosis of an open wound. Of the open wound cases, 31% (139 cases) were to the wrist and hand and 45% (200 cases) to the ankle and foot.

Place of occurrence

The majority of venomous snake bites occurred in and around people's homes (46%) (Table 11). A larger proportion of females than males were bitten by snakes at home and on farms.

Table 11: Place of occurrence of *Contact with venomous snakes*, by sex, 2017–18

	Males		Females		Persons	
Place of occurrence:	**Number**	**%**	**Number**	**%**	**Number**	**%**
Home	172	42.9	107	52.2	279	46.0
Farm	26	6.5	19	9.3	45	7.4
Beach	12	3.0	6	2.9	18	3.0
Forest	19	4.7	6	2.9	25	4.1
All other specified places	56	14.0	21	10.2	77	12.7
Unspecified/not reported	116	28.9	46	22.4	162	26.7
Total	**401**	**100.0**	**205**	**100.0**	**606**	**100.0**

Notes

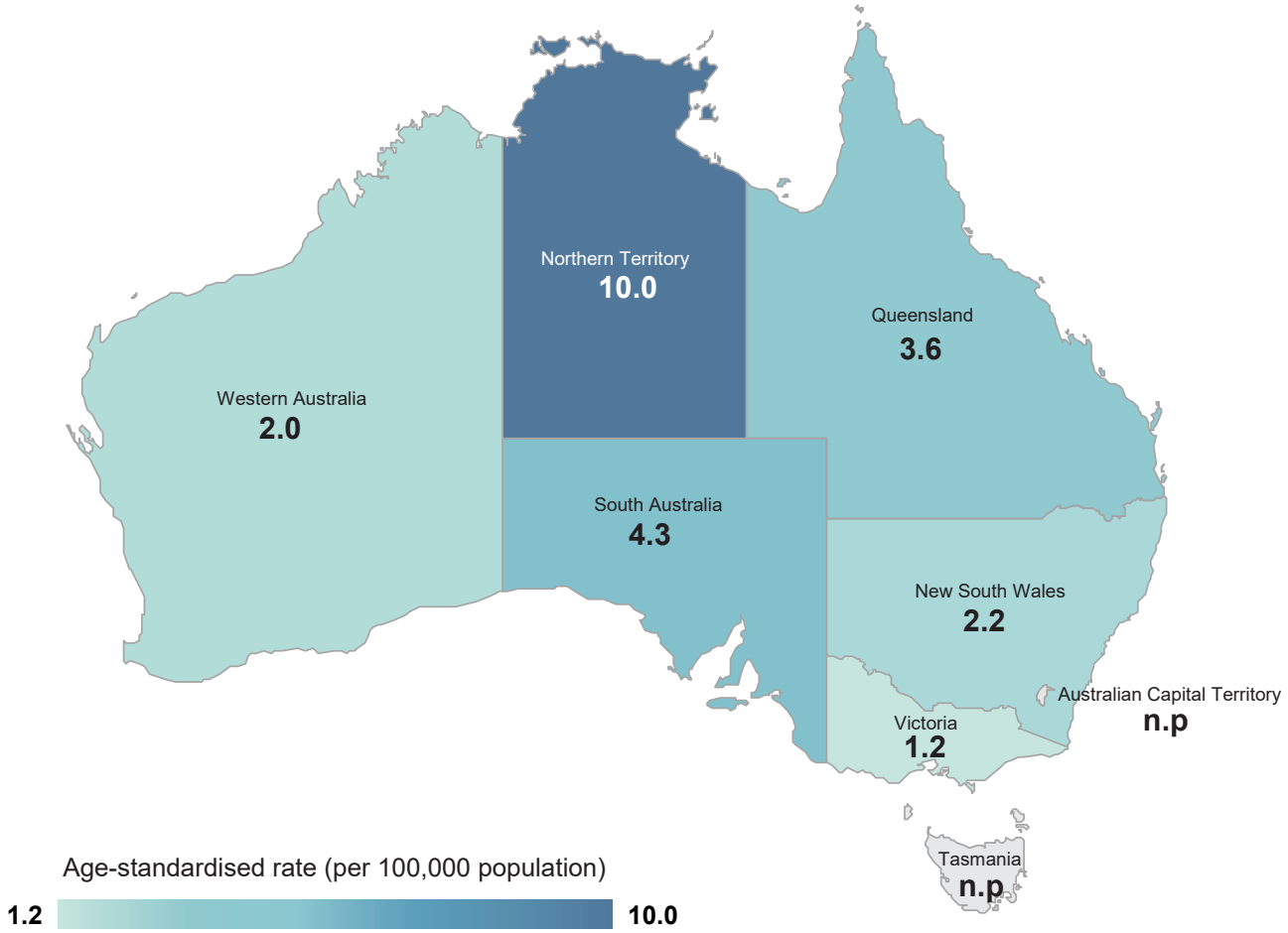
1. Cases include those that have a primary or first external cause code in the record of X20 *Contact with venomous snakes and lizards*.
2. Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Distribution by state and territory of usual residence

Brown and black snakes (the most identified types of snake causing hospitalisations) are widely distributed throughout most of Australia. The rate of hospitalisations due to snake bite, however, varied widely according to the person's state of usual residence (Figure 10). Residents of the Northern Territory had the highest rate of hospitalised snake bite (10 cases per 100,000 population) while residents of Victoria had the lowest rate (1.2 cases per 100,000).

Figure 10: Age-standardised rate of venomous snake bite injury hospitalisations, by state and territory of usual residence, 2017–18



n.p Not publishable due to small numbers and confidentiality concerns

Notes

1. Cases include those that have a primary or first external cause code in the record of *X20 Contact with venomous snakes and lizards.*
2. Age-standardised to the 2001 Australian population (per 100,000), using 5 age groups (0–14, 15–24, 25–44, 45–64, 65+).
3. Based on the patient's state of usual residence.
4. Rates based on underlying categories with fewer than 10 cases have been suppressed.
5. Data underpinning this map can be found in the accompanying supplementary spreadsheets

Source: AIHW National Hospital Morbidity Database.

Ants, ticks and caterpillars (*Other venomous arthropods*)

Contact with ants, ticks and caterpillars (*Contact with other venomous arthropods*) accounted for 14% (478 cases) of hospitalised injury cases due to *Contact with a venomous animal or plant* in 2017–18. The age-standardised rate of contact with ants, ticks and caterpillars was 1.9 cases per 100,000 population.

Type of ants, ticks and caterpillars

The type of arthropod was unknown in around a fifth of all cases (19%, 89 cases) (Table 12). The most common type of arthropod associated with a venomous animal and plant hospitalisation was an ant (42%, 203 cases), followed by a venomous tick (30%, 144 cases). Of the ant species included, the jumper and bull ant category accounted for the most hospitalisations.

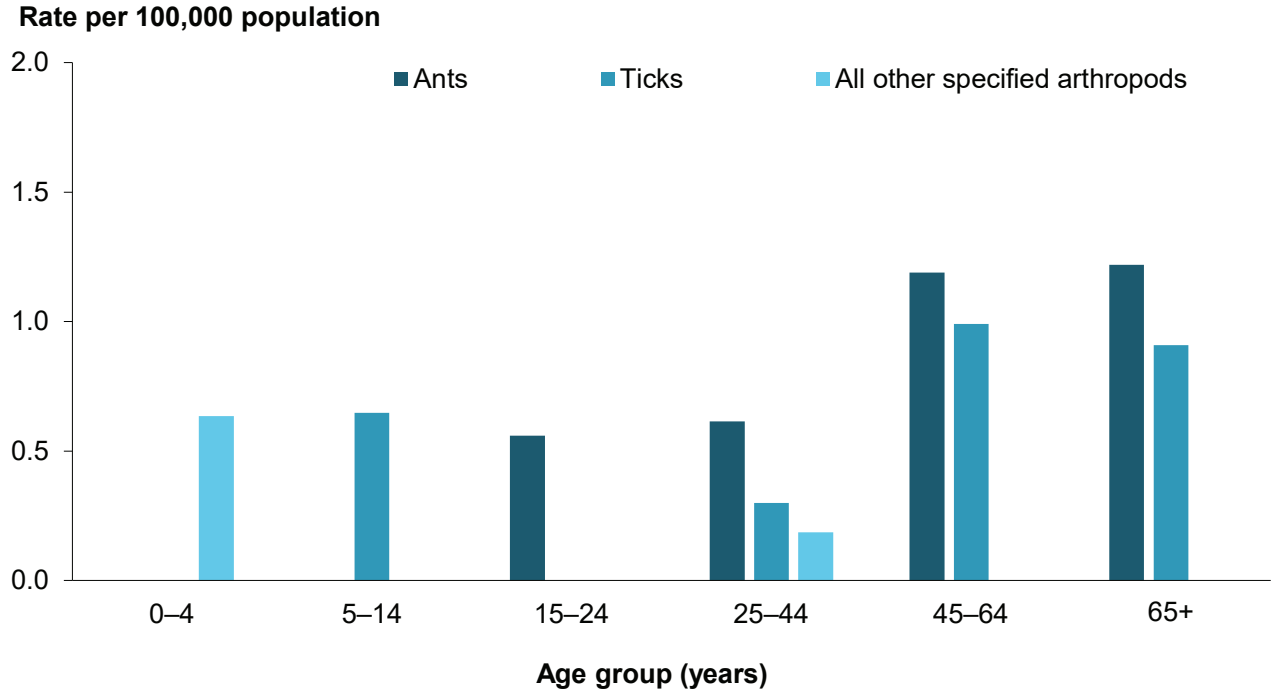
Table 12: Type of injury hospitalisations for contact with ants, ticks and caterpillars, by sex, 2017–18

	Males		Females		Persons	
Type of arthropod:	Number	%	Number	%	Number	%
Jumper and bull ant	61	24.2	63	27.9	124	25.9
Green ant	7	2.8	5	2.2	12	2.5
Other specified venomous ant (includes fire ant)	11	4.4	7	3.1	18	3.7
Unspecified venomous ant	23	9.1	26	11.5	49	10.3
Venomous tick	78	31.0	66	29.2	144	30.1
Other venomous arthropod (includes venomous and urticating caterpillar)	26	10.3	16	7.1	42	8.7
Unspecified venomous arthropod	46	18.3	43	19.0	89	18.6
Total	**252**	**100.0**	**226**	**100.0**	**478**	**100.0**

Note: Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

Figure 11: Age-specific rate of injury hospitalisations due to contact with ants, ticks and other arthropods, by age group, 2017–18



Notes

1. Rates based on underlying categories with fewer than 10 cases have been suppressed.
2. Data underpinning this chart can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Principal diagnosis

Almost all hospitalisations for *Contact with venomous animals and plants* by ants, ticks and all other arthropods in 2017–18 were coded with a principal diagnosis meaning 'Venom of other arthropods' (T63.4) (85% each).

Place of occurrence

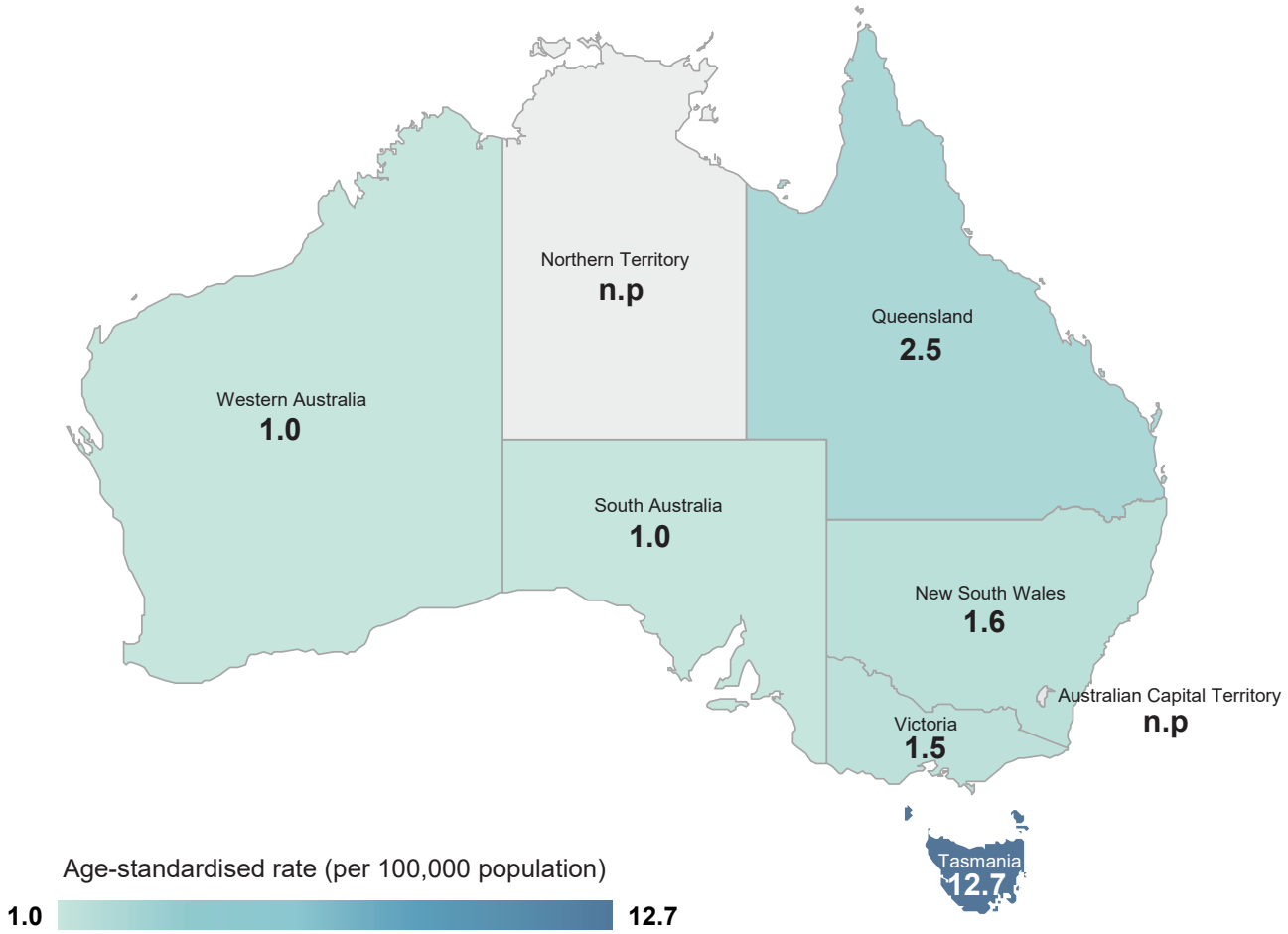
A quarter of all hospitalisations for *Contact with venomous animals and plants* by ants, ticks and all other arthropods occurred in and around people's homes (27%, 130 cases) but the majority had no information on place of occurrence (63%, 300 cases).

Distribution by state and territory of usual residence

Age-standardised rates of hospitalisations due to contact with ants, ticks and all other arthropods varied considerably according to the person's state of usual residence (Figure 12).

The highest rate of hospitalisations due to contact with ants, ticks and all other arthropods occurred in Tasmania at 13 cases per 100,000 population. Of all the hospitalisations caused by contact with a venomous ant, nearly a third occurred in Tasmania (61 of 203 cases), at a rate of 11 cases per 100,000. Most cases involving residents of Tasmania were due to stings from jack jumper ants (56 of the 61 cases). These ants are found only in the cooler areas of south-western and south eastern Australia. Jumper jack ant 'hotspots' are found in the Adelaide Hills, rural and semi rural areas around Melbourne and widely spread throughout Tasmania.

Figure 12: Age-standardised rate of injury hospitalisations due to contact with ants, ticks and other arthropods, by state and territory of usual residence, 2017–18



n.p Not publishable due to small numbers and confidentiality concerns

Notes

1. Cases include those that have an external cause code anywhere in the record of *X25 Contact with other venomous arthropods.*
2. Age-standardised to the 2001 Australian population (per 100,000), using 5 age groups (0–14, 15–24, 25–44, 45–64, 65+).
3. Based on the patient's state of usual residence.
4. Rates based on underlying categories with fewer than 10 cases have been suppressed.
5. Data underpinning this map can be found in the accompanying supplementary spreadsheets

Source: AIHW National Hospital Morbidity Database.

Marine animals and plants

Contact with venomous marine animals and plants accounted for 11% (393 cases) of hospitalised injury cases due to contact with a venomous animal or plant in 2017–18. The age-standardised rate of *Contact with venomous marine animals and plants* was 1.6 cases per 100,000 population.

Type of marine animals and plants

Most hospitalised injury cases due to *Contact with marine animals and plants* were due to *Contact with stinging fish* (81%, 320 cases) (Table 13). Thirty cases were identified as being caused by a stonefish with another 59 categorised as being caused by a 'specified stinging fish' (includes species such as the catfish, bat fish, scorpion fish, lionfish and the Port Jackson shark). There were 142 cases of *Contact with other specified venomous marine animals and plants*, which includes cone shells, coral, sea anemone, and stinging hydroids. *Contact with a stingray* accounted for 63 cases of hospitalised injury.

There were 73 cases of contact with a jellyfish in 2017–18, with the Irukandji the most common type leading to hospitalisation. The Irukandji jellyfish (*Carukia barnesi*) is seasonally common throughout northern Australian waters.

Table 13: Type of injury hospitalisations for contact with venomous marine animal or plant, by sex, 2017–18

	Males		Females		Persons	
Type of marine animal or plant:	**Number**	**%**	**Number**	**%**	**Number**	**%**
Contact with jellyfish						
Irukandji jellyfish	21	7.6	20	17.4	41	10.4
Portuguese Man-o-war and bluebottle	n.p	n.p	n.p	n.p	5	1.3
Other specified jellyfish (including the box jellyfish)	6	2.2	4	3.5	10	2.5
Unspecified jellyfish	n.p	n.p	n.p	n.p	17	4.3
Subtotal	***39***	***14.1***	***34***	***29.6***	***73***	***18.5***
Contact with stinging fish						
Stonefish	21	7.6	9	7.8	30	7.6
Specified stinging fish	52	18.7	7	6.1	59	15.0
Stingray	50	18.0	13	11.3	63	16.0
Other specified venomous marine animals and plants (including venomous octopus)	100	36.0	45	39.1	145	36.9
Unspecified venomous marine animals and plants	16	5.8	7	6.1	23	5.9
Subtotal	***239***	***86.0***	***81***	***70.4***	***320***	***81.4***
Total	**278**	**100.0**	**115**	**100.0**	**393**	**100.0**

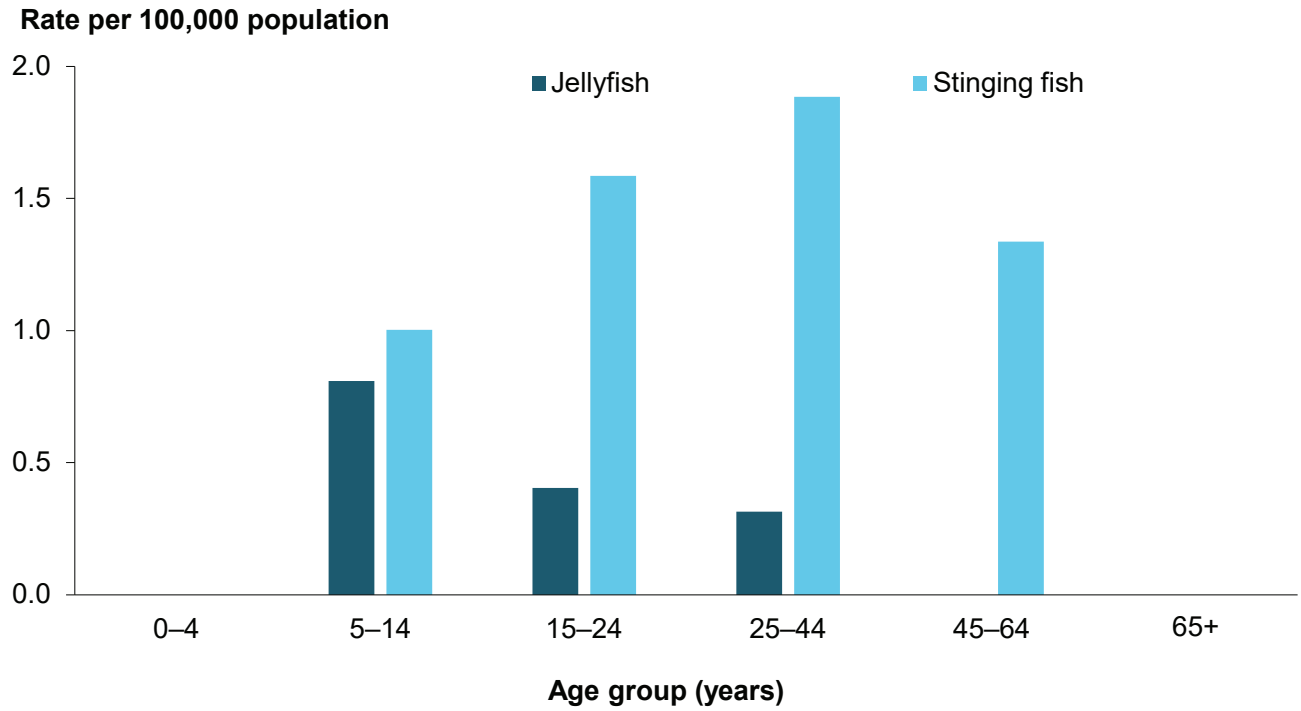
n.p Not publishable due to small numbers and confidentiality concerns

Note: Percentages may not sum to 100 due to rounding.

Source: AIHW National Hospital Morbidity Database.

The rates of hospitalisations for contacts with venomous jellyfish and stinging fish by age group are shown in Figure 13. The highest rates of hospitalisation due to *Contact with stinging fish* occurred in the 25–44 age group (1.9 cases per 100,000 population). In contrast, the highest rate of hospitalisations due to *Contact with jellyfish*, 0.8 cases per 100,000, occurred in the 5–14 age group.

Figure 13: Age-specific rate of injury hospitalisations due to contact with a venomous marine animal or plant, by age group, 2017–18



Notes

1. Rates based on underlying categories with fewer than 10 cases have been suppressed.
2. Data underpinning this chart can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

Principal diagnosis

Just under half of all hospitalisations for *Contact with venomous marine animals and plants* (40%, 156 cases) in 2017–18 were coded with a principal diagnosis meaning either 'Toxic effect of contact with fish' (12%) or 'Toxic effect of contact with other marine animals' (28%). A further 124 cases had a principal diagnosis of an open wound of the ankle and foot.

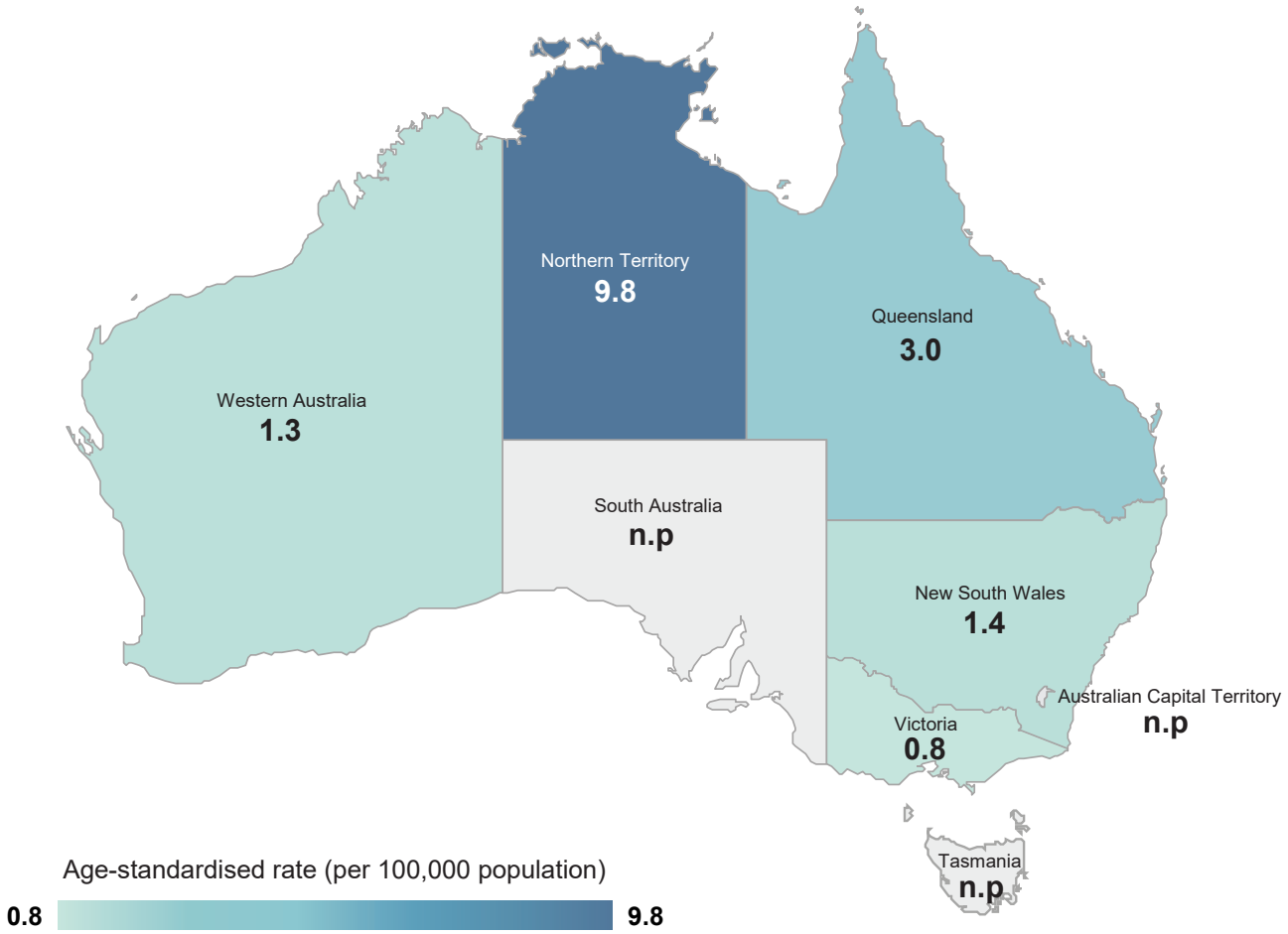
Place of occurrence

Unsurprisingly, the majority of cases of hospitalisations due to *Contact with venomous marine animals and plants* (72%) occurred in a large area of water (150 cases) or at the beach (131 cases).

Distribution by state and territory of usual residence

Venomous marine animals and plants are found all along Australia's coastline but are mainly concentrated in northern Australia. Seasonality also plays a role in the appearance of many species of venomous marine animal (for example, the Irukandji jellyfish). Queensland had the highest counts of hospitalisations due to contact with the Irukandji jellyfish (23 of 41 cases) and stonefish (26 of 30 cases) but, overall, the highest age-standardised rate of hospitalisations due to all venomous marine animals occurred in the Northern Territory (9.8 cases per 100,000 population) (Figure 14).

Figure 14: Age-standardised rate of injury hospitalisations due to contact with a venomous marine animal or plant, by state and territory of usual residence, 2017–18



n.p Not publishable due to small numbers and confidentiality concerns

Notes

1. Cases include those that have an external cause code anywhere in the record of *X26 Contact with venomous marine animals and plants.*
2. Age-standardised to the 2001 Australian population (per 100,000), using 5 age groups (0–14, 15–24, 25–44, 45–64, 65+).
3. Based on the patient's state of usual residence.
4. Rates based on underlying categories with fewer than 10 cases have been suppressed.
5. Data underpinning this map can be found in the accompanying supplementary spreadsheets.

Source: AIHW National Hospital Morbidity Database.

What data did we use?

The case data were sourced from the Australian Institute of Health and Welfare's National Hospital Morbidity Database for 2017–18, which covers all admitted episodes of care in Australian hospitals. Records included from this database are those with external cause codes anywhere in the record of X20–X29 Contact with venomous animals and plants.

Analyses were based on the first occurring X20–X29 *Contact with venomous animals and plants* code in the record, as well as injury as the Principal Diagnosis, specified as International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian modification (ACCD 2016) codes S00–T75 or T79 (but excluding any with 'Z50 Care involving use of rehabilitation procedures' appearing in any additional diagnosis field). Records with mode of admission reported as a transfer from another hospital were excluded to reduce multiple counting of cases.

Information on deaths due to *Contact with venomous animals and plants* was sourced from the National Coronial Information System in the Victorian Department of Justice and Community Safety, which is a data repository containing information about deaths reported to a coroner in Australia and New Zealand. This repository contains both coded and non-coded data, as well as searchable legal, medical and scientific reports (such as the coroner's finding, post-mortem report, toxicology report and police summary of death report).

The average length of stay is the average number of days each patient stayed in hospital. This is calculated by dividing the total number of patient days for injury separations by the number of injury cases. Patients who were admitted and discharged from hospital on the same day are counted as staying for 1 day.

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Glossary

additional diagnosis: A condition or complaint either coexisting with the principal diagnosis or arising during the episode of admitted patient care, episode of residential care or attendance at a health-care establishment. METeOR identifier: 641014.

age-specific rate: The rate for a specific age group. The numerator and denominator relate to the same age group.

antivenom: A specific treatment for envenomation. It is composed of antibodies and used to treat certain venomous bites and stings.

envenomation: is the toxic effect of contact with a venomous plant or animal and includes chemical released by animals and insects. Venom is released through fangs, hairs, spines, tentacles and other venom apparatus.

external cause: The environmental event, circumstance or condition as the cause of injury, poisoning and other adverse effect. METeOR identifier: 641415.

hospitalisation: see separation.

International Statistical Classification of Diseases and Related Health Problems (ICD): The World Health Organization's internationally accepted classification of death and disease. The Tenth Revision (ICD-10) is currently in use. The ICD-10-AM is the Australian Modification of the ICD-10 and is used for diagnoses and procedures recorded for patients admitted to hospitals.

invertebrate: any animal that lacks a vertebral column, or backbone.

length of stay: The length of stay of an overnight patient is calculated by subtracting the date the patient is admitted from the date of separation and deducting days the patient was on leave. A same day patient is allocated a length of stay of 1 day. METeOR identifier: 269982.

mode of admission: The mechanism by which a person begins an episode of admitted patient care. METeOR identifier: 269976.

place of occurrence of external cause: The place where the external cause of injury, poisoning or adverse effect occurred. METeOR identifier: 641422.

principal diagnosis: The diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care, an episode of residential care or an attendance at the health-care establishment. METeOR identifier: 640978.

separation: An episode of care for an admitted patient, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a stay beginning or ending in a change of type of care (for example, from acute to rehabilitation). 'Separation' also means the process by which an admitted patient completes an episode of care either by being discharged, dying, transferring to another hospital or changing type of care.

sting: A sharp organ possessed by some invertebrates and used to deliver venom. Some of the more well-known invertebrates that possess a sting are bees, wasps, ants and scorpions.

toxicity: The degree to which a substance (a toxin or poison) can harm humans or animals. Acute toxicity involves harmful effects in an organism through a single or short-term exposure.

venom: The generic name given to a variety of different mixtures of toxin produced by one organism and then injected into another through a bite or sting.

venomous: Describes an ability to produce venom in a specialised gland that is capable of inflicting injury or death.

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