NSW Zoonoses Annual Report 2017

NSW GOVERNMENT Health Communicable Diseases

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ISSN 2008-6196
SHPN (HP NSW) 180246

Suggested citation:
Communicable Diseases Branch. *NSW Zoonoses Annual Surveillance Report: 2017.* Sydney: Health Protection NSW, 2018.

Sept 2018

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Overview

A zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans. Worldwide, at least 61% of all human pathogens are zoonotic organisms, and during the past decade up to 75% of emerging pathogens were zoonoses.[1]

This report focuses on:

- Notifications of selected zoonoses in humans to NSW public health authorities during 2017
- Animal health events investigated in collaboration with the NSW Department of Primary Industries (DPI) and Local Land Services (LLS) requiring a public health response
- Post-exposure risk assessments and treatments delivered for the prevention of rabies and Australian Bat Lyssavirus (ABLV).

Beyond the scope of this report are numerous zoonoses transmitted through food, water or vectors – many of which are notifiable to NSW public health and animal health authorities (Appendix 2).

Surveillance findings on enteric and other zoonoses are routinely published in other reports available via the NSW Health website. A wealth of further information and resources are also available (Appendix 3).

2017 Highlights

- NSW observed a slight increase in the number of leptospirosis and psittacosis notifications in humans in 2017. There were fewer notifications of Q fever and brucellosis in humans in the same period.
- No human infections of anthrax, avian/animal influenza, Hendra virus, rabies/ABLV or tularemia were reported (Table 1, overleaf).
- The numbers of people exposed to animals at risk of rabies and ABLV requiring assessment and prophylactic treatment continued to increase, with the 2017 figures exceeding the previous eight years. The increase was largely driven by the number of tourists exposed to potentially rabid animals overseas, especially in Southeast Asia. Although the number of wildlife workers exposed to bats in Australia also increased slightly, the majority of people with local bat exposure were members of the general public.
- Sporadic animal infections with anthrax, brucellosis, Hendra virus, equine chlamydiosis and ABLV were reported in NSW, requiring public health investigation of exposures and interventions to prevent human infections.

Table 1: Incidence of selected zoonotic diseases in humans notified in 2017 compared to the previous 5 years (2012–2016), by Local Health District (LHD) of residence[a], NSW[b]

LHD	n (Rate per 100,000[c])							
	Brucellosis		Leptospirosis		Psittacosis		Q fever	
	5yr mean 2012-2016	2017	5yr mean 2012-2016	2017	5yr mean 2012-2016	2017	5yr mean 2012-2016	2017
Central Coast	0	0	<1 (0.18)	1 (0.29)	1 (0.42)	0	1 (0.51)	3 (0.88)
Far West	0	0	0	0	<1 (0.66)	0	3 (10.50)	8 (26.75)
Hunter New England	2 (0.26)	4 (0.43)	3 (0.38)	4 (0.43)	2 (0.18)	0	44 (4.93)	44 (4.77)
Illawarra Shoalhaven	0	1 (0.24)	<1 (0.15)	1 (0.24)	1 (0.30)	0	10 (2.43)	6 (1.47)
Mid North Coast	0	0	1 (0.47)	4 (1.83)	<1 (0.19)	1 (0.46)	20 (9.55)	30 (13.72)
Murrumbidgee	0	0	1 (0.35)	1 (0.34)	1 (0.48)	0	11 (4.07)	12 (4.08)
Nepean Blue Mountains	0	0	<1 (0.11)	0	4 (1.06)	2 (0.54)	1 (0.42)	3 (0.80)
Northern NSW	<1 (0.14)	0	4 (1.23)	5 (1.67)	<1 (0.27)	0	33 (11.40)	26 (8.67)
Northern Sydney	<1 (0.05)	0	<1 (0.07)	2 (0.22)	3 (0.32)	1 (0.11)	3 (0.36)	5 (0.54)
South Eastern Sydney	0	0	2 (0.18)	1 (0.11)	2 (0.27)	0	2 (0.28)	1 (0.11)
South Western Sydney	1 (0.13)	1 (0.10)	<1 (0.02)	0	2 (0.26)	0	3 (0.37)	4 (0.41)
Southern NSW	0	0	<1 (0.20)	0	1 (0.30)	1 (0.38)	13 (6.27)	16 (7.68)
Sydney	0	0	<1 (0.06)	0	1 (0.22)	0	<1 (0.16)	0
Western NSW	0	0	1 (0.43)	1 (0.36)	3 (1.01)	1 (0.36)	38 (13.56)	51 (18.16)
Western Sydney	1 (0.11)	0	<1 (0.07)	0	<1 (0.09)	0	1 (0.17)	1 (0.10)
NSW total	**5 (0.07)**	**6 (0.08)**	**16 (0.21)**	**20 (0.25)**	**24 (0.32)**	**6 (0.08)**	**182 (3.08)**	**210 (2.7)**

[a] *Exposures may have occurred outside the LHD of residence.*
[b] *There were no notifications of anthrax, avian or animal influenza, Hendra virus infection, Rabies/ABLV virus infection or tularemia in humans in NSW during this period.*
[c] *For population data source see Appendix 1.*

Brucellosis

Brucellosis is an infection that can be transmitted to humans from some animals such as cows, sheep, goats and pigs. *Brucella suis* remains a potential source of human infection in Australia, while other species have either been eradicated or never detected. Cases in NSW are rare and usually result from contact with feral pigs in northwestern NSW, or from consuming unpasteurized dairy products while overseas.

Key points:

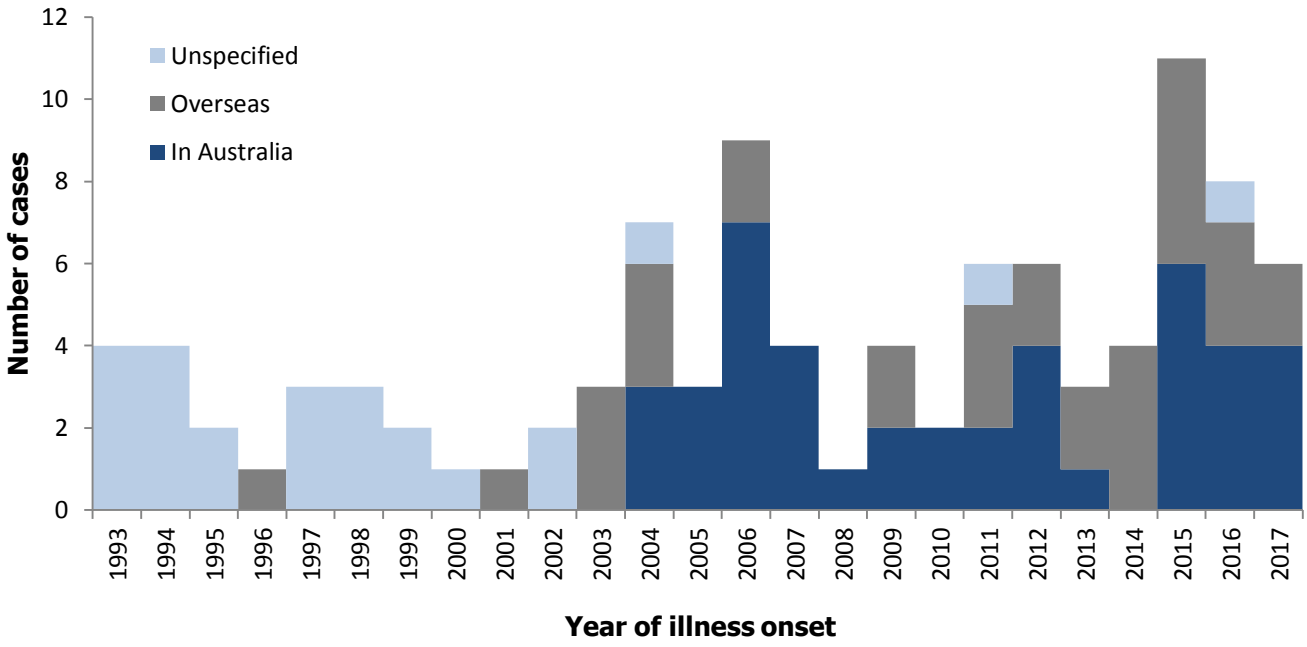
- 6 confirmed cases notified in 2017
- 4 locally acquired infections in Hunter New England LHD, predominantly from pig hunting
- 2 overseas acquired

During 2017, 6 (0.08 per 100,000) confirmed cases of brucellosis were notified in NSW (Figure 1).

Four cases were acquired in NSW, all adult males aged between 26–56 years (mean: 39.5 ± 14.0 years). No cases identified as Aboriginal. Three of the four cases reported hunting feral pigs and having direct contact with tissues and/or body fluids prior to onset of symptoms. All four hunted or lived in northern Hunter New England LHD, two in the Moree Plains area and two in the Northwest Slopes region. None of the four cases were confirmed by culture.

The other two NSW residents acquired the infection overseas, in Lebanon (n=1) and Turkey (n=1). Cases were a woman in her thirties and a man in his seventies. Both cases reported consuming unpasteurised dairy products (milk, cheese or yoghurt). Both cases were confirmed by culture, in which *Brucella melitensis* isolated.

Figure 1: Trends in brucellosis notifications by place of acquisition, NSW, 1993–2017



Leptospirosis

Leptospirosis is a disease of humans and animals caused by *leptospira* bacteria, found in infected animal urine and animal tissues. Although relatively rare in Australia, leptospirosis is more common in warm and wet areas such as northeastern NSW. Cases usually occur in people who have close contact with animals or who have been exposed to water, mud, soil, or vegetation contaminated by animal urine.

Key points:

- 20 confirmed cases notified in 2017
- 16 infections acquired in NSW following direct or indirect exposure with urine or other body fluids from infected farm animals or rodents
- 4 infections acquired during overseas (India, Fiji and Samoa) and interstate (Queensland) travel

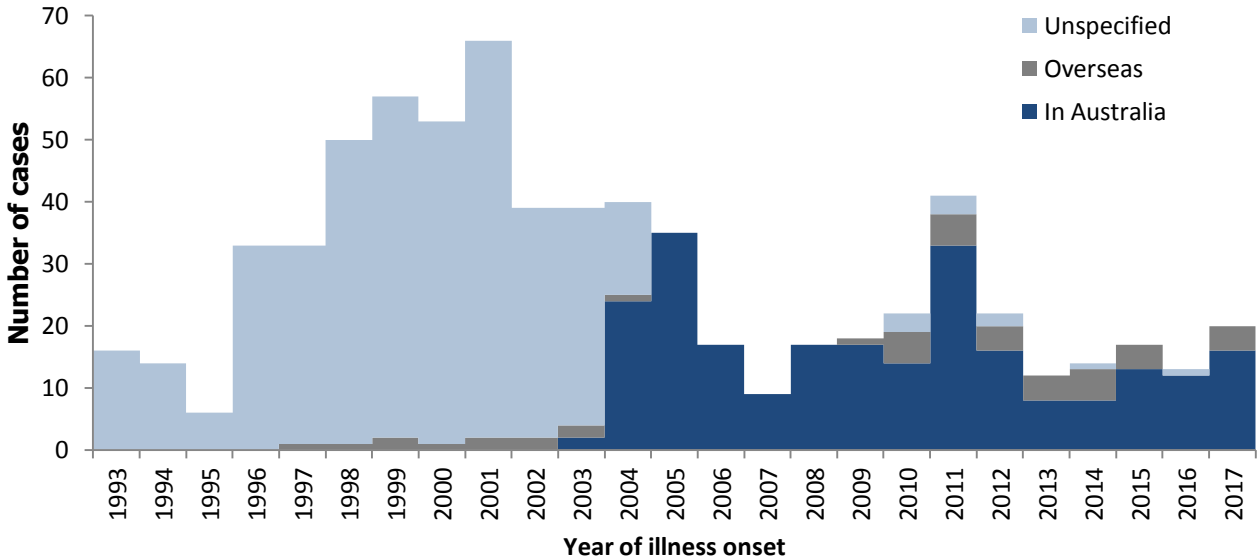
During 2017, 20 (0.25 per 100,000) confirmed cases of leptospirosis were notified in NSW. This is comparable to rates observed during recent years, but substantially lower than in the late 1990s and early 2000s, and in 2011 when an outbreak linked to a mouse plague occurred in southern NSW (Figure 2). Cases were predominately male (85%, n=17), ranging in age from 26–73 years (mean: 44.7 ± 13 years). No cases identified as Aboriginal.

Sixteen cases acquired their infection in NSW. Exposures recalled by cases included: contact with farm animals (n=8), working on a farm (n=5), contact with rodents or environments potentially soiled by urine from rodents (n=5), and contact with wild animals (n=1). Two cases did not report any high risk exposures.

Three cases acquired their infection overseas, in Fiji (n=1), India (n=1) and Samoa (n=1). Two cases reported contact with potentially contaminated dam and flood water; and the other case reported direct contact with farm animals.

One case acquired their infection in Queensland where they had extensive exposure to fresh water bodies.

Figure 2: Trends in leptospirosis notifications by place of acquisition, NSW, 1993–2017



Psittacosis (Ornithosis)

Psittacosis is an uncommon disease caused by the bacterium *Chlamydia psittaci*. The bacteria can also cause disease in other animals which is usually called chlamydiosis. Most cases in NSW develop the disease by inhaling dust containing feathers, secretions and droppings from infected birds but more rarely can contract the disease from other animals, such as sheep, cattle and horses.

Key points:

- Six confirmed cases notified in 2017
- Three cases reported exposure to wild birds, one reported exposure to poultry, and one reported exposure to sick foals

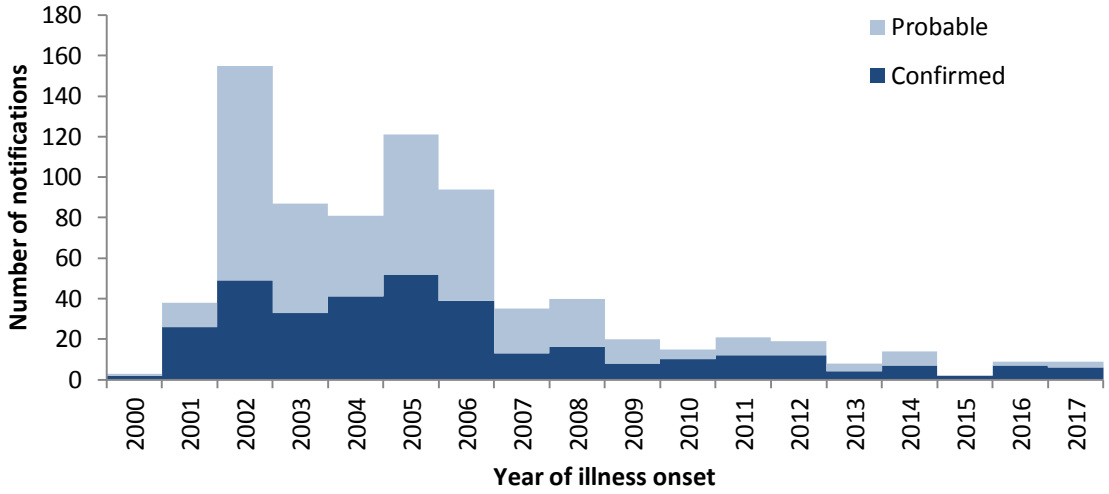
Since surveillance began in 2000, relatively high case incidence rates and sporadic outbreaks were observed from 2002–2006 in NSW, followed by a steady decline (Figure 3).

During 2017, six (0.11 per 100,000) confirmed cases were notified in NSW. Three probable cases were also reported. These nine cases were predominately male (56%, n=5), ranging in age from 23–73 years (mean: 41 ± 19 years). One case identified as Aboriginal. Of the eight cases interviewed, four cases reported exposure to sick foals, three cases reported exposure to wild birds, and one reported exposure to poultry.

The four cases who reported exposure to sick foals were veterinary students at the same facility nursing foals which were subsequently diagnosed with chlamydiosis after the contact occurred. Further information is provided in the Outbreaks section on page 9.

None of the cases exposed to wild birds or poultry reported signs of illness or deaths among the flock before their illness.

Figure 3: Trends in psittacosis notifications by case classification, NSW, 2000[a]–2017



[a] *Psittacosis notifications are not available prior to 2000.*

Q fever

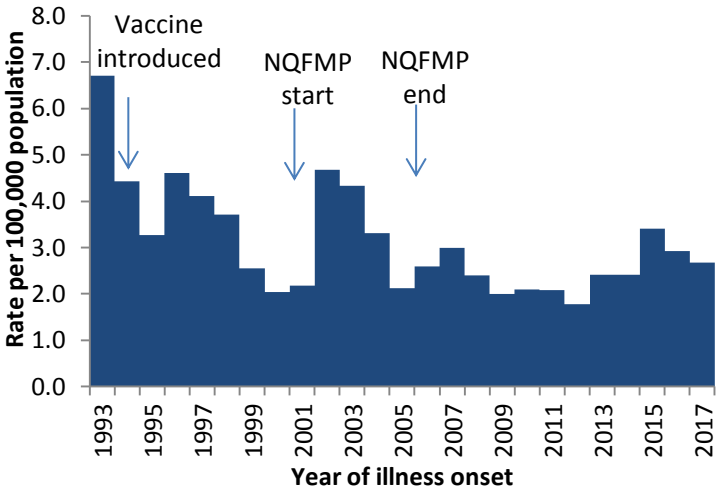
Q fever is caused by the bacterium *Coxiella burnetii*. The main carriers of the disease are cattle, sheep and goats but other animals, including marsupials, can also be infected. People are usually infected by inhaling aerosols or dust when working with infected animals, animal tissues or animal products. The bacteria survive for long periods in the environment as they are resistant to heat, drying and many disinfectants.

Key points:

- 210 confirmed cases notified during 2017; a decrease from the previous year
- Adult males, Aboriginal people and populations in regional/remote areas were disproportionally affected
- Three cases were reported in children aged less than 16 years
- Most adult cases (70%) worked in a known high-risk occupation
- Most cases (68%) were exposed to animals or animal products, tissues or discharges

During 2017, 210 confirmed cases of Q fever (2.7 cases per 100,000) were notified in NSW. This was lower than 2016 and higher than the five year annual mean (195 cases, 2.60 cases per 100,000), and comparable to the rate observed in 2007 after the National Q fever Management Program (NQFMP, which funded screening and vaccination of targeted occupational groups) had ceased (Figure 4).

Figure 4: Trends in Q fever notifications, NSW, 1993–2017



The most substantive increases were observed in Far West, Western NSW and Mid North Coast LHDs (Table 1). The highest incidence of disease was observed in regional remote areas of the state (Figure 6) – especially Narromine Shire (n=8, 121 per 100,000), Warren Shire (n=3, 107 per 100,000) and Coonamble Shire (n=4, 98 per 100,000) local government areas (LGAs).

Figure 5: Q fever incidence rate by age, gender and Aboriginality, NSW, 2017

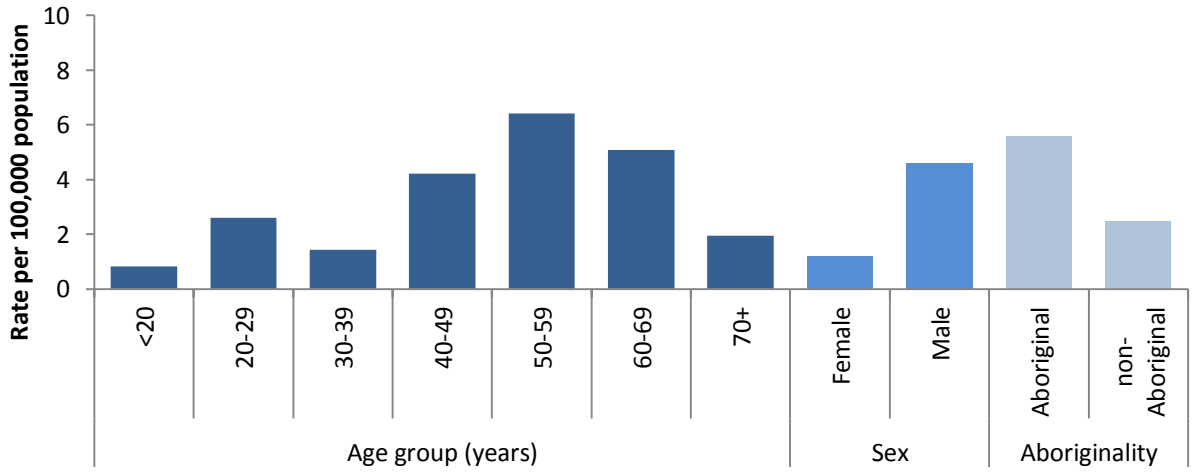
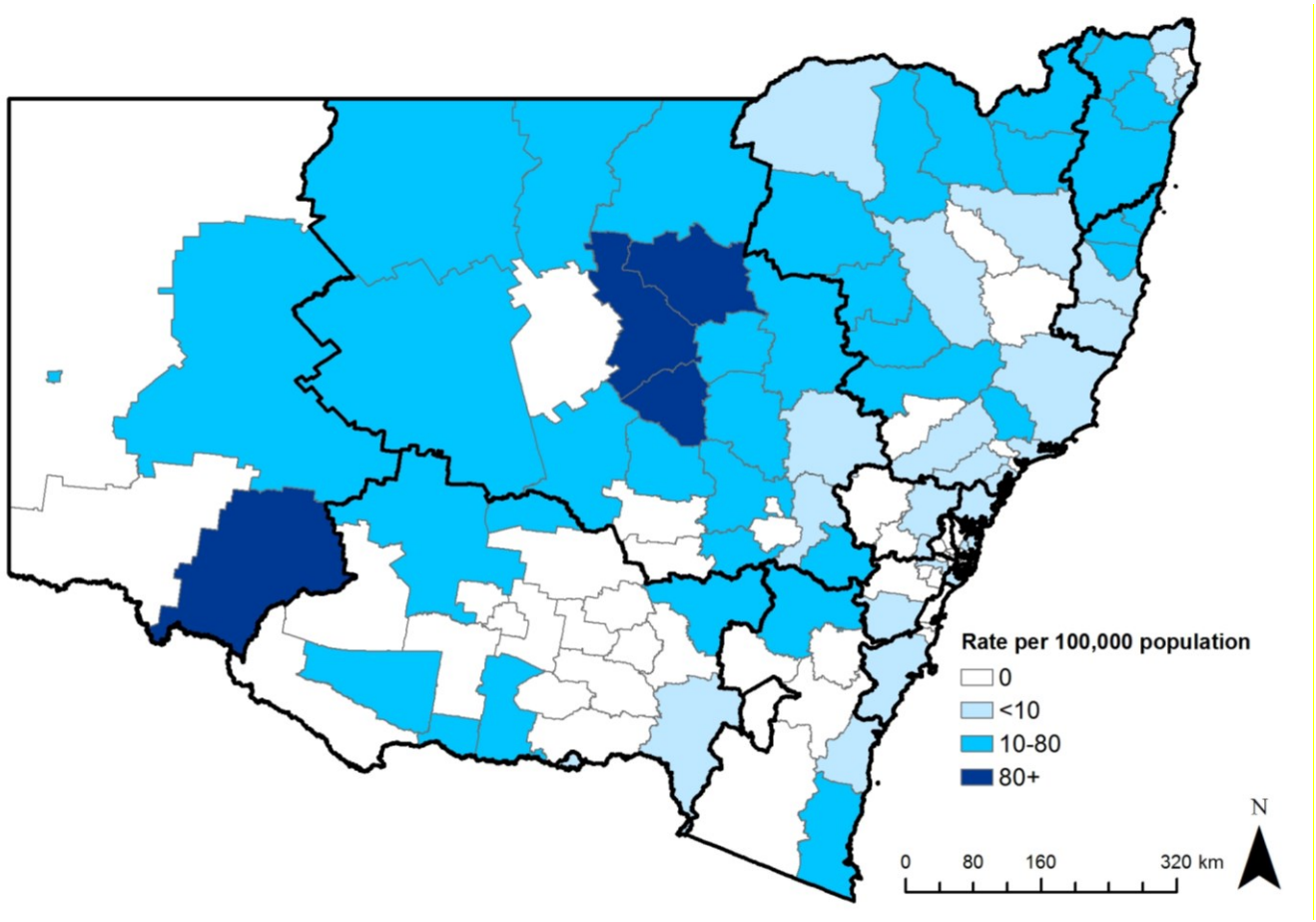


Figure 6: Q fever incidence rate by age, gender and Aboriginality, NSW, 2017



The majority of cases notified in 2017 were males (n=175, 83%), and cases ranged in age from 6–77 years (mean 45 ± 16 years) (Figure 5). Indigeneity was reported for 89% (n=187) of cases, wherein a disproportionate rate of disease was observed in Aboriginal NSW residents (n=8, 3.40 cases per 100,000) when compared to non-Aboriginal residents (n=179, 2.40 cases per 100,000).

Occupations were reported for 181 cases aged 16 years or over in 2017. Of these 70% (n=127) worked in high-risk occupations, including farmers, farm hands or property managers (n=87), shearers or wool classers (n=14), abattoir and other meat industry workers (n=7), stockyard worker or stock transporters (n=5), veterinary or wildlife workers (n=5), grass slashers or gardeners (n=5), hunters (n=2), shire council worker (n=1) and agricultural college student (n=1). The remainder of adult cases (30%, n=54) were retired, unemployed or worked in a non-animal related occupation. Three infections were reported in children under 16 years of age, two of whom were resident on a farm during the exposure period. The remaining child was lost to follow up.

Exposure history was available for 177 cases in 2017. Of these, most (68%, n=121) reported one or more types of exposure to animals or animal products, including exposures to livestock or their products (42%, n=75), and direct contact with animal tissues or discharges (26%, n=46). The remainder reported only incidental exposures to native wildlife (12%, n=22), or no discernible exposure to livestock or wildlife (20%, n=34).

Rabies and other lyssaviruses (including Australian Bat Lyssavirus)

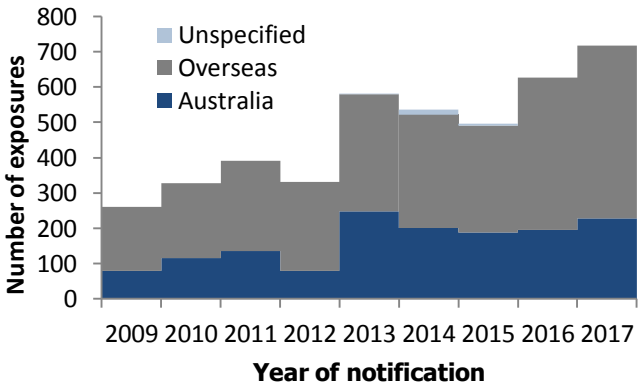
Lyssaviruses are a group of viruses that includes rabies and bat lyssavirus. Lyssavirus is carried by bats in Australia and worldwide. Rabies is carried by terrestrial mammals in many overseas countries. Both are spread by bites and scratches, which affect the central nervous system and are usually fatal. These diseases can be prevented by rapid and thorough cleaning of the wound and post exposure prophylaxis.

Key points:

- No human cases notified in 2017
- 718 exposures to potentially infected animals, of which 96% were assessed as requiring post-exposure prophylaxis to prevent infection
- 467 exposures requiring post exposure prophylaxis occurred overseas, of which 78% were in Southeast Asia and 52% were from monkey bites/scratches
- 219 local exposures to bats requiring post exposure prophylaxis, of which 19% occurred in persons who worked with (or cared for) bats, 74% were from flying-foxes. Four bats were positive for ABLV
- 2,064 doses of vaccine and 2,111 vials of human rabies immunoglobulin (HRIG) were distributed as post exposure prophylaxis

During 2017, while there were no human infections of classical rabies or ABLV, a total of 718 potential exposures to lyssaviruses were notified to public health units. The continuing increase in reported exposure events has been driven by overseas exposures (Figure 7).

Figure 7: Exposures to rabies and other lyssaviruses by location, NSW 2009–2017



Of all exposures, 686 (96%) required post exposure prophylaxis with either rabies vaccine or HRIG.

Overseas exposures - Of 489 exposures overseas (68%), post exposure prophylaxis was initiated or continued for 467 people exposed to potentially infected animals (96%). Of these, a slightly higher proportion were in females (n=260, 56%) and travellers aged 18–34 years accounted for the greatest proportion (n=224, 48%) – mean age: 32 ± 17 years. The vast majority of overseas exposures requiring prophylaxis occurred in Southeast Asia (n=363, 78%); predominantly Indonesia or Thailand (Table 3). Most incidents involved bites or scratches from monkeys (n=243, 52%), followed by dogs (n=163, 35%) and cats (n=51, 11%).

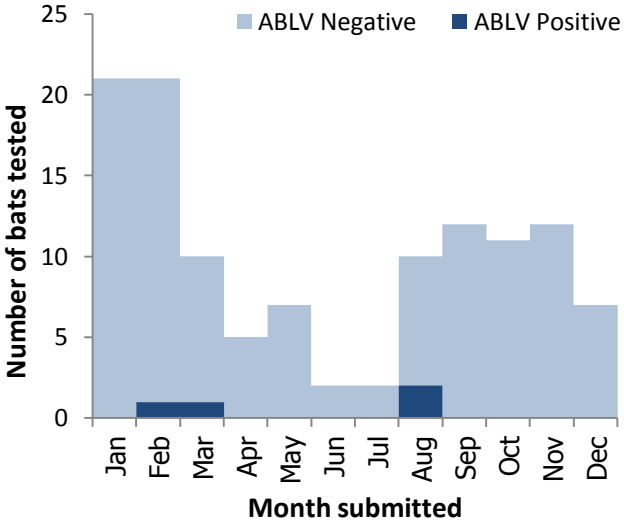
Table 3: Potential overseas exposures to rabies and other lyssaviruses by location, NSW, 2016

Location	n	%
Southeast Asia:	363	78
Indonesia (incl. Bali)	227	49
Thailand	75	16
Other[b]	61	13
India, Nepal, Sri Lanka, Bangladesh	32	7
China or Taiwan	28	6
Americas	15	3
Africa	13	3
Middle East	8	1.5
Other regions or unknown	5	1
Europe (incl. Eastern and Southern)	3	0.5
Total	**467**	**100**

[b] *Cambodia, Laos, Malaysia, Philippines or Vietnam*

Local exposures - Of 229 exposures to bats in Australia reported during 2017 (32%), 219 required post exposure prophylaxis (96%). Of these, slightly over half (51%, n=112) occurred in persons aged 40–70 years – mean age: 54 ± 9 years. A slightly higher proportion were in males (n=113, 52%). Occupation was reported for 184 exposures, of which 23% (n=42) were considered high risk occupations (including wild life workers/volunteers, veterinarians, etc.) and the remainder were members of the general public. The majority of bat exposures were megabats, which includes flying-foxes (n=161, 74%).

Figure 8: Number of bats tested for ABLV by month, NSW, 2017



Of 124 bats submitted for testing during 2017, four tested positive (see page 10). Submissions for testing peaked in January and February, and remained high towards the end of the year (Figure 8). This roughly corresponds to the bat birthing season (typically October to November each year). Two of the four ABLV positive bats were reported in the first three months of the year, while the remaining two ABLV positive bats were reported in August 2017.

Post-exposure prophylaxis - NSW Health provides post-exposure prophylaxis, including vaccination and rabies immunoglobulin, free of charge to people potentially exposed to rabies and ABLV following a risk assessment with their medical professional (see NSW Rabies and other lyssavirus infections control guidelines). During 2017, NSW Health distributed 2,064 doses of rabies vaccine and 2,111 vials of human rabies immunoglobulin (HRIG) to prevent infections, at a cost of approximately AUD 860,000.

Most overseas exposures requiring post-exposure prophylaxis occurred among residents of metropolitan Sydney, particularly Northern Sydney and South Eastern Sydney LHDs. The highest number of local exposures requiring post-exposure prophylaxis occurred among residents of Northern NSW (Table 4).

Table 4: Distribution of rabies vaccine and human rabies immunoglobulin (HRIG) by LHD, NSW, 2017

LHD	n		Total (%)
	Overseas	Local	
Central Coast	21	3	24 (3.5%)
Far West	0	0	0
Hunter New England	36	21	57 (8.3%)
Illawarra Shoalhaven	27	17	44 (6.4%)
Mid North Coast	9	17	26 (3.8%)
Murrumbidgee	6	7	13 (1.9%)
Nepean Blue Mountains	21	14	35 (5.1%)
Northern NSW	16	57	73 (10.6%)
Northern Sydney	96	14	110 (16.0%)
South Eastern Sydney	83	16	99 (14.4%)
South Western Sydney	34	13	47 (6.9%)
Southern NSW	3	6	9 (1.3%)
Sydney	68	12	80 (11.7%)
Western NSW	2	5	7 (1.0%)
Western Sydney	45	17	62 (9.0%)
NSW total	**467**	**219**	**686**

Distribution rates peaked in January and October 2017; corresponding with peak periods of overseas travel, bat testing and the bat birthing season (Figure 9).

Outbreaks

Psittacosis linked to sick foals

A cluster of psittacosis (infection with *Chlamydia psittaci*) was notified and investigated in early 2017 among veterinary students and staff in the Murrumbidgee region of NSW who had been nursing three sick foals in confined quarters.

The foals had been treated for acute respiratory illnesses between November 2016 and January 2017, and were later confirmed to have infection with *C. psittaci*. The foals came from different studs, and developed respiratory symptoms after birth. Two of the foals subsequently died.

Of the 30 people in attendance at the clinic during the three foals' admittance, 15 (50%) subsequently developed various symptoms of illness. Eleven unwell and five well people were able to be contacted for investigation by the public health unit. Laboratory testing confirmed one case of psittacosis infection (by PCR), and identified three other probable cases. The others were unable to be confirmed through laboratory testing owning to delays in notification of the cluster.

Investigation of the cause of infection found that inadequate PPE was worn. The veterinary school were reminded to follow the biosecurity advice issued in Primefact 1465 (April 2016) concerning appropriate PPE to avoid infection with *C. Psittaci*.

Psittacosis in humans is usually contracted through contact with birds, but rarely, the infection can contracted from close contact other animals infected with the bacteria, including horses. The risk of psittacosis from horses is unclear as there is little published material available. In 2015 NSW Health was notified of a small cluster of unconfirmed cases of psittacosis in veterinarians and veterinary students who were involved in handling a psittacosis-infected horse placenta.

As the evidence for the risk of psittacosis from horses grows, awareness of the potential for human illness and the importance of hygiene procedures is important. Staff on horse studs and any people who come in contact with aborted equine material should be advised to undertake careful hygiene procedures when dealing with equine abortions, stillbirths, or neonatal illness cases. This should include wearing gloves and P2 masks when dealing with these cases. Research is ongoing to establish the relationship between horses and human infection with *C. Psittaci*.

Animal health events notified to NSW Health

Key points:

- Sporadic cases of ABLV, anthrax, brucellosis and Hendra virus infection were reported in animal populations in 2017

Notifications of significant zoonotic animal health events to Department of Primary Industries (DPI) or Local Land Services (LLS) are rapidly communicated to NSW public health authorities. Depending on the disease and nature of the event, public health units (in collaboration with DPI, LLS and other relevant parties) will investigate human exposures and advise appropriate actions, which may include monitoring for symptoms and referral for laboratory testing and treatment. While animal health authorities work to confirm the diagnosis through laboratory tests at the Elizabeth Macarthur Agriculture Institute (EMAI) and the Australian Animal Health Laboratory (AAHL) and control spread in animal populations, public health authorities take steps to prevent human infections, such as providing education to reduce risk and post-exposure treatment, where indicated.

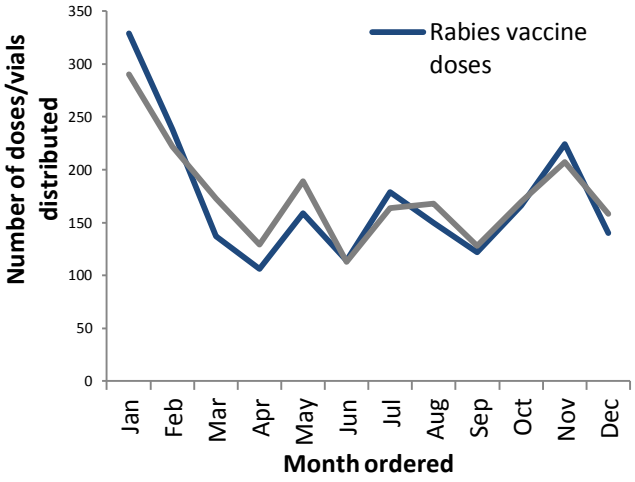
There were no incidents or clusters of highly pathogenic avian influenza, avian psittacosis, leptospirosis, terrestrial rabies or tularemia reported in NSW animal populations during 2017.

During 2017, NSW authorities collectively responded to the following animal health events:

ABLV – 124 bats were submitted for testing due to: human exposures, exposure of a pet, or exhibiting signs suggestive of ABLV infection.

Four bats tested positive for ABLV. All four flying foxes had clinical signs consistent with ABLV; there were no human or animal contacts associated with the four bats (see also Rabies and other lyssaviruses).

Figure 9: Distribution of rabies vaccine and human rabies immunoglobulin (HRIG) by month, NSW, 2017



Anthrax – was investigated on 164 occasions as the cause of death of stock, of which one incident was confirmed in February 2017 in central west NSW and included 88 sheep deaths. Shortly after infection was confirmed, all susceptible stock was vaccinated, all carcases burned and the property was subjected to movement restrictions as per the NSW Anthrax Procedure. In all events, public health units determined all potential human exposures to be low-risk and did not require prophylactic treatment.

Brucellosis – samples from 306 dogs were submitted for testing during 2017, a 20% increase from 2016. Of these, 46 were serologically positive and another 28 were inconclusive. The majority of positive cases originated from the north west of NSW and had reported either contact with feral pigs or were fed raw feral pig meat. NSW DPI assists private veterinarians in assessing and managing the risks posed by *Brucella suis* infection in dogs, providing advice on infection control to prevent transmission to humans and other animals. All infections were reported to the local public health unit for human health assessment and advice.

Equine Chlamydiosis – 65 instances of fetal death or perinatal illness in horses were investigated for chlamydiosis in NSW during 2017. *Chlamydia psittaci* was detected in 13 cases, mostly from the Hunter region. All infections were reported to the local public health unit for assessment. A cluster of human cases of psittacosis was linked to infected foals at a veterinary school (see p.10)

Although the zoonotic potential of psittacosis from non-avian sources is not currently well understood, the case definition in the NSW psittacosis control guideline will be updated to include epidemiological links to any animal with confirmed chlamydiosis from 1 July 2018.

Hendra virus infection – Of 280 reports of sick or dead horses where samples were submitted for Hendra virus testing in NSW during 2017, Hendra virus infection was confirmed on three properties involving unvaccinated horses. The events occurred in the Northern NSW region between July and August 2017. The dead horses were buried and the properties were placed into quarantine. All infections were reported to the local public health unit for assessment. Two people were assessed as having moderate risk exposure to one of the infected horses and were referred by an expert panel for prophylaxis with monoclonal antibodies. In the other two horse infections, there was minimal human contact and no public health intervention was required (Table 5).

Table 5: Human assessment and treatment following exposure to horses infected with Hendra virus, NSW, 2017[a]

Month	Council Area	Number of Horses	Number of Human contacts			Human Risk Assessment
			High Risk	Moderate Risk	Low/Neg Risk	
July	City of Lismore	1	0	0	2	Horse owner and partner: minimal direct contact with sick horse during infectious period. Assessed as 'low risk'
August	Byron Shire	1	0	2	3	Two children: extensive mucous membrane contact with sick horse during infectious period. Assessed as 'moderate risk' and referred for prophylaxis with monoclonal antibody. Horse owner, partner and another child: minimal direct contact with sick horse during infectious period. Assessed as 'low risk'.
August	Tweed Shire	1	0	0	1	Horse owner: minimal direct contact with sick horse during infectious period. Assessed as 'low risk'
Total		**3**	**0**	**2**	**6**	

[a] *Only lists humans deemed 'exposed'. The table does not include people who wore appropriate personal protective equipment (PPE).*

Appendices

Appendix 1: Methods

Human disease notifications: Under authority of the *NSW Public Health Act 2010*, NSW Health receives notifications of communicable diseases from laboratories, doctors, and hospitals. Cases are recorded on the NSW Notifiable Conditions Information Management System (NCIMS) – a confidential, internet based system used by NSW public health units – and categorised based on the agreed national cases definitions.[2]

This report reflects notifications of anthrax, avian and other animal influenza virus infections, brucellosis, Hendra virus infections, leptospirosis, psittacosis, Q fever, and rabies and other lyssaviruses (including ABLV), recorded in NCIMS on or shortly after 31 May 2017. Unless specified otherwise, cases were categorised by calendar year based on calculated onset date (i.e. the date of symptoms onset, or whichever occurred first between dates of specimen collection and notification).

Incidence rates were calculated using mid-year estimated resident population (ERP) projections published by the Secure Analytics for Population Health Research and Intelligence (SAPHaRI) group, NSW Ministry of Health. This includes LGA based ERPs derived from estimates published by the NSW Department of Planning and Environment (prior to 2015)[3] with projections from 2015 produced by using cubic spline interpolation, and Aboriginal/non-Aboriginal ERPs derived from estimates published by the Australian Bureau of Statistics.[4]

The degree to which notification data reflect the true incidence of disease varies between conditions, as many people with infectious disease will not be diagnosed with the disease or notified. For some conditions (e.g. Q fever), where infections maybe asymptomatic or are not diagnosed, notifications likely underestimate the true incidence of disease. Notification data are also subject to retrospective changes – data are only accurate at the time of extraction.

Animal disease notifications: Members of the public, veterinarians or animal owners or managers are legally obligated to notify certain suspected animal diseases under legislation. This report reflects selected conditions prone to infect humans, notified to the DPI during 2017, and conveyed to public health authorities. This information is not intended to reflect overall incidence of disease in the animal population, but rather an indication of the scope of diseases upon which the DPI and NSW Health collaborate to prevent transmission to the public.

Rabies post-exposure treatment: Doctors contact public health units for advice on the management of potential exposures to lyssaviruses. Where indicated, public health units arrange for the ordering, urgent delivery and administration of rabies vaccine and HRIG to prevent infection – a service provided free of charge to NSW residents. These events are routinely captured in NCIMS, and records of rabies vaccine and HRIG distribution are maintained by the Immunisation Unit.

Costs estimates provided in this report were based on the total number and costs of treatments distributed and courier distribution costs. This does not take into account any salaries, consumables, consultation costs, other incidental costs borne by NSW Health or costs associated with testing bats.

Appendix 2: Zoonoses notifiable to NSW human and/or animal health authorities

Disease	Status in NSW	Human health notification	Animal health notification
Anaplasmosis	sporadic		✓
Anthrax	sporadic	✓	✓
Arboviral infections	varies by virus	✓	some
Babesiosis	sporadic		✓
Borna disease	exotic		✓
Brucellosis - *Brucella suis*	sporadic	✓	✓
Brucellosis - NEC	exotic	✓	✓
Camelpox	exotic		✓
Campylobacteriosis	endemic	*	
Crimean-Congo haemorrhagic fever	exotic	✓	✓
Cryptosporidiosis	endemic	✓	
Cysticercosis – porcine, bovine	exotic/sporadic		✓
Encephalitides (tick-borne)	exotic		✓
Escherichia coli - STEC and HUS	endemic	✓	
Getah virus infection	exotic		✓
Giardiasis	endemic	✓	
Glanders	exotic		✓
Hendra virus infection except in pteropid bats	sporadic	✓	✓
Hepatitis E	sporadic	✓	
Influenza - highly pathogenic avian influenza	exotic	✓	✓
Influenza - swine/equine influenza	exotic	✓	✓
Leishmaniasis	exotic		✓
Leptospirosis	endemic	✓	
Listeriosis	endemic	✓	
Louping ill	exotic		✓
Lyssavirus - ABLV	endemic	✓	✓
Lyssavirus - Rabies	exotic	✓	✓
Menangle virus infection	sporadic		✓
Nairobi sheep disease	exotic		✓
Newcastle disease	exotic		✓
Nipah virus infection	exotic	✓	✓
Pigeon paramyxovirus	sporadic		✓
Plague	exotic	✓	
Psittacosis (Ornithosis) / Chlamydiosis in birds	endemic	✓	✓
Q Fever	endemic	✓	
Rift Valley fever	exotic	✓	✓
Salmonellosis - NEC	endemic	✓	
Salmonellosis - *Salmonella* Enteritidis	sporadic	✓	✓
SARS CoV	exotic	✓	
Transmissible spongiform encephalopathy	exotic	✓	✓
Trichinellosis	exotic		✓
Trypanosomiasis / Chagas' disease	exotic		✓
Tuberculosis - Bovine (*Mycobacterium bovis*)	exotic		✓
Tuberculosis - other mammal or avian	sporadic	✓	✓
Tularaemia	Exotic/sporadic	✓	✓
Turkey rhinotracheitis (avian metapneumovirus)	exotic		✓
Vesicular stomatitis virus	exotic		✓
Viral haemorrhagic fever, human – NEC	exotic	✓	
Warble-fly myiasis	exotic		✓
Wesselsbron disease	exotic		✓

*NEC: Not elsewhere classified. * Campylobacter notifications commenced in NSW on 7 April 2017*
Table correct as at 24 May 2017

Appendix 3: Additional sources of information

See NSW Health's Infectious Diseases website for further information for the general public and health professionals on all human health conditions presented in this report, as well as other notifiable conditions. This includes NSW-specific data and information, factsheets and control guidelines on:

- Anthrax
- Avian influenza
- Brucellosis
- Hendra virus
- Leptospirosis
- Psittacosis
- Q fever
- Rabies and ABLV
- Tularemia.

See the DPI's Animal health and diseases and Animal Biosecurity Zoonoses websites for further information for general public, veterinarians and animal health authorities about zoonoses in animals.

Appendix 4: List of acronyms

AAHL	Australian Animal Health Laboratory
ABLV	Australian Bat Lyssavirus
ACT	Australian Capital Territory
CDNA	Communicable Diseases Network Australia
DPI	Department of Primary Industries
EMAI	Elizabeth Macarthur Agriculture Institute
ERP	Estimated resident population
HRIG	Human rabies immunoglobulin
LGA	Local Government Area
LHD	Local Health District
LLS	Local Land Services
NCIMS	Notifiable Conditions Information Management System
NEC	Not elsewhere classified
NSW	New South Wales
NQFMP	National Q Fever Management Program
PPE	Personal protective equipment
SAPHaRI	Secure Analytics for Population Health Research and Intelligence
Yr	Year

Contributors and acknowledgements

This report was developed by staff of the Enteric and Zoonotic Diseases Unit and the Immunisation Unit, Communicable Diseases Branch, Health Protection NSW in collaboration with the NSW Department of Primary Industries.

Protecting the health of the community is a collaborative effort, involving public health units, clinicians, laboratory scientists, affected communities, and other government and community-based organisations. We sincerely thank all those involved for the role they played in NSW in 2017.

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