



# Vector-Borne Diseases

Arbovirus and other vector-borne disease surveillance in NSW

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## NSW ANNUAL REPORT

### 2019

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Suggested citation:

Communicable Diseases Branch. *NSW Vector-Borne Diseases Annual Surveillance Report: 2019*. Sydney: Health Protection NSW, 2020.

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June, 2020

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# ACRONYMS AND ABBREVIATIONS

## **VBD**                    **Vector-borne diseases**

BFV	Barmah Forest virus	MAL	Malaria
CHIKV	Chikungunya virus	MVE	Murray Valley encephalitis
DENV	Dengue virus	RRV	Ross River virus
KUNV	Kunjin virus (a West Nile virus subtype)	ZIKV	Zika virus

## **LHD**                    **Local health district**

CC	Central Coast LHD	NS	Northern Sydney LHD
FW	Far West LHD	SES	South Eastern Sydney LHD
HNE	Hunter New England LHD	SNSW	Southern NSW LHD
IS	Illawarra Shoalhaven LHD	SWS	South Western Sydney LHD
M	Murrumbidgee LHD	SYD	Sydney LHD
MNC	Mid-North Coast LHD	WNSW	Western NSW LHD
NBM	Nepean Blue Mountains LHD	WS	Western Sydney LHD
NNSW	Northern NSW LHD	NSW	New South Wales

## **SA2**                    Statistical Area Level 2 <sup>1</sup>

<sup>1</sup> The SA2 is the lowest level of the geographical boundary structure for which Australian Bureau of Statistics (ABS) estimated resident population (ERP) data are generally available. For more information see the [ABS SA2 description](#).

# SUMMARY – VECTOR-BORNE DISEASES IN NSW

This report summarises NSW vector-borne disease (VBD)<sup>2</sup> surveillance data for notifiable arboviruses (arthropod-borne viruses) and other notifiable arthropod-borne diseases in humans for 2019. The report notes changes in notifications over time and describes likely areas of disease acquisition for both local and exotic infections. NSW Health undertakes VBD surveillance to monitor VBD trends with the aim of implementing control measures to prevent further illness within the community from endemic local VBDs (such as Ross River virus and Barmah Forest virus), and to inform appropriate prevention messages for travellers to areas of the world with exotic vector-borne diseases (such as dengue, chikungunya, malaria and Zika virus).

Notified incidence of local and exotic vector-borne diseases in NSW, 2019\*

	2019		5-Year Mean		% change from 2018 <sup>#</sup>
	Count	Rate*	Count	Rate*	
Barmah Forest virus	63	0.8	99.6	1.3	-15%
Chikungunya	32	0.4	31.6	0.4	113%
Dengue	465	5.7	324.6	4.2	61%
Malaria	68	0.8	60.6	0.8	-3%
Ross River virus	569	7.0	848.8	10.9	-1%
Zika	1	0.0	8.4	0.1	-80%

\* Cases per 100,000 population, NSW (see Methods section for population calculations).

# Percentage change in condition case count in 2019 relative to the 2018 case count.

There was one West Nile virus / Kunjin virus case reported in 2019 that was acquired in the United States. There were no cases of human infection with Japanese Encephalitis virus, Yellow Fever virus, Murray Valley Encephalitis virus or other arboviruses reported in 2019.

## Key trends in 2019

- **Barmah Forest virus** – a decrease in notifications compared to 2017 and continued low activity overall.
- **Chikungunya virus** – a rise in notifications, with cases most commonly acquired in India, Thailand and Myanmar.
- **Dengue virus** – a large increase in notifications compared to 2018, with cases most commonly acquired Indonesia, Thailand, India and Fiji.
- **Malaria** – a similar number of notifications overall, with cases most commonly acquired in Papua New Guinea and India, and these were predominantly due to *P. vivax*. However, *P. falciparum* remains the most common malaria species reported overall, with these cases predominantly acquired in African countries.
- **Ross River virus** – moderate RRV activity this year, similar to 2018. Activity highest in coastal and inland areas of the state known to be endemic for RRV.
- **Zika virus** – there was only one notification, most likely acquired in Vanuatu.

## Mosquito and sentinel chicken surveillance for vector-borne arboviruses

In NSW, arbovirus surveillance in the environment is achieved through surveillance of chicken flocks and trapping of mosquitoes for virus isolation. Chicken surveillance aims to provide early warning of the emergence of two important flaviviruses – Murray Valley Encephalitis virus and Kunjin virus – in the northern inland areas of NSW. Chickens in these sentinel flocks are regularly tested from November to April for evidence of seroconversion to these rare but serious human pathogens. For further information and reports see the Environmental Health Branch VBD Surveillance website – <https://www.health.nsw.gov.au/environment/pests/vector/Pages/surveillance.aspx>.

<sup>2</sup> In this report arbovirus and other arthropod-borne infections are collectively referred to as vector-borne diseases.

# BARMAH FOREST VIRUS

Barmah Forest virus (BFV) infection is a vector-borne disease which is endemic in many parts of NSW. Infection rates are generally highest in the summer and autumn months. Cases are usually only followed up if they are believed to have been acquired in a non-endemic area.

The major mosquito vector in inland areas is *Culex annulirostris* which breeds in freshwater habitats. BFV transmission in coastal areas is most commonly due to saltmarsh mosquitoes, including a number of *Aedes* species.

In 2019, notifications of BFV infections decreased compared to the previous year and remained well below the historical average. Notifications were again highest along the north coast of NSW, particularly among residents of the Northern NSW Local Health District.

## Summary 2019

- Case count: 63
- Notification rate: 0.8 per 100,000 population

## Overall trend:

- Annual notifications fell by 15% compared to the annual total in 2018 (74 cases)
- The notification rate well remained well below the 5-year mean (1.3 per 100,000 population).

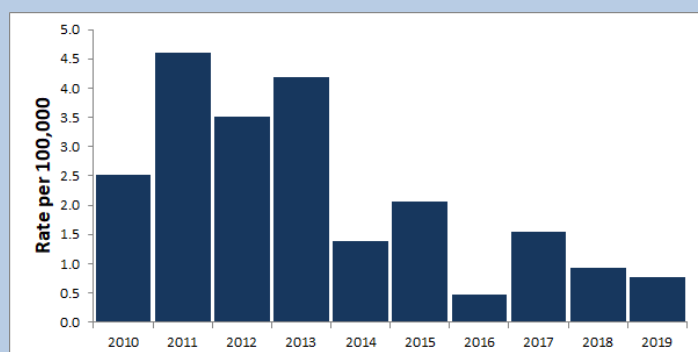
## Groups with highest notification rates in 2019

- Age: 70-79 years – 1.7 per 100,000 (16% of cases), particularly males (2.4 per 100,000 population)
- Sex: Male – 1.0 per 100,000 (62% of cases)
- Local health district: Northern NSW – 9.7 per 100,000 (48% of cases).

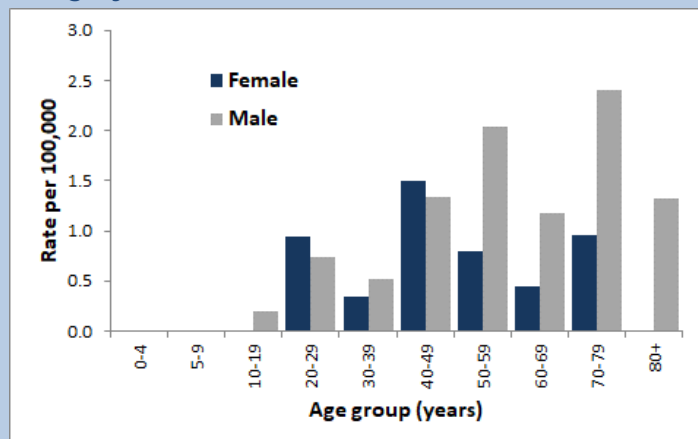
## Seasonality

- Notifications were highest in April (10 cases) and May (9 cases).

## Notification rate per 100,000 population by year, 2010 – 2019, NSW



## Notification rate per 100,000 population by age category and sex, 2019, NSW



## Number of cases and rates (per 100,000) by Local Health District, 2019, NSW

LHD	Count		Rate/100,000	
	2019	5yr mean	2019	5yr mean
CC	0	4.6	0.0	1.4
FW	0	0.2	0.0	0.7
HNE	12	16.4	1.3	1.8
IS	2	3.4	0.5	0.8
M	0	3.6	0.0	1.2
MNC	12	27.4	5.3	12.6
NBM	1	1.6	0.3	0.4
NNSW	30	43.8	9.7	14.7
NS	2	0.8	0.2	0.1
SES	0	1.2	0.0	0.1
SNSW	2	5.8	0.9	2.8
SWS	0	0.8	0.0	0.1
SYD	0	1.0	0.0	0.2
WNSW	2	4.6	0.7	1.6
WS	0	0.2	0.0	0.0
NSW	63	99.6	0.8	1.3

# Barmah Forest virus – continued

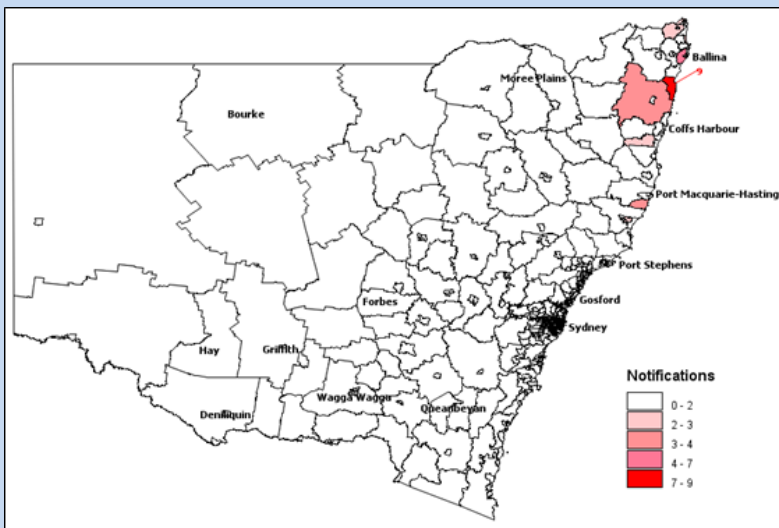
## Place of acquisition

Place of residence is used as a surrogate for place of acquisition for BFV infection. Most cases were reported from residents of coastal regions.

The highest numbers of BFV notifications were again in the Northern NSW LHD, particularly the Maclean-Yamba-Iluka and Ballina regions. The highest population incidence rates were for residents in the Maclean-Yamba-Iluka and Bellingen regions.

## Barmah Forest virus notifications by Statistical Area-2 (SA2) district, 2019, NSW.

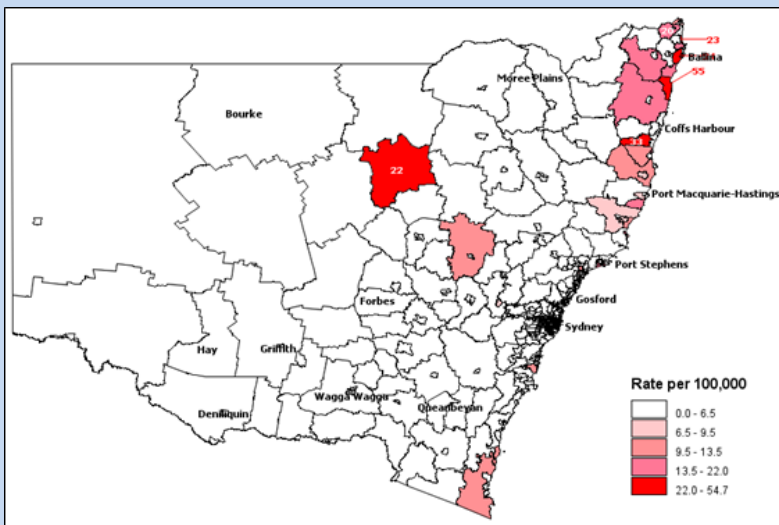
**BFV notifications by Statistical Area-2 (SA2) district, 2019, NSW**



**Number of cases and rates (per 100,000) by Statistical Area-2 (SA2), 2019, NSW \***

Region (SA2)	Count	Rate/100,000
Maclean - Yamba - Iluka	9	54.7
Ballina Region	4	24.3
Laurieton - Bonny Hills	3	18.5
Grafton Region	3	19.6
Bellingen	2	33.1
Murwillumbah Region	2	20.2
Ballina	2	11.7
Brunswick Heads - Ocean Shores	2	23.5
Taree	2	9.5
Tweed Heads	2	10.4

**BFV notification rates per 100,000 population by Statistical Area-2 (SA2) district, 2019, NSW**



\* Data presented for the 10 regions with two or more BFV notifications in 2019. There were 32 other regions with one BFV case.

# CHIKUNGUNYA VIRUS

Chikungunya virus (CHIKV) is an alphavirus, the same genus as Ross River virus, Barmah Forest virus and Sindbis virus. CHIKV infections occur in many parts of Africa and Asia, including many areas where dengue is also common.

CHIKV is transmitted by the bite of an infected *Aedes* spp. mosquito, predominantly *Ae. aegypti* and *Ae. albopictus*. While there have been no reports of chikungunya virus acquired in Australia, transmission remains a risk in parts of north Queensland where transmission-competent mosquitoes circulate.

## Summary 2019

- Case count: 32
- Notification rate: 0.4 per 100,000 population
- Major source country: India (34%)

## Overall trend:

- Notifications increased after a fall in 2018 (15 cases) but were still lower than the 2017 peak (47 cases).
- India was again the major source of infections in 2019, followed by Thailand and Myanmar.

## Groups with highest notification rates in 2019

- Age: 30-39 years – 0.9 per 100,000 (32% of cases)
- Sex: Male – 0.4 per 100,000 (52% of cases)
- Local health district: Western Sydney – 0.9 per 100,000 (28% of cases)

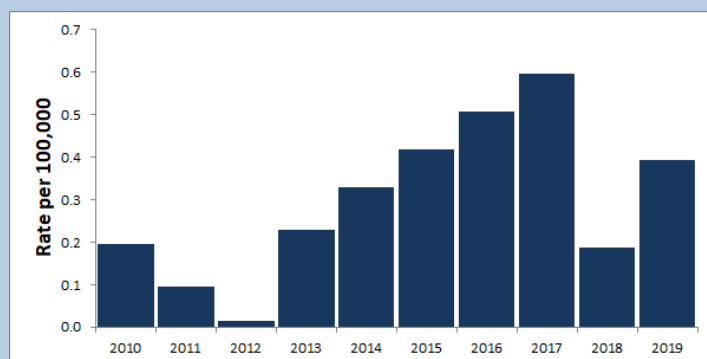
## Seasonality

- Cases peaked during the Spring months, likely corresponding to the increased risk of infection for travellers during or just after the hot, rainy season in endemic countries of the Northern Hemisphere.

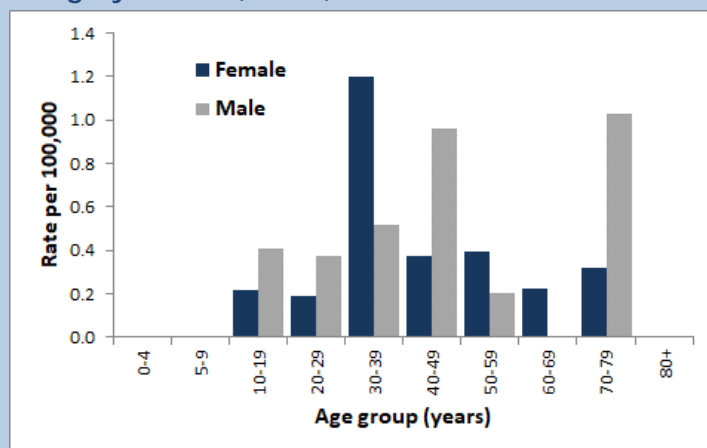
## Place of acquisition in 2019

- India (34%)

Notification rate per 100,000 population, by year, 2010 – 2019, NSW



Notification rate per 100,000 population by age category and sex, 2019, NSW



Number of cases and rate (per 100,000) by Local Health District, 2019, NSW

LHD	Count		Rate	
	2019	5yr mean	2019	5yr mean
CC	2	0.8	0.6	0.2
FW	0	0.0	0.0	0.0
HNE	2	0.8	0.2	0.1
IS	2	1.2	0.5	0.3
M	1	0.0	0.3	0.0
MNC	0	0.4	0.0	0.2
NBM	1	1.0	0.3	0.3
NNSW	0	0.8	0.0	0.3
NS	6	3.4	0.6	0.4
SES	4	4.6	0.4	0.5
SNSW	1	1.0	0.5	0.5
SWS	0	4.4	0.0	0.5
SYD	4	4.4	0.6	0.7
WNSW	0	0.4	0.0	0.1
WS	9	9.8	0.9	1.0
NSW	32	31.6	0.4	0.4



## Chikungunya – continued

### Place of acquisition

Over a third of notified Chikungunya cases were acquired in India (11 cases), followed by Thailand (9 cases) and Myanmar (5 cases).

There were no locally acquired cases of chikungunya in 2019.

### Number of cases of chikungunya by country of acquisition, 2019, NSW.

Country of acquisition	Total	% Total
India	11	34.4%
Thailand	9	28.1%
Myanmar	5	15.6%
Indonesia	2	6.3%
Brazil	1	3.1%
Maldives	1	3.1%
Mauritius	1	3.1%
Philippines	1	3.1%
Sri Lanka	1	3.1%
Total	32	

# DENGUE VIRUS

Dengue virus (DENV) is a flavivirus. Four serotypes of dengue viruses have been described - dengue 1, 2, 3 and 4. Each of the 4 serotypes is capable of causing the full spectrum of clinical manifestations following DENV infection. Humans and non-human primates are reservoirs for the virus and maintain it in limited forest settings of Asia, Africa, and the Americas. Periodic dengue outbreaks in Pacific Islands and Territories also put NSW travellers at risk.

Transmission is via the bite of an infective female mosquito, principally *Aedes aegypti*. This is a highly domesticated urban mosquito found in countries of the tropics and subtropics. In Australia, this mosquito is currently confined to parts of northern Queensland. *Ae. aegypti* is a day-biting species, with increased biting activity in the few hours after sunrise and before sunset. Humans are the preferred source of blood. *Ae. albopictus* can also transmit DENV.

## Summary 2019

- Case count: 465
- Notification rate: 5.7 per 100,000 population
- Most common country acquired: Indonesia

## Overall trend:

- A 61% increase in notifications compared to 2018 (288 cases) and a notification rate well above the 5-year mean
- DENV-2 remained the most common serotype, linked to 38% of cases where serotype information was available.

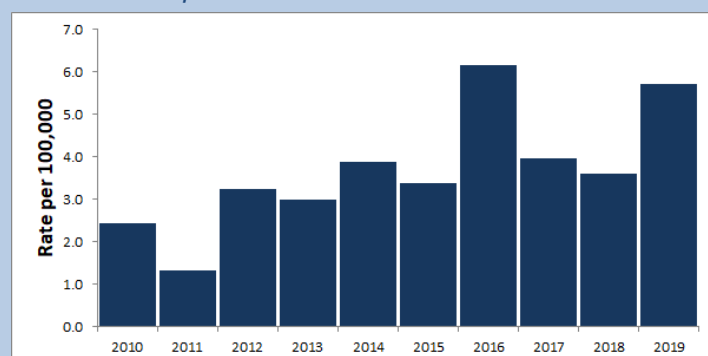
## Groups with highest notification rates in 2019

- Age: 30-39 years– 9.3 per 100,000 (24% of cases)
- Sex: Male – 6.0 per 100,000 (52.3% of cases)
- Local health district:  
Western Sydney – 9.4 per 100,000 (21% of cases)  
South Eastern Sydney – 9.5 per 100,000 (20% of cases)

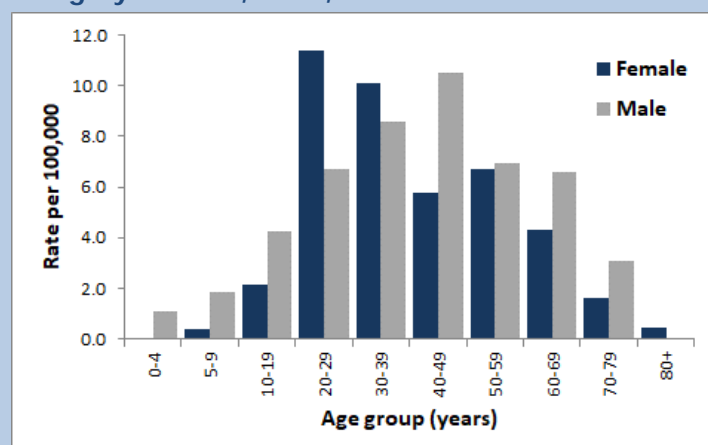
## Place of acquisition in 2019

- Indonesia – 21.5% of cases
- Thailand – 15.3% of cases

Notification rate per 100,000 population by year, 2010 – 2019, NSW



Notification rate per 100,000 population by age category and sex, 2019, NSW



Number of cases and rates (per 100,000) by Local Health District, 2019, NSW

LHD	Count		Rate	
	2019	5yr mean	2019	5yr mean
CC	14	20.8	4.0	6.2
FW	1	0.0	3.3	0.0
HNE	36	25.8	3.8	2.8
IS	24	22.4	5.7	5.5
M	8	7.2	2.7	2.5
MNC	5	7.2	2.2	3.3
NBM	22	9.0	5.7	2.4
NNSW	19	27.4	6.2	9.2
NS	58	53.4	6.1	5.8
SES	91	69.2	9.5	7.5
SNSW	13	6.6	6.0	3.2
SWS	29	20.6	2.8	2.1
SYD	41	25.8	5.9	3.9
WNSW	6	5.2	2.1	1.9
WS	98	55.8	9.4	5.8
NSW	465	324.6	5.7	4.2

## Dengue virus – continued

### Place of acquisition and serotypes

Indonesia and Thailand were the most common source countries for dengue infection in 2019, followed by India and Fiji. There were no locally acquired cases of DENV in 2019, and no cases imported from other parts of Australia.

Dengue serotyping was available for 11.4% of cases. Dengue serotype 2 (DENV-2) remained the most common serotype reported, accounting for 4.3% of cases overall, and 37.7% of the cases where serotype was available.

### Number of cases of DENV infection by country of acquisition and serotype, 2019, NSW.

County of acquisition	Dengue serotype					Total	% Total
	DENV-1	DENV-2	DENV-3	DENV-4	UNK#		
Bangladesh	0	0	0	0	12	12	2.6%
Brazil	0	1	0	1	2	4	0.9%
Cambodia	1	0	0	0	10	11	2.4%
Cook Islands	0	0	0	0	2	2	0.4%
Cuba	0	0	0	0	2	2	0.4%
Fiji	5	1	0	0	55	61	13.1%
French Polynesia	0	0	0	0	1	1	0.2%
India	1	3	4	1	52	61	13.1%
Indonesia	2	2	3	8	85	100	21.5%
Malaysia	1	1	0	0	13	15	3.2%
Maldives	0	0	0	0	6	6	1.3%
Marshall Islands	0	0	0	0	1	1	0.2%
Mexico	0	0	0	0	4	4	0.9%
Myanmar	0	0	0	0	2	2	0.4%
Nepal	0	2	0	0	6	8	1.7%
New Caledonia	0	1	0	0	4	5	1.1%
Pakistan	0	0	0	0	5	5	1.1%
Papua New Guinea	0	0	0	0	4	4	0.9%
Philippines	0	0	1	0	26	27	5.8%
Polynesia (NEC*)	0	0	0	0	1	1	0.2%
Samoa	0	0	0	0	1	1	0.2%
Singapore	0	0	0	0	3	3	0.6%
Solomon Islands	0	0	0	0	2	2	0.4%
South-East Asia (NEC)*	1	0	0	0	1	2	0.4%
Sri Lanka	0	2	0	0	15	17	3.7%
Thailand	3	7	1	0	60	71	15.3%
Timor-Leste	0	0	0	0	5	5	1.1%
Tuvalu	0	0	0	0	1	1	0.2%
Unknown	0	0	0	0	4	4	0.9%
Vanuatu	0	0	0	0	1	1	0.2%
Vietnam	0	0	0	0	26	26	5.6%
<b>Total (% of all cases)</b>	<b>14 (3.0%)</b>	<b>20 (4.3%)</b>	<b>9 (1.9%)</b>	<b>10 (2.2%)</b>	<b>412 (88.6%)</b>	<b>465</b>	

# UNK – unknown; \* NEC – not elsewhere coded, >1 possible exposure country reported.

# MALARIA

Malaria is an infection of the liver and red blood cells caused by microscopic protozoan parasites of the *Plasmodium* type. There are five species of parasites that cause malaria: *P. falciparum*, *P. ovale*, *P. malariae*, *P. vivax* and, rarely, *P. knowlesi*. Malaria due to *P. falciparum* is associated with more severe symptoms and most fatal cases.

Malaria parasites are spread through the bite of infective *Anopheles* mosquitoes. There are no competent vectors of malaria known to occur in NSW. Effective chemoprophylaxis is available for travellers to protect against malaria.

Travellers are at risk of malaria when travelling without appropriate protection in malaria-endemic parts of tropical and subtropical areas of Asia, Africa, Central and South America, some Pacific Islands and parts of the Middle East.

## Summary 2019

- Case count: 68
- Notification rate: 0.8 per 100,000 population

## Overall trend:

- A similar number of notifications to the previous two years and a similar notification rate to the 5-year mean.

## Malaria species

- 54% *P. falciparum*, 33% *P. vivax*, where species known.

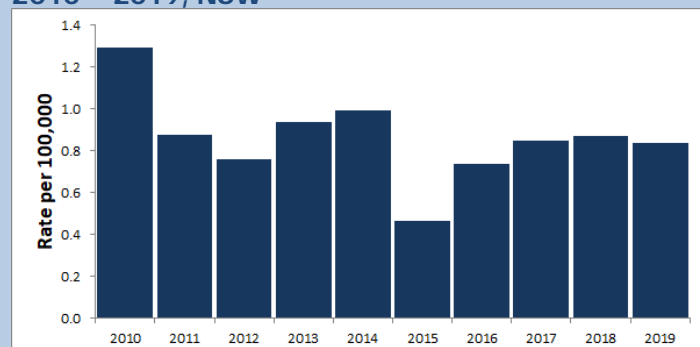
## Groups with highest notification rates in 2019

- Age: 30-39 years – 1.6 per 100,000 (28% of cases)
- Sex: Male – 1.2 per 100,000 (69% of cases)
- Local health district:
  - Western Sydney – 1.2 per 100,000 (19% of cases)
  - South Western Sydney – 1.0 per 100,000 (15% of cases).

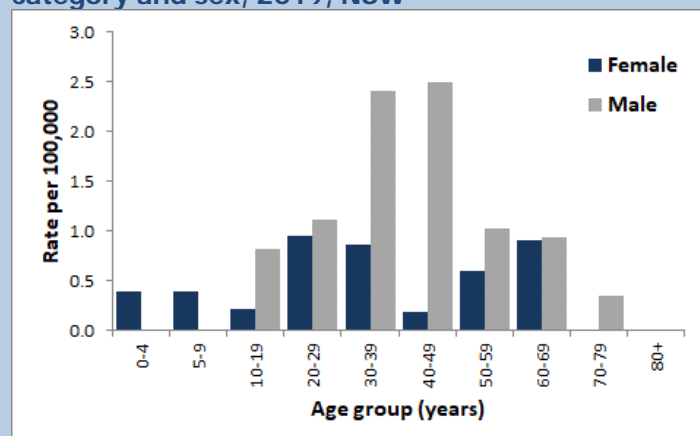
## Place of acquisition in 2019

- Papua New Guinea (19% of cases), India (13% of cases)
- Africa – 60% of cases acquired in African countries, including 88% of *P. falciparum* cases.

Notification rate per 100,000 population by year, 2010 – 2019, NSW



Notification rate per 100,000 population by age category and sex, 2019, NSW



Number of cases and rates (per 100,000) by Local Health District, 2019, NSW

LHD	Count		Rate	
	2019	5yr mean	2019	5yr mean
CC	1	1.2	0.3	0.4
FW	0	0.2	0.0	0.7
HNE	5	3.2	0.5	0.3
IS	5	4.0	1.2	1.0
M	5	3.6	1.7	1.2
MNC	2	2.8	0.9	1.3
NBM	4	2.2	1.0	0.6
NNSW	2	2.4	0.6	0.8
NS	4	2.8	0.4	0.3
SES	4	5.2	0.4	0.6
SNSW	2	1.6	0.9	0.8
SWS	10	5.2	1.0	0.5
SYD	8	7.6	1.2	1.2
WNSW	3	1.8	1.1	0.6
WS	13	21.4	1.2	2.2
NSW	68	60.6	0.8	0.8

## Malaria – continued

### Place of acquisition

Papua New Guinea was the most common source country for malaria cases notified in 2019 (19.1%) followed by India (13.2%). However, countries in Africa collectively accounted for most of the remaining cases (60.3%).

There were no locally acquired cases of malaria in 2019.

### Malaria species

*P. falciparum* was the again most common species identified, accounting for 54% of cases where species information was available, followed by *P. vivax* (33%). All but four of the 34 *P. falciparum* cases were acquired in countries in Africa while most of the *P. vivax* was the most common species for cases acquired in Papua New Guinea or India.

### Number of cases of malaria by country of acquisition and species, 2019, NSW.

County of acquisition	Malaria species					Total	% Total
	<i>P. falciparum</i>	<i>P. malariae</i>	<i>P. ovale</i>	<i>P. vivax</i>	UK#		
Angola	1	0	0	0	0	1	1.5%
Botswana	0	1	0	0	0	1	1.5%
Burkina Faso	3	0	0	0	0	3	4.4%
Burundi	1	0	0	0	0	1	1.5%
Cameroon	1	0	0	0	2	3	4.4%
Congo, Democratic Republic of	4	0	0	0	0	4	5.9%
Guinea	2	0	3	0	0	5	7.4%
India	1	1	0	7	0	9	13.2%
Indonesia	0	0	0	1	0	1	1.5%
Kenya	2	0	0	0	0	2	2.9%
Liberia	1	0	0	0	0	1	1.5%
Malawi	1	0	0	0	0	1	1.5%
Nigeria	3	0	1	0	1	5	7.4%
Papua New Guinea	2	0	0	10	1	13	19.1%
Sierra Leone	3	0	0	0	0	3	4.4%
Solomon Islands	1	0	0	2	0	3	4.4%
South Sudan	0	0	0	0	1	1	1.5%
South-East Asia (NEC)*	0	0	0	1	0	1	1.5%
Sudan	3	0	1	0	0	4	5.9%
Tanzania	1	0	0	0	0	1	1.5%
Uganda	4	0	1	0	0	5	7.4%
Total (% of all cases)	34 (50.0%)	2 (2.9%)	6 (8.8%)	21 (30.9%)	5 (7.4%)	68	

# UK – unknown; \* NEC – not elsewhere coded, >1 possible exposure country reported.

# ROSS RIVER VIRUS

Ross River virus (RRV) infection is a vector-borne disease which is endemic in many parts of NSW. Infection rates are generally highest in the summer and autumn months. Cases are usually only followed up if they are believed to have been acquired in a non-endemic area.

As with BFV infection, the major mosquito vector for RRV in inland areas is *Culex annulirostris* which breeds in freshwater habitats. RRV transmission in coastal areas is most commonly due to saltmarsh mosquitoes, including a number of *Aedes* species.

Some marsupials are a natural reservoir for RRV and are likely to be important in the circulation of RRV that includes sporadic transmission to humans.

## Summary 2019

- Case count: 569
- Notification rate: 7.0 per 100,000 population

## Overall trend:

- RRV notifications remained steady compared 2017 (572 cases)
- The 2018-2019 RRV season was moderate overall, with peak activity in Autumn and with residents of endemic coastal areas most affected, along with people living near rivers and wetlands.

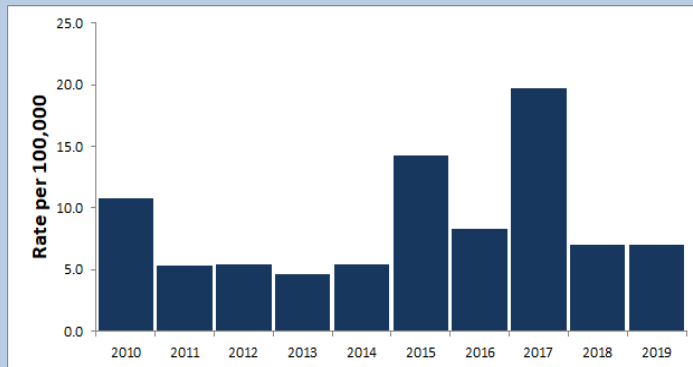
## Groups with highest notification rates in 2019

- Age: 60-69 years – 11.4 per 100,000 (19% of cases)
- Sex: Male – 7.4 per 100,000 (52% of cases)
- Local health district:
  - Northern NSW – 24.3 per 100,000 (13.2% of cases)
  - Hunter New England – 16.8 per 100,000 (27.9% of cases)

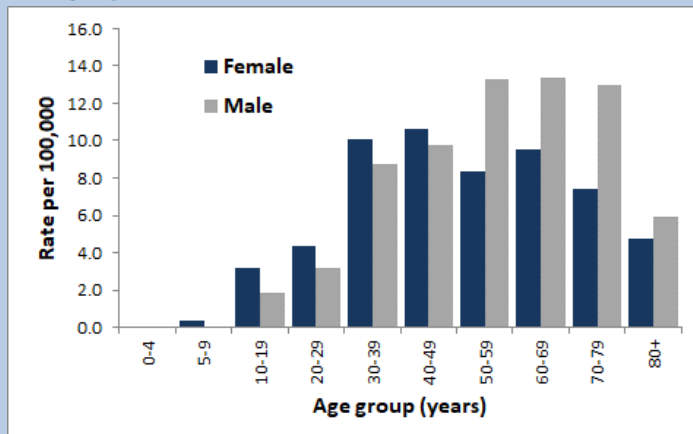
## Seasonality

- Notifications peaked in the Autumn months, following the typical case curve.

Notification rate per 100,000 population by year, 2010 – 2019, NSW



Notification rate per 100,000 population by age category and sex, 2019, NSW



Number of cases and rates (per 100,000) by Local Health District (LHD), 2019, NSW

LHD	Count		Rate	
	2019	5yr mean	2019	5yr mean
CC	36	41.0	10.3	12.1
FW	11	22.4	36.5	74.6
HNE	159	250.4	16.8	27.3
IS	23	23.0	5.5	5.7
M	50	158.8	16.8	54.1
MNC	57	104.0	25.4	47.8
NBM	7	26.4	1.8	7.1
NNSW	75	166.8	24.3	55.8
NS	24	26.2	2.5	2.9
SES	7	18.2	0.7	2.0
SNSW	26	24.6	12.1	11.9
SWS	6	10.0	0.6	1.0
SYD	6	7.0	0.9	1.1
WNSW	67	108.8	23.6	38.8
WS	15	12.0	1.4	1.2
NSW	569	848.8	7.0	10.9

# Ross River virus – continued

## Place of acquisition

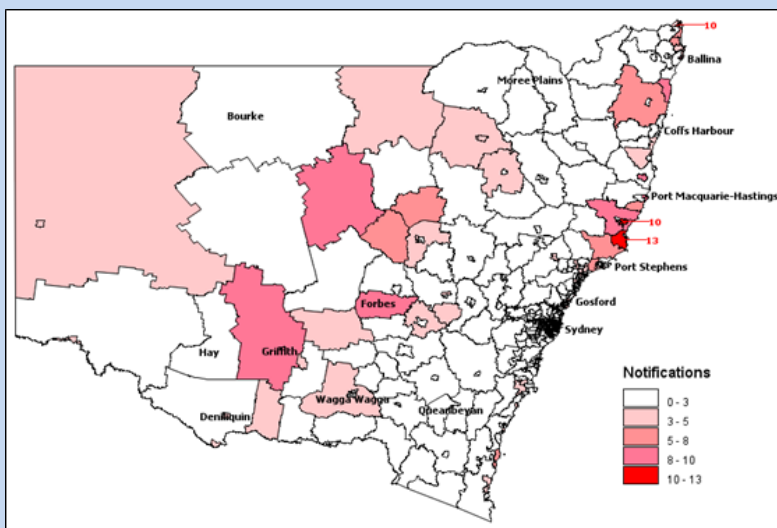
Place of residence is usually used as a surrogate for place of acquisition for Ross River virus infection, but some cases are actively followed up to determine the most likely source of acquisition, particularly when they live in areas not known to be endemic for RRV.

The highest numbers of RRV notifications were for residents of the Forster-Tuncurry, Taree and Tweed Heads regions. The highest population incidence rates were for residents in the Forster-Tuncurry, Nyngan - Warren, and Bulahdelah - Stroud regions.

Six of the cases were believed to have acquired their infections outside of NSW; four in other Australian states or territories, with single cases believed to have been acquired in Samoa and Vanuatu.

## Ross River virus notifications by Statistical Area-2 (SA2) district, 2019, NSW.

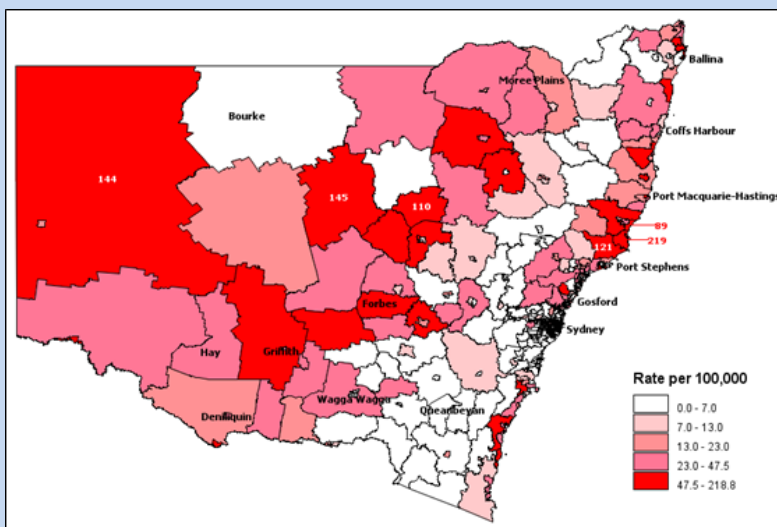
RRV notifications by Statistical Area-2 (SA2) district, 2019, NSW



Number of cases and rates (per 100,000) by Statistical Area-2 (SA2), 2019, NSW \*

Region (SA2)	Count	Rate/100,000
Forster-Tuncurry Region	13	218.8
Taree	10	47.5
Tweed Heads - South	10	36.1
Taree Region	9	73.5
Ballina	9	52.7
Griffith (NSW)	9	47.2
Old Bar - Manning Point - Red Head	9	88.7
Forbes	8	76.8
Macleay - Yamba - Iluka	8	48.6
Kempsey	8	53.6
Griffith Region	8	60.6
Nyngan - Warren	8	145.3
Port Macquarie - West	8	50.0
Port Macquarie - East	8	28.1
Pottsville	6	45.2
Bulahdelah - Stroud	6	120.7
Grafton Region	6	39.2
Narooma - Bermagui	6	67.3
Williamstown - Medowie - Karuah	5	37.3
Forster	5	34.5
Narromine	5	71.9
Mullumbimby	5	66.0
Gilgandra	5	109.6
Chittaway Bay - Tumby Umbi	5	31.0
Laurieton - Bonny Hills	5	30.9

RRV notification rates per 100,000 population by Statistical Area-2 (SA2) district, 2019, NSW



\* Data presented for the 25 regions with 5 or more RRV notifications in 2019.

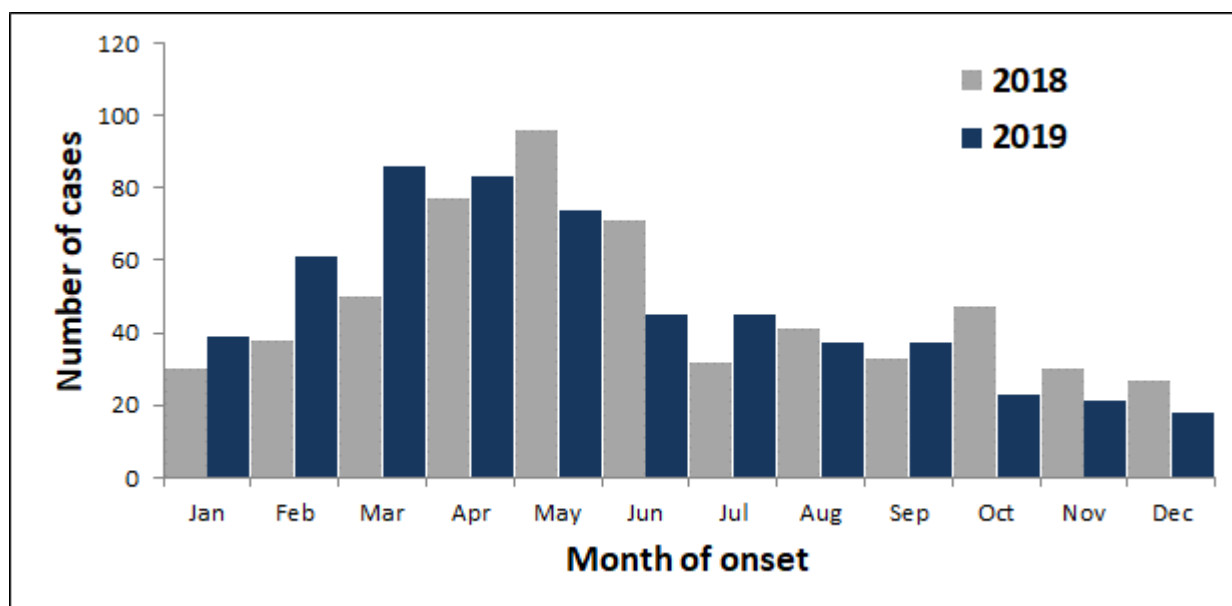
## Ross River virus – continued

### Month of acquisition

Notifications peaked in March (86 cases) and followed a typical pattern of notifications. There were no marked variations seen in the timing of RRV activity between residents of coastal and inland regions of NSW known to have endemic RRV activity.

RRV notifications received during the winter months when there is little mosquito activity are assumed to mostly represent serological detections of infections from earlier in the year.

### Number of RRV cases by month of onset, 2019 compared to 2018, NSW.





# ZIKA VIRUS

Zika virus (ZIKV) is a flavivirus, closely related to dengue virus. It was first isolated in 1947 in Uganda's Zika forest. There are two distinct ZIKV lineages: the African lineage and the Asian lineage, the latter of which has emerged more recently in the Pacific and the Americas.

The first outbreak of ZIKV infection identified outside of Africa and Asia, occurred on Yap Island, FSM in 2007. In 2015, ZIKV emerged in South America with widespread outbreaks reported initially in Brazil and Columbia, with subsequent spread to many countries in South and Central America and the Caribbean.

Like dengue, transmission is principally via the bite of an infective *Aedes aegypti* mosquito. Maternal-foetal transmission of ZIKV has also been well documented with potentially serious consequences for the unborn child, including congenital abnormalities such as microcephaly. Sexual transmission of ZIKV is rare but well documented.

## Summary 2019

- Case count: 2
- Notification rate: 0.02 per 100,000 population
- Congenital case: 0

## Overall trend:

- Continuing low number of annual notifications after the peak in 2016 (32 cases).

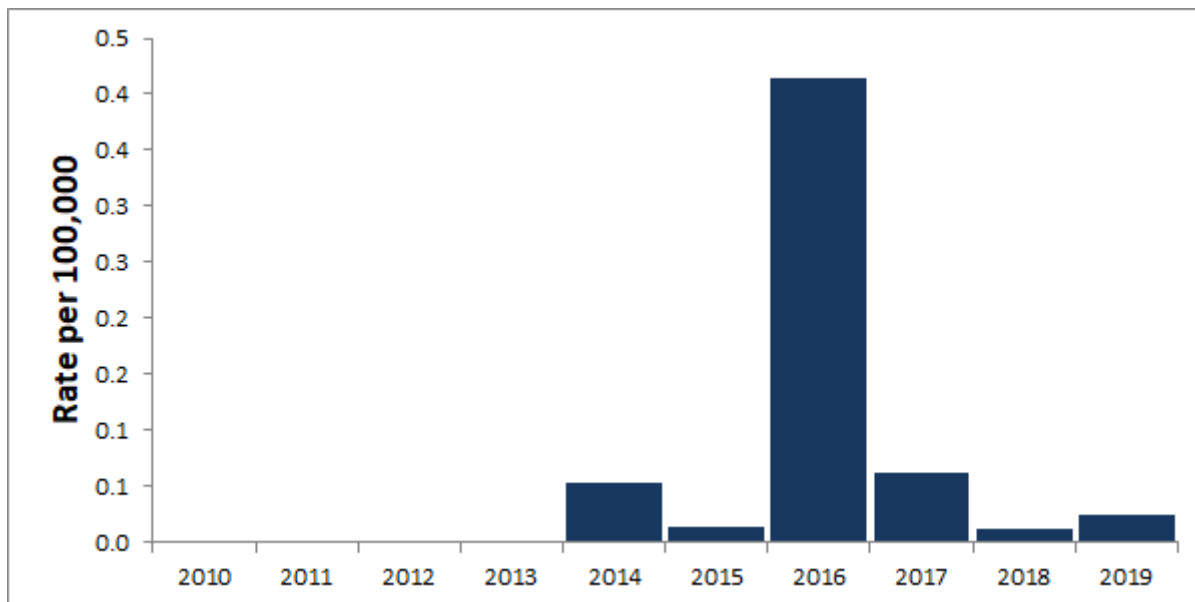
## Notifications in 2019

- Age: One case was in the 30-39-year-old age group and one case was in the 50-59-year-old age group.
- Sex: Both cases were female. Neither was pregnant at the time of infection.
- Local health district  
Northern NSW and Northern Sydney

## Place of acquisition in 2019

- Indonesia; Thailand.

## Notification rate per 100,000 population by year, 2010 – 2019, NSW



# METHODS

The data in this report are derived from disease surveillance and outbreak investigation activities undertaken by staff from NSW public health units and Communicable Diseases Branch. The management of human vector-borne disease surveillance in NSW is the shared responsibility of NSW public health units, and both Communicable Diseases Branch and Environmental Health Branch<sup>3</sup> of Health Protection NSW.

## Notifiable vector-borne diseases in NSW

Under the Public Health Act 2010 (NSW), all arboviral infections are notifiable in NSW. Other notifiable vector-borne diseases are malaria and epidemic typhus. NSW laboratories report cases to NSW public health units. Notifiable disease data are routinely entered by public health unit staff into the NSW Notifiable Conditions Information Management System (NCIMS).<sup>4</sup>

## Data sources for this report

Data in this report has been extracted from NCIMS held by Health Protection NSW.

## Analysis

We analysed data for all notifiable vector-borne infections for NSW residents. In June 2020, the notification data for the 2019 calendar year were extracted from NCIMS using Secure Analytics for Population Health Research and Intelligence (SaPHARi) and based on the actual or calculated date of onset of disease. The count of notifications of each notifiable vector-borne disease for 2019 was then used to calculate crude annual incidence ('notification') rates for each disease based upon the NSW estimated resident population at 30 June 2019.<sup>5</sup> Mean annual notification counts and incidence rates for the five year period 2014-2018 were also calculated for comparison with the 2019 data.

Notification maps of BFV and RRV infection by ABS statistical area level 2 (SA2) of residence for 2019 are shown. Place of residence is used as a surrogate for place of acquisition, but the infection may have actually been acquired elsewhere (e.g. while visiting endemic regions).

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3. Environmental Health Branch auspices the NSW mosquito and sentinel chicken surveillance for vector-borne arboviruses which is coordinated by the Medical Entomology Department, CIDMLS, ICPMR, Pathology West. For surveillance reports see: [www.health.nsw.gov.au/environment/pests/vector/Pages/surveillance.aspx](http://www.health.nsw.gov.au/environment/pests/vector/Pages/surveillance.aspx).

4. NSW Health Notifiable Conditions Information Management System (NCIMS), Communicable Diseases Branch and Centre for Epidemiology and Evidence, NSW Ministry of Health

5. Notifications per 100,000 estimated resident population based on ABS 2016 Census counts. Population projections by the Centre for Epidemiology and Evidence, NSW Ministry of Health, based on data from the NSW Department of Planning and Environment.

# VBD RESOURCES

## NSW Health Human VBD fact sheets

- Barmah Forest virus  
[https://www.health.nsw.gov.au/Infectious/factsheets/Pages/barmah\\_forest\\_virus\\_infection.aspx](https://www.health.nsw.gov.au/Infectious/factsheets/Pages/barmah_forest_virus_infection.aspx)
- Chikungunya virus  
<https://www.health.nsw.gov.au/Infectious/factsheets/Pages/chikungunya.aspx>
- Dengue virus  
<https://www.health.nsw.gov.au/Infectious/factsheets/Pages/dengue.aspx>
- Japanese encephalitis virus  
[https://www.health.nsw.gov.au/Infectious/factsheets/Pages/japanese\\_encephalitis.aspx](https://www.health.nsw.gov.au/Infectious/factsheets/Pages/japanese_encephalitis.aspx)
- Kunjin virus  
[https://www.health.nsw.gov.au/Infectious/factsheets/Pages/kunjin\\_virus.aspx](https://www.health.nsw.gov.au/Infectious/factsheets/Pages/kunjin_virus.aspx)
- Lyme borreliosis  
[https://www.health.nsw.gov.au/Infectious/factsheets/Pages/Lyme\\_disease.aspx](https://www.health.nsw.gov.au/Infectious/factsheets/Pages/Lyme_disease.aspx)
- Malaria  
<https://www.health.nsw.gov.au/Infectious/factsheets/Pages/malaria.aspx>
- Murray Valley encephalitis virus
- Ross River virus  
<https://www.health.nsw.gov.au/Infectious/factsheets/Pages/ross-river-fever.aspx>
- Zika virus  
<https://www.health.nsw.gov.au/Infectious/factsheets/Pages/zika-virus-infection.aspx>
- Mosquitoes are a health hazard  
<https://www.health.nsw.gov.au/Infectious/factsheets/Pages/mosquito.aspx>
- Staying healthy when travelling overseas  
<https://www.health.nsw.gov.au/Infectious/factsheets/Pages/staying-healthy-when-travelling-overseas.aspx>

## NSW Health Environmental VBD surveillance

(<https://www.health.nsw.gov.au/environment/pests/vector/Pages/surveillance.aspx> )

### Mosquito monitoring

In NSW, mosquito trapping and monitoring is undertaken by the Institute for Clinical Pathology and Medical Research (ICPMR) on behalf of Health Protection NSW. Mosquito populations are routinely monitored at up to 30 locations across the State from November to April to monitor mosquito types and densities that may indicate increased arboviral risk, and to test for the presence of clinically relevant alphaviruses and flaviviruses.

### Sentinel chicken surveillance

In NSW, sentinel chicken surveillance is undertaken by the Institute for Clinical Pathology and Medical Research (ICPMR) on behalf of the Health Protection NSW. Sentinel chicken flocks located at inland locations are bled weekly during the mosquito season (April – November) to detect the transmission of Murray Valley encephalitis virus and Kunjin virus.

### Environmental VBD resources

(<https://www.health.nsw.gov.au/environment/pests/vector/Pages/resources.aspx> )

Including *Fight the Bite* campaign posters and related factsheets.

# ACKNOWLEDGEMENTS

The NSW Vector-Borne Diseases Annual Report 2019 was possible due to the collaborative work of many people who contribute in varying capacities to the management of communicable enteric diseases in NSW, including the following:

- NSW public health unit staff for surveillance, reporting and investigation of unusual disease cases and outbreaks
- Public and private laboratories, supported by the NSW Arbovirus Reference Laboratory, CIDMLS, ICPMR, NSW Pathology.
- Communicable Diseases Branch staff at Health Protection NSW, NSW Health.
- Clinicians across NSW who assist in the diagnosis and follow up vector-borne diseases.