Mosquito-Borne Disease in New Zealand

This surveillance report presents information on how the health of New Zealanders is affected by exotic mosquito-borne diseases such as dengue fever and malaria between 2001 and 2021.

Key facts

- Mosquito-borne disease cases decreased in New Zealand in 2020 (74 cases) and 2021 (16 cases) after an average of 284 cases per year from 2015–2019.
- Pacific Island and African countries were common travel destinations for individuals returning to New Zealand with mosquito-borne diseases in 2021.
- There were no known cases contracted locally; all cases were caught overseas before returning to Aotearoa, New Zealand.
- Mosquito-borne disease rates were highest for males, and individuals aged 15-34.

Background information

Certain exotic diseases pose a greater risk to the public health of Aotearoa New Zealand because:

- individuals are not immune as the disease is not found naturally in New Zealand and no vaccines are readily available.
- they spread easily and are often difficult to identify.
- they can cause serious illness and can be difficult to treat.

High-risk exotic diseases include:

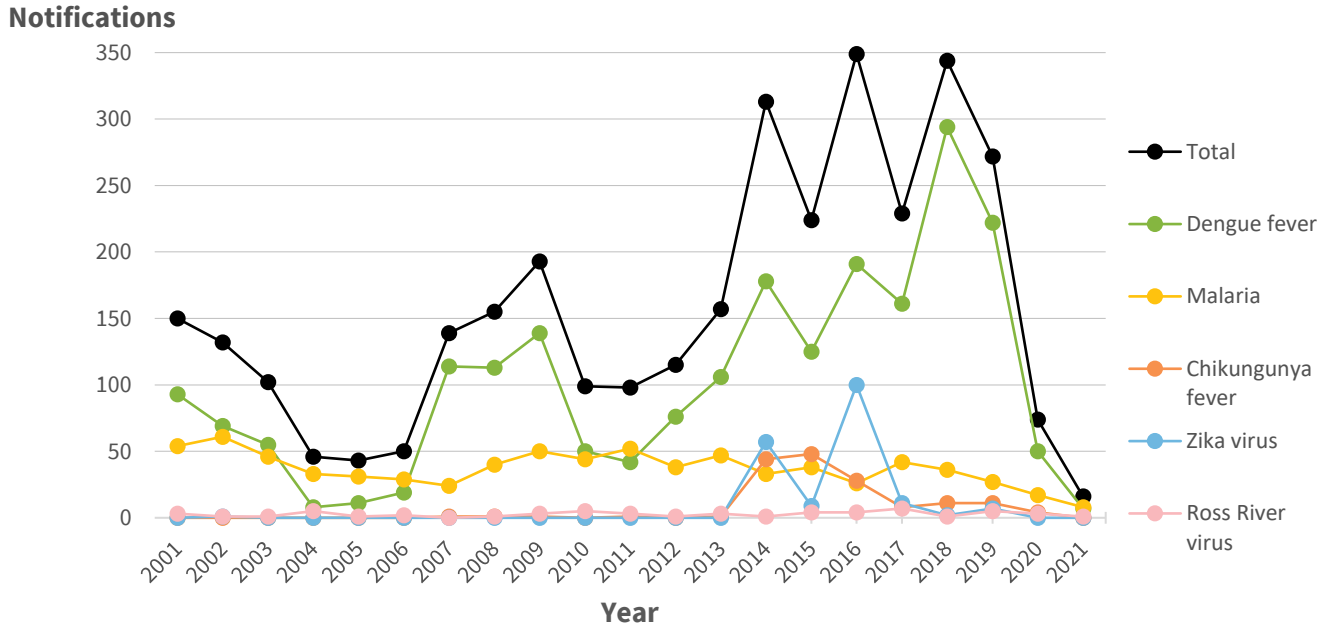
- vector-borne diseases, especially those spread by mosquitoes which cause chronic suffering and life-long morbidity and disability. These often have no or mild symptoms, often making it difficult to determine the true burden of disease (Duffy et al 2009).
- Public Health Emergency of International Concern diseases as classified by the World Health Organisation (see Overseas infectious diseases of concern for more information).
- Respiratory diseases can cause serious lung infections (eg, influenza, COVID-19).

Emerging and known international diseases of concern to New Zealand require ongoing monitoring and evaluation. This process reduces the risk associated with the ever-changing infectious disease environment seen globally (Bloom and Cadarette 2019).

COVID-19 travel restrictions cause mosquito-borne disease cases to plummet

In 2021, 16 cases of mosquito-borne disease (MBD) cases were reported in New Zealand. These included: two mosquito-borne viral diseases, seven cases of dengue fever and one case of Ross River fever, and one mosquito-borne parasitic disease, malaria (eight cases). In comparison, there were between 224-349 cases per year during 2014–19. (Figure 1). Prior to 2014 total MBD cases ranged from 44–193 cases per year, with the increase in 2014 linked to Zika, chikungunya and dengue outbreaks overseas.

Figure 1: Number of notifications of mosquito-borne diseases, 2001–2021



Source: ESR 2023

Of the 74 cases recorded in 2020, 46 occurred on or before 19 March, when New Zealand closed its borders to non-citizens/permanent residents and implemented quarantine for all arrivals (MoH 2021). According to Statistics NZ, international arrivals declined for most of 2020/21 (Statistics NZ 2023):

- **Q1–Q4 2019:** Between 1.5 and 2.0 million arrivals per quarter through air and seaports
- **Q1 2020:** 1.64 million arrivals
- **Q2 2020–Q1 2021:** <40,000 arrivals per quarter
- **Q2 of 2021:** 223,652 arrivals. Increase due to quarantine free travel for vaccinated people from Australia, Cook Islands and Niue (MBIE 2022)
- **Q3 2021:** 99,048 arrivals with travel from Australia suspended in July 2021 (MBIE 2022)
- **Q4 2021:** <40,000 arrivals.

Given the unprecedented nature of the 2020 and 2021 border health situation, these figures do not reflect normal disease and travel patterns. Given this, the rest of this report focuses on whether there were any changes during the 2020 and 2021 periods, as well as a more detailed analysis of 2017–19 to help understand patterns that may re-emerge in 2022.

All mosquito-borne disease cases acquired overseas

From 2019–21, all people diagnosed with a MBD were thought to have acquired it while travelling overseas (ESR 2023). Many cases had travelled to multiple countries, all of which are recorded in Table 1. It is often not possible to determine a specific country of origin when individuals have travelled to multiple countries, therefore all are counted.

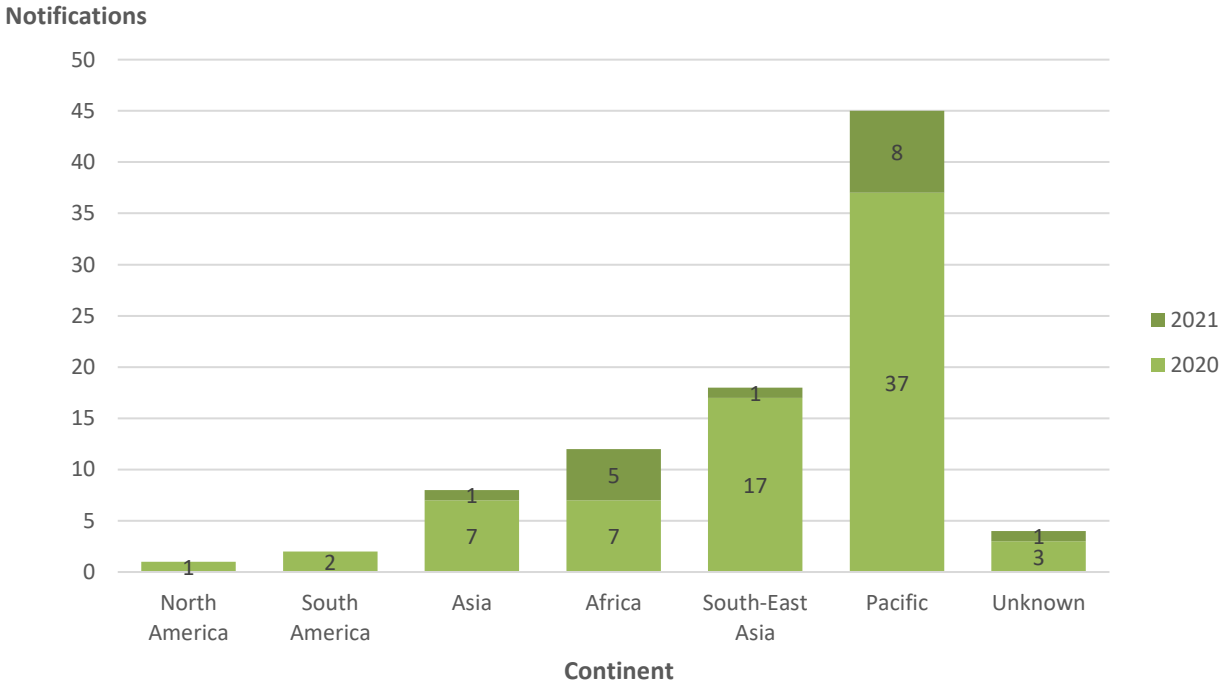
The most commonly visited countries prior to diagnosis were the Pacific Islands (141 in 2019, 37 in 2020, and 8 in 2021), followed by South-East Asia in 2019 (78 cases) and 2020 (17 cases), and Africa in 2021 (5 cases).

Dengue fever was the most commonly reported MBD over the three years. In 2021, six of the seven Dengue Fever cases had recently returned from the Cook Islands and the final Dengue Fever case had returned from Vanuatu. One Ross River Virus case was notified, with the individual having recently returned from Australia.

Of the eight malaria cases recorded in 2021, five had recently been travelling in Africa. Two cases were from Uganda, and one each from Zambia, Chad, and Central and West Africa. There was one case from Asia (India) and one from South-East Asia (Papua New Guinea). The origin was unknown for one case.

While the origin of these mosquito-borne diseases is not definite, these are the last countries visited by the individuals who were then diagnosed in New Zealand. Countries visited by New Zealanders prior to diagnosis with a mosquito-borne disease between 2019–21 are shown in Figure 2 (showing 2020–21) and Table 1 (showing 2019–21).

Figure 2: Locations visited by New Zealand travellers prior to diagnosis of a mosquito-borne disease, 2020–21



Source: ESR 2023

Table 1: Locations visited by New Zealand travellers prior to diagnosis of a mosquito-borne disease, 2019–21

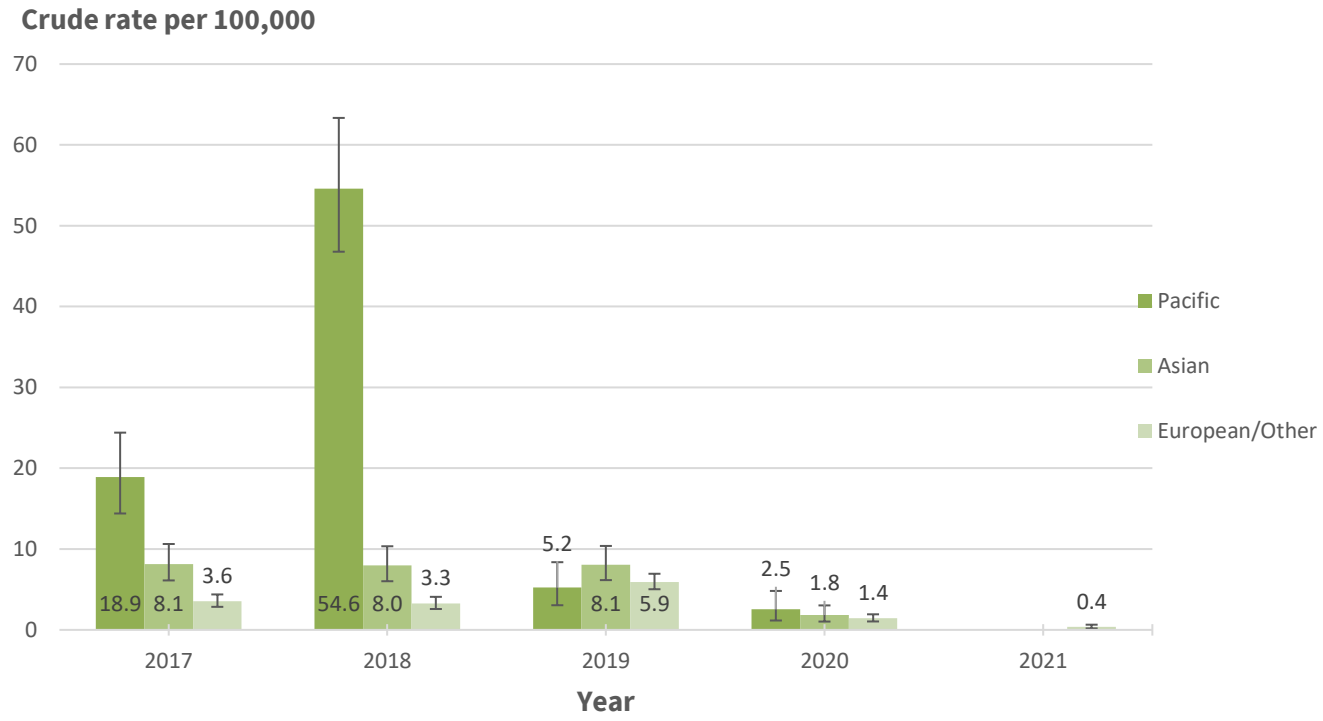
	Dengue			Malaria			Ross River Virus			Zika			Chikungunya			MBD Total		
	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
North America	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
South America	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
Asia	25	3	0	4	2	1	0	0	0	0	0	0	4	2	0	33	7	1
Africa	0	0	0	9	7	5	0	0	0	1	0	0	0	0	0	10	7	5
South-East Asia	65	11	0	6	4	1	1	0	0	2	0	0	4	2	0	78	17	1
Pacific	127	33	7	3	1	0	4	3	1	4	0	0	3	0	0	141	37	8
Unknown	1	0	0	5	3	0	0	0	1	0	0	0	0	0	0	6	3	1

Source: ESR 2023

Males and those aged 15-34 were most affected by MBD prior to 2020

Prior to 2020, Asian and Pacific peoples had considerably higher rates of mosquito-borne disease than Māori and European/Other ethnicities. Between 2018 and 2019, there was a large drop in the MBD notification rate for Pacific peoples (54.6 per 100,000 to 5.2 per 100,000), and this rate continued to drop in the following years (Figure 3). The rate of MBD notifications in Asian people remained relatively consistent from 2017 to 2019, before decreasing in 2020 (1.8 per 100,000). Rates were suppressed for Pacific (three cases) and Asian peoples (one case) in 2021 due to low counts.

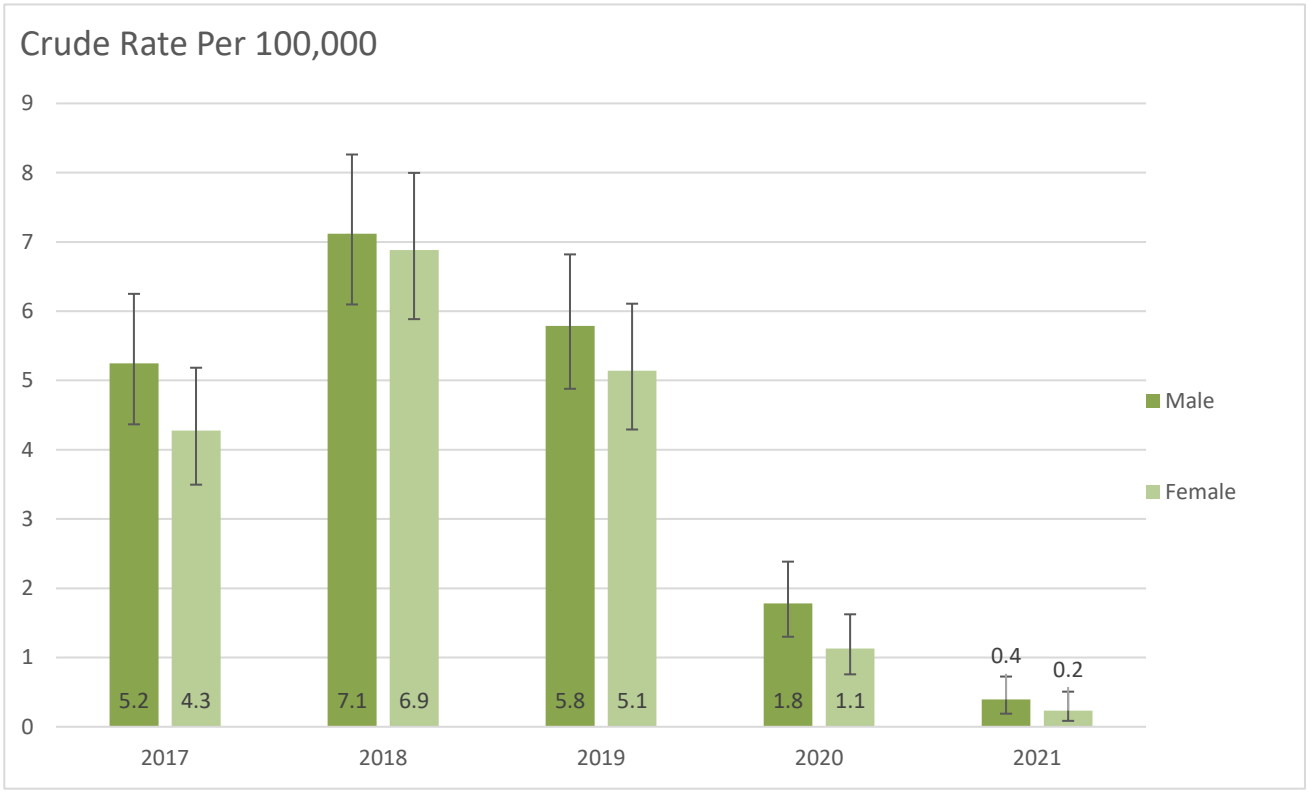
Figure 3: Rate of mosquito-borne disease notifications, by ethnicity, 2017–21



Note: 95% confidence intervals have been shown as error bars.
Source: ESR 2023

Rates of MBD in males have remained consistently above that of females. However, both the male and female rates have decreased over recent years. Males and females had rates of 7.1 and 6.9 per 100,000, respectively, in 2018, and 0.4 and 0.2 per 100,000, respectively, in 2021 (Figure 4).

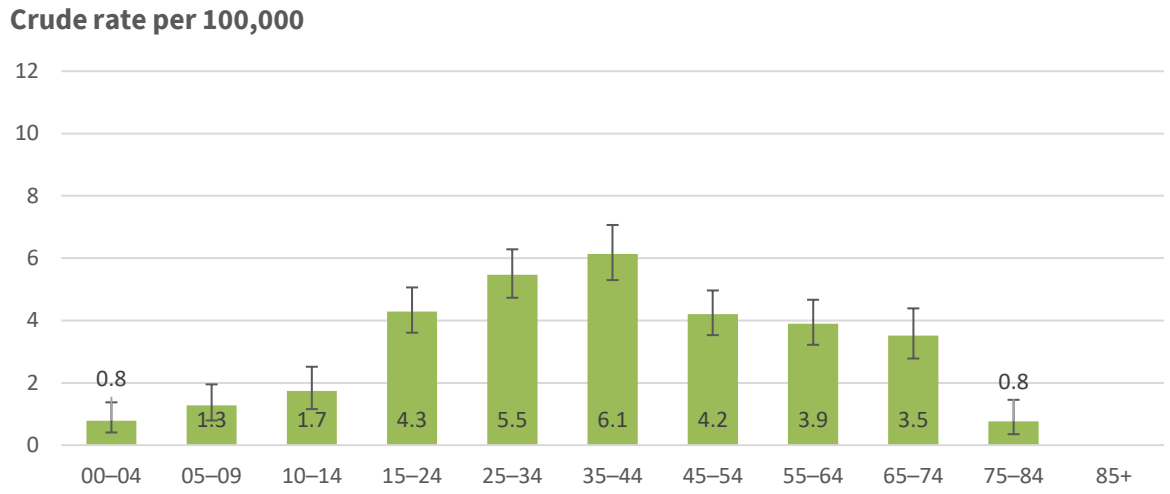
Figure 4: Rate of mosquito-borne disease notifications, by sex, 2017–21



Note: 95% confidence intervals have been presented as error bars.
Source: ESR 2023

In 2017–21, MBD rates were highest for those aged 15–24 and 25–34 years (5.5 and 6.1 per 100,000 respectively) (Figure 5). This is similar to previous years.

Figure 5: Rate of mosquito-borne disease notifications, by age group, 2017–21

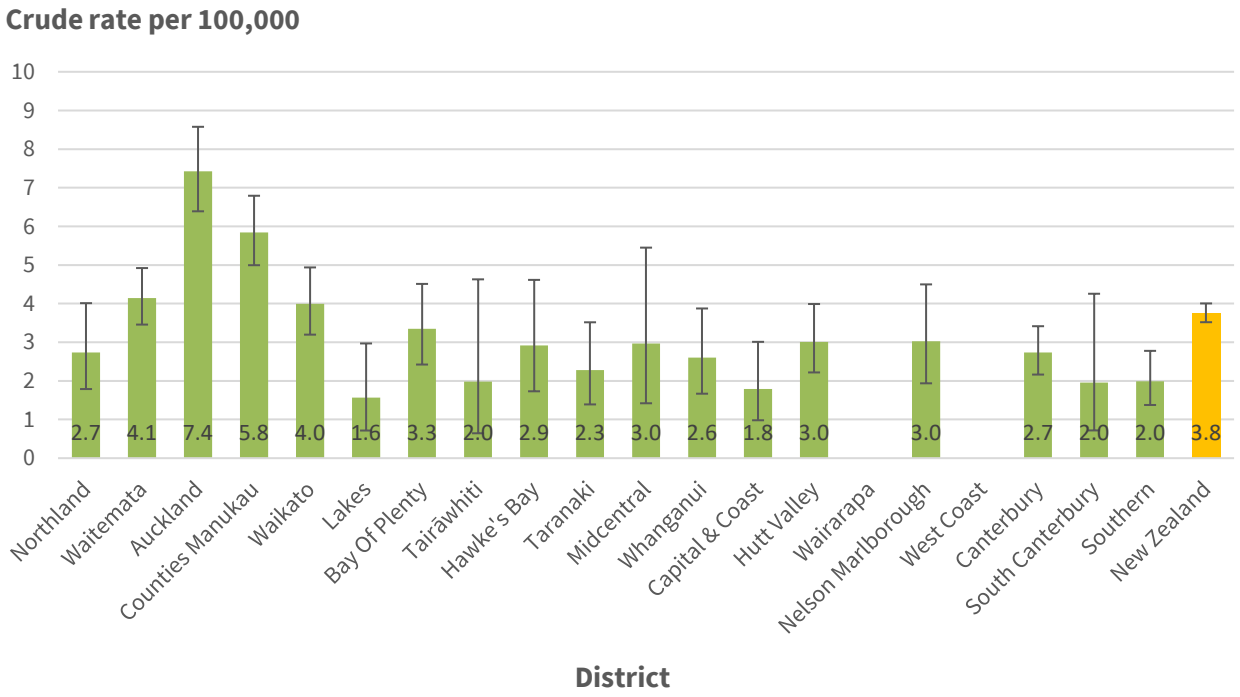


Note: 95% confidence intervals have been presented as error bars.
Source: ESR 2023

The North Island had higher rates of mosquito-borne disease

The Auckland district had the highest notification rate of mosquito-borne disease at 7.4 per 100,000 people during 2017–2021 (Figure 6). The districts with the next highest rates of MBD were Counties Manukau and Waikato, with 5.8 and 4.0 per 100,000 respectively. The rates for the Wairarapa and West Coast districts have been suppressed due to low case numbers.

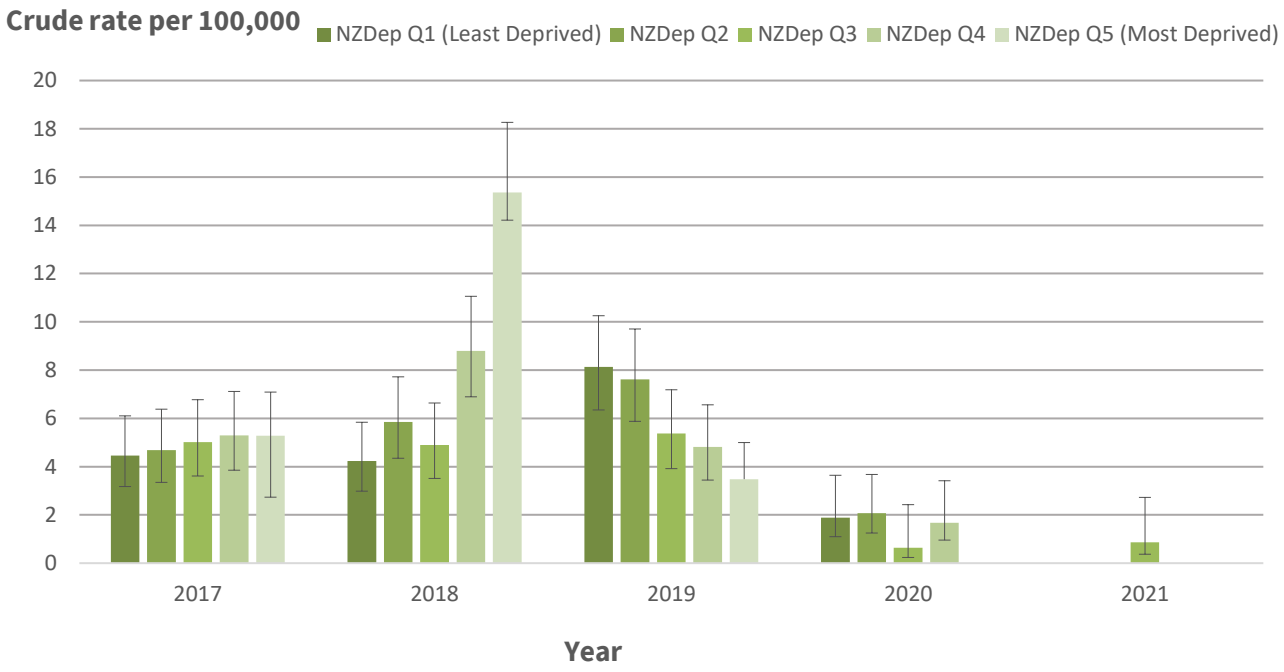
Figure 6: Rate of mosquito-borne disease notification, by district, 2017–2021



Note: The 95% confidence intervals have been presented as error bars.
Source: ESR 2023

With the exception of 2019 (and suppressed data from 2021), quintile 5 had the highest rates of mosquito-borne disease (Figure 7). Rates for other deprivation quintiles fluctuated moderately over time but all quintiles had relatively similar rates. 2018 showed the most disparity in rates among quintiles, marking an increase from 2017. In 2019, the incidence rate based on deprivation quintiles was highest in quintile 1 (least deprived), signalling a decrease across quintiles, with quintile 5 (most deprived) exhibiting the lowest rate.

Figure 7: Rate of mosquito-borne disease notifications, by deprivation quintile, 2017–2021



Note: The 95% confidence intervals have been presented as error bars. Low counts have been suppressed.
Source: ESR 2023

Data for this indicator

This indicator includes the most recent EpiSurv notifications data available, provided to EHINZ by ESR in April 2023.

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

All 95% confidence intervals have been presented as error bars on graphs.

For additional information, see the Metadata sheet.

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Citation

Environmental Health Intelligence. 2024. *Mosquito-borne disease in New Zealand*. [Surveillance Report]. Wellington: Environmental Health Intelligence NZ, Massey University.

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